Pacific City Joint Water-Sanitary Authority
Wastewater Master Plan

Prepared for
Pacific City Joint Water-Sanitary Authority

December 2022

Prepared by
Parametrix

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Wastewater Master Plan

Prepared for

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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Checked by Jeff Coop, PE

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ACRONYMS AND ABBREVIATIONS

BOD_5	five-day biochemical oxygen demand
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CIC	capital improvement charge
DEQ	Oregon Department of Environmental Quality
E. coli	*Escherichia coli*
EPA	U.S. Environmental Protection Agency
FEB	flow equalization basin
GO	General Obligation (bond)
gpd	gallons per day
gpm	gallons per minute
hp	horse power
I&I	infiltration and inflow
kW	kilowatt
LGIP	local government investment pool
mL	milliliter
MGD	million gallons per day
mg/L	milligrams per liter
MLSS	mixed liquor suspended solids
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
PCJWSA	Pacific City Joint Water-Sanitary Authority
pcd	pounds per connection per day
PDAF	peak day average flow
pH	hydrogen ion concentration
PIF	peak instantaneous flow
ppd	pounds per day
PVC	polyvinyl chloride
SCADA	Supervisory Control and Data Acquisition
SDC	system development charge
SPWF	Special Public Works Fund

ACRONYMS AND ABBREVIATIONS (CONTINUED)

STEP	septic tank effluent pumping
TDH	total dynamic head
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USDA	U.S. Department of Agriculture
UV	ultraviolet
WPCF	Water Pollution Control Federation
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

Overview

The Pacific City Joint Water-Sanitary Authority (PCJWSA) is a publicly owned water and sewer district located in Pacific City in southern Tillamook County, adjacent to the confluence of the Nestucca River with the Pacific Ocean. PCJWSA serves the unincorporated communities of Pacific City and Woods approximately midway between Lincoln City and Tillamook, Oregon.

This *Wastewater Master Plan* describes and evaluates regulatory requirements; the existing service area; existing and future wastewater flows and loads; the wastewater collection, pumping, treatment, and biosolids systems; and existing operational practices. Future wastewater system needs are identified based on the projected flows and loads. This plan includes a list of recommended system improvements, as well as estimated and capital and operating costs. Chapter 5 describes the financial analysis that was conducted to determine how to pay for the recommended improvements.

Regulatory Requirements

PCJWSA has a National Pollutant Discharge Elimination System (NPDES) Permit number 101519, which expires on June 30, 2025. The wastewater treatment plant (WWTP) permit discharge limits are shown in Table ES-1.

Table ES-1. NPDES Permit for PCJWSA – Year-Round Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
BOD_5	mg/L	10	15	-
	lb/day [a]	26	39	52
	% removal	85	-	-
TSS	mg/L	10	15	-
	lb/day [a]	26	39	52
	% removal	85	-	-
pH	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli [b]	#/100 mL	Must not exceed a monthly geometric mean of 34; no more than 10% of the samples shall exceed 110		

a Mass load limits are based on a flow of 0.315 million gallons per day

b If a single sample exceeds 110 organisms per 100 mL, then the permittee must evaluate the previous 9 bacteria sample results to determine if the 10% requirement has been met

BOD5 = 5-day biochemical oxygen demand; lb/day = pounds per day; mg/L = milligrams per liter; mL = milliliters; SU = standard units

Since receiving its new NPDES permit in August 2020, PCJWSA has been cited once for exceeding limits defined in its permit. On August 24, 2022, PCJWSA collected an effluent sample exceeding BOD_5 limits. Because this was an isolated incident and the measurement was more than two times any previous BOD_5 measurement since the WWTP upgrades, this is considered to be an outlier and no upgrades at the WWTP are warranted at this time. Operations staff should continue to monitor the situation closely.

Prior to the new permit and upgrades to the WWTP, PCJWSA received nine warning or enforcement letters from the Oregon Department of Environmental Quality (DEQ) related to permit concentration exceedances from 2011 to 2019. Because PCJWSA has significantly upgraded its WWTP, those exceedances are not described in detail in this master plan; however, more information is available through the DEQ website. Since upgrading its WWTP, PCJWSA has not been cited by DEQ for exceeding concentrations defined in its permit.

Flows and Loading

Historical flow data from 2017 to 2021 from discharge monitoring reports were analyzed to develop average annual flow, average dry weather flow, average wet weather flow, and maximum-month dry weather flow (MMDWF).

- Average Annual Flow 0.162 million gallons per day (MGD)
- Average Dry Weather Flow 0.168 MGD
- Average Wet Weather Flow 0.155 MGD
- MMDWF 0.214 MGD

Previous master plans used peaking factors to develop PDAF and PIF. These peaking factors were developed in 2000 using plant flows and rainfall data from 1995 to 2000; they are considered outdated at this point. New peaking factors were developed for this master plan, using recent flow and rainfall data, and follow the same guidelines as were used in 2000 using DEQ *Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF, PDAF, and PIF* (DEQ n.d.). Note that this analysis did not use DEQ guidelines to develop MMDWF. The guidelines indicate that (west of the Oregon Cascade Mountains) MMDWF likely happens in May. May is typically the rainiest month during dry weather, and high groundwater results in higher flows in collection systems. Because of tourism at PCJWSA, the maximum dry month is almost always July and thus was calculated using the last 5 years of plant flow data. Peak day average flow (PDAF) and peak instantaneous flow (PIF) were calculated as follows:

- PDAF 0.389 MGD
- PDAF/MMDWF Peaking Factor 1.82
- PIF 0.515 MGD
- PIF/MMDWF Peaking Factor 2.41

Part of the collection system is located within the regulatory floodway. These areas include Rueppell Avenue, River Avenue, Brooten Road (at the intersection of River Avenue and north), Resort Drive, and Airport Lift Station. These areas are prone to flooding when heavy rainfall or tidal influence cause the Nestucca River to exceed its banks. This causes direct inflow of river water into the collection system. Based on flow monitoring data at the Airport Lift Station during a flooding event on January 12, 2021, flooding caused approximately 700 gallons per minute (gpm) of additional flow for about 6 hours; this resulted in 252,000 gallons of direct infiltration.

- PDAF during a flooding event 0.591 MGD
- PIF during a flooding event 1.443 MGD

Because flooding can have significant impacts on peak day and instantaneous flow rates, peak flow rates were projected for future conditions with and without flooding.

Monthly data for influent 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) concentrations and loadings were examined from the years 2017 to 2021, and the ranges and averages were typical of domestic wastewater. Table ES-2 shows a summary of current and projected 2042 connections, flows, and loads.

Table ES-2. Projected Future Populations and Wastewater Flows and Loadings

			Max. Month Dry Weather Flow	Peak Day Average Flow	PIF		Peak Flows with Flooding				Max. Month Wastewater Loading	
							Flood Inflow	Peak Day	PIF		BOD_5	TSS
Year	Connections	Gallons/ Connection	gpd	gpd	gpd	gpm	gallons	gpd	gpd	gpm	ppd	ppd
2022	1,438	148.7	213,826	389,284	514,806	358	252,000	641,284	1,522,806	1,058	474	828
2042	1,689	148.7	251,148	457,232	604,664	420	252,000	709,232	1,612,664	1,120	557	973

BOD5 = 5-day biochemical oxygen demand; TSS = total suspended solids; ppd = pounds per day; gpd = gallons per day; PIF = peak instantaneous flow

Existing Collection and Pumping System

The collection system consists of about 78,000 feet of gravity sewers, 126 septic tank effluent pumping (STEP) systems, and 10 pumping stations. All lift stations consist of two submersible pumps in a precast manhole. Airport Lift Station is the largest station and handles all flows east of the Nestucca River.

Parts of the collection system are located within the regulatory floodway. These areas are prone to flooding when heavy rainfall and/or tidal influence cause the Nestucca River to exceed its banks. This causes direct inflow of river water into the collection system. As a precaution, PCJWSA turns off the STEP systems along North Brooten and Resort Drive. Otherwise, the STEP tanks would be inundated and the associated pumps would run constantly—overwhelming the STEP systems. PCJWSA estimates that 80 percent of the manholes in the floodway are watertight. Because flooding drives the peak events at the wastewater treatment plant, PCJWSA should install watertight manholes covers on all nonwatertight manholes within the floodway and replace those watertight manholes covers already in place; it is possible that the gaskets have failed or are not installed correctly.

The Brooten North/Resort Drive STEP system that pumps into the Woods Lift Station force main does not have sufficient discharge pressure to pump when the Woods Lift Station is operating. STEP system service will deteriorate if the Woods Lift Station pumps more frequently should its service area develop and produce higher flows. The Brooten North/Resort Drive STEP systems are susceptible to flooding during high stages of the Nestucca River.

Many pumps have exceeded their useful life. The control panels are exposed to the weather, and many have highly corroded components. At the time of writing this master plan, PCJWSA is in process of changing the Kiwanda and Straub pumps, controls, and electrical panels. In 2023, PCJWSA plans to also update the pumps, controls, and electrical panels at Cindy, Roger, Beachy, and Madrona Lift Stations.

The pipelines on the Woods, Slough, and Beachy Bridges were either not constructed to accommodate a seismic event and/or are susceptible to corrosion. All of these bridge-crossing pipelines should be replaced with a corrosion-resistant pipeline with a seismic-resilient joint.

Existing Wastewater Treatment System

The influent lift station and WWTP have gone through significant upgrades in recent years. These upgrades concluded in 2020. At this point, no upgrades are recommended as part of this master plan.

Operations

PCJWSA has six full-time operators, one full-time manager, one full-time supervisor, and two full-time administrative staff. The lead operators are certified at appropriate levels by the State for the system. PCJWSA intends to hire one new operator-in-training (OIT) in 2023 and another in the next 5 to 10 years.

Recommended Improvements

A prioritized listing of recommended improvements to the wastewater system was developed through the year 2042. The objective was to first replace system components that were undersized or needed to be replaced, and to provide new components to better accommodate growth. Recommended improvements were identified based upon deficiencies identified by PCJWSA staff, engineering analysis of the wastewater system, and system needs to accommodate growth. The improvements were tabulated over the planning period, and an opinion of capital and operational costs was estimated. The list and costs are in Table 4-1 in Chapter 4.

Financial Analysis

To fund sewer projects, PCJWSA can use cash reserves, Federal or State grants, or issue debt either to various Federal or State agencies with lending programs, or to the municipal bond market. Also, PCJWSA can legally issue voter-approved general obligation (GO) bonds and assess property taxes to pay annual debt service (principal and interest) until the bonds are fully repaid. PCJWSA also qualifies for some federal and state grant and lending programs. See Chapter 5 for a description of the methods of borrowing, sources of revenues to repay the loans, the possible lenders, and current financial conditions.

1. BACKGROUND

1.1 Scope of Study

The Pacific City Joint Water-Sanitary Authority (PCJWSA) authorized Parametrix to complete a new wastewater master plan. The following summarizes the scope of work:

1. Review regulatory requirements and the wastewater National Pollutant Discharge Elimination System (NPDES) permit to confirm compliance with Oregon Administrative Rule (OAR) requirements. Coordinate with the Oregon Department of Environmental Quality (DEQ) to understand any general or specific concerns that DEQ may have regarding wastewater treatment or collection and pumping.
2. Develop 20-year wastewater connections, wastewater flow, and biosolids forecasts.
3. Evaluate average and peak capacity of the existing wastewater treatment plant at estimated future flows and pollutant loads relative to existing and anticipated future permit limitations. Review biosolids management procedures.
4. Develop a computer model of the existing sewers, force mains, and pumping stations to evaluate the capacity of the system to convey existing and future flows. Assess estimated rainfall-derived infiltration and inflow.
5. Review existing wastewater system operations and maintenance practices.
6. Review existing electrical and telemetry systems at the wastewater treatment plant (WWTP) and pumping stations and recommend improvements.
7. Identify capital improvements to correct deficiencies for collection, pumping, treatment, and disposal. Develop a prioritized implementation schedule for the improvements. Prepare planning-level opinion of probable costs for recommended improvements.
8. Review financing options such as bonds, grants, system development charges, reserves, or loans, and recommend a plan to fund the improvements. Develop estimates for user rates and system development charges sufficient to fund system improvements, expansion, and operation.
9. Prepare the wastewater master plan to meet DEQ requirements for preparation of engineering reports.

1.2 General

PCJWSA is a publicly owned water and sewer district located in Pacific City in southern Tillamook County, adjacent to the confluence of the Nestucca River with the Pacific Ocean. PCJWSA serves the unincorporated communities of Pacific City and Woods approximately midway between Lincoln City and Tillamook, Oregon. The Pacific City Water District was organized in 1959. The Pacific City Sanitary District was organized in 1974. The two organizations shared offices and were joined into one agency in 1998 forming the Pacific City Joint Water-Sanitary Authority. PCJWSA is controlled by a five-member board of directors. PCJWSA currently serves approximately 1,438 wastewater service connections as of June 2022.

The Pacific City area is recognized as the home of the scenic Cape Kiwanda and has become a recreational area that is well known for its dory boat fishing fleet. It is growing because of increased

summertime tourism and a growing interest in vacation home developments. The area also includes dairy farming as an important agricultural business.

1.3 Overview of Regulatory Requirements

1.3.1 Master Plan Report Requirements

Wastewater treatment systems are required to complete a facility plan if they are funded by or through (1) DEQ; (2) Business Oregon; (3) the U.S. Department of Agriculture; or (4) the Rural Community Assistance Corporation. Requirements include compliance with the National Environmental Policy Act and review and approval by DEQ and the participating agencies. Preparing a facilities plan may also be required as a condition in the discharge permit or as part of a Mutual Agreement and Order or similar regulatory document. Because PCJWSA did not obtain funding from any of these agencies and is not under a compliance order, this *Wastewater Master Plan* is not considered a "facilities plan" and does not need to comply with the DEQ requirements for a facility plan.

Prior to completing the scope of work for this project, DEQ was contacted to confirm compliance requirements for this report. It was confirmed that DEQ does not have wastewater master plan guidelines. Parametrix was directed to use previous example plans as a basis for this, and as such, the previous PCJWSA wastewater master plan from 2005 was used as a guide for this plan.

According to OAR 340-41-0057, the Oregon Environmental Quality Commission urges each sewerage utility in Oregon to develop a financing plan to ensure that future sewerage works construction, operation, maintenance, and replacement needs can be met in a timely manner. These are prerequisite to DEQ issuance of permits for new or significantly modified sewerage facilities, for approval of plans, or for access to funding assistance. It is intended that this *Wastewater Master Plan* meet the requirements for the financing plan.

1.3.2 Other Requirements

OAR, Chapter 340, Division 41, Sections 0001 to 0350 are collectively titled *Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon* and govern wastewater treatment facilities. These rules set forth Oregon's plans for management of the quality of public waters within the State of Oregon. DEQ manages water quality by evaluating discharges and activities, whether existing or a new proposal, within the limiting framework of minimum standards, treatment criteria, and policies that are set forth in the plan.

These rules set standards for nondegradation of the quality of state waters and maintains waters of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. Sections of these rules set standards for minimum levels of dissolved oxygen and limitations on nuisance algae. Other sections set standards for bacteria, pH, temperature, total dissolved gases, total dissolved solids, toxic substances, and turbidity. Sections designate water-quality-limited waters that require more stringent discharge requirements. Requirements for discharge mixing zones are established. Guidelines are provided for federal funding. There are also basin-specific requirements that set discharge standards and beneficial uses for different drainage basins.

PCJWSA is in the North Coast Basin drainage basin, which is governed under OAR 340-41-0230. Beneficial uses in the North Coast Basin are outlined in Table 1-1. The only beneficial use not designated for PCJWSA was hydropower. The PCJWSA service area is within the Wilson-Trask-Nestucca subbasin.

The upper reach of the Nestucca River is designated as a "Core Cold-Water Habitat" and the lower reach is designated as a "Salmon and Trout Rearing and Migration" fish use area according to Figure 230A of OAR 340-41-0230. According to Figure 230H of OAR 340-41-0230, the Pacific Ocean adjacent to the PCJWSA service area and the Nestucca Bay are designated for "coastal contact recreate and shellfish harvesting." Additionally, the lower reach of the Nestucca River is designated for "freshwater contact recreation." Relevant tables and figures from OAR 340-41-0230 are included in Appendix A.

Table 1-1. Beneficial Uses in North Coast Basin

Beneficial Uses	Estuaries and Adjacent Marine Waters	All Streams and Tributaries
Public & Private Domestic Water Supply		X
Industrial Water Supply	X	X
Irrigation		X
Livestock Watering		X
Fish & Aquatic Life	X	X
Wildlife Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power		
Commercial Navigation & Transportation	X	

Water quality must be managed to protect all of these beneficial uses. Total Maximum Daily Loads (TMDLs) have been approved by the EPA for temperature, bacteria, and sediment within the Nestucca Bay Drainage according to OAR 340-41-0234. Water quality standards and policies for the North Coast Basin are defined in OAR 340-41-0235 as follows:

- pH
  - Marine waters: 7.0–8.5
  - Estuarine and fresh waters: 6.5–8.5
- Total dissolved solids: less than 100 milligrams per liter (mg/L)
- Minimum design criteria for treatment and control of sewage
  - Low stream flows (approximately May 1 to October 31): Monthly effluent concentrations not to exceed 20 mg/L of biochemical oxygen demand (BOD_5) and 20 mg/L of suspended solids.
  - High stream flows (approximately November 1 to April 30): Minimum of secondary treatment and operation of all waste treatment and controls facilities at maximum practicable efficiency and effectiveness as to minimize waste discharges to public waters.

Other divisions of the OARs that regulate wastewater treatment works are listed below. The current rules are all available on the secretary of state's website. [1]

- TMDLs – Division 42
- Regulations Pertaining to NPDES and WPCF Permits – Division 45
- Certification of Compliance with Water Quality Requirements and Standards – Division 48
- Wastewater System Operator Certification – Division 49
- Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage – Division 50
- Review of Plans and Specifications – Division 52
- Clean Water State Revolving Fund Program – Division 54
- Recycled Water Use – Division 55
- Instream Water Rights – Division 56
- Onsite Wastewater Treatment Systems – Division 71
- Construction Standards – Division 73
- State Financial Assistance to Public Agencies for Water Pollution Control Facilities – Division 81

1.4 Previous Reports

The following previously prepared reports were used as the basis for this *Wastewater Master Plan*:

- *Wastewater Master Plan*, prepared for PCJWSA by Parametrix, 2005.
- *Wastewater Master Plan Update*, prepared for PCJWSA by Parametrix, 2009.
- *Preliminary Engineering Report Wastewater Treatment Plant Upgrade*, prepared for PCJWSA by Parametrix, 2015.
- *Water Master Plan,* Prepared for PCJWSA by Parametrix, 2022.

1.5 Service Area

The PCJWSA service area includes the communities of Pacific City and Woods. The service area is approximately 1.7 square miles in size. The properties within the service area are zoned as residential, commercial, planned development, or airpark land use types. Figure 1-1 shows an aerial map of the Pacific City area and indicates the major streets, sanitary pipelines, lift stations, and PCJWSA service area boundary.

[1] https://sos.oregon.gov/archives/Pages/oregon_administrative_rules.aspx

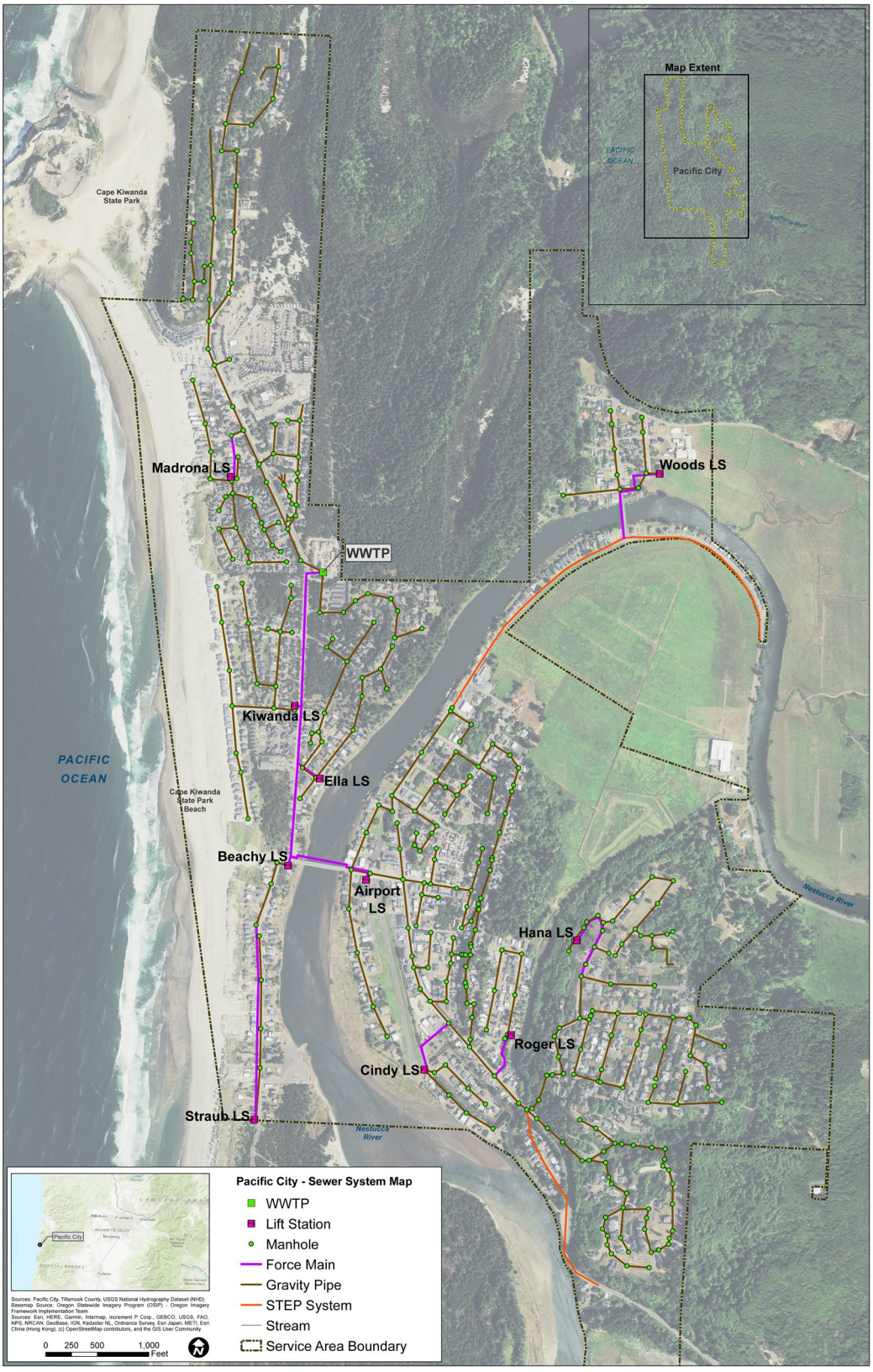


Figure 1-1. PCJWSA Wastewater System Overview

1.6 Existing Service Connections and Wastewater Flows and Loads

1.6.1 Existing Service Connections

Analysis conducted for this master plan used the number of service connections to determine wastewater flows and loads instead of population. The existing population of Pacific City is not precisely known. According to the U.S. Census Bureau, the Pacific City Census-Designated Place (CDP) has a population of 1,109. It is worth noting that the Census Bureau does not provide a population estimate for the PCJWSA service area only. The Pacific City CDP encompasses all the PCJWSA service area and 2 additional square miles of the surrounding rural area. Additionally, there are no population forecasts available to use population to forecast future flows and loads. In Oregon, communities outside the Metro boundary must apply the most recent final forecast (PRC 2020) issued by the Portland State University Population Research Center to develop population projections according to OAR 660-032-0020. The research center does not issue a population forecast for the PCJWSA service area.

Based on PCJWSA records, there were 1,450 water and 1,438 sewer service connections as of June 30, 2022. This master plan analysis used the number of sewer connections to determine wastewater flows and loads.

1.6.2 Wastewater Flow and Loads

1.6.2.1 Flows

Figure 1-2 through Figure 1-4 show historical monthly maximum, average, and minimum flows at PCJWSA for the period January 2017 to December 2021 as reported in the PCJWSA Discharge Monitoring Reports. Figure 1-5 shows daily influent flows at PCJWSA during the same period.

During the period January 2017 to December 2021, the following summarize the plant flow data:

- Maximum Daily Flow 0.528 million gallons per day (MGD)
- Average Maximum Daily Flow 0.361 MGD
- Minimum Daily Flow 0.046 MGD
- Average Minimum Daily Flow 0.073 MGD
- Average Daily Flow 0.162 MGD

There are generally two annual peaks in the figures: one in summer corresponding to higher populations and one in winter corresponding to higher rainfall. DEQ defines wet weather as the period between November 1 and April 30 and dry weather as the period between May 1 and October 31. January 2021 has significantly higher max flow compared to years past. This is related to flooding in the collection system – which is further discussed and addressed in this plan. DEQ-defined flows for characterizing a treatment plant follow:

- Maximum Month Average Dry Weather Flow
- Maximum Month Average Wet Weather Flow

- Peak Day Average Flow (PDAF)
- Peak Instantaneous Flow (PIF)

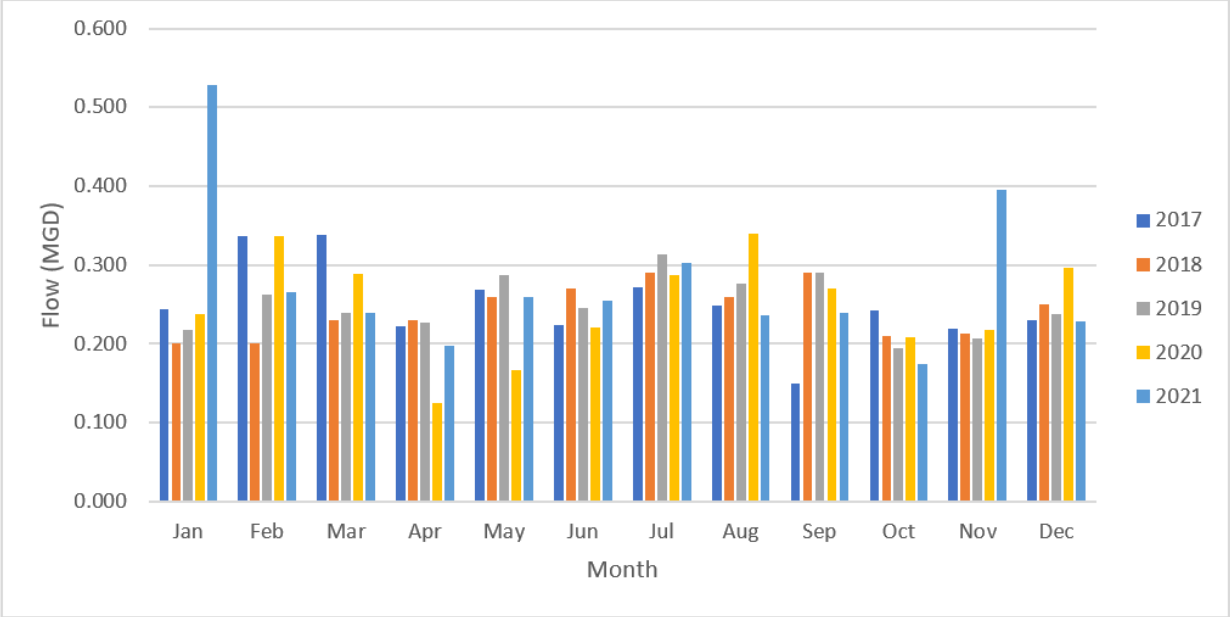


Figure 1-2. Maximum Flows by Month, 2017–2021

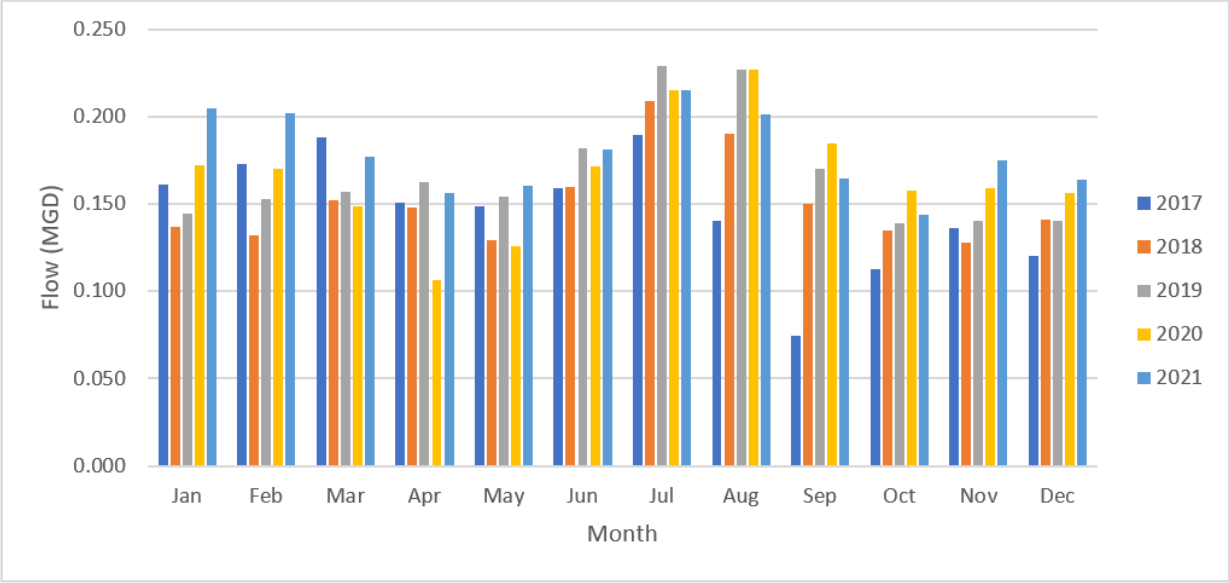


Figure 1-3. Average Flows by Month, 2017–2021

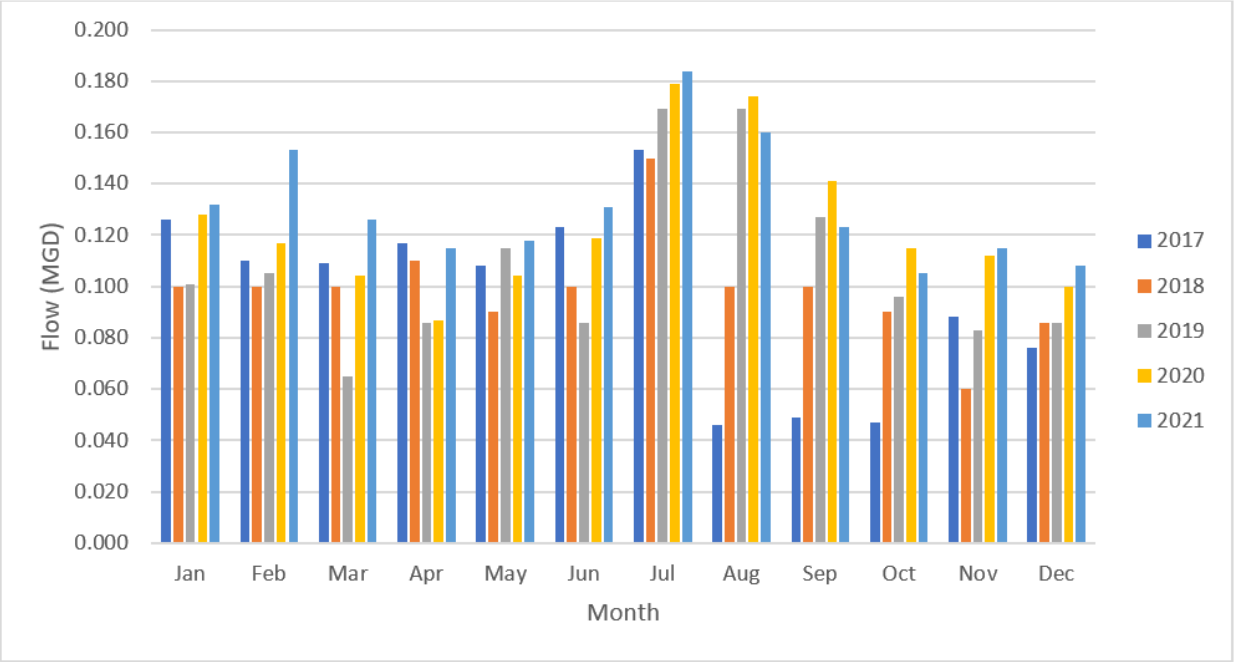


Figure 1-4. Minimum Flows by Month, 2017–2021

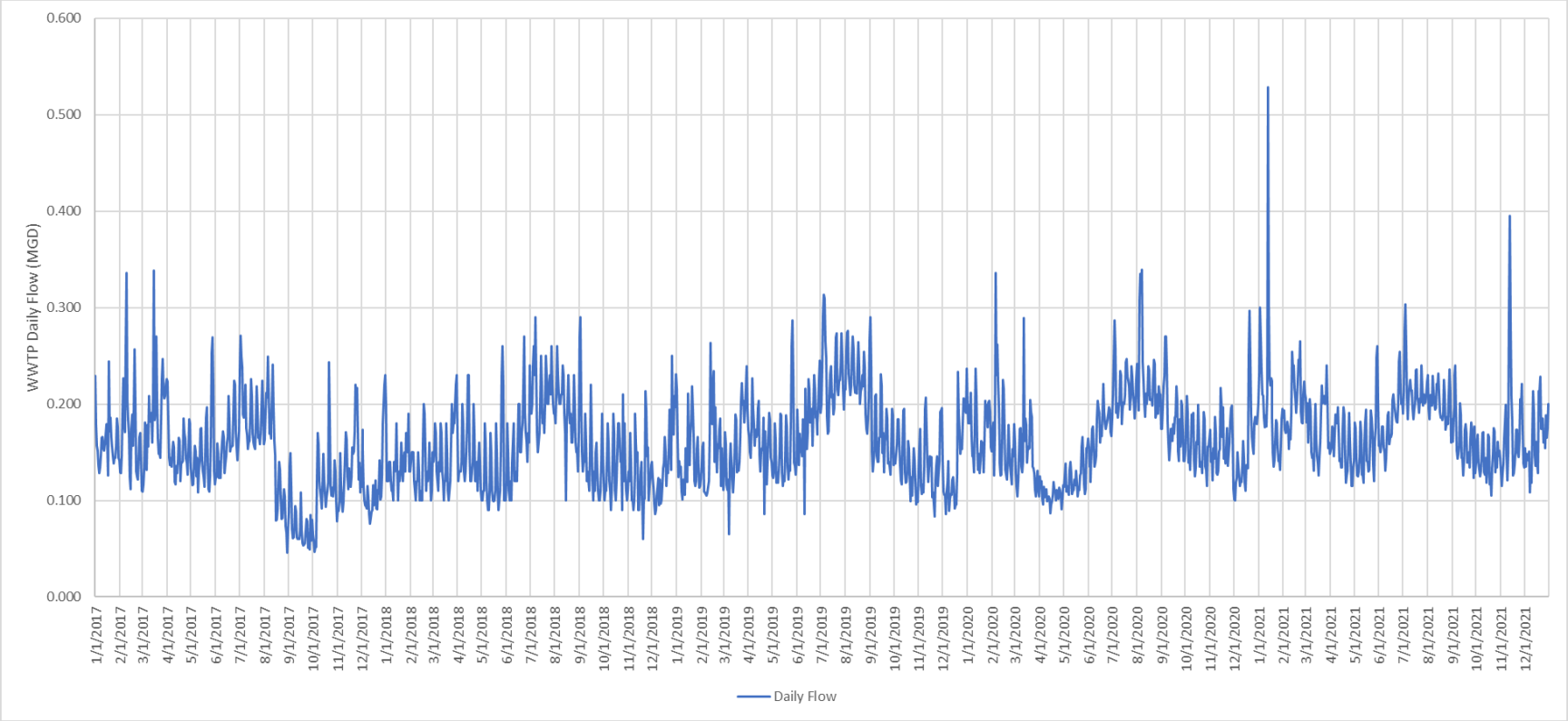


Figure 1-5. PCJWSA Wastewater Flow Data, 2017–2021

Table 1-2 summarizes dry weather and wet weather flows at PCJWSA. Statistics from 2017 to 2021 were used to develop average annual flow, average dry weather flow, average wet weather flow, and maximum month dry weather flow (MMDWF).

