City of Yachats

WASTEWATER SYSTEM FACILITIES PLAN

Final Draft January 2022

Westech Engineering, Inc.
3841 Fairview Industrial Drive SE, Suite 100
Salem, OR 97302
(503) 585-2474 FAX: (503) 585-3986

WASTEWATER SYSTEM FACILITIES PLAN

CITY OF YACHATS

Final Draft January 2022

Prepared for
The City of Yachats
P.O. Box 345
Yachats, OR 97498

Prepared By
Westech Engineering, Inc.
3841 Fairview Industrial Drive SE, Suite 100
Salem, OR 97302
(503) 585-2474

J.O. 3096.3000.0

3096.3000

Oregon

Kate Brown, Governor

Department of Environmental Quality
Western Region Salem Office
4026 Fairview Industrial Dr SE
Salem, OR 97302-1142
Office: (503) 378-8240
Fax: (503) 373-7944
TTY: 711

January 24, 2022

Katherine Guenther
Interim City Manager
City of Yachats
PO Box 345
Yachats, OR 97498

RE: WQ-**City of Yachats Sewage Treatment Plant**
File No. 99260
Lincoln County
Approval – Facility Plan, Sewage Collection and Treatment Facilities

Dear Ms. Guenther:

DEQ received the final facilities plan for the City of Yachats sewage collection system and treatment facility on January 18, 2022. The document reflects comments and recommended changes by DEQ correspondence of January 13, 2022. The DEQ comments and recommended changes were addressed in the final document. The City of Yachats Facilities Plan is hereby approved.

The next step for this project is to complete a Predesign Report for the overall project. Please submit a draft report to DEQ for our review. DEQ will review the draft promptly and provide comments for inclusion in the final report.

If you have any questions regarding this letter of approval, please contact me at (503) 378-4995.

Sincerely,

Timothy C. McFetridge, P.E.
Senior Environmental Engineer
Western Region-Salem Office

cc: Alexis Cooley, DEQ, Eugene

Chris Brugato, P.E
Westech Engineering
3841 Fairview Industrial Drive SE
Salem, OR 97302

TABLE OF CONTENTS

Chapter **Page**

Chapter **Page**

Chapter **Page**

Chapter **Page**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

FOREWORD

Using this Report

This report will be used by many people whose needs for information will differ widely. Accordingly, an Executive Summary appears at the beginning of this report. The summary provides an overview of the report and presents the main conclusions. Readers may gain a good general understanding of the report and its contents by reading the summary. Additional detailed information is presented in the body of the report.

LIST OF ABBREVIATIONS

AAF	average annual flow
AC	asbestos cement
ADWF	average dry weather flow
ATS	automatic transfer switch
AWWA	American Water Works Association
AWWF	average wet weather flow
BGS	below ground surface
BOD	biochemical oxygen demand
BSF	base sewage flow
CFS	cubic feet per second
CIP	capital improvement plan
CMU	concrete masonry units
DAF	dissolved air flotation
DEQ	Oregon Department of Environmental Quality
DHS	Oregon Department of Human Services
DO	dissolved oxygen
EPA	US Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FM	force main
FPS	feet per second
FRP	fiber reinforced plastic
GPD	gallons per day
HDPE	high density polyethylene
HP	horsepower
IGA	intergovernmental agreement
KW	kilowatt
MAO	mutual agreement and order
MBR	membrane bioreactor
MBBR	moving bed bioreactor
MH	manhole
MMDWF	maximum month dry weather flow
MMWWF	maximum month wet weather flow
MG	million gallons
MGD	million gallons per day
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation

OPSC	Oregon Plumbing Specialty Code
ORS	Oregon Revised Statutes
PDF	peak day flow
PHF	peak hour flow
PIF	peak instantaneous flow
PSI	pounds per square inch
PVC	Polyvinyl chloride
RPM	revolutions per minute
SBR	sequencing batch reactor
SCADA	supervisory control and data acquisition system
SCFM	standard cubic feet per minute
SDC	system development charge
SF	square feet
SRT	solids retention time
TDH	total dynamic head
TSS	total suspended solids
TV	television
UGB	urban growth boundary
USGS	United States Geological Survey
UV	ultraviolet light
VFD	variable frequency drive
WEF	Water Environment Federation
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

Summary Outline

EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this study is to provide a comprehensive evaluation of the City's wastewater system with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a framework for the provision of sanitary sewer service through the year 2041.

This executive summary has been prepared to provide a concise overview of the evaluations and analyses performed in each chapter of the study. A summary of the recommended capital improvement program costs appears at the end of this summary.

PROJECT OBJECTIVES

This Wastewater Facilities Plan was completed to achieve the following objectives;

- *Evaluate Current and Future Needs*

Evaluate the City's sanitary sewerage facilities with respect to existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a guide for future development of the sanitary sewerage system.

- *Satisfy Funding Agency Requirements*

As with most small municipalities, the City may have some difficulty accumulating sufficient resources to construct the required improvements. Therefore, outside funding may be desired. The federal and state funding agencies that distribute funds for public wastewater projects have published guidelines for the preparation of Facilities Plans. This plan is intended to conform to those guidelines.

BACKGROUND INFORMATION AND NEED FOR PLAN

The City of Yachats is located in southern Lincoln County approximately 24 miles south of Newport and approximately 26 miles north of Florence. The City provides sanitary sewer service for the businesses and residents located in the City. The City has a comprehensive plan that establishes an urban growth boundary (UGB). The UGB and the city limits encompass the same area which includes approximately 600 acres. The wastewater utility provides sanitary sewer service to customers located inside the city limits/UGB. The wastewater system does not provide service to any customers located outside the city limits/UGB. The City currently serves approximately 900 sewer connections. The overall population within the City is highly variable due to the high number of hotel rooms, vacation rentals, and part-time residences. The Portland State Population Research Center estimates the current population of the City to be about 760. During peak holiday weekends, the population served by the sewer system can exceed 2,000 people.

The City's wastewater system consists of a conventional gravity collection system with five pump stations and a sequencing batch reactor treatment plant. Treated effluent is discharged to the Pacific Ocean on a year-around basis. The treatment plant is located on 7th Street, west of Highway 101.

The City's last facilities plan was completed in 2004. The wastewater treatment plant that existed at that time was unable to comply with the requirements of the NPDES permit and most the City's pump stations were in poor condition. Following the recommendations in the 2004 Facilities Plan, the City made major improvements to the system in 2008. The 2008 improvements included upgrades to four of the five pump stations and the construction of a new sequencing batch reactor wastewater treatment plant. This was a major project that dramatically improved the wastewater utility. Since the completion of the 2008 project, the City has not experienced any compliance issues and the improved system has served the City successfully. As a result of the 2008 project, the wastewater utility is in good overall condition. However, the 2008 improvements are more than 10 years old and will be 30 years old by the end of the planning period. In an effort to be proactive, the City decided to perform a new evaluation of the wastewater utility by preparing this facilities plan. This plan will replace the 2004 plan entirely and will serve as the City's primary planning document for the next planning period.

STUDY AREA AND PLANNING CONSIDERATIONS

The State of Oregon requires wastewater planning documents comply with statewide land use goals and be consistent with locally adopted comprehensive land use plans. Statewide land use Goal 11 directs local governments to establish an urban growth boundary (UGB) and provide sewer services within it. Sewer services may be provided outside the UGB if it is the only practicable alternative to mitigate a public health hazard and will not adversely affect farm or forest land. To be consistent with these requirements, the study area of this report is the area within the Yachats UGB. Therefore, this plan does not consider service to areas outside the Yachats UGB.

The improvements recommended in this plan are based on the development of land within the UGB, as well as the existing land use zoning for these areas. It is assumed that no significant development will occur within the study area that will require major changes to the existing zoning, and that there will be no significant expansions of the UGB within the study period. It is also assumed that there will be no extension of wastewater services outside of the UGB during the planning period. Changes in any of these assumptions could change the recommendations contained in this plan.

The DEQ recommends a minimum 20-year planning period for wastewater facilities planning. Based on this recommendation, the planning period for this study extends through 2041.

In order to assess the City's needs over this time, population growth projections must be made to determine future wastewater flows and loads. Based on data provided by the Portland State University Population Research Center, the population in Yachats in 2020 was about 760. The population is expected to increase to approximately to 1,070 in 2041. However, Yachats, like many Oregon Coast communities, experiences seasonal changes in population as a result of hospitality and travelers. Therefore, wastewater flow projections were based on an estimated service population, which more accurately describes the number of users served by the utility. This methodology is described in more detail in Chapter 5. The population projections presented in Chapter 5 include estimates of permanent and seasonal residents. At maximum occupancy, the existing (i.e., 2021) population is estimated to be about 2,200 people. By 2041, this value is expected to increase to about 2,850 people. It is important to note that these population projections are based on the assumption that the relative number of rental properties and seasonally-occupied homes, to the number of permanent residents remains approximately constant over time. Therefore, if more people choose to live in the City on a year-around basis, the wastewater flows will increase faster than projected in this plan. Should this occur, the City may need to increase the priority ranking of some of the recommended projects or consider updating this plan entirely. That said, most facilities plans are typically updated every 10-15 years and this interval should be sufficient to capture any changes to occupancy trends.

REGULATORY REQUIREMENTS

The City currently operates the wastewater utility under a NPDES permit issued by DEQ. These permits are typically renewed every 5 years. The City's existing permit expires in 2023 and is expected to be renewed shortly thereafter. This plan is based on the assumption that there will be no major changes to the City's permit when it is renewed.

The NDPES permit identifies the requirements under which the City must collect, treat, and dispose of wastewater and the associated byproducts. The treatment plant produces treated effluent that is discharged to the Pacific Ocean and biosolids that are disposed of by landfilling or hauling to another treatment facility. The NPDES permit lists effluent limits for organic content (BOD), the solids content (TSS), the pH, and pathogenic indicator organisms (fecal coliform and E. coli). The sequencing batch reactors reduce the BOD and TSS below the limits in the permit and the disinfection system reduces pathogenic indicator organisms below the limits in the in the permit. Since the completion of the 2008 upgrades, the City has not had any significant violations of these permit limits.

The NPDES permit requires that the City prepare a biosolids management plan that describes the treatment and disposal practices for biosolids. The City has a current plan that lists three disposal methods. These include landfilling, hauling to a treatment facility in Douglas County, and land-application. At the present time, the City disposes of biosolids by landfilling and hauling to another treatment plant. The City has not land-applied biosolids in recent years. Landfilling and hauling biosolids to another plant do not require the City to meet certain treatment goals for the biosolids. However, land-application of biosolids requires the production of Class B biosolids. The City's treatment plant has the ability to produce Class B biosolids. Class B biosolids must be treated using one of the EPA's Processes to Significantly Reduce Pathogens (PSRP), or an equivalent process. These processes include aerobic digestion, air drying, anaerobic digestion, composting, and lime stabilization. The City currently uses aerobic digestion supplemented with lime stabilization when needed to achieve the Class B biosolids requirements.

OVERVIEW OF EXISTING FACILITIES

Chapter 4 provides a detailed description of the existing wastewater collection and treatment facilities serving the City. The City's existing wastewater facilities consist of a conventional gravity collection system that conveys wastewater to one of five pump stations. These pump stations generally pump water through pressurized forcemain pipes that discharge to the gravity collection system that drains to the Main Pump Station. Therefore, all of the wastewater collected in the City is ultimately routed to the Main Pump Station where it is pumped to the treatment plant headworks. Figure 4-1 in Chapter 4 is a schematic representation of the collection system. In addition to the five pump stations the collection system includes approximately 65,000 feet of gravity piping, 335 manholes, and 7,300 feet of pressurized forcemain piping. Detailed maps of the collection system are included in Appendix B.

The vast majority of the gravity collection system piping and manholes were originally installed in 1974 and were primarily constructed using asbestos cement pipe. There have been several extensions of the system to serve new developments since 1974. Most new extensions of the system utilized PVC pipe. Overall, the gravity collection piping is in good condition and is expected to serve the City for the remainder of the planning period. There are some isolated problem areas that the City will need to address during the planning period and this plan recommends three projects to address these problems. Like most municipalities in Western Oregon, the infiltration of groundwater and inflow of stormwater (collectively known as “I/I”) is a problem that requires ongoing maintenance. I/I enters the collection system and must be conveyed and treated in the same manner as wastewater. Therefore, I/I consumes conveyance capacity, consumed treatment capacity, increases power consumption costs, and increases wear and tear on the system. As such, I/I is a financial burden to the City and it makes economical sense to control it. That said, it is not practical to eliminate I/I altogether but it is reasonable to assume that management activities can keep I/I amounts from increasing over time. The City currently has a good, but somewhat informal, I/I control program. This plan recommends formalizing the I/I control program with dedicated funding on an annual basis. This funding can be used to inspect the system in order to identify problem areas and make repairs as needed.

As noted above, four of the five pump stations were upgraded as part of the 2008 project. Therefore, they are in fairly good condition. The electrical control systems for these stations will likely reach the end of their useful life due to overall age during the planning period and will need to be upgraded. The remaining pump station (i.e., Quiet Water Pump Station) was constructed in the 1980s and will likely require upgrades during the planning period due to age.

The City’s Wastewater Treatment Plant (WWTP) is located on 7th Street west of Highway 101. The WWTP consists of a headworks, a two-basin sequencing batch reactor activated sludge treatment facility, an equalization basin, an ultraviolet light disinfection facility, an ocean outfall pipe, an aerobic digester, a sludge storage tank, a dewatering screw press, a plant pump station, an operations building, and a public works building. Treated wastewater is discharged to the Pacific Ocean on a year-around basis. An overall schematic representation of the existing wastewater treatment system is presented in Figure 4-10 in Chapter 4. The treatment plant was significantly upgraded in 2008 and has served the City well ever since. There are some issues that will need to be addressed during the planning period. Most of these are related to elements of the system that are aging and will likely reach the end of their useful life during the planning period. These are mostly control systems and mechanical systems that are not typically designed to last more than 20 years. One of the major issues at the treatment plant is corrosion of the metal components of the public works and dewatering buildings. The metal roofing and roll up doors are badly corroded and will reach the end of their useful life during the planning period. The metal siding on these buildings is also showing early signs of corrosion and may not last the remainder of the planning period.

More detailed descriptions of the existing facilities are included in Chapter 4.

WASTEWATER FLOWS AND LOADS

Chapter 5 of the plan includes an analysis of the existing wastewater flow rates, organic loading rates, and solids loading rates to the treatment plant. Population projections and occupancy rates are used to estimate future flows and loads. The design flows and loads are used to analyze the existing systems. The design flows and loads consist of the existing and future flows and loads due to population growth. The flow and load projections are based on the following key assumptions. If any of these assumptions prove to be inaccurate over time, the City may want to consider updating this plan. That said, facilities plans are typically updated every 10-15 years and that interval should be sufficient to capture any changes in the following assumptions.

- The ratio of multi-family units to standard residential units will remain approximately equal to the present value for the remainder of the planning period.
- The ratio of hotel rooms to standard residential unity will remain approximately equal to the present value for the remainder of the planning period.
- The ratio of commercial properties to standard residential units will remain approximately equal to the present value for the remainder of the planning period.
- The occupancy rate of hotel rooms, vacation properties, and seasonal residents will remain approximately equal to the present value for the remainder of the planning period.
- No large wet-industrial users will be added to the system during the planning period.

COLLECTION SYSTEM DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Chapter 6 presents an analysis of the wastewater collection system. Current operation and maintenance practices are first reviewed and one recommendation is presented. This is to formally establish an I/I correction program (Program-1) at an annual funding rate of $30,000 per year. The purpose of this program it to perform television inspections of the gravity collection system at 5-year intervals and repair leaking manholes, mainlines, and service laterals. Background information for this recommendation is presented in Section 6.2.

In addition to operation and maintenance practices, the ability of the existing collection system to convey the anticipated wastewater flows is analyzed in Chapter 6. This analysis shows that the existing gravity collection system generally has the capacity to convey peak flows with the exception of the mainline from Manhole D-010 to D-030. To address this problem, this plan includes a project to upsize this pipe segment.

The hydraulic capacity of the pump stations and forcemain pipes are also analyzed in Chapter 6. The analysis shows that all of the pump stations and forcemain pipes have the capacity needed to convey peak flows at complete buildout of the City. Therefore, improvements to address capacity problems should not be needed during the planning period. However, several projects will be needed to address aging infrastructure. As described above and in Chapter 4, some electrical and mechanical components of the pump stations will likely reach the end of their useful life during the planning period. The Quiet Water Pump Station is also likely to reach the end of its useful life during the planning period. Finally, the forcemain pipes for the Pontiac Pump Station and most of the Riverside Pump Station Forcemain are the original AC pipes that were installed in 1974. These pipelines will be almost 70 years old at the end of the planning period. Of all of the City's forcemain pipes, these two pipelines are the oldest and will likely reach the end of their useful life the soonest. It is likely that the existing pipes will be sufficient for the remainder of the planning period. However, in an effort to be conservative, this plan does recommend replacing these two pipelines. However, these projects are assigned a relatively low priority ranking and the City may be able to delay these projects until the next planning period if no issues are observed.

A complete listing of the recommended collection system projects is included in Chapter 6. These improvements are later prioritized in Chapter 8 to aid in developing the recommended Capital Improvement Plan (see discussion below).

TREATMENT SYSTEM DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Chapter 7 includes an analysis of the City's treatment system. The existing treatment facilities are relatively new and in good condition. As such, a major replacement project should not be needed during the planning period. The recommended improvements described in Chapter 7 are generally geared toward managing the existing infrastructure.

Several improvements are recommended in Chapter 7 to improve operations of the existing plant. These projects include installing baggers for the headworks screen and grit removal systems, installing drying beds for biosolids management, acquiring a new biosolids disposal site, acquiring a manure spreader for biosolids disposal, and improving the air delivery system for the aerobic digester and sludge storage tank.

Another class of recommendations are projects to address maintenance items that are of a cost that is beyond what can typically be funded by the normal maintenance budget. This class of improvements includes new diffuser membranes, a new tractor for biosolids management, upgrades to the SBR, equalization basin, and digester control systems, and upgrades to the UV disinfection control system.

Two projects are recommended to address corrosion issues. These include improvements to some of the metal components of the public works building and the dewatering building and coating of the interior concrete surfaces of the digester and sludge storage tanks.

The final two projects are recommended to address capacity issues. The first includes upsizing the outfall pipeline between the wastewater treatment plant and Ocean View Drive. This pipe segment is too small to convey the peak flows anticipated during the planning period. The second capacity improvement project includes constructing a third SBR basin. Based on the flow projections, a third basin may be needed toward the end of the planning period. However, there is considerable treatment capacity remaining in the two existing SBR basins, and the flow projection methodologies conventionally used in facilities planning tend to be fairly conservative. Therefore, it is very possible that the construction of the third SBR may be able to be delayed to the next planning period (i.e., beyond 2041). However, for planning purposes, it is reasonable to plan for this project to occur near the end of the current planning period.

RECOMMENDED CAPITAL IMPROVEMENT PLAN

The Facilities Plan identifies a number of deficiencies and includes several recommended improvement projects. Some of these projects are more critical than others. Some projects should be constructed early in the planning period. Other projects are not needed immediately, but will be needed as the City grows and the existing system continues to age.

A prioritizing process was developed to rank the improvement projects. Factors utilized in the prioritizing process included several measures of criticality, as well as the cost/benefit ratio of each project. This process identified essential, high benefit to cost projects for early implementation, and the deferral of less critical, lower value projects. Each of the projects identified in the plan were examined and assigned a priority for implementation and appear in Table ES-1 below.

Priority 1 projects are considered to be needed immediately. They have been developed to resolve existing or near-term system deficiencies. It is recommended that Priority 1 improvements are undertaken as soon as practical. Priority 2 projects will be needed beyond the near term of the Priority 1 projects to improve the quality of service throughout the City. Although not critical at this time, they will likely be required at some point during the planning period. All of the Priority 1 and Priority 2 improvements should be included in the CIP.

Several potential funding programs are available to assist communities with the funding of major infrastructure improvements. A number of these programs are identified and discussed in Chapter 8. Even with funding assistance, increases in user rates and SDC fees are likely to be needed during the planning period to fund the recommended projects.

Table ES-1 | Recommended Capital Improvement Priorities

Project Code [1]	Project	Priority	Total Estimated Project Cost [2]
G-1	Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270)	1	$140,000
G-2	Mainline A Manhole A-040 to Manhole A-050	1	$141,000
G-3	Mainline D Manhole D-010 to D-030, Ocean View Drive	1	$263,000
G-4	Hanley Drive Sewer Manholes	1	$25,000
G-5	Wastewater Collection System Design Standards	1	$5,000
P-1	Pump Station Disconnect Panel Improvements	1	$265,000
P-2	New Portable Generator	1	$40,000
P-3	Quiet Water Pump Station Improvements	1	$493,000
T-1	Headworks and Grit Removal Baggers	1	$10,000
T-2	SBR and Digester Diffuser Membrane Replacement	1	$15,000
T-3	New Tractor for the Treatment Plant	1	$35,000
T-4	Public Works Building, Headworks Shelter, and Solids Handling Building Rehab	1	$700,000
T-5	Outfall Pipeline Improvements	1	$96,000
		Subtotal Priority 1….	**$ 2,228,000**
P-4	Main Pump Station Improvements	2	$382,000
P-5	Parkside Pump Station Improvements	2	$218,000
P-6	Riverside Pump Station Improvements	2	$218,000
P-7	Pontiac Pump Station Improvements	2	$218,000
F-1	Pontiac Pump Station Forcemain Improvements	2	$121,000
F-2	Riverside Pump Station Forcemain Improvements	2	$326,000
T-6	Biosolids Drying Beds	2	$158,000
T-7	New Biosolids Disposal Site Acquisition	2	$50,000
T-8	Biosolids Manure Spreader	2	$100,000
T-9	Aerobic Digester and Sludge Storage Tank Air Supply System Imps.	2	$223,000
T-10	Aerobic Digester Tank Coating and Piping Improvements	2	$330,000
T-11	SBR, EQ Basin, & Digester Control System Upgrades	2	$972,000
T-12	UV Disinfection Control System Upgrades	2	$40,000
T-13	SBR Basin #3	2	$1,236,000
		Subtotal Priority 2….	**$ 4,592,000**
		TOTAL….	**$ 6,820,000**
Recurring Annual Programs			
Pgm-1	Annual Sewer Collection System Rehabilitation Program (Program – 1)		$30,000
	Subtotal Recurring Annual Programs….		**$30,000**

[1] Project Code Legend:
G = Gravity Sewer T = Treatment P = Pump Station F= Forcemain Pgm = Improvement Program

[2] See Section 8.3 for basis of project cost estimates. Costs are in June 2021 dollars (ENR Cost Index = 12,112).

CHAPTER 1

INTRODUCTION

Chapter Outline

INTRODUCTION

CHAPTER 1

1.1 INTRODUCTION

The City of Yachats is located on the central Oregon coast. Most of the community is located on the gentle slopes on the north and south sides of the Yachats River Estuary immediately north of Cape Perpetua. The City is located at the southern end of Lincoln County. US Highway 101 provides the main transportation route to and from the City. Yachats is located approximately 24 miles south of Newport and approximately 26 miles north of Florence.

The City was incorporated in 1966. According to estimates prepared by the Portland State Population Research Center, the current population of Yachats is about 760 people. The Urban Growth Boundary (UGB) is the same as the City Limits and encompasses approximately 600 acres. Yachats is a unique community in that it is home to a large population of part-time residents as well as a transient tourist population. Therefore, the wastewater system is designed to serve a population significantly greater than the total number of full-time residents. Due to the scenic location along the central Oregon coast, Yachats is an attractive tourist destination and the City's economy is strongly tied to tourism.

The City is served by a publicly owned and operated wastewater utility. This system consists of conventional gravity sewers, pump stations, force mains, and a wastewater treatment plant (WWTP) that is located on 7th Street. The plant uses the sequencing batch reactor (SBR) activated sludge process to provide treatment. Treated effluent is disinfected using ultraviolet light (UV) prior to discharge. Treated water is discharged from the plant into the Pacific Ocean.

The City's facilities are permitted under a National Pollutant Discharge Elimination System (NPDES) permit issued by the Oregon Department of Environmental Quality (DEQ). The City's permit was most recently renewed in 2018 and expires in 2023.

In 2004, the City prepared a Wastewater Facilities Plan that recommended major upgrades to the City's treatment plant and pump stations. These upgrades were completed in 2008 and have operated successfully since that time. Therefore, most of the improvements identified in the 2004 plan have been implemented. Also, the plan is more than 15 years old. For these reasons, the 2004 plan is becoming outdated and it is appropriate for the City to prepare a new plan at this time. This facilities plan replaces the 2004 plan entirely and will serve as the City's primary wastewater system planning document for the next planning period.

1.2 AUTHORIZATION

The City of Yachats authorized Westech Engineering to proceed with the preparation of this Wastewater Facilities Plan in the Spring of 2020. The plan has been prepared to meet the current requirements of the regulatory and funding agencies.

1.3 PURPOSE

The purpose of this plan is to provide a comprehensive evaluation of the City's wastewater system with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a framework for the provision of wastewater service through the year 2041.

This plan will assist the City in the planning and implementation of capital improvements and will assist the development community as the wastewater system is expanded for future growth. The plan will benefit the current and future residents of the City by enhancing the quality of life through improved water quality, planned growth, scheduled improvements, and an equitable distribution of improvement costs.

1.4 SCOPE OF STUDY

The scope of the Wastewater Facilities Plan is intended to comply with the applicable requirements of DEQ and the City. Study area characteristics are identified and included both physical and socioeconomic conditions. Existing population and land use are examined and projected into the future.

The existing wastewater system is investigated. Data was collected on the existing wastewater collection and treatment systems from operating records, conversations with City staff, on-site investigations, maps, as-built records, and other pertinent documentation. Existing facilities are evaluated in terms of location, sizing, capacity, condition, limitations, and performance. Consideration is given to the manner in which existing and proposed facilities could be used in the future as the study area develops to City zoning densities.

Typical wastewater characteristics are identified in terms of loads, flows, strength and I/I allowances throughout the year. Future characteristics are projected to establish capacity requirements. Flows projections are made for both dry period and wet period conditions, and unit design values are established.

The basis for planning is established. Applicable regulatory requirements are identified and addressed, including current and future treatment criteria and discharge standards. The design capacity of the City's collection piping and treatment facilities are examined to determine impacts to present and future operation of wastewater facilities. Alternatives are identified for collection, treatment, and effluent disposal/reuse. Alternatives for system administration are also identified and evaluated.

Nonviable options are screened out, and a limited number of selected alternatives are established and evaluated in detail. Finally, a recommended plan is identified that will enable the City to provide wastewater collection and treatment within the study area. This plan includes preliminary design data, capital improvement and operational costs, and a description of potential financing options.

1.5 PREVIOUS STUDIES AND REPORTS

The following reports and studies were referenced in the preparation of this study:

- *Comprehensive Land Use Plan,* City of Yachats, Yachats Oregon, February, 2019
- *Comprehensive Storm Drainage Plan,* Yachats Oregon, HGE Engineers and Planners, May 1993
- *Comprehensive Wastewater Plan,* Yachats Oregon, HGE Engineers and Planners, September 1991
- *Construction Drawings, Wastewater System Improvements,* City of Yachats, Oregon, The Dyer Partnership, Inc., May, 2007.
- *Mixing Zone Study,* City of Yachats, The Dyer Partnership, February, 2010
- *Wastewater Facilities Plan*, City of Yachats, Oregon, The Dyer Partnership, Inc., September 2004.
- *Wastewater Treatment Plant Operation and Maintenance Manual,* Yachats Oregon, HGE Engineer and Planners, March 1995

1.6 WASTEWATER TERMS AND DEFINITIONS

An understanding of key wastewater terms and definitions is necessary for an understanding of the discussions in this and subsequent sections. The following does not include all terms used in this report, but will provide a useful glossary for those readers not familiar with wastewater terminology. The different sewage flow classifications are defined in Chapter 5.

- Aerobic - Microorganisms living in the presence of free oxygen, or biological treatment processes that occur in the presence of oxygen.
- Anaerobic - Microorganisms capable of living without the presence of free oxygen, or biological treatment processes that occur in the absence of oxygen.
- Anoxic Denitrification - The process by which nitrate nitrogen is converted biologically to nitrogen gas in the absence of oxygen.
- Attached Growth Process - A biological treatment process in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are attached to some inert medium such as rocks, slag, ceramic or plastic materials. Attached growth treatment processes are also known as fixed film processes.
- Biological Treatment Processes - Treatment processes by which the stabilization and decomposition of organic material in sewage is accomplished by living microorganisms. The organic matter is used as a food source for microorganisms, and converted to forms which can either be removed from the waste stream (soluble organics) or are sufficiently stabilized to allow disposal without negatively affecting the environment (insoluble organics).
- Biological Nutrient Removal - The removal of nitrogen and/or phosphorus with biological treatment processes.
- Biosolids – Treated sludge that is removed from a treatment facility for beneficial reuse or disposal.
- BOD (Biochemical Oxygen Demand) - The amount of oxygen required to biologically stabilize the organic material in sewage by aerobic treatment processes. All references to BOD in this report are to 5-day BOD at 20°C (BOD5).

- Chlorine Residual - The measured residual of chlorine used in disinfecting wastewater. Chlorine residual can exist in two forms; combined or free. The specific form is dependent on the rate of formation, which is controlled by the pH and temperature. A free chlorine residual is the most effective in achieving disinfection.
- Denitrification - The biological process by which nitrate is converted to nitrogen and other gaseous end products.
- DEQ – Oregon Department of Environmental Quality
- Facultative Processes - Biological treatment processes in which the organisms can function in the presence or absence of molecular oxygen.
- Fecal Coliform - Bacteria which are used as an indicator of fecal pollution.
- Industrial Wastes - Wastes produced as a result of manufacturing or processing operations.
- Infiltration/Inflow (I/I) - Groundwater and stormwater which enters the sanitary sewer system.
- Excessive I/I - Portion of infiltration or inflow which can be removed from the sewerage system through rehabilitation at less cost than continuing to transport or treat that portion of I/I.
- Infiltration - Water that enters the sewage system from the surrounding soil. Common points of entry include broken pipe and defective joints in pipe and manhole walls. Although generally limited to sewers laid below the normal groundwater level, infiltration also occurs as a result of rain or irrigation water soaking into the ground and entering mains, manholes, or shallow house sewer laterals with defective joints or other faults.
- Base Infiltration - Water that enters the sanitary sewer system from the surrounding soil during periods of low groundwater levels.
- Rainfall Induced Infiltration - Additional infiltration which enters the sewerage system during and for several days after a period of rainfall. Rainfall often percolates into sewer ditches, especially ditches with granular backfill, and establishes a perched water table. This water then infiltrates into faulty sewers and manholes.
- Sludge - Solid and semisolid residuals resulting from wastewater treatment operations.
- Inflow - Stormwater runoff which enters the sewerage system only during or immediately after rainfall. Points of entry may include connections with roof and area drains, storm drain connections, holes in manhole covers in flooded streets, and manhole cones located in ditch lines and that do not have watertight joints.
- MAO – Mutual Agreement and Order
- Nitrification - The biological process by which ammonia nitrogen is converted first to nitrite, then to nitrate.
- NPDES - National Pollutant Discharge Elimination System.
- pH - The degree of acidity or alkalinity of waste water, 7.0 being neutral, a lower number being acidic, and a higher number being basic.
- Sanitary Sewage - Waterborne wastes principally derived from the sanitary conveniences of residences, business establishments, and institutions.

- Suspended Growth Process - A biological treatment process in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are maintained in suspension within the liquid.
- TSS (Total Suspended Solids) - All of the solids in sewage that can be removed by settling or filtration. The quantity of TSS removed during treatment impacts the sizing of sludge handling and disposal processes, as well as the effectiveness of disinfection.
- Wastewater - The total fluid flow in a sewerage system. Wastewater may include sanitary sewage, industrial wastes, and infiltration and inflow (I&I).

CHAPTER 2

STUDY AREA AND PLANNING CONSIDERATIONS

Chapter Outline

STUDY AREA AND PLANNING CONSIDERATIONS — CHAPTER 2

2.1 INTRODUCTION

The City of Yachats is located along the central Oregon coast in southern Lincoln County approximately 24 miles south of Newport and 26 miles north of Florence. US Highway 101 provides the primary access to the area from the north and south. The City owns and operates the wastewater utility that provides sanitary sewer service to the community. The City's comprehensive plan identifies and urban growth boundary (UGB) that encompass approximately 600 acres. The City Limits and the UGB are the same. Figure 2-2, presented at the end of this chapter for formatting reasons, is a vicinity map depicting these features.

2.2 STUDY AREA

The State of Oregon requires wastewater planning documents comply with statewide land use goals and be consistent with locally adopted comprehensive land use plans. Statewide land use Goal 11 directs local governments to establish an urban growth boundary and provide sewer services within it. Sewer services may be provided outside the boundary if it is the only practicable alternative to mitigate a public health hazard and will not adversely affect farm or forest land. To be consistent with these requirements, the study area of this report is the area within the Yachats UGB. Therefore, this plan does not consider service to areas outside the Yachats UGB.

The improvements recommended in this plan are based on the development of land within the UGB in its present location, as well as the existing land use zoning for these areas. It is assumed that no significant development will occur within the study area that will require major changes to the existing zoning, and that there will be no significant expansions of the UGB within the study period. Changes in any of these assumptions could change the recommendations contained in this plan. Should significant changes in any of the above occur, this plan should be updated accordingly.

The location of the Yachats UGB and land use zoning designations are shown in Figure 2-3 presented at the end of this chapter.

2.3 STUDY PERIOD

Choosing a "reasonable" design period for which a utility system should be designed is a somewhat arbitrary decision. If the design period is too short the public faces the prospect of continual upgrades and replacements as demands exceed capacity. On the other hand, choosing a design period that is too long can lead to facilities with excess capacity that may never be needed if population growth does not occur at the projected rates. Such facilities can place an economic burden on the present population and may become obsolete before being fully utilized.

The Oregon Department of Environmental Quality (ODEQ) has established 20 years as a proper planning period for sanitary sewer system improvements. This report will evaluate the anticipated sewage collection, pumping, treatment, and disposal needs for the 20 year planning period. The collection system piping will be planned for the ultimate development of land within the UGB based on current land use designations. Although this may result in capacities greater than those needed during the 20-year planning period, sewage collection lines are, by their very nature, unsuited for incremental expansion without extensive capital outlays. The planning period used in this report is 20 years and ends in the year 2041.

It should be recognized that projections into the future are subject to many variables and assumptions, some of which may prove inaccurate. Accordingly, it is recommended that the City review its wastewater system at five-year intervals and update this report as appropriate.

2.4 PHYSICAL ENVIRONMENT

2.4.1 Climate and Rainfall Patterns

Since there is no National Weather Service recording station in Yachats rainfall and temperature data were examined from Newport, a coastal city 24 miles north of Yachats. While the data from this weather station is not specifically for Yachats, these values are generally believed to be representative for the immediate area around the City.

The climate in Yachats is similar to much of the Oregon coast with moderate temperatures year-round, little precipitation during summer months, and heavy precipitation between late fall and early spring. Average high temperatures range from the high 40's to mid 50's in the winter months and are in the 60's in the summer. Average low temperatures are in the mid 30's to low 40's in the winter, and are in the high 40's to low 50's in the summer. Days with a maximum temperature above 70°F occur only 20 times per year on average, and days with minimum temperatures below 32°F occur only 20 times per year on average.

The study area receives an average of 68 inches of precipitation annually, with the heaviest rainfall in the winter months. Precipitation extremes are somewhat difficult to verify because rainfall records are not always complete. There are relatively complete records for Newport from 1940 through 2004. Since 1940, the wettest year for the study area was 1968 resulting in an estimated 111 inches of rainfall. The driest year was 1944 when the total rainfall in Newport was approximately 43 inches. Approximately 3/4 of the annual precipitation occurs between November 1 and April 30. July is typically the driest month with an average rainfall for the month of approximately one inch.

Snow rarely falls in Newport. In the 65 year historical record, snow fell once every 5 years on average.

2.4.2 Topography

Yachats is located at the Yachats River estuary near the Coast Range foothills. The City's core commercial area is situated on a relatively flat area on the north side of the estuary and west of Highway 101. A similar flat area located on the south side of the estuary and west of Highway 101 includes a number of residential properties. The elevation of these areas varies between about 30 and 60 feet. Moving east from Highway 101, the ground becomes steeper as the study area progresses up the coast range foothills. The highest areas on the east side of the study area are at elevations of about 700 feet. Across the entire study area, the ground generally slopes from the east to the west and several drainages cross the study area from the east to the west. The most significant of these is the Yachats River which divides the study area into areas that can be referred to as North Yachats and South Yachats.

2.4.3 Soils

The soils along the Yachats River are generally alluvial bottomland deposits that are composed of silts, sand, and gravel with some local areas of peat. The soils in the relatively flat areas of the City along Highway 101 are generally marine terrace deposits. These deposits are typically fine to medium grain friable sandstone of beach origin with thin interbeds of siltstone. The thickness of these deposits may be up to 75 feet. In upper elevations along the east side of the study area, the soils are generally rocky basaltic formations.

None of the soil types outright preclude the construction of typical wastewater facilities from a foundation stability point of view. The construction of significant structures (e.g., buildings, pump stations, treatment plant tankage, etc.) recommended in this report will require detailed geotechnical investigations during the design phase of each project.

This discussion of soil types is based on the information included in the Soil Survey of Lincoln County, Oregon prepared by the Natural Resource Conservation Service in July 1997. This document shows the approximate location of the soil types in the study area. The reader is referred to the Lincoln County Soil Survey for more detailed definitions and descriptions of the individual soil designations.

2.4.4 Geologic Hazards

Known geologic hazards within the study area include earthquakes, flooding, steep/unstable slopes, and tsunamis.

2.4.4.1 Earthquakes

The 2008 U.S. Geological Survey (USGS) National Seismic Hazard Maps display earthquake ground motions for various probability levels across the United States. These factors are applied in the seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. A review of these maps identifies Oregon as having a relatively high seismic risk. The Oregon Structural Specialty Code shares this assessment and has adopted similar ground motion data as the USGS. Seismic risk factors for structures are typically influenced by a combination of factors including the geographical location, specific building and structural configurations, and local soil types. The construction and rehabilitation of significant structures recommended by this report (buildings and hydraulic structures) will require detailed geotechnical reports and site specific seismic evaluations.

2.4.4.2 Flooding

The Yachats River is the primary stream within the study area. However, several smaller creeks and drainages cross the study area from east to west. These include Agency Creek in the northern portion of the City and Gender and Gregory Creeks in the southern portion of the City. All of these streams have streamflow patterns similar to other Coast Range streams. It is typified by high flows during the winter and low flows during the summer months.

The Federal Emergency Management Agency (FEMA) has established a 100-year floodplain designation and insurance ratings for the study area. While sometimes referred to as the “100 year flood”, it is more accurate to consider it the flood having a 1 percent chance of occurrence in any year, or a 10 percent chance of occurrence during any 10 year period. The 100-year floodplain has been defined for the Yachats River and the coastal areas. However, 100-year floodplains have not been defined for the smaller creeks in the area.

During a FEMA defined 100-year flood, the Yachats River as well as some of the smaller creeks will rise out of their normal channel into the floodplain. Flood profiles and maps for the streams in and around the study area are included in the Flood Insurance Study prepared for Lincoln County and appear on Flood Insurance Rate Maps (FIRMs). It should be noted that the FEMA flood boundaries are based on flood elevations. Therefore, the actual inundation boundaries may vary due to localized topographical variations. Final determinations of whether a specific property is affected must be determined based on a topographic survey of the property in question.

A review of the existing flood boundary maps show that none of the City’s wastewater pump stations or the treatment plant are located within the 100 year floodplain boundary.

2.4.4.3 Steep/Unstable Slopes

Steep and unstable slopes are a concern for areas on the east side of Highway 101. Steep slopes can have the potential for either mass movement or slope erosion. Mass movement results from shifting of rock or soil material in response to gravity, such as landslides and rock slides. These mass movements are often precipitated or aggravated by excessive groundwater. Slope erosion is the removal of soils or rock that occurs as a result of sheet flow, resulting in surface erosion or gully erosion. This is primarily caused by private land use practices (mainly land clearing and road construction) that can exacerbate slope erosion. At the present time, none of the existing wastewater infrastructure has been significantly impacted by unstable slopes.

2.4.4.4 Tsunamis

Tsunamis are a substantial concern to the City. Undersea earthquakes can cause destructive tsunamis that strike the coast after the earthquake. The configuration of the Oregon and Washington continental shelf can produce tsunami waves that may appear to rise slowly but can build up to 30 feet or more in height as water surges shoreward. Tsunamis rarely come as single waves but arrive as multiple crests that may be hours apart. Often the first tsunami is not the largest or most destructive.

Oregon is vulnerable to two types of tsunamis (distant and local). Local tsunamis are most generally associated with Cascadia subduction zone earthquakes. Tsunamis from distant undersea earthquakes can take place anywhere in the Pacific Rim and will take several hours to reach the Oregon coast. Because the Cascadia Subduction Zone is so close to the Oregon coast, tsunamis caused by earthquakes along this rift can strike the northern Oregon coast within 20-30 minutes of the earthquake. In many cases, the only tsunami warning will be the earthquake itself.

Since 1995, Oregon has placed restrictions on the construction of certain types of critical and essential facilities within tsunami inundation zones along the coast. In 2013, the Oregon Department of Geology and Mineral Industries completed a study to define Tsunami hazard and inundation zones along the Oregon coast. Maps showing the inundation zones are available online. Based on these map and the accompanying report, the maximum Tsunami run-up associated with a Cascadia subduction zone earth quake is 75 to 100 feet above the ocean level at the time of the Tsunami. Similar to 100 year flood elevations, the Tsunami run-up elevations are based on assumed worst case seismic events. The actual wave run-up will depend on the magnitude of the seismic event and any mitigating circumstances, such as concurrent submarine landslides. However, it is not economically feasible to design for higher magnitude events.

Virtually all of the areas west of Highway 101 and some of the areas east of Highway 101 are within the Tsunami inundation zone. This includes most of the commercial and residential areas of the City and virtually all of the wastewater infrastructure. A plan to address the needs of these facilities in the event of a tsunami is beyond the scope of this plan and may be addressed by other studies if the City deems it necessary.

2.4.5 Public Health Hazards

There are no known public health hazards within the City of Yachats. The vast majority of the developed properties within the study area are connected to the public sanitary sewer system. There area likely to be a few septic systems in the study area, but there are no known or ongoing problems with onsite systems in the City.

2.4.6 Energy Production and Consumption

Electricity is provided to the community by the Central Lincoln PUD. Natural gas service is not available in the City. There are no known power generation facilities with the City. The major energy demand in a wastewater treatment and collection system is from the electric motors that drive pumps and other equipment. It is recommended that these components be specified as having high efficiency motors and variable speed controls, which will reduce the energy costs over the life of the project. Depending on the current programs in place with the electric utility, there may be rebates available if high efficiency electrical motors and variable speed controls are specified, which will tend to offset the slightly higher capital construction cost.

2.4.7 Water Resources

Water resources within the study area include freshwater streams and the Pacific Ocean. Groundwater resources in the area are poor and not typically used as water supplies.

The City of Yachats utilizes an outfall to the Pacific Ocean for the wastewater treatment plant. The City holds an NDPES permit for the discharge of treated effluent to this Pacific Ocean.

The City’s municipal water supply comes from Salmon and Reedy Creeks. The City also holds water rights for the Yachats River and Cape Creek which is located south of the study area.

2.4.8 Flora and Fauna

The vegetation in the Yachats area is typical of the Oregon coast. Forestlands lie east of the City; the Pacific Ocean lies to the west. Forestlands consist of Douglas Fir, western Hemlock, Sitka Spruce, Red Alder, and Western Red Cedar. Other plants common to the area include Pacific Rhododendron, Vine and Big Leaf Maple, Red Elderberry, Hairy Manzanita, Kinnikinnick, Salal, Salmonberry, and Sword and Bracken Fern.

The tidal zone along the Pacific Coast and the Yachats River estuary are the habitat of marine bass, rockfish, and ocean perch. Other types of marine life include clams, mussels, chitons, limpets, crab, shrimp, starfish, sea anemone, and urchins. Sea mammals living off the coast of Yachats include harbor seal and sea lions. Other mammals that are native to the region include shrew, mole, raccoon, river otter, muskrat, beaver, skunk, squirrel, and blacktail deer.

Of particular environmental interest in the area are the Steelhead, Coho, and Chinook Salmon, and other anadromous fish that can be found at various times of the year in in the Yachats River. As with other coastal streams, impacts due to low water levels, over fishing, and numerous other environmental issues have resulted in dwindling salmon and steelhead populations.

Fieldwork to identify the presence of threatened and endangered species habitat in the study area is beyond the scope of this study. However, several threatened and endangered species may inhabit the study area. Therefore, detailed investigations to determine if a particular project impacts threatened and endangered species should be performed early in the design phase for each project. The one exception to this is for locations of utilities that have previously been developed.

2.4.9 Environmentally Sensitive Areas

The Yachats River, the estuary, the tidal areas, and the riparian areas along these waterways are considered to be environmentally sensitive. There are also likely to be other wetland areas located throughout the study area. The City has completed a local wetland inventory that identifies several wetland areas around the study area. Other wetland areas are likely to exist that are not shown on the City's wetland inventory. Several of the projects recommended in this plan will require some sort of wetland and environmental investigations as part of the early design work.

2.4.10 Air Quality and Noise

The existing air quality in the study area is very good. There are no known air quality monitoring stations located within the study area.

Significant non-natural noise sources within the study area are limited to traffic on local streets and the highway. The predominant natural noise source is the surf from the adjacent coastal areas.

2.4.11 Historic and Archeological Sites

There are no known archaeological sites that will be disturbed or impacted by the recommended projects. However, since the mouths of rivers, coastlines, protected coves, and estuary areas are well known to have been the center of coastal aboriginal life. It should be noted that archaeological or cultural deposits including shell middens, burial sites, village sites, etc. could be located within the project boundaries. As such, a detailed archaeological assessment may need to be performed prior to implementation of some of the recommended projects.

2.4.12 Threatened or Endangered Species

A comprehensive inventory for threatened or endangered species under the Endangered Species Act (ESA) within the study area has not been completed. However, the Oregon Department of Fish and Wildlife maintains an inventory of both state and federally-listed threatened and endangered species. Project specific biological assessments may be required for those capital improvements that include work in existing undeveloped areas.

2.5 SOCIOECONOMIC ENVIRONMENT

Growth within the study area will depend on socioeconomic conditions. The following section contains a general discussion of economic conditions, trends, population, land use, and public facilities relating to the both the study area and the City.

2.5.1 Economic Conditions and Trends

Population growth and the resultant wastewater flows within the study area are linked to the economic conditions and trends of the City.

Yachats does not have large commercial or industrial activities that would support large numbers of employees. Yachats is mainly a residential community with small or medium size commercial/industrial enterprises that mainly serve the local and tourist populations. Some of the attributes that make the City an attractive place to live are location, environmental and air quality, City services, recreational activities, and small-town atmosphere. One of the more active areas of commerce in the City is the recreation industry. By virtue of the coastal location and proximity to popular areas of the central Oregon coast, Yachats offers good recreational opportunities. Many homes in the area are vacation rentals or second homes. The City also has a high number of hotel rooms relative to the overall population. The City hosts a large number of part time residents as well as a significant tourist population during the peak tourist season. These economic conditions and trends are expected to continue through the planning period.

2.5.2 Population and Growth Projections

The population in Yachats in 2020 is about 780[1]. Based on United States census data, the population was 533 in 1990, 617 in 2000, and 690 in 2010, and 994 in 2020. Therefore, the historic data shows a steady population increase over the last 30 years. This trend is expected to continue during the planning period. In June of 2017, population projections for Lincoln County were prepared by the Portland State University Population Research Center[2]. These projections estimate the 2040 population of Yachats to be 1,061 and are based on an average annual growth rate of 1.4% from 2020-2035 and 0.9% from 2035-2067. These projections will be used for planning purposes in order to conform to state-wide planning goals. As noted elsewhere in this document, the study period ends in 2041. Therefore, the 2040 population was extrapolated for one additional year for the preparation of this document. Adding an additional year of growth at a rate of 0.9% to the 2040 population of 1,061 results in a 2041 population of 1,070.

2.5.3 Land Use

The City's Comprehensive Plan was adopted in 2008 and most recently updated in 2019. The plan established an urban growth boundary (UGB) encompassing approximately 600 acres. The current City Limits and the UGB are the same.

[1] Portland State University, Population Research Center
[2] Portland State University, Population Research Center, Coordinated Population Forecast Benton County Oregon 2017-2067

A majority of land use zoning in the City is comprised of residential uses with some areas designated for commercial uses. The location of the UGB and City limits are shown in Figure 2-3. This figure also shows the land use zoning designations within the City. The total areas contained under each zoning designation are listed in Table 2-1 and illustrated in Figure 2-1.

Table 2-1 | Yachats Land Uses by Area

Zoning Designation	(Acres)	(%)
Single Family Residential (R-1)	282.9	58.2%
Single Family & Duplex (R-2)	31.2	6.4%
Single, Duplex, Multi-family (R-3)	60.5	12.4%
Single, Duplex, Multi-family, & Motel (R-4)	51.2	10.5%
Commercial (C-1)	20.6	4.2%
Public Facilities (PF)	9.4	1.9%
State Parks (S-P)	23.3	4.8%
Estuary Natural (EN)	7.3	1.5%
Total (Acres)	486.4 (1)	100

Notes:
(1) Total does not include road right of ways and other similar non-zoned areas.

Figure 2-1 | Ranked Land Uses

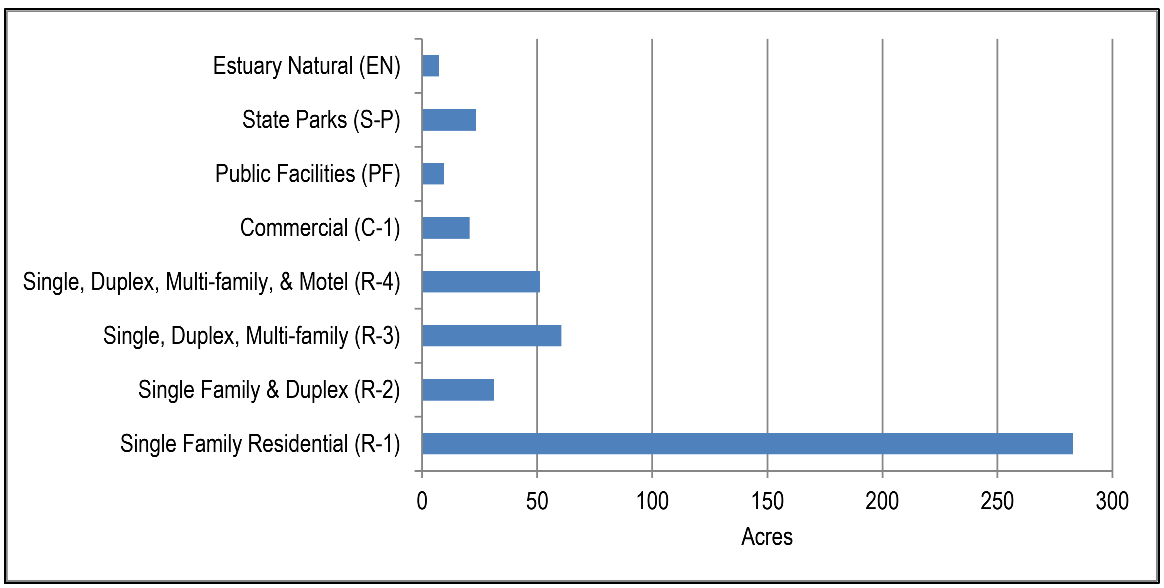


Figure 2-2 | Study Area and Vicinity Map

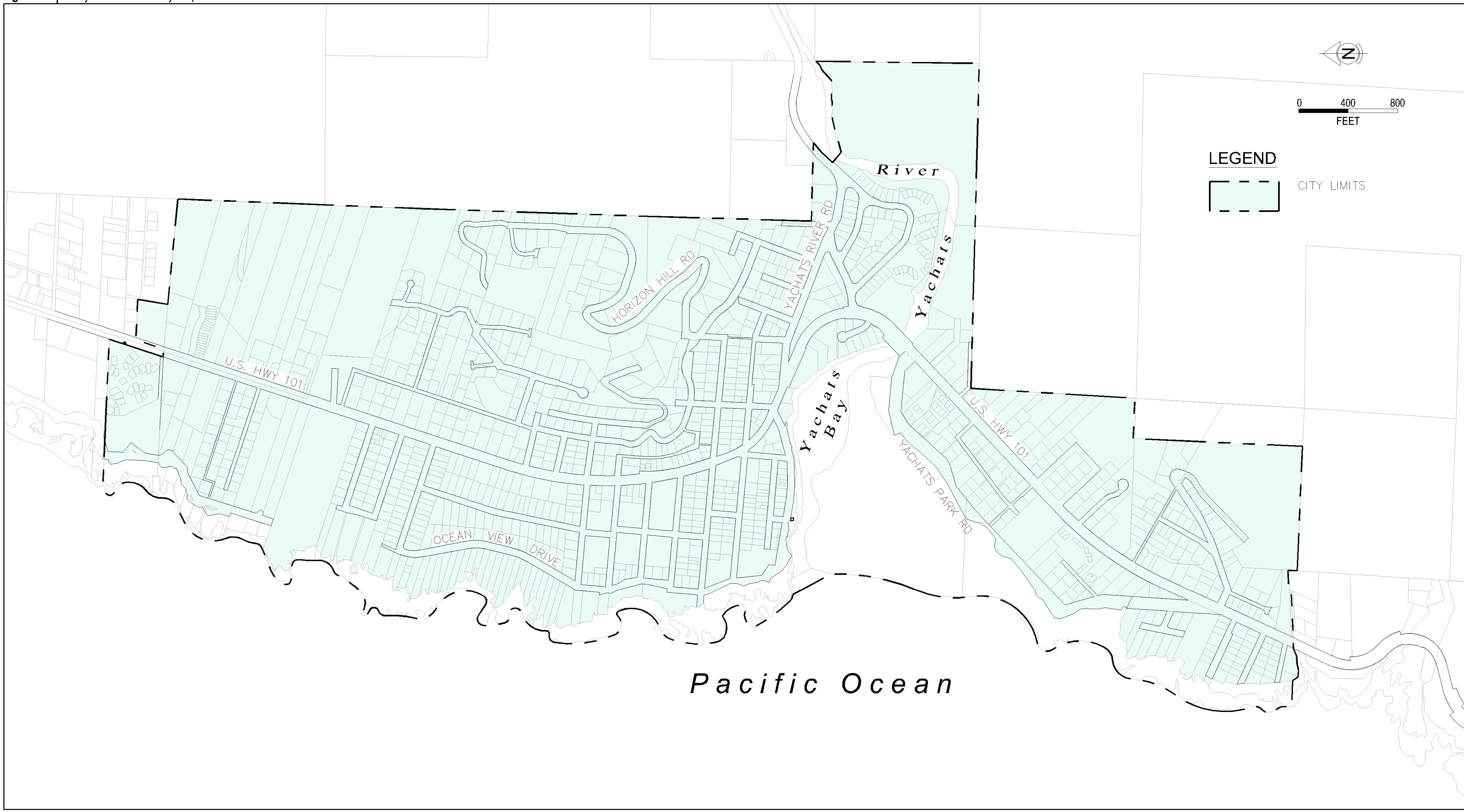


FIGURE 2-2

Figure 2-3 | Comprehensive Plan Designations

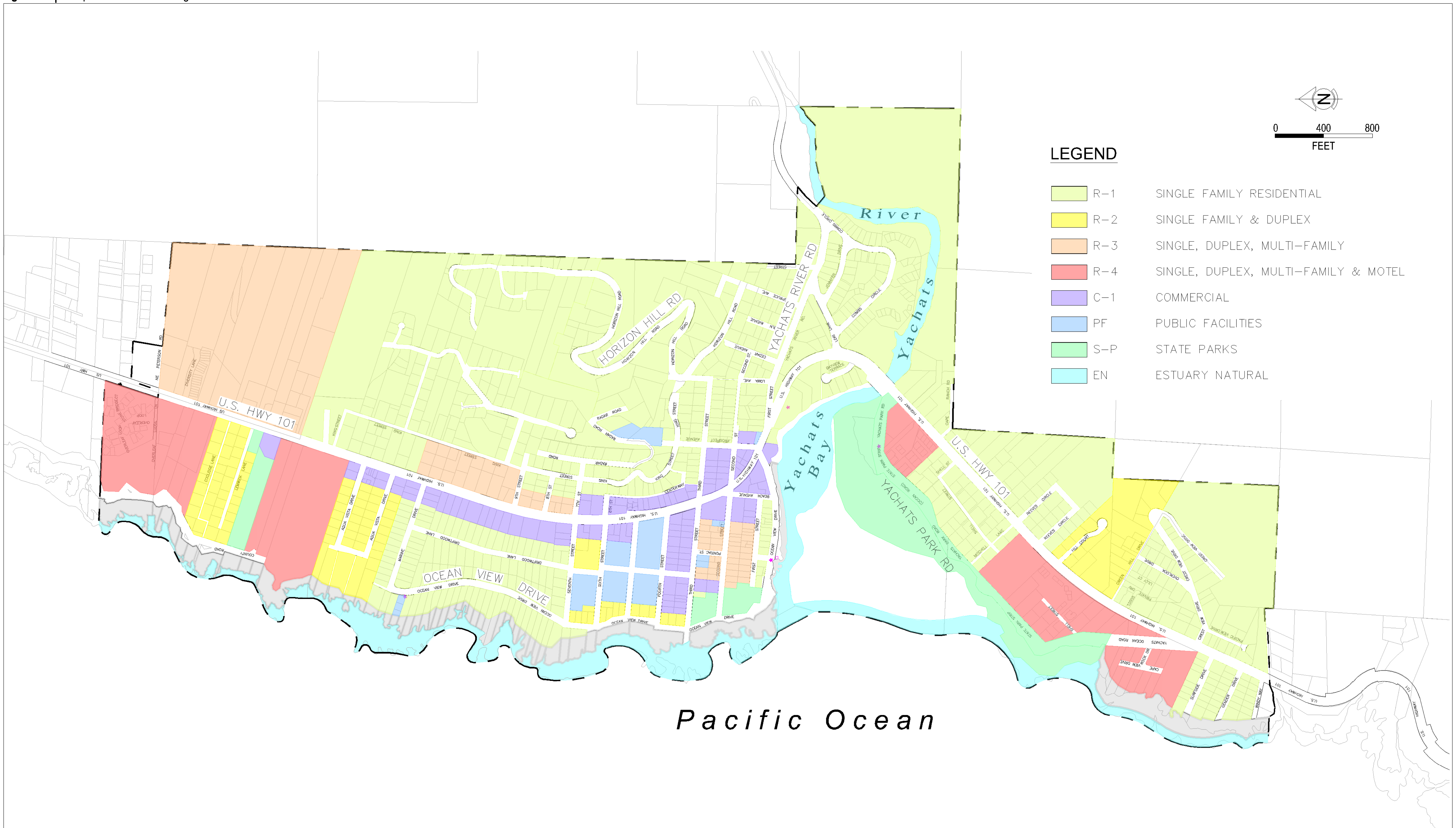


FIGURE 2-3

CHAPTER 3

REGULATORY REQUIREMENTS

Chapter Outline

REGULATORY REQUIREMENTS

CHAPTER 3

3.1 INTRODUCTION

The purpose of this chapter is to present an overview of the regulatory requirements as well as the basic design criteria used to develop and evaluate the various alternatives. This chapter presents the common baseline used to evaluate each of the recommended improvements. All of the recommended improvements must meet all applicable regulatory requirements and provide reliable service for a reasonable cost.

3.2 REGULATING AGENCIES

The U.S. Environmental Protection Agency (EPA) regulates disposal and/or reuse of sewage sludge and septage, as well as the discharge of wastewater effluent to surface waters. Subsurface disposal of treated effluent is regulated by the Oregon Department of Environmental Quality (DEQ). The basis of the regulations imposed or overseen by the EPA is the Federal Water Pollution Control Act of 1972 (Public Law 92-500) often referred to as the Clean Water Act (CWA). The scope of the Clean Water Act has been revised and expanded over the subsequent years. The EPA promulgates regulations to implement the requirements of the CWA and subsequent legislation, and is required to coordinate its requirements with other federal agencies such as the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and with state agencies such as the Department of Environmental Quality (DEQ), the Oregon Department of Fish and Wildlife, and the Department of Health.

In Oregon, the Oregon Department of Environmental Quality (DEQ) is the EPA's delegated agency to implement the Clean Water Act.

3.3 EXISTING PERMIT REQUIREMENTS

The City's existing treatment plant is regulated under a National Pollutant Discharge Elimination System (NPDES) permit issued by DEQ (Appendix A). The existing permit was issued on October 28, 2018 and expires on September 30, 2023.

The permit sets forth effluent BOD and TSS limits that vary seasonally (Table 3-1 and Table 3-2). In addition to seasonal limitations, the NPDES permit includes several other limitations with respect to effluent quality and quantity (Table 3-3).

The NPDES permit also establishes a mixing zone at the outfall location. The mixing zone is defined as that portion of the Pacific Ocean within 100 feet of the outfall diffuser. At the present time, the City is able to comply with all requirements of the NPDES permit.

Table 3-1 | NPDES Permit Discharge Limitations on BOD_5 and TSS (May 1 – October 31)

NPDES Permit Schedule A, Treated Effluent, Outfall 001(Pacific Ocean)

Constituent	Max. Concentration (mg/L)		Max. Mass Load (lb/day)		
	Avg. Monthly	Avg. Weekly	Avg. Monthly	Avg. Weekly	Daily
BOD_5	20	30	25	37	50
TSS	20	30	25	37	50

Table 3-2 | NPDES Permit Discharge Limitations on BOD_5 and TSS (November 1 – April 30)

NPDES Permit Schedule A, Treated Effluent, Outfall 001(Pacific Ocean)

Constituent	Max. Concentration (mg/L)		Max. Mass Load (lb/day)		
	Avg. Monthly	Avg. Weekly	Avg. Monthly	Avg. Weekly	Daily
BOD_5	30	45	37	56	75
TSS	30	45	37	56	75

Table 3-3 | Current NPDES Permit Discharge Limitations on Other Parameters Year Around

NPDES Permit Schedule A, Treated Effluent, Outfall 001(Pacific Ocean)

pH	Range	6.0 – 9.0
Fecal coliform	Monthly Median	14 cfu/ 100 ml
	Maximum for 10% or less of samples	43 cfu/ 100 ml
Enterococcus Bacteria	Monthly Geometric Mean	35 cfu/ 100 ml
	Maximum single sample	104 cfu/ 100 ml
BOD_5 Removal Efficiency	Min. Monthly Average Removal	85%
TSS Removal Efficiency	Min. Monthly Average Removal	85%

3.4 SLUDGE STABILIZATION REQUIREMENTS

The term “sludge” refers to the solids that settle and are removed when a liquid with suspended solids passes through a settling basin or tank. Sludge may originate from several sources in a wastewater treatment plant, but can typically be classified as either raw or primary sludge (primary settling of untreated sewage) or secondary sludge (excess biological sludge from secondary treatment processes). With the exception of sludge hauled to a landfill, all sludge must be stabilized prior to reuse or disposal. Stabilized sludge is a mixture of solids and liquids that is one of the end products of the wastewater treatment process. Adequately processed sludge is classified in regulations as “biosolids.” It is commonly disposed of by applying it to agricultural or forest land after adequate processing.

3.4.1 Biosolids Quality

Wastewater biosolids are subject to differing regulations and restrictions based on quality. The Code of Federal Regulations (40 CFR 503) defines standards for three measures of biosolids quality:

- Pathogens
- Vector attraction (the tendency of the sludge to attract rodents, insects and other organisms that can spread disease)
- Trace elements

Biosolids that meet the higher of two standards for all three of these measures are designated exceptional quality (EQ) biosolids. EQ biosolids have fewer reporting and monitoring requirements and virtually no restrictions on use. Use is restricted for biosolids that do not meet the higher standard by any of these three measures. The following is a short discussion of each of these measurements of biosolids quality.

3.4.2 Pathogen Requirements

Pathogen requirements define two classes of biosolids - Class A and Class B. Class A is the higher standard and requires complete destruction of pathogens before disposal. Class B requirements call for reducing pathogens before disposal and applying the biosolids to land in such a way that pathogens are further reduced.

To be classified as Class A, biosolids must be treated using one of the EPA's Processes to Further Reduce Pathogens (PFRP), or an equivalent process. These processes include composting, heat drying, heat treatment, thermophilic aerobic digestion, beta ray irradiation, gamma ray irradiation, and pasteurization. Regardless of the process used, Class A biosolids must not exceed maximum allowable fecal coliform density or Salmonella bacteria density.

Class B biosolids must be treated using one of the EPA's Processes to Significantly Reduce Pathogens (PSRP), or an equivalent process. These processes include aerobic digestion, air drying, anaerobic digestion, composting, and lime stabilization.

3.4.3 Vector Attraction Requirements

Class A Biosolids must meet one of the following requirements for reducing vector attraction if they are to be applied to land without restrictions. It should be noted that the City of Yachats currently produces Class B biosolids. So, these requirements do not currently apply to the City.

- Volatile solids in the sludge shall be reduced by a minimum of 38 percent.
- The specific oxygen uptake rate for sludge treated by aerobic digestion shall be less than or equal to 1.5 mg oxygen per hour per gram of total solids at a temperature of 20°C.
- Aerobic processes shall treat the sludge for a minimum of 14 days with an average temperature of at least 45°C and a minimum temperature of 40°C.
- Alkali addition shall raise the pH of the sludge to a minimum of 12 for two hours and maintain the pH at a minimum of 11.5 for an additional 22 hours without additional alkali.

The use of the land where the biosolids is applied is restricted if vector attraction reduction is achieved by measures, such as injecting the biosolids below the surface of the land or disposing of them on the surface and incorporating them into the soil within six hours.

3.4.4 Trace Elements

Ten elements typically found in biosolids have been identified as critical. Two limits have been set for each of these trace elements: Exceptional Quality (EQ) and a ceiling limit. If all the trace elements are below the EQ limit, then no restrictions are placed on loading rates. If any of the trace elements are over the ceiling limit, then the biosolids are not suitable for land application. If the trace elements fall between these two limits, restrictions are placed on loading rates.

3.4.5 Biosolids Use

Table 3-4 outlines some of the general restrictions on the use of biosolids depending on the quality of the biosolids.

Table 3-4 | Biosolids Use Restrictions Based on Quality Rating

Biosolids Quality Rating by Category			
Pathogens	Vector Attraction	Trace Elements	Use Restrictions
EQ	EQ	EQ	No restrictions are imposed on application or use with regard to pathogens, vector attraction, or trace elements.
Class B	EQ	EQ	Application is subject to EPA defined waiting periods for crops, grazing, and public access. Biosolids cannot be distributed for home use, in bags, or in containers.
EQ	-	EQ	Biosolids must be injected or tilled into the soil. Biosolids cannot be distributed for home use, in bags, or in containers.
EQ	EQ	-	Bulk application must not exceed EPA defined cumulative loading rates. Biosolids distributed in bags or containers are subject to annual loading rate restrictions.
All Other Biosolids Qualities			Application is subject to trace loading requirements and pathogen waiting periods. Biosolids must be injected or tilled into the soil and cannot be distributed for home use, in bags, or in containers.

EQ – Exceptional Quality Biosolids

3.4.6 Biosolids Land Application Site Criteria

Site criteria for land applying class B biosolids includes geological formation, flood plain proximity, groundwater and surface water proximity, topography, and soils, as well as method of application. Table 3-5 contains an overview of some of the general criteria contained in OAR 340-050.

Land application of Class B biosolids at sites used for agricultural purposes requires special management considerations. These relate to access to the site, types of crops grown, plant nutrient-uptake rates, timing and duration of biosolids application (i.e., site life and seasonal constraints), and grazing restrictions. A brief discussion of each of these issues follows.

- Access. Controlled access must be provided for municipal class B biosolids application sites for 12 months following surface application of biosolids. Controlled access is defined as public entry or traffic being unlikely. Privately owned rural land is typically assumed to have controlled access, while public lands such as parks may require fencing to ensure access control.
- Crops. Class B Biosolids are not to be used directly on fruits or vegetables which may be eaten raw. As a general rule, crops grown for human consumption should not be planted within 14 months of application of class B biosolids. If the edible parts will not be in contact

with the biosolid amended soil, or if the crop will be processed or treated prior to marketing in such a manner to ensure that pathogen contamination is not a concern, this requirement may be waived by DEQ. There are no restrictions on planting times for crops not grown for direct human consumption.

- Nutrient Loading. The application of Class B biosolids to agricultural land should not exceed the annual nitrogen loading required for maximum crop yield. Biosolids are, therefore, typically managed according to their fertilizer value. Biosolids may be applied above agronomic rates on a onetime basis or less than once per year so long as runoff, nuisance conditions, and groundwater concerns are adequately addressed. In cases of higher than agronomic application rates, the acceptable loading rate and application frequency is typically based on nitrogen accumulation and annual nitrogen use.
- Site Life. Class B biosolids disposal sites generally have a limited application life, which may be determined by the chemistry of the soil and the metals loading from the biosolids. Site life is determined by dividing lifetime biosolids loading limits (based on the most limiting constituent) by the annual application rate.
- Seasonal Constraints. The main consideration in land applying class B Biosolids on sloping ground is to avoid surface runoff and soil erosion. Additionally, class B biosolids application should be restricted to the dry season to prevent soil damage that may occur from equipment traffic during the wet season.
- Grazing Restrictions. Grazing animals should not be allowed on pasture or forage for 30 days after application of class B Biosolids.
- Site Monitoring and Reporting. As previously noted, site monitoring is typically not required where "EQ" biosolids are applied at or below agronomic rates based on crop nitrogen requirements. However, if class B biosolids contain high concentrations of heavy metals or other toxic elements, or if crop nitrogen requirements are exceeded on a regular basis, soil monitoring and special management practices may be required. At the discretion of DEQ, monitoring wells and groundwater background characterization and/or monitoring may be required on any site on a case by case basis.

Table 3-5 | Site Criteria for Class B Biosolids Application

Parameter	Criteria
Geology	Must have a stable formation
Within Flood Plain	Restricted period of application and incorporation of biosolids
Groundwater	At time of application; 4-foot minimum depth to permanent groundwater; 1-foot minimum depth to temporary groundwater
Topography	Must have appropriate management to eliminate surface runoff
Slope less than or equal to 12%	• Surface application of liquid dewatered or dried biosolids
Slope greater than 12% but less than 20%	• Direct incorporation of liquid biosolids into the soil, surface application of dewatered or dried biosolids
Soils	• Minimum rooting depth of 24 inches
	• No rapid leaching
	• Avoid saline or alkali soil
	• pH of 6.5 to 8.2 for heavy metal accumulator crops, or pH can be raised by adding lime to the soil.
Method of Application & Proximity to Water Bodies	Buffer strips may be required to protect water bodies. Size depends on method of application and proximity to sensitive area (determined at discretion of DEQ), generally as follows:
	• Direct injection: no limit required
	• Truck spreading: less than 50 foot buffer strip
	• Spray irrigation: 300 to 500 foot buffer strip
	• Near ditch, pond, channel, or waterway: greater than 50 foot buffer strip
	• Near domestic water source or well; greater than 200 foot buffer strip

3.5 RELIABILITY AND REDUNDANCY REQUIREMENTS

The EPA has established minimum standards for mechanical, electrical, fluid systems, and component reliability for all new or expanding sewerage facilities, including treatment plants. These reliability standards establish minimum levels of reliability for three classes of sewerage facilities. Pump stations associated with, but physically removed from the actual treatment works may have a different classification than the treatment works itself.

The purpose of these reliability standards is to ensure that the treatment facilities will operate effectively on a day-to-day basis and that provisions are made for operation during power failures, flooding, peak loads, equipment failures, and maintenance shutdowns. These reliability and redundancy standards are designed to ensure that unacceptable degradation of the receiving water will not occur due to the interrupted operation of specific treatment process or unit operation.

The reliability classification will be based on the water quality and public health consequences of a component or system failure. Specific requirements pertaining to treatment plant unit processes for each reliability class are described in EPA's technical bulletin, Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability, EPA 430-99-74-001. EPA and DEQ guidelines for classifying sewerage works are summarized as follows:

- Reliability Class I. These are works whose discharge, or potential discharge, (1) is into public water supply, shellfish, or primary contact recreation waters, or (2) as a result of its volume and/or character, could permanently or unacceptably damage or affect the receiving waters or public health if normal operations were interrupted. Examples of Reliability Class I works are those with a discharge or potential discharge near drinking water intakes, into shellfish waters, near areas used for water contact sports, or in dense residential areas.
- Reliability Class II. These are works whose discharge, or potential discharge, as a result of its volume and/or character, would not permanently or unacceptably damage or affect the receiving waters or public health during periods of short-term operations interruptions, but could be damaging if continued interruption of normal operations were to occur (on the order of several days). Examples of a Reliability Class II works are works with a discharge or potential discharge moderately distant from shellfish areas, drinking water intakes, areas used for water contact sports, and residential areas.
- Reliability Class III. These are works not otherwise classified as Reliability Class I or Class II.

Table 3-6 contains the typical redundancy requirements for treatment plant and pump station components that are designed in accordance with the EPA Reliability Class I standards. DEQ requires all pump stations be designed to reliability Class I standards. For treatment plants, DEQ typically requires Class I reliability standards during the low flow season and Class II standards during the high flow season. One of the goals of treatment plant redundancy is for the treatment plant to have the ability to meet effluent permit limits with any unit removed from service. Major maintenance activities should be scheduled for the low flow season. Therefore, in practice, treatment facilities must be designed to treat the maximum month dry weather flow with any unit removed from service. During wet weather conditions, the DEQ typically allows treatment facilities to be designed such that all treatment units are required to treat the peak wet weather flow.

Table 3-6 | EPA Reliability Class I Requirements

System Component	Capacity/Redundancy Requirements
Raw Sewage Pumps	Handle peak flow with largest unit out of service. As a minimum, the Peak flow is defined as the flow associated with a 5-year, 24-hour storm.
Mechanical Bar Screens	Provide one backup with either manual or mechanical cleaning (manual cleaning acceptable if only two screens)
Grit Removal	Provide a minimum of two units.
Primary Sedimentation	Handle 50% of design flow capacity with largest unit out of service. Design flow is defined as the flow used as the design basis of the component.
Activated Sludge Process	A minimum of two equal size basins. No backup basin required.
Aeration Blowers	Supply the design air capacity with the largest unit out of service. Provide a minimum of two units.
Air Diffusers	Allow for the isolation of largest section of diffusers (within a basin) without measurably impairing oxygen transfer.
Secondary Sedimentation	Handle 75% of design flow capacity with largest unit out of service. Design flow is defined as the flow used as the design basis of the component.
Disinfection Contact Basin	Handle 50% of the design flow with largest unit out of service. Design flow is defined as the flow used as the design basis of the component.
Effluent Pumps	Handle peak flow with largest unit out of service. Peak flow is defined as the maximum wastewater flow expected during the design period of the treatment works.
Electrical Power	Two separate and independent sources of electrical power shall be provided, either from two separate utility substations or from a single substation and a plant based generator. Designated backup source shall have sufficient capacity to operate all vital components, critical lighting, and ventilation during peak flow conditions, except that components used to support the secondary processes need not be included as long as treatment equivalent to sedimentation and disinfection is provided.