Table 1-2. Dry and Wet Weather Flow

	2017	2018	2019	2020	2021	Average
Average Annual Flow	0.146	0.151	0.166	0.166	0.179	0.162
Average Dry Weather Flow	0.137	0.162	0.183	0.180	0.178	0.168
Average Wet Weather Flow	0.155	0.140	0.149	0.152	0.180	0.155
Max. Month Dry Weather Flow	0.190	0.209	0.229	0.227	0.215	0.214

Previous master plans used peaking factors to develop PDAF and PIF. These peaking factors were developed in 2000, using 1995 to 2000 flow and rainfall data, and are considered outdated at this point. New peaking factors were developed for this master plan, using recent flow and rainfall data, and follow the same guidelines as were used in 2000 using the DEQ *Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF, PDAF, and PIF*. Note that this analysis did not use DEQ guidelines to develop MMDWF. The guidelines indicate that (west of the Oregon Cascade Mountains) MMDWF likely happens in May. May is typically the rainiest month during dry weather, and high groundwater results in higher flows in collection systems. Because of tourism at PCJWSA, the maximum dry month is almost always July and thus was calculated using the last 5 years of plant flow data.

Updated peaking factors were developed based on DEQ guidelines. Those calculations can be found in Appendix B. A summary of the calculations and peaking factors is included in Table 1-3.

Table 1-3. Peak Flow Rates

	Flow, MGD	MMDWF Peaking Factor
PDAF	0.389	1.82
PIF	0.515	2.41

MGD = million gallons per day; MMDWF = maximum month dry weather flow; PDAF = peak day average flow; PIF = peak instantaneous flow

The peaking factors and associated flow rates shown in Table 1-3 are significantly lower than those from 2000. Looking through the recent discharge monitoring report data, there were 4.75 inches of rainfall on February 5, 2020, and 2 weeks of antecedent rainfall. The 5-year, 24-hour storm for PCJWSA, is 4.4 inches. According to DEQ guidelines, PDAF corresponds with the 5-year, 24-hour storm. This February 5, 2020, event is very close to what to expect for PDAF. The February 5, 2020, flowrate at the WWTP was 0.336 MGD, which is very close to what was developed in Table 1-3.

On January 12, 2021, there was a 0.528 MGD flow at the WWTP and 1.25 inches of rainfall that day. This is significantly more flow than the PDAF in Table 1-3 resulting from significantly less rainfall. This event was driven by flooding and direct infiltration into the collection system. Flooding took place along

Rueppell Avenue, River Avenue, Brooten Road (at the intersection of River Avenue and north), Resort Drive, and Airport Lift Station. A flooding event may be the driver for the peaking rates developed in the previous plan.

These streets are prone to flooding when heavy rainfall and/or tidal influence cause the Nestucca River to exceed its banks. This causes direct inflow of river water into the collection system. As a precaution, PCJWSA turns off the STEP systems along North Brooten and Resort Drive. Otherwise, the STEP tanks would be inundated and the associated pumps would run constantly, thus overwhelming the STEP systems. However, not all the manholes in this area are watertight, and some of the watertight manholes may have failed or not installed correctly; this allows flood waters to enter the collection system. Based on flow monitoring data at Airport Lift Station collected during this event, this causes approximately 700 gpm of additional flow for about 6 hours, resulting in 252,000 gallons of direct infiltration. Table 1-4 summarizes peak flow rates during a flooding event. For PCJWSA, it is important to track flow rates with and without flooding.

Table 1-4. Peak Flow Rates with Flooding

	Flow, MGD
PDAF	0.591
PIF	1.443

MGD = million gallons per day; PDAF = peak day average flow; PIF = peak instantaneous flow

1.6.2.2 Loading

Monthly data for influent 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) concentrations and loadings were examined from the years 2017 to 2021. Typical ranges and average concentrations and loads are shown in Table 1-5.

Table 1-5. Ranges of Influent BOD_5 and TSS during 2017–2021

Parameter	Typical Range	Average
BOD_5, mg/L	180 – 330	280
BOD_5, ppd	160 – 380	339
TSS, mg/L	100 – 370	330
TSS, ppd	100 – 480	435

BOD5 = 5-day biochemical oxygen demand; mg/L – milligrams per liter; ppd – pounds per day; TSS = total suspended solids

Figure 1-6 and Figure 1-7 show how loadings of BOD_5 and TSS have varied month to month over the past 5 years. This shows how loads are generally highest in summer with a second peak in winter.

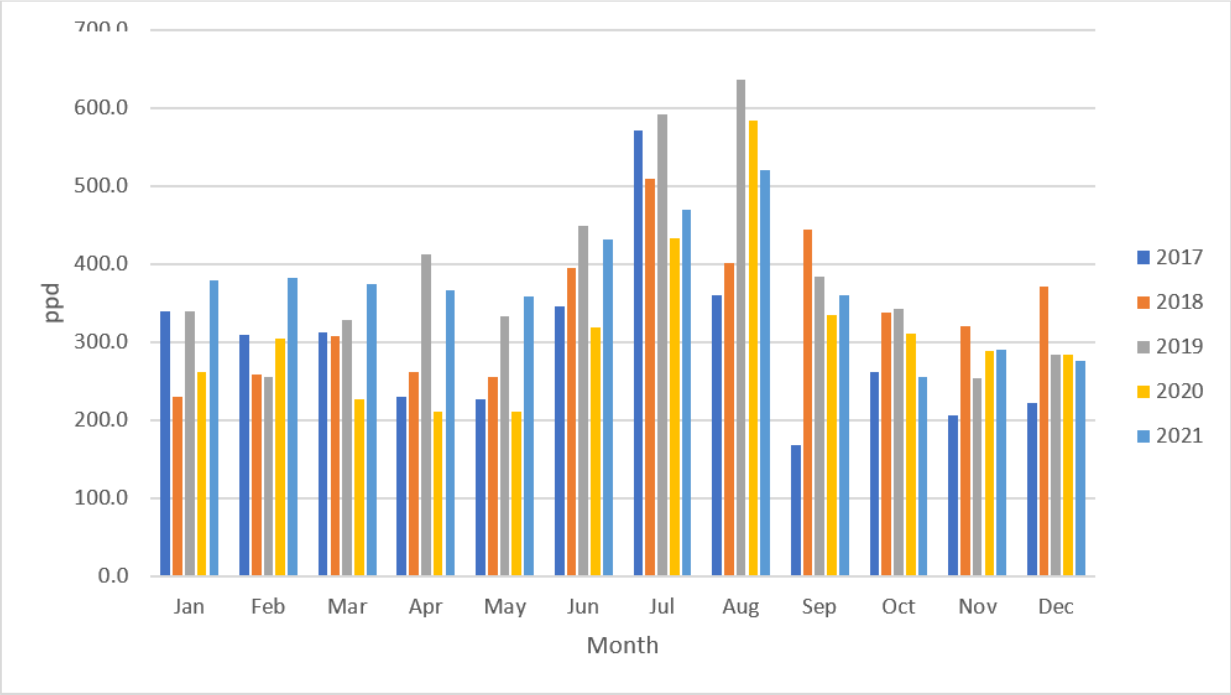


Figure 1-6. Average Monthly BOD_5 Loading, 2017–2021

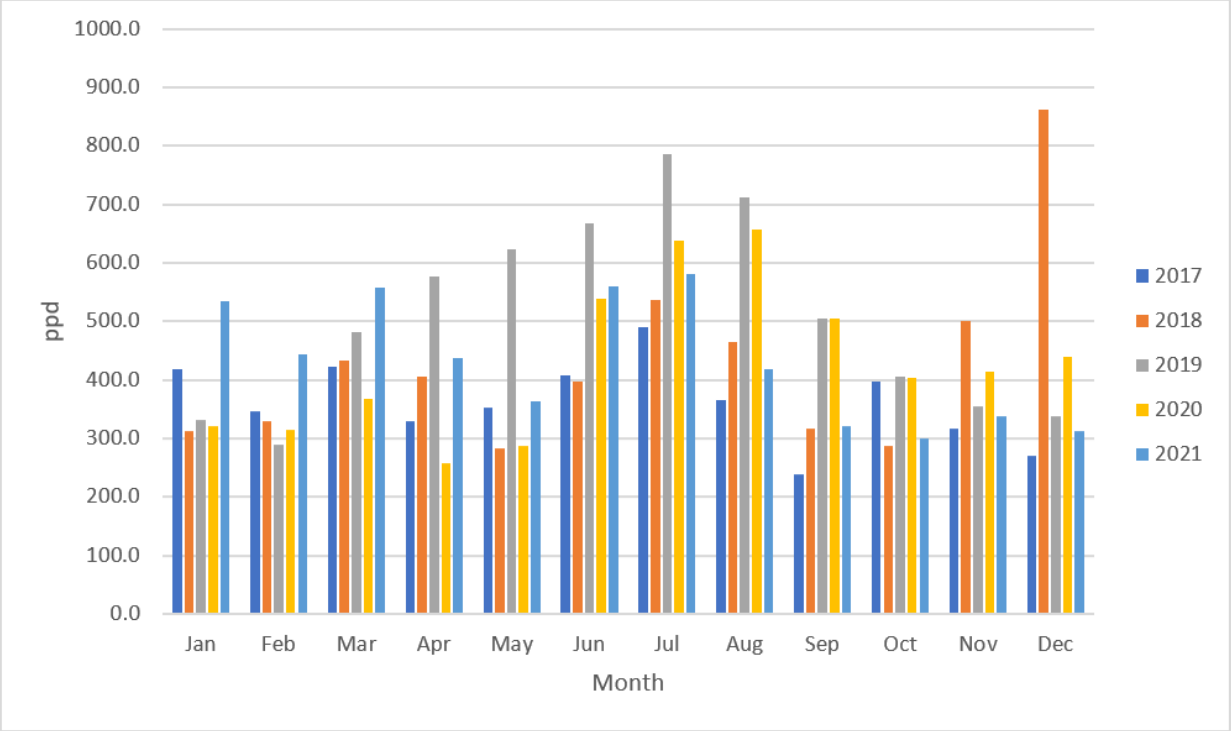


Figure 1-7. Average Monthly TSS Loading, 2017–2021

Over the past 5 years, average TSS concentration has ranged from 300 to 360 mg/L. Average BOD_5 has ranged from 240 to 315 mg/L over the same period. These concentrations do not appear to be trending up or down at this point in time. In general, peak TSS and BOD_5 events have been decreasing over the past 4 years; this is shown in Figure 1-8.

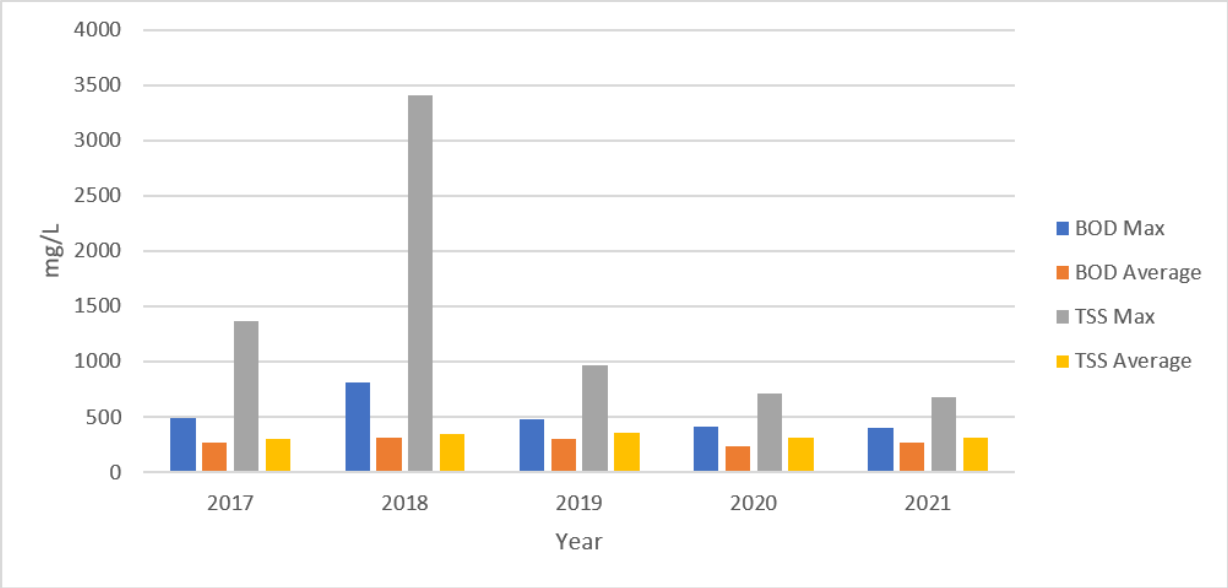


Figure 1-8. Yearly Influent BOD_5 and TSS

Per Capita Flow and Loading

Based on the above analysis of existing connections, flow, and loading, per connection rates were developed.

Using the average MMDWF 0.214 MGD and 1,438 sewer connections, the current per connection flow rate is 148.7 gallons per connection per day. This averages flow contributions from commercial and residential sources. To determine peak flows, a peaking factor of 2.41 should be applied.

Because organics and solids determine the size of loading processes such as aeration basins, solids pumping, and digesters, the maximum month values should be considered to estimate per connection rates. However, the individual maximum month values observed over the period 2017 to 2021 were 870 pounds per day (ppd) of BOD_5 and 2,558 ppd of TSS. It is unknown what may have caused these peak loads in 2018; however, they are considered outliers since PCJWSA has not experienced any similar loadings since. PCJWSA should continue to monitor influent quality and investigate any future spikes. These led to per capita rates of 0.61 pounds per connection per day (pcd) BOD_5 and 1.78 pcd TSS. These are unusually high and could be expected for a community with a large industrial base but not for PCJWSA. Expected per connection rates (assuming two people per connection) are approximately 0.36 pcd BOD_5 and 0.4 pcd TSS (Metcalf and Eddy 1979).

To develop more reasonable per capita loading rates, the average of 12 monthly maximums for each year over the period 2017 to 2021 were divided by the number of connections to develop per connection rates. The results are shown in Table 1-6.

Table 1-6. BOD_5 and TSS Loadings – Annual Maximum Month and Average of Annual Maximum Month

Parameter	Average of Monthly Maximums	Per Connection Loading (pcd)	Textbook Per Connection Loading [a] (pcd)
BOD_5, ppd	474	0.33	0.36
TSS, ppd	828	0.58	0.40

a Metcalf and Eddy 1979. Assumes two people per connection.

BOD5 = 5-day biochemical oxygen demand; pcd = per connection per day; ppd = pounds per day; TSS = total suspended solids

1.7 Projected Future Service Connections and Wastewater Flows and Loads

1.7.1 Projected Future Service Connections

1.7.1.1 Build-Out

Several approaches were considered to estimate future connections. A list of all available lots was examined to estimate build-out based on the ultimate number of connections that could potentially be within the PCJWSA boundary. This list included lot zoning, size, and whether occupied or not.

There were generally three types of zones available that could support growth having potential demands on the infrastructure: residential, commercial, and overlay zones. The residential zones are R1, R2, and R3, which are low-, medium-, and high-density housing (single-family, one- or two-family, or multifamily dwellings, respectively). The fourth residential zone is RR, Rural Residential, that allows single-family dwellings on larger lots.

The two commercial zones, C1 and C2, are generally for low- and medium-density commercial activities. Zone C1 is typically mixed in with residential areas, while zone C2 is more dedicated to commercial. In PCJWSA, there are two C2 zones: one in the vicinity of Brooten Road and Pacific Avenue and one on Cape Kiwanda Drive across from the dory launch/parking lot.

The first overlay zone is the Airpark Overlay Zone, which allows one- or two-family residential dwellings, aircraft hangers, and aircraft-related businesses. The second overlay zone is PD or Planned Development. Its purpose is to allow greater flexibility and to promote development of areas with attractive features such as views or natural amenities. It can be used in any of the planned or conditional uses in all of the other zones. For purposes of estimating populations, all overlay zones were assumed to be developable as if they were zoned R2, one- or two-family dwellings. This assumption allows for a reasonable increase in connections and should provide for adequate future infrastructure.

To estimate the future service connections at build-out, the PCJWSA service area was divided into two categories: developed lots and undeveloped lots.

All zoned areas are allowed increased density of use with conditional approval. For example, R1 is typically for single-family homes, but conditionally may have two-family homes. Conditional changes could potentially increase water/sewer use in all areas. To simplify the evaluation, all areas were assumed to be used only for their designated zoning purpose. All developed lots were assumed to retain their existing development and not to be subdivided.

Undeveloped lots were assumed to be subdivided based on lot size limitations set in the zoning code to achieve the maximum number of homes for the primary allowed zone. The area available for an undeveloped lot was assumed to have an effective area of 80 percent available, to allow for public right of way, setbacks, driveways, access between lots, steep slopes, etc. For example, an undeveloped parcel of 1.2 acres or 52,272 square feet would be developable as follows for the different residential zones:

- The lot has an effective area of 41,818 square feet.
- If zoned R1, it can be subdivided into five 7,500-square-foot single-family lots for five new connections.
- If zoned R2, it can be subdivided into five 7,500-square-foot lots with one two-family dwelling per lot for 10 new connections. Note that if the option for 5,000 square feet per single-family home were used, only 8 new connections would be built. This would be less advantageous to the developer, so the greater density would be assumed.
- If zoned R3, it can be divided into 10 lots of 5,000 square feet each, with a four-family dwelling per lot, for a total of 40 households. Note that this zoning allows one-, two-, and three-family dwellings. These would be less advantageous to a developer, so the greater density would be assumed.
- If zoned RR, it is limited to a minimum lot size of 20,000 square feet for a total of one household.

The two overlay zones were assumed to be treated the same as R2 residential and included in the estimate of total households.

Using the total number of existing lots (which equals existing connections) plus the future connections, leads to the total potential number of residential households that PCJWSA could serve at build-out. The estimated number of connections at build-out is approximately 2,500.

Determining the population potential does not address the question of the rate of growth needed to estimate the population in the 20-year planning horizon. This is discussed in the following section.

1.7.1.2 Development Estimate for 2042

The conventional approach to forecasting flows and loads is based on population trends. In Oregon, communities outside the Metro boundary must apply the most recent final forecast issued by the Portland State University Population Research Center to develop population projections per OAR 660-032-0020. The most recent population forecast for Tillamook County was published in 2020 and did not include a forecast for PCJWSA. It is worth noting that the research center did forecast an average annual growth rate of 0.3 percent for Tillamook County as a whole and 0.0 percent for areas outside the urban growth boundaries between 2020 and 2045.

Because a population forecast for Pacific City is not available, the number of service connections added per year was evaluated to help predict growth and forecast future demand. Between 1996 and 2021, the growth rate per connection ranged from 0.3 to just under 8 percent. Table 1-7 summarizes the number of connections from 1996 to present. PCJWSA experienced a growth rate per connection of 0.83 percent over the past 5 years, 0.66 percent over the past 10 years, and 0.99 percent over the past 15 years. The past 5-year period is considered to be the anticipated projected future for Pacific City. During the analysis for the PCJWSA *Water System Master Plan*, 0.8 percent annual average growth was used. Note that the number of connections and recent connection increase rates differ slightly between the water plan and this wastewater plan because not all PCJWSA customers have both water and sewer

connections. As of June 30, 2021, three PCJWSA customers have sewer-only service and 15 have water-only service. It is assumed that all future connections during this planning phase will include both water and sewer. As such, 0.8 percent annual increase in service connections is used as part of this master plan.

Table 1-7. Historical Sewer Connections

Fiscal Year Ending [a]	New Connections	Total Connections [b]
1996	35	907
1997	25	932
1998	24	956
1999	25	981
2000	22	1,003
2001	23	1,026
2002	17	1,043
2003	33	1,076
2004	38	1,114
2005	88	1,202
2006	32	1,234
2007	50	1,284
2008	31	1,315
2009	9	1,324
2010	10	1,334
2011	4	1,338
2012	5	1,343
2013	5	1,348
2014	6	1,354
2015	6	1,360
2016	11	1,371
2017	5	1,376
2018	21	1,397
2019	12	1,409
2020	9	1,418
2021	11	1,429
2022	9	1,438

a PCJWSA Fiscal Year is July 1 to June 30

b As of June 30, 2022, PCJWSA had 1453 connections, 3 of which have only sewer service (15 have only water service)

1.7.2 Projected Future Wastewater Flow and Loads

To evaluate flows and populations, the following factors and assumptions apply using WWTP flows from 2017 to 2021:

- Future populations and dry weather flow rates at build-out were estimated based on each lot being developed as described above to determine the households and population per lot. Then the per capita and commercial flow rates were used to determine build-out dry weather flow.
- The total flow (combining commercial and residential flows) was divided by the total number of connections to determine an aggregate per connection flow rate. This was then used to estimate future flows based on population without being tied to how commercial property developed. When this was conducted for the future condition, the aggregate per connection flow rate was 148.7 gallons per connection per day.
- The peak day average flow was estimated by multiplying the PDAF factor of 1.82 times the MMDWF.
- The peak instantaneous flow was estimated by multiplying the PIF factor of 2.41 times the MMDWF.
- The per connection BOD_5 and TSS ppd loadings of 0.33 and 0.58 pounds per connection per day, respectively, were multiplied by the projected population to estimate future maximum monthly BOD_5 and TSS loadings.

Table 1-8 shows projected population, per connection flow rates, maximum month dry weather flow, peak day, peak instantaneous flow, flooding, monthly BOD_5 loading, and monthly TSS loading for PCJWSA through 2042.

Table 1-8. Projected Future Populations and Wastewater Flows and Loadings

							Peak Flows with Flooding				Max. Month Wastewater Loading	
			Max. Month Dry Weather Flow	Peak Day Average Flow	PIF		Flood Inflow	Peak Day	PIF		BOD_5	TSS
Year	Connections	Gallons/ Connection	gpd	gpd	gpd	gpm	gallons	gpd	gpd	gpm	ppd	ppd
2022	1,438	148.7	213,826	389,284	514,806	358	252,000	641,284	1,522,806	1,058	474	828
2023	1450	148.7	215,610	392,532	519,102	360	252,000	644,532	1,527,102	1,060	478	835
2024	1462	148.7	217,394	395,781	523,398	363	252,000	647,781	1,531,398	1,063	482	842
2025	1474	148.7	219,179	399,029	527,694	366	252,000	651,029	1,535,694	1,066	486	849
2026	1486	148.7	220,963	402,278	531,990	369	252,000	654,278	1,539,990	1,069	490	856
2027	1498	148.7	222,747	405,526	536,286	372	252,000	657,526	1,544,286	1,072	494	863
2028	1510	148.7	224,532	408,775	540,582	375	252,000	660,775	1,548,582	1,075	498	870
2029	1522	148.7	226,316	412,023	544,878	378	252,000	664,023	1,552,878	1,078	502	877
2030	1534	148.7	228,100	415,272	549,174	381	252,000	667,272	1,557,174	1,081	506	884
2031	1546	148.7	229,885	418,520	553,470	384	252,000	670,520	1,561,470	1,084	510	891
2032	1558	148.7	231,669	421,769	557,766	387	252,000	673,769	1,565,766	1,087	514	898
2033	1571	148.7	233,602	425,288	562,420	391	252,000	677,288	1,570,420	1,091	518	905
2034	1584	148.7	235,535	428,807	567,074	394	252,000	680,807	1,575,074	1,094	522	913
2035	1597	148.7	237,468	432,327	571,728	397	252,000	684,327	1,579,728	1,097	526	920
2036	1610	148.7	239,401	435,846	576,382	400	252,000	687,846	1,584,382	1,100	531	928
2037	1623	148.7	241,334	439,365	581,036	403	252,000	691,365	1,589,036	1,103	535	935
2038	1636	148.7	243,268	442,884	585,690	407	252,000	694,884	1,593,690	1,107	539	943
2039	1649	148.7	245,201	446,404	590,344	410	252,000	698,404	1,598,344	1,110	544	950
2040	1662	148.7	247,134	449,923	594,998	413	252,000	701,923	1,602,998	1,113	548	957
2041	1675	148.7	249,067	453,442	599,652	416	252,000	705,442	1,607,652	1,116	552	965
2042	1,689	148.7	251,148	457,232	604,664	420	252,000	709,232	1,612,664	1,120	557	973

gpd = gallons per day; gpm = gallons per minute; ppd = pounds per day; PIF = peak instantaneous flow; BOD5= 5-day biochemical oxygen demand; TSS = total suspended solids

2. EXISTING WASTEWATER SYSTEM

2.1 Regulatory Requirements

The PCJWSA WWTP was placed into operation in 1979 and designed to treat a monthly average flow of 360,000 gpd and serve a peak population of 3,000. Since then, the WWTP has undergone significant upgrades with substantial completion in May 2019 and final completion in October 2020 (additional filters were added to the project construction between substantial and final completion). PCJWSA has NPDES permit number 101519, which expires on June 30, 2025. The WWTP permit discharge limits are shown in Table 2-1. A copy of the entire permit is in Appendix C.

Table 2-1. NPDES Permit for PCJWSA – Year-Round Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
BOD5	mg/L	10	15	-
	lb/day [a]	26	39	52
	% removal	85	-	-
TSS	mg/L	10	15	-
	lb/day [a]	26	39	52
	% removal	85	-	-
pH	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli [b]	#/100 mL	Must not exceed a monthly geometric mean of 34; no more than 10% of the samples shall exceed 110		

a Mass load limits are based on a flow of 0.315 MGD

b If a single sample exceeds 110 organisms per 100 mL, then the permittee must evaluate the previous nine bacteria sample results to determine if the 10 percent requirement has been met

BOD5 = 5-day biochemical oxygen demand; lb/day = pounds per day; mg/L = milligrams per liter; mL = milliliters; SU = standard units

The treated wastewater is discharged into the Nestucca River at river mile 1.5. At this location, the Nestucca River is water-quality limited for dissolved oxygen. In 2002, a TMDL was completed for the Nestucca River to address concerns for temperature, bacteria, and sedimentation. PCJWSA was identified as a potential source for water quality issues for temperature and bacteria. Based on the DEQ evaluation, there was no reasonable potential to cause a measurable increase in stream temperature, primarily because PCJWSA discharges into an area of the river influenced by tidal surges; therefore, no wasteload allocation for temperature was established. However, the current permit requires temperature monitoring, a wasteload allocation is established for bacteria, and standards are set for *Escherichia coli* (*E. coli*) in the PCJWSA discharge.

The NPDES permit defines a regulatory mixing zone as the portion of the Nestucca River contained within a 100-foot radius of the outfall diffuser. The zone of initial dilution is defined as the portion of allowable mixing within 10 feet of the point of discharge.

Biosolids requirements are defined in the NPDES permit. As part of these requirements, PCJWSA developed a Biosolids Management Plan and Land Application Plan to manage the biosolids generated at the WWTP. The plans, as required by the NPDES permit, outline the liquids and solids processes at the

facility, how biosolids are managed to meet federal and state requirements, and how the biosolids land application program is operated. A copy of these plans is included in Appendix D. The NPDES permit also defines limits for pollutants often found in biosolids. A summary of the biosolids limits is found in Table 2-2.

Table 2-2. NPDES Permit Biosolids Limits

Pollutant [a]	Ceiling Concentration (mg/kg)	Pollutant Concentration (mg/kg)	Cumulative Pollutant Load Rates (kg/ha)
Arsenic	75	41	41
Cadmium	85	39	39
Copper	4,300	1,500	1,500
Lead	840	300	300
Mercury	57	17	17
Molybdenum	75	N/A	N/A
Nickel	420	420	420
Selenium	100	100	100
Zinc	7,500	2,800	2,800

a Biosolids pollutant limits are described in 40 CFR 503.12, which uses the terms *ceiling concentrations*, *pollutant concentrations*, and *cumulative pollutant loading rates*.

mg/kg = milligrams per kilogram; kg/ha = kilograms per hectare

Other provisions of the permit include the following:

- Chlorine and other chlorine compounds are prohibited from being used for disinfection
- Year-round monitoring of influent parameters is as follows:
  - Flow: Daily
  - BOD5: 1/week
  - TSS: 1/week
  - pH: 2/week
- Year-round monitoring of effluent parameters is as follows:
  - Flow: Daily
  - BOD_5: 1/week
  - BOD_5 % Removal: Monthly
  - TSS: 1/week
  - TSS % Removal: Monthly
  - pH: 2/week
  - Temperature: 2/week
  - *E. coli*: 1/week

  - *E. coli* % Sampled Exceeding limit: Monthly
  - Total Ammonia: Quarterly
  - Alkalinity (as $CaCO_3$): Monthly
  - Ultraviolet (UV) dose: Daily
- In 2022, monitoring of effluent parameters is as follows:
  - Dissolve Oxygen: Quarterly
  - Total Kjeldahl Nitrogen: Quarterly
  - Nitrate: Quarterly
  - Oil and Grease: Quarterly
  - Total Phosphorus: Quarterly
  - Total Dissolved Solids: Quarterly
- Receiving stream monitoring is as follows:
  - pH: 1/month
  - Temperature: 1/month
  - Alkalinity (as $CaCO_3$): 1/month
  - Total Ammonia: 1/month
- Report Requirements Frequency and Due Date are as follows:
  - Influent, Effluent, and Stream Monitoring: Monthly – due the 15th of the following month
  - Biosolids annual report: Annually – due February 19
  - Inflow and Infiltration report: Annually – due February 15
  - Hauled Waste Control Plan: One time – due 2 months prior to accepting hauled waste
    - Only required if planning to accept hauled waste
  - Hauled Waste Annual Report: Annually (once hauled waste accepted) – due January 15
    - Only required if hauled waste accepted
  - Industrial User Survey: Every 5 years – due 24 months after permit effective date
  - Outfall Inspection Report: Once per cycle – due August 15, 2023

Since receiving its new NPDES permit in August 2020, PCJWSA has been cited once for exceeding limits defined in its permit. On August 24, 2022, PCJWSA collected an effluent sample exceeding BOD_5 limits. Because this was an isolated incident and the measurement was more than two times any previous BOD_5 measurement since the WWTP upgrades, this is considered to be an outlier and no upgrades at the WWTP are warranted at this time. Prior to the new permit and upgrades to the WWTP, PCJWSA received nine warning or enforcement letters from DEQ related to permit concentration exceedances from 2011 to 2019. Because PCJWSA has significantly upgraded its WWTP, those exceedances are not detailed in this master plan; however, they are available through the DEQ website. Since upgrading its WWTP, PCJWSA has not been cited by DEQ for exceeding concentrations defined in its permit.

The PCJWSA biosolids management plan was submitted in February 2020. To meet Class B pathogen and vector attraction reduction requirements, biosolids are aerobically digested to achieve the geometric mean of seven representative samples less than 2 million Most Probable Number or 2 million Colony Forming Units of fecal coliforms, or as a backup, sufficient lime is added to the biosolids to raise the pH to 12 for 2 or more hours. After stabilization, they are trucked about 15 miles to be land applied on PCJWSA-owned application sites near Beaver, Oregon—a town on Highway 101 about 12 miles from Pacific City.

2.2 Collection and Pumping Systems

The sanitary sewer collection system was constructed in 1978–79 in a series of projects with the objective of eliminating the use of onsite sewage disposal systems. Since then, the collection system has been expanded to serve additional areas. The collection system is composed mostly of gravity pipelines with gravity laterals from residential and commercial services within the service area. There are also STEP systems and 10 sewage lift stations. Figure 1-1 shows the service area boundary and the major sanitary sewer collection system components.

2.2.1 Gravity Collection System

The gravity sewers comprise about 70 percent of the pipelines in the wastewater collection system. Based on a review of the drawings, the pipes consist primarily of PVC pipe with small portions of cast iron. Table 2-3 lists the lengths of different pipe diameters in the gravity collection system.

Table 2-3. Lengths of Different Pipe Diameters in the Gravity Collection System

Gravity Pipeline Diameter (inches)	Length (feet)
6	1,794
8	69,423
10	2,078
12	4,200
15	580
Total Length of Gravity Pipelines	**78,075**

An 8-inch PVC pipe crosses the Slough Bridge on Brooten Road. The pipeline collects flows from Pacific Heights, the STEP systems at Nestucca Manor, and on the south end of Brooten Road. As these areas develop, there is concern about the capacity of this pipeline. Another concern is that the pipeline was not constructed to accommodate any seismic event. Current design practice is to provide a telescoping ball joint at one or both ends of a pipeline on a bridge to allow it to flex and move laterally should there be a seismic event. This pipeline should be replaced with a pipeline constructed of ductile iron, coated inside and out for corrosion resistance, and provided with a telescoping ball joint.

The manholes in the system are precast concrete. There are points of the collection system that end with cleanouts, and these should be replaced with manholes.

2.2.2 Pumping Systems

There are two components of the pumped system: (1) the STEP systems and (2) the lift stations and force mains.

Approximately 126 services out of the current total of 1,438 sewer service connections are STEP systems. There are 65 STEP systems along Brooten Road North and Resort Drive along the Nestucca River (collectively called Brooten North/Resort Drive STEP). These pump into the Woods Lift Station force main. There are 11 STEP systems on Cape Kiwanda Drive near Pacific Avenue (collectively called Cape Kiwanda Drive STEP). There are 29 STEP systems south of the Slough Bridge on Brooten Road South and Nestucca Manor (collectively called Nestucca Manor STEP systems). There are also smaller groupings of STEP services on Cape Kiwanda Drive at the very north end of the service area, on Sunset Drive, and on Ocean Drive. Each STEP system consists of a 1,000-gallon septic tank, a pump tank (approximately 140 gallons), and an ejector pump operated by a float switch. The discharge lateral to the street is typically 1.5-inch PVC pipe material. The street trunk lines for the STEP systems are from 1.5-inch- to 4-inch-diameter PVC pipes that run at a flat grade to the nearest gravity sanitary pipeline. Table 2-4 lists the lengths of different pipe diameters in the STEP systems.

Table 2-4. Approximate Lengths of Different Pipe Diameters in the STEP Systems

Description	Pipe Diameter (inches)	Length (feet)
STEP system laterals	1.5	7,000
Nestucca Manor	3	1,000
Brooten Road South	2	1,390
Resort Drive	3	1,630
Brooten Road North (north of Shade Street)	4	2,450
Third Street	1.5	200
Third Street	2	550

There are 10 lift stations located throughout the service area. Airport Lift Station is the largest of the stations and is located at the north end of the airport runway. The lift station completed construction upgrades in 2013 and consists of a 9-foot-diameter wet well and two submersible pumps with a spot for a future third. The site also includes a valve vault, flow meter vault, pig launching station, and a building to house a standby generator and electrical and instrumentation equipment. Photograph 2-1 shows the raised wet well and electrical building exterior.

Photograph 2-1. Airport Lift Station

Hana Lift Station was constructed around 2005 and consists of a 6-foot-diameter wet well and two submersible pumps. The site also contains a valve vault and a controls building that includes a standby generator.

The other eight lift stations are all of a similar design and each consists of a 5-foot-diameter manhole serving as a wet well and two submersible sewage pumps. The electrical control panel for each station is located above ground and is mounted on a metal or wooden frame adjacent to the wet wells. A typical lift station configuration is shown in Photograph 2-2, which shows an access hatch and electrical panels, and Photograph 2-3, which shows the wet well and submersible pumps. Several of the lift stations are adjacent to residential homes, and others are adjacent to rivers, sloughs, or other water bodies.

Hana and Airport Lift Stations have 480-volt 3-phase electrical service. All other lift stations have 230-volt electrical service. Hana, Airport, and Woods Lift Stations have 3-phase electrical service, the others are single phase. Hana, Airport, and Woods Lift Stations all have backup power; the others do not.

Photograph 2-2. Beachy Lift Station

5

Photograph 2-3. Kiwanda Lift Station Wet Well

Design drawings of the existing lift stations were reviewed, and the features for each lift station are summarized in Table 2-5. Because PCJWSA is already in the process of upgrading Straub and Kiwanda, the new pumps and electrical information was included in the table. Additionally, similar upgrades are anticipated to take place at Madrona, Beachy, Cindy, and Roger, and those upgrades are reflected in the table below. At all these stations, the improvements include pump, electrical, and controls upgrades.

Table 2-5. Lift Station Characteristics

Name	Type	Existing PS Capacity (gpm)	Discharge Head (TDH) (feet)	Motor name plate hp	Motor Voltage/Phase	Generator	Force Main Length (feet)	Force Main Diameter (inches)	D.T. min.
Airport	submersible	755	30	30	480/3	Yes	2,021 / 848	8 / 10	14.7
Madrona	submersible	250	37	5	230/3	No	435	4	1.1
Kiwanda	submersible	439	28	5	230/3	No	65	6	0.2
Ella	submersible	134	49	5	230/3	No	260	3	0.7
Beachy	submersible	300	34	5	230/3	No	90	4	0.2
Straub	submersible	151	42	5	230/3	No	1,890	4	8.2
Cindy	submersible	190	40	5	230/3	No	685	4	2.4
Roger	submersible	140	44	5	230/3	No	485	3	1.3
Woods	submersible	150	75	11	230/3	Yes	1,010	4	4.4
Hana	submersible	110	115	23	480/3	Yes	930	4	5.5

1 D.T., min. – nominal force main detention time in minutes.

D.T. = detention time; gpm = gallons per minute; hp = horsepower; min. = minimum; TDH = total dynamic head

Beachy LS also has an 8-inch force main not currently in use

2.2.3 Collection System Current Capacity

The collection system capacity was evaluated using the software program InfoSWMM. Details of the computer model and approach are included in Appendix E.

The InfoSWMM model was calibrated to simulate the total flow to the wastewater treatment plant for dry weather and wet weather conditions. Computer modeling indicated that the gravity sanitary collection system had adequate capacity for the existing and 2042 future population for both dry weather (including tourist and seasonal resident population) and wet weather flow conditions with one exception: the Airport Lift Station did not have sufficient firm capacity to pump wastewater during flooding events. PCJWSA should address reducing direct inflow. Additionally, some portions of the gravity sewers will likely need upgrading to meet peak flows at build-out conditions, but that is beyond the study period of this master plan.

2.2.4 Concerns for the Existing Collection and Pumping Systems

The primary concerns with the existing collection system include the following:

- STEP system services
- Lift station age (excluding Airport and Hana)

- River crossing pipelines
- Flooding
- Rainfall-derived infiltration and inflow

2.2.4.1 STEP Systems

The STEP systems that pump into the Woods Lift Station force main do not have sufficient discharge pressure to function when the Woods Lift Station is operating. So, when the lift station is operating, the STEP pumps may run but they cannot overcome the pressure in the lift station force main. Because there are long pauses when the pumps are off, the STEP pumps are able to pump into the pressure pipeline. However, STEP system service would deteriorate if the Woods Lift Station was pumping more frequently. This might occur if the community developed and produced a higher sanitary flow rate.

The Brooten North/Resort Drive STEP systems are susceptible to river flooding during high stages of the Nestucca River. PCJWSA staff monitors this condition and maintains and repairs the STEP systems if they flood or fail to operate.

A major concern with the STEP systems is the large amount of maintenance required. PCJWSA allots a significant portion of funds to material and labor costs to maintain these systems. As the STEP systems approach the end of their useful life, PCJWSA should evaluate replacing some of these systems with centralized lift stations and/or gravity sewers.

2.2.4.2 Lift Stations

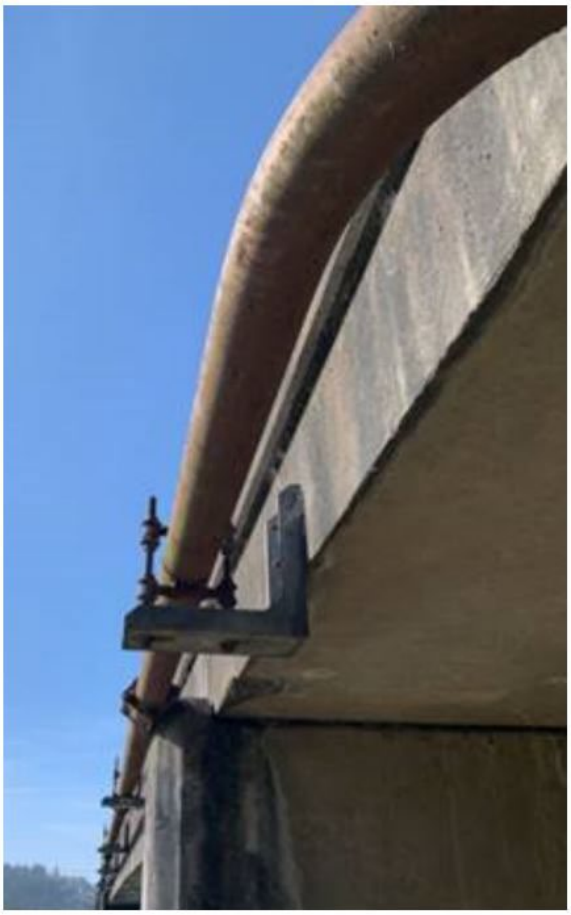
Another concern is the condition of the other pumping stations in the system. Many pumps have exceeded their useful life. The control panels are exposed to the weather, and many have highly corroded components. All of the lift stations, except Airport, Hana, and Woods, have exposed control panels, transfer switches, and access hatches, which makes them susceptible to tampering or vandalism. At the time of writing this master plan, PCJWSA is in process of changing the Kiwanda and Straub pumps, controls, and electrical panels. In 2023, PCJWSA plans to also update the pumps, controls, and electrical panels at Cindy Lane, Roger, Beachy, and Madrona Lift Stations. It is also recommended that PCJWSA upgrade the Woods Lift Station to provide a new electrical panel and control.

Not all the lift stations have remote telemetry. Without remote telemetry, PCJWSA is unable to monitor or check alarms at these lift stations from the WWTP. It is recommended that PCJWSA add remote telemetry to Woods, Roger, Cindy, Straub, and Hana Lift Stations.

2.2.4.3 River Crossings

The pumping stations are used to pump sewage across the Nestucca River in two places: from Woods and on Pacific Avenue. The Woods Bridge force main is 4-inch-diameter ductile iron and steel and is pumped from the Woods Lift Station. The Pacific Avenue (Beachy) Bridge force main is 10-inch-diameter ductile iron and is pumped from the Airport Lift Station.

The Woods Bridge force main has corrosion on the steel portion and on the couplings on the north end. The pipeline is shown in Photograph 2-4 and the couplings are shown in Photograph 2-5 and Photograph 2-6. It is recommended that the steel section and couplings be replaced.



Photograph 2-4. Woods Bridge Force Main Steel Section

Photograph 2-5. Woods Bridge Force Main Coupling

Photograph 2-6. Woods Bridge Force Main Coupling

The Beachy Bridge force main has corroded Megalug joints (see Photograph 2-7). It is recommended that the Megalug joints are removed and replaced with split Megalug joints and stainless steel or Cor-Blue hardware.

2.2.4.4 Flooding

Parts of the collection system are located within the regulatory floodway. These areas include

- Rueppell Avenue
- River Avenue
- Brooten Road at the intersection of River Avenue and north
- Resort Drive
- Airport Lift Station

These areas are prone to river flooding when heavy rainfall and/or tidal influence cause the Nestucca River to exceed its banks. This causes direct inflow of river water into the collection system. As a precaution, PCJWSA turns off the STEP system along North Brooten and Resort Drive. Otherwise, the STEP tanks would be inundated and the associated pumps would run constantly thus overwhelming the STEP system.

Photograph 2-7. Beachy Bridge Force Main Joint

PCJWSA has installed some watertight manhole covers in these areas. It is recommended that PCJWSA replace these with new watertight manhole covers and install watertight manhole covers in any other flood-prone area that does not already have them. It is possible that existing watertight manhole covers or gaskets have failed or were installed incorrectly. PCJWSA should also replace the flow meter at Airport Lift Station and incorporate SCADA upgrades to record flow measurements in a historian database. During the next flood, PCJWSA will better be able to determine the system's response to the flood. If flows increase because of the flood, PCJWSA should inspect all manholes and look for alternative floodwater entry points.

Photograph 2-8 below shows the Airport Lift Station (before the 2013 upgrades) during a flood.

Photograph 2-8. Airport Lift Station During Flood

2.2.4.5 Inflow and Infiltration

Many collection systems designed to convey wastewater also convey some amounts of rainfall-dependent infiltration and inflow (RDII). RDII enters into a collection system through cracked or broken pipes, defective pipe joints, or poorly constructed laterals. RDII can often increase with the age of a collection system, increase operational costs of lift stations, and can overload collection systems and lift stations. Additional information on RDII is found in the flow modeling technical memorandum (see Appendix E).

PCJWSA is in the process of procuring a compact, portable mainline crawler. This is a remote-controlled closed-circuit television unit able to move through and provide video for inspection. It is recommended that PCJWSA regularly inspect its collection system, especially in places where RDII is known. It is currently unknown how many or what defects exist in the collection system. It is known that there is some RDII near the Kiwanda Lift Station. When a defect is identified, it should be repaired to keep RDII at a minimum in the system.

2.3 Treatment System

2.3.1 Wastewater Treatment Plant Overview

The WWTP was originally constructed in 1979 with aeration basins and secondary clarifiers and has had multiple improvements since then.

- The first Side Hill Screen unit was installed in 1991, followed by the second Side Hill Screen unit in 2014.
- The flow equalization basin (FEB) and the Parshall flume were installed in 1998.
- The chlorine disinfection system was replaced in 2002 with the UV light disinfection system.
- Two cloth media filters replaced a dual-media filter in 2005.
- The influent lift station was upgraded in 2013.

In 2018, the following major upgrades were conducted at the WWTP:

- A new headworks with mechanical screens and grit vortex and classifier.
- FEB pump, valving, and piping replacement.
- A new sequencing batch reactor (SBR) and associated alkalinity feed system.
- New solids handling system.
- New filter pumps.
- A new UV disinfection train.
- A new water reuse system.
- Conversion of two clarifiers and two aeration basins into aerobic digesters.

Startup, testing, and seeding of the SBR WWTP was conducted in January and February 2019. The WWTP was marked for substantial completion on May 24, 2019. The additional schedule items including a third cloth filter were installed and completed on October 5, 2020.

The WWTP was originally designed to treat an average monthly flow of 0.36 MGD. Following the recent upgrades, the WWTP is designed for 2.0 MGD peak day flow.

Flows into the WWTP come from three pipelines:

- The Airport Lift Station 8-inch force main pumps directly to the headworks. The Airport Lift Station serves all of the areas east of the Nestucca River and Woods. The Airport Lift Station force main, in turn, receives flows from the Beachy, Ella, and Kiwanda Lift Stations that serve areas west of the Nestucca River south of the WWTP.
- The Cape Kiwanda Drive gravity sewer is 10 inches in diameter; it serves all areas north of the WWTP and flows into the influent lift station.
- A gravity sewer from Nestucca Ridge Development also flows into the influent lift station. This sewer serves the north half of the Nestucca Ridge Development, which is south of and adjacent to the WWTP.

2.3.2 Influent Lift Station

The influent lift station consists of a 15-foot-deep, 8-foot inside diameter concrete manhole with duplex Flygt submersible pumps (see Photograph 2-9). The two pumps are rated at 400 gpm each and 24 feet TDH with 5-horsepower (hp) motors. A hatch provides access to the wet well. A 4-inch drainpipe from other headworks also enters the influent lift station. The influent lift station has a 6-inch force main that

discharges into the 8-inch force main from the Airport Pumping Station, which then discharges into the headworks.

Photograph 2-9. Influent Lift Station Yard Valves and Piping

2.3.3 Headworks

The headworks facility consists of a mechanical screen and a grit removal system. Raw sewage from the influent lift station and Airport Lift Station is conveyed into the headworks. Headworks influent enters a 20-inch rectangular channel, passes through the mechanical screens, and enters the grit chamber. Effluent from the headworks is conveyed to the FEB via a 12-inch pipe.

2.3.3.1 Mechanical Screens

Mechanical screens (Photograph 2-10) remove larger solids from raw sewage and are often the first step in pretreatment of domestic wastewater. There is one mechanical screen at the PCJWSA WWTP. It is a 6 mm perforated screen with a 2.5 MGD capacity. When the screw conveyer is engaged, solids are removed from flow, transported through the integrated screenings washing system and a compaction and dewatering zone, and then discharged onto the screenings conveyer. The system is fitted with a water-resistant brush to clean the screen basket opening; the brush is fastened only to the spiral edge in the screening section. The screenings conveyer transfers the screenings following compaction and dewatering to a disposal container. The screenings conveyer is a 12-inch shaftless screw conveyer, which is capable of handling 75 cubic feet per hour.

Photograph 2-10. Mechanical Screen and Conveyor

The mechanical screen can be bypassed via a bypass channel by moving the channel stop gates. Bypass flow is conveyed through a manual bar screen bypass. The manual bar screens have no mechanized rake, so solids must be manually removed by plant operators with a rake.

2.3.3.2 Grit Removal

This grit removal system (Photograph 2-11) is designed to collect and remove any particles passing the 6 mm perforated plate mechanical screen prior to exiting the headworks. Particles are first removed from suspension by gravity when water passing the mechanical screen is delivered to the 7-foot-diameter conical bottom vortex grit chamber. All wetted parts of the chamber are constructed of Type 316 stainless steel. Inside of the chamber are two flow-control baffles and an impeller. These components are designed to ensure proper vortex flow to facilitate particles settling from solution. Once the water travels through the vortex chamber, it exits the chamber over the outlet baffle and flows out of the headworks. Particles which settle by gravity in the vortex chamber are removed by suction from the bottom of the conical structure using a 5-hp grit pump capable of 220 gpm. Once removed from the chamber, the grit and water mixture is pumped to the cyclone. In the cyclone, the grit and water undergo rotational forces and grit particles are forced into the underflow and to the classifier. The upper flow of cyclone is delivered back to the headworks. Once inside the classifier, the grit particles are separated from the water by gravity and delivered by a 50 percent pitch, 12-inch-diameter screw-type conveyor to the same waste container that collects particles from the mechanical screen.

Photograph 2-11. Grit Removal System. Left to right: Classifier and cyclone, grit pump, and vortex grit chamber

The grit removal system can be bypassed via a bypass channel by moving the channel stop gates. Bypassing the grit removal system should only be done when the grit system is not operable. Bypassed grit will likely accumulate in the FEB and can increase wear on downstream mechanical equipment.

2.3.4 Flow Equalization Basin

The FEB (Photograph 2-12) is an open-top concrete tank that is 48 feet by 51 feet with an operating depth of 1.25 to 5.75 feet. The variable operating depth allows a holding volume of 22,890 to 105,300 gallons. Flows come to the FEB after screening where they are mixed by 64 coarse-bubble diaphragm diffusers; each is rated at 15 to 20 cubic feet per minute (cfm). Two 20-hp regenerative helical blowers located in the blower building provide air at 320 cfm. The mixing rating is 21.8 standard cfm per 1,000 cubic feet of volume or 1.4 hp/1,000 cubic feet of volume.

There are four FEB pumps: two duty and two standby. Each pump's capacity is rated at 400 gpm. The FEB is used to equalize/reduce peak flows by providing temporary holding of flow. The FEB can be bypassed using a portable pump to pump from the FEB bypass wet well to the SBR tanks.

Photograph 2-12. Discharge Pump Piping at the FEB

Flow is conveyed to the FEB by a 12-inch pipe from the headworks. Submersible pumps are used to pump wastewater from the FEB to the SBR units via two 6-inch pipes. Under normal conditions, FEB Pumps 1 and 2 feed SBR 1, and FEB Pumps 3 and 4 feed SBR 2. Each pair of pumps operates in a duty/standby configuration. Each pump has a variable frequency drive (VFD) which is modulated based on the level of wastewater in the FEB. Depending on the level in the FEB, the FEB may operate under continuous level control, fill and draw level control, and high level control.

The FEB was designed to accommodate future growth by including features to allow easy construction of a second basin on the north side of the existing basin. These features include water stops installed in the existing basin where the new basin will be added and pipe fittings with tees and blind flanges to allow connection to the future basin.

Previous master planning efforts noted the potential for generating odors at the FEB. At this time, the FEB does not produce noticeable odors, and no projects are recommended at this point. If in the future the FEB becomes a source of odors, the FEB should be covered. Air would be moved through the basin with blowers and then treated by scrubbing.

2.3.5 Sequencing Batch Reactor

Flow from the FEB is pumped to two SBR tanks via two parallel 6-inch pipes. The SBR (see Photograph 2-13) combines in one tank the biological functions of a conventional activated sludge reactor with the solids/liquid separation function of a clarifier. Each of the two PCJWSA SBR tanks is partitioned into a pre-react and an SBR basin by a baffle wall. The baffle wall has six 20-inch-square openings near the floor to prevent short circuiting and allow the two zones to be hydraulically connected.

The three-unit processes in the PCJWSA SBR are the following:

- React Phase – Screened and de-gritted sewage flows continuously into the pre-react zone and reacts with the mixed liquor suspended solids (MLSS). Sewage flows from the pre-react zone into the main zone through the holes at the bottom of the wall between the zones. Mechanical mixers provide mixing during the anoxic (denitrification) portion of the react phase. During the aerobic portion of the react phase, the entire SBR is aerated to provide mixing and biological oxidation of organics and ammonia. Sewage continues to flow into the pre-react zone throughout this phase.
- Settle Phase – The mixers and aeration air both stop at this phase to allow settling of MLSS. This separates solids and provides a clear decant layer on the upper surface of the SBR. Sewage continues to flow into the pre-react zone throughout this phase.
- Decant Phase – The clean liquid from the upper surface is decanted or removed from the SBR tank. Concurrently, a portion of the settled sludge from the bottom of the tank is removed, or wasted, to the sludge holding tank. Sewage continues to flow into the pre-react zone throughout this phase.

After the settle phase, the decanted water, or secondary effluent, is conveyed by a 12-inch pipe to the filter holding tank or directly to the filters. The accumulated solids, better known as waste-activated sludge (WAS), are pumped by 110-gpm WAS pumps via a 3-inch pipe to the aerobic digesters.

Photograph 2-13. SBR Basin and Decant

2.3.6 Filter Holding Tank

After treatment, the SBR decant flow goes to the filter holding tank (FHT; see Photograph 2-14). Because the SBR decant flow is typically twice the SBR influent flow rate, it can be too high to discharge directly to the filters. To reduce the decant flow surges, a 48,350-gallon FHT is used to temporarily hold and equalize SBR effluent so it can be pumped through to the cloth media filters at an acceptable rate. The FHT has three pumps: two duty pumps and one standby pump. Each pump is rated at 460 gpm for single-pump operation and 833 gpm with two pumps operating. Secondary effluent is pumped to the filters through an 8-inch pipe.

The FHT can be bypassed using either the two plug valves east of the FHT that divert flow directly to the UV disinfection facility (this also bypasses the cloth media filters) or by either of the two gate valves located on the filter influent and effluent manifolds.

Photograph 2-14. Pump Discharge Piping at the FHT

2.3.7 Cloth Media Filters

Cloth media filters are used to filter suspended particles from the SBR effluent (see Photograph 2-15). There are three filters in operation. The filters operate when the FHT pumps are on which raise the water level in the filter. They shut off when the flow stops and the water level decrease. These parameters are configured per the manufacturer. Filtered secondary effluent is conveyed through an 8-inch pipe to the UV disinfection facility. The filters have an internal backwashing mechanism. See the cloth media filter manufacturer's operation and maintenance for more information.

The cloth media filters can be bypassed by either directly discharging from the SBRs to UV disinfection by using the yard valves or by pumping directly from the FHT to UV disinfection.

Photograph 2-15. Cloth Media Filter

2.3.8 Disinfection

UV disinfection inactivates microorganisms present in the filter effluent. The PCJWSA WWTP has two UV channels (duty/standby), each with two banks. The southern channel contains two UV banks and is considered the duty channel. These two new banks treat the design flow of up to 1.27 MGD. The northern channel will be turned on for high flow conditions or to divert the flow during maintenance of the primary channel.

The UV banks have lamps that emit UV radiation. The UV radiation inactivates bacteria, viruses, and protozoan cysts by damaging the microorganisms' DNA and preventing it from reproducing. From the UV disinfection building, effluent is either conveyed to the Nestucca River by the outfall or conveyed to the reuse water system by a 6-inch pipe.

2.3.9 Water Reuse

After UV disinfection, water can be intercepted from the UV system effluent and conveyed to the 7,657-gallon reuse water tank. This is controlled with a motorized butterfly valve. The reuse water pumps (see Photograph 2-16) are used to pump water from the reuse water tank through the reuse water system piping to the final point of use. There are three pumps: two duty and one standby. Each

pump is capable of pumping at 35 gpm. Reuse water is supplied to the WWTP hose bibs, headworks screens and grit system, screw press, alkalinity feed system, and as foam suppression spray water for the SBR. The reuse water piping system is outfitted for future connection to the yard hydrants.

Photograph 2-16. Reuse Water System (right) and Pressure Tank (left)

2.3.10 Outfall

Treated wastewater is discharged into the estuarine waters of the Nestucca River, 1.5 miles before it enters Nestucca Bay. The outfall is located in the tidally influenced lower reach, thus river depth and width vary continuously.

The 12-inch-diameter outfall is approximately 180 feet offshore. The diffuser is a 36-foot-long 12-inch-diameter ductile iron pipe. It has five ports that are each 3 inches in diameter and spaced at 9-foot intervals with a single 3-inch port at the end of the pipe. Four ports are located on the downstream (south) side of the diffuser, and the fifth is in the end plate on the east end of the diffuser pipe. PCJWSA visually inspected and videoed the diffuser with a submersible camera in May 2015. According the NPDES permit, PCJWSA should have the outfall inspected and a report submitted by August 15, 2023, to DEQ. The diffuser was accessible at that time by wading in the Nestucca River. No ports were blocked, and all ports appeared to be discharging normally. The diffuser pipe and anchors were intact and appeared to be in good condition.

2.4 Biosolids Management

2.4.1 Solids Digesting

Wasted biosolids from the SBR system are pumped to the aerobic digestors (see Photograph 2-17). Aerobic digestion is a biological process taking place in the presence of oxygen where microorganisms consume organic matter and convert it to carbon dioxide. At PCJWSA, WAS from the SBR is treated and stabilized in five aerobic digestors which range in size from 29,110 to 58,890 gallons. Blowers provide the mixing and oxygen to each digester. This digestion process reduces the overall volume of solids. There is no solids dewatering before digestion, so each digester is equipped with a decant pump to remove any supernatant. The supernatant is pumped to the filter backwash sump located between Filters No.1 and No.2, which ultimately drains to the 10-inch plant drain.

Digester solids should normally flow from Digester 1 through 5 in series—one after the other. Solids are normally pumped from Digester 2 to Digester 3 and from Digester 4 to Digester 5. Solids are more efficiently treated if they can travel through four or five digesters rather than being treated in separate digesters operating in parallel. After passing through multiple digesters, solids are pumped to the lime mix tank.

Photograph 2-17. Aerobic Digesters

2.4.2 Solids Dewatering

After traveling through four or five digesters in series, the solids should have reached a Class B biosolids treatment level and are ready to be dewatered and land applied.

The operators can, however, choose to further treat the solids by adding lime. Lime is fed to the tank to stabilize the solids. The lime inhibits the growth of undesirable microorganisms by raising the pH which creates unfavorable growing conditions. At PCJWSA, lime is fed into the tank by an auger. Mechanical mixers in the tank are utilized to ensure the lime is well incorporated into the solids.

Once stabilized, solids are land applied. Currently, solids are not dewatered because PCJWSA does not have a polymer that is effective at higher pH. PCJWSA should continue to look for a polymer to use, and once one is identified, the solids process will continue as follows. Solids are pumped to the screw press. Prior to arriving at the screw press, polymer is added to the solids and mixed in a flocculation tank mixer. This process causes the solids to clump together which improves the performance and dewatering of the screw press. After dewatering, solids are conveyed by an auger and dumped onto a truck.

The PCJWSA biosolids management plan was submitted in February 2020. In order to meet Class B pathogen and vector attraction reduction requirements, biosolids are aerobically digested to achieve a

geometric mean of seven representative samples less than 2 million Most Probable Number or 2 million Colony Forming Units of fecal coliform, or as a backup, sufficient lime is added to the biosolids to raise the pH to 12 for 2 or more hours. After stabilization, they are trucked about 15 miles to be land applied on PCJWSA-owned application sites near Beaver, Oregon, on Highway 101 about 12 miles from Pacific City.

2.4.3 Monitoring and Sampling Plan

PCJWSA has developed and implemented a biosolids monitoring and sampling plan. Samples collected and analyzed will be representative of the biosolids to be land applied. Quality control measures and procedures are implemented for microbiological tests to verify precision and accuracy.

All monitoring and reporting will be conducted in accordance with the PCJWSA NPDES permit. The monitoring frequency is based on the amount of biosolids generated that are land applied, marketed to be sold, or given away. Based on 40 CFR §503.16, Table 1, and the amount of biosolids generated and used during 2019, PCJWSA is required to sample biosolids annually.

2.4.4 Recordkeeping

PCJWSA is the preparer and land applier of biosolids and is required to maintain records to demonstrate that federal and state biosolids requirements are met. Records are maintained by PCJWSA. Monitoring and sampling records are retained for a period of no fewer than 5 years. The minimum required records include the following information:

- Pollutant concentrations of each parameter stated in the permit.
- Pathogen requirements as stated in the permit for Class B.
- Description of how one of the vector attraction reduction requirements in 40 CFR §503.33(b)(1) through (8) is met.
- Description of how the management practices in 40 CFR §503.14 and site restrictions in 40 CFR §503.32(b)(5) are met for each biosolids land application site (*Note: This is for Class B bulk biosolids*).
- Certification that the information submitted is accurate to determine compliance with pathogen and vector attraction reduction requirements and site restriction/management requirements.

2.4.5 Annual Reporting

A biosolids annual report is required to be submitted to DEQ each year by February 19 or as required by the permit if bulk biosolids have been land applied or if biosolids-derived products were sold or given away the previous year. The report will include information on biosolids handling activities and data (i.e., monitoring results, nutrient loading rates) from the previous calendar year. Some of the information required with the annual report includes:

- Daily site logs or records including date, time, and quantity (gallon, pounds) of nitrogen/acre land applied.
- Map, including scale, showing the site and the land application location that coincides with the daily site application method (e.g., truck spreader bar, irrigation cannon).

- Signed copy of the certification statement.

2.5 Electrical and Control

2.5.1 Electrical and Control for the Collection and Pumping Systems

The collection system is gravity driven except for the 10 lift stations. The electrical system at all lift stations is 240-volt single-phase except at Airport (480-volt, 3-phase), Hana (480-volt, 3-phase), and Woods (240-volt, 3-phase) Lift Stations. Airport and Hana Lift Stations all have backup power generators. The other lift stations receive power from the electrical utility, have a receptacle to receive standby power from a portable generator, and have a manual transfer switch.

The controls for all the lift stations are similar and include the following:

- Duplex pump control panel located above grade and adjacent to the lift station, except for Hana and Airport.
- Pumps are operated by floats at all lift stations.
- A local beacon light indicates a sewage overflow and/or station trouble. There is a nearby sign with instructions and a phone number for calling in case of trouble.
- Not all the lift stations have remote telemetry. Without remote telemetry, PCJWSA is unable to monitor or check alarms of these lift stations from the WWTP. It is recommended that PCJWSA add remote telemetry to Woods, Roger, Cindy, Straub, and Hana Lift Stations.

Each STEP system's lift station receives its power from the home it serves.

Woods Lift Station is in an area that often floods to a depth of one to two feet. The control panel has a stainless steel enclosure and is mounted about 3 feet above grade on a utility pole. This control panel operates satisfactorily. A red beacon light is located on the pole about 10 feet above grade. A portable 30 kilowatt (kW) standby generator is available for the Woods Lift Station. The generator is U.S. Navy surplus and is beyond its useful life. When used, the generator is at grade and can be partially submerged by floodwater.

Airport and Hana Lift Stations both have standby generators inside the electrical and controls building. The Airport Lift Station is located within the regulatory floodway. There is a floodwall to prevent the floodwater from entering the lift station.

2.5.2 Electrical and Control for the Wastewater Treatment Plant

The WWTP has one 480-volt, 3-phase power feed into the WWTP from the north. Power is routed from the north of the plant to a transformer near the FEB blower building. From the transformer, power is routed to the distribution switchboard inside the Electrical room and then routed to the rest of the plant.

An automatic transfer switch and standby generator are also onsite. The standby generator is 500 kW, 480-volt, 3-phase. The standby generator can provide power to the WWTP, administration building, and influent lift station. It is supplied by a 3,000-gallon freestanding fuel tank.

The WWTP is controlled by a plant-wide SCADA system. This automation allows real-time monitoring of the system status and fine tuning of the operation of many functions and unit processes at the WWTP.

2.6 Existing Operation and Maintenance Practices

2.6.1 Regulatory Requirements

ORS 448.415 and OAR Chapter 340, Division 049 regulate certification requirements for wastewater system operators. The regulations typically require operators to be certified for treatment or collection with a Certification Grade (level) commensurate with the complexity of the treatment or collection system.

OAR 340-049-0020 provides guidance for classifying treatment and collection systems. Under the current permit, the lead operator of the WWTP must have a Level 3 certification. The wastewater is considered a Class I system having a 1,500 or less design population. All owners of WWTPs must have certified operators at a grade equal to or greater than classifications defined in the regulations.

OAR 340-052-0015 and 340-052-0040 require that for any improvements to WWTP or pumping stations to be approved, an operation and maintenance manual must be prepared and that the manual be completed prior to startup of facilities.