3.6 COLLECTION SYSTEM DESIGN CRITERIA

The requirements and regulations covering the design and sizing of the collection piping portion of the wastewater conveyance system are set forth in guidelines published by the DEQ. Table 3-7 includes a list of the minimum allowable gravity sewer pipe slopes as contained in OAR 340-052, Appendix A and DEQ design guidelines.

Table 3-7 | Minimum Mainline Pipe Slopes

Inside Pipe Diameter (inches)	% Slope (ft/100 ft)
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.09
27	0.08

The City does not currently have any design standards that would build on the requirements set forth by DEQ. The DEQ guidelines are fairly general and lack the specificity with which most City's prefer to have with respect to new collection system improvements. Furthermore, there are many other advantages for a City to have these standards. As such, this plan recommends that the City prepare and adopt design standards for future sanitary sewer extensions. This work is discussed in greater detail in Chapter 6.

3.7 PUMP STATION AND FORCEMAIN DESIGN CRITERIA

DEQ has extensive design guidelines for public pump stations. Under the authority granted by OAR 340-052, DEQ has established requirements and guidelines for the design of public sewage pump stations. These design guidelines include OAR 340-052 Appendix B and various design memoranda issued by DEQ. DEQ has established 20-years as being the proper planning period for pump stations. Table 3-8 below summarizes design criteria assumed for new pump stations or the upgrades of the existing pump stations.

Table 3-8 | Recommended Minimum Pump Station Design Criteria

Category	Minimum Design Criteria
Design Flows	• 20-year peak instantaneous flow
Pump Station Structure	
• Wetwell Type	• Precast concrete, hatches with integral hatches/fall protection
• Operational Storage	• Based on pump starts or overflow storage as appropriate
• Valve Vault	• Precast concrete vault adjacent to wetwell
• Overflow	• Provide bypass in accordance with DEQ historical design requests.
Pumps	
• Pump Station Capacity	• Convey design flow with largest single unit out of service
• Type	• Submersible pumps
• Number	• 2 minimum
• Motor Size	• HP as required, 480 volt, 3 phase power preferred
• Min. Pump Cycle Time	• 6 minutes (10 starts per hour total)
• Pump Retrieval	• Jib or davit crane installed on or adjacent to wetwell
Force Mains	
• Minimum Size & Material	• 4-inch, C-900 PVC, Class 52 Ductile Iron or fused HDPE
• Min Velocity / Max Velocity	• 3.5 fps / ±8 fps
Instrumentation & Control System	
• Location	• Building adjacent to pump station
• Control Building	• CMU block
• Pump Speed Control	• Soft starters or VFDs if required by City or utility company
• Flow Measurement	• Mag meter in vault downstream of valve.
Auxiliary Power	
• Type	• Diesel generator with Transfer Switch
• Location	• Control building adjacent to P.S.
• Fuel Supply	• Sub-base tank, 24 hour minimum or as required by City
• Silencer	• Critical grade, insulated
Telemetry	
• Type	• Match City system, programmed per City direction
• Alarms	• Remote alarms as required by City

CHAPTER 4

EXISTING WASTEWATER FACILITIES

Chapter Outline

EXISTING WASTEWATER FACILITIES

4.1 INTRODUCTION

This chapter provides an inventory of the existing wastewater system components that serve the study area. This inventory includes a description of funding mechanisms and operation and maintenance budgets. The evaluation of these specific systems and the development of improvement alternatives are performed in other chapters of this study.

4.2 GENERAL OVERVIEW OF EXISTING WASTEWATER FACILITIES

The wastewater system that serves the study area consists of a conventional gravity collection system that conveys wastewater to the treatment plant. The collection system includes five pump stations. One of these is the Main Pump Station that is located near the intersection of Ocean View and Marine Drive. All of the wastewater from the community eventually flows to the Main Pump Station where is it pumped to the treatment plant headworks. The City's treatment facility is located on 7th Street near the intersection with Driftwood Lane. The treatment plant includes a headworks with screening, grit removal and flow measurement. The treatment plant utilizes an active sludge process operated in a sequencing batch reactor (SBR) configuration. The plant includes two SBR basins. Waste sludge from the SBR's is routed to a series of aerobic digesters. After digestion, the solids are dewatered for final disposal using a screw press. Dewatered solids are disposed either at a regional solids handling facility (Heard Farms Inc.) or at a landfill. Discharge from the SBR basins is routed to an equalization basin where the flow is equalized prior to being routed through an ultraviolet light (UV) disinfection facility. After UV disinfection, plant effluent is routed to an outfall pipeline for discharge into the Pacific Ocean. The plant also includes a public works building that houses the aeration blowers, office space, a laboratory room, and electrical control room, shop space, and vehicle storage. A separate operations building houses the blowers for the aerobic digesters, a locker room, and a meeting room. The plant is equipped with a diesel backup power generator.

Detailed maps of the collection system are included in Appendix B. An overall schematic of the wastewater system is shown in Figure 4-1. Detailed descriptions of the major components of the wastewater system are included below.

4.3 HISTORY AND DEVELOPMENT OF THE WASTEWATER SYSTEM

The original sewer system was installed in 1974 and included a conventional gravity collection system, four pump stations, a secondary wastewater treatment plant, and an ocean outfall. The treatment plant was a donut-style activated sludge plant that included aeration basins, an aerobic digester and clarifier in a single tank. This tank remains in service, but is now use as an aerobic digester. Three of the four pump stations and treatment plant remain in their existing location, but have been improved since originally constructed. The Pontiac Pump Station wet well has been relocated, but the station remains in the same general area as originally constructed. The vast majority of the gravity collection piping installed in 1974 remains in service.

In 1980, the Quiet Water development was constructed and included new gravity sewers with a new pump station. In the mid-1980s, the treatment plant was improved. A new clarifier with an integral chlorine contact chamber was constructed and the existing clarifier was converted into a second aerobic digester. The new clarifier/chlorine contact chamber tank remains in service and is currently used as a sludge storage tank.

In 1991, the collection system was expanded to provide service to new homes built on the east side of the City. In 2003, an inflow and infiltration (I/I) project was completed and included upsizing sewers along Yachats Ocean Road and lining about 750 feet of piping. In 2008, the City completed a major upgrade to the sewer system. The 2008 project included the construction of the new sequencing batch reactor plant, and upgrades to four pump stations that were constructed in 1974. No major improvements to the treatment plant or pump stations have been made since 2008. In the late 2000s and early 2010s, the sewer system was extended to provide service to the Blackstone Development on the east side of the City. Several other sanitary sewer extension projects have been completed over the years to expand sewer service to nearly all residents living in the City.

4.4 WASTEWATER COLLECTION SYSTEM

This subsection provides an overview of the existing wastewater collection system within the study area with an emphasis on flow routing as well as known and reported problems.

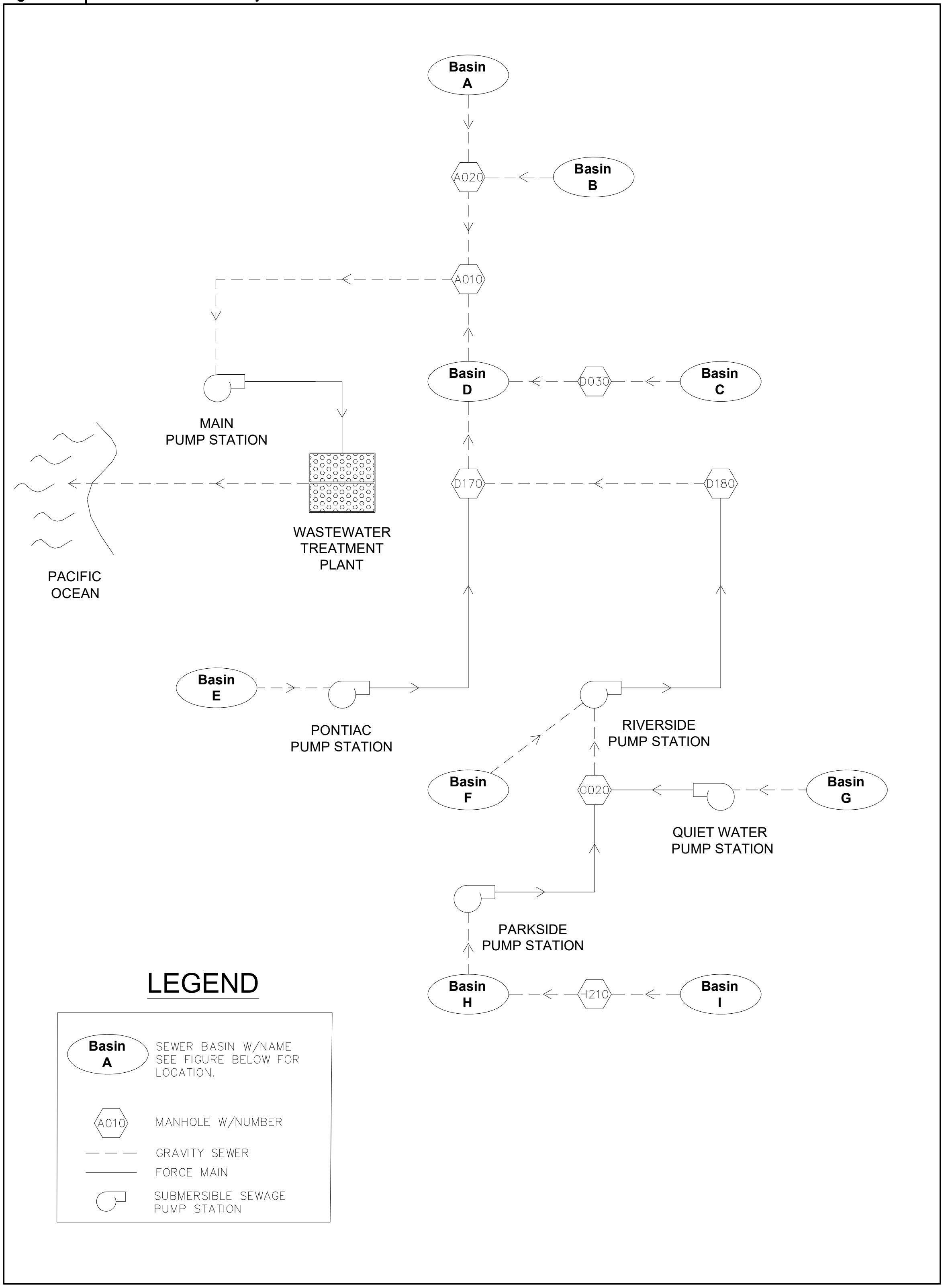
4.4.1 Service Area and User Connections

The City's system currently serves approximately 900 user connections. A breakdown of the connections user type is presented below (Table 4-1). The vast majority of the connections are single family residential. There are no large industrial or commercial users that currently discharge to the sewer system. Several of the Commercial users are hotels that have several rooms and therefore are relatively large users in Yachats.

Table 4-1 | Sewer User Summary

User Classification	Number of Connections
Residential	828
Commercial	52
Miscellaneous	9
Total	889

Figure 4-1 | Overall Wastewater System Schematic



4.4.2 Drainage Basins

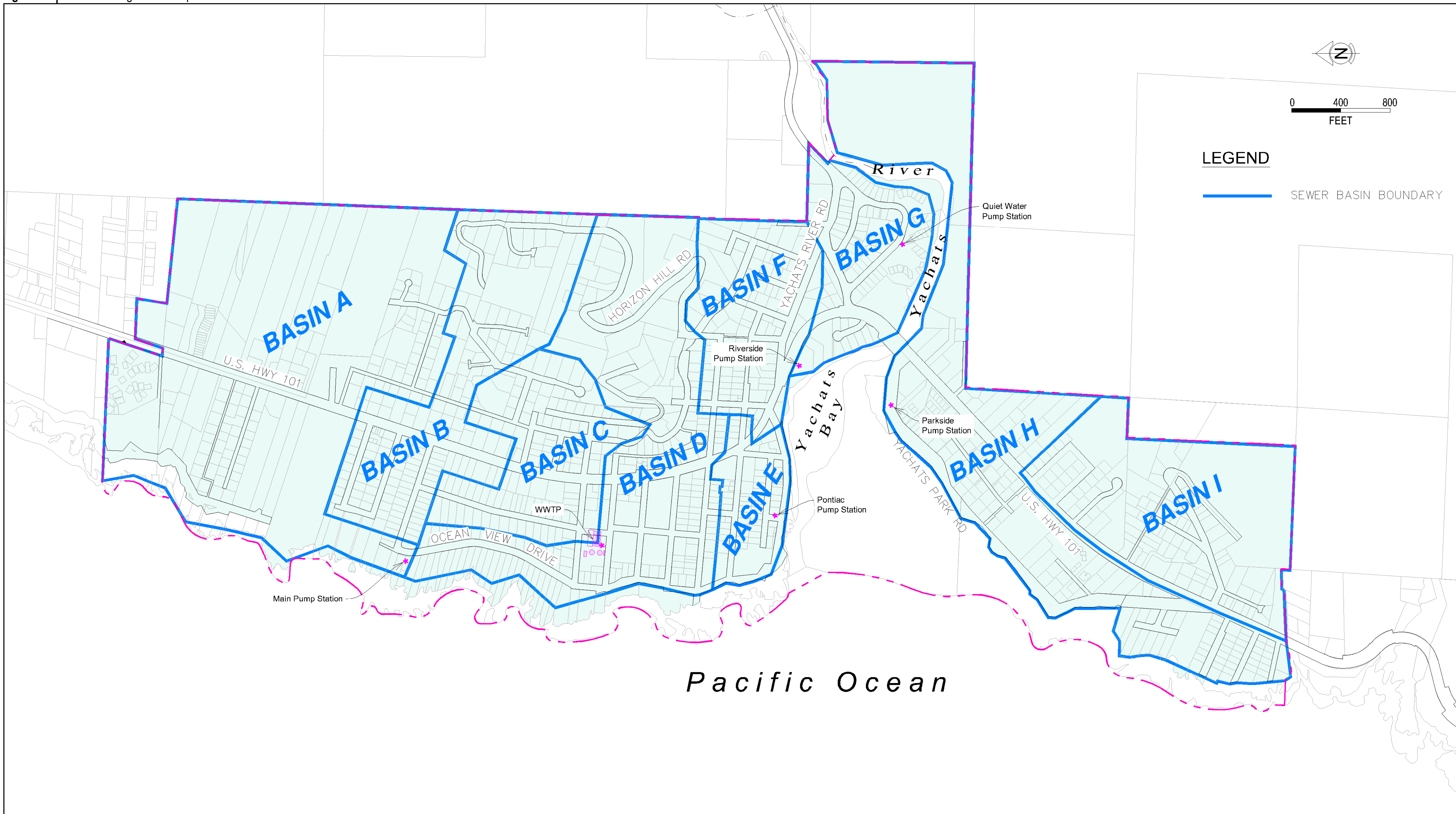
To aid in the analysis of the collection system, it is convenient to divide the collection system into separate drainage basins. The basin boundaries are based on a combination of factors including topography, urban growth boundaries, as well as the existing drainage patterns and trunk sewer locations. The collection system is divided into nine basins as shown in Figure 4-2. The approximate area within each of the major sewer drainage basins is listed in Table 4-2. The routing of the existing system is shown schematically in Figure 4-1.

Table 4-2 | Sewer Drainage Basin Areas

Basin	Total Area (Acres)	Undeveloped Area Suitable for Future Development (1) (Acres)
A	138	54
B	56	8
C	36	0
D	80	21
E	16	0
F	33	0
G	29	0
H	93	30
I	57	17
Totals	598	130

Notes
(1) Does not include vacant lots or properties within areas that are already sewered.

Figure 4-2 | Sewer Drainage Basin Map



4.4.3 Gravity Collection System

The collection system serving the City includes approximately 65,000 feet of mainline pipe, 335 manholes and mainline cleanouts, and about 900 service laterals. Pipe sizes range from 6-inch to 15-inch diameter (Figure 4-3). The majority of the piping is 8-inch diameter asbestos concrete (AC) pipe. The collection system includes five pump stations, and approximately 5,500 feet of pressure forcemain piping. The pump stations and forcemain piping are described in greater detail below. The original collection system was built in the early 1970s using AC pipe. Most of the original piping remains in service. The original collection system has been extended over the years and most new extensions have been with PVC pipe. All of the concrete pipe was installed in the early 1970s is approaching 50 years of age. The PVC piping varies in age from 5-30 years old.

Figure 4-3 | Pipe Inventory by Diameter

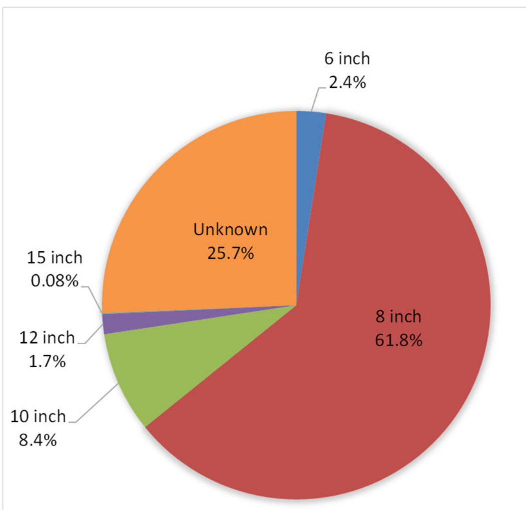
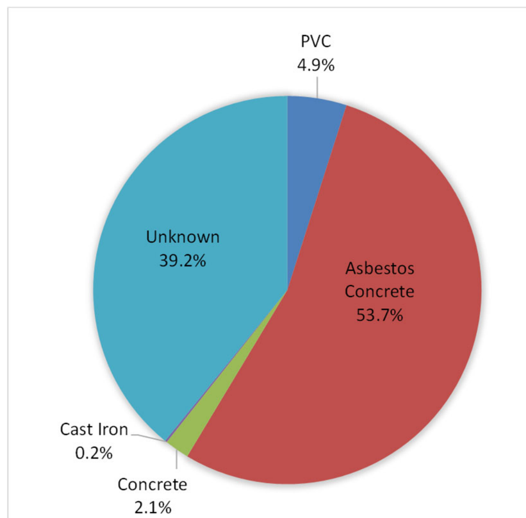


Figure 4-4 | Pipe Inventory by Material



4.4.4 Known Gravity Collection System Problems

The following bullet points list major collection system problem that are known at the present time.

- Sewer Line from King Street to East 3rd Street (Manhole D-220 to Manhole D-270). This piping is old concrete piping with poor joint integrity. I/I and root intrusion are known problems on this section of piping.
- Mainline A Manhole A-040 to Manhole A-050. There is a belly on this section of line which is downstream of the Adobe Resort. The belly causes surcharging, debris accumulation, and maintenance problems.
- Hanley Drive Sewer Upstream of Manhole C-150. This mainline pipe was constructed without manholes at the termina end and at a 90-degree bend on Hanley Drive. As a result, it is not possible to clean or inspect these pipelines.

4.4.5 Pump Stations

The existing wastewater collection system serving the City includes five pump stations. Table 4-3 contains a summary of some of the important characteristics of each of the pump stations. A more detailed description of each of the stations is presented in the following sections. The Main Pump Station, the Parkside Pump Station, the Riverside Pump Station, and the Pontiac Pump Station were all constructed as part of the 2008 wastewater system improvement project. Therefore, they are relatively similar and in good condition. The Quiet Water Pump Station was constructed in the 1980s and is older type of station.

Table 4-3 | Summary of Existing Pump Stations

Category	Main Pump Station	Parkside Pump Station	Riverside Pump Station
General			
▪ Basins served	All	H, I	G,H,I,F
▪ Construction date(s)	2009	2009	2009
▪ Type	Submersible	Submersible	Submersible
Firm Capacity (1)	1,600 gpm @ 84 ft TDH	400 gpm @ 25 ft TDH	590 gpm @ 65 ft TDH
Wetwell			
▪ Type	Concrete	Fiberglass/Packaged	Fiberglass/Packaged
▪ Size	8’ diameter	6’ diameter	6’ diameter
▪ Rim Elevation	24.0 ft.	21.55 ft.	19.15 ft.
▪ Influent Invert Elev.	15.06 ft.	12.95 ft.	9.00 ft.
▪ Bottom Elev.	6.0 ft.	7.5 ft.	2.0 ft.
▪ Depth (Rim to Bottom)	18 ft.	14.05 ft.	17.15 ft.
Pumps			
▪ Type	Submersible	Submersible	Submersible
▪ Number	3	2	2
▪ Manufacturer & Model	ABS AFPK 1547ME210/4D	ABS AFPK 1041M46/4D	ABS AFPK 1047ME130/4
▪ Motor Size & Speed	30 HP 1750 RPM	6.2 HP 1750 RPM	17.4 HP 1750 RPM
▪ Power Supply	480-Volt 3-Phase	240-Volt 3-Phase	240-Volt 3-Phase
Force Main			
▪ Size & Type	6” & 10” AC	6” PVC	6” AC & HDPE
▪ Length	1,850 ft	1,035	1,173 ft.
▪ FM Discharge	WWTP Headworks	MH G-2	MH D-18
▪ FM Discharge Elev.	± 62.5 ft.	± 13.6 ft. with intermediate high point elev. = ± 30 ft.	± 48 ft.
Hydrogen Sulfide Control	none	none	none
Auxiliary Power			
▪ Type & Location	80 KW Fixed Gen	20 KW Fixed Gen	30 KW Portable Gen
▪ Fuel Supply	Diesel	Diesel	Diesel
▪ Transfer Switch	Automatic	Automatic	Manual
Telemetry	Autodialer	Autodialer	Autodialer
Overflow	Manholes A-010 and A-040	Top of pump station, then overland to Pacific Ocean Elevation = 21.55 ft.	Manhole G-010

(1) Firm capacities based on the largest single out of service at each station.

Table 4-4 | Summary of Existing Pump Stations (continued**)**

Category	Pontiac Pump Station	Quiet Water Pump Station
General		
▪ Basins served	E	G
▪ Construction date(s)	2009	1980
▪ Type	Submersible	Vacuum Prime/Packaged
Firm Capacity [(1)]	150 gpm @ 21.5 ft TDH	150 gpm @ 50 ft TDH
Wetwell		
▪ Type	Fiberglass/Packaged	Concrete
▪ Size	5' diameter	5' diameter
▪ Rim Elevation	27.20 ft.	11.7 ft.
▪ Influent Invert Elev.	20.0 ft.	3.69 ft.
▪ Bottom Elev.	15.0 ft.	-2.31 ft.
▪ Depth (Rim to Bottom)	12.20 ft.	14 ft.
Pumps		
▪ Type	Submersible	Vacuum Prime
▪ Number	2	2
▪ Manufacturer & Model	ABS AFPK0841M22/4D	Hydronix 40 MPC w/7.75 inch impeller
▪ Motor Size & Speed	3 HP 1750 RPM	7.5 HP 1800 RPM
▪ Power Supply	230-Volt 3-Phase	230-Volt 3-Phase
Force Main		
▪ Size & Type	4" AC	4"
▪ Length	573 ft	825 ft
▪ FM Discharge	MH D-17	MH G-2
▪ FM Discharge Elev.	± 37 ft	± 12.2
Hydrogen Sulfide Control	none	none
Auxiliary Power		
▪ Type & Location	30 KW Portable Gen	30 KW Portable Gen
▪ Fuel Supply	Diesel	Diesel
▪ Transfer Switch	Manual	Manual
Telemetry	Autodialer	Autodialer
Overflow	MH E-013 Elevation = 24.8 ft.	Manhole G-030 Elevation = ± 11.2

(1) Firm capacities based on the largest single out of service at each station.

4.4.5.1 Main Pump Station

Figure 4-5 | Main Pump Station

The Main Pump Station is located on the west side of Ocean View Drive near the intersection with Marine Drive. The entire collection system eventually drains to the Main Pump Station (Figure 4-1) where it is pumped to the treatment plant site. The station was reconstructed in 2008 and is relatively new and in good condition. The design criteria for the station are outlined above (Table 4-3).

The station consists of a packaged fiberglass wet well, a valve vault, and a control building. Three submersible wastewater pumps are located in the wet well. Pump isolation and check valves are located in the valve vault. The electrical distribution and control gear are located in the control building along with a backup power generator. The pump power cables are not equipped with an easy way to disconnect the cables from the power supply. In order to remove the pumps, the operators must disconnect the power wires at the pump. This requires an electrician which is awkward and costly. A better system includes disconnect plugs at some intermediate location between the pumps and the control panel (usually near the wet well hatch) that can be used to remove the pumps and a portion of the power cables without the need for an electrician. The City may want to consider installing a similar disconnect system during the planning period.

The station includes no provisions for hydrogen sulfide control. The station conveys water to the treatment plant headworks. The headworks concrete and associated structures do not show excessive signs of hydrogen sulfide corrosion. Therefore, hydrogen sulfide corrosion does not seem to be a major problem.

The Main Pump Station is equipped with an automatic transfer switch and an onsite diesel generator to provide backup power. The primary level control element is an ultrasonic transducer mounted in the wetwell. The pump speeds are controlled using variable frequency drives. In addition to the primary level control system, the station includes a backup level control system that consists of float switches located above the normal liquid levels. If liquid level rises above normal operating ranges and lifts the float switches, the pumps will start. The station is equipped with an autodialer for calling out alarm conditions. The station does not include a dedicated overflow pipe. This is a shortcoming that should consider addressing by installing a dedicated overflow pipe from the wet well to the storm drainage system.

The pump station discharges into 12-inch ductile iron forcemain that runs for about 64 feet from the valve vault to a manifold connecting the 12-inch pipe to 6-inch diameter and 10-inch diameter forcemain pipes. The 6- and 10-inch pipes are approximately 1,850 feet long and run in parallel to the treatment plant. The 6-inch diameter pipe is believed to be asbestos concrete and was constructed as part of the original collection system in 1974. The 10-inch pipe is PVC and was installed later in 1993.

The Main Pump Station was constructed in 2008 and should serve the City well throughout the planning period with normal maintenance activities. As noted above, a new dedicated overflow pipe should be installed. Over the 20 year planning period, the electrical control system will likely require upgrades due to the overall age of the equipment. The remaining work at the station should consist of typical maintenance activities including building maintenance, normal pump maintenance, generator maintenance, periodic upgrades to the telemetry equipment, etc. These activities should be funded under normal operation and maintenance budgets and are not included as capital improvement projects in this document.

4.4.5.2 Parkside Pump Station

The Parkside Pump Station is located south of the Yachats River on the north side of Yachats Ocean Road. All of the collection system piping located south of the Yachats River drains to this station. The station pumps water through a 6-inch forcemain to a manhole on the north side of the Yachats River Bridge that drains to the Riverside Pump Station. The Parkside Pump Station and forcemain were constructed in 2009 and are relatively new and in good condition. The design criteria for the station is outlined above (Table 4-3).

Figure 4-6 | Parkside Pump Station

The station is a packaged fiberglass station that includes a 6-foot diameter fiberglass wet well with an integral valve vault. Two submersible wastewater pumps are located in the wet well. The pumps discharge into 4-inch piping in the wet well. The pump discharge piping passes through the fiberglass valve vault where an isolation and check valve are installed on each discharge pipe. Outside the valve vault, the two 4-inch pipes connect to the 6-inch forcemain pipe. The 6-inch forcemain is mostly PVC with a section of ductile iron mounted to the Yachats River Bridge. The total length of the forcemain is approximately 1,035 feet

The station includes no provisions for hydrogen sulfide control. Based on recent inspections, the manholes downstream of the forcemain discharge point do not show signs of excessive hydrogen sulfide corrosion.

The station is equipped with an automatic transfer switch and an onsite diesel generator to provide backup power. The generator is located in a small wood framed building next to the wet well. The pumps are controlled automatically using float switches and motor starters. The station does not have variable frequency drives. The pump controls are located in stainless steel panels adjacent to the wet well. The station is equipped with an autodialer for calling out alarm conditions. The pump power cables are not equipped with an easy way to disconnect the cables from the power supply. In order to remove the pumps, the operators must disconnect the power wires at the pump. This requires an electrician which is awkward and costly. A better system includes disconnect plugs at some intermediate location between the pumps and the control panel (usually near the wet well hatch) that can be used to remove the pumps and a portion of the power cables without the need for an electrician. The City may want to consider installing a similar disconnect system during the planning period.

The station does not include a dedicated overflow pipe. Therefore, in the event of a prolonged pump failure, sewage will flow out the top of the wet well hatch. This has not traditionally been a problem for the City, but is not standard and is something the City may want to consider addressing during the planning period.

The Parkside Pump Station was constructed in 2008 and should serve the City well throughout the planning period with normal maintenance activities. Over the 20-year planning period, the electrical control system will likely require upgrades due to the overall age of the equipment. The remaining work at the station should consist of typical maintenance activities including building maintenance, normal pump maintenance, generator maintenance, periodic upgrades to the telemetry equipment, etc. These activities should be funded under normal operation and maintenance budgets and are not included as capital improvement projects in this document.

4.4.5.3 Riverside Pump Station

Figure 4-7 | Riverside Pump Station

The Riverside Pump Station is located north of the Yachats River on the west side of Highway 101 south of the intersection with Yachats River Road. The station receives flow from the Parkside Pump Station as well as from the areas of the City that are generally north of the Yachats River, east of Highway 101 and south of King Street. The station pumps water through a 6-inch forcemain to a manhole near the intersection of Highway 101 and Third Street. From this location the wastewater flows by gravity to the Main Pump Station. The Riverside Pump Station was constructed in 2008, but the original forcemain constructed in 1974 was not replaced and remains in service. The design criteria for the station is outlined above (Table 4-3).

The station is a packaged fiberglass station that includes a 6-foot diameter fiberglass wet well with an integral valve vault. Two submersible wastewater pumps are located in the wet well. The pumps discharge into 4-inch piping in the wet well. The pump discharge piping passes through the fiberglass valve vault where an isolation and check valve are installed on each discharge pipe. Outside the valve vault, the two 4-inch pipes connect to the 6-inch forcemain pipe. The original 6-inch forcemain was constructed in 1974 and is believed to be asbestos concrete pipe that is about 1,200 feet long. In 2017, the City replaced about 270 feet of the forcemain between East 2nd Street and East 3rd Street with 6-inch HDPE pipe. Since HDPE pipe is dimensioned to the outside of the pipe rather than the inside like asbestos concrete pipe, the actual diameter of the HDPE section is slightly less than 6 inches.

The station includes no provisions for hydrogen sulfide control. Based on recent inspections, the manholes downstream of the forcemain discharge point do not show signs of excessive hydrogen sulfide corrosion.

The station is equipped with a manual transfer switch and a receptacle for a portable backup generator. The City currently has two portable generators that are stored stored at the public works shop building. During power outages, the City moves the generators to the pump stations. The City only has two portable generators that must be rotated among the three pump stations that are not equipped with permanent generators (i.e., Riverside, Pontiac, and Quiet Water). This is time consuming and somewhat risky. Therefore, the City may want to consider purchasing a third portable generator for the system.

The pumps are controlled automatically using float switches and motor starters. The station does not have variable frequency drives. The pump controls are located in stainless steel panels adjacent to the wet well. The station is equipped with an autodialer for calling out alarm conditions. The pump power cables are not equipped with an easy way to disconnect the cables from the power supply. In order to remove the pumps, the operators must disconnect the power wires at the pump. This requires an electrician which is awkward and costly. A better system includes disconnect plugs at some intermediate location between the pumps and the control panel (usually near the wet well hatch) that can be used to remove the pumps and a portion of the power cables without the need for an electrician. The City may want to consider installing a similar disconnect system during the planning period.

The station does not include a dedicated overflow pipe. Therefore, in the event of a prolonged pump failure, sewage will flow out the top of Manhole G-010. This has not traditionally been a problem for the City, but is not standard and is something the City may want to consider addressing during the planning period.

The Riverside Pump Station was constructed in 2008 and should serve the City well throughout the planning period with normal maintenance activities. Over the 20-year planning period, the electrical control system will likely require upgrades due to the overall age of the equipment. The remaining work at the station should consist of typical maintenance activities including building maintenance, normal pump maintenance, periodic upgrades to the telemetry equipment, etc.

These activities should be funded under normal operation and maintenance budgets and are not included as capital improvement projects in this document.

4.4.5.4 Pontiac Pump Station

Figure 4-8 | Pontiac Pump Station

The Pontiac Pump Station is located on the east side of Pontiac Street north of the intersection with Ocean View Drive. The station receives flow from the properties west of Highway 101 between Ocean View Drive and Second Street. The station pumps water through a 4-inch forcemain to a manhole at the intersection of Pontiac Street and Third Street. From this location the wastewater flows by gravity to the Main Pump Station. The Pontiac Pump Station was constructed in 2008, but the original forcemain constructed in 1974 was not replaced and remains in service. The design criteria for the station is outlined above (Table 4-3).

The station is a packaged fiberglass station that includes a 5-foot diameter fiberglass wet well with an integral valve vault. Two submersible wastewater pumps are located in the wet well. The pumps discharge into 4-inch piping in the wet well. The pump discharge piping passes through the fiberglass valve vault where an isolation and check valve are installed on each discharge pipe. Outside the valve vault, the two 4-inch pipes connect to the 4-inch forcemain pipe. The 4-inch forcemain is believed to be asbestos concrete pipe and is about 575 feet long.

The station includes no provisions for hydrogen sulfide control. Based on recent inspections, the manholes downstream of the forcemain discharge point do not show signs of excessive hydrogen sulfide corrosion.

The station is equipped with a manual transfer switch and a receptacle for a portable backup generator. The City currently has two portable generators that are stored stored at the public works shop building. During power outages, the City moves the generators to the pump stations. The City only has two portable generators that must be rotated among the three pump stations that are not equipped with permanent generators (i.e., Riverside, Pontiac, and Quiet Water). This is time consuming and somewhat risky. Therefore, the City may want to consider purchasing a third portable generator for the system.

The pumps are controlled automatically using float switches and motor starters. The station does not have variable frequency drives. The pump controls are located in stainless steel panels located about 45 feet north of the wet well. The station is equipped with an autodialer for calling out alarm conditions. The pump power cables are not equipped with an easy way to disconnect the cables from the power supply. In order to remove the pumps, the operators must disconnect the power wires at the pump. This requires an electrician which is awkward and costly. A better system includes disconnect plugs at some intermediate location between the pumps and the control panel (usually near the wet well hatch) that can be used to remove the pumps and a portion of the power cables without the need for an electrician. The City may want to consider installing a similar disconnect system during the planning period.

The station does not include a dedicated overflow pipe. Therefore, in the event of a prolonged pump failure, sewage will back up into the collection system and flow out the lid of Manhole E-013.

The Pontiac Pump Station was constructed in 2008 and should serve the City well throughout the planning period with normal maintenance activities. Over the 20-year planning period, the electrical control system will likely require upgrades due to the overall age of the equipment. The remaining work at the station should consist of typical maintenance activities including building maintenance, normal pump maintenance, periodic upgrades to the telemetry equipment, etc. These activities should be funded under normal operation and maintenance budgets and are not included as capital improvement projects in this document.

4.4.5.5 Quiet Water Pump Station

The Quiet Water Pump Station is located on the south side of Combs Circle in the Quiet Water Subdivision. The station receives wastewater from the Quiet Water Subdivision and pumps through a 4-inch forcemain to a manhole on Highway 101 that drains to the Riverside Pump Station. The Quiet Water station and forcemain were constructed as part of the Quiet Water Subdivision in 1980. The design criteria for the station is outlined above (Table 4-3).

Figure 4-9 | Quiet Water Pump Station

The station is a vacuum primed package type station consisting of a concrete wet well with a packaged pumping unit mounted over the wet well. The packaged pumping unit includes the two vacuum primed pumps, discharge piping, and controls located in a fiberglass shelter. The mechanical and electrical equipment is 40 years old and will likely reach the end of its useful life during the planning period. The pumps discharge into a 4-inch forcemain that is approximately 820 feet long. The piping material is unknown.

The station includes no provisions for hydrogen sulfide control. Based on recent inspections, the manholes downstream of the forcemain discharge point do not show signs of excessive hydrogen sulfide corrosion.

The station is equipped with a manual transfer switch and a receptacle for a portable backup generator. The City currently has two portable generators that are stored stored at the public works shop building. During power outages, the City moves the generators to the pump stations. The City only has two portable generators that must be rotated among the three pump stations that are not equipped with permanent generators (i.e., Riverside, Pontiac, and Quiet Water). This is time consuming and somewhat risky. Therefore, the City may want to consider purchasing a third portable generator for the system.

The pumps are controlled automatically using float switches and motor starters. The station does not have variable frequency drives. The pump controls are located adjacent to the pumps in the fiberglass enclosure over the wet well. The station is equipped with an autodialer for calling out alarm conditions.

The station does not include a dedicated overflow pipe. Therefore, in the event of a prolonged pump failure, sewage will back up into the collection system and flow out the lid of Manhole G-030.

4.4.6 Inflow and Infiltration

The City's collection system is typical of many western Oregon sewer systems in that it experiences higher flows during the winter months because of ground water infiltration and storm water inflow (I/I). The average dry weather flow measured at the WWTP during the months of May through and October is approximately 0.134 MGD. The average flow during the wet weather months (November through April) is approximately 0.236 MGD. The highest daily flows measured most years are over 1.0 MGD. The ratio between average dry weather flow and the peak day flow is approximately 9. This ratio is common for similar municipal collection systems in Western Oregon. The City routinely inspects key manholes in the collection system during large winter storm events and does not observe any significant surcharging. However, since these are spot checks, it is possible that some surcharging occurs in the older portions of the City during very large storm events. During very large storm events, some surcharging is normal and not necessarily considered a significant shortcoming due to the relatively infrequent occurrence of these events.

No known raw sewage overflows from the collection system have ever been documented in the last several years. This fact along with a review of pump station run times and a general lack of surcharging in the system suggests that the collection piping is generally large enough to convey high flows. Nonetheless, I/I control measures are something that the City should continue to implement for the foreseeable future.