OAR 340-045-0015, entitled “Permit Required,” states permit holders must comply with the requirements for recording, reporting, monitoring, entry, inspection, and sampling of the WWTP.

The current NPDES permit requires that records of sludge use and application be maintained for 5 years; for permit compliance records must be maintained for 3 years.

Any noncompliance is to be reported within 24 hours of becoming aware of the circumstances and provide a written account with 5 days.

2.6.2 Operations Staff

PCJWSA has six full-time operators, one full-time manager, one full time supervisor, and two full-time administrative staff. Certifications for operators are as follows;

- Grade III Wastewater Treatment and Grade III Collection System – John Wesely (manager)
- Grade III Wastewater Treatment and Grade I Collection Systems – Leonard Whiteman (supervisor)
- Grade IV Wastewater Treatment – Jason Stewart (operator)
- Grade I Wastewater Treatment and Grade I Collection System – Terry Rand (operator)
- Grade I Wastewater Treatment and Grade I Collection System – Dale Pesterfield (operator)

PCJWSA intends to hire a new OIT in 2023 and another in 5-10 years.

2.6.3 Operational Practices

Based on an interview with the PCJWSA manager, the following operation practices are routinely conducted by PCJWSA staff:

- Routine sampling and testing of WWTP influent, effluent, receiving stream, and biosolids is conducted in accordance with the NPDES permit.
- All STEP systems are inspected on an annual basis.

- Screenings are hauled to the landfill every 1 to 2 weeks. Aerobically digested sludge is either dewatered or lime stabilized before being land applied.
- Sewage lift stations are checked three times per week, and thorough inspections are performed monthly.
- Treatment processes are checked each day, and adjustments are made if needed.
- Standby emergency power generators are exercised on a weekly basis.
- The filter holding tank is cleaned on a monthly basis.
- The disc filters are inspected daily and cleaned as needed.
- The UV lamps and sleeves are cleaned on a monthly basis and replaced as needed.
- Septage is pumped from septic tanks every 5 years for full-time residents or on an as-needed basis for part-time residents.

Operation and maintenance needs identified by PCJWSA staff include the following:

- A sewer line video camera system that will allow routine inspection and accurately map the collection system.
- Additional storage space is needed for vehicles and equipment.
- Sewer lift stations are in need of major upgrades or rebuilds.
- Secondary treatment pH adjustment.

3. FUTURE WASTEWATER SYSTEM NEEDS

This chapter describes needed future improvements. In Chapter 4, these improvements are scheduled over time, and capital and operating costs estimated.

3.1 Anticipated Future Regulatory Requirements

The current regulatory requirements are reflected in the NPDES permit. The permit requires monitoring of nutrients and temperature. The current permit is valid until June 30, 2025. At this time, there has been no indication from DEQ that major permit modifications will be made during the next renewal period.

3.2 Recommended Future Collection and Pumping System Needs

Computer modeling indicated that the gravity sewer collection system has adequate capacity for the 2042 population, for both dry weather flow (at high tourist and seasonal resident populations) and under wet weather flow conditions except when there is flooding (see Table 3-1). A summary of the model setup, calibration, and existing and future conditions is in Appendix E.

Rather than add a pump at the Airport Lift Station, it is recommended to replace all the watertight manholes. It is possible that these have failed or are not properly installed. Any manhole within the floodplain that does not already have a watertight manhole cover should have one installed. These manholes should help reduce river floodwater from entering the collection system. PCJWSA estimates that 80 percent of their manholes within the floodway have a watertight manhole. If PCJWSA could reduce peak inflow rate by 20 percent, it would not need to add an additional pump at Airport. Following future flood events, PCJWSA should review Airport flow meter data to confirm that peak flow was reduced sufficiently.

The flow meter at Airport Lift Station should be replaced, and the telemetry and SCADA system should be updated to log flow measurements in the historian database. Following a flooding event, the pump runtimes should be compared to those of the prior days to establish a baseline for the efficacy of the watertight manholes. In the future, unusual amounts of inflow during a flood event may suggest that one or more of the manhole covers are not installed correctly or have failed.

Because of age, the pumps at Cindy, Roger, Beachy, and Madrona lift Stations should be upgraded. The electrical and controls systems should be updated at the same time. The electrical and controls should also be upgraded at the Woods Lift Station.

Telemetry should be provided at Woods, Roger, Cindy, Straub, and Hana Lift Stations. This will allow PCJWSA to manage and track alarms and run status at the remote lift stations.

Table 3-1. Lift Station Capacity Needs at Build-Out

Lift Station	Capacity (gpm)	Future Peak Flow (gpm, no river flooding)	Future Peak Flow (gpm, with river flooding)
Airport	755	315	925
Madrona	250	28	28
Kiwanda	439	28	28
Ella	134	36	36
Beachy	300	110	110
Straub	151	13	13
Cindy	190	6	6
Roger	140	9	9
Woods	150	25	25
Hana	110	12	12

gpm = gallons per minute

The river crossing pipelines on Slough Bridge, Woods Bridge, and Beachy Bridge all need to be upgraded as described in Chapter 2 to mitigate corrosion and seismic concerns.

3.3 Recommended Future Wastewater Treatment Plant and Biosolids Management Needs

The influent lift station and WWTP have gone through significant upgrades in recent years. These upgrades concluded in 2020. At this point, no upgrades are recommended as part of this master plan.

4. RECOMMENDED IMPROVEMENTS, COSTS AND IMPLEMENTATION

This section presents recommended improvements based upon the previous evaluations, deficiencies identified by PCJWSA staff, and system needs to accommodate growth. The first section describes recommend improvements. The second section tabulates the improvements over the planning period and provides an opinion of capital costs. The third section lists operational needs and costs.

4.1 Descriptions of Recommended Collection, Pumping, and Treatment Improvement Projects

The following list contains recommended improvement projects for the wastewater system through the year 2042. Each item is listed by priority and contains a title and brief description. Figure 4-1 shows the proposed improvements. The objective is to replace system components that are undersized or need replacing or to provide new components to better accommodate growth. Project numbers correspond to the prioritized project list with cost opinions in Table 4-1.

1. Watertight Manhole Covers. Install all new watertight manhole covers in areas inundated by floods. Inspect all manholes for leaks or defects at the manhole walls, joints, or connections. Recent flow monitoring indicates significant inflow of river floodwater through these areas.
2. Airport Flow Meter. Replace the Airport Lift Station flow meter. Upgrade telemetry and the SCADA system so flow measurements are logged through the historian. Following flooding events, compare flow meter data to days prior to understand the level of direct inflow from flooding into the collection system.
3. Lift Station Upgrades. Replace aging pumps, the electrical system, and the controls at Cindy, Roger, Beachy, and Madrona Lift Stations.
4. I&I Inspections. Inspect the collection system with a closed-circuit television crawler device. Prioritize areas of known infiltration such as the Madrona Lift Station service area. Repair defects as encountered. The cost opinion does not include repair costs because the type and extent of repair are not currently known. Cost opinions will be determined after the I&I inspections are performed, and funding for the repairs will be determined at that time.
5. Remote Telemetry. Install remote monitoring for Woods, Roger, Cindy, Straub, and Hana Lift Stations.
6. pH Adjustment System. Upgrade chemical feed system in secondary treatment to provide a new alkalinity feed system.
7. Woods Lift Station Upgrade. Upgrade electrical and controls system at Woods Lift Station.
8. Woods Bridge Force Main. Replace corroded steel piping and couplings with ductile iron.
9. Beachy Bridge Force Main. Replace corroded Megalug joints with stainless steel or Cor-Blue hardware.
10. Bridge Seismic Upgrades. Provide seismic-resilient joints at the bridge connections for the Woods Bridge, Beachy Bridge, and Slough Bridge force mains.

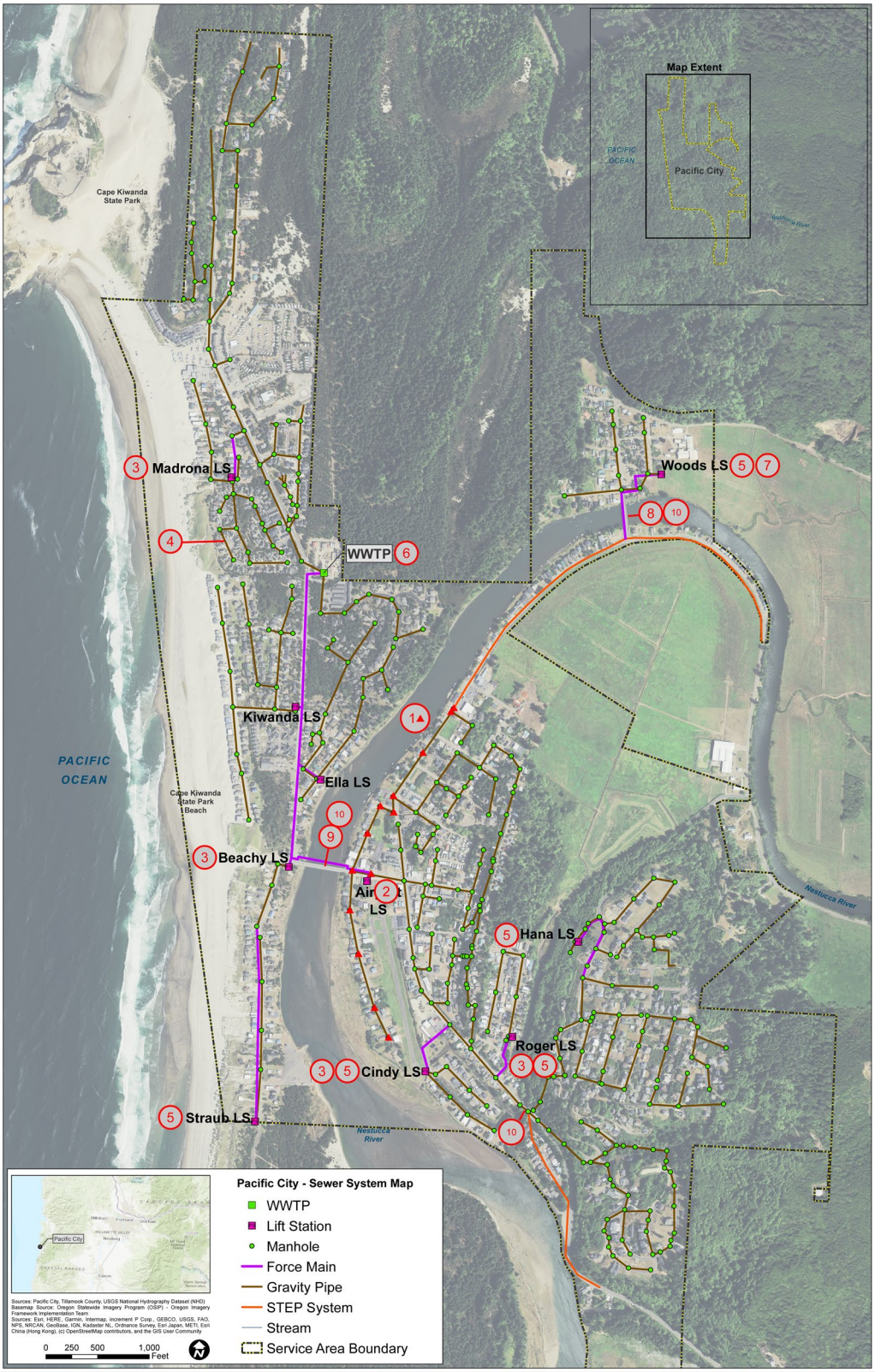


Figure 4-1. Proposed Improvements

4.2 Implementation Schedule and Capital Cost Opinions for Recommended Improvements

Table 4-1 contains the improvements and proposed schedule for implementation. An opinion of the total project cost is also shown in Table 4-1. The cost opinion includes construction cost, surveying, engineering, a contingency, and PCJWSA administrative costs. The following general assumptions apply to the cost opinion:

- A contingency is added to address details not covered in this preliminary estimate and to attend to unanticipated circumstances. Actual costs may vary because of market conditions, contractor desire for work, subsurface conditions, and other factors not known at this time.
- Surveying is included for all new pipeline work. A production rate of 1,000 linear feet of surveying per crew-day was used with typical crew rates, plus time to prepare base maps for engineering.
- For I&I reduction, the cost opinion does not include repair costs because the type and extent of repair are not currently known. Cost opinions will be determined after the I&I inspections are performed, and funding for the repairs will be determined at that time.
- Other project costs include design engineering, bidding and construction phase services, and preparation of the DEQ-required operation and maintenance manual and record drawings. Engineering for treatment plant projects was based on the complexity of the project and the estimated number of engineering plans.
- At the time of writing this master plan, inflation was significantly higher than previous years. For the costs shown below, it was assumed that inflation would average 7 percent per year for the first 2 years and then lower to 4 percent after those 2 years.

Table 4-1. Proposed Improvements, Year of Implementation, and Cost Opinion

Project Number	Description	Year	Cost
1	Watertight Manhole Covers	2023	$50,000
2	Airport Flow Meter	2023	$10,000
3	Lift Station Upgrades	2023	$180,000
4	I&I Inspections	2023	$150,000
5	Remote Telemetry	2024	$18,000
6	pH Adjustment System	2025	$75,000
7	Woods Lift Station Upgrade	2026	$44,000
8	Woods Bridge Force Main	2032	$16,000
9	Beachy Bridge Force Main	2032	$12,000
10	Bridge Pipe Seismic Upgrades	2040	$161,000

4.3 Operation and Maintenance Costs

The annual expenditures for PCJWSA include salaries and expenses to operate the wastewater system. The past 5 years of data were evaluated. In the previous 5 years, a number of longtime employees retired and had a significant amount of time off to cash out. PCJWSA also hired an operations manager during this period, and a number of employees received equity salary increases. This type of variation in payroll is not anticipated to be typical for the remainder of the planning horizon.

PCJWSA intends to hire a new OIT in 2023 and another in 5 to 10 years. For planning purposes, it was assumed this would occur in 2030.

Operation and maintenance costs include labor payroll, materials, supplies, chemicals, training, office supplies, electricity, and equipment. The 2023 budget was used as a base for estimating future operating and maintenance costs. These are inflated at 3 percent per year. To this was added estimated costs for proposed new staff and additional costs to operate and maintain new facility to include electricity, laboratory testing, maintenance, and operating costs. Table 4-2 includes estimates of O&M costs projected through the year 2042.

Table 4-2. O&M Costs Projected through the Year 2042

Year	Payroll	New Hire Added Payroll	Total Payroll	Existing Materials and Expenses	Electricity	Total O&M
2022	$477,208	-	$477,208	$234,841	$47,491	$ 759,540
2023	$537,918	$41,600	$579,518	$251,966	$48,000	$ 879,484
2024	$554,056	$42,848	$596,904	$259,525	$49,440	$ 905,869
2025	$570,677	$44,133	$614,811	$267,311	$50,923	$ 933,045
2026	$587,798	$45,457	$633,255	$275,330	$52,451	$ 961,036
2027	$605,431	$46,821	$652,253	$283,590	$54,024	$ 989,867
2028	$623,594	$48,226	$671,820	$292,098	$55,645	$1,019,563
2029	$642,302	$49,673	$691,975	$300,861	$57,315	$1,050,150
2030	$661,571	$105,243	$766,814	$309,887	$59,034	$1,135,735
2031	$681,418	$108,400	$789,818	$319,183	$60,805	$1,169,807
2032	$701,861	$111,652	$813,513	$328,759	$62,629	$1,204,901
2033	$722,917	$115,002	$837,918	$338,622	$64,508	$1,241,048
2034	$744,604	$118,452	$863,056	$348,780	$66,443	$1,278,279
2035	$766,942	$122,005	$888,948	$359,244	$68,437	$1,316,628
2036	$789,951	$125,665	$915,616	$370,021	$70,490	$1,356,127
2037	$813,649	$129,435	$943,085	$381,122	$72,604	$1,396,810
2038	$838,059	$133,318	$971,377	$392,555	$74,782	$1,438,715
2039	$863,200	$137,318	$1,000,518	$404,332	$77,026	$1,481,876
2040	$889,096	$141,437	$1,030,534	$416,462	$79,337	$1,526,332
2041	$915,769	$145,681	$1,061,450	$428,956	$81,717	$1,572,122
2042	$943,242	$150,051	$1,093,293	$441,824	$84,168	$1,619,286

5. FINANCING

5.1 Overview

PCJWSA operates both the water and sewer systems within the community of Pacific City. Since 1998, when the former Pacific City Water District and the former Pacific City Sanitary District merged to form PCJWSA, the financials have been reported as a single consolidated utility. To fund water projects, PCJWSA can issue debt either to another federal, state, or local agency pledging gross revenues from only water rates and charges, or from water and sewer rates and charges. Also, PCJWSA can legally issue voter-approved GO bonds and assess property taxes to pay annual debt service (principal and interest) until the bonds are fully repaid. PCJWSA also qualifies for some federal and state grant and lending programs. In this chapter, we review the methods of borrowing, sources of revenues to repay the loans, the possible lenders, and current financial conditions.

5.2 Financing Methods and Sources

5.2.1 Methods of Borrowing

5.2.1.1 Direct State Loans

PCJWSA has three legal means of borrowing money. The first and easiest is to borrow from the State of Oregon via programs the State offers. These loans are state-to-municipal loans for water and sewer that do not require PCJWSA to issue bonds. Only administrative action by the PCJWSA Board of Directors is required to obligate PCJWSA to accept the loan and to repay it. It is not subject to voter referral to an election. PCJWSA can refer this loan to a vote of the people to secure a GO taxing authority. If it is successful, then PCJWSA can assess property taxes to repay this loan. Otherwise, PCJWSA has to pledge to increase its user fees sufficient to pay all operating costs and annual debt service.

5.2.1.2 Revenue Bonds

PCJWSA has the power to issue revenue bonds under the authority of ORS 287A.150. The PCJWSA Board of Directors would adopt a resolution of intent to issue a revenue bond. The resolution spells out the purpose(s) and amount(s) of the bond(s). The resolution and notice of the resolution have to be published in at least one newspaper or comparable method of notification, and then there is a 60-day waiting period during which time voters may collect petition signatures of 5 percent of the electorate to refer the bonds to a vote. If a referral is not undertaken or successful, then the PCJWSA Board of Directors has the authority to negotiate and sell revenue bonds.

Revenue bond advantages include increased flexibility since bonds are not typically restricted by debt limitation statutes, and voter approval is not typically required (unless 5 percent of the electorate signs a petition). Disadvantages of the revenue bonds are that they are more complex financial arrangements and that they are used to finance revenue-producing projects.

5.2.1.3 General Obligation Bonds

PCJWSA has the power to issue GO bonds through Tillamook County by the authority of ORS 297A.100, but only upon voter approval. PCJWSA would draft and adopt a bond resolution and submit the

resolution and a bond title to the Tillamook County elections officer to place on the ballot for a general election. In an even-numbered year, voters would approve (or disapprove) the bonds by a simple majority of those who vote at the election. In an odd-numbered year, voters would approve the bonds only if more than 50 percent of the voters cast ballots and more than 50 percent of the votes cast were in favor of the bonds (double majority). Once voters approve issuing GO bonds, then PCJWSA has the power to negotiate the sale of the bonds and to assess property taxes at a rate that will generate up to an amount equal to total annual debt service. Because GO bonds are a full faith and credit pledge of PCJWSA, they get a lower interest rate on the municipal bond market than comparably sized revenue bonds. Federal and state lenders do not differentiate the interest rate between revenue and GO bonds. Also, annually the PCJWSA Board of Directors, through the budgeting process, can decide to pay the next year's debt service partially from user fee revenues, system development charge (SDC) revenues, or property tax assessments. This flexibility allows the PCJWSA Board of Directors to more equitably allocate the cost of debt service to its rate and taxpayers.

Sewer (or water) rates use a "pay-for-services-rendered" notion of equity. The more water (which is also used to estimate sewage flows) a customer uses, the more it pays in debt service (and in operating costs). Property taxes use an "ability-to-pay" notion of equity. That is, the more valuable a tax payer's property (a surrogate measure of wealth), the more the tax payer pays in debt service. By adjusting the percentage of total annual debt service paid from user fees (or SDCs) and the percentage paid from taxes, the PCJWSA Board of Directors can adjust its own notions of equity.

Because these bonds are tax exempt, the interest portion of the tax payments on these bonds is deductible from Oregon and federal income taxes.

PCJWSA has to use one of these three methods of borrowing. Selecting the lender has much to do with the method of borrowing, which is discussed below.

5.2.2 Sources of Financing

PCJWSA has three separate sources of financing for wastewater improvement projects:

- Municipal bond market
- The U.S. Department of Agriculture (USDA) Rural Development Water and Environmental Programs
- Oregon Business Development Department

5.2.2.1 The Municipal Bond Market

This source of financing is 100 percent loan—no grants. These loans are placed through financial institutions that require that an official statement of offering be prepared that clearly demonstrates the municipality's legal and financial ability to borrow and repay the loan. Typical closing costs to prepare the bonds range from 1.5 percent to over 2.0 percent of the amount of the bonds being issued.

5.2.2.2 USDA Rural Development Water and Environmental Programs

USDA provides financing resources through the Rural Utilities Service Water and Environmental Programs (WEP). WEP focuses specifically on rural communities with populations of 10,000 or less and aims to develop drinking water and wastewater systems. PCJWSA is eligible for this program and used this program for upgrades to its wastewater treatment plant. PCJWSA applied and received a $30,000

grant from the Special Evaluation Assistance for Rural Communities and Households (SEARCH) Program to conduct an environmental review and preliminary engineering report. It also received an $8.7 million loan and $1.9 million grant through the Water and Wastewater Disposal program for the construction of the WWTP.

Applications are accepted electronically through the USDA Rural Development RD Apply website or submitted through the local USDA Rural Development office. For more information, contact Jay DeLapp, the Community Programs Specialist for Tillamook County, jay.delapp@usda.gov or at (541) 801-2676.

The following programs administered through WEP may be applicable for PCJWSA:

- SEARCH
- Water and Waste Disposal Loan and Grant Program

Special Evaluation Assistance for Rural Communities and Households

The SEARCH program serves rural communities with a population of 2,500 or less and where median household income is below the poverty line. The program is intended to help small, financially distressed rural communities. Funds can be used for feasibility studies, preliminary design, and technical assistance to develop applications for financial assistance. PCJWSA applied for and received a $30,000 grant from this program on the wastewater side to conduct an environmental review and preliminary engineering report for upgrades at its WWTP. Applications are open year-round.

Water and Waste Disposal Loan and Grant Program

This program provides funding for clean drinking water, sanitary sewer, and stormwater systems. Areas with less than 10,000 people are eligible. The program provides long-term, low-interest loans to finance construction or improvements. Terms for the loans are up to 40 years based on the expected life of the systems. The fixed, low interest rates are based on the median household income of the area. For some, the program will also provide a grant to keep costs lower for the users. PCJWSA received an $8.7 million loan and $1.9 million grant through this program for the construction of the WWTP. Applications are open year-round.

5.2.2.3 Oregon Business Development Department

The Oregon Business Development Department came from what was previously the Oregon Economic and Community Development Department. The Infrastructure Finance Authority administers resources for development activities in the water and wastewater industry. The regional development officer for Tillamook County is Melanie Olson who can be contacted at melanie.olson@oregon.gov or 503-801-7155 for more information.

The following programs administered through the Infrastructure Finance Authority may be applicable to PCJWSA:

- Community Development Block Grants (CDBG)
- Safe Drinking Water Revolving Loan Fund (SDWRLF)
- Special Public Works Funds (SPWF)
- Water/Wastewater Financing Program (WWFP)

Community Development Block Grants

CDBG funds public works infrastructure including water and wastewater treatment plants, public water and sewer pipe, and water reservoirs. Funds can only be applied to final design or construction. No funding for planning activities is provided. PCJWSA is eligible for this program. All non-metropolitan cities and counties in rural Oregon are eligible for grants. For PCJWSA to receive one of these grants, the project must demonstrate the benefit to low- and moderate-income families.

CDBG will fund up to $2,500,000 for public water works projects. Applications are accepted in spring and summer of each year.

Safe Drinking Water Revolving Loan Fund

The SDWRLF provides funds for engineering, design, upgrade, construction, or installation of system improvements and equipment for water intake, filtration, treatment, storage, and transmissions. Funds can also be used toward acquisition of property or easements, improvements to physical security, and legal or technical help. Funds are strictly prohibited from being used on ongoing operations, fire suppression projects, projects that do not directly address the most severe noncompliance and health risks, and growth beyond industry-standard 20-year projections. PCJWSA is eligible for this program. To be eligible, a water system must service at least 25 or more year-round residents or have 15 or more connections; systems cannot be federally owned or operated. It may prove to be challenging to obtain a SDWRLF for the projects listed as part of this master plan; however, some wastewater projects—such as using reclaimed wastewater effluent to replace potable sources—are eligible.

SDWRLF provides up to $6 million per project with possible subsidized interest rates and principal forgiveness. Loans tend to be 30 years or the useful life of the project asset, whichever is less. Drinking water providers must submit their proposed drinking water project information on a Letter of Interest (LOI) form found on the Oregon Business Development Department website. LOIs are due each quarter on March 15, June 15, September 15, and December 15. LOIs are rated and ranked to create a project priority list; funding is available only for those projects on the list.

Part of the SDWRLF is the Sustainable Infrastructure Planning Projects for projects that promote sustainability in the drinking water industry. These projects receive a 100 percent forgivable loan that funds up to $20,000. PCJWSA is likely not to receive this funding as priority for these projects is given to water systems with fewer than 300 connections.

Special Public Works Funds

SPWF is geared primarily for developing industrial and commercial lands. This likely does not impact PCJWSA in the near future but could be a possibility later on; however, it can be applied to projects as a result of a natural disaster. For emergency projects, the fund provides a 25 percent match (up to 500,000). Grants are also available for projects with a business commitment to create or retain traded sector jobs up to $5,000 per job not to exceed 85 percent of the project cost or $500,000 per project. The application process is open year-round.

Water/Wastewater Financing Program

WWFP provides low-cost financing for planning, design, and construction of water and wastewater infrastructure. PCJWSA is eligible for this program as are most public entities. Applications are accepted year-round and require submission of a Project Notification and Intake form. Contact the Regional Development Officer (Melanie Olson, see Section 5.2.2.3) for additional information.

Loans are limited to $10,000,000 per project with up to 25 years of repayment. Loans are typically repaid with utility revenues or voter-approved bonds.

Grants may be awarded where the annual median household income is less than the state average. Grants may be as much as $750,000.

Additionally, the Infrastructure Finance Authority offers grants up to $20,000 and loans up to $60,000 for utilities serving fewer than 15,000 people. These grants may be used toward preliminary planning, engineering studies, and economic investigations.

5.2.3 Sources of Revenue

PCJWSA has four basic sources of revenue to pay for capital projects or repay future loans:

1. Capital improvement charges
2. Interest from the local government investment pool (LGIP)
3. SDCs
4. Property taxes

Revenue is also generated by water usage per customer. Sewer connections are not metered and rely on water billing records to assess sewer usage. This is PCJWSA's primary source to pay for all operating expenditures such as payroll and electricity, and the PCJWSA Board of Directors can increase the rates as needed to meet its financial obligations. Only those connected to the sewer collection system pay these rates.

5.2.3.1 Capital Improvement Charges

PCJWSA charges all users $5.00 per month for sewer collection system capital improvements.

There is a separate monthly capital improvement charge (CIC) to fund the annual WWTP upgrade repayment. Table 5-1 outlines the WWTP CIC schedule.

Table 5-1. WWTP CIC Schedule

User	Monthly WWTP CIC
Residential/Non Profit	$8.50
Vacation Rentals	$51.00
Commercial (0 - 5,000 cubic feet)	$59.50
Commercial (5,001 – 20,000 cubic feet)	$102.00
Commercial (20,001+ cubic feet)	$123.25

5.2.3.2 Local Government Investment Pool

PCJWSA has investments in the LGIP which is included in the Oregon Short-Term Fund. Investments in the short-term fund are governed by ORS 294.135, the Oregon Investment Council, and portfolio guidelines issued by the Oregon Short-Term Fund Board. Interest from the investment funds are used to finance capital improvement projects. As of January 31, 2022, PCJWSA had over $5 million in

investments in the LGIP. Around $3 million of the fund is allocated to the wastewater system for the WWTP CIC, sewer CIC, and sewer operations.

5.2.3.3 SDCs

In the 1989 Oregon state legislative session, a bill was passed that created a uniform framework for the imposition of SDCs statewide. ORS 223.297 to 223.314, which became effective on July 1, 1991, (with subsequent amendments), authorizes local governments to assess SDCs for the following types of capital improvements:

- Drainage and flood control
- Water supply, treatment, and distribution
- Wastewater collection, transmission, treatment, and disposal
- Transportation
- Parks and recreation

SDCs can be developed around two concepts—reimbursement fee or improvement fee—or a combination of the two.

The reimbursement fee is based on the costs of capital improvements *already constructed or under construction*. The legislation requires the reimbursement fee to be established or modified by an ordinance or resolution setting forth the methodology used to calculate the charge. This methodology must consider the cost of existing facilities, prior contributions by existing users, gifts or grants from federal or state government or private persons, the value of unused capacity available for future system users, rate-making principles employed to finance the capital improvements, and other relevant factors. The objective of the methodology must be that future system users contribute no more than an equitable share of the capital costs of *existing* facilities. Use of reimbursement fee revenues is restricted only to capital expenditures for the specific system for which they are assessed including debt service.

The methodology for establishing or modifying an improvement fee must be specified in an ordinance or resolution that demonstrates consideration of the *projected costs of capital improvements identified in an adopted plan and list* that are needed to increase capacity in the system to meet the demands of new or expanded development. Use of revenues generated through improvement fees is dedicated to capacity-increasing capital improvements or the repayment of debt on such improvements. An increase in capacity is established if an improvement increases the level of service provided by existing facilities or provides new facilities.

In many systems, growth needs will be met through a combination of existing available capacity and future capacity-enhancing improvements. Therefore, the law provides for a combined fee (reimbursement plus improvement component).

Table 5-2 outlines the current SDC schedule.

Table 5-2. Current SDC Schedule

Meter Size	SDC
5/8 x 3/4 inches	$ 9,729
1 inch	$ 25,975
1-1/2 inches	$ 32,395
2 inches	$ 64,889
3 inches	$ 97,284
4 inches	$ 129,677
6 inches	$ 325,511
5/8 x 3/4 inches – Duplex/fourplex, per unit	$ 9,729
5/8 x 3/4 inches – Apartment, per unit	$ 6,905
5/8 x 3/4 inches – Lodging facility per unit	$ 7,687
5/8 x 3/4 inches – Space in a recreational vehicle park	$ 4,378

5.2.3.4 Property Taxes

PCJWSA can collect property taxes to repay voter-approved GO bonds. The tax levy is calculated annually, and the revenues by state law are restricted to repayment of the specific debt authorized by voters. As soon as the bonds are repaid, PCJWSA must stop levying the tax. This source of revenue is the most secure for lenders, and lenders reward municipalities that issue GO bonds with lower interest rates than comparably sized revenue bonds.

5.3 Financial Analysis

A financial forecast provides PCJWSA with a snapshot of its current financial status and its ability to finance the projects listed in the Capital Improvement Plan (CIP). These forecasts include numerous assumptions and can deviate from observed conditions in the future. As such, PCJWSA should review this forecast annually and compare it to observed conditions. The intent of this exercise is to determine the potential need to finance projects in the CIP outside of the current funding mechanisms.

Table 5-3 is a 10-year forecast. Water Revenue includes the monthly CIC, interest from the LGIP, and SDCs. It was assumed that the CIC would stay constant throughout and that the interest acquired from the LGIP and the SDC rates would increase by 3 percent annually. In general, the SDC rates have typically increased 2 to 3 percent; however, there have been some years with no increases. PCJWSA uses economic indicators each year to determine the SDC increase annually, and 3 percent was selected based on historical information and anticipation of the future. Expenses in Table 5-3 were developed based on the previous 5 years and escalated 3 percent annually into the future.

Projects from the CIP were included in this table based on the year each appears in the CIP. Based on this high-level analysis, PCJWSA has the funding mechanisms needed to finance the projects in the CIP.

Table 5-3. Projected Short-Term Cash Flow

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Starting Balance	$1,643,000	$1,294,382	$1,318,870	$1,287,497	$1,288,299	$1,334,309	$1,381,565	$1,430,104	$1,479,964	$1,531,184
Water Revenue	$202,696	$208,642	$214,766	$221,074	$227,571	$234,263	$241,156	$248,256	$255,568	$263,101
Expenses	$161,314	$166,154	$171,138	$176,272	$181,561	$187,007	$192,618	$198,396	$204,348	$210,478
CIP Projects	$390,000	$18,000	$ 75,000	$44,000	-	-	-	-	-	$28,000
Ending Balance	$1,294,382	$1,318,870	$1,287,497	$1,288,299	$1,334,309	$1,381,565	$1,430,104	$1,479,964	$1,531,184	$ 1,555,806

5.4 Recommendations

This section discusses known funding mechanisms for capital improvement projects. Current revenues can provide sufficient funding for the current expenses and anticipated capital projects. PCJWSA has invested heavily in its wastewater system over the past 10 years to address most of the deficiencies identified in the previous plans.

If unexpected capital costs exceed the funds available, PCJWSA should begin to look for outside or additional resources to fund the CIP. It should begin by requesting a one-stop financing roundtable with Business Oregon (also referred to as Oregon Business Development Department in this master plan). This will give PCJWSA the opportunity to review the CIP with Business Oregon, Rural Development, and DEQ in one meeting. After the meeting, PCJWSA should have a better idea which projects may qualify for funding and through which state or federal program. A list of potential funding programs is provided earlier in this master plan; however, this meeting will help to focus PCJWSA on the most advantageous ones.

6. REFERENCES

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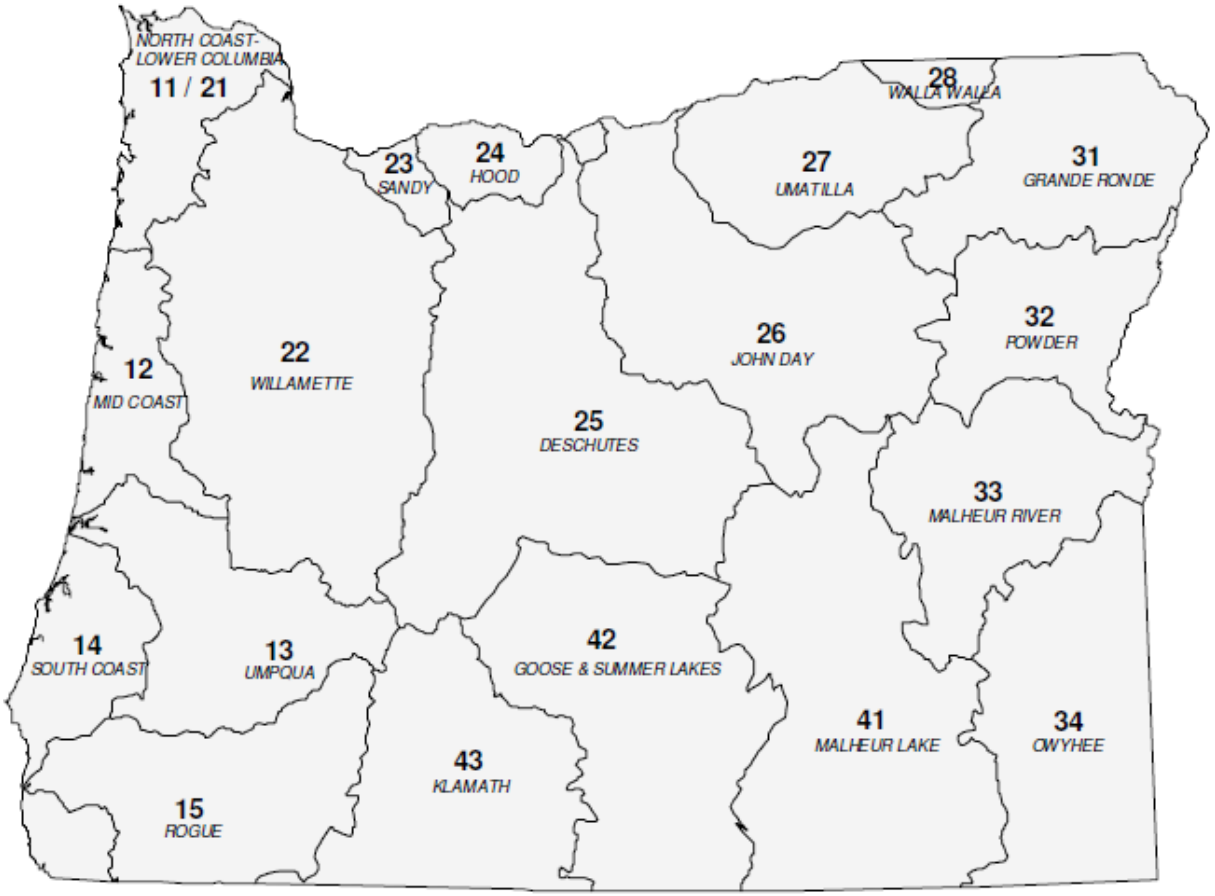
PRC (Portland State University College of Urban and Public Affairs Population Research Center). 2020. Coordinated Population Forecast for Tillamook County, its Urban Growth Boundaries (UGB), and Area Outside UGBs 2020-2070. Available at https://pdxscholar.library.pdx.edu/opfp/67/.

Appendix A

Relevant Tables and Figures from OAR 340-41-0230

Figure 1: Oregon Basin Index Map



Basin Name	Basin #	OAR #
DESCHUTES	25	340-041-0130
GOOSE & SUMMER LKS	42	340-041-0140
GRANDE RONDE	31	340-041-0151
HOOD	24	340-041-0160
JOHN DAY	26	340-041-0170
KLAMATH	43	340-041-0180
MALHEUR LAKE	41	340-041-0190
MALHEUR RIVER	33	340-041-0201
MD COAST	12	340-041-0220
NORTH COAST-LWR COL	11-21	340-041-0230
OWYHEE	34	340-041-0250
POWDER	32	340-041-0260
ROGUE	15	340-041-0271
SANDY	23	340-041-0286
SOUTH COAST	14	340-041-0300
UMATILLA	27	340-041-0310
UMPQUA	13	340-041-0320
WALLA WALLA	28	340-041-0330
WILLAMETTE	22	340-041-0340

OAR 340-041-0230
Table 230A
Designated Beneficial Uses
North Coast Basin

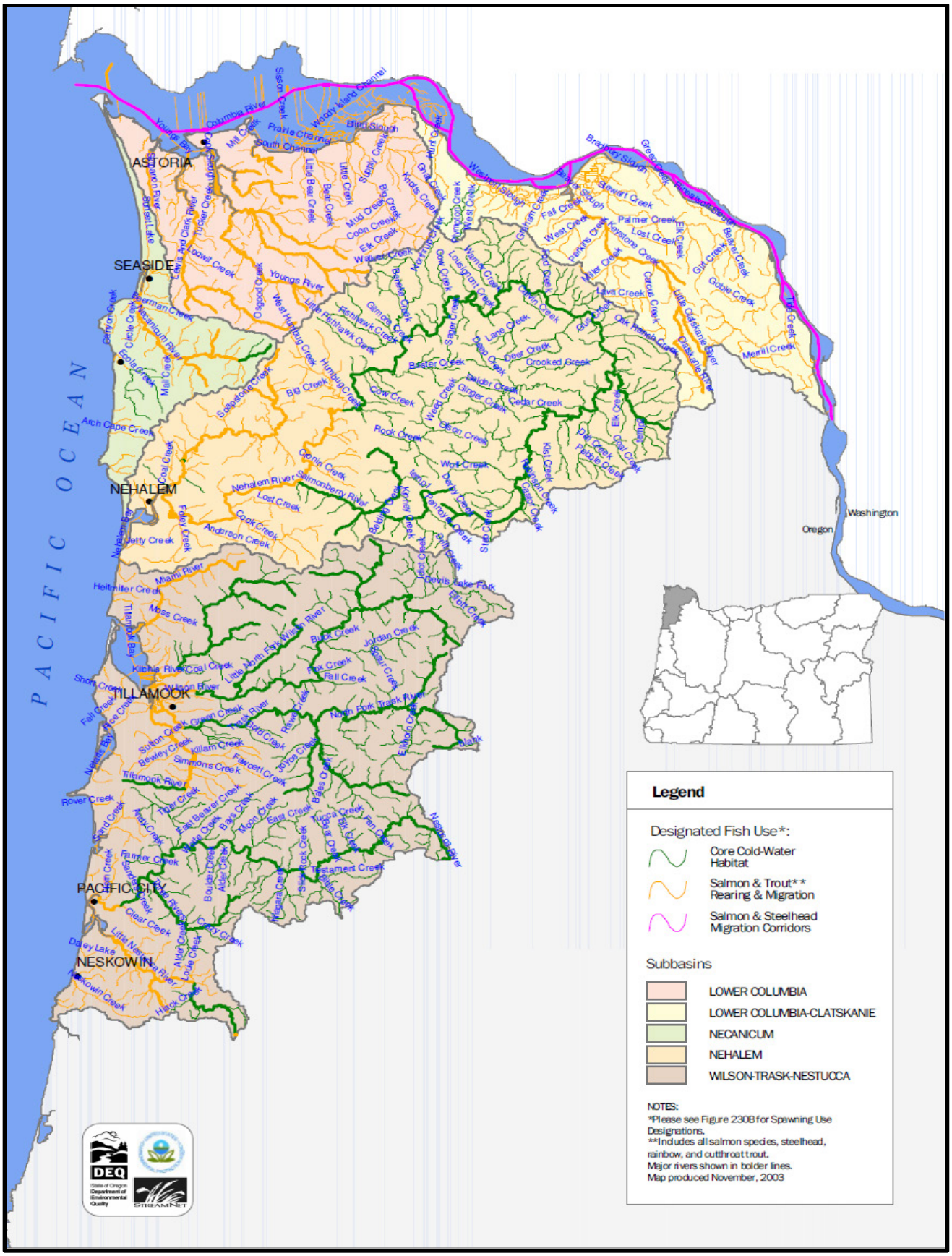
Beneficial Uses	Estuaries & Adjacent Maine Waters	All Steams & Tributaries Thereto
Public Domestic Water Supply[1]		X
Private Domestic Water Supply[1]		X
Industrial Water Supply	X	X
Irrigation		X
Livestock Watering		X
Fish & Aquatic Life[2]	X	X
Wildlife & Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power		
Commercial Navigation & Transportation	X	

[1] With adequate pretreatment (filtration & disinfection) and natural quality to meet drinking water standards.
[2] See also Figures 230A and 230B for fish use designations for this basin.

State of Oregon Department of Environmental Quality

OAR 340-041-0230 – Figure 230A

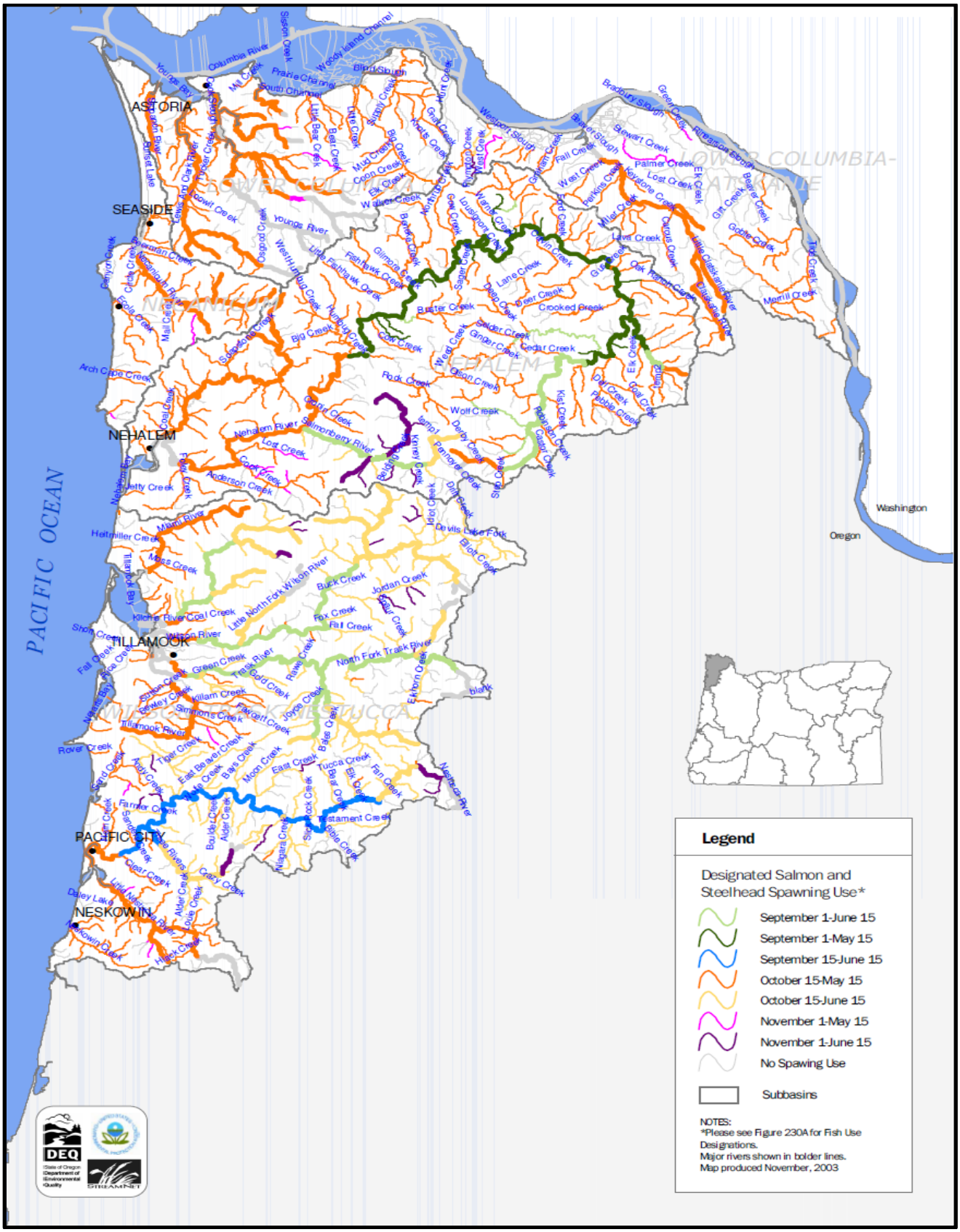
Fish Use Designations* - North Coast Basin, Oregon



State of Oregon Department of Environmental Quality

OAR 340-041-0230 – Figure 230B

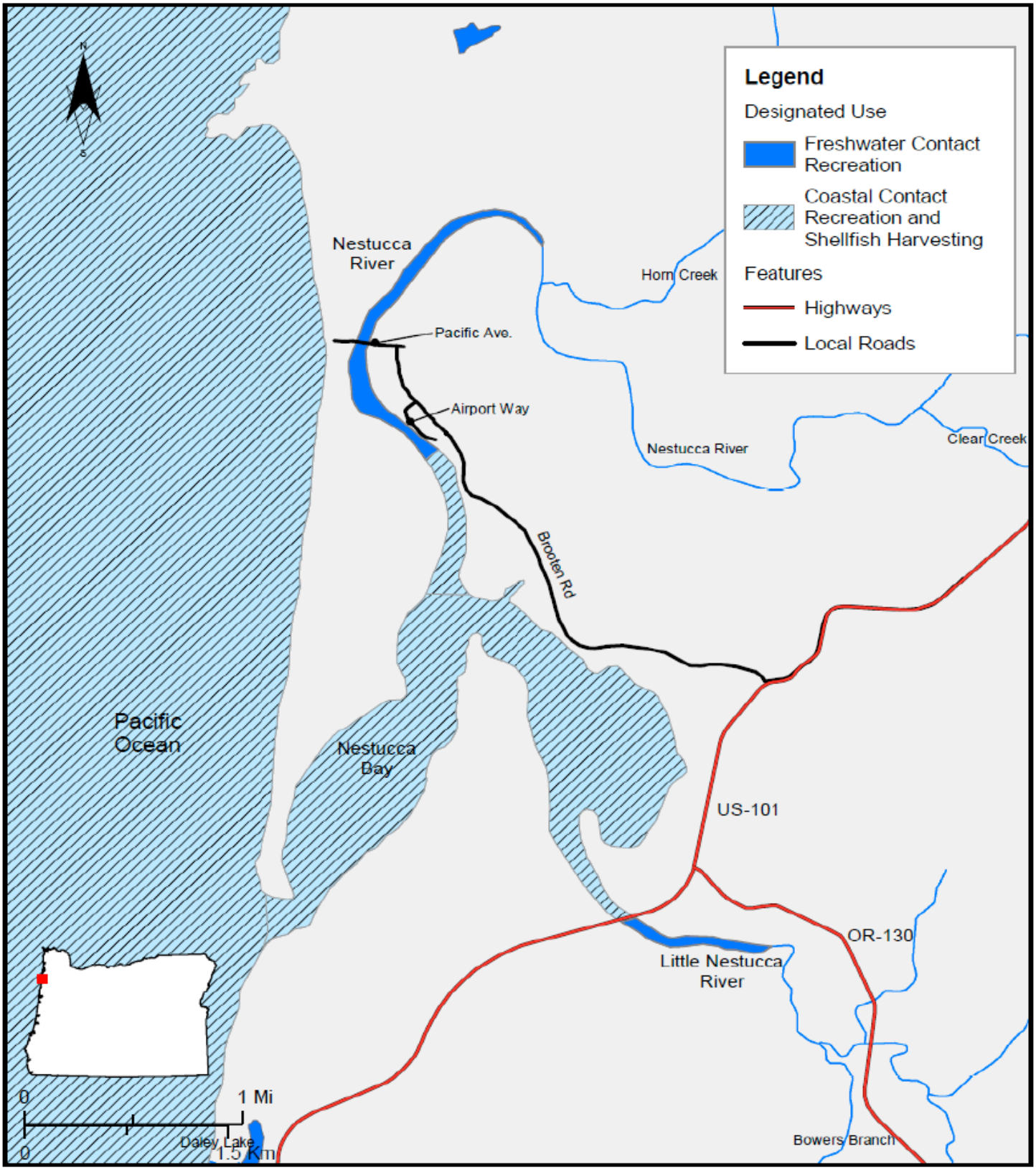
Salmon and Steelhead Spawning Use Designations*
North Coast Basin, Oregon



State of Oregon Department of Environmental Quality

OAR 340-041-0230 – Figure 230H

Water Contact Recreation and Shellfish Harvesting Designated Uses
Nestucca Bay, North Coast Basin, Oregon



Appendix B

Peaking Factor Calculations

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

700 NE MULTNOMAH, SUITE 1000 | PORTLAND, OR 97232 | P 503.233.2400, 360.694.5020

TECHNICAL MEMORANDUM

DATE: November 2, 2022
TO: John Wesely, PCJWSA
FROM: Matt Steiner, Parametrix
SUBJECT: Wastewater Peaking Factors
CC:
PROJECT NUMBER: 276-3300-005
PROJECT NAME: PCJWSA Wastewater Master Plan

Background and Introduction

Previous master plans used peaking factors to develop Peak Day Average Flow (PDAF) and Peak Instantaneous Flow (PIF). These peaking factors were developed in 2000 and considered outdated at this point. These peaking factors require determining the maximum month dry weather flow (MMDWF) and the maximum month wet weather flow (MMWWF). New peaking factors were developed for this master plan and follow the same guidelines as 2000 – using DEQ's *Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF, PDAF, and PIF*.

Maximum Month Dry Weather Flow

The DEQ guidelines indicate that (West of the Oregon Cascade Mountains) MMDWF likely happens in May. May is typically the rainiest month during dry weather and high groundwater results in higher flows in collection systems. As such, DEQ provides guidelines to calculate MMDWF when calculating MMWWF. Because of tourism at PCJWSA, the maximum dry month is almost always July and thus was calculated using the last 5 years of plant flow data. Table 1 summarizes the previous 5 years maximum month dry weather flows. On average, the MMDWF is 0.214 MGD.

Table 1: Maximum Month Dry Weather Flows 2017-2021

	Flow, MGD					
	2017	2018	2019	2020	2021	Average
Max Month Dry Weather Flow, MMDWF	0.190	0.209	0.229	0.227	0.215	0.214

Maximum Month Wet Weather Flow

The monthly averages from January – May were compared to the monthly precipitation to determine the MMWWF. In Western Oregon, January through May typically sees significant rainfall and high groundwater levels – which often results in the peak wet weather events. Figure 1 shows the relationship of January – May 2021 monthly average flow rates versus monthly cumulative rainfall. Figure 1 shows a linear relationship between these data points, and a linear trendline was developed.

MMWWF corresponds to the 5-year January accumulation – equivalent to the 80% percentile of January rainfall. Monthly rainfall records were pulled from the National Oceanic and Atmospheric Administration (NOAA) station USC003151682 located in Cloverdale, OR – located very close to the PCJWSA service area. The data from this

station goes back to December 1940. January rainfall was analyzed from the available data and found the 80% percentile to be 16.7 inches. Using the trendline determined from Figure 1, the MMWWF was calculated to be 0.215 MGD.

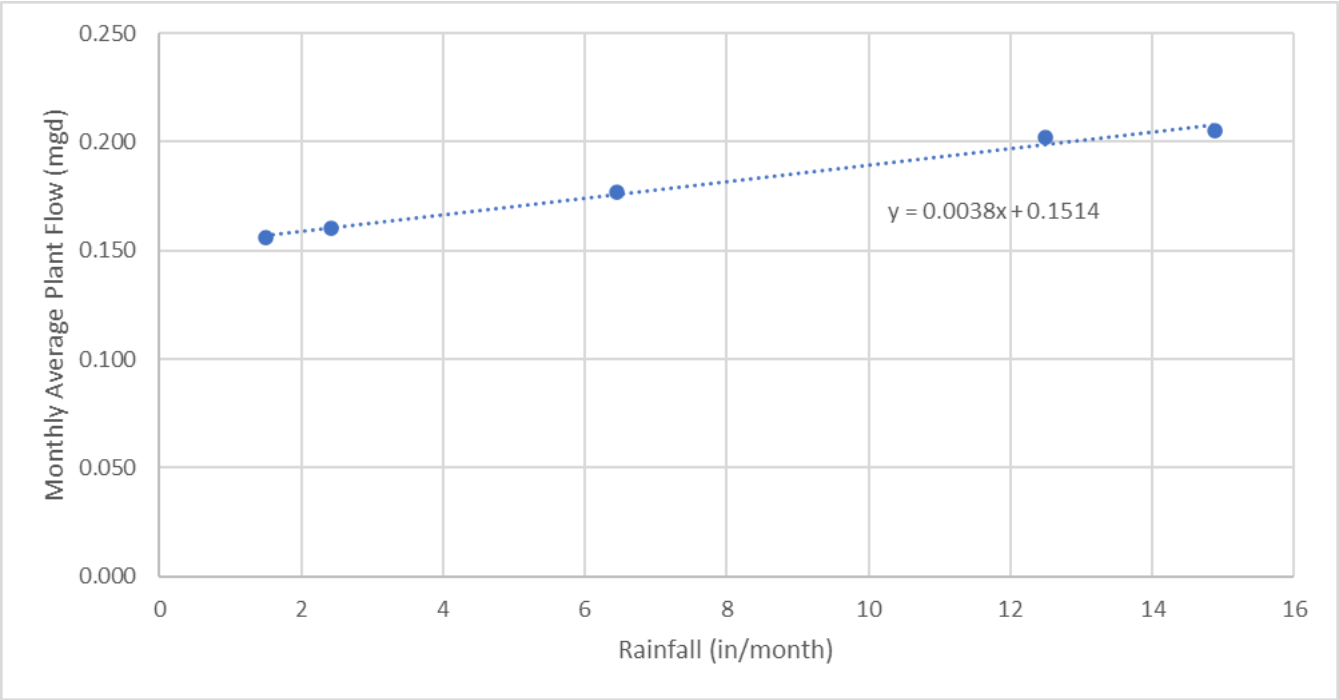


Figure 1: Average Plant Flow vs Winter Rainfall (January – May 2021)

Peak Day Average Flow

In Western Oregon, PDAF often occurs during the wet season. In addition to sewage, collection systems almost certain will convey at times an additional amount of rainfall-dependent infiltration and inflow (RDII) – which is the flow entering the sewer system as a direct result of rain. RDII leaks into the system through defects like cracked/broken pipes, defective pipe joints, poorly construction lateral services. RDII increases the total volume and peak flows of a collection system. The infiltration component will percolate slowly into the collection system through cracks or defects, and inflow will enter directly into the collection system as runoff through manholes or low spots where ponding occurs.

PDAF can be determined by analyzing large precipitation events when groundwater is at its highest (January – April). During this time, RDII is at its highest. DEQ does not provide criteria to establish the requirements for large rainfall events or antecedent weather to help determine when groundwater levels are high. For this study, the daily rainfall totals from 2017 – 2021 were evaluated. To qualify as a large rainfall event, events much:

1. At least 1.1 inches in precipitation on the day of the event
2. Occur in January, February, March, or April when groundwater levels are typically at the highest
3. At least 1.5 inches in precipitation in the 72 hours prior to the day of the event to provide sufficient antecedent weather to have high groundwater

There were 12 events from 2017 – 2021 that met these criteria. There was 1 additional event that was excluded from this analysis because the flow rate at the WWTP was influenced by localized flooding within the collection

system. This is discussed in greater detail in the following sections. These events were graphed in Figure 2 to evaluate the relationship between daily rainfall and daily WWTP flows. A trendline was calculated based on the 12 events.

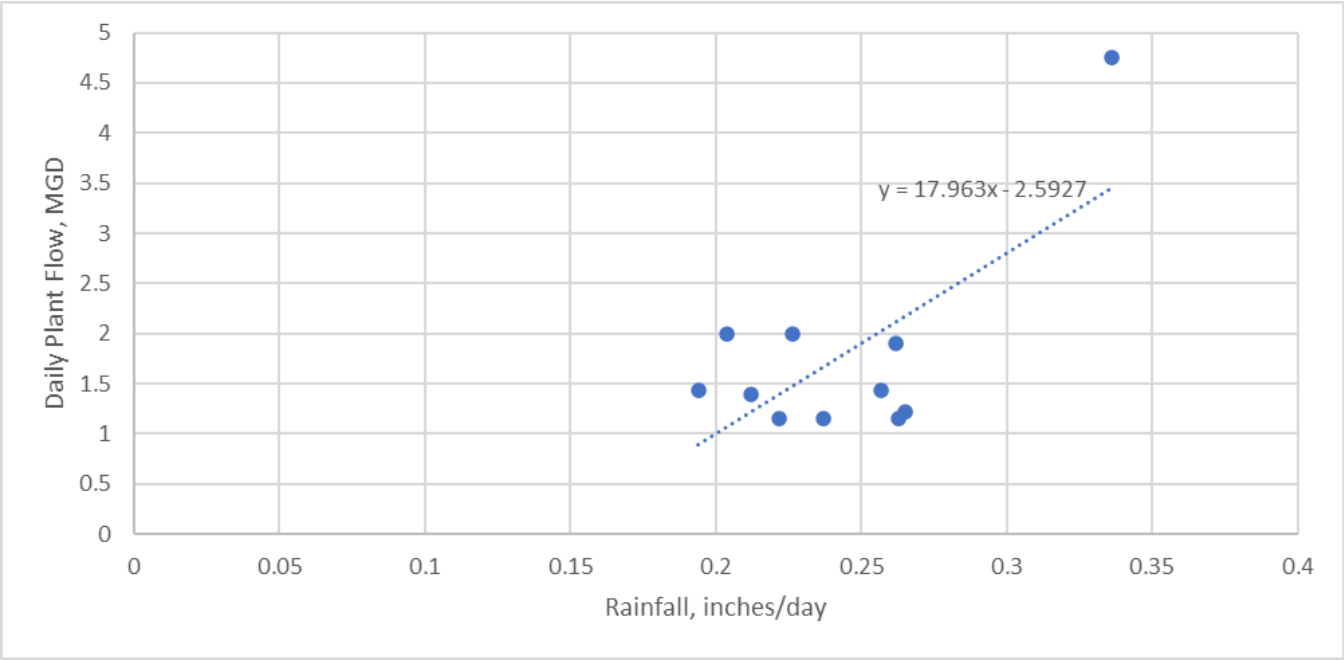


Figure 2: Large Rainfall Events from 2017 – 2021 and Daily Plant Flows

In order to determine the PDAF, the depth of the 5-year, 24-hour rainfall event is required. According to the Precipitation-Frequency Atlas of the Western United States (NOAA, 1973), the design storm should have a 24-hour depth equal to 4.4 inches. Based on the available data on large rainfall events and plant flows and the 5-year 24-hour rainfall event, the PDAF is 0.389 MGD. The PDAF/MMDWF peaking factor is 1.82.

Peak Instantaneous Flow

Because historical PIF data is not available at the WWTP influent, it was determined graphically based on peak flow rates and probability of occurrence. DEQ defines the probability of occurrence for the following events:

- Average Annual Flow: 50%
- MMWWF: 8.3%
- PDAF: 0.27%
- PIF: 0.011%

Figure 3 shows these events graphed against the probability of occurrence. Based on the logarithmic trend, the PIF is 0.515 MGD. The PIF/MMDWF peaking factor is 2.41.

Collection System Flooding

As mentioned in the Peak Day Average Flow section, there was one large rainfall event excluded from the analysis. According to Discharge Monitoring Reports (DMR), the flow into the WWTP was 0.528 MGD on 1/12/2021. This event was by far the largest event during the flow monitoring period.

After discussion with PCJWSA, it was learned that the Nestucca River had flooded. Part of the collection system is located within the regulatory floodway. These areas include Rueppell Avenue, River Avenue, Brooten Rd (at the intersection of River Ave and north), Resort Drive, and Airport Pump Station. These areas are prone to flooding when heavy rainfall and/or tidal influences cause the Nestucca River to exceed its banks. This causes direct inflow of river water into the collection system. As a precaution, PCJWSA turns off the STEP system along North Brooten and Resort Drive. Otherwise, the STEP tanks would be inundated, and the associated pumps would run constantly – overwhelming the STEP system.

Based on flow monitoring data at Airport PS collected during this event, this causes approximately 700 gpm of additional flow for about 6 hours – resulting in 252,000 gallons of direct infiltration. This additional flow increases peak flow rates to:

- PDAF: 0.591 MGD
- PIF: 1.443 MGD

Because the flooding does not increase with increase in connections or expansions in the collection system, peaking factors were not calculated. Instead, PDAF and PIF are increased based on the most recent flood.

Summary

Table 2 summarizes the values and peaking factors established in this report.

Table 2: Summary of Values in MGD

MMDWF	MMWWF	PDAF (no flooding)	PDAF/MMDWF Peaking Factor	PIF (no flooding)	PIF/MMDWF Peaking Factor	PDAF (with Flooding)	PIF with Flooding
0.241	0.215	0.389	1.82	0.515	2.41	0.591	1.443

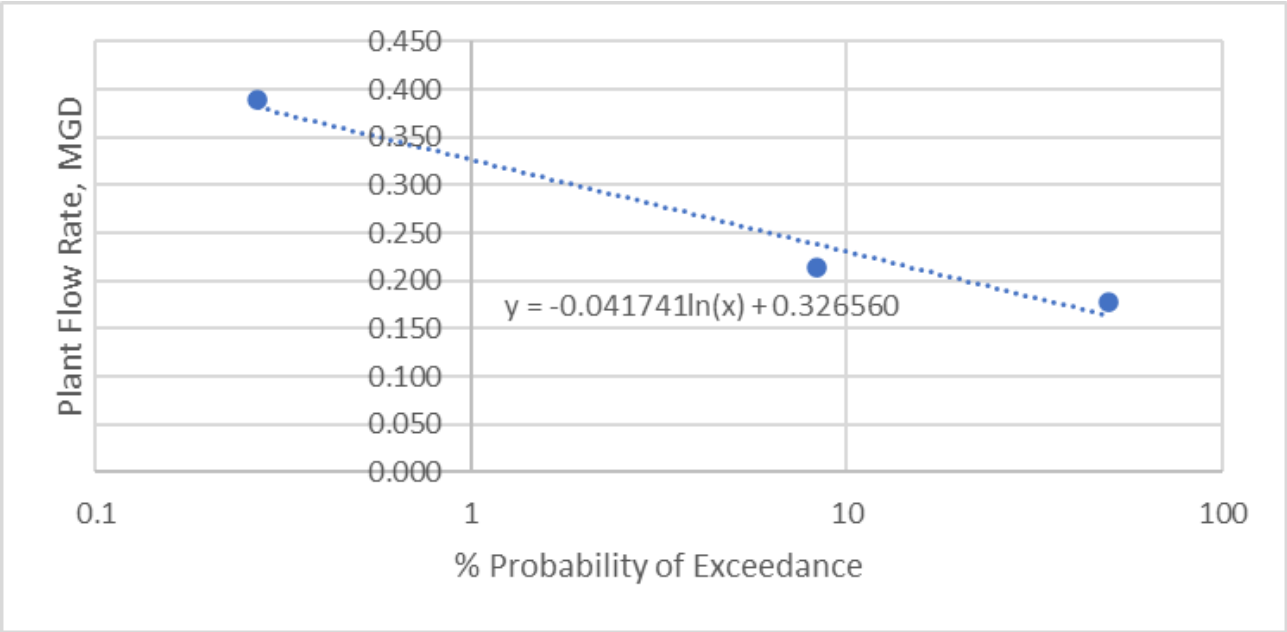


Figure 3: Peak Flow Rates vs % Probability of Exceedance

Appendix C

NPDES Permit

State of Oregon Department of Environmental Quality

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Northwest Region – Portland Office
700 NE Multnomah St., Suite 600
Portland, OR 97232
Telephone: 503-229-5263

Issued pursuant to ORS 468B.050 and the Federal Clean Water Act (the Clean Water Act)

ISSUED TO:

Pacific City Joint Water-Sanitary Authority

PO Box 520
Pacific City, OR 97135

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Municipal Wastewater	001	45.20409 N, 123.96389 W
Biosolids	N/A	Specified in Biosolids Management/Land Application Plan

FACILITY LOCATION:

34005 Cape Kiwanda Drive
Pacific City, OR 97135
County: Tillamook

EPA Permit Type: Minor

RECEIVING STREAM INFORMATION:

WRD Basin: North Coast
USGS Sub-Basin: Wilson-Trask-Nestucca
Receiving Stream Name: Nestucca River
NHD Reach Code: 17100203000033 (61.74%)
LLID: 1239555451826 -1.5

Issued in response to Application No. 957225 received May 2, 2016. This permit is issued based on the land use findings in the permit record.

Tiffany Yelton-Bram, Water Quality Manager, Northwest Region	7/16/2020 Issuance Date	August 1, 2020 Effective Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to: 1) operate a wastewater collection, treatment, control and disposal system; and 2) discharge treated wastewater to waters of the state only from the authorized discharge point or points in Schedule A in conformance with the requirements, limits, and conditions set forth in this permit.

Unless specifically authorized by this permit, by another NPDES or Water Pollution Control Facility permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

TABLE OF CONTENTS

*Note: Schedule C: Compliance Schedule and Schedule E: Pretreatment Activities are not required for this permit

LIST OF TABLES

SCHEDULE A: WASTE DISCHARGE LIMITS

1. Outfall 001 – Permit Limits

During the term of this permit, the permittee must comply with the limits in the following table:

Table A1: Permit Limits (Year-Round)

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
BOD_5	mg/L	10	15	
	lb/day	26	39	52
	% removal	85		
TSS	mg/L	10	15	
	lb/day	26	39	52
	% removal	85		
pH	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli See note a.	#/100 mL	Must not exceed a monthly geometric mean of 34; no more than 10% of the samples shall exceed 110		
*Mass load limits are based on a flow of 0.315 MGD.				
Notes: a. If a single sample exceeds 110 organisms per 100 mL, then the permittee must evaluate the previous 9 bacteria sample results to determine if the 10% requirement has been met.				