The City currently allocates approximately $30,000 per year for I/I corrective work. These funds have traditionally been used to rehabilitate manholes and perform spot repairs. As the City's collection system continues to age and deteriorate, groundwater infiltration rates are likely to increase. As such, the City must continue to implement I/I corrective improvements in order to keep infiltration rates at their current levels.

4.4.7 Known Collection System Non-Compliance Issues

The City has not received any warning letters from DEQ over the past few years regarding problems in the collection system. There are also no known areas that are likely to cause any compliance issues in the coming years. That said, continued I/I control efforts are needed in the collection system to maintain I/I amounts are current levels and to prevent any future non-compliance issues. The specific recommendations for the collection system are discussed in more detail in Chapter 6.

4.4.8 Collection System Deficiencies

Problems with the Collection System were identified from meetings and discussions with City staff and from field investigations. These are discussed in greater detail above and summarized in Table 4-5.

Table 4-5 | Known Collection System Deficiencies

Location	Problem Category
Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270)	This piping is old concrete piping with poor joint integrity. I/I and root intrusion are known problems on this section of piping.
Mainline A Manhole A-040 to Manhole A-050	There is a belly on this section of line which is downstream of the Adobe Resort. The belly causes surcharging, debris accumulation, and maintenance problems.
Hanley Drive Sewer Upstream of Manhole C-150	This mainline pipe was constructed without manholes at the termina end and at a 90-degree bend on Hanley Drive. As a result, it is not possible to clean or inspect these pipelines.
Main Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Main Pump Station	Lacks a dedicated overflow pipe.
Main Pump Station – Automatic Control System	May reach end of useful life during planning period
Parkside Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Parkside Pump Station – Automatic Control System	May reach end of useful life during planning period.
Riverside Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Riverside Pump Station – Automatic Control System	May reach end of useful life during planning period.
Pontiac Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Quiet Water Pump Station	Will likely reach the end of its useful life during the planning period.
Riverside, Pontiac, and Quiet Water Pump Stations	The City only has two portable backup generators that are used for these three stations. The City may want to consider purchasing a third generator for the system.

4.5 EXISTING WASTEWATER TREATMENT AND DISPOSAL SYSTEM

The City owns, operates and maintains the wastewater treatment plant (WWTP) serving the study area. The WWTP is located on 7th Street west of Highway 101. Vehicular access to the WWTP is from 7th Street. The WWTP consists of a headworks, a two-basin sequencing batch reactor activated sludge treatment facility, an equalization basin, an ultraviolet light disinfection facility, an aerobic digester, a sludge storage tank, a screw press for biosolids dewatering, a plant pump station, a public works building, and an operations building. Treated wastewater is discharged to the Pacific Ocean on a year-around basis.

The City's first wastewater treatment plant was constructed in 1974 at the current site treatment plant site. The 1974 plant was a donut style activated sludge system installed in a circular tank. The tank was divided into different cells that were used as aeration basins, clarifiers, and an aerobic digester. In 1994, the plant was expanded by installing a second circular tank that was used as a clarifier and chlorine contact chamber. The old clarifier was converted into a second aerobic digester. In 2008, a major upgrade was completed. The 2008 improvements included the construction of a new headworks, sequencing batch reactors, equalization basin, UV disinfection facilities, and the dewatering screw press. The old treatment aeration basin was converted to the aerobic digester and the old clarifier was converted to a sludge storage tank. The outfall pipeline from 1974 also remains in service.

The wastewater facilities are schematically presented in Figure 4-10. The layout of the treatment facilities are shown in Figure 4-11. A summary of the design data for the facilities is presented in Table 4-6. The following subsections provide an evaluation of the performance of the existing plant as well as a brief description of each of the individual unit processes that comprise the treatment facility.

Table 4-6 | Existing Treatment Plant Design Data

Design Flows			
MMDWF	• 0.33 MGD		
MMWWF	• 0.51 MGD		
PDF	• 1.96 MGD		
PHF	• 2.64 MGD		
Design Loadings			
BOD		TSS	
Average Annual	• 600 PPD	Average Annual	• 500 PPD
Maximum Month	• 995 PPD	Maximum Month	• 936 PPD
Anticipated Effluent Quality			
BOD Concentration	• 10 mg/L		
TSS	• 10 mg/L		
Nitrate	• 4 mg/L		

Table 4-6 | Existing Treatment Plant Design Data

Headworks	
Screening	
• Type	• Shaftless spiral fine screen
• Screen Opening Size	• ¼ Inch
• Number of Screens	• 1, plus bypass channel with 3/4" manual screen
• Capacity	• 2.6 MGD
Grit Chamber	
• Type	• Aerated Grit Basin
• Volume	• 10,900 gallons
• Detention Time	• 6 minutes @ 2.6 MGD
• Grit Removal System	• 4 inch air lift pump
Grit Chamber Air System	
• Number of Blowers	• 1
• Blower Size/Type	• 5 HP
Grit Washer	
• Type	• Helical Screw classifier
• Incoming Flow	• 70 – 100 gpm
• Capacity	• 1,100 pounds per hour
Influent Flow Measurement	
• Primary Device	• 9-inch Parshall Flume
• Number	• 3 (one for each SBR influent pipe, and one for future SBR tank)
• Measurement Range	• 0.059 to 5.73 MGD, each flume
• Flow Meter	• Ultrasonic
Secondary Treatment	
Type	• Extended Aeration / ICEAS SBR
Number of Basins	• 2
Basin Size (L x W x H)	• 77 ft. x 30.5 ft. x 20 ft. (top water level = 18 ft., bottom water level = 12.2 ft)
Volume at High Level	• 316,000 gallons each (includes pre-react basin)
Volume of Pre-React Chamber at High Level	• 51,000 gallons
Hydraulic Retention Time	
• MMDWF	• 46 hours
• MMWWF	• 30 hours
F/M Ratio	• 0.055 pounds BOD per pounds MLSS (at max month load)
Solids Retention Time (SRT)	• 24 days (at max month load)
Waste Sludge Production	• 752 pounds per day (at max month load)
Decanter	
• Length	• 17.5 feet
• Average Decant Rate	• 2,038 gpm
• Peak Decant Rate	• 3,037 gpm
Aeration System	
• Number of Blowers	• 2 (one for each basin).
• Blower Size/Type	• 40-hp, rotary positive displacement with variable frequency drives
• Blower Capacity	• 520 SCFM @ 8.0 psi
• Aeration Type	• Fine Bubble Diffused Aeration

Table 4-6 | Existing Treatment Plant Design Data

Waste Sludge Pumps	
• Type	• Submersible solids handling
• Number	• 2, one for each basin
• Size	• 2.4 HP
• Capacity	• 74 gpm
Waste Sludge Flow Meter	
• Type	• 2 inch magnetic
• Number	• 2, one for each basin
Flow Equalization Basin	
Basins	• 1
Basin Size	• 63.5 ft. x 30 ft. x 13.8 ft.
Maximum Water Depth	• 8.4 ft
Flow Control	• Modulating sluice gate
Flow Control Meter	• Effluent flow meter
Effluent Disinfection	
Type	• UV radiation, open channel
Design Flow (Peak)	• 1.96 MGD
Transmission	• 65% minimum
Channels	• 1
Banks Per Channel	• 2
Lamps Per Bank	• 18
Total Lamps	• 36
Minimum Dosage	• 50 MJ/CM^2
Effluent Flow Meter	• 12 inch magnetic
Effluent Flow Meter	
Type	• 12 inch magnetic
Location	• In vault between EQ basin and UV channel
Outfall Pipeline	
Nominal Size	• 10 inch
Material	• Concrete
Length	• ± 700 ft.
Diffuser	• none
Auxiliary Power	
Type	• Permanent Diesel Generator
Rating	• 250 KW, 480 V, 3.-phase
Location	• Under Headworks
Fuel Supply	• Subbase Tans
Transfer Switch	• Automatic transfer switch in electrical room
Exerciser	• Automatic, weekly

Table 4-6 | Existing Treatment Plant Design Data

Aerobic Digester	
Number of Cells	• 4
Total Volume	• 164,000 gallons
SRT	• 60 days at average BOD loading and 2% solids
Aeration System	
• Number of Blowers	• 3
• Blower Size/Type	• 20 HP, rotary positive displacement
• Blower Capacity	• 320 SCFM @ 7.9 psi
• Aeration Type	• Fine bubble
Sludge Transfer Basin	
• Volume	• 8,400 gallons
• Pump Capacity	• 200 gpm @ 26 ft TDH
• Pump Size/Type	• 3 HP Submersible
Digested Sludge Storage Tank	
Number of Cells	• 1
Total Volume	• 110,000 gallons
SRT	• 50 days at average BOD loading and 2% solids
Aeration System	
• Number of Blowers	• 1
• Blower Size/Type	• 20 HP, rotary positive displacement
• Blower Capacity	• 320 SCFM @ 7.9 psi
• Aeration Type	• Fine bubble
Sludge Transfer Pump	
• Pump Capacity	• 200 gpm @ 26 ft TDH
• Pump Size/Type	• 3 HP Submersible
Digested Sludge Dewatering System	
Type	• Packaged polymer feed/screw press system
Capacity	• ± 900 dry pounds per day
Feed Solids Content	• 1% - 2%
Dewatered Solids Content	• 10% - 20%
Polymer Feed	
• Carrier Water Source	• City potable water or non-potable water
• Carrier Water Usage	• ± 80 gallons per hour
• Polymer Feed Pump	• LMI Diaphragm Metering Pump
• Polymer Usage	• ± 1 pound per hour
Screw Press	
• Manufacturer	• FKC Press
• Motor Size	• 7.5 HP
Loading Conveyor	
• Manufacturer	• FKC Press
• Motor Size	• 3 HP

Table 4-6 | Existing Treatment Plant Design Data

Compliance Sampling	
Type	• Automatic, refrigerated, composite
Number	• 2
Influent Sampler Location	• Headworks
Effluent Sampler Location	• UV Channel
Plant Pump Station	
Type	• Submersible
Wet Well	• 5 ft. diameter, precast
Wet Well Depth	• 15 ft.
Pump Number & Size	• 1 @ 7.5 HP
Capacity	• 350 gpm @ 45 ft. TDH (1 pump)
Force Main Pipe Type	• 3-inch ductile iron
Flow Measurement	• Magnetic Flow Meter
Force Main Discharge Point	• Headworks after screen
Non Potable Water Supply System	
Source	• Treated effluent stored in annular tank around sludge storage basin
Storage Volume	• 16,700 gallons (estimated)
Pump Type	• Submersible, multistage well pump
Pump Number	• 2
Pump Size	• 2 HP
Pump Capacity	• 60 gpm @ 80 psi
Pressure Tank Size	• 500 gallon
Flow Measurement	• Magnetic flow meter

Figure 4-10 | Existing Wastewater Treatment Plant Schematic

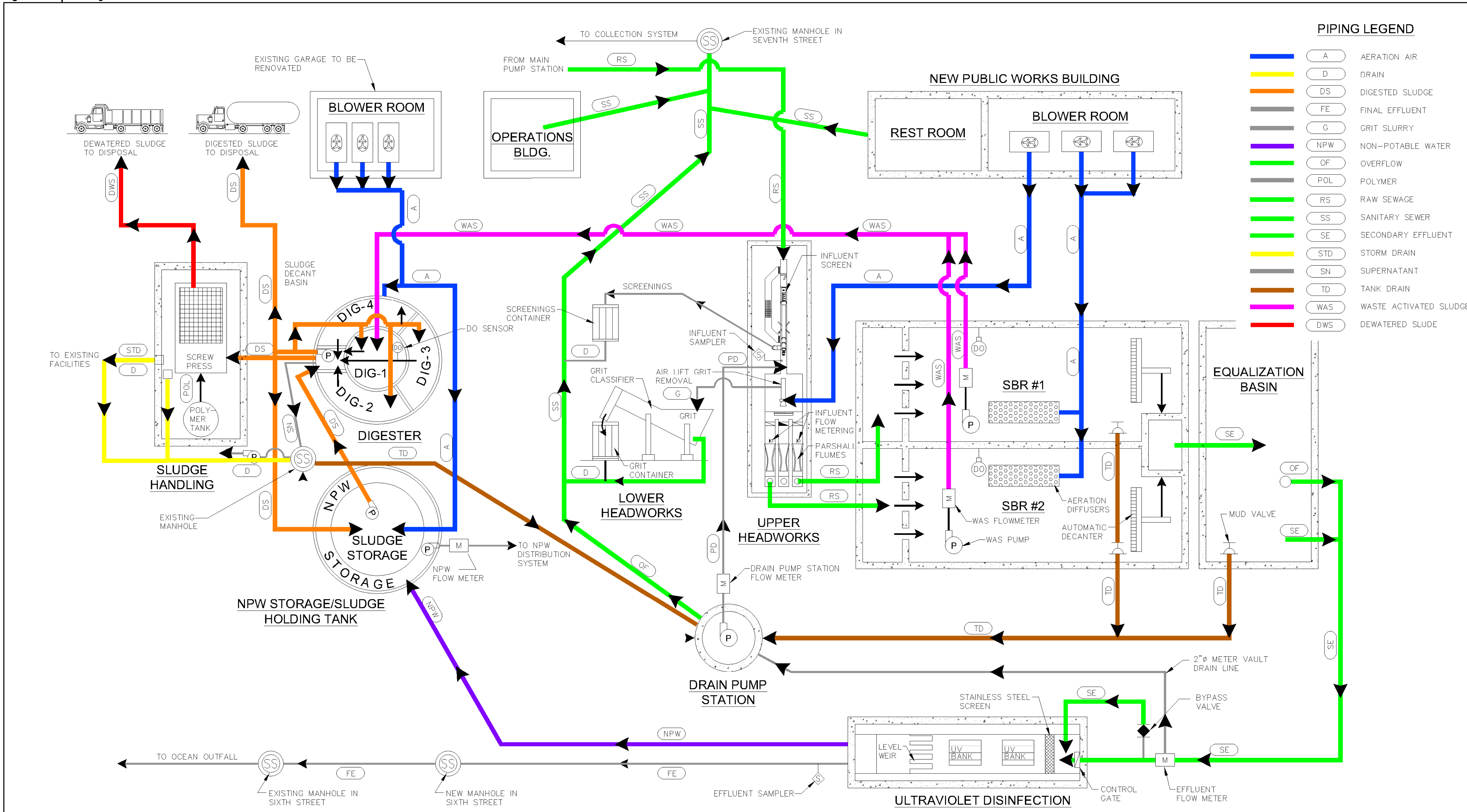
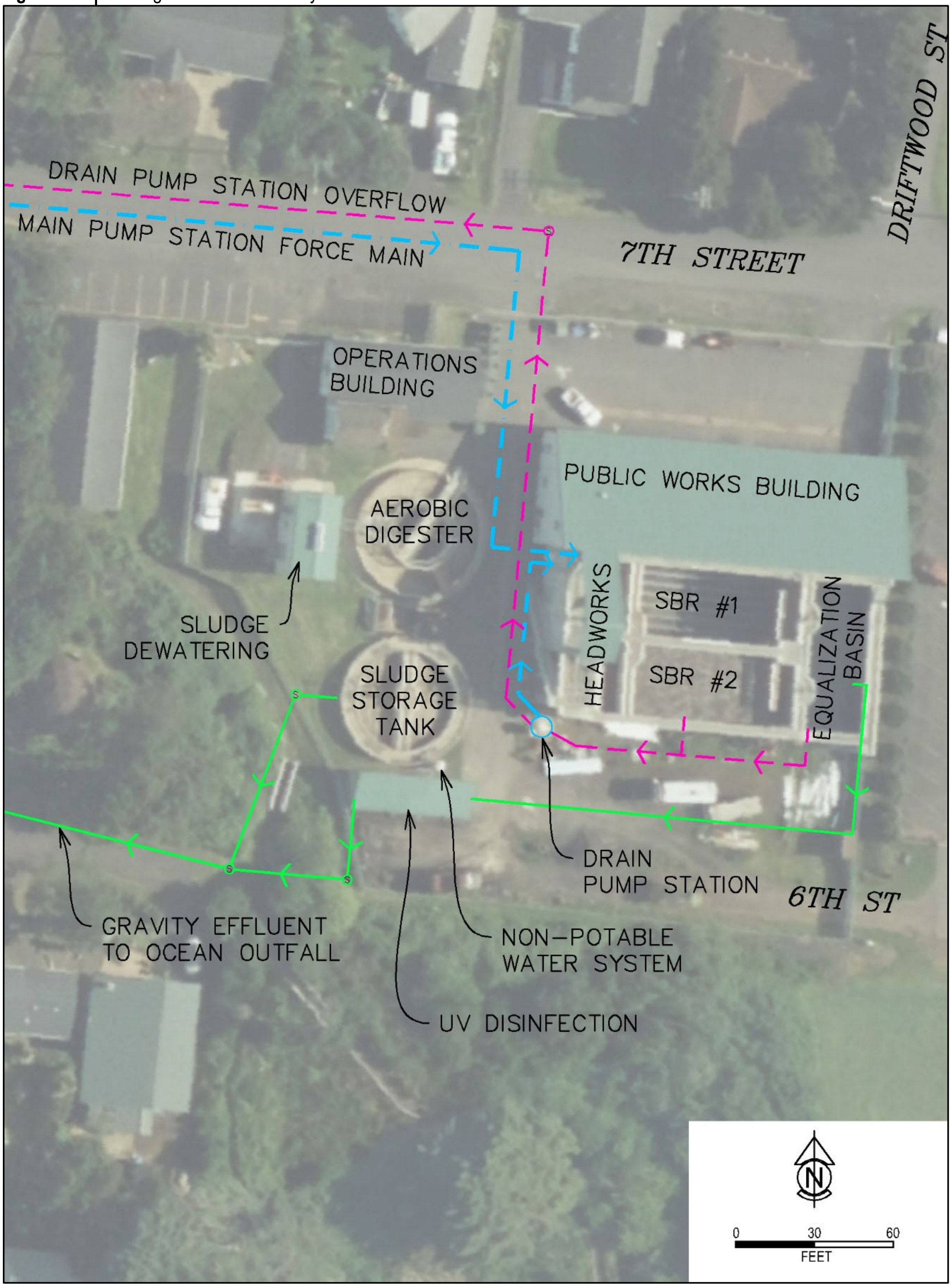


Figure 4-11 | Existing Treatment Plant Layout



4.5.1 Plant Performance

The City's existing effluent permit requires the production of effluent BOD and TSS concentrations below 20 mg/L an on average monthly basis from May 1 – October 31 and below 30 mg/L on an average monthly basis from November 1 – April 30. Average monthly effluent BOD and TSS concentrations are listed in Table 4-7 for the 2016 through 2019 calendar years. As demonstrated in Table 4-7, the existing plant is capable of reliably meeting the effluent BOD and TSS concentration limits under existing flow and loading conditions.

Table 4-7 | Existing Average Monthly Effluent BOD and TSS Concentrations (mg/L)

Year	2016		2017		2018		2019		Average	
Month	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS
January	3.3	3.5	3.3	3.0	6.2	6.3	3.5	3.5	4.1	4.1
February	4.2	4.1	3.6	2.3	6.0	4.9	3.6	2.0	4.4	3.3
March	4.4	5.9	3.0	2.1	5.3	3.4	2.7	1.6	3.9	3.3
April	5.9	14.0	3.6	3.4	4.7	3.4	3.0	2.0	4.3	5.7
May	5.7	12.8	3.3	4.9	7.0	2.4	2.4	1.5	4.6	5.4
June	5.0	6.1	3.7	4.8	6.4	3.2	4.1	5.5	4.8	4.9
July	7.2	10.4	4.5	5.5	6.6	4.1	5.2	3.1	5.9	5.8
August	4.7	4.4	6.1	6.1	6.9	3.2	6.1	4.9	6.0	4.7
September			4.8	7.1	3.2	4.5	11.8	9.3	6.6	7.0
October	3.5	3.2	4.5	5.4	3.1	4.5	6.2	2.6	4.3	3.9
November	3.3	3.2	4.9	5.7	4.7	2.3	4.0	1.7	4.2	3.2
December	2.6	2.1	4.1	4.6	3.4	1.3	2.7	2.0	3.2	2.5
Average	**4.5**	**6.3**	**4.1**	**4.6**	**5.3**	**3.6**	**4.6**	**3.3**	**4.7**	**4.5**

Note: Existing effluent BOD and TSS permit limit is 20 mg/L from May through October and 30 mg/L from November through April.

In addition to the effluent concentration limits, the City's discharge permit also limits the total amount of pollutant that may be discharged by setting mass load limits. Mass load limits are determined by multiplying the effluent concentration of a pollutant by the effluent flow rate. Mass load limits are usually expressed in pounds of pollutant per day. Since flow and concentration are multiplied, increases in the flow rate must be offset by decreases in the pollutant concentration in order to maintain a constant effluent mass load. The existing permit allows for the discharge of 25 pounds per day of BOD and TSS on a monthly average basis from May through October and 37 pounds per day from November through April. Average monthly effluent BOD and TSS mass loads are listed in Table 4-8 for the 2016 through 2019 calendar years. As demonstrated in Table 4-8, the existing plant is capable of reliably meeting the effluent BOD and TSS mass load limits under existing flow and loading conditions.

Table 4-8 | Existing Average Monthly Effluent BOD and TSS mass loads (pounds per day)

Year	2013		2014		2015		2016		Average	
Month	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS	BOD	TSS
January	6.5	5.9	7.1	6.4	10.9	10.9	5.0	4.8	7.4	7.0
February	6.4	6.3	10.7	7.5	10.0	9.3	7.3	4.4	8.6	6.9
March	8.7	12.0	9.5	6.4	7.9	5.8	2.6	1.5	7.2	6.4
April	5.1	12.1	7.7	7.1	7.2	5.4	3.9	2.6	6.0	6.8
May	3.8	8.5	4.4	6.3	6.1	7.0	2.4	1.5	4.2	5.8
June	1.7	3.1	3.7	4.7	6.3	3.2	3.9	5.2	3.9	4.1
July	7.6	11.1	5.2	6.2	6.2	3.9	5.0	3.0	6.0	6.1
August	4.3	4.0	5.9	5.9	6.5	3.1	9.2	6.4	6.5	4.9
September			4.5	6.0	2.8	3.9	11.4	9.9	6.2	6.6
October	5.0	4.6	3.6	4.3	2.5	3.6	6.1	2.7	4.3	3.8
November	5.6	6.7	8.8	11.1	4.8	2.3	3.7	1.3	5.7	5.4
December	5.4	4.4	4.4	5.0	5.7	2.2	2.8	2.1	4.6	3.4
Average	**5.5**	**7.2**	**6.3**	**6.4**	**6.4**	**5.1**	**5.3**	**3.8**	**5.9**	**5.6**

Note: Existing effluent BOD and TSS mass load limits are 25 pounds per day from May through October and 37 pounds per day from November through April.

4.5.2 Description of Existing Treatment Plant Components

4.5.2.1 Headworks

Wastewater from the City is pumped from the Main Pump Station to the Headworks. The headworks provides screening of the incoming raw wastewater, grit removal, measurement of influent flow, monitoring of influent temperature and pH, and sampling of the influent.

Figure 4-12 | Headworks Fine Screen with Grit Removal Chamber Behind

The wastewater from the Main Pump Station force main discharges into a small chamber upstream of the fine screen. A refrigerated composite wastewater sampler draws samples from this chamber. The sampler is Hach automatic wastewater sampler. The sampler is used to obtain influent samples for BOD and TSS. Slide gates are used to direct flow to either a mechanical fine screen or a manually-cleaned bar screen. Under normal operating conditions all wastewater is routed through the fine screen. The fine screen is a Parkson Hycor Helisieve unit with a capacity of 2.6 MGD. The screen opening size is ¼- inch diameter. Screened material is removed from the channel by a shaftless auger. The screenings are washed, compacted, and dried before being discharged into a dumpster for final disposal at a landfill. The manually-cleaned bar screen is designed to be used on a temporary basis when the mechanical screen is out of service.

Downstream of the screen, the wastewater flows to a grit removal chamber. The grit removal chamber is a small aerated concrete tank that provides about 6 minutes of detention time at a peak flow of 2.6 MGD. Grit falls to the bottom of the tank and is removed by an air lift pump. The air lift pump discharges into a grit concentrator located below the headworks. Dewatered grit is transported from the concentrator by a dewatering screw into a dumpster next to the headworks. Dewatered grit is hauled to a landfill for disposal. The water runoff from the concentrator is routed to the plant pump station which discharges back to the headworks.

Figure 4-13 | Headworks Grit Dewatering Equipment

Downstream of the grit removal system, weirs are used to split the flow between the two SBR basins. Water flows over the weirs into an SBR inlet channel fitted with a Parshall flume for flow measurement. There is a dedicated flume for each SBR inlet channel as well as a third inlet channel and flume for a future SBR basin. An ultrasonic flow meter is mounted over each flume to track influent

Figure 4-14 | Headworks Shelter Corrosion

flow. The fine screen and grit removal system are also monitored for various alarm conditions.

Overall, the headworks is in good condition and should serve the City well for the remainder of the planning period. One notable exception is the metal awning the covers the headworks. The structure has corrosion issues (Figure 4-14) that are likely to get worse in the coming years and the City should plan to address the corrosion during the planning period. Other improvements that should be considered include installing baggers on the screening and grit chutes. This will improve overall sanitation and reduce problems from insects and other pests.

4.5.2.2 Sequencing Batch Reactors

Figure 4-15 | SBR Basin

The plant has two sequencing batch reactor (SBR) basins. The incoming flow is split between the two basins at the headworks. The SBR basins provide secondary treatment of the wastewater. The SBR process is an activated sludge process that is performed in a batch sequence. The sequence consists of a two-hour aerated phase, followed by a one-hour settle phase, followed by a one-hour decant phase. All three phases are performed in a single basin. Several variations of the SBR process exist. The variation at the City's plant is the intermittent cycle extended aeration system (ICEAS) process manufactured by Xylem. This process is a modification of a conventional SBR that allows continuous inflow of wastewater to the SBR basins during all phases of the treatment cycle: Therefore, the City can operate on a single basin as well as both basins depending on the influent flow and loading conditions.

The SBR process is automatically controlled by a programmable logic controller (PLC) located in a the SBR control panel. The control panel is located in the electrical room inside the public works building. System settings are adjusted using a human-machine interface mounted on the door of the control panel. The control panel also includes local control switches to manually operate the equipment when the PLC is unavailable. The PLC monitors the status of the SBR process as well as various alarm conditions.

Two 40-hp, positive displacement, blowers are housed in public works building. They deliver air to the bottom of the SBR basins via membrane diffusers during the aeration phase. Two actuated air valves are used to control the flow of air to each aeration grid depending on the number of basins in service. Air is fed to an aeration grid mounted on the bottom of each aeration basin.

The grid consists of a main header pipe with several lateral pipes. Air diffusers are mounted along each lateral pipe. The air diffusers are Xylem, 9-inch fine bubble membrane disc diffusers.

A dissolved-oxygen (DO) probe is located near the middle of each SBR basin. The probe is suspended from the hand railing. The probe is monitored by an analyzer located in the electrical room inside the Public Works Building. Signals from the probe and analyzer are transmitted to the SBR PLC to control the speed of the blowers when desired by the plant operators. The PLC can be used to regulate the DO concentration in the basins by controlling blower speed and operation time during the aeration phase. The variable frequency drives for each blower are located in the electrical room inside the public works building.

Each SBR basin has a decanter assembly at the east end. The decanter lowers during the decant phase, drawing off the clarified supernatant in the basin. A variable-frequency drive keeps the decanter speed relatively constant. At the end of the decant phase, the decanter will return to the park position. A selector switch for each decanter is located near the decanter operator at the east end of the SBR basins. The switch can be set to lower, off, auto, or raise. In auto mode, the PLC will control the decanter. The other switch positions are used to manually raise, lower, or stop the decanter from operating. Treated effluent from the SBR tanks flows through the decanters, into the decanter discharge boxes, then to the equalization basin.

Figure 4-16 | SBR Aeration Grid

Each SBR basin has a submersible pump used to waste sludge. The pump discharge line is fitted with a magnetic flow meter to track the volume of sludge that is wasted. Waste sludge is pumped directly to the aerobic digesters.

Under normal conditions, the waste sludge pumps are automatically controlled by the PLC. The operator is able to adjust set points to control sludge wasting. Once the set points are in place, the pumps are started and stopped automatically. Sludge wasting typically occurs near the end of the decant phase of the SBR cycle.

Overall, the sequencing batch reactors are in good condition and should serve the City well for the remainder of the planning period. The only exception to this is some of the mechanical and electrical equipment will reach the end of its useful life during the planning period. Mechanical equipment such as valve actuators, waste pumps, etc. do tend to wear out and must be rebuilt or replaced from time to time. Electrical gear like variable frequency drives also must occasionally be replaced. In addition to electrical and mechanical equipment, the rubber membranes on aeration grid in each basin eventually wear out and must be replaced. These black rubber membranes can be seen in Figure 4-16 above. Each basin has a few hundred of these membranes and replacing them is a significant work effort.

4.5.2.3 Equalization Basin

The purpose of the equalization basin is to provide short-term storage of effluent decanted from the SBRs, resulting in a smaller peak flow to the effluent disinfection system. The equalization basin is 62.5 feet long and 30 feet wide, with a water depth varying from 0 to 10.8 feet. The equalization basin accepts decanted effluent from the SBRs through openings at the bottom of the decanter discharge boxes.

Figure 4-17 | Equalization Basin

The discharge rate from the equalization basin flows through a 12-inch pipe to the UV disinfection channel. The end of the pipe is fitted with an actuated gate that is used to control the discharge rate from the equalization basin. The gate is located in the UV channel. Under normal operating conditions, the PLC located in the main plant control panel adjusts the position of the actuated valve to set the discharge from the EQ basin equal to a value that is set by the operations staff. This control scheme requires daily attention from the operators. It is possible to increase the automation of the control programming. The City may want to consider installing a level transducer in the basin and modifying the control programming. The costs for these improvements would probably be in the $10,000 to $15,000 dollar range and would decrease the amount of labor require to monitor the system.

The equalization basin is a relatively straight-forward element of the treatment plant. It is in good condition and should serve the City well for the reminder of the planning period. The actuated control gate will require maintenance during the planning period as well as some of the other mechanical components. However, work of this nature is generally considered maintenance rather than a capital improvement and should be included in the City’s normal operation and maintenance budget.

4.5.2.4 UV Disinfection

Figure 4-18 | UV Disinfection System

Discharge from the equalization basin is routed to the ultraviolet light (UV) disinfection system. The purpose of the UV disinfection system is to reduce the number of pathogens in the wastewater effluent to acceptable limits prior to discharge.

The UV system is model UV 3000+ manufactured by Trojan UV. The system consists of the inlet baffle, UV banks, UV junction box for each bank of lamps, UV system controller, an automatic lamp wiping system, and outlet finger weir. The UV lamps are mounted in an open channel downstream of the EQ basin. The channel is enclosed in a wood framed enclosure. There are two banks of lamps with 18 lamps per bank. All other UV equipment is located adjacent to the UV channel except the main control panel which is located in the electrical room inside the public works building. The system was furnished with a portable Davit crane for removing the lamp banks for maintenance purposes. The crane is heavy and awkward to use. The City may want to consider purchasing a gantry crane on casters with an electric hoist to reduce the amount of labor required to service the lamps.

Effluent from the equalization basin is discharged to the upstream end of the UV channel, where it proceeds through an inlet baffle that creates uniform flow conditions through the two bulb banks. A constant flow depth is maintained by the finger weir at the downstream end of the channel. As the effluent flows by the lamps, microorganisms are exposed to UV radiation, which causes rearrangements of their genetic material, effectively killing them.

The UV disinfection system is controlled by a PLC within the UV system controller. Under normal operation, the UV lamp intensity level is controlled by the UV system PLC. The lamp power is adjusted based on inputs from the effluent flow meter and UV intensity sensors. As the flowrate through the system increases, or the turbidity of the water increases, the lamp power is increased to maintain a minimum UV dose.

The UV system controller control panel has a display screen and keypad for monitoring the system and setting the cleaning system wiping frequency and strokes per wiping cycle. The control panel has the ability to display all alarm conditions, UV levels, and all control functions.

The UV system was installed in 2008 and should serve the City for the remainder of the planning period. Some of the electrical control elements of the system will likely reach the end of their useful life during the planning period due to normal aging. Therefore, the City should anticipate upgrading the control system during the planning period. The recommended improvements are discussed in Chapter 7.

4.5.2.5 Effluent Monitoring

Effluent monitoring equipment is generally located near the UV channel. A magnetic flow meter is located in a vault on the 12-inch pipe between the equalization basin and the UV channel. This flow meter is used to track effluent flows from the plant.

A refrigerated composite wastewater sampler draws samples from the upstream side of the finger weir in the UV channel. The sampler is an Hach automatic wastewater sampler. The sampler is used to obtain effluent samples for BOD, TSS, e.coli and fecal colifom testing. Grab samples are collected from the downstream side of the UV lamps to monitor pH.

4.5.2.6 Ocean Outfall

The effluent from the UV channel flows to the outfall pipeline that discharges to the Ocean. The first 60 feet of pipe downstream of the UV channel is 12 inch pipe that was installed in 2008. This pipe connects to a manhole at the southwest corner of the treatment plant site. The remaining pipeline from this manhole to the end is 10 inch diameter and is the original pipe that was installed in 1974. The pipeline generally runs west from the plant along the 6th Street right of way for approximately 670 feet. The end of the pipe is approximately 350 feet west of a manhole on Ocean View Drive. From the manhole on Ocean View Drive west, the pipe is cast iron and was backfilled with concrete. The end of the pipe is exposed during minus tides and can be inspected. The City inspects the pipe using a push camera and from the surface on an annual basis. The pipeline condition appears to be satisfactory. There are no known offset joints, collapsed sections, or cracks in the pipe. The pipe was installed using open cut construction techniques and the end of the trench was backfilled with concrete. Some of this concrete has eroded in recent years, so the City should plan to replace the concrete pipe cover as soon as possible.

4.5.2.7 Drain Pump Station

Figure 4-19 | Drain Pump Station Wet Well

The purpose of the Drain Pump Station is to convey plant building wastes and drain flows to the plant headworks. Drainage from the headworks, the sludge dewatering system, and other miscellaneous sanitary drains are directed to the drain pump station wet well. Tank drains from the SBR basins, and the equalization basin are also routed to the drain pump station wet well.

The Drain Pump Station consists of a wet well and a valve vault. The station is equipped with a single 7.5 HP submersible solids handling pumps. The wet well is equipped with guiderails for pump removal and installation. The pump discharge pipe is fitted with a check valve and an isolation valve located in the valve vault. The flow from the station is tracked using a magnetic flow meter mounted on an exposed portion of the force main that is under the headworks structure near the backup power generator.

The pump is controlled automatically using float switches. The pump control panel is located in the electrical room inside the public works building. The control panel includes a Hand/Off/Auto switch to manually start the pump if desired. The station does not have a backup level control system. The station utilizes standard motor starters to start pump. Therefore, the pump operates at a single speed.

Power for this pump station is provided from the treatment plant power distribution system, which is equipped with an automatic transfer switch for operation with the auxiliary generator located at the WWTP site. If, despite these precautions, the station were to overflow, the overflow will discharge through an overflow pipe to the gravity collection system that ultimately drains to the Main Pump Station.

4.5.2.8 Aerobic Digester

Figure 4-20 | Aerobic Digester

The existing aerobic digester tank was originally constructed in 1974. Prior to the 2008 wastewater treatment plant improvement project, the City's treatment plant consisted of a donut style aeration basin that was part of an activated sludge wastewater treatment process. The basin included four cells. Two were used as aeration basins and two were used as aerobic digesters. As part of the 2008 project, all four cells were converted into aerobic digesters. New aeration grids were installed along with transfer and decant piping. The waste sludge from the SBR's can be piped to any of the four digester cells. The four cells can be isolated from one another to control sludge digestion. Each cell is aerated using a fine bubble aeration grid mounted at the bottom of each cell. Three positive displacement blowers are used to provide aeration air. The blowers are located in the Operations Building.

The air supply from each cell can be turned off which enables the operator to settle the solids and decant the supernatant in order to thicken the sludge. Each digester cell is fitted with a floating pipe on swivel joint for decanting supernatant. The decant lines are piped to the sludge transfer pump station.

A portion of the tank is isolated from the four digester cells and fitted with a transfer pump. This section of the tank is referred to as the "sludge transfer pump station." The digester is piped so that mixed sludge and decanted clear water can be routed to the sludge transfer pump station. The sludge transfer pump discharge piping has valves and piping that allows sludge to be pumped to either of the four digester cells in order to transfer sludge from one cell to another. The pump discharge piping also allows the operators to pump from the sludge transfer pump station to the Drain Pump Station, a liquid sludge disposal port, and the sludge storage tank. The pump that is used to feed the dewatering screw press also draws suction from the sludge transfer pump station.

The aerobic digesters are sized to provide a solids residence of time of at least 60 days thereby meeting the Federal Pathogen reduction requirements of CFR 40 503.32(b) (3) PSRP (1).

The aerobic digester is in relatively good condition and should serve the City well for the remainder of the planning period. There is some corrosion of the concrete walls. Due to the slightly acidic environment in the digester, some of the concrete has corroded exposing the aggregate. The City should consider coating the digester walls during the planning period to halt the corrosion. The mechanical components such as the blowers and the sludge transfer pump will need to be periodically rebuilt or replaced due to age. This type of work is typically considered normal maintenance that is funded from the City's operation and maintenance budget rather than a capital improvement project. Therefore, the replacement costs for this equipment are not included in any of the recommended projects described in this document. In addition to the miscellaneous mechanical components, the diffuser membranes will need to be replaced due to normal aging during the planning period. One of the projects listed in Chapter 7 includes replacement of the diffuser membranes.

The most significant problem with the aerobic digester involves the air delivery system. The aerobic digester and sludge storage tank share the same blower system. This system consists of three blowers that are operated manually. There is a timer system that can be used to automatically turn the blowers on and off, but there is no way to automatically adjust the amount of air that is supplied to the individual tanks. The air is either on for all of the tanks or off for all of the tanks. There is no way to automatically deliver air to each tank individually. This creates serval operational problems. This system makes achieving adequate digestion more difficult, leads to over-aerating the older sludge, excessive foam buildup, and excessive power consumption. Between the aerobic digester and the sludge storage tank, there are five smaller sub-tanks and the sludge is typically processed through the tanks in series. Therefore, the sludge age in each of these tanks can be very different and the aeration needs in each tank can be very different. For the first tank in the series, the air demands are relatively high. For the last tank the series, the air demands are relatively low. With the current system, the first tank in the series controls the amount of time that the blowers must be operated. In order to meet the aeration demands of the first tank (i.e., the tank with the youngest sludge), an excess amount of air must be supplied to the tanks with the older sludge. This creates foaming problems and wastes energy. Maintaining an adequate dissolved oxygen concentration in the first tank in the series requires over-aerating the tanks with the older sludge. In the tanks with older sludge, it is not uncommon for the dissolved oxygen levels to be greater than 10 mg/L, which is much higher than needed. If the City had the means to automatically adjust the air supply to each of the five tanks individually, this would enable operators to better manage the digestion process, control foaming, and reduce power consumption costs. For this reason, this plan recommends improving the air delivery system for the aerobic digester and the sludge storage tank. The recommended improvements are discussed in Chapter 7.

4.5.2.9 Sludge Storage Tank

The sludge storage tank was originally constructed in 1992. The tank was used as a clarifier and a chlorine contact chamber. A circular clarifier is located in the middle of the tank and an annular ring around the outside of the clarifier was used for chlorine contact time. As part of the 2008 improvement project, the clarifier was converted into a sludge storage tank and the contact chamber was converted into a final effluent storage tank for the non-potable water system.

Figure 4-21 | Sludge Storage Tank

As noted in the previous subsection, the sludge transfer pump station is used to pump water from the aerobic digester to the sludge storage tank. Air is supplied to the sludge storage tank from the same blowers used to supply air to the aerobic digester. The sludge storage tank is fitted with a submersible pump that is used to pump sludge to the Sludge Transfer Pump Station. Where it is typically fed into the dewatering screw press.

The sludge storage tank is in good condition and should serve the City well for the remainder of the planning period. There is some corrosion of the concrete walls. Due to the slightly acidic environment in the tank, the concrete has corroded exposing the aggregate. The City should consider coating the tank walls during the planning period to halt the corrosion. The mechanical components such as the blowers and the sludge transfer pump will need to be periodically rebuilt or replaced due to age. This type of work is typically considered normal maintenance that is funded from the City's operation and maintenance budget rather than a capital improvement project. Therefore, the replacement costs for this equipment are not included in any of the recommended projects described in this document. In addition to the miscellaneous mechanical components, the diffuser membranes are wear items that will need to be replaced due to normal aging during the planning period. One of the projects listed in Chapter 7 includes replacement of the diffuser membranes. As described in the previous subsection (Section 4.5.2.8), the air supply system for the aerobic digester and the sludge storage tank is a shared system that lacks automatic control functionality. This leads to operational problems and excess power consumption. The recommended improvements for the air supply system are discussed in Chapter 7.

4.5.2.10 Sludge Dewatering System

Figure 4-22 | Solids Handling Building

The treatment plant is equipped with a sludge dewatering system that consists of a sludge pump, a polymer feed system, a screw press, and a screw conveyor. All of this equipment is located in the sludge handling building. The sludge dewatering system is used to dewater sludge prior to hauling and disposal. Sludge is typically pumped from the sludge storage tank to the sludge transfer pump station. The sludge pump is located in the solids handling building and draws suction from the sludge transfer pump station. Polymer is added to the sludge on the discharge side of the sludge pump as a coagulant to aid the dewatering process. Sludge is fed into the screw press for dewatering. The water removed from the sludge drains to the Drain Pump Station. The dewatered sludge is fed into a dump truck or dumpsters using the screw conveyor.

The sludge dewatering system is a packaged, skid-mounted, system manufactured by FKC Screw Press Inc.. The sludge pump, polymer feed system, screw press, control panel, and screw conveyor are mounted on a skid that is located inside the solids handling building. The polymer feed system consists of a diaphragm metering pump, pipping and valves, to blend the polymer with mixing water prior to adding it to the sludge. The sludge is then fed into a small flocculation tank that is mounted upstream of the screw press. The flocculation tank is fitted with a motorized mixer that gently mixes the polymer with the sludge to facilitate flocculation. The flocculated sludge is then fed into the screw press. The screw press includes an auger shaft that presses the sludge against a screen. The diameter of the auger shaft increases from the intake to discharge end of the press which increases the pressing force across the machine. The auger is powered by a motor on the discharge side of the press. Dewatered solids discharge into a screw conveyor that is used to feed the material into a dump truck or dumpster for disposal.

The screw press is rated for about 900 dry pounds per day and typically produces dewatered sludge with solids concentrations of 10-20% by weight. The City typically dewaters sludge in batches by operating the system about 45 days each year. The dewatered solids are either fed into a dumpster that is picked up by the local solid waste disposal company or loaded into a City-owned dump truck and then hauled to a treatment plant owned by Heard Farms, Inc. near Roseburg. The City owns a small tractor that is used to load biosolids into the dump truck.

Overall, the sludge dewatering equipment is in good condition and should serve the City well for the remainder of the planning period with proper maintenance. The system includes several mechanical components (e.g., metering pumps, sludge pump, screw press bearings and motor, etc.) that will eventually wear out due to normal usage and require replacement. This type of work is typically considered normal maintenance that is funded from the City's operation and maintenance budget rather than a capital improvement project. Therefore, the replacement costs for this equipment are not included in any of the recommended projects described in this document.

The main issue with the sludge dewatering system is corrosion of the metal building components. There are some corrosion issues with some of the metal framing. These are relatively minor however. The larger issue is with the metal siding panels, the roof, and the doors. Theses components are showing early signs of corrosion issues which will continue to worsen during the planning period. As some point, improvements to the building will be needed. This will likely occur during the planning period. Therefore, the recommended improvements discussed in Chapter 7 include a building upgrade to address the corrosion issues.

Another issue with the sludge handling facilities is the overall age and condition of the tractor used to load biosolids into the City's dump trucks. This tractor is fairly old and will likely reach the end of its useful life during the planning period. Therefore, the City should plan to replace the tractor at some point.

4.5.2.11 Sludge Disposal

City of Yachats has the ability to produce Class B biosolids, but often doesn't. The City has found that it more economical to have the biosolids landfilled or hauled to another treatment facility in Douglas County. Neither of these disposal options requires the production of Class B biosolids.

The City's most recent biosolids management plan was prepared in 2014. The plan identifies three different disposal options. These include landfilling, hauling to the treatment plant owned by Heard Farms in Douglas County, and land application at a 16 acre site that has been authorized for biosolids disposal. The City has not utilized the land application site for many years and the current owner is not overly interested in receiving biosoilds. The City owns a tanker truck that can be used to haul wet solids to the site, but does not have the equipment needed distribute dewatered solids at the site. Hauling wet solids is time consuming and operator intensive. For all of these reasons, the City has not used the land application site in recent years. For many years, the City either had the local solid waste company pick up dewatered solids for landfilling or hauled dewatered solids to Heard Farms. Recently, the City stopped having the local solids waste company pick up the solids and all solids are currently sent to Heard Farms. This approach is currently sufficient. However, as the City grows and the quantity of biosolids increases, disposal will become more challenging. Also, if there are any policy changes at Heard Farms, the City may be forced to find new disposal methods. In order to ensure that the City always has reliable disposal options, this plan recommends several improvements to the biosolids handling equipment and disposal program. These are discussed in Chapter 7.

4.5.2.12 Non-Potable Water System

The treatment plant includes a non-potable water system. This system is used to deliver treated wastewater effluent at pressure to various locations though the plant. The purpose of the system is to use recycled water for various uses to offset the use of potable water. An example is the wash water used to clean the solid material removed by the headworks screen.

Figure 4-23 | Non-Potable Water Pump Skid and Pressure Tank

Treated effluent is diverted from the downstream end of the UV chamber into the old chlorine contact chamber that is located around the sludge storage tank. The old chlorine contact chamber acts as a storage tank for non-potable water. As part of the 2008 project, two submersible pumps were installed in the tank. The pump discharge piping is fitted with a pressure tank. A pressure switch is used to start and stop and the pumps. The system feeds washdown stations around the treatment plant, the headworks screen, the grit removal system, and the sludge dewatering system.

The pumps were supplied as packaged system and are suspended from a skid. The skid is mounted to the top of the old chlorine contact chamber. The skid includes the pump discharge piping, isolation valves, the pressure switch and an electrical junction box. The pressure tank is mounted adjacent to the pump skid. Downstream of the pressure tank, the supply piping is fitted with a magnetic flow meter that is used to track non-potable water usage.

All of the equipment is mounted outside. The pump skid, pressure tank, and exposed electrical conduits are painted steel and corrosion is a problem. The City typically repaints the mild steel components on an annual basis. This requires a fair amount of labor and the City may want to consider moving some of the equipment inside the adjacent UV shelter to provide some protection from the weather.

4.5.2.13 Operations Building

Figure 4-24 | Operations Building

The operations building was constructed in 1974 and remains in service. The building originally included the blowers, a backup power generator, a restroom, office space, a chlorine storage room, and a chemical feed room. The building was reconfigured as part of the 2008 improvements. These improvements included converting the office space into a meeting room, converting the generator room into an equipment storage room, and converting the chlorine storage and chemical feed rooms into a locker room for the public works staff. The old blowers were removed and replaced with the blowers used for the aerobic digester and sludge storage tank.

The building is a wood framed structure with a composite roof. The building is in good condition and should serve the City for many years provided that needed routine maintenance activities (i.e., painting, roof maintenance, etc.) occur.

4.5.2.14 Public Works Building

The Public Works Building was constructed in 2008 as part of the treatment plant upgrades. The building houses a vehicle and equipment storage garage, a workshop, a blower room for the SBR and grit chamber blowers, office space, a restroom, a laboratory, and the main electrical control room for the plant. The building also has a mezzanine for equipment and records storage.

Figure 4-25 | Public Works Building

The SBR tank wall serves as the back wall of the building. The remaining structure is a metal framed building with metal siding and roofing. Several components of the building are showing corrosion issues. Some of the door frames and the entire metal roof are in poor condition and some of the metal siding panels are also corroding. These problems will continue to worsen during the planning period. As some point, improvements to the building will be needed. This will likely occur during the planning period. Therefore, the recommended improvements discussed in Chapter 7 include a building upgrade to address the corrosion issues.

4.5.2.15 Telemetry System

The treatment plant is equipped with an autodialer for alertering operations staff of the various alarm conditions that are automatically monitored. The plant does not include an overall SCADA system.

4.5.3 Summary of Treatment and Disposal System Deficiencies

Overall, the treatment facilities are functioning well. The facilities are relatively new and in good condition and should continue to serve the City for the remainder of the planning period with normal maintenance activities. There are some shortcomings the City should plan to address during the planning period. These are summarized below.

- The shelter over the headworks structure has corrosion problems that will get worse during the planning period and will likely need to be addressed.
- The City may want to consider installing baggers to contain the screenings and grit that is removed at the headworks. This will improve overall sanitation and reduce problems from insects and other pests.

- The tractor used to load biosolids into the City's dump trucks will likely reach the end of its useful life during the planning period. Therefore, the City should plan to purchase a new tractor during the planning period.
- Several components (e.g., metal siding panels, doors, and metal roof) of the public works building are corroding. This problem will worsen in the coming years and the City should plan to make upgrades during the planning period.
- Some of the mechanical and electrical equipment used throughout the plant (e.g., valve, actuators, variable frequency drives, etc.) will likely reach the end of their useful life during the planning period due to normal wear and age.
- The SBR diffuser membranes will likely reach the end of their useful life during the planning period due to normal wear and age.
- The automatic control system for the UV disinfection equipment will likely reach the end of its useful life during the planning period.
- The diffuser membranes in the aerobic digester and sludge storage tank will likely reach the end of their useful life during the planning period due to normal wear and age.
- The concrete surfaces of the aerobic digester and sludge storage tank are corroding and the City should consider coating the walls of the tanks during the planning period.
- The air supply system for the aerobic digester and the sludge storage tank lacks automatic control functionality which makes it more difficult to control the digestion process, leads to operational problems like foaming, and leads to excess power consumption.

4.6 WASTEWATER SYSTEM OPERATOR LICENSING

The City's wastewater collection system currently requires a level 2 certification for operation. The treatment system requires a level 3 certification. It is unlikely that these will change during the planning period.

4.7 WASTEWATER SYSTEM FUNDING MECHANISMS

Funding for the City's existing wastewater system comes from several sources including user fees, a food and beverage tax, system development charges (SDCs), and an urban renewal district.

4.7.1 Wastewater User Fees

User fees are monthly charges to all residences, businesses, and other users that are connected to the wastewater system. User fees are established by the city council and are typically the sole source of revenue to finance wastewater system operation and maintenance. The City's wastewater user fee system is established by Resolution 2015-12-01. For most residential and commercial connections (i.e., ⅝ and ¾ inch meters), the City currently charges a flat fee of $47.94 that includes up to 200 cubic feet of water per month. An additional charge of $6.00 is assessed for each 100 cubic foot above the initial amount that is included in the base charge. The City does have some users with larger meters. These users are charged a special rate that is based on usage.

The anticipated revenue from sewer billings for the fiscal year 2020/2021 is budgeted to be approximately $565,000. Including other various charges and interest earnings, the total sewer fund revenues, for the 2020/2021 fiscal year are budgeted to be approximately $567,500. It should be noted that these budget amounts are less than the historic revenue from user rates. In the previous two fiscal years, the revenue from user rates was about $750,000 and $620,000. Due to the Covid 19 pandemic, the City anticipated less revenue for the 2020/2021 fiscal year.

The City's sewer fund must provide sufficient revenues to properly operate and maintain the wastewater system and provide reserves for normally anticipated replacement of key system components such as pumps, motors, pump station control equipment, chemical feed equipment, manholes and sewer collection piping. Although the City relies exclusively on sewer fees for operation and maintenance costs, the sewer fund is typically not adequate to finance major capital improvements without outside funding sources.

4.7.2 Food and Beverage Taxes

The City currently collects a 5% tax on food and non-alcoholic beverages sold at restaurants. These funds are used to pay for improvements to the City's utility systems. The anticipated revenue from this tax is listed as $175,000 in the 2020/2021 fiscal year budget. These funds are typically used to repay loans for the wastewater system improvements that were completed in 2008. As with user rates, the anticipated revenue from the food and beverage tax for the 2020/2021 fiscal year is significantly less than has historically been collected. For the last two fiscal years, revenue from the food and beverage tax has been about $370,000. The City anticipated less revenue from this source for the 2020/2021 fiscal year due to the Covid 19 pandemic.

4.7.3 System Development Charges

A system development charge (SDC) is a fee collected by the City as each piece of property is developed. SDCs are used to finance necessary capital improvements and municipal services required by the development. SDCs can be used to recover the capital costs of infrastructure required as a result of the development, but cannot be used to finance either operation and maintenance, or replacement costs.

The SDC fee system was most recently revised by Resolution Number 2007-01-01. The City charges different SDC fees based on the size of the water meter installed at each property. The current fee structure is listed in Table 4-9. Over the last three fiscal years, the City has collected and average of about $70,000 in wastewater system development charges. A portion of these funds are typically used to retire the debt associated with the 2007 wastewater system improvement project and a portion is reserved for capital improvements.

Table 4-9 | Current Wastewater SDC Fees

Meter Size	SDC Charge
¾ by ⅝ - Inch	$4,851
¾ - Inch	$7,277
1- Inch	$12,128
1 ½ - Inch	$24,255
2 – Inch	$38,808
3- Inch	$77,616
4- Inch	$121,275
6- Inch	$242,550

4.7.4 Urban Renewal District

The City collects revenues from and urban renewal district. Some of these funds are used to retire the debt associated with the 2007 wastewater system improvement project. For the 2020/2021 fiscal year, the City planned to use approximately $95,000 of urban renewal funds to service this debt.

4.7.5 Annual Sewer System Costs

Annual operations and maintenance costs are recurring costs typically funded through user rates. The City's budget for 2020/2021 fiscal year includes various expenditures as listed below (Table 4-10). The total expenditures for the fiscal year are approximately $793,240.

Table 4-10 | Sewer Utility Fund Expenditures 2020/2021 Fiscal Year

Item	**Budget**
Personnel Services	$ 345,000
Materials and Services	$ 288,460
Capital Outlays	$ 99,780
Debt Service	$ 60,000
TOTAL EXPENDITURES	**$ 793,240**

4.7.6 Debt Service

The City currently has two outstanding loans (Table 4-11). As of the fall of 2021, the total outstanding principal owed is approximately $3,363,000 and the minimum debt service payments total approximately $505,500 per year.

Table 4-11 | Sewer Utility Fund Existing Debt

Loan Description	Loan Amount	Term (years)	Payoff Date	Interest Rate	Annual Payment	Outstanding Principal (10/2021)
Wastewater Treatment Plant – Clean Water State Revolving Loan Fund	$6,671,721	20	4/2029	2.9%	±$469,000	$3,016,073
Wastewater Treatment Plant – OECDD Loan	$528,000	25	12/2033	Varies 2-5%	$36,915	$346,740

4.7.7 Wastewater Capital Reserve Fund

The City maintains a capital reserve fund used to make improvements to the wastewater system. In recent years, the City has typically contributed an average of about $80,000 from user fees to this fund. At the end of the 2020/2021 fiscal year, the ending balance in this fund is anticipated to be about $220,000.

CHAPTER 5

WASTEWATER FLOWS AND LOADS

Chapter Outline

WASTEWATER FLOWS AND LOADS

CHAPTER 5

5.1 INTRODUCTION

In order to select and size both collection and treatment facilities for the planning period, projected wastewater flows and organic loadings must be determined. The projected flows and organic loadings were determined based on a number of variables including the following:

- Rate of projected population increase
- Land use zoning within the UGB
- Projected per capita and per acre flowrates and organic loadings.

This chapter develops wastewater flow and loading projections which are used for sizing the collection system components as well as the treatment plant components. The projected design flowrates were determined based on a number of variables including zoning of land within the service area, anticipated development density at buildout and within a 20-year planning period, and projected per capita and per acre flowrates.

5.2 POPULATION

Population projections serve as the basis for future wastewater flow and load projections. Much of the challenge in projecting system growth relates to the difficulty in accurately tracking or projecting actual populations. This is especially challenging in Yachats. As a tourist destination, The population in Yachats fluctuates on a seasonal basis and on a weekly basis. The population generally increases during the summer season with peaks occurring during weekends and holidays. As noted in the following subsection, the current population of Yachats is estimated to be about 760 residents. During peak holidays, the population is believed to greater than 2,000 residents. This fluctuation is significantly greater than a typical City. Therefore, traditional population estimates are of limited use and other means must be developed to track the service population in Yachats.

The population of Yachats consists of permanent residents, part time residents, and tourists. Permanent residents generally own homes in the City and reside in the City on a full-time basis. Part time residents own homes, but the homes are not occupied on a full-time basis. Tourists visit the City for short periods of time and occupy hotel rooms and vacation rentals.

5.2.1 Historic and Future Population

As described previously (Section 2.5.2) the population in Yachats has steadily increased from about 533 residents in 1990 to about 760 in 2020. This trend is expected to continue during the planning period. In June of 2017, population projections for Lincoln County were prepared by the Portland State University Population Research Center[3]. Based on these projections, the

[3] Portland State University, Population Research Center, Coordinated Population Forecast Benton County Oregon 2017-2067

estimated population in 2041 is 1,070 (see Section 2.5.2). These projections are based on an average annual growth rate of 1.4% from 2020-2035 and 0.9% from 2035-2041. These population values are generally considered to be the full-time residents, but do not include part time residents or tourists. Therefore, these projections are of limited use for projecting wastewater flows.

In order to account for flows from part-time residents and tourists, the total number of connections to the sewer system and the number of multifamily units such as apartment buildings, condominium complexes, and hotel rooms were tracked separately. The City currently has about 959 user connections. Of these, 11 are multi-family connections that include about 70 units. There are also eight hotel connections that include about 311 rooms. The total number of what can be considered "standard" connections is about 940. These connections mostly consist of single-family homes and businesses.

In order to project future populations in the City, the annual average growth rates used for the projections prepared by the Portland State Population Research Center were applied to the number of "standard" connections, the number of multi-family units, and the number of hotel rooms (Table 5-1). Therefore, this approach is based on the assumption that the ratio of single-family homes, to multi-family units and hotel rooms will remain constant during the planning period. This is likely to be an oversimplification, but seems like a reasonable assumption given all of the other uncertainties involved in estimating future wastewater flows.

Table 5-1 | Yachats Sewer Service Category Projections

Year	Number of "Standard" Connections	Number of Multi-Family Units	Number of Hotel Rooms
2020	940	70	311
2025	1008	75	334
2030	1081	81	358
2035	1160	86	384
2040	1213	93	411
2041	1224	94	417

Note: Annual Average growth rates based on projections prepared by the Portland State Population Research Center which equal 1.4% from 2020-2035 and 0.9% from 2035-2041

5.3 OCCUPANCY RATES

In the previous section, projections of the total number of connections and non-standard living units (i.e., multi-family units and hotel rooms) are presented. If Yachats didn't have a large number of part time residents and tourists, then these values could be used to estimate the total population using reasonable estimates of population densities. For example, a reasonable population density for single family homes and multi-family units is about 1.8 people per unit. A reasonable population density for hotel rooms is about 1.2 people per unit. Using these values, it is possible to estimate the total population of Yachats at full occupancy (Table 5-2).

Table 5-2 | Yachats Sewer Service Population at Full Occupancy

Year	Estimated Population at Full Occupancy
2020	2191
2025	2350
2030	2520
2035	2703
2040	2844
2041	2873

Note: Population at full occupancy estimated by assuming 1.8 people per standard connection and multi-family unit and 1.2 people per hotel room.

As shown in Table 5-2, the 2020 population of Yachats at full occupancy is estimated to be about 2,200 residents. This is the population that would correspond to peak holidays like Independence Day. In communities like Yachats, wastewater production tends to be about 90 gallons per person per day. Therefore, the 2021 peak wastewater flow at full occupancy should be about 200,000 gallons per day. Since peak occupancy occurs during the summer months, when groundwater infiltration and stormwater inflow into the collection system are minimal, drinking water production rates can be used as a way to check this estimate. The City does not measure drinking water production on a daily basis. But, based on discussions with City staff, the peak water usage during summer months is believed to be about 225,000 gallons per day. If we assume some of this water is used for lawn watering and other consumptive uses, 200,000 gallons per day of wastewater seems like a reasonable estimate and supports the methodology used to estimate population.

Drinking water production may also be used as a means to estimate the average occupancy rate during the year. This should be less than the occupancy rate during peak weekends and holidays. On an average annual basis, the City currently produces about 136,000 gallons per day of drinking water. Per capita drinking water production rates are typically about 90 gallons per person per day in a City like Yachats. Therefore, the average annual population should be about 1,500 people, which corresponds to an occupancy rate of 70%. This value agrees well with the BOD loading at the wastewater treatment plant. As shown below (Table 5-8), the average annual BOD loading measured at the treatment plant is about 314 pounds per day. Typical per-capital BOD loading rates tend to be about 0.22 pounds per person per day. At this rate, 315 pounds of BOD corresponds to a population of about 1,430. Again, this is roughly equal to an occupancy rate of 70%. Therefore, throughout the remainder of this document, a 70% occupancy rate will be used to estimate average annual flows and organic and solids loading.

A similar analysis of drinking water production and BOD loading, shows that the occupancy rate during the peak month is about 90%. Therefore, this value will be used to estimate peak monthly wastewater flows and loads.

5.4 WASTEWATER FLOWS

Wastewater facility evaluation and design typically account for the following standard flow rates:

- Average dry-weather flow (ADWF) - Average daily wastewater flow during the dry-weather months of May through October
- Average wet-weather flow (AWWF) - Average daily wastewater flow during the wet weather months of November through April
- Average annual flow (AAF) - Daily wastewater flow averaged over the entire year
- Maximum-month dry-weather flow (MMDWF) - Maximum monthly flow during the dry weather months
- Maximum-month wet-weather flow (MMWWF) - Maximum monthly flow during the wet weather months
- Peak-day flow (PDF) - Maximum one-day flow during the weather months
- Peak-hour flow (PHF) - Maximum flow over a short duration (peak hour).

5.4.1 Wastewater Treatment Plant Flow Records

The City's treatment plant Discharge Monitoring Reports (DMRs) filed with the DEQ for the period from November 2015 through October 2020 were evaluated to identify flow patterns and evaluate current flows to the plant.

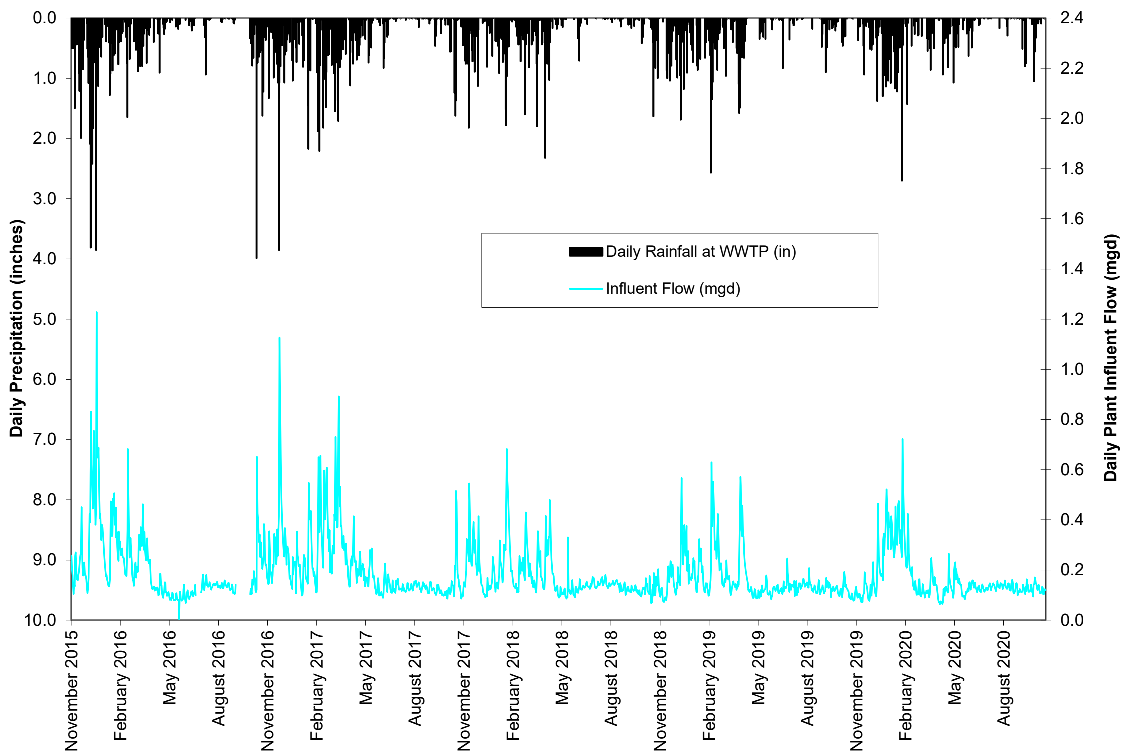
Wastewater flows in Yachats are strongly influenced by precipitation (Figure 5-1). This is common for wastewater collection systems in Western Oregon. Winter rains cause groundwater levels to rise. The groundwater enters the collection system through faults and cracks in the collection piping and manholes (infiltration) and through direct connections to storm drainage collection facilities (inflow). Infiltration and inflow (I/I) results in increased flows measured at the treatment plant. As shown in Figure 5-1, plant inflows during the winter months are significantly higher than flows during the dry summer months. This can also be seen in Table 5-3 where the various flow components are tabulated for the last four years in millions of gallons per day (MGD).

Table 5-3 | Summary of Treatment Plant Flow Data November 2015 through October 2020.

Water Year [1]	ADWF (MGD)	AAF (MGD)	AWWF (MGD)	MMDWF (MGD)	MMWWF (MGD)	PDF (MGD)
2016	0.144	0.216	0.275	0.240	0.491	1.23
2017	0.141	0.218	0.296	0.171	0.381	1.13
2018	0.130	0.172	0.216	0.150	0.270	0.682
2019	0.126	0.163	0.200	0.139	0.267	0.629
2020	0.132	0.161	0.191	0.147	0.363	0.723
Average	0.134	0.186	0.236	0.169	0.354	0.879
Maximum	0.144	0.218	0.296	0.240	0.491	1.23

Notes
1. Water year is November through October starting in November prior to the year listed.

Figure 5-1 | Precipitation Effects on Plant Influent Flow



5.4.2 Wastewater System Existing Flow Estimates

The DEQ has published guidelines for the estimation of wet weather flows in Western Oregon. The purpose of these guidelines is to identify a methodology that can be used to estimate wastewater flows if no surcharging in the collection system were to occur. In most municipal systems, large amounts of I/I enter the collection piping and manholes. As a result, portions of the system surcharge during high flow conditions associated with wet weather. This surcharging tends to decrease the amount of I/I that could occur if the surcharging were not present. For most municipal systems, the existing wet weather flows are influenced by this phenomenon and the wet weather flows to the wastewater treatment plant would actually be higher if no surcharging were to occur. It is important to consider the flowrates in the absence of surcharging because as the improvements to the collection system are made, the bottlenecks that cause the surcharging will be removed and the wet weather flows to the treatment plant may increase beyond the flows currently measured today.

In order to estimate the wet weather flow components that would occur in the absence of bottlenecks, the DEQ has published guidelines that describe a methodology to correlate wastewater flows to rainfall during moderate rainfall events when surcharging is believed to be absent. This mathematical correlation is used to extrapolate flows at higher rainfall events associated with peak wet weather flow conditions. This methodology is useful for most Cities where surcharging is common. However, the City's system does not experience any surcharging even during the largest winter storms. Therefore, the DEQ flow projection methodology is overly conservative for Yachats and is not used for this plan. The City routinely inspects the collection system during large winter storms and has never observed any surcharging. The collection system was inspected as part of this facilities planning effort and there was no evidence of surcharging such as debris accumulation on the manhole shelfs and grease rings on the manhole walls above the flow channel. There is no evidence to support using the DEQ flow projections methodology for Yachats and doing so would result in overly conservative flow estimates. Therefore, the DEQ wet weather flow projection methodology was not used and the existing flows as measured at the treatment plant (Table 5-4) are considered to be representative of the actual peak flows in the system.

The City does not record flows to the treatment plant on an hourly basis. Therefore, the existing peak hourly flow must be estimated. For this planning document, the peak hourly flow is assumed to be 10 times the average dry weather flow. This value fairly common in municipal systems in Western Oregon and is likely to be slightly conservative (i.e., slightly over-estimates the actual peak flow), but is considered a reasonable estimate for the purposes of this planning document. Table 5-4 includes a summary of existing flow estimates that will be used throughout the remainder of this planning document.

Table 5-4 | Summary of Existing Flow Estimates

Flow	Value (MGD)
AAF	0.186
ADWF	0.134
AWWF	0.236
MMDWF	0.240
MMWWF	0.491
PDF	1.23
PHF	1.34

5.4.3 Wastewater Flow Projections

This section builds on the discussions of population projections and occupancy rates in Sections 5.2 and 5.3 and the existing flow estimates listed in Table 5-4. Projections of future wastewater flows through the planning period were based on the existing flows combined with flow from the anticipated population growth. Increases in wet weather flows were estimated by making assumptions about the total area of land developed in the future and the amount of I/I per acre of newly developed land. It is important to note that the flow projections listed below include the existing peak flow estimates listed in Table 5-4. These flow estimates are theoretical estimates of wastewater flow that might occur in the absence of surcharging (Section 5.4.2). These flows are significantly higher than the measured flows (Table 5-4). Therefore, a comment on the applicability of the following flow projections is appropriate. These flow estimates are generally considered useful for sizing new facilities, but not useful for determining when certain components of the wastewater system (e.g., pump stations and trunk sewers) should be upgraded to increase capacity. In the case of existing pump stations, other information such as pump run times should also be evaluated to determine if the flows to the station are exceeding pump capacity.

The projected wastewater flowrates were based on the following assumptions.

- Population growth will occur in accordance with the projections in Sections 5.2 and 5.3.
- Flow rates will increase in proportion to population increase.
- Occupancy rate of 70% will be used estimates of AAF, ADWF, and AWWF.
- Occupancy rate of 90% will be used for estimates of MMDWF and MMWWF.
- Occupancy rate of 100% will be used for estimates of PDF and PHF.
- The per capita average dry weather flow rate associated with the population increase will remain constant during the planning period at a value of 90 gallons per capita per day.
- There will be no contribution from "wet" industries during the planning period. Commercial and industrial development will be "dry" with flows comparable to residential developments.
- The ratio of industrial and commercial development to municipal population will remain constant over the planning period.
- The City will continue to implement infiltration and inflow reduction measures that will prevent any increase in infiltration and inflow into the existing collection system. In other words, existing I/I contributions will remain constant.
- A peaking factor of 2 will be applied to the sanitary flow component of the PHF.
- The increase in the AWWF over the planning period is equal to twice the increase in the ADWF.
- The increase in the MMDWF over the planning period is equal to twice the increase in the ADWF.
- The increase in the MMWWF over the planning period is equal to three times the increase in the ADWF.
- The increase in the PDF over the planning period is equal to four times the increase in the ADWF.
- The increase in the PHF over the planning period is equal to five times the increase in the ADWF.

Based on these assumptions, the future estimates of wastewater flow listed in Table 5-5 were prepared.

Table 5-5 | Future Wastewater Flow Projections

Year	Population at Full Occupancy	Projected Wastewater Flows (MGD)						
		ADWF	AAF	AWWF	MMDWF	MMWWF	PDF	PHF
2025	2350	0.148	0.206	0.264	0.266	0.530	1.288	1.413
2030	2520	0.159	0.222	0.286	0.294	0.572	1.349	1.489
2035	2703	0.170	0.239	0.309	0.323	0.616	1.415	1.571
2040	2844	0.179	0.252	0.326	0.346	0.650	1.466	1.635
2041	2873	0.181	0.255	0.330	0.351	0.657	1.476	1.648

5.4.4 Drainage Basin Service Area Flows

The peak discharge from each basin was estimated to evaluate the capacity of the trunk sewers. Estimates of existing peak flows as well as projected peak flows associated with buildout were developed. In Chapter 6, the existing peak flows are used to determine existing deficiencies and the projected peak flows associated with buildout are used for sizing the recommended improvements. Flows associated with buildout conditions are used for sizing trunk sewers because gravity sewer piping is not suited for incremental expansion. In small cities like Yachats it is generally more cost effect to install a sewer line sized for complete development of the upstream service area. This is due to the fact that the pipe sizes are relatively small (i.e., less than 24 inches in diameter). Over the life of a particular pipeline it is generally not cost effective to install a smaller diameter pipe (e.g., an 8-inch diameter pipe), then later replace this pipe with a larger pipe (e.g., 12-inch diameter pipe) before the smaller diameter pipe has reached the end of its useful life. Due to the relatively long life cycle of modern pipeline materials (i.e., 70+ years), it is usually more cost effective to install a larger pipe sized for buildout of the upstream basin. For this reason, peak flows associated with complete buildout of the UGB are used in this plan to size the trunk sewers in the City.

The peak flow from each basin at buildout conditions was determined by summing the following quantities.

- Existing average dry weather flow multiplied by a peaking factor of 2
- Existing I/I contribution
- Additional base sewage flow from growth multiplied by a peaking factor of 2
- I/I from future development

The existing ADWF from each basin was estimated by using a ratio of the sewered area in each basin to total sewered area of the City, then multiplying this ratio by the total ADWF for the City. The existing I/I contribution from each basin was estimated based on the age and total length of piping within each basin, pump station run times, and field measurements during wet weather conditions.

For undeveloped areas in the City, the additional ADWF associated with growth in the basin was determined by multiplying estimates of sewage flow per acre (Table 5-6) by the area of undeveloped land for each land use within each basin. For areas of the City that are already developed to residential densities, but are not served by the public wastewater system, the ADWF was estimated by assuming a typical occupancy of 2.25 people per residence and a flow of 90 gallons per minute per person. A peaking factor of two was applied to these values to estimate PHF from new development. The additional I/I from future development was determined by multiplying 1,200 gallons per acre per day by the total undeveloped area within each basin. This allowance for I/I in currently undeveloped areas is used only to size the collection system piping serving those areas.

Table 5-6 | Flow Rates Per Acre Used for Estimates of Flow from Undeveloped Areas

Land use	**Flow (gallons/acre/day)**
Regular Density Residential Areas	810
High Density Residential Areas	2,430

The existing peak flows and the projected peak flows at buildout are listed for each collection system basin in Table 5-7. It is important to note that the peak flows listed in Table 5-7 are for complete buildout of the land within the study area.   For this reason, these peak flows are greater than the flows listed in the previous subsection (Table 5-5). The flows in Table 5-7 are generally useful for sizing the gravity collection system piping while the flows listed in Table 5-5 are useful for evaluating the treatment plant and pump stations.