2. Regulatory Mixing Zone

Pursuant to OAR 340-041-0053, the permittee is granted a regulatory mixing zone as described below:

> That portion of the Nestucca River contained within a hundred (100) foot radius of the outfall diffuser. The Zone of Immediate Dilution (ZID) is that portion of the allowable mixing zone that is within ten (10) feet of the point of discharge.

3. Biosolids

The permittee may land apply biosolids or provide biosolids for sale or distribution, subject to the following conditions:

a. The permittee must manage biosolids in accordance with its DEQ-approved Biosolids Management Plan and Land Application Plan.

b. The permittee must apply biosolids at or below the agronomic rates approved by DEQ in order to minimize potential groundwater degradation.

c. The permittee must obtain written site authorization from DEQ for each land application site prior to land application (see Schedule D) and follow the site-specific management conditions in the DEQ-issued site authorization letter.

d. Prior to application, the permittee must ensure that biosolids meet one of the pathogen reduction standards under 40 CFR 503.32 and one of the vector attraction reduction standards under 40 CFR 503.33.

e. The permittee must not apply biosolids containing pollutants in excess of the ceiling concentrations shown in the table below. The permittee may apply biosolids containing pollutants in excess of the pollutant concentrations, but below the ceiling concentrations, however, the total quantity of biosolids applied cannot exceed the cumulative pollutant loading rates in the table below.

Table A2: Biosolids Limits

Pollutant See note a.	**Ceiling concentrations (mg/kg)**	**Pollutant concentrations (mg/kg)**	**Cumulative pollutant loading rates (kg/ha)**
Arsenic	75	41	41
Cadmium	85	39	39
Copper	4300	1500	1500
Lead	840	300	300
Mercury	57	17	17
Molybdenum	75	N/A	N/A
Nickel	420	420	420
Selenium	100	100	100
Zinc	7500	2800	2800

Note:
a. Biosolids pollutant limits are described in 40 CFR 503.13, which uses the terms *ceiling concentrations*, *pollutant concentrations*, and *cumulative pollutant loading rates*.

4. Chlorine Usage

The permittee is prohibited from using chlorine or chlorine compounds for effluent disinfection purposes. Chlorine residual in effluent resulting from chlorine or chlorine-containing chemicals used for maintenance or other purposes is also prohibited.

SCHEDULE B: MINIMUM MONITORING AND REPORTING REQUIREMENTS

1. Reporting Requirements

The permittee must submit to DEQ monitoring results and reports as listed below.

Table B1: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date (See Note a.)	Report Form (See Note b.)	Submit To:
Tables B2, B3, and B4 Influent Monitoring, Effluent Monitoring, and Receiving Stream Monitoring	Monthly	By the 15th of the following month	Specified in Schedule B. Section 2 of this permit	Electronic reporting as directed by DEQ
Biosolids annual report (See Schedule D)	Annually	February 19	Electronic copy in the DEQ-approved form	Attached via electronic reporting as directed by DEQ DEQ Biosolids Program Coordinator
Inflow and infiltration report (see Schedule D)	Annually	February 15	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ
Hauled Waste Control Plan (see Schedule D)	One time	Submit at least two months prior to accepting hauled waste	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ
Hauled Waste Annual Report (see Schedule D)	Annually, once hauled waste is accepted	January 15	Electronic copy in the DEQ-approved format	Attached via electronic reporting as directed by DEQ
Industrial User Survey (see Schedule D)	Every 5 years	Submit by no later than 24 months after permit effective date	1 electronic copy and 1 hard copy in a DEQ-approved format	• 1 Hard copy to DEQ Pretreatment Coordinator • 1 Electronic copy to Compliance Officer
Outfall Inspection Report (see Schedule D)	Once per permit cycle	Submit by August 15, 2023	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ

Notes:
a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date.
b. All reporting requirements are to be submitted in a DEQ-approved format, unless otherwise specified in writing.

2. Monitoring and Reporting Protocols

a. **Electronic Submissions**

The permittee must submit to DEQ the results of monitoring indicated in Schedule B in an electronic format as specified below.

i. The permittee must submit monitoring results required by this permit via DEQ-approved web-based Discharge Monitoring Report (DMR) forms to DEQ via electronic reporting. Any data used to calculate summary statistics must be submitted as a separate attachment approved by DEQ via electronic reporting.

ii. The reporting period is the calendar month.

iii. The permittee must submit monitoring data and other information required by this permit for all compliance points by the 15th day of the month following the reporting period unless specified otherwise in this permit or as specified in writing by DEQ.

b. **Test Methods**

The permittee must conduct monitoring according to test procedures in 40 CFR part 136 and 40 CFR part 503 for biosolids or other approved procedures as per Schedule F.

c. **Quality Assurance and Quality Control**

i. Quality Assurance Plan – The permittee must develop and implement a written Quality Assurance Plan that details the facility sampling procedures, equipment calibration and maintenance, analytical methods, quality control activities and laboratory data handling and reporting. The QA/QC program must conform to the requirements of 40 CFR 136.7.

ii. If QA/QC requirements are not met for any analysis, the permittee must re-analyze the sample. If the sample cannot be re-analyzed, the permittee must re-sample and analyze at the earliest opportunity. If the permittee is unable to collect a sample that meets QA/QC requirements, then the permittee must include the result in the discharge monitoring report (DMR) along with a notation (data qualifier). In addition, the permittee must explain how the sample does not meet QA/QC requirements. The permittee may not use the result that failed the QA/QC requirements in any calculation required by the permit unless authorized in writing by DEQ.

iii. Flow measurement, field measurement, and continuous monitoring devices - The permittee must:

(A) Establish verification and calibration frequency for each device or instrument in the quality assurance plan that conforms to the frequencies recommended by the manufacturer.

(B) Verify at least once per year that flow-monitoring devices are functioning properly according to manufacturer's recommendation. Calibrate as needed according to manufacturer's recommendations.

(C) Verify at least weekly that the continuous monitoring instruments are functioning properly according to manufacturer's recommendation unless the permittee demonstrates a longer period is sufficient and such longer period is approved by DEQ in writing.

d. **Reporting Sample Results**

i. The permittee must report the same number of significant digits as the permit limit for a given parameter.

e. **Calculating and Reporting Mass Loads**

The permittee must calculate mass loads on each day the parameter is monitored using the following equation:

Flow (in MGD) X Concentration (in mg/L) X 8.34 = Pounds per day

i. Mass load limits all have two significant figures unless otherwise noted.

3. Monitoring and Reporting Requirements

a. The permittee must monitor influent after influent screening and grit removal, but before it enters the sequential batch reactors, and report results in accordance with the table below:

Table B2: Influent Monitoring Requirements

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type / Required Action See note a.	Report Statistic See note b.
Flow (50050)	MGD	Year-round	Daily	Metered	Monthly Average Daily Maximum
BOD_5 (00310)	mg/L	Year-round	1/week	24-hour composite	Monthly Average
TSS (00530)	mg/L	Year-round	1/week	24-hour composite	Monthly Average
pH (00400)	SU	Year-round	2/week	Grab	Monthly Maximum Monthly Minimum

Notes:

a. In the event of equipment failure or loss, the permittee must notify DEQ and deploy new equipment to minimize interruption of data collection. If new equipment cannot be immediately deployed, the permittee must perform grab measurements.

b. When submitting DMRs electronically, the permittee must submit all data used to determine summary statistics in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.

b. The permittee must monitor effluent for Outfall 001 at the discharge end of the UV disinfection unit, before the effluent weir, and report results in accordance with Table B1 and the table below:

Table B3: Effluent Monitoring Requirements

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/ Required Action See note a.	Report Statistic See note b.
Flow (50050)	MGD	Year-round	Daily	Metered	Monthly Average Daily Maximum
BOD_5 (00310)	mg/L	Year-round	1/week	24-hour composite	Monthly Average Weekly Average
BOD_5 (00310)	lb/day	Year-round	1/week	Calculation	Daily Maximum Monthly Average Weekly Average
BOD_5 Percent Removal (81010) See note c.	%	Year-round	Monthly	Calculation based on monthly average BOD_5 concentration values	Monthly Average
TSS (00530)	mg/L	Year-round	1/week	24-hour composite	Monthly Average Weekly Average
TSS (00530)	lb/day	Year-round	1/week	Calculation	Daily Maximum Monthly Average Weekly Average
TSS Percent Removal (81011) See note c.	%	Year-round	Monthly	Calculation based on monthly average TSS concentration values	Monthly Average
pH (00400)	SU	Year-round	2/week	Grab	Daily Maximum Daily Minimum
Temperature (00010)	ºC	Year-round	2/week	Grab	Daily Maximum Monthly Average of Daily Maximums Maximum 7-Day Average
E. coli (51040)	#/100 mL	Year-round	1/week	Grab	Daily Maximum Monthly Geometric Mean
E. coli Percent of Samples Exceeding Limit (51617)	%	Year-round	Monthly	Calculation	Percent of Samples Exceeding 110
Total Ammonia (as N) (00610)	mg/L	Year-round	Quarterly	24-hour composite	Quarterly Maximum

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/ Required Action See note a.	Report Statistic See note b.
Alkalinity as $CaCO_3$ (00410)	mg/L	Year-round	Monthly	24-hour composite	Monthly Maximum
UV dose (61938)	mJ/cm^2	Year-round	Daily	Calculation	Daily Minimum
Dissolved Oxygen (00300)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Minimum
Total Kjeldahl Nitrogen (TKN) (00625)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Maximum
Nitrate (NO_3) Plus Nitrite (NO_2) Nitrogen (00630)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Maximum
Oil and Grease (00556)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Maximum
Total Phosphorus (00665)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Maximum
Total Dissolved Solids (70295)	mg/L	Third year of permit cycle [2022]	Quarterly	Grab	Quarterly Maximum

Notes:

a. In the event of equipment failure or loss, the permittee must notify DEQ and deploy new equipment to minimize interruption of data collection. If new equipment cannot be immediately deployed, the permittee must perform grab measurements. If the failure or loss is for continuous temperature monitoring equipment, the permittee must perform grab measurements daily between 2 PM and 4 PM until continuous monitoring equipment is redeployed.

b. When submitting DMRs electronically, all data used to determine summary statistics must be submitted in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.

c. Percent Removal must be calculated on a monthly basis using the following formula:

$$Percent\ Removal = \frac{[Influent\ Concentration] - [Effluent\ Concentration]}{[Influent\ Concentration]} \times 100$$

Where:
Influent Concentration = Corresponding monthly average influent concentration based on the analytical results of the reporting period.
Effluent Concentration = Corresponding monthly average effluent concentration based on the analytical results of the reporting period.

c. The permittee must monitor the Nestucca River and report the results in accordance with Table B1 and the table below. The permittee must collect samples such that the effluent does not impact the samples.

Table B4: Receiving Stream Monitoring (Nestucca River)

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/ Required Action See note a.	Report Statistic See note b.
pH (00400)	SU	Year-round	1/month	Grab	Monthly Maximum
Temperature (00010)	ºC	Year-round	1/month	Grab	Monthly Maximum
Alkalinity as $CaCO_3$ (00410)	mg/L	Year-round	1/month	Grab	Monthly Maximum
Total Ammonia (as N) (00610)	mg/L	Year-round	1/month	Grab	Monthly Maximum

Notes:

a. In the event of equipment failure or loss, the permittee must notify DEQ and deploy new equipment to minimize interruption of data collection. If new equipment cannot be immediately deployed, the permittee must perform grab measurements. If the failure or loss is for continuous temperature monitoring equipment, the permittee must perform grab measurements daily between 2 PM and 4 PM until continuous monitoring equipment is redeployed.

b. When submitting DMRs electronically, all data used to determine summary statistics must be submitted in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.

4. Biosolids Monitoring Requirements

The permittee must monitor biosolids land applied or produced for sale or distribution as listed below. The samples must be representative of the quality and quantity of biosolids generated and undergo the same treatment process used to prepare the biosolids. Results must be reported as required in the biosolids management plan described in Schedule D.

Table B5: Biosolids Monitoring

Item or Parameter	Minimum Frequency	Sample Type
Nutrient and conventional parameters (% dry weight unless otherwise specified): Total Kjeldahl Nitrogen (TKN) Nitrate-Nitrogen (NO_3-N) Total Ammoniacal Nitrogen (NH-N) Total Phosphorus (P) Potassium (K) pH (S.U.) Total Solids Volatile Solids	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B5.	As described in the DEQ-approved Biosolids Management Plan
Pollutants: As, Cd, Cu, Hg, Pb, Mo, Ni, Se, Zn, mg/kg dry weight	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B5.	As described in the DEQ-approved Biosolids Management Plan
Pathogen reduction	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B5.	As described in the DEQ-approved Biosolids Management Plan
Vector attraction reduction	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B5.	As described in the DEQ-approved Biosolids Management Plan
Record of biosolids land application: date, quantity, location.	Each event	Record the date, quantity, and location of biosolids land applied on site location map or equivalent electronic system, such as GIS.

Table B6: Biosolids Minimum Monitoring Frequency

Quantity of biosolids land applied or produced for sale or distribution per calendar year		Minimum Sampling Frequency
(dry metric tons)	(dry U.S. tons)	
Less than 290	Less than 320	Once per year
290 to 1,500	320 to 1,653	Once per quarter (4x/year)
1500 to 15,000	1,653 to 16,535	Once per 60 days (6x/year)
15,000 or more	16,535 or more	Once per month (12x/year)

SCHEDULE C: COMPLIANCE SCHEDULE

A compliance schedule is not part of this permit.

SCHEDULE D: SPECIAL CONDITIONS

1. Inflow and Infiltration

The permittee must submit to DEQ an annual inflow and infiltration report on a DEQ-approved form as directed in Table B1. The report must include the following:

a. An assessment of the facility's I/I issues based on a comparison of summer and winter flows to the plant.

b. Details of activities performed in the previous year to identify and reduce inflow and infiltration.

c. Details of activities planned for the following year to identify and reduce inflow and infiltration.

d. A summary of sanitary sewer overflows that occurred during the previous year. This should include the following: date of the SSO, location, estimated volume, cause, follow-up actions and if performed, the results of receiving stream monitoring.

2. Emergency Response and Public Notification Plan

The permittee must develop an Emergency Response and Public Notification Plan ("plan"), or ensure the facility's existing plan is current and accurate, per Schedule F, Section B, and Condition 8 within 6 months of permit effective date. The permittee must update the plan annually to ensure all information contained in the plan, including telephone and email contact information for applicable public agencies, is current and accurate. An updated copy of the plan must be kept on file at the facility for DEQ review. The latest plan revision date must be listed on the plan cover along with the reviewer's initials or signature.

3. Exempt Wastewater Reuse at the Treatment System

Recycled water used for landscape irrigation within the property boundary or in-plant processes at the wastewater treatment system is exempt from the requirements of OAR 340-055 if all of the following conditions are met:

a. The recycled water is an oxidized and disinfected wastewater.

b. The recycled water is used at the wastewater treatment system site where it is generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system. Land that is contiguous to the property upon which the treatment system is located is considered to be part of the wastewater treatment system site if under the same ownership.

c. Spray and/or drift from the use does not migrate off the site.

d. Public access to the site is restricted.

4. Biosolids Management Plan

The permittee must maintain a Biosolids Management Plan and Land Application Plan meeting the requirements in OAR 340-050-0031. The permittee must submit any significant modification of these plans to DEQ for review and approval with sufficient time to clear DEQ review and a public notice period prior to implementing any significant changes to the biosolids program. The permittee must keep the plans updated. All plan revisions require written authorization from DEQ and are effective upon permittee's receipt of DEQ written approval. No significant modifications can be made to a plan for an administratively extended permit (after the permit expiration date). Conditions in the plans are enforceable requirements under this permit.

a. Annual Report

The permittee must submit a Biosolids Annual Report by February 19 each year documenting biosolids management activities of the previous calendar year as described in OAR 340-050-0035(6). The permittee must use the DEQ-approved Biosolids Annual report form. This report must include the monitoring data and analytical laboratory reports for the previous year's monitoring specified under Schedule B.

b. Site Authorization

The permittee must obtain written authorization from DEQ for each land application site prior to its use. Conditions in site authorizations are enforceable requirements under this permit. The permittee is prohibited from land applying biosolids to a DEQ-approved site except in accordance with the site authorization, while this permit is effective and with the written approval of the property owner. DEQ may modify or revoke a site authorization following the procedures for a permit modification described in OAR 340-045-0055.

c. Public Participation

i. DEQ will provide an opportunity for public review and comment on any significant plan modifications prior to approving or denying. Public review is not required for minor modifications or changes to utilization dates.

ii. No DEQ-initiated public notice is required for continued use of sites identified in the DEQ-approved biosolids management plan.

iii. For new sites that fail to meet the site selection criteria in the biosolids management plan or that are deemed by DEQ to be sensitive with respect to residential housing, runoff potential, or threat to groundwater, DEQ will provide an opportunity for public comment as directed by OAR 340-050-0015(10).

iv. For all other new sites, the permittee must provide for public participation following procedures in its DEQ-approved land application plan.

d. Exceptional Quality Biosolids

The permittee is exempt from the requirements in condition 4.b above, if:

i. Pollutant concentrations of biosolids are less than the pollutant concentration limits in Schedule A, Table A2;

ii. Biosolids meet one of the Class A pathogen reduction alternatives in 40 CFR 503.32(a); and

iii. Biosolids meet one of the vector attraction reduction options in 40 CFR 503.33(b)(1) through (8).

5. Wastewater Solids Transfers

a. *Within state.* The permittee may transfer wastewater solids including Class A and Class B biosolids, to another facility permitted to process or dispose of wastewater solids, including but not limited to: another wastewater treatment facility, landfill, or incinerator. The permittee must satisfy the requirements of the receiving facility. The permittee must report the name of the receiving facility and the quantity of material transferred in the wastewater solids annual report identified in Schedule B.

b. *Out of state.* If wastewater solids, including Class A and Class B biosolids, are transferred out of state for use or disposal, the permittee must obtain written authorization from DEQ, meet Oregon requirements for the use or disposal of wastewater solids, notify in writing the receiving state of the proposed use or disposal of wastewater solids, and satisfy the requirements of the receiving state.

6. Hauled Waste Control Plan

The permittee may accept hauled wastes at discharge points designated by the POTW after receiving written DEQ approval of a Hauled Waste Control Plan. Hauled wastes may include wastewater solids from another wastewater treatment facility, septage, grease trap wastes, portable and chemical toilet wastes, landfill leachate, groundwater remediation wastewaters and commercial/industrial wastewaters.

7. Hauled Waste Annual Report

By the date listed in Table B1, the permittee must submit a report of hauled waste received by the POTW. This report must include the date, time, type, and amount received each time the POTW accepts hauled waste. Hauled waste is described in the permittee's Hauled Waste Control Plan. Annual report is only required after the permittee has decided to accept hauled waste and DEQ has approved the permittee's Hauled Waste Control Plan.

8. Operator Certification

a. Definitions

i. "Supervise" means to have full and active responsibility for the daily on site technical operation of a wastewater treatment system or wastewater collection system.

ii. "Supervisor" or "designated operator", means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.

iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system when the system is operated on more than one daily shift.

iv. "System" includes both the collection system and the treatment systems.

b. The permittee must comply with OAR Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system as specified on the Wastewater System Classification Worksheet in the fact sheet for this permit (including renewals and modifications). DEQ may revise the permittee's classification in writing at any time to reflect changes in the collection or treatment system. This reclassification is not considered a permit modification and may be made after the permit expiration date provided the permit has been administratively extended by DEQ. If a facility is re-classified, a certified letter will be mailed to the system owner from the DEQ Operator Certification Program. Current system classifications are publicized on the DEQ Supervisory Wastewater Operator Status Report found on the DEQ Wastewater Operator Certification Homepage.

c. The permittee must have its system supervised full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification.

d. The permittee's wastewater system may be without the designated supervisor for up to 30 consecutive days if another person supervises the system, who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.

e. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervise operation of the system. Each shift supervisor must be certified at no more than one grade lower than the system classification.

f. The permittee is not required to have a supervisor on site at all times; however, the supervisor must be available to the permittee and operator at all times.

g. The permittee must notify DEQ in writing of the name of the system supervisor by completing and submitting the Supervisory Wastewater System Operator Designation Form. The most recent version of this form may be found on the DEQ Wastewater Operator Certification homepage *NOTE: This form is different from the Delegated Authority form. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of the operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 700 NE Multnomah St, Suite 600, Portland, OR 97232-4100. This address may be updated in writing by DEQ during the term of this permit.

h. When compliance with item (e) of this section is not possible or practicable because the system supervisor is not available or the position is vacated unexpectedly, and another certified operator is not qualified to assume supervisory responsibility, the Director may grant a time extension for compliance with the requirements in response to a written request from the system owner. The Director will not grant an extension longer than 120 days unless the system owner documents the existence of extraordinary circumstances.

9. Industrial User Survey

a. By the date listed in Table B1, the permittee must conduct an industrial user survey as described in 40CFR 403.8(f)(2)(i-iii) to determine the presence of any industrial users discharging wastewaters subject to pretreatment and submit a report on the findings to DEQ. The purpose of the survey is to identify whether there are any industrial users discharging to the POTW, and ensure regulatory oversight of these discharges to state waters.

b. Should the DEQ determine that a pretreatment program is required, the permit must be reopened and modified in accordance with 40 CFR 403.8(e)(1) to incorporate a compliance schedule for development of a pretreatment program. The compliance schedule must be developed in accordance with the provisions of 40 CFR 403.12(k), and must not exceed twelve (12) months.

10. Outfall Inspection

By the date in Table B1, the permittee must inspect outfall 001 including the submerged portion of the outfall line and diffuser to document its integrity and to determine whether it is functioning as designed. The inspection must determine whether diffuser ports are intact, clear and fully functional. The inspection must verify the latitude and longitude of the diffuser. The permittee must submit a written report to DEQ regarding the results of the outfall inspection by the date in Table B1. The report must include a description of the outfall as originally constructed, the condition of the current outfall and identify any repairs needed to return the outfall to satisfactory condition.

SCHEDULE E: PRETREATMENT ACTIVITIES

A pretreatment program is not part of this permit.

SCHEDULE F: NPDES GENERAL CONDITIONS

NPDES GENERAL CONDITIONS – DOMESTIC FACILITIES
October 1, 2015 Version

SECTION A. STANDARD CONDITIONS

A1. Duty to Comply with Permit

The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and the federal Clean Water Act and is grounds for an enforcement action. Failure to comply is also grounds for DEQ to terminate, modify and reissue, revoke, or deny renewal of a permit.

A2. Penalties for Water Pollution and Permit Condition Violations

The permit is enforceable by DEQ or EPA, and in some circumstances also by third-parties under the citizen suit provisions of 33 USC § 1365. DEQ enforcement is generally based on provisions of state statutes and Environmental Quality Commission (EQC) rules, and EPA enforcement is generally based on provisions of federal statutes and EPA regulations.

ORS 468.140 allows DEQ to impose civil penalties up to $25,000 per day for violation of a term, condition, or requirement of a permit.

Under ORS 468.943, unlawful water pollution in the second degree, is a Class A misdemeanor and is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense.

Under ORS 468.946, unlawful water pollution in the first degree is a Class B felony and is punishable by a fine of up to $250,000, imprisonment for not more than 10 years, or both.

The Clean Water Act provides that any person who violates permit condition, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation.

The Clean Water Act provides that any person who negligently violates any condition, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both.

In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both.

In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

Any person who knowingly violates section any permit condition, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both.

In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both.

An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

Any person may be assessed an administrative penalty by the Administrator for violating any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act.

Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000.

Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

A3. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit. In addition, upon request of DEQ, the permittee must correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

A4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application must be submitted at least 180 days before the expiration date of this permit.

DEQ may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

A5. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute.
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a total maximum daily load (TMDL).
e. New information or regulations.
f. Modification of compliance schedules.
g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions.
i. Determination that the permitted activity endangers human health or the environment.
j. Other causes as specified in 40 CFR §§ 122.62, 122.64, and 124.5.
k. For communities with combined sewer overflows (CSOs):

(1) To comply with any state or federal law regulation for CSOs that is adopted or promulgated subsequent to the effective date of this permit.
(2) If new information that was not available at the time of permit issuance indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses.
(3) Resulting from implementation of the permittee's long-term control plan and/or permit conditions related to CSOs.

The filing of a request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

A6. Toxic Pollutants
The permittee must comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rule (OAR) 340-041-0033 and section 307(a) of the federal Clean Water Act for toxic pollutants, and with standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

A7. Property Rights and Other Legal Requirements
The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other private rights, or any infringement of federal, tribal, state, or local laws or regulations.

A8. Permit References
Except for effluent standards or prohibitions established under section 307(a) of the federal Clean Water Act and OAR 340-041-0033 for toxic pollutants, and standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

A9. Permit Fees
The permittee must pay the fees required by OAR.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

B1. Proper Operation and Maintenance
The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

B2. Need to Halt or Reduce Activity Not a Defense
For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It is not a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B3. Bypass of Treatment Facilities

a. Definitions
   (1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.
   (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.
   (1) Bypass is prohibited and DEQ may take enforcement action against a permittee for bypass unless:
      i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and
      iii. The permittee submitted notices and requests as required under General Condition B3.c.
   (2) DEQ may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, if DEQ determines that it will meet the three conditions listed above in General Condition B3.b.(1).

c. Notice and request for bypass.
   (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, a written notice must be submitted to DEQ at least ten days before the date of the bypass.
   (2) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required in General Condition D5.

B4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of General Condition B4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   (1) An upset occurred and that the permittee can identify the causes(s) of the upset;
   (2) The permitted facility was at the time being properly operated;
   (3) The permittee submitted notice of the upset as required in General Condition D5, hereof (24-hour notice); and
   (4) The permittee complied with any remedial measures required under General Condition A3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

B5. Treatment of Single Operational Upset

For purposes of this permit, a single operational upset that leads to simultaneous violations of more than one pollutant parameter will be treated as a single violation. A single operational upset is an exceptional incident that causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one federal Clean Water Act effluent discharge pollutant parameter. A single operational upset does not include federal Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational upset is a violation.

B6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definition. "Overflow" means any spill, release or diversion of sewage including:
   (1) An overflow that results in a discharge to waters of the United States; and
   (2) An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.

b. Reporting required. All overflows must be reported orally to DEQ within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D5.

B7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (for example, public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B8. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

B8. Emergency Response and Public Notification Plan

The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses, or upsets that may endanger public health. At a minimum the plan must include mechanisms to:

a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;
e. Provide emergency operations; and
f. Ensure that DEQ is notified of the public notification steps taken.

B9. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

C1. Representative Sampling

Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge. All samples must be taken at the monitoring points specified in this permit, and must be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points must not be changed without notification to and the approval of DEQ. Samples must be collected in accordance with requirements in 40 CFR part 122.21 and 40 CFR part 403 Appendix E.

C2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices must be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices must be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected must be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

C3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR part 136 or, in the case of sludge (biosolids) use and disposal, approved under 40 CFR part 503 unless other test procedures have been specified in this permit.

For monitoring of recycled water with no discharge to waters of the state, monitoring must be conducted according to test procedures approved under 40 CFR part 136 or as specified in the most recent edition of Standard Methods for the Examination of Water and Wastewater unless other test procedures have been specified in this permit or approved in writing by DEQ.

C4. Penalties for Tampering

The federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

C5. Reporting of Monitoring Results

Monitoring results must be summarized each month on a discharge monitoring report form approved by DEQ. The reports must be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

C6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR part 136 or, in the case of sludge (biosolids) use and disposal, approved under 40 CFR part 503, or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the discharge monitoring report. Such increased frequency must also be indicated. For a pollutant parameter that may be sampled more than once per day (for example, total residual chlorine), only the average daily value must be recorded unless otherwise specified in this permit.

C7. Averaging of Measurements
Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean, except for bacteria which must be averaged as specified in this permit.

C8. Retention of Records
Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities must be retained for a period of at least 5 years (or longer as required by 40 CFR part 503). Records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete the application for this permit must be retained for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of DEQ at any time.

C9. Records Contents
Records of monitoring information must include:
a. The date, exact place, time, and methods of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

C10. Inspection and Entry
The permittee must allow DEQ or EPA upon the presentation of credentials to:
a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

C11. Confidentiality of Information
Any information relating to this permit that is submitted to or obtained by DEQ is available to the public unless classified as confidential by the Director of DEQ under ORS 468.095. The permittee may request that information be classified as confidential if it is a trade secret as defined by that statute. The name and address of the permittee, permit applications, permits, effluent data, and information required by NPDES application forms under 40 CFR § 122.21 are not classified as confidential [40 CFR § 122.7(b)].

SECTION D. REPORTING REQUIREMENTS

D1. Planned Changes
The permittee must comply with OAR 340-052, "Review of Plans and Specifications" and 40 CFR § 122.41(l)(1). Except where exempted under OAR 340-052, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers may be commenced until the plans and specifications are submitted to and approved by DEQ. The permittee must give notice to DEQ as soon as possible of any planned physical alternations or additions to the permitted facility.

D2. Anticipated Noncompliance
The permittee must give advance notice to DEQ of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

D3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and EQC rules. No permit may be transferred to a third party without prior written approval from DEQ. DEQ may require modification, revocation, and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under 40 CFR § 122.61. The permittee must notify DEQ when a transfer of property interest takes place.

D4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. Any reports of noncompliance must include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

D5. Twenty-Four Hour Reporting

The permittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to the DEQ regional office or Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.
   (1) Oral Reporting within 24 hours.
      i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to the DEQ regional office.
         (a) The location of the overflow;
         (b) The receiving water (if there is one);
         (c) An estimate of the volume of the overflow;
         (d) A description of the sewer system component from which the release occurred (for example, manhole, constructed overflow pipe, crack in pipe); and
         (e) The estimated date and time when the overflow began and stopped or will be stopped.
      ii. The following information must be reported to the DEQ regional office within 24 hours, or during normal business hours, whichever is earlier:
         (a) The OERS incident number (if applicable); and
         (b) A brief description of the event.
   (2) Written reporting postmarked within 5 days.
      i. The following information must be provided in writing to the DEQ regional office within 5 days of the time the permittee becomes aware of the overflow:
         (a) The OERS incident number (if applicable);
         (b) The cause or suspected cause of the overflow;
         (c) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
         (d) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
         (e) For storm-related overflows, the rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

      DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

b. Other instances of noncompliance.
   (1) The following instances of noncompliance must be reported:
      i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
      ii. Any upset that exceeds any effluent limitation in this permit;
      iii. Violation of maximum daily discharge limitation for any of the pollutants listed by DEQ in this permit; and
      iv. Any noncompliance that may endanger human health or the environment.
   (2) During normal business hours, the DEQ regional office must be called. Outside of normal business hours, DEQ must be contacted at 1-800-452-0311 (Oregon Emergency Response System).
   (3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
      i. A description of the noncompliance and its cause;
      ii. The period of noncompliance, including exact dates and times;
      iii. The estimated time noncompliance is expected to continue if it has not been corrected;
      iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
      v. Public notification steps taken, pursuant to General Condition B**7.**
   (4) DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

D6. Other Noncompliance
The permittee must report all instances of noncompliance not reported under General Condition D4 or D5 at the time monitoring reports are submitted. The reports must contain:
a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

D7. Duty to Provide Information
The permittee must furnish to DEQ within a reasonable time any information that DEQ may request to determine compliance with the permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit. The permittee must also furnish to DEQ, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it has failed to submit any relevant facts or has submitted incorrect information in a permit application or any report to DEQ, it must promptly submit such facts or information.

D8. Signatory Requirements
All applications, reports or information submitted to DEQ must be signed and certified in accordance with 40 CFR § 122.22.

D9. Falsification of Information
Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $125,000 per violation and up to 5 years in prison per ORS chapter 161. Additionally, according to 40 CFR § 122.41(k)(2), any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or non-compliance will, upon conviction, be

punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D10. Changes to Indirect Dischargers

The permittee must provide adequate notice to DEQ of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the federal Clean Water Act if it were directly discharging those pollutants and;
b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
c. For the purposes of this paragraph, adequate notice must include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

SECTION E. DEFINITIONS

E1. *BOD* or BOD_5 means five-day biochemical oxygen demand.
E2. *CBOD* or $CBOD_5$ means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.
E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) bacteria, and *Enterococcus* bacteria.
E5. *FC* means fecal coliform bacteria.
E6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
E7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR § 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-041.
E8. *mg/l* means milligrams per liter.
E9. *µg/l* means microgram per liter.
E10. *kg* means kilograms.
E11. m^3/d means cubic meters per day.
E12. *MGD* means million gallons per day.
E13. *Average monthly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
E14. *Average weekly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.
E15. *Daily discharge* as defined at 40 CFR § 122.2 means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge must be calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge must be calculated as the average measurement of the pollutant over the day.
E16. *24-hour composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.
E17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
E18. *Quarter* means January through March, April through June, July through September, or October through December.
E19. *Month* means calendar month.
E20. *Week* means a calendar week of Sunday through Saturday.
E21. *POTW* means a publicly-owned treatment works.

Appendix D

Biosolids Management Plan and Land Application Plan

Biosolids Management Plan
for
Pacific City Joint Water-Sanitary Authority
NPDES Permit No. 101519
Facility No. 66100
Kirk Medina
(503)965-6636

INTRODUCTION

The Pacific City Joint Water-Sanitary Authority (PCJWSA) owns and operates a municipal wastewater treatment plant located in Pacific City, Tillamook County, Oregon. As part of the treatment system operation, the PCJWSA manages a biosolids land application program. Wastewater processed by the treatment works is primarily of domestic origin, and no formal pretreatment program is required to be implemented under the existing National Pollutant Discharge Elimination System (NPDES) permit. However, a pretreatment program is in place for commercial and industrial users. This biosolids management plan, as required by the NPDES permit, outlines the liquids and solids processes at the facility, how biosolids are managed to meet federal and state requirements, and how the biosolids land application program is operated. The PCJWSA biosolids management plan was previously approved by the Oregon Department of Environmental Quality (Department) in 2011 and is being updated at this time to address upgrades to the liquid stream treatment and associated minor changes to the solids handling procedures.