Table 5-7 | Projected Drainage Basin Service Area Flows at Buildout of the System

Basin	Total Area (Acres)	Existing Sanitary Flow (MGD)	Existing I/I (MGD)	**Existing PHF (MGD)**	Future Sanitary Flow (MGD)	Future I/I (MGD)	**Buildout PHF (MGD)**
A	138	0.028	0.217	0.272	0.108	0.065	0.552
B	56	0.016	0.122	0.154	0.017	0.010	0.197
C	36	0.012	0.076	0.100	0.001	0.000	0.102
D	80	0.019	0.133	0.172	0.019	0.025	0.235
E	16	0.005	0.043	0.054	0.000	0.000	0.055
F	33	0.011	0.129	0.151	0.002	0.000	0.155
G	29	0.010	0.057	0.076	0.002	0.000	0.080
H	93	0.021	0.201	0.242	0.029	0.036	0.336
I	57	0.013	0.093	0.120	0.020	0.020	0.180
Totals	598	0.134	1.072	1.34	0.198	0.156	1.892

5.5 WASTEWATER LOADS

In addition to the expected wastewater flow, evaluation and design of wastewater facilities requires estimates of the expected loads of various pollutants in the wastewater. Treatment facilities must be designed with operating capacity to treat the highest expected loads of pollutants over the planning period. Pollutants used as design parameters for this study were biochemical oxygen demand (BOD; sometimes referred to as a five-day oxygen demand expressed as BOD_5), and total suspended solids (TSS). The following classifications of wastewater pollutant loads were used.

- Average Load – Average daily wastewater load.
- Maximum Month Load – Daily wastewater load during the maximum month.

5.5.1 Wastewater Treatment Plant Load Records

The City's treatment plant Discharge Monitoring Reports (DMRs) filed with the DEQ for the period from November 2015 through October 2020 were evaluated to identify loading patterns and evaluate current loads to the plant. This data set includes BOD and TSS measurements once per week from 24 hour composite samples taken from the wastewater treatment plant influent flow stream.

Pollutant loads in pounds per day were calculated for BOD and TSS using the data sets described above. Pollutant load calculations were based on the concentration for each pollutant multiplied by the influent flow on the day the sample was collected.

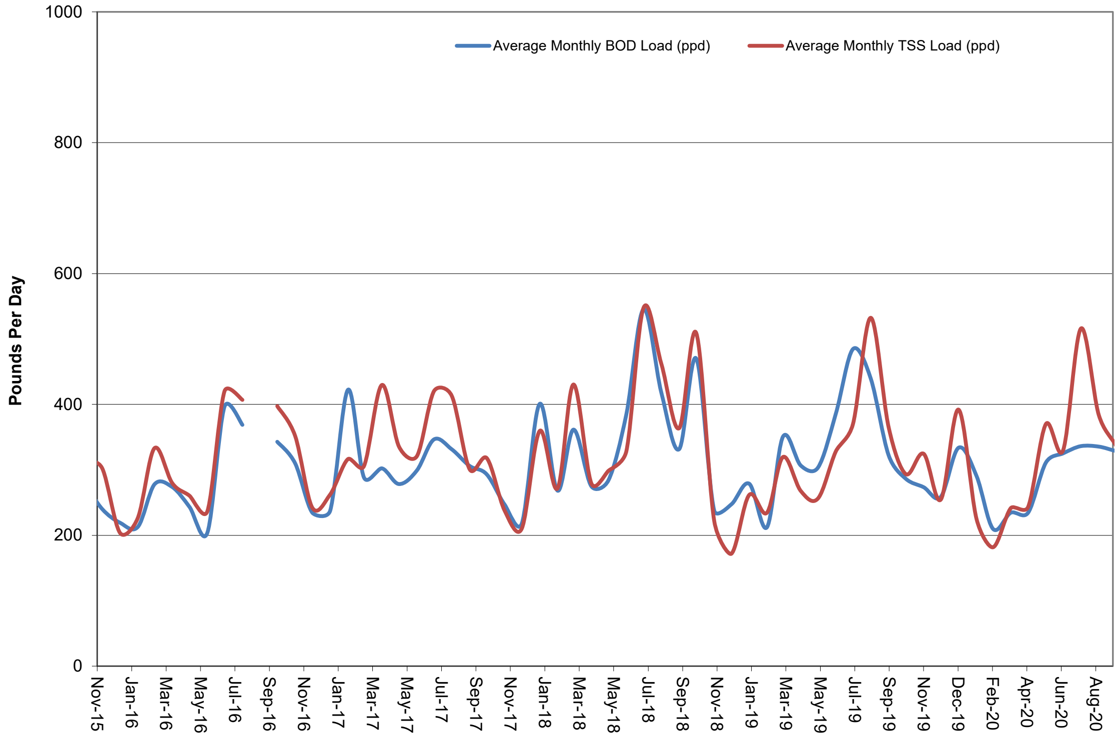
The average monthly influent BOD and TSS loads measured at the treatment plant from November 2015 through October 2020 are plotted in Table 5-8. The annual average influent loading and the maximum month loading are listed in Table 5-8 for BOD and TSS. As expected for a community with a large portion of vacation homes, the influent BOD and TSS loading rates generally increase over the summer months as vacation visitation increases. As described above (section 5.3) annual average flow and load values correspond to an annual average service population of approximately 1,500 residents. This equates to an occupancy rate of about 70% assuming the maximum occupancy is equal to 1.8 people per residence and 1.2 people per hotel room.

Table 5-8 | Summary of Plant BOD and TSS Loading Data 2015 through 2020.

	BOD Load (pounds per day)		TSS Load (pounds per day)	
Time Period	Average Annual	Maximum Month	Average Annual	Maximum Month
November 2015 - October 2016	282	396	310	420
November 2016 - October 2017	302	422	332	429
November 2017 - October 2018	350	545	359	547
November 2018 - October 2019	320	484	303	532
November 2019 - October 2020	291	336	317	516

Average	309	436	324	489

Figure 5-2 | BOD and TSS Loading History at Wastewater Treatment Plant



5.5.2 Load Projections

This section builds on the discussions of population projections in Section 5.2 and 5.3 and the existing load data listed in section 5.5.1. Projections of future wastewater loads through the planning period were based on the following assumptions.

- Population growth will occur in accordance with the projections in Section 5.2 and 5.3.
- BOD and TSS loading rates will increase in proportion to population increase.
- A unit loading rate of 0.22 pounds per person per day will be used for estimates of average annual and maximum monthly BOD and TSS loading rates.
- Occupancy rate of 70% will be used estimates of average annual loading rates.
- Occupancy rate of 90% will be used for estimates of the maximum month loading rates.

Based on these assumptions, the future estimates of influent wastewater loads listed in Table 5-9 were prepared.

Table 5-9 | Future Wastewater Load Projections

Year	Population at Full Occupancy	BOD (ppd)		TSS (ppd)	
		Average Annual	Peak Month	Average Annual	Peak Month
2020	2,191	337	434	337	434
2025	2,350	362	465	362	465
2030	2,520	388	499	388	499
2035	2,703	416	535	416	535
2040	2,844	438	563	438	563
2041	2,873	442	569	442	569

CHAPTER 6

COLLECTION SYSTEM EVALUATION

Chapter Outline

COLLECTION SYSTEM EVALUATION

6.1 INTRODUCTION

This chapter includes an analysis of the collection system. The first subsection focuses on operation, maintenance, and rehabilitation of the collection system. This is followed by the development of alternatives for potential improvements to the wastewater collection system.

This chapter addresses the following key questions:

- What are the current collection system operation and maintenance practices and how can they be improved?
- What are the existing collection system deficiencies?
- What collection system components are likely to become deficient during the planning period or prior to complete buildout of the system?
- What are the alternatives for correcting existing and projected deficiencies?

The existing and projected collection system deficiencies are presented. Where appropriate, different alternatives for addressing each of the deficiencies are presented and discussed. The alternatives are evaluated against each of the collection system deficiencies to generate complete collection system recommendation. In Chapter 7, the treatment system is evaluated and alternatives for correcting treatment system deficiencies are identified and evaluated.

6.2 COLLECTION SYSTEM OPERATION, MAINTENANCE, & REHABILITATION

This section discusses the need for maintenance of the gravity sewer collection piping and provides recommendations for the basic elements necessary for a maintenance program. The need for system-wide preventive maintenance is addressed first, and then the general recommended approaches to collection system maintenance are outlined.

6.2.1 Need for System-Wide Preventative Maintenance

Maintenance of sewerage systems is necessary to ensure the proper operation of the facilities and to obtain the full useful life of those facilities. Sanitary sewer systems represent significant investment of public capital. If a sewer system is allowed to fall into disrepair because of the lack of maintenance, it will not operate efficiently or as designed. Health problems and property damage may result from sanitary sewer backups, surcharging and/or overflows. Without proper maintenance, a system's capacity can be reduced by debris clogging, root intrusion growth, structural damage, infiltration and inflow (I/I), and other factors that eventually lead to failures throughout the system. Repair of failed sections of a sanitary sewer system are costly, quite often exceeding the original cost of construction. In spite of this, many jurisdictions do not adequately fund the level of maintenance necessary to protect their investment in the sewerage system. Collection system maintenance can be separated into two types: preventive and corrective.

Preventive maintenance involves scheduled inspection of the system and data gathering to identify problem areas and analysis of this data so that scheduled maintenance can be targeted at specific problems. As a general rule, as preventative maintenance increases, the amount of corrective maintenance required decreases.

Corrective maintenance, often referred to as emergency maintenance, is typically performed when the sewer system fails to convey sewage. Causes for initiating corrective maintenance may include blockages, solids buildup, excessive I/I, flooding and sewer breaks. Corrective maintenance requires immediate action, and the jurisdiction will typically pay a premium to have this work performed.

6.2.2 Present Maintenance Practices

At the present time, the City has a good collection system maintenance program. The City owns sewer cleaning and television inspection equipment. The City cleans about 2,600 feet of mainline every year. This work is usually performed in the areas of the system that are known problem areas. The City currently owns a push camera and has traditionally inspected about 2,100 feet of mainline piping each year. To increase this rate, the City plans to purchase more sophisticated television inspection equipment in 2021 or early. With this equipment, the City anticipates being able to inspect about 14,000 feet per year. At this rate, the City should be able to inspect all mainline pipes about once every 5 years. In the 2021/2022 fiscal year, the City budgeted approximately $30,000 per year for I/I correction. The City plans to use these funds to purchase the television inspection equipment. The costs of this equipment will consume the annual $30,000 budget for the next few years. Once the television inspection equipment purchase is completed, these funds should be used for other I/I corrective measures. Since 2015, the City has smoke tested about 15% of the collection system.

6.2.3 Recommended Collection System Maintenance Program (Program – 1)

The City's original collection system was constructed in 1974 and is in relatively good condition. In the last six years, the City has performed television inspections of about 20% of the gravity collection system piping. The City plans to acquire a self-propelled television inspection camera in the 2021-2022 fiscal year which should increase the amount of mainline the City can inspect each year. The City should consider inspecting about 20% of the system each year. At this rate, the City can inspect the entire system about once every 5 years. Based on the City's recent experience, most problems in the collection system can be addressed by manhole rehabilitation and spot repairs of mainlines and service laterals. Over the planning period, the collection system will continue to age and deteriorate and it will become increasingly important for the City to make annual repairs in order to keep the system in good condition. Therefore, the City should formalize the annual maintenance program at a funding rate of $30,000 per year and not divert these funds for other needs. This funding rate should be sufficient for the immediate future, but the City should evaluate this funding rate at 5 year intervals along with the list of problems observed through television inspections to ensure that the program is able to adequately address the needs of the system. Initial maintenance activities should be focused on rehabilitating leaking manholes, making spot repairs in the mainline piping, and working with customers to repair service laterals with high rates of infiltration. The City should also consider smoke testing the collection system to identify illicit connections to the sewer system.

6.3 COLLECTION SYSTEM DEFICIENCIES

The purpose of this section is to determine the components of the existing collection system that are or will become deficient. This includes components that lack capacity to convey existing peak flows or will lack capacity as flows increase due to growth. Some collection system deficiencies were identified in Chapter 4. This section is intended to supplement those discussions. Together with the deficiencies listed in Chapter 4, the intent of this section is to present an overall list of deficiencies that must be addressed by the City.

6.3.1 Gravity Main Capacity Analysis

The peak design flows developed in Chapter 5 were used as the basis for an evaluation of the existing sanitary sewer trunk lines. Pipe sizes, lengths, slopes, and locations were determined from City records. The evaluation was limited to the main trunk lines conveying sewage through the basins. This approach was taken since most of the pipes within a basin will actually encounter only a fraction of the capacity of the pipe. Typical practice is to construct sewer lines with pipe no smaller than 8-inches in diameter. This facilitates solids conveyance, cleaning, and maintenance. In the upper ends of the drainage basins, flows do not approach the capacity of the 8-inch diameter pipes. Therefore, it is not necessary to model all of the smaller diameter pipes in the collection system.

The capacity of each mainline segment was estimated using Manning's equation. The adequacy of the main trunk sewers can be determined by comparing the capacity calculated using Manning's equation against the peak flow estimates for each basin (Table 5-7). This analysis was used to identify the following problem.

- Mainline D from Manhole D-010 to Manhole D-030 – This section of 10-inch trunk sewer is located on Ocean View Drive just south of the Main Pump Station. This section of piping lacks the capacity to convey existing peak flows and peak flows at buildout of the collection system.

6.3.2 Collection System Improvements to Serve Currently Undeveloped Areas

In addition to the sewers lacking capacity, there are a number of areas within the City that are currently undeveloped and/or areas that lack gravity sewer service. New gravity mainlines will need to be installed to serve underdeveloped or underserved areas as they develop. In some cases pump stations may be needed to convey wastewater to the existing system. Most municipalities require that mainlines serving these areas are to be installed at the expense of the developer. These lines should be sized as required to serve all upstream areas. In Yachats, drainage patterns and locations for new sewers is relatively obvious. Therefore, this plan does not show all future extensions. In general, the integrity of the sewer basin boundaries shown in Figure 4-2 should be maintained. As sewer service is extended into undeveloped areas of the City, some minor adjustments to the sewer basin boundaries may be needed. These are acceptable as long as they are relatively minor. Any major changes to the sewer basin boundaries that change the basin area by more than about 10% should only be approved if adequate downstream capacity is available.

6.3.3 Pump Station Capacity Analysis

There are a total of five wastewater pump stations in the collection system. The City collects run time data for each pump station. This data consists of the number of hours each day that each pump at each station was running. This data showed that all of the pump stations were able to convey the peak flows without the need to run the redundant pump. With the exception of the Main Pump Station, all of the City's stations are equipped with two pumps. The run time data showed that the second pump was not needed to convey peak flows to each station. Therefore, there was always a backup pump available which is needed to satisfy redundancy requirements. The Main Pump station has three pumps and the run time data never showed a time when all three pumps were running. Therefore, there was always a redundant pump available at the Main Pump Station as well. The run time data demonstrates that the pumps are adequately sized to convey existing peak flows.

The firm capacity of each station (Table 4-3) was compared against the peak flow from each sewer basin (Table 5-7) with the flows routed through the system as shown in Figure 4-1. This analysis showed that none of the pump stations lack the capacity to convey the existing peak flows or the peak flows anticipated at complete buildout of the collection system. Therefore, the capacity of the pump stations is adequate for the planning period and there is no need to improve the stations from a capacity standpoint. However, improvements to the pump stations will be needed during the planning period to address other issues that are mainly related to the age of the equipment. The recommended improvements are discussed below.

6.3.4 Force Main Capacity Analysis

Each of the five pump stations convey water through pressure force main pipes to the discharge locations. Each of these pipelines was analyzed with respect to their ability to convey peak flows at buildout of the upstream basin, as well as their overall age and ability to reliably serve the City for the remainder of the planning period. Pipe friction losses become problematic for pump station design when pipe velocities exceed about seven feet per second. At these pipe velocities, the power requirements to overcome the friction losses drive operating costs above acceptable levels. These pipe velocities also cause mechanical problems due to hydraulic pressure transients and excessive wear on valves and other similar pipe appurtenances. As such, the flow in each pipe segment that corresponds to a velocity of seven feet per second was considered to be the maximum capacity of each pipe segment.

All of the force main pipelines are adequately sized to convey the existing peak flows and the peak flows associated with complete buildout of the collection system. Therefore, improvements to address capacity issues are not needed.

The forcemain pipe for the Pontiac Pump Station and most the pipe for the Riverside Pump Station are the original AC pipes that were installed in 1974. About 270 feet of the Riverside Pump Station Forcemain was replaced in 2018 with HDPE pipe. The remaining 930 feet of the Riverside Pump Station Forcemain is the original 1974 pipe. The 1974 pipelines will be almost

70 years old at the end of the planning period. Of all of the City's forcemain pipes, these two pipelines are the oldest and will likely reach the end of their useful life the soonest. It is likely that the existing pipes will be sufficient for the remainder of the planning period. However, in an effort to be conservative, this plan does recommend replacing these two pipelines. However, these projects are assigned a relatively low priority ranking and the City may be able to delay these projects until the next planning period if no issues are observed. The recommended forcemain improvements are discussed in greater detail below.

6.3.5 Summary of Collection System Deficiencies

The known deficiencies described in Chapter 4 have been combined with the deficiencies described above to develop a complete list of collection system deficiencies. These are listed below (Table 6-1).

Table 6-1 | Summary of Collection System Deficiencies

Location (note 1)	**Problem Category**
Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270)	This piping is old concrete piping with poor joint integrity. I/I and root intrusion are known problems on this section of piping.
Mainline A Manhole A-040 to Manhole A-050	There is a belly on this section of line which is downstream of the Adobe Resort. The belly causes surcharging, debris accumulation, and maintenance problems.
Hanley Drive Sewer Upstream of Manhole C-150	This mainline pipe was constructed without manholes at the terminal end and at a 90-degree bend on Hanley Drive. As a result, it is not possible to clean or inspect these pipelines.
Mainline D Manhole D-010 to D-030	Lacks capacity to convey peak flows
Main Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Main Pump Station	Lacks a dedicated overflow pipe.
Main Pump Station – Automatic Control System	May reach end of useful life during planning period
Parkside Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Parkside Pump Station – Automatic Control System	May reach end of useful life during planning period.
Riverside Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Riverside Pump Station – Automatic Control System	May reach end of useful life during planning period.
Riverside Pump Station Forcemain	The segment installed in 1974 may reach end of useful life during planning period.
Pontiac Pump Station	Pump power cables do not include any disconnect plugs and an electrician is needed to remove the wiring from the pumps when service is required.
Pontiac Pump Station Forcemain	May reach end of useful life during planning period
Quiet Water Pump Station	Will likely reach the end of its useful life during the planning period.
Riverside, Pontiac, and Quiet Water Pump Stations	The City only has two portable backup generators that are used for these three stations. The City may want to consider purchasing a third generator for the system.

Note 1: See collection system maps in Appendix B for manhole numbering.

6.4 COLLECTION SYSTEM ALTERNATIVES

Facilities planning requires the examination of a broad range of alternatives for each portion of the wastewater system. This section examines the alternatives for collecting wastewater within the study area and conveying it to the point of treatment. This section develops and screens wastewater collection alternatives using criteria such as land requirements, topographic constraints, reliability, operational flexibility, construction and long-term O&M costs, and regulatory restrictions. The alternatives listed in this section represent the tools used in the facilities planning effort to address the previously listed deficiencies in order to provide a comprehensive long-term solution for the City's collection system.

6.4.1 No Action

The no action approach implies that no improvements will be made to the existing collection system (excluding maintenance or repairs). Obviously, this approach is recommended for those areas of the system which have sufficient capacity to convey the design flows and are in acceptable condition. Although this approach may be justified in isolated areas within the system on a case-by-case basis where there is insufficient capacity to convey peak design flows (i.e., minor surcharging for short periods of time), this approach is effectively eliminated by DEQ guidelines and regulations.

Although it is always an option to not improve the system, the result will be health risks, damage to existing facilities, sanitary sewer overflows, environmental pollution, compliance issues, and inconveniences where sewage collection and facilities are inadequate. Furthermore, delaying required improvements almost inevitably leads to a greater future problem. However, to ensure that system improvements are justified, it is necessary to consider the costs and advantages of proposed improvements against the risks entailed by the no action alternative. It should be noted that since resources are limited and the sewer system cannot be upgraded all at one time, the phasing plan adopted by the City for the improvements will in effect require that the no action alternative be adopted on a temporary basis for all but the first phase improvements.

6.4.2 Reroute Sewage

Under this scenario, sewage would be diverted or rerouted from one sewer basin or system to another. This approach is practical in cases where an existing sewer has capacity in excess of that needed to convey design flows from that basin, and where flow diversion is practical from a construction and topographic standpoint.

6.4.3 Upgrade Existing Facilities

This approach involves constructing replacement pipes or pump stations to provide adequate capacity for the design flows. This is the most obvious alternative since it provides assurance that the sewage collection system can convey the design flows through the City and that overflows will be kept to a minimum, which in turn limits the City's liability and health risks to residents.

6.4.4 Infiltration/Inflow Reduction

As stated previously, the collection system collects moderate amounts of I/I during the winter months. While reduction of the existing I/I flows and minimization of future I/I flows is important, experience in Western Oregon has shown that the goal of complete elimination of I/I is unreasonable and largely unattainable. For the purposes of this study, it was assumed that the recommended sewer collection system maintenance program (i.e., Program-1) will prevent increases in the amount of I/I that enters the existing collection system. In other words, no reduction in flows is assumed. This assumption is based on the idea that I/I reduction should be an ongoing work effort included in the City's maintenance budget indefinitely. This approach is recommended because as the I/I corrective work is performed, other areas in the collection system will continue to age and deteriorate and new I/I sources will appear over time. These new I/I sources will replace the I/I sources that were removed as a result of the corrective work. This assumption may turn out to be somewhat conservative. If so, future flow projections during the next planning cycle can be adjusted accordingly.

6.5 RECOMMENDED GRAVITY COLLECTION SYSTEM IMPROVEMENTS

The remainder of this section describes the recommended improvements to the collection system. Written descriptions are provided for each improvement project. The locations of the projects are shown in Figure 6-1 through Figure 6-3. These figures are included at the end of this section for formatting purposes. The recommended project budgets for each project are listed in Table 6-2. A detailed breakdown of the construction costs, contingency, design, and administration costs are included in Appendix C.

As noted previously, the recommended pipe sizes and capacities are based on complete buildout of the UGB in its current configuration. The decision to size pipelines to convey peak flows associated with buildout conditions is based on the fact that buried pipelines are not well suited for incremental expansion. In other words, it is more cost effective in the long-run to install pipelines sized for complete buildout of the upstream basin rather than for 20-year flow projections.

To address the I/I problems in the collection system, the I/I reduction plan (i.e., Program-1) is recommended. This program is discussed in greater detail above.

6.5.1 Improvements to the Gravity Collection System

This section includes a description of the recommended improvements to the gravity collection piping. As described above, most of the existing collection system piping is adequately sized to convey the peak flows at buildout of the study area. However, some of the main trunk lines are undersized and will need to be upsized. Some of the pipelines have known problems that are not related to capacity, but other problems such as grade issues, root intrusion, etc. The recommended improvements are discussed below.

- *Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270) - Project G-1*

This project is recommended to replace old concrete pipe with poor joint integrity that is susceptible to root intrusion and I/I. Rather than replacing the pipeline using open cut construction methods, the recommended improvements include lining the pipe with a cured in place fiberglass liner. This approach does not require open cut construction and will require much less disturbance than traditional open cut construction methods. The location of the pipeline is challenging because it is located in undeveloped side and back yards. The pipes are located in public right of ways or easements, but there are no roadways in the right of ways. The adjacent property owners tend to use the easements and right of way as extensions of their yards. Open cut construction would result in significant disturbance to the adjacent properties and would require the removal of three large spruce trees. The cured in place pipe avoids this disturbance. There are some pipe joints that are slightly offset in this section and the cured in place liner will not repair these. However, the offsets are fairly minor and not likely to result in clogging. The cured in place liner will stop the I/I that is entering through the joints and will stop future root intrusion. Since it eliminates the need for trenching, cured in place liners for these three pipe lengths is the recommended approach. The total recommended budget for this project is $140,000. A detailed breakdown of this budget is included in Appendix C.

- *Mainline A Manhole A-040 to Manhole A-050 - Project G-2*

This pipeline is located north of Marine Drive outside of any public right of way. The existing 12-inch diameter pipeline is known to have a large belly that collects debris and is a maintenance issue for the City. The recommended improvements include replacing the existing pipeline with a new 12-inch PVC pipeline in the same alignment but constructed with positive grade by open cut construction. The total length of this segment is approximately 475 feet. The project also includes the replacement of the manholes and reinstating the service laterals. The pipeline is located in the backyards of four homes. Therefore, the construction activities will be fairly disruptive to these properties and close coordination with the property owners is required. The project will require the removal and replacement of fences, and rehabilitation of landscaping. The total recommended budget for this project is $141,000. A detailed breakdown of this budget is included in Appendix C.

- *Mainline D Manhole D-010 to D-030, Ocean View Drive - Project G-3*

This pipeline segment is located on Ocean View Drive south of the Main Pump Station. The existing 10-inch diameter pipeline lacks the capacity to convey peak flows. The recommended improvements include replacing the existing pipeline with approximately 670 feet of new 15-inch diameter pipe. Ideally, it would be best to install this pipe in the same alignment as the existing pipe. However, the existing pipe may be too close to the existing 6-inch forcemain for the Main Pump Station. If these two pipelines were constructed in a common trench, then it is probably not possible to replace the gravity sewer in the same alignment. It is assumed that another corridor for the new gravity sewer can be found along this section of Ocean View Drive. However, this may be a challenge depending on the specific location of the waterlines and the 10-inch forcemain from the Main Pump Station. Very early in the design process, it would be wise to perform some utility potholing to verify the exact locations of all of the pipelines in the area. With this information it will be possible to verify the feasibly of open-cut installation of the new 15-inch gravity sewer. The total recommended budget for this project is $263,000. A detailed breakdown of this budget is included in Appendix C.

- *Hanley Drive Sewer Manholes - Project G-4*

This project is relatively straight-forward and includes installing manholes at the terminal end of the line in Hanley Street south of the 10th Street intersection as well as at the location where the mainline pipe makes a 90 degree turn west. This mainline pipe was constructed without manholes. As a result, it is not possible to clean or inspect this pipeline section. Should the line plug, the City will be forced to excavate and cut into the pipe to remove the plug. This would be time consuming and beyond a typical sewer cleaning process that is commonly performed by public works staff. The proposed manholes correct this problem and essentially bring the pipe up to current standards. The total recommended budget for this project is $25,000. A detailed breakdown of the budget is included in Appendix C.

- *Wastewater Collection System Design Standards - Project G-5*

Over the years, the City's collection system has been extended using a wide range of piping materials and sizes. Some pipelines have been installed at substandard grades and without manholes at appropriate locations. To prevent these types of problems, most cities publish design standards that can be provided to developers and other relevant parties. These standards not only clarify pipe sizing requirements, they also document the City's standards with respect to materials, service connections, manholes, etc. The lack of such standards in Yachats is a shortcoming the City can easily address. We recommend the City budget approximately $5,000 to retain an engineering firm to develop standards for future development of the wastewater collection system.

6.6 RECOMMENDED PUMP STATION AND FORCEMAIN IMPROVEMENTS

This subsection includes a description of the recommended improvements to the City's existing pump stations and force main piping. Where appropriate the various improvement alternatives that were considered are discussed along with the reasons for the selection of the preferred alternative.

- *Pump Station Disconnect Panel Improvements (Project P-1)*

None of the City's existing pump stations are equipped with disconnect plugs for the pumps. The pump power cables are hard-wired to the power supply equipment. The problem with this arrangement is that the City must hire an electrician to disconnect the pump power cables anytime a pump must be removed for service. Most modern pump stations have disconnect plugs at some location on the pump cables that enable utility workers to legally disconnect the power cables from the power supply system without the need for an electrician. To make the stations more operator friendly, new disconnect panels with plugs are recommended at all of the stations except for the Quiet Water Pump Station. As described below, the Quiet Water Pump Station should be upgraded early in the planning period. The disconnect panel for the Quiet Water Pump Station should be installed as part of the upgrade project (i.e., Project P-3). Therefore, Project P-1 includes the installation of disconnect panels at the other four pump stations. In general, the improvement should consist of a disconnect panel mounted near each pump station wet well. Plugs for the pump cables should be located on the bottom of the panel. The pump cables should be located in a secured, screened, raceway between the disconnect panel and the wet well. Given the limitations of public procurement rules, the most economical approach for the City will be to install disconnect panels at each station as a single project rather than doing the work one station at a time. A single package of design documents suitable for public bidding can be prepared and the installation work can be performed under a single construction contract. This will create an economy of scale and the overall cost should be lower than performing the work one station at a time. The total recommended budget for this project is $265,000. A detailed breakdown of this budget is included in Appendix C.

- *New Portable Generator (Project P-2)*

The Riverside, Pontiac, and Quiet Water Pump Stations are not equipped with permanent onside generators. The City currently has two portable generators that are used to power these three stations during a prolonged power outage. Operations staff is required to move the generators from station to station in order to prevent overflows. This is awkward and time consuming and the City should consider purchasing a third portable generator to make the system more user friendly. This generator can be located at the shops building and should be size to power all three pump stations to provide some redundancy. The total cost of the generator is estimated to be about $40,000.

- *Quiet Water Pump Station Improvements (Project P-3)*

The Quiet Water Pump Station was installed in the early 1980s, and while it has been well-maintained, it will likely reach the end of its useful life during the planning period due to age. Therefore, the City should plan to upgrade the station early in the planning period. The recommended improvements include a new wet well with a top slab and hatch, two new submersible pumps with discharge piping, a new valve vault, a new pump disconnect panel, and a new pump control panel with a manual transfer switch for a portable generator. Once the new station is operational, the old station can be decommissioned and demolished. The improvements should be designed with a firm capacity of 150 gallons per minute to match the capacity of the existing station. The new wet well should be installed next to the existing pump station. The existing station is relatively shallow. Therefore, it makes sense to replace the wet well rather than salvaging the existing wet well. This approach has the advantage of utilizing modern materials for the wet well structure and avoiding the need for bypass pumping. It is possible that the City will need to obtain a new easement for the new station, but it is assumed that the property owners will be willing to grant the easement at no cost to the City. The City could even offer the vacate the existing easement if it is no longer needed after the improvements are completed. In this way, the overall impact to the property owners can be minimized. The total recommended budget for this project is $493,000. A detailed breakdown of this budget is included in Appendix C.

- *Main Pump Station Improvements (Project P-4)*

The Main Pump Station was constructed in 2008. Therefore, the station is relatively new and in good condition. Most of the infrastructure will serve the City for the remainder of the planning period with the exception of the automatic control equipment and the pumps. By the end of the planning period, this equipment will be 30 years old which is beyond the typical lifespan of this equipment. Therefore, the City should plan to replace the pumps and the control system during the planning period. The recommended improvements include new pumps and a new control panel. The new pumps should be sized to match the capacity of the existing pumps. This station also lacks an overflow pipe. Therefore, this should be added as part of the improvement project. There is an existing 30 inch storm drainage pipe immediately south of the wet well. Is it envisioned that a new overflow pipe will be installed between the wet well and the 30 inch storm drainage pipe. In order to install the new control panel, the old control panel must be removed. Once the old control panel is removed, bypass pumping will be required since there will be no way to start and stop the pumps. Therefore, this project includes some budget for bypass pumping and the installation of a bypass pumping port in the existing valve vault. The total recommended budget for this project is $382,000. A detailed breakdown of this budget is included in Appendix C.

- *Parkside Pump Station Improvements (Project P-5)*

The Parkside Pump Station was installed in 2008. Most of the infrastructure should serve the City well for the remainder of the planning period with the exception of the pumps and the automatic control system. The pumps and automatic control system will be more than 30 years old at the end of the planning period. This is far beyond the typical design life for these facilities. Therefore, the City should plan to upgrade the station during the planning period. The proposed scope of the improvements is very similar to that proposed for the Main Pump Station and includes new pumps and a new control panel. The total recommended budget for this project is $218,000. A detailed breakdown of this budget is included in Appendix C.

- *Riverside Pump Station Control System Improvements (Project P-6)*

The Riverside Pump Station was installed in 2008. Most of the infrastructure should serve the City well for the remainder of the planning period with the exception of the pumps and the automatic control system. The pumps and automatic control system will be more than 30 years old at the end of the planning period. This is far beyond the typical design life for these facilities. Therefore, the City should plan to upgrade the station during the planning period. The proposed scope of the improvements is very similar to that proposed for the Main Pump Station and includes new pumps and a new control panel. The total recommended budget for this project is $218,000. A detailed breakdown of this budget is included in Appendix C.

- *Pontiac Pump Station Improvements (Project P-7)*

The Pontiac Pump Station was installed in 2008. Most of the infrastructure should serve the City well for the remainder of the planning period with the exception of the pumps and the automatic control system. The pumps and automatic control system will be more than 30 years old at the end of the planning period. This is far beyond the typical design life for these facilities. Therefore, the City should plan to upgrade the station during the planning period. The proposed scope of the improvements is very similar to that proposed for the Main Pump Station and includes new pumps and a new control panel. The total recommended budget for this project is $218,000. A detailed breakdown of this budget is included in Appendix C.

- *Pontiac Pump Station Forcemain Improvements (Project F-1)*

The Pontiac Pump Station Forcemain is the original pipeline that was installed in 1974. By the end of the planning period, this pipeline will be almost 70 years old. It is possible that this pipeline will reach the end of its useful life toward the end of the planning period. If not, this project can be delayed to the next planning period. This project is relatively straight-forward and includes the installation of a new 4-inch forcemain adjacent to the existing forcemain. Once the new pipe is installed, the old forcemain pipe can be abandoned in place. The total length of the pipeline is about 575 feet. The total recommended budget for this project is $80,500. A detailed breakdown of this budget is included in Appendix C.

- *Riverside Pump Station Forcemain Improvements (Project F-2)*

Most of the Riverside Pump Station Forcemain is the original pipeline that was installed in 1974. Approximately 270 feet of the line on Highway 101 between East 2nd Street and East 3rd Street was replaced with HDPE pipe in 2018. The remaining 930 feet of this pipeline is the original pipe that was installed in 1974. By the end of the planning period, this pipeline will be almost 70 years old. It is possible that this pipeline will reach the end of its useful life toward the end of the planning period. If not, this project can be delayed to the next planning period. This project includes the installation of a new 8-inch forcemain adjacent to the existing forcemain. The existing forcemain is 6-inches in diameter. The larger 8-inch diameter forcemain is recommend to provide the City with some flexibility should the flow projections included herein turn out to be low. Most of the pipeline will need to be installed in the Highway 101 right of way. Due to the traffic control requirements and other requirements that will be imposed by ODOT, this project will be much more expensive than a typical pipeline project in a City right of way. The cost difference between a 6-inch pipe and an 8-inch pipe is fairly minor compared to the trenching, traffic control, and surface restoration costs required for this particular project. As such, the benefits of installing a slightly larger pipe seem worth the minor additional cost. The total length of the pipeline is about 930 feet. The total recommended budget for this project is $326,000. A detailed breakdown of this budget is included in Appendix C.

6.7 SUMMARY OF RECOMMENDATIONS

The recommended improvements described above are summarized in Table 6-2 below and are shown in the figures below. These improvements will result in a sewage collection system with the capacity needed to convey flows from within the planning area assuming development to current zoning densities.

The improvements address existing deficiencies, as well as potential deficiencies may potentially arise during the planning period. Only the improvements that address the existing deficiencies are required at this time. The remaining deficiencies are largely related to aging infrastructure. If some of these facilities are able to be maintained effectively, some of the age-related improvements may be deferred to the next planning period. The improvements are prioritized in Chapter 8.

The improvements recommended in this chapter are based on the existing land use zoning and UGB. If the service area limits or community growth boundaries are to be expanded in the future, the sewer system should be re-examined to determine where additions are needed and if alternate projects are justified.