WASTEWATER TREATMENT FACILITY

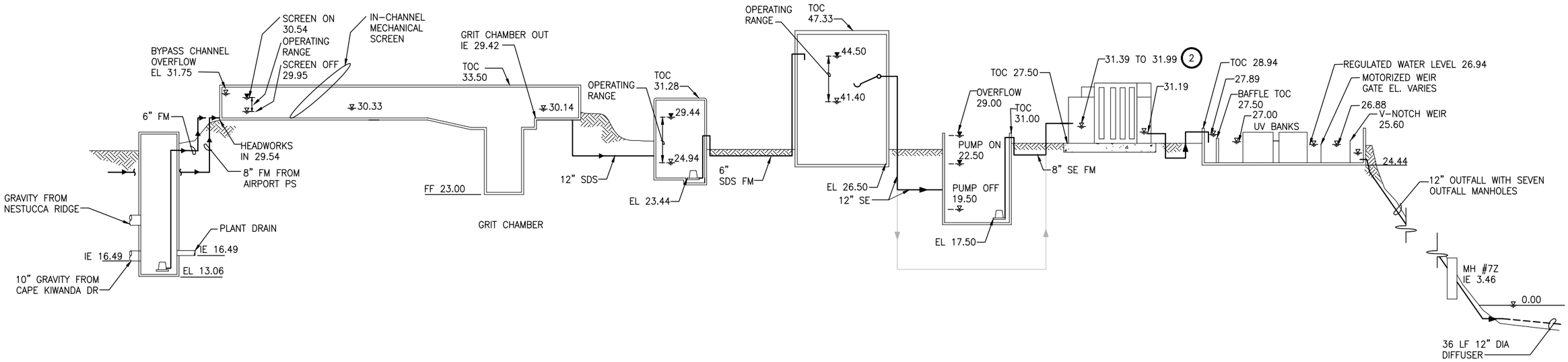
Liquids Processing

PCJWSA operates a municipal wastewater treatment plant (WWTP) located at 34005 Cape Kiwanda Dr., Pacific City, OR 97135. Treated effluent is discharged year-round to the Nestucca River at river mile 1. The designed average maximum monthly flow is 0.315 million gallons per day (MGD). Actual flows during the 2019 dry season averaged 0.190 MGD and during the wet season averaged 0.150 MGD. The peak daily flow design capacity is 0.633 MGD. The connections to the sewer system are 97 percent domestic, 3 percent percent commercial, with 1 industrial connection.

The liquids treatment process consists of:

- 1 x 6mm screen with a 2.5 MGD capacity
- 1 x Grit removal chamber with a 2.5 MGD capacity
- 1 x Flow equalization basin with a volume of 0.11 million gallons
- 2 x Sequencing batch reactor (SBR) tanks with a volume of 0.22 million gallons each
- 1 x Filter holding tank
- 2 x Cloth media filters (expandable to 3) with a capacity of 2 MGD total
- 2 x UV disinfection system with 2 banks, with a capacity of 1.27 MGD each

Figure 1 shows a hydraulic profile of the system.



NOTES:

1 LIQUID ELEVATIONS FOR 2035 ARE SHOWN AT MAX HR FLOW OF 2.07 MGD FOR HEADWORKS AND A FLOW OF 1.27 MGD FOR FILTER AND UV. OTHER ELEVATIONS ARE OPERATING RANGES.

(2) FILTER INFLUENT ELEVATION VARIES WITH SOLIDS ON MEDIA.

HYDRAULIC PROFILE
PLAN
NO SCALE

Figure 1
Hydraulic Profile

The flow equalization basin, filters, filter holding tank, and 1 UV channel were existing facilities. The screen, grit removal, SBR tanks, and 1 UV channel are new since the previously approved biosolids management plan. These treatment processes replaced the previous extended aeration treatment process.

The PCJWSA receives significantly higher flow in the dry season due to tourism and vacation home use, with a peak flow 1.5 to 2 times higher than the wet season flow. There are no seasonal changes in operation.

Influent flow is measured with dual 6-inch magmeters. Effluent flow is measured with a V-notch weir.

Solids Processing

The current solids processing treatment train was installed in 2019. The process consists of:

- 5 x Aerobic digesters with a combined volume of 205,000 gallons
- 1 x Solids holding/lime mix tank with a volume of 25,910 gallons
- 1 x Screw press dewatering system with a capacity of 225 dry lbs/hr

Solids are wasted from the SBR tanks to the digesters. The digesters are designed to operate in series for maximum solids digestion but can be operated in parallel mode at low loading and high temperatures. Solids are digested for a minimum of 60 days. After digestion, solids are sent to the solids holding tank/lime mix tank where they are held for dewatering. If needed, lime can be added (if pathogen reduction has not been achieved in the digesters). Solids are pumped from the lime mix tank to the screw press, where they are mixed with polymer, dewatered, and loaded onto a truck with a screw conveyor. There are no seasonal changes to the solids handling process except for longer digestion times at cooler temperatures.

For odor minimization, dewatering take place in an enclosed solids handling facility.

Pretreatment Program

PCJWSA is not required at this time to implement an industrial wastewater pretreatment program as there is only one industrial discharger (a brewery). PCJWSA has implemented a pretreatment permit system despite not being required to do so. Pollutant monitoring requirements as stated in the permit will ensure land application of biosolids occurs within federal and state limitations.

BIOSOLIDS TREATMENT PROCESSES

PCJWSA will certify in writing that Class B pathogen requirements and vector attraction reduction requirements are met. PCJWSA will also notify the Department in writing and obtain written approval prior to any process change that would use a pathogen reduction or vector attraction reduction method other than what is specified in this biosolids management plan.

Pathogen Reduction

Pathogen reduction requirements of 40 CFR Part 503 and OAR 340-050 are primarily met through Class B, Alternative 1. Biosolids will be sampled prior to dewatering and tested for fecal coliform.
In the event that the biosolids do not meet the requirements of Alternative 1, Alternative 2 will be used through lime stabilization. Sufficient lime will be added to the lime mix tank, and solids will be processed in batches to meet the requirements of the Processes to Significantly Reduce Pathogens (PSRP). Following lime treatment, solids will be land applied. This will continue until such time as Alternative 1 becomes feasible again. For various other reasons, PCJWSA may choose to rely on either alternative to meet Class B Pathogen requirements.

Class B Pathogen Requirements

**Note: Must meet one of the following alternatives. Check applicable alternative.*

☒ Alternative 1: The geometric mean of the density of fecal coliform of seven representative samples shall be less than either 2 million Most Probable Number (MPN) or 2 million Colony Forming Units (CFU) per gram of total solids (dry weight basis).

☒ Alternative 2: Biosolids shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in the table below. **(NOTE: This is a backup option.)**

☐ Alternative 3: Biosolids shall be treated in a process that is equivalent to a PSRP, as determined by the permitting authority.

Processes to Significantly Reduce Pathogens (PSRP) Listed in Appendix B of 40 CFR Part 503

**Note: Check applicable PSRP*

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☐	Aerobic Digestion	Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20ºC (68ºF) and 60 days at 15ºC (59ºF).
☐	Air Drying	Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0ºC (23ºF).
☐	Anaerobic Digestion	Sewage sludge is treated in the absence of air for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35ºC to 55ºC (131ºF) and 60 days at 20ºC (68ºF).
☐	Composting	Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40ºC (104ºF) or higher and remains at 40ºC (104ºF) or higher for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds 55ºC (131º).
☒	Lime Stabilization	Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 for ≥2 hours of contact. **(NOTE: This is a backup option.)**

Vector Attraction Reduction

Vector attraction reduction requirements of 40 CFR Part 503 are met through Option 4 or Option 6 from the table below. Specific oxygen uptake rate (SOUR) testing will be conducted on aerobically digested sludge before dewatering to verify the SOUR requirements are met. The process meets this requirement through aerobic digestion.

Vector Attraction Reduction Options

**Note: Must meet one of the following options. Check applicable option(s).*

40 CFR Part 503 Requirement		What is Required?	Most Appropriate For:
☐	Option 1 503.33(b)(1)	At least 38% reduction in volatile solids during sewage sludge treatment	Sewage sludge processed by: Anaerobic biological treatment Aerobic biological treatment
☐	Option 2 503.33(b)(2)	Less than 17% additional volatile solids loss during bench-scale anaerobic batch digestion of the sewage sludge for 40 additional days at 30ºC to 37ºC (86ºF to 99ºF)	Only for anaerobically digested sewage sludge that cannot meet the requirements of Option 1

40 CFR Part 503 Requirement		What is Required?	Most Appropriate For:
☐	Option 3 503.33(b)(3)	Less than 15% additional volatile solids reduction during bench-scale aerobic batch digestion for 30 additional days at 20ºC (68ºF)	Only for aerobically digested liquid sewage sludge with 2% or less solids that cannot meet the requirements of Option 1 – e.g., sewage sludges treated in extended aeration plants. Sludges with 2% or greater solids must be diluted
☒	Option 4 503.33(b)(4)	SOUR at 20ºC (68ºF) is ≤ 1.5 mg oxygen/hr/g total sewage sludge solids	Liquid sewage sludges (2% or less solids) from aerobic processes run at temperatures between 10 to 30ºC (should not be used for composted sewage sludges)
☐	Option 5 503.33(b)(5)	Aerobic treatment of the sewage sludge for at least 14 days at over 40ºC (104ºF) with an average temperature of over 45ºC (113ºF)	Composted sewage sludge (For sewage sludges from other aerobic processes, it will likely be easier to meet option 3 or 4)
☒	Option 6 503.33(b)(6)	Addition of sufficient alkali to raise the pH to at least 12 at 25ºC (77ºF) and maintain a pH ≥ 12 for 2 hours and a pH ≥ 11.5 for 22 more hours	Alkali-treated sewage sludge (alkaline materials include lime, fly ash, kiln dust, and wood ash)
☐	Option 7 503.33(b)(7)	Percent solids ≥ 75% prior to mixing with other materials	Sewage sludges treated by an aerobic or anaerobic process (i.e., sewage sludges that do not contain unstabilized solids generated in primary wastewater treatment)
☐	Option 8 503.33(b)(8)	Percent solids ≥ 90% prior to mixing with other materials	Sewage sludges that contain unstabilized solids generated in primary wastewater treatment (e.g., heat-dried sewage sludges)
☐	Option 9 503.33(b)(9)	Sewage sludge is injected into soil so that no significant amount of sewage sludge is present on the land surface 1 hour after injection, except Class A sewage sludge which must be injected within 8 hours after the pathogen reduction process	Sewage sludge applied to the land or placed on a surface disposal site. Domestic septage applied to agricultural land, a forest, or a reclamation site, or placed on a surface disposal site
☐	Option 10 503.33(b)(10)	Sewage sludge is incorporated into the soil within 6 hours after application to land or placement on a surface disposal site, except Class A sewage sludge which must be applied to or placed on the land surface within 8 hours after the pathogen reduction process	Sewage sludge applied to the land or placed on a surface disposal site. Domestic septage applied to agricultural land, forest, or a reclamation site, or placed on a surface disposal site

BIOSOLIDS STORAGE

Treatment Facility

From the screw press in the solids room, dewatered biosolids are transferred by a shaftless auger into a truck for land application.

Staging

The unloading and placement of biosolids in one area at a land application site may occur on a limited time basis. If staging of biosolids occurs, the requirements outlined in the site authorization letters for each site will be followed.

Field Storage

Field storage is not authorized by the Department at this time.

TRANSPORTATION

PCJWSA owns two trucks to transport biosolids from the wastewater treatment facility to authorized land application sites. Both trucks are operated by PCJWSA employees**.** PCJWSA is able to handle the volume of biosolids produced through these transportation practices. The spreader truck holds up to 12 cubic yards of 16 percent biosolids and typically transports solids monthly to the land application site. The tanker trailer is used to haul up to 3,300 gallons of liquid biosolids to the land application sites.

REMEDIAL PROCEDURES

All spills into waters of the state or spills on the ground surface that are likely to enter waters of the state will be reported immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and the Department's regional biosolids specialist, Tim Ruby, at 503-229-5292. All spills of 42 gallons or more on the ground surface will be reported to the Department's regional biosolids specialist within 24 hours of the spill incident.

Spill During Transportation of Dewatered Biosolids

PCJWSA is responsible for cleanup of any biosolids spills that occur during transport to land application sites. If a spill occurs during the transport of biosolids between the WWTP and the land application site, PCJWSA will:

- Contain the spill.
- Post the area and set up temporary fencing if there is a potential for public exposure.
- Remove spilled biosolids with a front-end loader or shovel.
- Cover the area with dry lime if needed.
- Apply absorbent (e.g., sand) if needed.
- Transport spilled product to a Department-authorized biosolids land application or disposal site.

Spill During Transportation of Liquid Biosolids

In the event of a biosolids spill between the WWTP and the application site, containment of the biosolids with either dirt and/or sand is an important first step along with calling OERS at 1-800-452-0311 for spills in excess of 50 gallons. Depending on the location and amount of biosolids spilled, local contractors with vacuum trucks may need to be called to vacuum up the biosolids. Once the spill has been cleaned up, publication notice, barricades and posting at the affected area, PCJWSA should contact the Department regarding the use of hydrated lime at the spill location. The Department may want hydrated lime placed on the spill once cleanup has been completed. PCJWSA must check with the Department prior to placing lime on the spill site. Close contact with the Department is imperative throughout the process.

Solids Treatment Process Failure or Modification

If a mechanical problem occurs with the screw press and replacement parts are not in stock at the treatment facility, an emergency parts order will be placed. During this period, the PCJWSA would divert waste-activated sludge to another wastewater facility – such as the City of Tillamook or Lincoln City.

In the event that PCJWSA is unable to meet Class B pathogen requirements using fecal coliform sample results and vector attraction reduction using the SOUR method, PCJWSA is able to use lime stabilization to meet the Class B requirements. Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 for 2 or more hours of contact to reduce pathogens. Sludge must then maintain a pH not less than 11.5 for 22 more hours for vector attraction reduction.

MONITORING AND REPORTING

Monitoring and Sampling Program

PCJWSA has developed and implemented a biosolids monitoring and sampling plan. Samples collected and analyzed will be representative of the biosolids to be land applied. Quality control measures and procedures are implemented for microbiological tests to verify precision and accuracy. Sampling location(s) stated will demonstrate how vector attraction reduction is met. The plan includes:

- Sample location (for pathogen reduction Alternative 1 and vector attraction reduction Option 4) is located before the dewatering process when cake is hauled, OR
- Pathogen reduction Alternative 2 (Lime Stabilization) and vector attraction reduction Option 6 is used when liquid is hauled.
- Samples will be preserved according to the test methods specified.
- Samples will be tested in the PCJWSA lab onsite or promptly sent to a commercial laboratory for testing.

All monitoring and reporting will be conducted in accordance with the PCJWSA NPDES permit. The monitoring frequency is based on the amount of biosolids generated that are land applied, marketed to be sold, or given away. Based on 40 CFR §503.16, Table 1, and the amount of biosolids generated and used during 2019, PCJWSA is required to sample biosolids annually.

Recordkeeping and Reporting Procedures

PCJWSA as the preparer and land applier of biosolids is required to maintain records to demonstrate that federal and state biosolids requirements are met. Records will be kept on file by PCJWSA, and will be available upon request by the Department. Monitoring and sampling records will be retained for a period of no fewer than 5 years. The minimum required records include the following information:

- Pollutant concentrations of each parameter stated in the permit.
- Pathogen requirements as stated in the permit for Class B.
- Description of how one of the vector attraction reduction requirements in 40 CFR §503.33(b)(1) through (8) is met.
- Description of how the management practices in 40 CFR §503.14 and site restrictions in 40 CFR §503.32(b)(5) are met for each biosolids land application site (*Note: This is for Class B bulk biosolids*).
- Certification that the information submitted is accurate to determine compliance with pathogen and vector attraction reduction requirements, and site restriction/management requirements.

Annual Reporting

A biosolids annual report is required to be submitted to the Department each year by February 19 or as required by the permit if bulk biosolids have been land applied, or biosolids-derived products were sold or given away the previous year. The report will include information on biosolids handling activities and data (i.e., monitoring results, nutrient loading rates) from the previous calendar year. Some of the information required with the annual report includes:

- Daily site logs or records, including date, time, and quantity (gallon, pounds) of nitrogen/acre land applied.
- Map, including scale, showing the site and the land application location that coincides with the daily site application method (e.g., truck spreader bar, irrigation cannon).
- Signed copy of the certification statement (see next section on Certification Statement).

Certification Statement

PCJWSA is capable of meeting Class B pathogen reduction and vector attraction reduction requirements. As required under 40 CFR §503.17, PCJWSA must retain a certification statement indicating whether compliance with pathogen reduction, vector attraction reduction, and certain site restrictions have been met. The certification statement must be retained for a period of 5 years, and must be submitted with the annual report that is due February 19 or as required by the permit. PCJWSA will retain the following certification statement and it will be signed by a principal executive officer, ranking elected official, or their duly authorized representative (e.g., individual or position having responsibility for the overall operation of the system, such as the position of plant manager, supervisor, superintendent or equivalent responsibility).

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirements in 40 CFR §503.32(b)(1) or (2), the vector attraction reduction requirement in 40 CFR §503.33(b)(4) or (6), and the site restrictions in 40 CFR §503.32(b)(5) for each site on which Class B sewage sludge was applied, was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

Signature_____Date_____

PCJWSA is also required as the land applier to certify that the management practices in 40 CFR §503.14 are being met. This certification includes that biosolids are being land applied at approved agronomic loading rates as specified in department issued site authorization letters.

> "I certify, under penalty of law that the management practices in 40 CFR §503.14 have been met for each site on which bulk biosolids is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

Signature_____Date_____

BIOSOLIDS CHARACTERISTICS

Pollutant Characteristics

The following table is a representative biosolids analysis for pollutant characteristics. These data and all previous data indicate that pollutant concentrations for all regulated pollutants have been met.
**Note: If a facility is required to monitor more than once a year, all data for the year should be provided in this section.*

Parameter	Biosolids Analytical Result (mg/kg)[1]	Sample Date	40 CFR §503.13(b)(3) Pollutant Concentration Limits (mg/kg)
Arsenic (As)	< LOQ	9/3/2019	41
Cadmium (Cd)	< LOQ	9/3/2019	39
Chromium (Cr)	< LOQ	9/3/2019	-
Copper (Cu)	222	9/3/2019	1500
Lead (Pb)	< LOQ	9/3/2019	300
Mercury (Hg)	< LOQ	9/3/2019	17
Molybdenum (Mo)	< LOQ	9/3/2019	-
Nickel (Ni)	< LOQ	9/3/2019	420
Selenium (Se)	< LOQ	9/3/2019	100
Zinc (Zn)	443	9/3/2019	2800

Notes: LOQ = Limit of Quantification; 1 = as dry weight

Nutrient Characteristics and Other Parameters

The following table is a representative biosolids analysis for nutrient characteristics and other parameters.
**Note: If a facility is required to monitor more than once a year, all data for the year should be provided in this section.*

Parameter/measurement unit	Biosolids Analytical Result	Sample Date
Total solids, percent[1]	0.537	9/3/2019
Volatile solids, percent[2]	86.8	9/3/2019
TKN, percent[3]	3.43	9/3/2019
NO_3-N, percent[3]	< LOQ	9/3/2019
NH_4-N, percent[3]	0.348	9/3/2019
Phosphorus (P), percent[3]	2.51	9/3/2019
Potassium (K), mg/kg[3]	13,600	9/3/2019
pH, standard unit[1]	6.35	9/3/2019

Notes: 1 = as received; 2 = as dry weight of % of total solids; 3 = as dry weight;
LOQ = Limit of Quantification

BIOSOLIDS UTILIZATION PROGRAM

100 percent of biosolids generated by PCJWSA are beneficially used through land application. The following biosolids land application plan outlines the agronomic application rate and site crops, where biosolids are land applied, site selection criteria for a new site, and site and crop management practices.

BIOSOLIDS LAND APPLICATION PLAN

Agronomic Application Rate and Site Crops

Class B biosolids are required to be land applied to a site at a rate that is equal to or less than the agronomic rate for the site. An agronomic rate is the whole biosolids application rate (dry weight basis) designed to provide the annual total amount of nitrogen needed by a crop and to minimize the amount of nitrogen passing below the root zone of the crop or vegetation to groundwater.

Biosolids application rates for the PCJWSA site were developed based on conversations with the Department subsequent to the initial approval for the site. The annual application rate for grass is 140 pounds available nitrogen (N) per acre, unless the application site demonstrates additional nitrogen is required to match crop uptake rates. The land application sites authorized for use can assimilate the total plant-available nitrogen the biosolids provide on an annual basis.

Site Inventory of Existing and Potential Sites

PCJWSA currently land applies Class B biosolids to the Department-authorized site listed in the table below. Surface application of biosolids is performed using a combination truck and spreader. The spreader is mounted on the side of the truck. Solids are fed into the spreader and projected up to 60 feet from the truck. Surface application of biosolids using a tanker trailer are gravity fed from the tanker to a distribution manifold on the rear of the tanker. The 8-foot-wide manifold is designed to maintain even distribution of biosolids on the application site.

A site map with the general location and size of existing authorized sites is included as Appendix A of this biosolids management plan. PCJWSA currently has 50 acres that are authorized for land application, of which approximately 40 acres are available for application after accounting for buffer zones and topography. This is an adequate land base for current and future operations, based on current biosolids generation rates.

Biosolids Land Application Site Inventory

Site Name/ Identifier	Type of Crop/Acreage	lb. N/ acre	lb. N/ site	Time of year applied (month)	Harvest Cycle	Department Authorized?
Beaver, OR	Grass, approximately 40 acres available for land application	140	5,600	Year-round	Grass is mowed 4 times per year	Yes

Site Selection Criteria for a New Site

If necessary, PCJWSA will locate additional sites for land applying biosolids. Prior to using any site for land application, PCJWSA is required to receive a written site authorization letter from the Department. The following site conditions will be considered when determining the suitability of a site for land application:

- All sites will be located on agricultural, forest, or reclamation land in Tillamook County.
- A site should be on a stable geologic formation not subject to flooding or excessive runoff from adjacent land.
- Minimum depth to permanent groundwater should be 4 feet.
- Topography should be suitable for normal agricultural operations. Dewatered or dried biosolids may be land applied on well-vegetated slopes up to 30 percent.
- Soil should have a minimum rooting depth of 24 inches.

Public Notification

PCJWSA owns the land used for land application, so notifying the owner is not required.

Site Management Practices

Site access restrictions and setbacks will be followed as outlined in the Department's site authorization letters. PCJWSA will ensure that access is restricted by appropriate means as necessary, such as fencing or posting of signs at the land application site. Biosolids land application will not occur in those areas designated as buffer strips and will be achieved through accurate measurement of the buffer area prior to commencing land application.

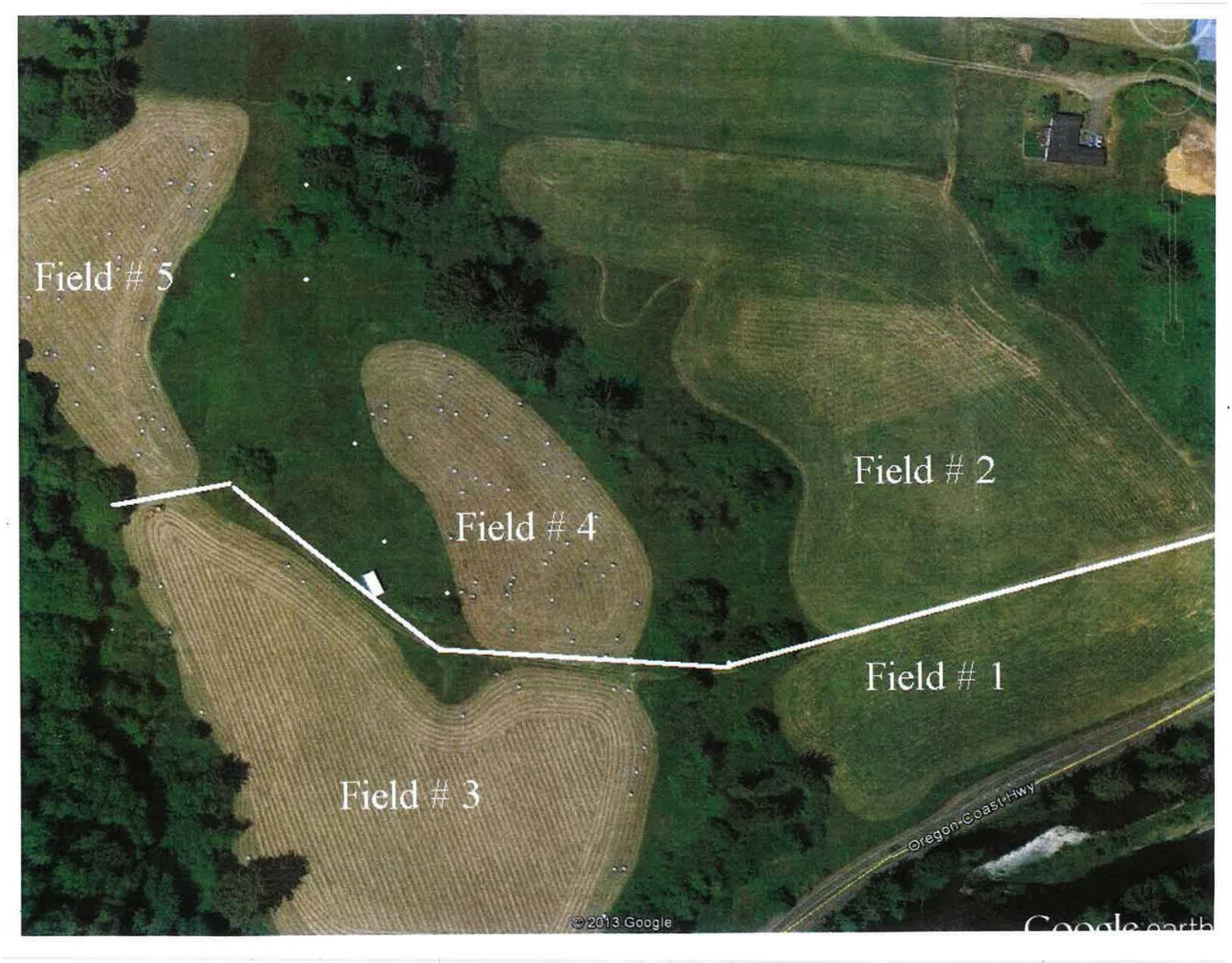
Crop Management Practices

As listed in the Biosolids Land Application Site Inventory table above, biosolids are applied to grass. Timing of application and the harvest cycle of the crop are also listed. Soil conditions must be favorable for application such that runoff, leaching, or soil compaction does not occur. No tilling and irrigation practices may occur onsite. Additionally, biosolids are not applied on snow, frozen ground, or during seasonal storms.

The overall management of nutrients at the land application sites takes into account the amount of biosolids that are land applied.

Appendix A

Biosolids Land Application Site Map



Appendix E

Wastewater Collection System Model Development and Calibration

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

700 NE MULTNOMAH, SUITE 1000 | PORTLAND, OR 97232 | P 503.233.2400, 360.694.5020

TECHNICAL MEMORANDUM

DATE:	November 1, 2022
TO:	John Wesely, PCJWSA
FROM:	Matt Steiner, Parametrix
SUBJECT:	Wastewater Collection System Model Development and Calibration
CC:	
PROJECT NUMBER:	276-3300-005
PROJECT NAME:	PCJWSA Wastewater Master Plan

Background and Introduction

As part of the PCJWSA Wastewater Master Plan, a hydraulic model was created using InfoSWMM to assess existing and future system capacity deficiencies. InfoSWMM is a fully ArcGIS-integrated hydrologic and hydraulic simulation model for the management of wastewater collection systems. Figure 1 shows the model setup selections that were used for this collection system.

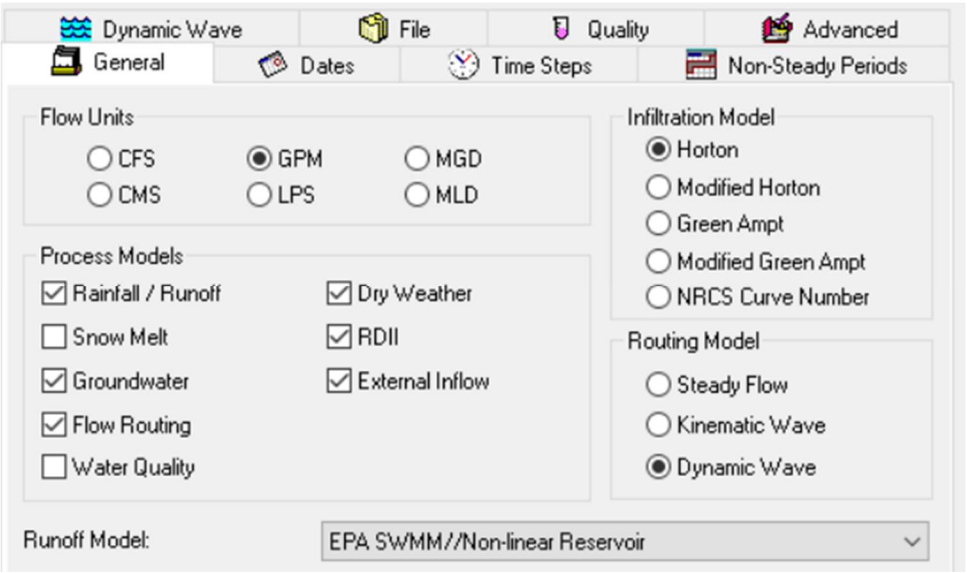


Figure 1: Model Setup

To account for potential stormwater-related rainfall dependent infiltration and inflow (RDII), InfoSWMM executes dynamic rainfall-runoff simulation for single events or long term simulations that can account for climate, soil, land use and topographic conditions for the areas tributary to the sewer system. InfoSWMM is able to account for various hydrologic processes that produce runoff from urban areas including time varying rainfall, rainfall interception, infiltration, percolation, evaporation, snow melt, and flow between groundwater and the conveyance system, dry sanitary flows, and any user defined flows.

An InfoSWMM model was created using available GIS information. For the existing sewer system components, model information was based on the most current GIS information. Record drawings were used to address any issues within the collection system related to missing pipe diameters, manhole locations, or pipe inverts.

The model was calibrated based on dry and wet weather flow monitoring. Once the model was calibrated, the focus of the modeling shifted to the future, 2042, condition. A design storm was developed and simulated. Because part of this collection system is located within the regulatory floodway, there is flooding, and a portion of the floodwater enters the collection system. A scenario with RDII but without river flooding was also simulated. The results and findings were documented in the Wastewater Master Plan text.

Flow Monitoring

A critical component of wastewater modeling is to do collection system flow monitoring. Flow monitoring can help to assess the total wet and dry weather flows to the WWTP. Collection systems are design to convey wastewater. These collection systems almost certain will convey at times an additional amount of RDII – which is the flow entering the sewer system as a direct result of rain. RDII infiltration leaks into the system through defects like cracked/broken pipes, defective pipe joints, poorly constructed lateral services, or manhole joints. RDII increases the total volume and peak flows of a collection system. The infiltration component will percolate slowly into the collection system whereas the inflow component will enter directly into the collection system as runoff through manholes located at or near low spots where ponding occurs. RDII can be assessed by analyzing the relationship between system flow and rainfall.

For this master plan project, three flow meters were installed from July 2020 and removed in early April 2021. The flow meters were installed by SFE Global, a company providing services for underground infrastructure assessment, monitoring, and environmental data management. These flow meters were installed at

- Cape Kiwanda Dr just north of the WWTP (Kiwanda)
- Upstream of Airport Pump Station (Airport)
- River Avenue just north of Pacific Avenue (River)

The flow meter locations are also shown in Figure 2 (at the end of this report). The associated sewersheds are also outlined in Figure 1. Note that River flow meter is a sub-sewershed of Airport. All flow from River is conveyed through the Airport as well.

The Kiwanda flow meter measures all the flow north of the WWTP. The Airport flow meter measures all the flow east of the Nestucca River, and the River flow meter measures the area to the north of Airport Pump Station, along Brooten Rd and Resort Dr, and the Woods service area. The River flow meter is part of the area tributary to the Airport flow meter. Consequently, the Airport meter also measures flows coming from the River meter.

Flow monitoring data was used to identify dry weather flow and RDII contributions during wet weather conditions. Flow monitoring data was used to calculate existing system loading for the model and to identify variability in the existing system from RDII.

The US Environmental Protection Agency (EPA) Sanitary Sewer Overflow Analysis and Planning (SSOAP) toolbox is an industry standard software developed by EPA to estimate RDII. The SSOAP toolbox was used as part of this master plan to analyze existing dry weather loading and wet weather parameters for integration into the model. It was also used to develop diurnal patterns for the dry weather flow. The software is able to consolidate flow and precipitation records to identify dry weather conditions and average diurnal flows over the flow monitoring period – producing diurnal curves for each flow meter.

Dry Weather Flow

Dry weather flow is the flow in the sanitary sewer during periods of dry weather where RDII is at its lowest. For PCJWSA, this is typically July – September; however there are short spans of days throughout the year where there is little to no rainfall that can be considered dry weather as well because the rainfall, if any, does not result in any significant RDII.

To construct the collection system model, dry weather flow was distributed first in the model's pipe network first. Water billing records were analyzed from November – February. Because lawn irrigation is unlikely during this time of year, water billing records were assumed to equal wastewater generation. For the current condition, each parcel was assigned an associated manhole (typically the closest) that indicates where flow from that parcel would be loaded into the model.

The EPA SSOAP toolbox analyzed the flow monitoring data for dry conditions and developed diurnal patters for the three flow meters. The flow assigned to the loading manholes was input in the model based on the diurnal pattern. These diurnal patterns with peaking factors are shown in Figure 3. These diurnal patterns follow expected shape and peaking factors for collection system.