Table 6-2 | Recommended Collection System Improvements

Project Code	Project Description	Recommended Diam./Capacity	Length	Project Cost
Gravity Collection System Improvements				
G-1	Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270)	8	360	$140,000
G-2	Mainline A Manhole A-040 to Manhole A-050	12	475	$141,000
G-3	Mainline D Manhole D-010 to D-030, Ocean View Drive	12	670	$263,000
G-4	Hanley Drive Sewer Manholes	N/A	N/A	$25,000
G-5	Wastewater Collection System Design Standards	N/A	N/A	$5,000
Pump Station and Forcemain Improvements				
P-1	Pump Station Disconnect Panel Improvements	N/A	N/A	$265,000
P-2	New Portable Generator	N/A	N/A	$40,000
P-3	Quiet Water Pump Station Improvements	N/A	N/A	$493,000
P-4	Main Pump Station Improvements	2.3 MGD	N/A	$382,000
P-5	Parkside Pump Station Improvements	0.6 MGD	N/A	$218,000
P-6	Riverside Pump Station Improvements	0.85 MGD	N/A	$218,000
P-7	Pontiac Pump Station Improvements	0.22 MGD	N/A	$218,000
F-1	Pontiac Pump Station Forcemain Improvements	4 inch	575	$121,000
F-2	Riverside Pump Station Forcemain Improvements	8 inch	1200	$326,000
General Collection System				
Pgm-1	Annual Sewer Collection System Rehabilitation Program (Program – 1)	-	-	$30,000 per year

Figure 6-1 | Recommended Improvements to the City's Collection System - North

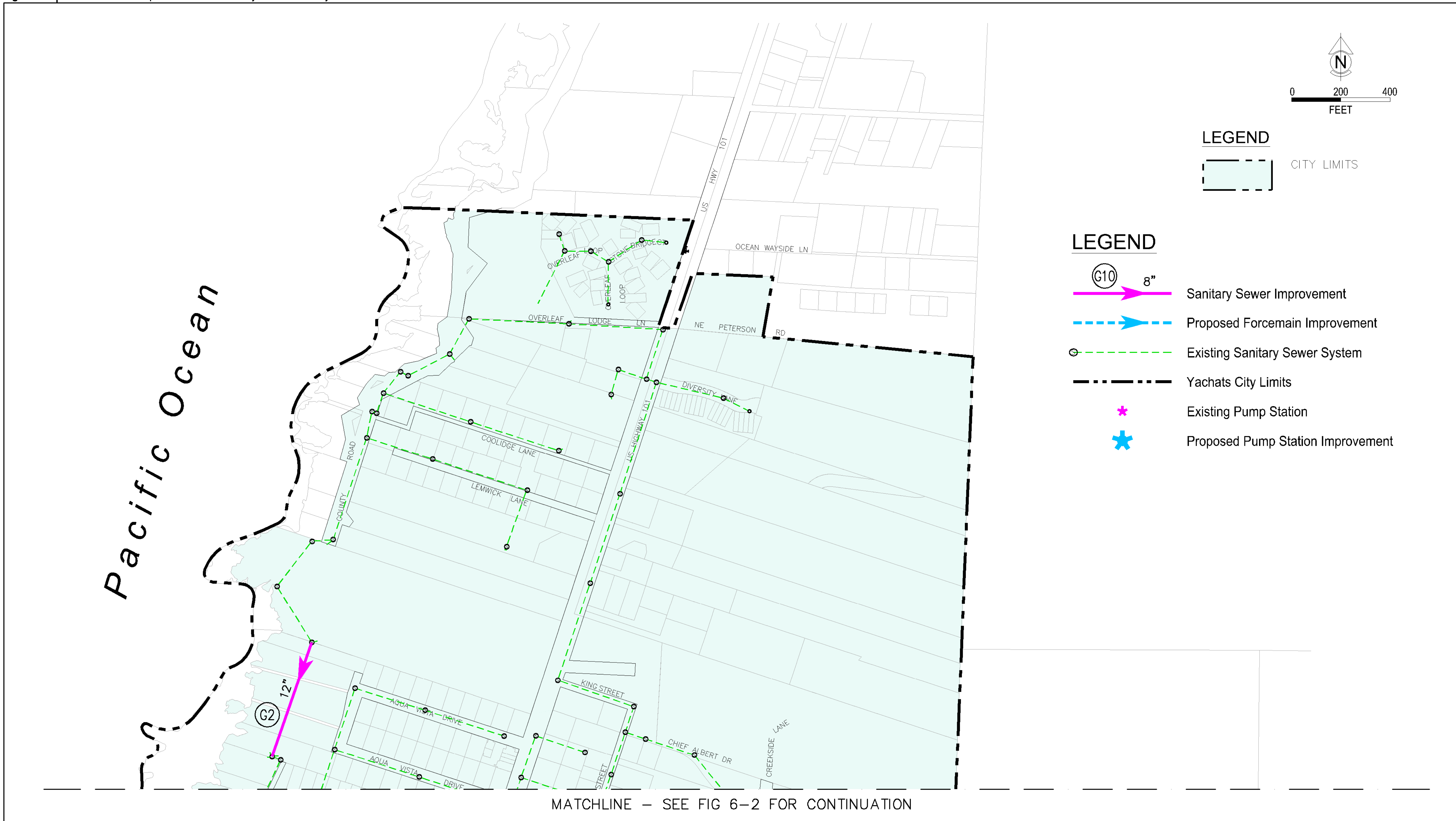


FIGURE 6-1

Figure 6-2 | Recommended Improvements to the City's Collection System – North Central

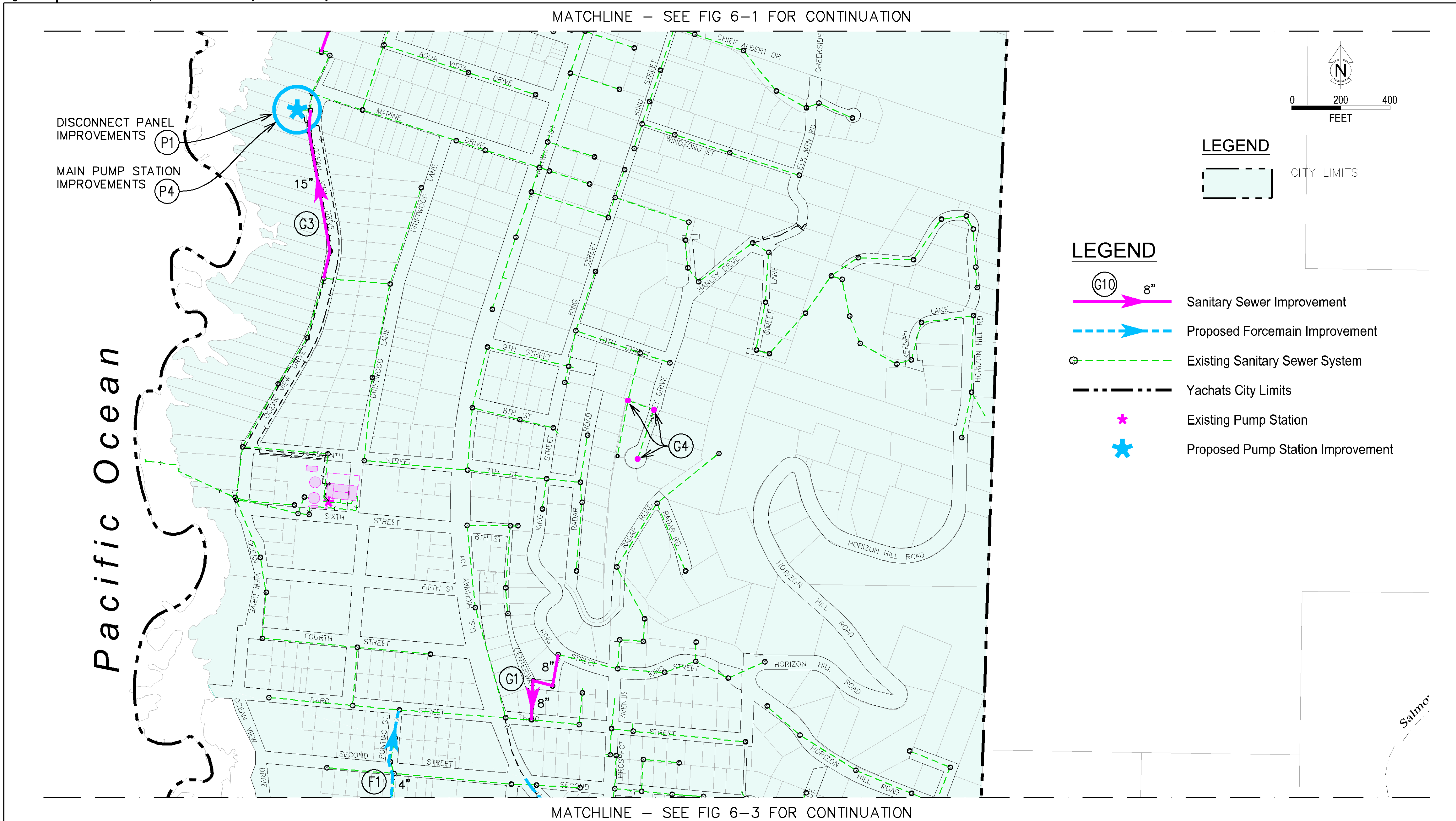


FIGURE 6-2

Figure 6-3 | Recommended Improvements to the City's Existing Collection System – South Central

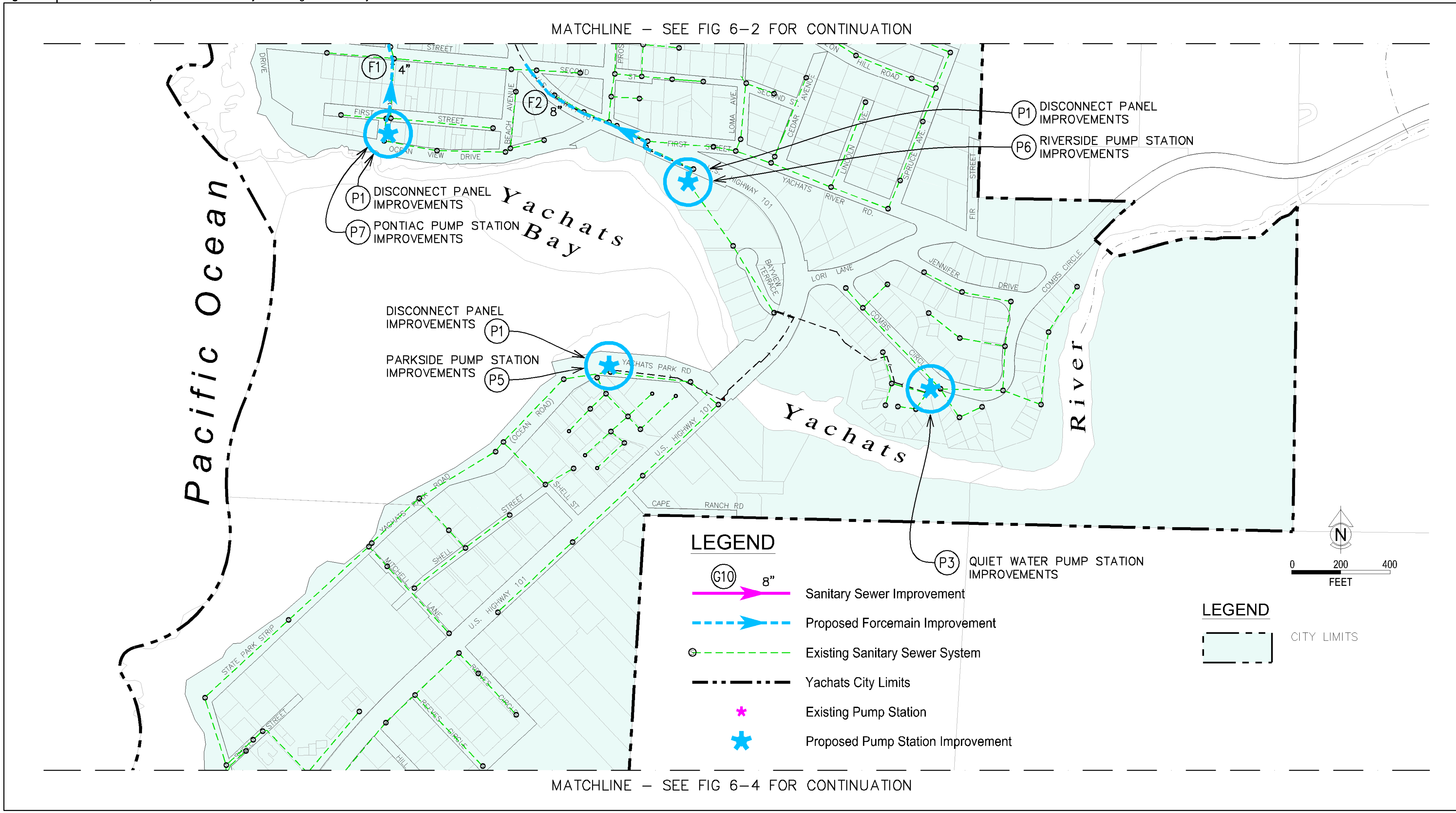


FIGURE 6-3

CHAPTER 7

TREATMENT SYSTEM EVALUATION

Chapter Outline

TREATMENT SYSTEM EVALUATION

7.1 INTRODUCTION

Chapter 4 includes a listing of existing treatment system deficiencies (Section 4.5.3). This chapter builds on the information from Chapter 4 by evaluating the existing treatment system with respect to future flows and loads. The deficiencies identified in Chapter 4 are first summarized. This is followed by an analysis of the existing treatment and disposal system with respect to future flows and loads. The purpose of this analysis is to identify treatment system components that are likely to become deficient during the planning period as a result of increased flows and loads due to growth. A comprehensive list of existing and projected shortcomings is then presented.

The second portion of this chapter includes a listing of the recommended improvements to address each deficiency.

7.2 EXISTING TREATMENT SYSTEM DEFICIENCIES

For completeness, the treatment system shortcomings identified in Chapter 4 are listed in this subsection. These shortcomings include the following items.

- The shelter over the headworks structure has corrosion problems that will get worse during the planning period and will need to be addressed.
- The City may want to consider installing baggers to contain the screenings and grit that is removed at the headworks. This will improve overall sanitation and reduce problems from insects and other pests.
- The tractor used to load biosolids into the City's dump trucks will likely reach the end of its useful life during the planning period. Therefore, the City should plan to purchase a new tractor during the planning period.
- Several components (e.g., metal siding panels, doors, and metal roof) of the solids handling building are corroding. This problem will worsen in the coming years and the City should plan to make upgrades during the planning period.
- Some of the mechanical and electrical equipment used throughout the plant (e.g., valve, actuators, variable frequency drives, etc.) will likely reach the end of their useful life during the planning period due to normal wear and age.
- The SBR diffuser membranes will likely reach the end of their useful life during the planning period due to normal wear and age.
- The automatic control system for the UV disinfection equipment will likely reach the end of its useful life during the planning period.
- The diffuser membranes in the aerobic digester and sludge storage tank will likely reach the end of their useful life during the planning period due to normal wear and age.

- The concrete surfaces of the aerobic digester are corroding and the City should consider coating the walls of the tank during the planning period.
- The air supply system for the aerobic digester and the sludge storage tank lacks automatic control functionality which makes it more difficult to control the digestion process, and this leads to operational problems like foaming and excess power consumption.

7.3 TREATMENT SYSTEM EVALUATION

This section includes a quantitative evaluation of the treatment plant with respect to the projected wastewater flows and loadings. The purpose of this analysis is to identify treatment system components that are likely to become deficient during the planning period as a result of increased flows and loads due to population growth.

7.3.1 Headworks

The headworks consists of the fine screen, the grit removal system, two influent flow measurement flumes, the flow meter, and the automatic sampler. These facilities were constructed in 2008 and are relatively new and in good condition. These facilities are designed for a peak flow of about 2.6 MGD. The projected peak flow at the end of the planning period is about 2.7 MGD. While this number is slightly greater than the design capacity of the existing facility, it is unlikely to be a problem during the planning period. The projected flow is only 4% greater than the design capacity of the facilities. This is not enough to cause any problems. Also, the flow projection methodology used in Chapter 5 is fairly conservative and tends to overestimate the actual flows. Therefore, it is very unlikely that improvements to address capacity issues will be needed during the planning period. During the 20-year planning period, some of the mechanical equipment such as the motors that operate the screen and the grit removal equipment may need to be replaced due to age. However, this type of work is generally considered to be maintenance and should be included in the City's current O&M budget rather than listed as a capital improvement project.

7.3.2 Secondary Treatment Process

Sequencing batch reactors (SBRs) are used to provide secondary treatment at the plant. The SBR tankage and piping were constructed in 2008, are in good condition, and should serve the City well for the remainder of the planning period. As noted above, some of the mechanical and electrical systems will likely reach the end of their useful life due to age and need to be replaced, But, the major structural and mechanical elements should serve the City well for the remainder of the planning period.

The design capacity of the secondary treatment process is listed below (Table 7-1) along with the projected design criteria at the end of the planning period. A comparison of the projected flows to the existing flows shows that the plant may be operating near its hydraulic capacity at the end of the planning period. From a practical perspective, the plant will likely be able to provide adequate treatment for the entire planning period. This is because the projected flows are simply not much greater than the design capacity of the plant. However, from a planning perspective, the City should plan for a plant expansion near the end of the planning period. It is better to be prepared for a plant expansion and not need it rather than need it and not be prepared. It is very likely that this project will not be needed and can be delayed into the next planning period (i.e., beyond 2041). For this reason, the plant expansion will be given a relatively low priority ranking in Chapter 8. The City should be able to monitor flows over the course of the planning period and can increase the priority ranking of the expansion project if needed. The recommended improvements are described later in this section.

Table 7-1 | Existing Treatment Plant Capacity Evaluation

Wastewater Flow	Existing Capacity	2041
MMDWF	• 0.33 MGD	• 0.37 MGD
MMWWF	• 0.51 MGD	• 0.52 MGD
PDF	• 1.96 MGD	• 1.64 MGD
PHF	• 2.64 MGD	• 2.71 MGD
BOD Loading	**Existing Capacity**	**2041**
Average Annual	• 600 PPD	• 442 PPD
Maximum Month	• 995 PPD	• 569 PPD

7.3.3 Equalization Basin and UV Disinfection

The equalization basin and the UV disinfection system are designed to convey and disinfect about 2.0 MGD. The peak day flow and the peak hour flow at the end of the planning period are about 1.6 MGD and 2.7 MGD respectively. Therefore, the capacity of the equalization basin and the UV disinfection system is slightly less than the projected peak hour flow to the plant. However, since the SBR treatment cycles are longer than one hour, the peak hour flow will be attenuated through the SBRs and the EQ basin. The volume of the equalization basin is greater than the volume decanted from the SBRs under peak flow conditions and the basin has the storage volume needed to reduce the peak flows below 2.0 MGD. As such, the existing system should be sufficient to convey and treat the flows at the end of the planning period. Therefore, these systems should serve the City for the remainder of the planning period with proper maintenance and periodic replacement of bulbs and other wear items. The costs for this maintenance should be included in the City's normal O&M budget. As noted above (Section 7.2), the automatic control system for the UV equipment will likely reach the end of its useful life during the planning period. Therefore, the City should plan to replace this equipment at some point. The recommended improvements are discussed below.

7.3.4 Outfall Pipe

An analysis of the hydraulic capacity of the outfall pipeline from the UV channel to the ocean was performed. Based on this analysis, the pipeline has the capacity to convey about 1.75 MGD without flooding the UV chamber. As described in the previous paragraph, the peak discharge rate from the plant at the end of the planning period will be about 2 MGD. Since the pipeline cannot convey this amount, upgrades are needed during the planning period. Fortunately, the segment of pipe that is west of Ocean View Drive does have sufficient capacity. The problem is with the 10-inch pipe segment between the treatment plant site and Ocean View Drive. The recommended improvements are discussed below.

7.3.5 Aerobic Digester and Sludge Storage Tank

The aerobic digester and sludge storage tank were designed to provide about 110 days of solids storage at a solids content of 2% and a plant BOD loading rate of 600 pounds per day (Table 4-6). The projected BOD loading rate at the end of the planning period is estimated to be about 440 pounds per day (Table 5-9). Since the projected BOD loading rate at the end of the planning period is significantly less that the design BOD loading rate, the aerobic digester and sludge storage tank should be sufficiently sized for the remainder of the planning period and no improvements should be needed to increase the capacity of the two tanks.

7.3.6 Sludge Dewatering System

The City currently uses a screw press to dewater the digested sludge prior to disposal. The dewatered sludge is either sent to a landfill or hauled to another treatment facility (Heard Farms, Inc.) for disposal. In recent years, the City has operated the screw press about 50 days each year. Over the planning period, the solids and organic loading rates are expected to increase by a factor of about 1.3. Therefore, the screw press will need to operate about 65 days each year at the end of the planning period. This amount of use is considered reasonable and there is no reason from a capacity standpoint to replace the screw press.

7.3.7 Sludge Disposal Practices

The City currently disposes of dewatered biosolids by hauling it to another treatment facility (Heard Farms, Inc.) located in Douglas County. The City currently disposes about 30 dry tons of biosolids per year. This value is expected to increase by 30% over the planning period. As the amount of biosolids increases, it will become more challenging for the City to adequately dispose of it. Therefore, the City should plan to develop additional disposal strategies during the planning period. The recommendations for accomplishing this are discussed below.

7.4 SUMMARY OF TREATMENT SYSTEM DEFICIENCIES

Having been constructed in 2008, the treatment facilities are relatively new and in good condition. The previous subsection (Section 7.3) includes a brief analysis of the plant with respect to its ability to treat and dispose of the future flows and loadings anticipated during the planning period. As expected, most of the facilities are sufficient to meet the City's needs for the duration of the planning period. The flow and loading projections show that additional secondary treatment capacity may be needed toward the end of the planning period. This makes sense since the treatment plant was designed in 2008 for 20 year flow projections (i.e., 2028 flows). The planning period for this facilities plan ends in 2041. Therefore, it makes sense that the secondary treatment capacity may need to be expanded because the end of the planning period is several years beyond the original design year for the plant. In addition the potential need for increased secondary treatment capacity, a number of existing shortcomings were also identified in Chapter 4 (see section 7.2). For the sake of completeness, all of the existing and projected deficiencies are summarized in Table 7-2.

Table 7-2 | Summary of Treatment System Deficiencies

Deficiency Number	Description
D-1	The shelter over the headworks structure has corrosion problems that will get worse during the planning period and will need to be addressed.
D-2	The solids handling building has corrosion problems that will get worse during the planning period and will need to be addressed.
D-3	The public works building has corrosion problems that will get worse during the planning period and will need to be addressed.
D-4	The City should consider installing baggers for the fine screen and grit removal system at the headworks to improve sanitation and simplify operations.
D-5	Some of the mechanical and electrical equipment used throughout the plant (e.g., valve, actuators, variable frequency drives, etc.) will likely reach the end of their useful life during the planning period due to normal wear and age.
D-6	The automatic control system for the UV disinfection equipment will likely reach the end of its useful life during the planning period.
D-7	The SBR diffuser membranes will likely reach the end of their useful life during the planning period due to normal wear and age
D-8	The diffuser membranes in the aerobic digester and sludge storage tank will likely reach the end of their useful life during the planning period due to normal wear and age.
D-9	The tractor used to load biosolids into the City's dump trucks will likely reach the end of its useful life during the planning period.
D-10	The City should develop additional strategies for sludge disposal to deal with the anticipated quantity increases during the planning period
D-11	The 10 inch segment of the outfall pipeline between the treatment plant and Ocean View Drive lacks the capacity to convey peak flows at the end of the planning period.
D-12	The sequencing batch reactors may lack the capacity to treat the projected flows at the end of the planning period
D-13	The air supply system for the aerobic digester and the sludge storage tank lacks automatic control functionality which makes it more difficult to control the digestion process, leads to operational problems like foaming, and leads to excess power consumption.
D-14	The concrete surfaces of the aerobic digester and sludge storage tank are corroding and the City should consider coating the walls of the tank during the planning period.

7.5 TREATMENT PLANT IMPROVEMENT ALTERNATIVES ANALYSIS

As described in the following sections, the recommended treatment system improvements are relatively straight-forward and obvious. As such, detailed alternatives analyses are not needed for this planning effort. The treatment plant was constructed in 2008 and is relatively new and in good condition. As such, the recommended improvements are needed to maintain, and make minor modifications to the existing treatment operation. Detailed alternatives analyses are typically performed for major treatment plant upgrades like constructing a new treatment plant in a new location or changing from one treatment technology to another (e.g., wastewater lagoons versus activated sludge). In the case of Yachats, the existing treatment facilities are fairly new and functional and there are no compliance issues are reasons to perform major upgrades that would necessitate a detailed alternatives analysis.

7.6 RECOMMENDED TREATMENT PLANT IMPROVEMENTS

This subsection includes a description of the recommended improvements to the City's wastewater treatment plant. These improvements are needed to address the deficiencies listed above in Table 7-2. Cost estimates for these improvements are listed in Table 7-3. The recommended improvements are based on the flow and loading projections presented in Chapter 5. These projections are fairly conservative. As such, some of the improvements may not be required during the planning period. Only the improvements that address the existing deficiencies are required at this time. The need for the additional SBR basin is growth dependent. As such, it may not be needed during the planning period. The improvements are prioritized in Chapter 8.

- *Headworks and Grit Removal Baggers (Project T-1)*

This project is relatively small and straight-forward and includes the installation of new baggers for the headworks screenings and grit. This project addressed deficiency D-4 in Table 7-2. At the present time, these materials drop into trash cans and are not contained within the cans. The screenings and grit create odors and attract nuisance pests. Baggers keep these materials contained in bags thereby reducing odors, improving sanitation, and improving overall worker safety. The baggers can be purchased from the original equipment manufacturers. Operations staff should be able to purchase the baggers and install them without needing assistance from a contractor. The total recommended budget for this project is $10,000.

- *SBR and Digester Diffuser Membrane Replacement (Project T-2)*

This project is recommended to address deficiencies D-7 and D-8 in Table 7-2. The aeration system in the SBR and digester tanks consists of rubber membranes that wear over time. The typical life of these membranes is about 10 years. The existing membranes are older than this and are reaching the end of their useful life. Therefore, the City should plan to replace the membranes early in the planning period. As the membranes age, the air bubbles tend to get larger and less evenly distributed in the tanks. This reduces the oxygen transfer efficiency which ultimately drives up power costs. Therefore, replacing the membranes will have the benefit of reducing power consumption costs. The membranes are typically purchased from the original equipment manufacturers and installed by public works staff without assistance from a contractor. The installation process requires draining and cleaning the tanks. Therefore, the membranes in each tank can only be replaced one tank at a time and the process may need to span multiple years. Based on discussions with the diffuser manufacturer, the current purchase price of the membranes is $12.00 each. In the two SBR tanks, the aerobic digesters, and the sludge storage tank, there are a total of 1,022 membranes that need to be replaced. Therefore, the total purchase price is about $12,300. As the work proceeds, it is likely that miscellaneous repairs of the aeration piping and other similar mechanical repairs will be required. Therefore, some additional budget should be allocated for this project. A total recommended budget of $15,000 is reasonable for planning purposes.

- *New Tractor for the Treatment Plant (Project T-3)*

This project addresses deficiency D-9 in Table 7-2. A small tractor is used at the treatment plant to manage biosolids and perform other chores. The tractor is old, in poor condition, and will likely reach the end of its useful life during the planning period. As such, the City should budget to replace the tractor in the coming years. The total recommended budget for this item is $35,000.

- *Public Works Building, Headworks Shelter, and Solids Building Rehab. (Project T-4)*

This project addresses deficiencies D-1, D-2, and D-3 in Table 7-2. Corrosion of these structures is a problem that the City will need to address during the planning period. The entire headworks shelter is in poor condition including the roofing and the structural framing members. Most treatment facilities do not have similar shelters over the headworks area. Shelters are convenient, but not needed. The exterior coastal environment is hard on metal building materials, and replacing the headworks structure with long-lasting materials would be expensive. Since the shelter is not necessarily needed, the recommended improvements include removing the shelter altogether without replacement. With a few minor exceptions, the metal frames of the public works and solids handling buildings are in good condition and should serve the City for the remainder of the planning period. The metal roofing on the public works and solids handling buildings is failing and will need to be replaced during the planning period. The overhead doors on the public works and solids handling buildings are failing and will need to be replaced during the planning period. The metal siding panels and exterior metal trim elements on both buildings are also showing signs of corrosion and the City should consider replacing all of the panels during the planning period. These panels consist of an interior and exterior metal skin over a foam insulation board. On several of the panels, the metal skin is separating from the foam board which allows water penetration that increases corrosion rates. As such, it is likely that all of these panels will eventually fail and need to be replaced. Replacing these panels will be a major construction effort that will basically require removing and replacing the exterior walls of both buildings. This will be disruptive to the operations staff and it will likely be necessary to temporarily move out of the public works building while the work is occurring. All new materials will need to be carefully selected by qualified professionals to ensure that high quality materials and coating systems are used that can withstand the harsh coastal environment. Several manufactures offer metal roofing, doors, and siding that are manufactured from materials and coating systems that are suitable for a coastal environment. Therefore, it should be possible to rehabilitate the metal buildings rather than replacing them. That said, building material costs are fairly dynamic and the City may discover that the costs to replace the wall panels with new metal panels is comparable to the cost of installing masonry walls. If this proves to be the case, masonry walls would be the better choice for corrosion resistance. This project is presented as a single project in this plan because it will be more cost effective to perform this work as a single project. However, the City may need to break the project into smaller sub-projects for cash flow purposes. For example, the overhead doors and metal roofing can be replaced as individual sub-projects prior to replacing the metal siding panels. A detailed cost estimate for this work is presented in Appendix C. The costs for each of the project elements is listed in the estimate should the City choose to implement this project as separate sub-projects. The total recommended budget for this work is $700,000.

- *Outfall Pipeline Improvements (Project T-5)*

The existing 10-inch diameter outfall pipe from the treatment plant to Ocean View Drive lacks the capacity to convey projected peak flows that are expected during the planning period (deficiency D-11, Table 7-2). The recommended improvements include replacing the existing pipeline with a new 12-inch PVC pipeline in the same alignment as the existing pipe. The total length of this segment is approximately 260 feet. It is envisioned that this section of pipe can be replaced using conventional open-cut construction methods. The total recommended budget for this work is $96,000. A detailed breakdown is included in Appendix C.

- *Biosolids Drying Beds (Project T-6)*

This project is recommended to improve the biosolids disposal options for the City (deficiency D-10, Table 7-2). Biosolids disposal is an ongoing effort for operations staff that can be time consuming and challenging. At the present time, the City disposes of dewatered biosolids by hauling it to another treatment plant in Douglas County. This method is currently sufficient. However, as the City grows and the quantities of biosolids increase, disposal will become more challenging. Likewise, if there are policy changes with management of the treatment plant in Douglas County, the City may someday be forced to find other options. Therefore, the City should plan to develop other biosolids disposal strategies during the planning period. During the summer months, it is possible to further dry the dewatered solids in drying beds prior to disposal. This decreases the volume of solids that must be hauled and thereby reduces disposal costs. The City currently has a makeshift drying bed at the treatment plant that is used for this purpose. Biosolids are currently dried by placing on the asphalt surface between the digester tank and the headworks. Unfortunately, this area is too small to accommodate the solids from an entire digester dewatering run and the asphalt surface is somewhat challenging to clean after the drying is complete. To increase the amount of biosolids that can be dried, this project includes the construction of a dedicated drying bed located on the south side of the UV shelter. With these improvements, the City should be able to dry the solids from an entire digester run which will improve the overall disposal capabilities. The total recommended budget for this work is $158,000. A detailed breakdown is included in Appendix C.

- *New Biosolids Disposal Site Acquisition (Project T-7)*

As described in Section 4.5.2.11, the City's existing biosolids disposal practices are currently sufficient. However, as the City grows and the quantity of biosolids increases, finding adequate disposal methods will become more challenging. Also, if there are any policy changes with the management of the treatment plant in Douglas County, the City might be forced to find other disposal options. The City currently has an approved land application site about 8 miles from the treatment plant on Yachats River Road. However, the current property owner is not particularly interested in receiving biosolids at this time. Therefore, the site is not a reliable disposal option and the City should consider finding alternative sites. The City may want to start by having discussions with the owner of the Yachats River Road Site to see if there are some improvements the City could make to the property in order to make biosolids disposal more attractive to the owner. The goal of these discussions should be to establish a long-term written agreement with the property owner. If an agreement with the owner of the Yachats River Road Site cannot be reached, the City should then consider locating another site. The process of obtaining authorization for new biosolids disposal sites includes first reaching an agreement with the local property owner, then preparing a biosolids management plan in accordance with DEQ guidelines that has the proper site authorization request paperwork. In most cases, land owners are willing to accept the biosolids for their value as fertilizer and cities do not typically compensate the land owners. The fertilizer benefit is usually sufficient compensation. The process of preparing a biosolids management plan and obtaining the needed site authorizations can be time consuming and somewhat costly, but is something that should only need to be performed once during the planning period. There are some other fields along Yachats River Road that would be good options. However, based on discussion with City staff, none of the property owners have traditionally been receptive to receiving biosolids. As such, the City may need to look at fields that are further from the City. There are several fields in the Florence area and along Highway 34 that are potential options if a receptive property owner can be found. For planning purposes, the recommended budget to find a new disposal site is $50,000. This includes some budget for consulting costs and labor to develop new agreements with other land owners, and prepare a new biosolids management plan. At this time, it is difficult to accurately estimate the work effort involved to find a new site. So, to some degree, the budget for this project is a “placeholder.” The actual costs are likely to vary.

- *Biosolids Manure Spreader (Project T-8)*

As described above for Project T-7, the City will likely need to locate a new site for the disposal of biosolids by land application during the planning period. Once the site is located and permitted, the City will need the equipment to haul and spread biosolids at the site. At the present time, the City does not have this equipment. Manure spreaders are typically used to distribute dewatered biosolids on fields. Manure spreaders can either be towed behind a tractor or can be truck-mounted. The costs for a small tow-behind spreader are about $40,000 while the costs for a small truck-mounted unit are about $100,000. With the tow behind option, the City would need transport the spreader to the site, use a dump truck to haul biosolids to the site, transfer the biosolid from the dump truck into the spreader, and use a tractor to move and operate the spreader. A medium to large size tractor would be required. The PTO power for even the smallest tow-behind spreaders is at least 60 horsepower. This tractor size is quite a bit larger than the tractor needed at the treatment plant (See Project T-3). Therefore, the City would need to acquire another larger tractor in order to use a tow-behind spreader. A more cost-effective option may be to purchase a truck-mounted spreader. These are more costly than the tow-behind units. However, the dewatered biosolids can be directly loaded into the spreader at the treatment plant and the truck-mounted unit can be driven to the site and used directly to distribute the biosolids. The truck-mounted unit significantly decreases the labor, handing requirements, and the equipment needed for the task. Just considering biosoilds disposal, the truck mounted unit is the most efficient option. However, considering other needs of the public works department, a larger tractor for road maintenance or similar public works activities may make sense for the City. In which case, a tow-behind spreader may be a better choice. For planning purposes, this plan recommends the acquisition of a truck-mounted spreader. However, it may make sense for the City to use these funds to purchase a tow-behind unit and a larger tractor. This decision can be made after the land application site is located and a more thorough evaluation can be performed to determine the best long-term option for the City. For now, a budget of $100,000 is recommended for the acquisition of a truck-mounted spreader.

- *Aerobic Digester and Sludge Storage Air Supply System Improvements (Project T-9)*

As described in Section 4.5.2.8, the air supply system for the aerobic digester and the sludge storage tank is a shared system that lacks the ability to automatically control the air supply to the individual tanks. Between the aerobic digester and the sludge storage tank, there are a total of five sub-tanks that are used to digest the sludge in a sequential manner. Since the sludge age in each tank is very different, the air demands in each tank are also different. With the current air supply system, the air can be automatically turned on or off for all of the tanks at once. There is no way to automatically turn the air on and off for each of the five tanks. This creates operational problems described in Section 4.5.2.8. Air is supplied to the five tanks from three blowers that are connected to a single pipe that feeds all five tanks. A more ideal system would be to have a dedicated blower for each of the five tanks. While ideal, this would be costly and other options are available. The recommended improvements include modifying the air piping in the blower room, and the underground air piping immediately outside the blower room, so that one of the three blowers can be dedicated to the sludge storage tank and two blowers can be dedicated to the aerobic digester. This requires the installation of an isolation valve and a new tee in the manifold piping inside the blower room. A new discharge pipe will also need to be installed from the new tee and connect to the underground air piping that supplies air to the aerobic digester. The piping improvements should be designed so that all three blowers remain connected by a manifold so that a valve can be opened to supply air to the sludge storage tank from the digester blowers (and vice versa) in the event of a blower failure. This will provide the required redundancy in the air delivery system. When the piping modifications are completed, the plant control system can then be re-programed to start and stop the sludge storage tank blower based on timer settings that are selected by the operations staff. In order to provide control for the air supply to the individual digester tanks, new motor-actuated air control valves need to be installed on the aeration pipes feeding each tank. A total of seven 4-inch actuated valves are required. The plant control system, can then be re-programmed to open and close these valves based on timer settings selected by the operations staff. The plant control system can also be programmed to increase or decrease the digester blower speeds depending on the number of digester valves that are open. The total recommended budget for this work is $223,000. A detailed breakdown is included in Appendix C.

- *Aerobic Digester and Sludge Storage Tank Coating & Piping Improvements (Project T-10)*

The Aerobic Digester tank was constructed in 1974 and the Sludge Storage tank was constructed in the mid 1980s. Overall, the tanks are in good condition and should serve the City well for remainder of the planning period. There is some corrosion of the concrete surfaces inside the tanks exposing some of the aggregate (Deficiency D-14, Table 7-2). At the present time, the corrosion is not advanced to the point of causing any structural concerns. But, the corrosion will continue and eventually the City will need to address it in order to preserve the structural integrity of the tanks. The typical approach is to rehabilitate the concrete surface by applying a protective coating. Several coating systems are available from various coating manufacturers. The most robust system that is typically used is an epoxy liner applied over the concrete surface. Prior to application of the epoxy liner, specialized mortar mixes are used to smooth the rougher portions of the walls to create a surface suitable for the epoxy liner. These coating systems are expensive but long-lasting and will extend the life of the tanks well beyond the current planning period. Therefore, they are a long-term investment. In order to apply the coating system, each tank will need to be isolated, drained, cleaned, and the concrete surfaces will need to be prepared in accordance with the coating manufacturer's specifications. Any seepage cracks will need to be repaired in order to provide a suitably dry surface for the coating process. Overall, the project will be somewhat risky from a cost-control standpoint because the work will need to be performed while the adjacent digester cells are full of water. A number of previously unknown problems (e.g., concrete cracks, spot repairs, etc.) can arise during the recoating process that will require other repair methods. Some contingency for these unknowns is built into the recommended budget for this project. But until the tanks are drained, cleaned, and inspected, the risk cannot entirely be quantified. Nonetheless, the work needs to be performed, and the City simply needs to be prepared for the potential cost-escalation risk. In addition to the recoating work, the City should also perform any miscellaneous improvements while the tanks are drained and cleaned. For example, there is no gravity piping between digester cells 3 and 4. The addition of a gravity piping connection would simplify the transfer of sludge between these two cells. Also, the old launder in the sludge storage tank collects debris and is a maintenance nuisance. While the tank is drained for recoating the launder can be filled with concrete to address this problem. Other similar improvements should be carefully considered prior to recoating. The recommended budget for this project includes some cost for these types of miscellaneous improvements. But, they are just approximate estimates. Finally, the total recommended budget for this project includes recoating all of the digester tanks and the sludge storage tank as a single project. However, the rehabilitation work can be done on a tank-by-tank basis in order to spread the costs out over multiple years for cash flow purposes. The total recommended budget for this project is $330,000. A detailed breakdown is provided in Appendix C.