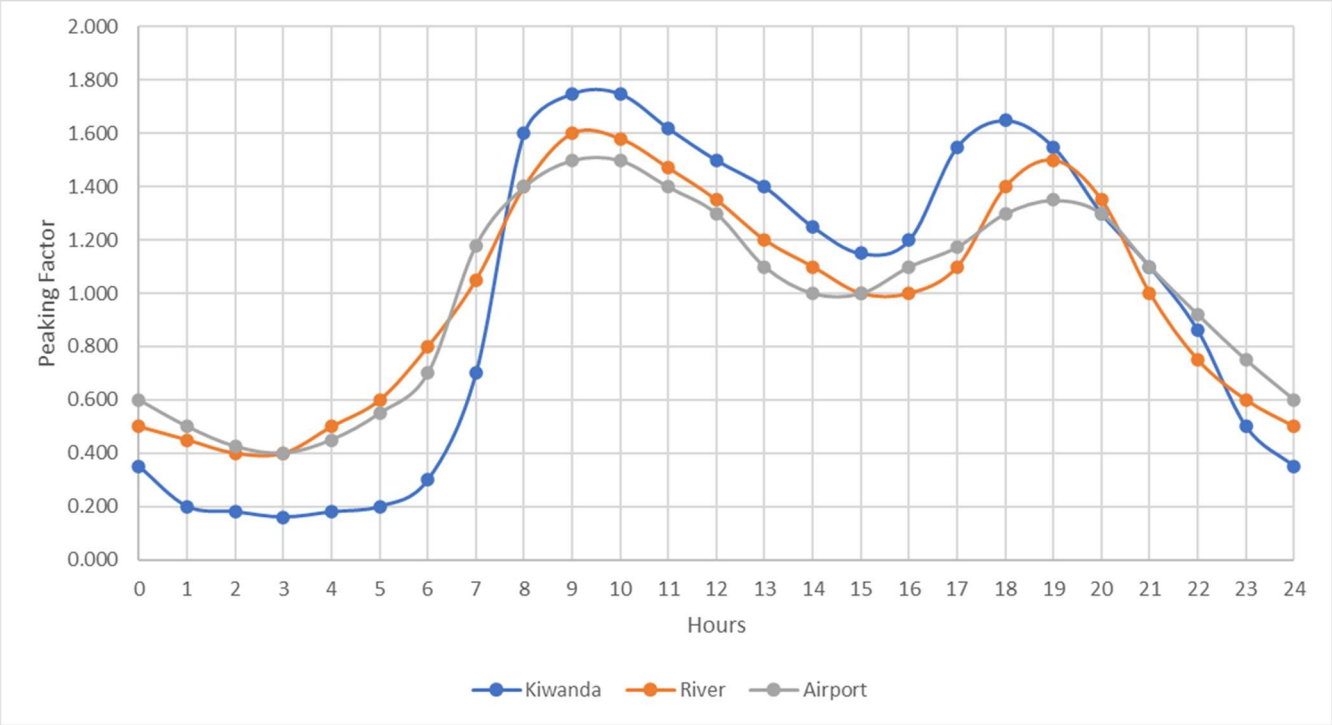


Figure 3: System Diurnal Curves

Figures 4, 5, and 6 show the modeling results compared to observed flows for Kiwanda, River, and Airport, respectively. The DWF calibration used dates in March because PDAF is likely to occur between January and April. In 2021, March 10 and 11 had almost no antecedent rainfall and is considered to a dry condition. In general, all results show good model calibration.

There is some discrepancy at Airport between the modeled and observed peaks. These are related to the four pump stations that feed into Airport – particularly Hana PS. The general shape of the DWF matches, but the exact timing of the upstream pump stations operation does not exactly match. It is unlikely to get pump station run times to align exactly, and so Airport is still considered to have a good calibration. The peaks at River are perhaps

not quite a defined as what was observed at the flow meter. River has the Woods pump station upstream and a large STEP system. This difference between the observed and modeled conditions are likely related to assumptions related to the STEP system. It still follows the same general shape, and because it is part of the Airport tributary area and Airport has a good DWF calibration, this is still considered a good DWF calibration.

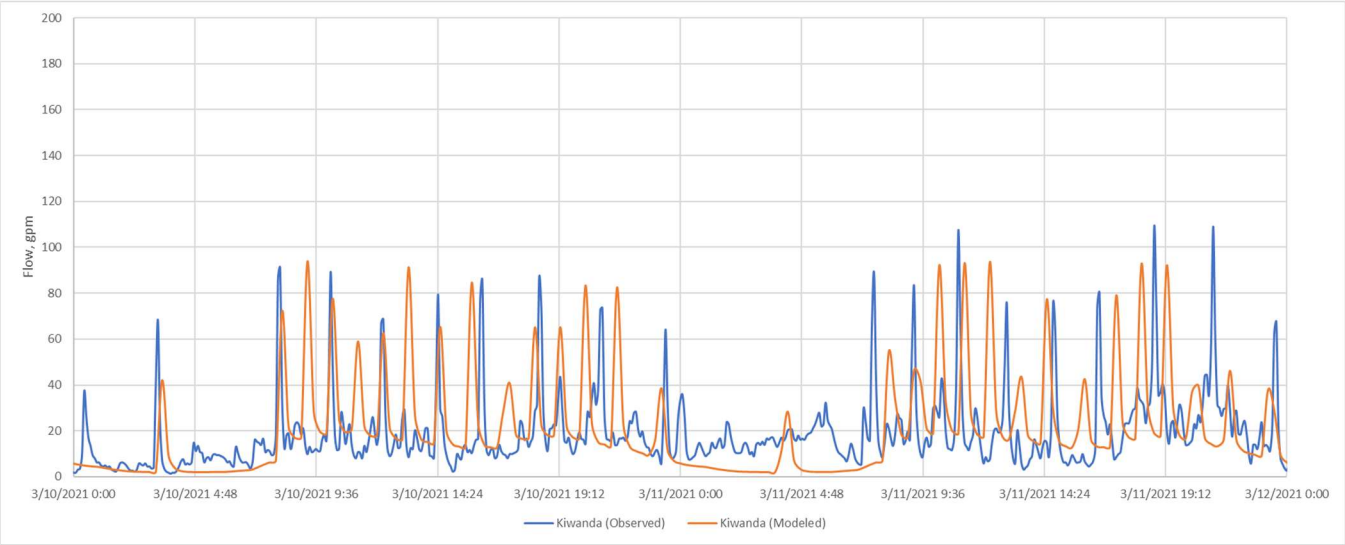


Figure 4: DWF Calibration at Kiwanda

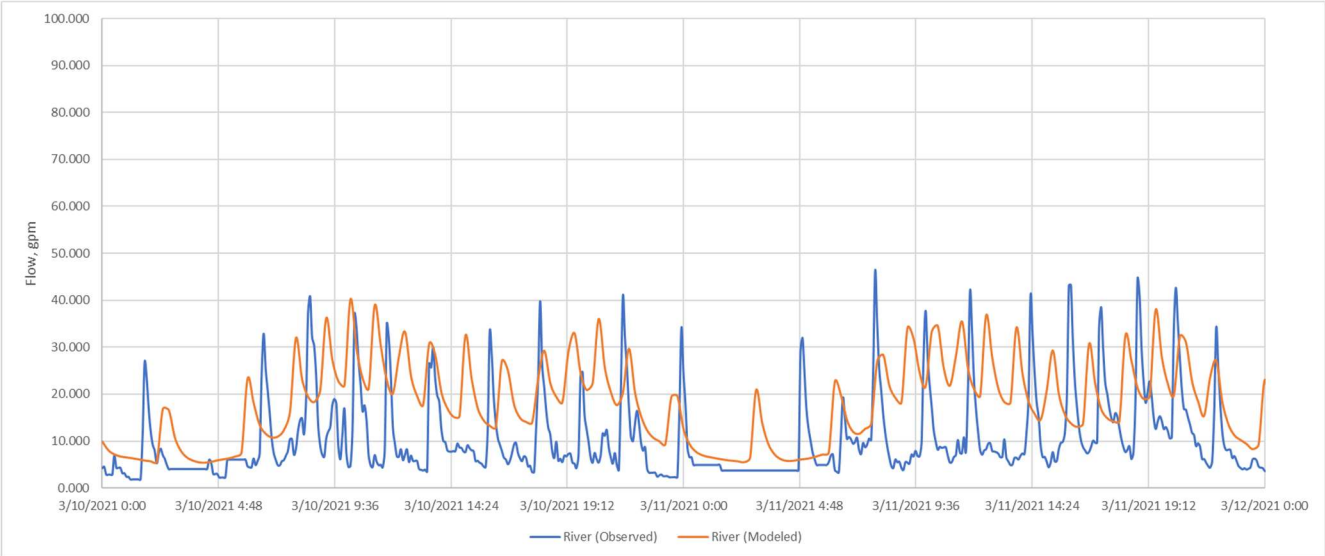


Figure 5: DWF Calibration at River

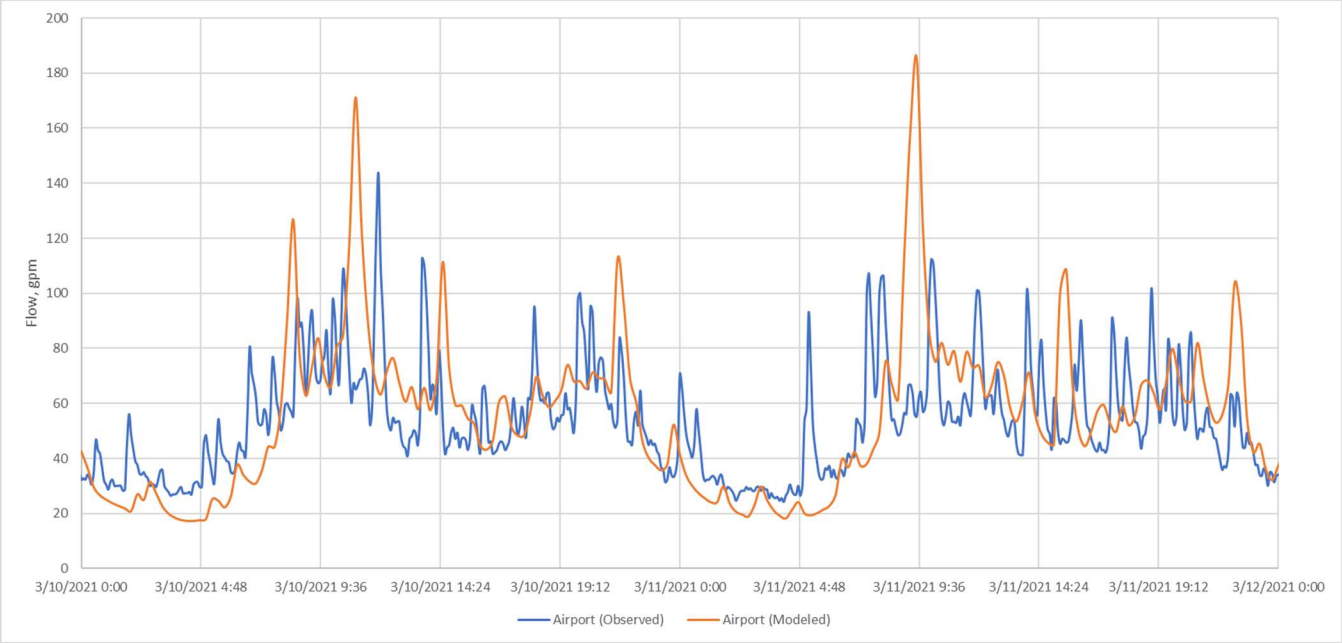


Figure 6: DWF Calibration at Airport

Wet Weather Flow

Wet weather flows add RDII to weather season dry weather flow to create peak sewer flows in the system. This helps to identify capacity deficiencies which can results in overflows. As with the dry weather analysis, monitoring data is available to characterize and distribute RDII. Wet weather monitoring information is described below. For this WWSP, the RTK unit hydrograph method was used to determine the sewer response to rainfall for each of the three areas with a flow monitor. The RTK method is used throughout western Oregon to determine RDII. It is based on fitting up to three triangular unit hydrograph to an observed hydrograph. These hydrographs estimate the fast, medium, and slow RDII response. R represents the proportion of rainfall falling on the catchment area and enters the sewer system. T is the time to peak of the unit hydrograph. K is the ratio of “time to recession” to the ”time to peak” of the hydrograph.

According to Discharge Monitoring Reports (DMR), the largest flow into the WWTP was 0.528 MGD on 1/12/2021. This event was by far the largest event during the flow monitoring period. The precipitation that day was 2.33 inches – which is not unusual for PCJWSA. For reference, the 5-year, 24-hour storm event is 4.4 inches.

After discussion with PCJWSA, it was learned that the Nestucca River had flooded on 1/12/2021. Part of the collection system is located within the regulatory floodway. These areas include Rueppell Avenue, River Avenue, Brooten Rd (at the intersection of River Ave and north), Resort Drive, and the Airport Pump Station. These areas are prone to flooding when heavy rainfall and/or tidal influences cause the Nestucca River to exceed its banks. This causes direct inflow of portions of the river water into the collection system. As a precaution, PCJWSA turns off the STEP system along North Brooten and Resort Drive. Otherwise, the STEP tanks would be inundated, and the associated pumps would run constantly – overwhelming the STEP system. Because this event contained so much direct inflow from flooding, it was important to model another large storm event to determine the contribution from flooding and the contribution from RDII.

There was another large precipitation even on 2/13/2021 where 2.25 inches fell in a 24-hour period (most of which fell on 2/12/2021). The total flow to the WWTP on 2/12/2021 was 0.254 MGD and 0.237 on 2/13/2021.

There was no river flooding on these days. Note that the precipitation amounts on 1/12/21, 2/12/21 and 2/13/21 were similar but the flow rates into the plant was about twice as much in January. It is anticipated that this large difference was due to the river flooding.

The wet weather modeled was first calibrated to established RTK values for the 2/13/2021 event. Figures 7, 8, and 9 show the modeling results for Kiwanda, River, and Airport, respectively. Once the model was calibrated, then additional inflow was added to the manholes within the floodway to calibrate to the flooded condition on 1/12/2021. Figures 10 and 11 show the modeling results for River, and Airport, respectively. Kiwanda was not calibrated for a flooded condition because its sewershed was not inundated. Note, Figure 10 shows an observed peak flow of nearly 1,000 gpm for 5 minutes. The flow meter took measurements every 5 minutes – meaning that this peak 1,000 gpm was read for only 1 measurement. Based on the rest of the flooding and peak flow rates into Airport (which is downstream of River), it is likely that this measurement was an error. The calibration focused on calibrating to the rest of the observed River data and all the Airport data.

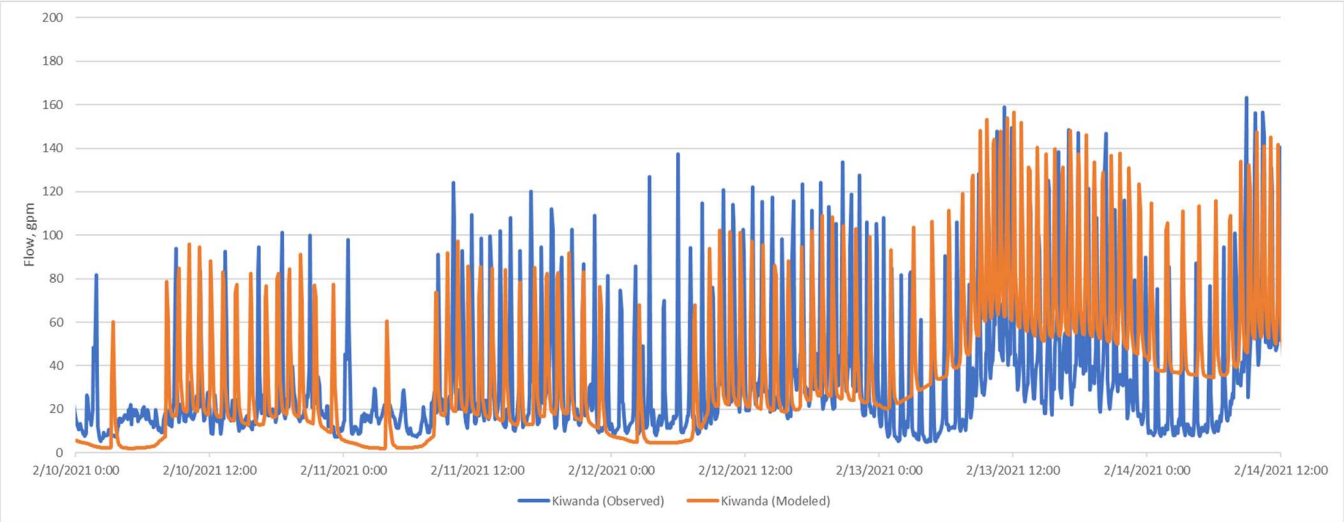


Figure 7: Kiwanda WWF Calibration (no river flooding)

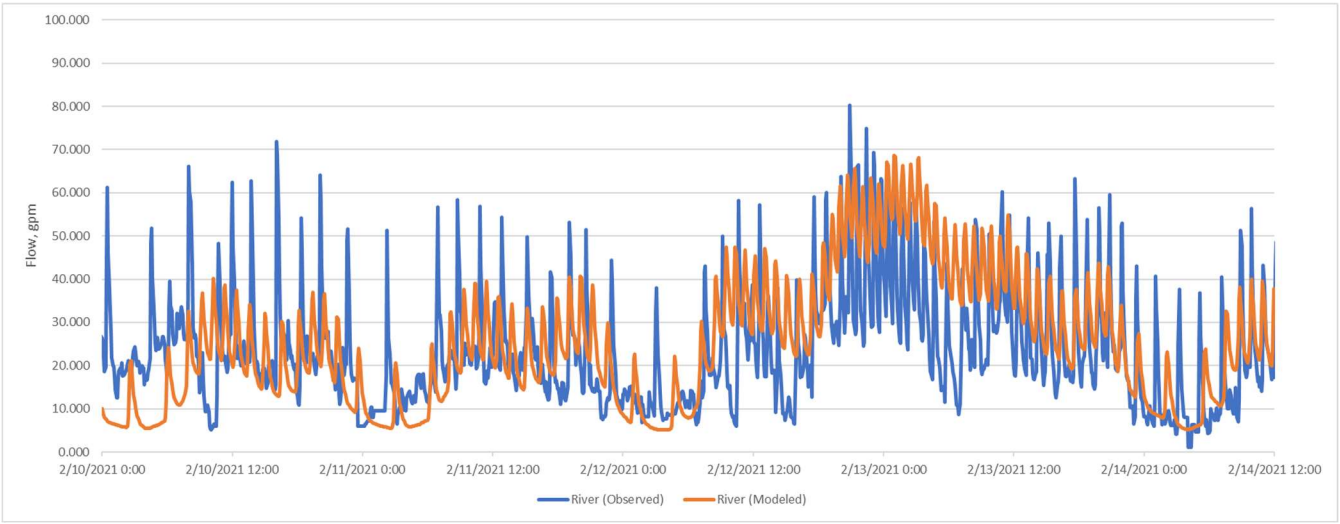


Figure 8: River WWF Calibration (no flooding)

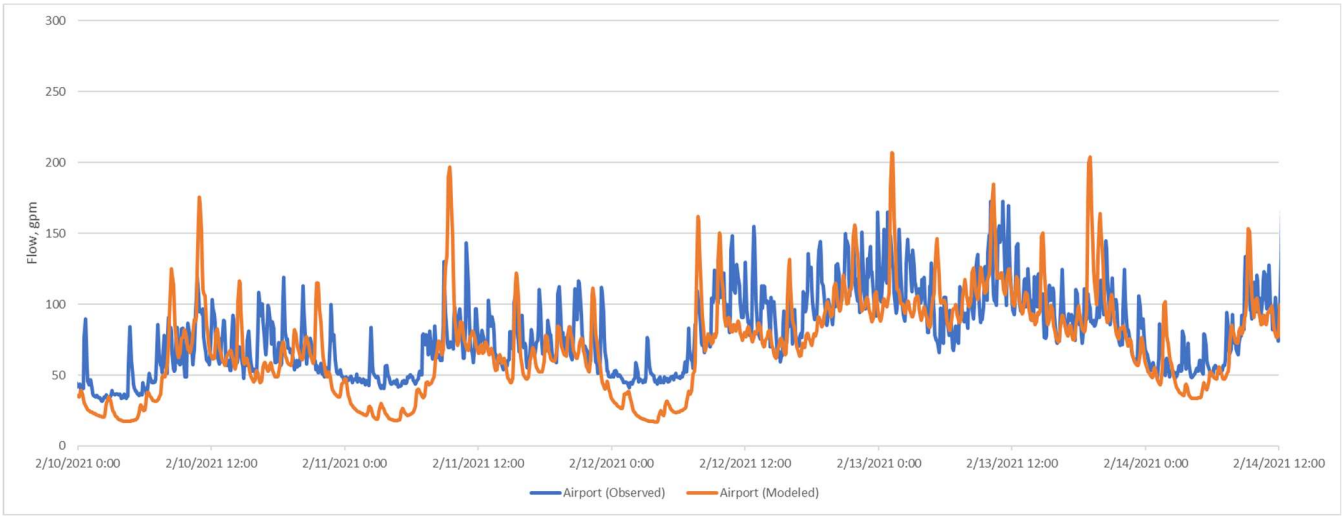


Figure 9: Airport WWF Calibration (no flooding)

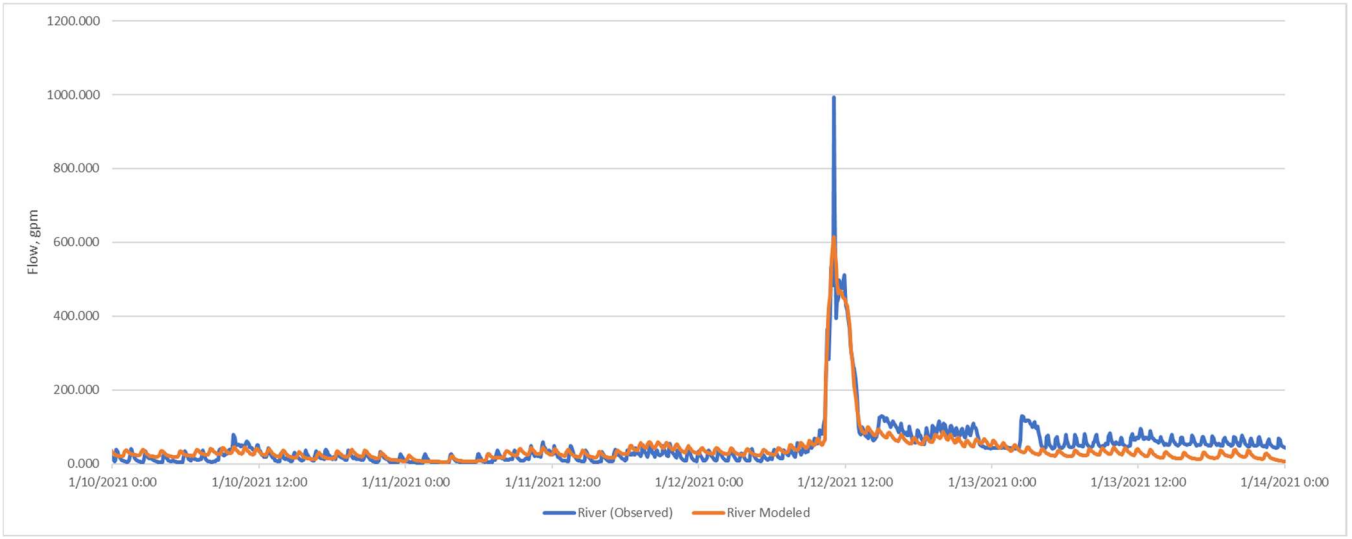


Figure 10: River WWF Calibration (with flooding)

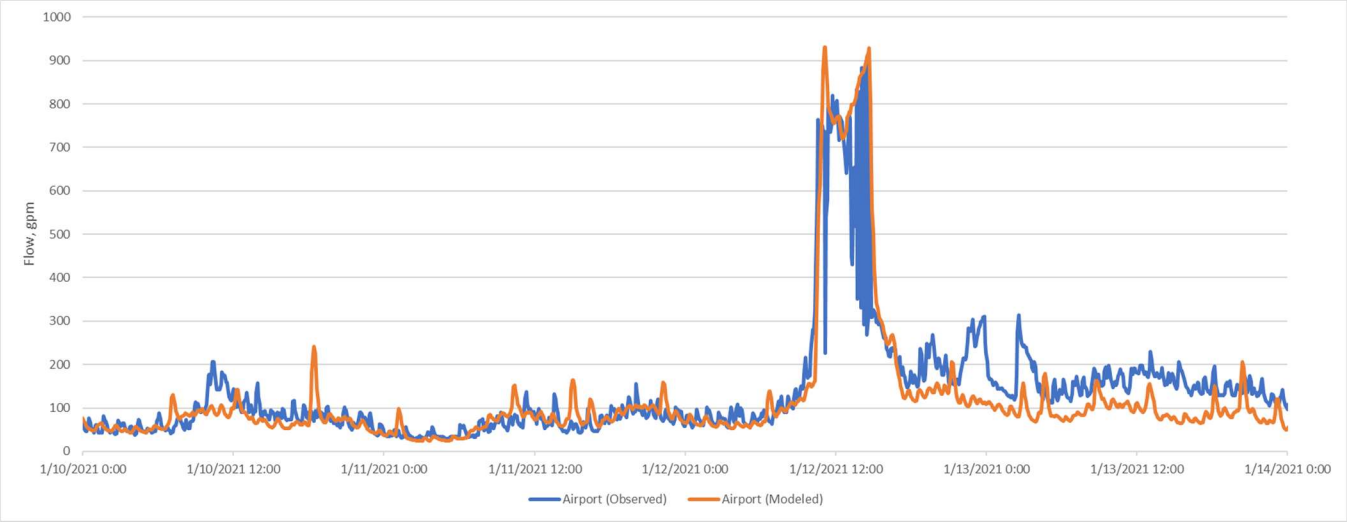


Figure 11: Airport WWF Calibration (with flooding)

Design Storm

Analysis of the collection system was conducted using RDII flows produced by a design storm developed for this master plan. For this plan, the design storm was a 5-year return interval with a 24-hour precipitation depth. Design storm selection dictates the level of protection from potential overflows that the associated improvements will provide. According to the Precipitation-Frequency Atlas of the Western United States (NOAA, 1973), the design storm should have a 24-hour depth equal to 4.4 inches.

The design storm was developed using the Soil Conservation Service 24-hour type 1A rainfall distribution (NRCS, 1986). Figure 12 show the instantaneous and cumulative rainfall distribution for a type 1A precipitation event.

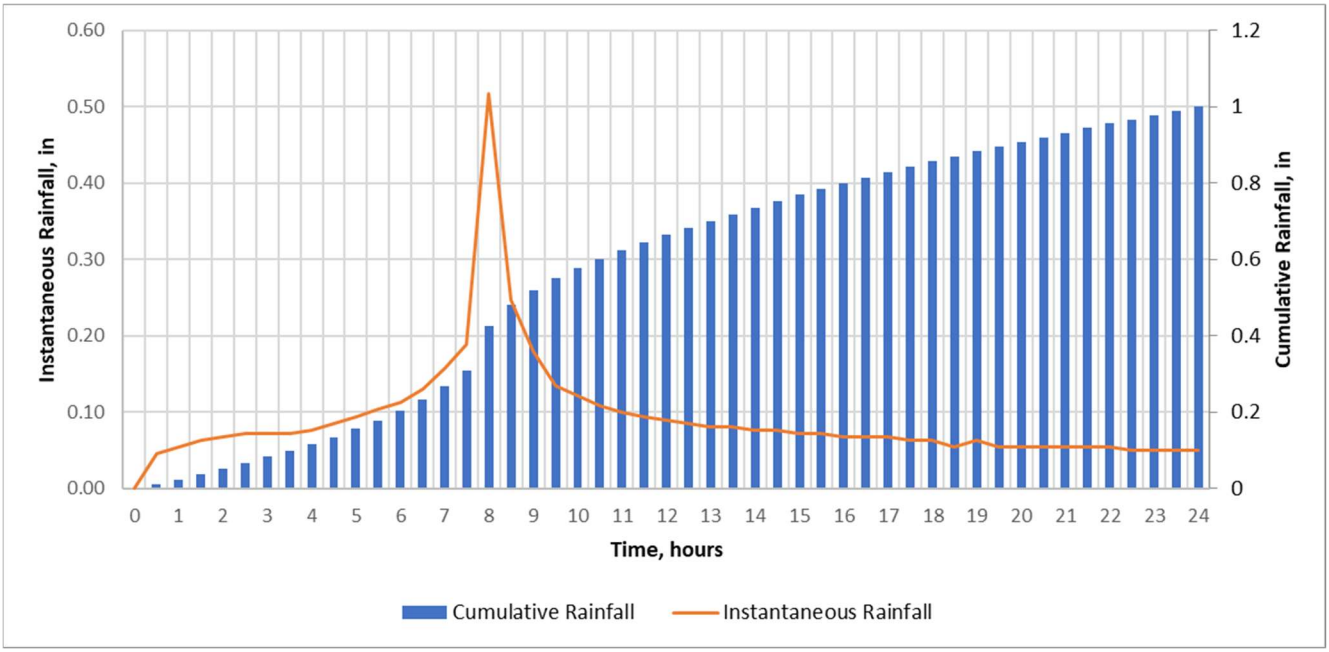


Figure 12: Type 1A Rainfall Distribution

When adding the design event to the model, rainfall data before and after the 2/13/2021 event were added to the time series. This allowed the model to simulate observed rainfall prior to the synthetic design storm.

Future Conditions Model

The future conditions model is intended to simulate 2042 conditions. Additional dry weather flow was added to the model based on the number of anticipated new connections and added to the places where there are current vacant parcels. This included significant development within the area served by Hana pump station and the north end of the service area. There are also vacant lots throughout the service area that are assumed to fill in.

The 2042 model was run without any river flooding and then with. Results from the model are discussed in detail in the Wastewater Master Plan.

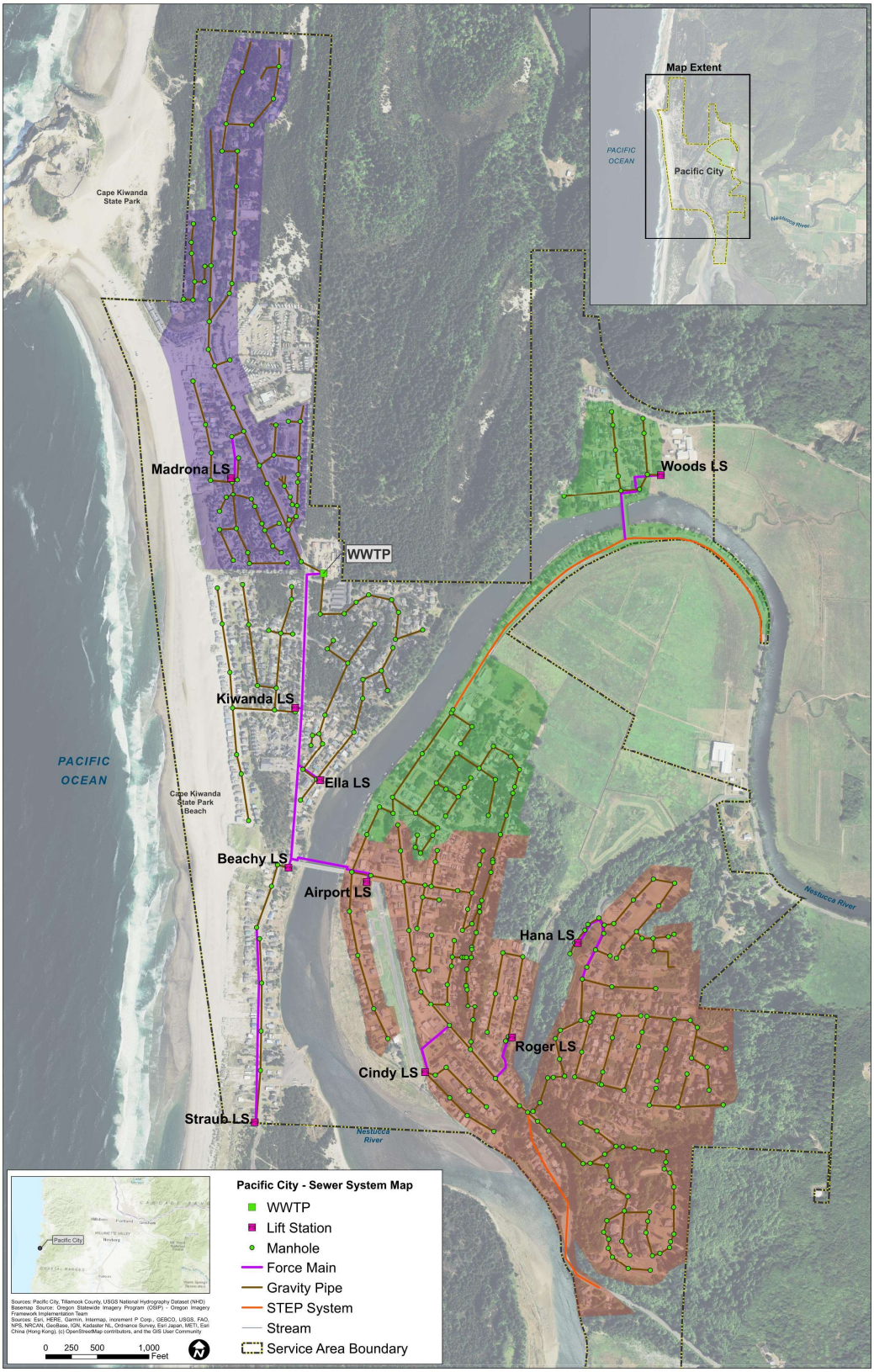


Figure 2: Flow Meter Locations and Sewersheds