- *SBR & Digester Control System Upgrades (Project T-11)*

The mechanical equipment (i.e., blowers, decanters, air valves, WAS pumps, etc.) that is used for the treatment process is controlled by a centralized control system. The control system consists of a control panel, variable frequency drives, blower motors, decanter motors, valve actuators, WAS pumps, and instruments. These electrical and mechanical systems were installed in 2008 and will be more than 30 years old by the end of the planning period. This is beyond the design life for certain elements of the system including the primary control equipment in the main control panel, the variable frequency drives, and some of the equipment motors and instruments. The City has already replaced two of the variable frequency drives and it is reasonable to assume that the rest will eventually need to be replaced. As a preventative measure, the City should plan to upgrade some of the mechanical and electrical equipment during the planning period before failures require emergency measures. It is envisioned that this work will be performed near the midpoint of the planning period when the existing systems are 20-25 years old. The proposed improvements will address deficiencies D-5 in Table 7-2. The specific improvements are envisioned to include the following items: a new control panel to replace the existing plant control panel, new variable frequency drives, new decanter actuators, new actuators on the air control valves, new WAS pumps, a new sludge pump, new dissolved oxygen probes, new water level sensors, and a SCADA control computer with software. The total recommended budget for this project is $972,000. A detailed breakdown of this estimate is included in Appendix C.

- *UV Disinfection Control System Upgrades (Project T-12)*

The electrical system that controls the UV disinfection equipment is a PLC based system that will be more than 30 years old by the end of the planning period (Deficiency D-6, Table 7-2). This is beyond the expected reliable service life of this type of electrical control equipment and the City should plan to upgrade the system during the planning period. As part of this planning effort, the original UV equipment manufacturer was consulted about replacement costs to develop the proposed budget for this project. This approach is adequate for planning purposes, but a more thorough inspection should be performed prior to upgrading the system. Therefore, the City should plan to pay for a site visit from the manufacturer's service technicians to inspect the system to develop a thorough replacement/upgrade scope of service. This inspection should be performed about 5-10 years after the adoption of this plan or sooner if problems with the system arise. The total recommended budget for the inspection and upgrades is $40,000.

- *SBR Basin #3 (Project T-13)*

This project may be needed to increase the secondary treatment capacity of the plant (Deficiency D-12, Table 7-2). The secondary process is a two-basin SBR. The process was designed to be easily expanded by adding a third basin. As the City grows, or if more residents live in Yachats on a full-time basis, the flows to the plant may exceed the capacity of the two existing SBR basins and a third basin may be needed. If this happens, it will be late the planning period at the soonest and it is very possible that this project may be able to be deferred to the next planning period (i.e., beyond 2041). Therefore, this project should be assigned a relatively low priority ranking. The existing plant was designed to accommodate the addition of a third SBR basin. The headworks includes a flow measurement flume and outlet pipe for a third SBR basin and the aeration air system was designed for the addition of the new blower to provide additional air for the third basin. The new SBR basin will be constructed on the south side of the existing basins and will share a common wall with basin #2. The project will require the construction of the new SBR tank, installation of air piping and aeration grid, the installation of inlet piping, a decanter, WAS piping, WAS pump, handrails stairs and walkways. The total recommended budget for this project is $1,236,000. A detailed cost estimate is also included in Appendix C.

Table 7-3 | Recommended Treatment Plant Improvements

Project Code	Project Description	Recommended Project Budget
T-1	Headworks and Grit Removal Baggers	$10,000
T-2	SBR and Digester Diffuser Membrane Replacement	$15,000
T-3	New Tractor for the Treatment Plant	$35,000
T-4	Public Works Building, Headworks Shelter, and Solids Handling Building Rehab	$700,000
T-5	Outfall Pipeline Improvements	$96,000
T-6	Biosolids Drying Beds	$158,000
T-7	New Biosolids Disposal Site Acquisition	$50,000
T-8	Biosolids Manure Spreader	$100,000
T-9	Aerobic Digester and Sludge Storage Tank Air Supply System Imps.	$223,000
T-10	Aerobic Digester Tank Coating and Piping Improvements	$330,000
T-11	SBR, EQ Basin, & Digester Control System Upgrades	$972,000
T-12	UV Disinfection Control System Upgrades	$40,000
T-13	SBR Basin #3	$1,236,000

CHAPTER 8

CAPITAL IMPROVEMENT PLAN

Chapter Outline

CAPITAL IMPROVEMENT PLAN

8.1 INTRODUCTION

As documented in the previous sections, there is a need for wastewater system improvements within the study area to correct existing and projected deficiencies. Some of these deficiencies are more critical than others. Some deficiencies exist under current conditions, while other deficiencies will manifest as the City grows and/or the existing systems continue to age.

Recommended improvements for specific components of the City's wastewater system have been described in previous chapters. This chapter builds on that work by assigning a priority to each of the improvement recommendations. The cost estimates have been developed to a conceptual level, for planning and budgeting purposes. More detailed cost estimates will be necessary as the projects are implemented.

8.2 PRIORITIZED IMPROVEMENTS

A prioritizing process is required since the scope of the proposed improvements is large. Projects that resolve immediate deficiencies should naturally have a higher priority than long-term, growth-related improvements. The following approach is designed to provide a basis for evaluating and ranking the improvement projects.

8.2.1 Prioritization Criteria

The assignment of a particular project or capital improvement program to a priority level was made after an evaluation using the following criteria:

- Public Health/Environmental Concerns—Projects targeted to resolve existing or near-term regulatory compliance issues were assigned the highest priority.
- Capacity or Size Deficiencies—The severity of the deficiency was considered and compared with the service improvements provided by the replacement components. The projected 'yield' or cost-benefit ratio of a project was used to assign a priority of high, medium or low.
- Consumed Infrastructure—Projects to replace damaged or deteriorated infrastructure, particularly those facilities that have reached the end of their useful life and no longer function as designed were assigned a higher priority.
- City Priority—Projects identified by City operations and maintenance personnel to be high priority due to operational or maintenance problems.

8.2.2 Prioritized Groups

In order to assist the City with their planning, scheduling and construction efforts each improvement project was assigned to one of two priority levels. The priority levels are:

- Priority 1—Near Term Improvements

These projects are targeted to problem areas needing immediate attention. They have been developed to resolve existing or near-term system deficiencies. It is recommended that Priority 1 improvements are undertaken as soon as practical.

- Priority 2—Intermediate Improvements

  These projects will be needed beyond the near term of the Priority 1 projects to address problems with existing infrastructure that is likely to become deficient during the planning period. Although not critical at this time, Priority 2 improvements should be considered as improvement projects that will be upgraded to Priority 1 at some point during the planning period.

8.2.3 Prioritized Capital Improvement Projects

To aid in the development of a wastewater system capital improvement program (CIP), each improvement project was examined and assigned to one of the priority classes described above. Table 8-1 is a comprehensive listing of these projects. The locations of the various projects are shown in Figure 8-1 Through Figure 8-3 below. The reader is referred to previous chapters of this report for more detailed descriptions of the individual projects.

At a minimum, all of the Priority 1 and Priority 2 improvements should be included in the CIP. Work on the Priority 1 improvements should begin immediately after agency approval and adoption of this plan by the City. A key early first step is the procurement of a funding plan for the Priority 1 improvements. This work effort may include meeting with the various funding agencies to evaluate funding assistance alternatives. The funding plan should also include preparation of a financial analysis of the wastewater utility that includes recommendations for utility rate and SDC fee increases if needed.

8.2.4 Environmental Impact

It should be noted that while the improvements recommended in this report are not anticipated to have significant adverse impacts on the environment, each CIP project will need to undergo project-specific environmental review (as applicable) as part of the preliminary and final design process. The scope of the environmental review and permitting requirements will vary from project to project. Should the City choose to pursue State or Federal funding assistance for a particular project, the funding agency will have specific environmental review requirements that must be completed prior to the award of a funding package.

Table 8-1 | Recommended Capital Improvement Priorities

Project Code [1]	Project	Priority	Total Estimated Project Cost [2]
G-1	Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270)	1	$140,000
G-2	Mainline A Manhole A-040 to Manhole A-050	1	$141,000
G-3	Mainline D Manhole D-010 to D-030, Ocean View Drive	1	$263,000
G-4	Hanley Drive Sewer Manholes	1	$25,000
G-5	Wastewater Collection System Design Standards	1	$5,000
P-1	Pump Station Disconnect Panel Improvements	1	$265,000
P-2	New Portable Generator	1	$40,000
P-3	Quiet Water Pump Station Improvements	1	$493,000
T-1	Headworks and Grit Removal Baggers	1	$10,000
T-2	SBR and Digester Diffuser Membrane Replacement	1	$15,000
T-3	New Tractor for the Treatment Plant	1	$35,000
T-4	Public Works Building, Headworks Shelter, and Solids Handling Building Rehab	1	$700,000
T-5	Outfall Pipeline Improvements	1	$96,000
		Subtotal Priority 1….	**$ 2,223,000**
P-4	Main Pump Station Improvements	2	$382,000
P-5	Parkside Pump Station Improvements	2	$218,000
P-6	Riverside Pump Station Improvements	2	$218,000
P-7	Pontiac Pump Station Improvements	2	$218,000
F-1	Pontiac Pump Station Forcemain Improvements	2	$121,000
F-2	Riverside Pump Station Forcemain Improvements	2	$326,000
T-6	Biosolids Drying Beds	2	$158,000
T-7	New Biosolids Disposal Site Acquisition	2	$50,000
T-8	Biosolids Manure Spreader	2	$100,000
T-9	Aerobic Digester and Sludge Storage Tank Air Supply System Imps.	2	$223,000
T-10	Aerobic Digester Tank Coating and Piping Improvements	2	$330,000
T-11	SBR, EQ Basin, & Digester Control System Upgrades	2	$972,000
T-12	UV Disinfection Control System Upgrades	2	$40,000
T-13	SBR Basin #3	2	$1,236,000
		Subtotal Priority 2….	**$ 4,592,000**
		TOTAL….	**$ 6,820,000**
Recurring Annual Programs			
Pgm-1	Annual Sewer Collection System Rehabilitation Program (Program – 1)		$30,000
		Subtotal Recurring Annual Programs….	**$30,000**

[1] Project Code Legend:
G = Gravity Sewer T = Treatment P = Pump Station F= Forcemain Pgm = Improvement Program

[2] See Section 8.3 for basis of project cost estimates. Costs are in June 2021 dollars (ENR Cost Index = 12,112).

Figure 8-1 | Recommended Capital Improvement Priorities - North

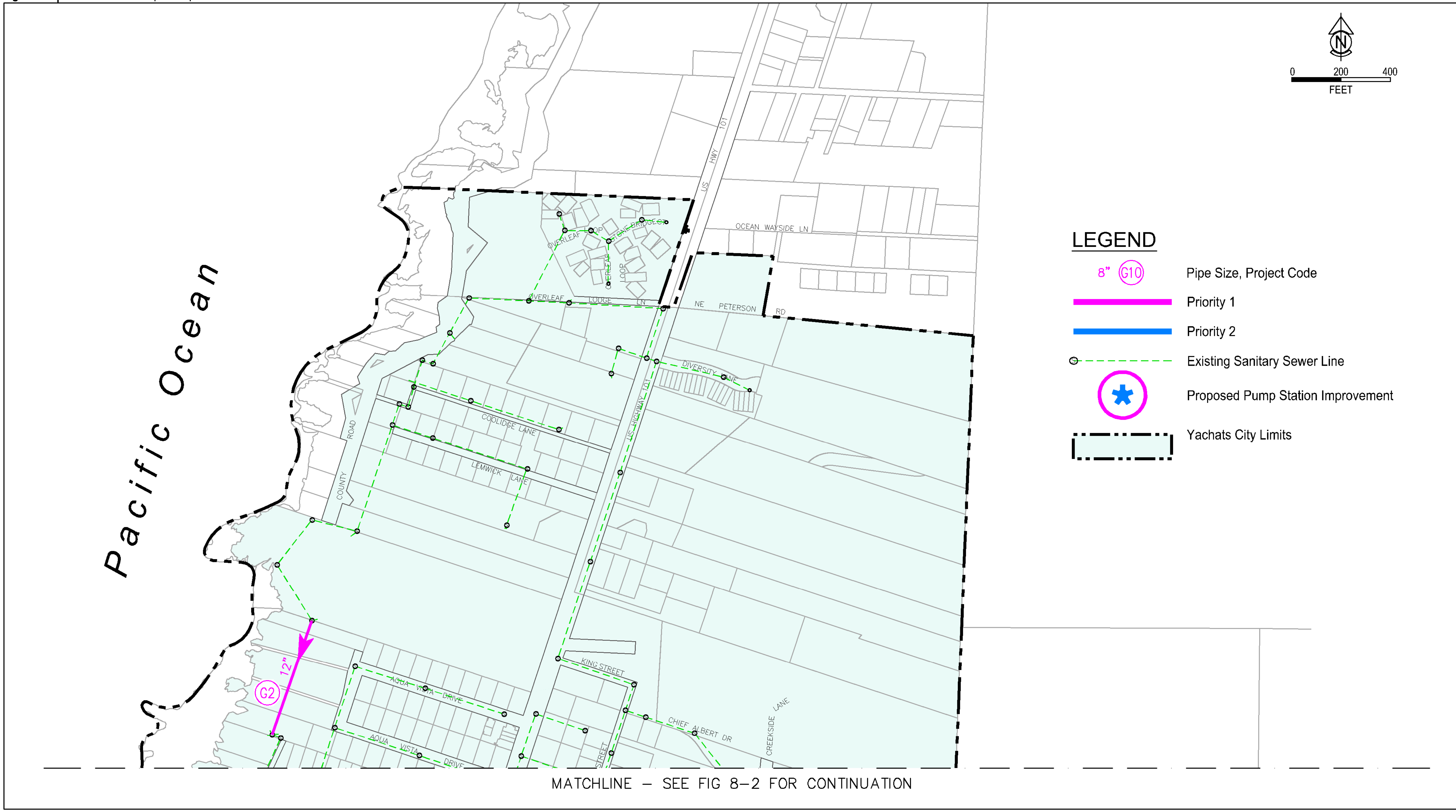


FIGURE 8-1

Figure 8-2 | Recommended Capital Improvement Priorities – North Central

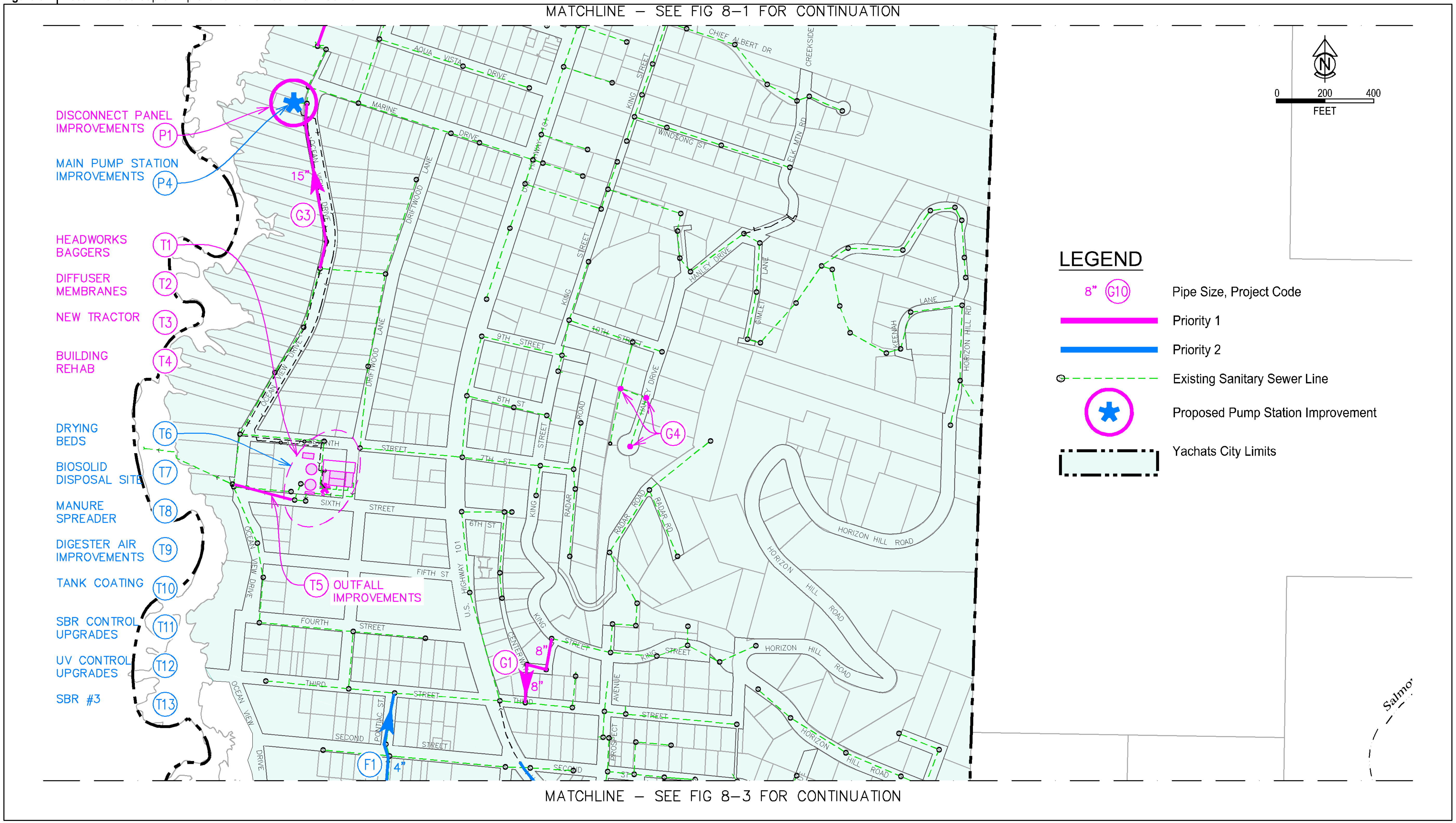


FIGURE 8-2

Figure 8-3 | Recommended Capital Improvement Priorities – South Central

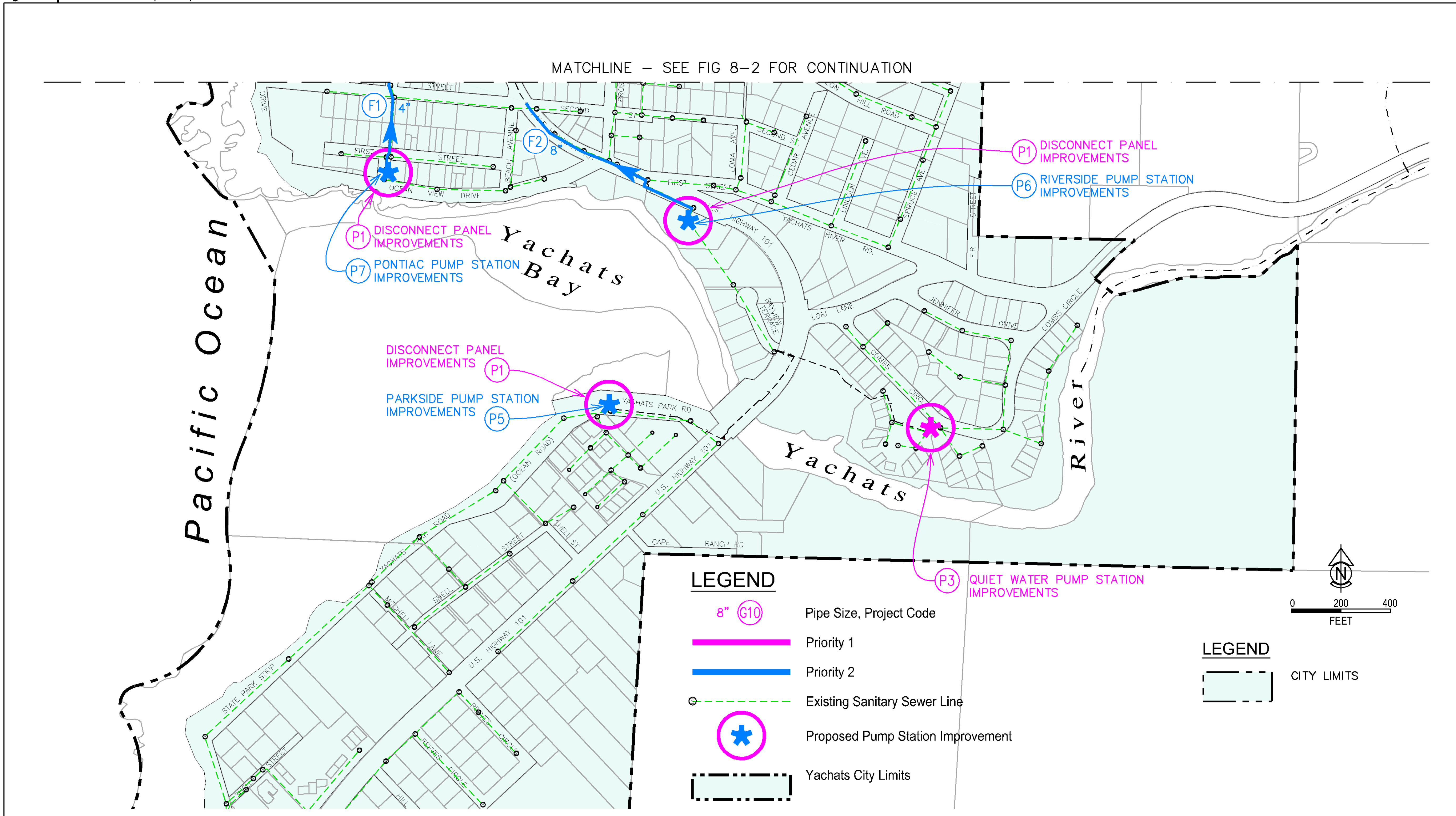


FIGURE 8-3

8.3 BASIS OF COSTS

In order to forecast municipal capital expenditures, cost estimates have been prepared for each improvement project. The preparation methodology and intended use of these cost estimates are summarized below.

8.3.1 Accuracy of Cost Estimates

The accuracy and precision of cost estimates is a function of the level to which improvement alternatives are developed (i.e., detail and design) and the techniques used in preparing the actual estimate. Estimates are typically divided into three basic categories as follows:

- Planning Level Estimate. These are order-of-magnitude estimates made without detailed engineering design data. They are often performed at the zero to 2 percent stage of project completion and typically range from 35 percent over, to 25 percent below the final project cost. A relatively large contingency is typically included to reduce the risk of underestimating. This is particularly important since many times the project financing must be secured before the detailed design can proceed.
- Budgetary Estimates. This level of estimate is prepared during the preliminary design phase using process flow sheets, preliminary layouts and equipment details. This type of estimate is typically accurate to +30 and –15 percent of the final project cost.
- Engineer's Estimate. This estimate is prepared on the basis of well-defined engineering data, typically when the construction plans and specifications are completed. The estimating process at this level relies on piping and instrument diagrams, electrical diagrams, equipment data sheets, structural drawings, geotechnical data and a complete set of specifications. This estimate is sometimes called a definite estimate. The engineer's estimate is expected to be accurate within +15 percent to –5 percent of the pricing secured during the bidding process.

The project costs prepared as part of this study are planning level estimates. Actual project costs will depend on the final project scope, labor and material costs, market conditions, construction schedule, and other variables at the time the project is built. These variables are typically uncertain at the time planning level estimates are prepared. Prior to the implementation of each of the recommended projects, the City should update the cost estimates during the preliminary design phase. As more detailed information becomes available, more accurate cost estimates can be prepared.

8.3.2 Adjustment of Cost Estimates over Time

A commonly used indicator to evaluate the change of construction costs over time is the Engineering News-Record (ENR) construction cost index. The index is computed from the prices for structural steel, Portland cement, lumber, and common labor, and is based on a value of 100 in the year 1913. The construction costs developed in this analysis are based on June 2021 ENR 20 City Construction Cost Index of 12,112. As the planning period elapses, the costs presented in this study can be updated to the present, by applying the ratio of the current cost index to the index used during the preparation of the estimate.

8.3.3 Engineering and Administrative Costs and Contingencies

The cost of engineering services for major projects typically covers special investigations, pre-design reports, topographic surveying, geotechnical investigations, contract drawings and specifications, construction administration, inspection, project start-up, the preparation of O&M manuals, and performance certifications. Depending on the size and type of the project, engineering costs may range from 16 to 25 percent of the contract cost when all of the above services are provided. The lower percentage applies to large projects without complex mechanical systems. The higher percentage applies to smaller, more complex projects that require the integration of a complex design into an existing facility and where full-time inspection is required by the funding agencies or desired by the Owner.

The City will have administrative costs associated with any construction project. These include internal planning and budgeting costs, administration of engineering and construction contracts, legal services, and coordination with regulatory and funding agencies.

8.4 CONSTRUCTION COST ESTIMATES

The planning level estimates for the improvements recommended in this study are based on a number of assumptions as follows. The cost estimates reflect projects bid in late winter or early spring for summer construction. The estimates are based on construction costs of similar historical projects and on current estimates solicited from material and equipment vendors. The estimates are expected to have accuracies of +35 percent and –25 percent of the actual project cost. The following sections describe the cost estimating process for the various categories of projects.

8.4.1 Gravity Collection System Improvement Costs

The cost estimates for the proposed gravity pipeline improvements were based on the following assumptions.

- Normal depth sewer pipeline construction
- 4 inch forcemain piping in City right of way (materials, installation, surface restoration, etc.) - $150 per foot
- 8 inch forcemain piping in ODOT right of way (materials, installation, surface restoration, etc.) - $250 per foot
- 8 inch gravity pipeline construction cost (materials, installation, surface restoration, etc.) - $150 per foot
- 10 inch gravity pipeline construction cost (materials, installation, surface restoration, etc.) - $160 per foot

- 12 inch gravity pipeline construction cost (materials, installation, surface restoration, etc.) - $170 per foot
- 15 inch gravity pipeline construction cost (materials, installation, surface restoration, etc.) - $200 per foot
- New Manholes (materials, installation, and surface restoration) - $6,000 each
- Service Laterals (materials, installation, and surface restoration) - $2,000 each
- Construction Contingencies - 10% of estimated construction cost
- Engineering Costs (surveying, engineering design, and construction administration) - 20% of estimated construction cost
- Legal, Permits & Administrative Costs (permitting, administration, legal, easement acquisition and financing) - 10% of estimated construction cost

8.4.2 Pump Station Improvement Costs

Construction costs for new pump stations include site preparation, foundation, wetwell construction, building, pumps, mechanical piping, emergency power generation, and electrical and instrumentation. Project costs have been based on historical construction cost information for similarly sized projects and discussions with equipment manufacturers. A construction contingency of 10%, an engineering design cost of 20% and an administrative, legal and permitting cost of 10% was assumed for these projects.

8.4.3 Wastewater Treatment Plant Improvement Costs

Construction costs for the wastewater treatment plant improvements include all materials and treatment equipment for each project as well as associated mechanical piping, and electrical and instrumentation.

A construction contingency of 10% of the estimated construction cost was used for the treatment plant estimates. Engineering, legal, and administration costs were assumed to be 20% of the estimated construction cost. Legal and permitting cost of 10% was assumed for these projects.

8.5 FUNDING SOURCES

As a general rule, small communities are not able to finance major wastewater system improvements without some form of government funding such as low interest loans or grants. It is anticipated that the funding for the recommended capital improvement plan outlined in this report will be secured from multiple sources depending on the particular project. These funding sources might include system development charges (SDCs), monthly user fees, as well as state and federal grant and loan programs. The following section outlines the major local and State/Federal funding programs that may be available for these projects.

8.5.1 Local Funding Sources

To a large degree, the type and amount of local funding used for the improvements will depend on the amount of grant funding obtained and the requirements of any loan funding. Local revenue sources for capital improvements include ad valorem taxes (property taxes), various types of bonds, user fees, connection fees and SDCs. Local revenue sources for operating costs include ad valorem taxes and user fees. The following sections discuss local funding sources and financing mechanisms that are most commonly used for the type of capital improvements presented in this study.

8.5.1.1 User Fees

User fees are monthly charges to all residences, businesses, and other users that are connected to the system. User fees are established by the City Council and are typically the sole source of revenue to finance operation and maintenance. These fees are periodically modified to account for changes in operation and maintenance costs, and the need for new improvements. Although user fees are not always sufficient to finance major capital construction projects, they can be used to repay long term financing. The reader is referred to Section 4.7.1 for a description of the City's current user fee structure.

8.5.1.2 System Development Charge Revenues

A system development charge (SDC) is a fee collected by the City as each piece of property is developed. SDCs are used to finance necessary capital improvements and municipal services required by the development. SDCs can be used to recover the capital costs of infrastructure required as a result of the development, but cannot be used to finance either operation and maintenance, or replacement costs. The reader is referred to Section 4.7.3 for information on the City's current SDC charges.

As established in ORS 223, a SDC can have two principal elements, the reimbursement fee and the improvement fee. Fees are collected at issuance of building permits. The reimbursement portion of the SDC is the fee for buying into either existing capital facilities or those that are under construction. The reimbursement fee represents a charge for utilizing excess capacity in an existing facility that was paid for by other parties. The revenue from this fee is typically used to repay existing improvement loans. The improvement portion of the SDC is the fee designed to cover the costs of capital improvements that must be constructed to provide an increase in capacity.

8.5.1.3 Connection Fees

Many communities charge connection fees to cover the cost of connecting a new development to the municipal sewer system. There are two types of connection fees. The first is for newly constructed connections and is designed to cover the cost of the City's inspections at the time of connection to the collection system. The second type of fee is designed to defray the City's administrative cost of setting up a new account and is charged against newly constructed connections, as well as transfers of an existing service to a new owner.

8.5.1.4 Capital Construction Fund

Capital construction funds, or sinking funds, are often established as a budget line item to set aside money for a particular construction purpose. A set amount from each annual budget is deposited in a sinking fund until sufficient reserves are available to complete the project. Such funds can also be developed from user fee revenues or from SDCs. The City currently maintains a capital improvement fund. The status of this fund is discussed in Chapter 4.

8.5.1.5 General Obligation Bonds

The sale of municipal general obligation bonds is a traditional method of funding municipal improvement projects. General obligation bonds utilize a municipality's basic taxing authority and are retired with property taxes based on an equitable distribution of the bonded obligation across the community's assessed valuation. General obligation bonds are normally associated with the financing of facilities that benefit an entire community and must be approved by a majority vote of the residents.

General obligation bonds are backed by the municipality's full faith and credit, as the municipality must pledge to assess property taxes sufficient to pay the annual debt service. This portion of the property tax is outside the State constitutional limits that restrict property taxes to a fixed percentage of the assessed value. The municipality may use other sources of revenue, including user fee revenues, to repay the bonds. If it uses other funding sources to repay the bonds, the amount collected as taxes is reduced commensurately.

The general procedure followed when financing improvements with general obligation bonds is typically as follows:

- Determination of the capital costs required for the improvement
- An election by the voters to authorize the sale of bonds
- The bonds are offered for sale
- The revenue from the bond sale is used to pay the capital cost of the project(s)

General obligation bonds can be "revenue supported", wherein a portion of the user fee is pledged toward repayment of the bond debt. The advantage of this method is that the need to collect additional property taxes to retire the bonds is reduced or eliminated. Such revenue supported general obligation bonds have most of the advantages of revenue bonds in addition to a lower interest rate and ready marketability.

The primary disadvantage with the use of general obligation bonds is that the debt incurred by this method is often added to the debt ratios of the municipality. This has the potential to limit flexibility of the municipality to issue debt for other purposes.

8.5.1.6 Revenue Bonds

Revenue bonds are similar to general obligation bonds, except they rely on revenue from the sales of the utility (i.e., user fees) to retire the bonded indebtedness. The primary security for the bonds is the municipality's pledge to charge user fees sufficient to pay all operating costs and debt service. Because the reliability of the source of revenue is relatively more speculative than for general obligation bonds, revenue bonds typically have slightly higher interest rates.

The general shift away from ad valorem property taxes makes revenue bonds a frequently used option for payment of long-term debt. Many communities prefer revenue bonding, because it ensures that no additional taxes are levied. In addition, repayment of the debt obligation is limited to system users since repayment is based on user fees.

One advantage with revenue bonds is that they do not count against a municipality's direct debt. This feature can be a crucial advantage for a municipality near its debt limit. Rating agencies closely evaluate the amount of direct debt when assigning credit ratings. There are normally no legal limitations on the amount of revenue bonds that can be issued; however, excessive issue amounts are generally unattractive to bond buyers because they represent high investment risks.

Under ORS 288.805-288.945, municipalities may elect to issue revenue bonds for revenue producing facilities without a vote of the electorate. Certain notice and posting requirements must be met and a sixty (60) day waiting period is mandatory.

The bond lender typically requires the municipality to provide two additional securities for revenue bonds that are not required for general obligation bonds. First, the municipality must set user fees such that the net projected cash flow from user fees plus interest will be at least 125% of the annual debt service (a 1.25 debt coverage ratio). Secondly, the municipality must establish a bond reserve fund equal to maximum annual debt service or 10% of the bond amount, whichever is less.

8.5.1.7 Improvement Bonds

Improvement (Bancroft) bonds are an intermediate form of financing that are less than full-fledged general obligation or revenue bonds. This form of bonding is typically used for Local Improvement Districts.

Improvement bonds are payable from the proceeds of special benefit assessments, not from general tax revenues or user fees. Such bonds are issued only where certain properties are recipients of special benefits not occurring to other properties. For a specific improvement, all property within the designated improvement district is assessed on the same basis, regardless of whether the property is developed or undeveloped. The assessment is designed to divide the cost of the improvements among the benefited property owners. The manner in which it is divided is in proportion to the direct or indirect benefits to each property. The assessment becomes a direct lien against the property, and owners have the option of either paying the assessment in cash, or applying for improvement bonds. If the improvement bond option is taken, the municipality sells Bancroft Improvement Bonds to finance the construction, and the assessment is paid over 20 years in 40 semiannual installments plus interest.

The assessments against the properties are usually not levied until the actual cost of the project is determined. Since the determination of actual costs cannot normally be determined until the project is completed, funds are not available from assessments for the purpose of paying costs at the time of construction. Therefore, some method of interim financing must be arranged.

The primary disadvantage to this source of revenue is that the development of an assessment district is very cumbersome and expensive when facilities for an entire community are contemplated. Therefore, this method of financing should only be considered for discrete improvements to the collection system where the benefits are localized and easily quantified.

8.5.1.8 Certificates of Participation

Certificates of Participation are a form of bond financing that is distinct from revenue bonds. While it is more complex, and typically has a higher interest rate than revenue bonds, it is a process controlled by the City Council, and it does not have to be referred to the voters. This can result in significant time savings.

8.5.1.9 Ad Valorem Property Taxes

Ad valorem property taxes were often used in the past as a revenue source for public utility improvements. These taxes were the traditional means of obtaining revenue to support all local governmental functions. Ad valorem taxation is a financing method that applies to all property owners that benefit, or could potentially benefit from an improvement, whether the property is developed or not. The construction costs for the improvement project are shared proportionally among all property owners based on the assessed value of each property. Ad valorem taxation, however, is less likely to result in individual users paying their proportionate share of the costs as compared to their benefits.

8.5.2 State and Federal Grant and Loan Programs

Several state and federal grant and loan programs are available to provide financial assistance for municipal wastewater system improvements. The primary sources of funding available for wastewater system financing are Rural Utilities Service (RUS), Special Public Works Fund (SPWF), the Water/Wastewater (W/W) Financing Program, the Community Development Block Grant (CDBG) program, and the Clean Water State Revolving Fund (CWSRF).

8.5.2.1 USDA Rural Development

USDA Rural Development (RD) provides federal loans and grants to rural municipalities, counties, special districts, Indian tribes, and not-for-profit organizations to construct, enlarge, or modify water treatment and distribution systems and wastewater collection and treatment systems. Preference is given to projects in low-income communities with populations below 10,000.

Borrowers of RD loans must be able to demonstrate the following:

- Monthly user rates must be at or above the local area-wide average.
- They have the legal authority to borrow and repay loans, to pledge security for loans, and to operate and maintain the facilities and services.
- They are financially sound and able to manage the facility effectively.
- They have a financially sound facility based on taxes, assessments, revenues, fees, or other satisfactory sources of income to pay for all facility costs including O&M and to retire indebtedness and maintain a reserve.

The maximum RD loan term is 40 years, but the finance term may not exceed statutory limitations on the agency borrowing the money or the expected useful life of the improvements.

The reserve can typically be funded at 10 percent per year over a ten-year period. Interest rates for RD loans vary based on median household income, but tend to be lower than those obtained in the open market.

8.5.2.2 Oregon Infrastructure Finance Authority

The Oregon Infrastructure Finance Authority (IFA) manages a number of grant and low interest loan programs as described in the following sections.

Special Public Works Fund

The IFA administers the Special Public Works Fund (SPWF) program. The SPWF is a lottery-funded loan and grant program that provides funding to municipalities, counties, special districts, and public ports for infrastructure improvements to support industrial/manufacturing and eligible commercial economic development. Eligible commercial economic development is defined as commercial activity that is marketed nationally, or internationally, and attracts business from outside Oregon. Funded projects are usually linked to a specific private sector development and the resulting direct job creation (i.e., firm business commitment), of which 30% of the created jobs must be "family wage" jobs. The program also funds projects that build infrastructure capacity to support industrial/manufacturing development where recent interest by eligible business(s) can be documented.

The SPWF is primarily a loan program, although grant funds are available based on economic need of the community. Although the maximum loan term is 25 years, loans are generally made for 20-year terms. The maximum loan amount for projects funded with direct SPWF money is $1 million, while the maximum for projects financed with bond funds is $10 million.

Water/Wastewater Financing Program

The IFA also administers the W/W Financing Program, which gives priority to projects that provide system-wide benefits and helps communities meet the Clean Water Act or the Safe Drinking Water Act standards. It is intended to assist local governments that have been hard hit with state and federal mandates for public drinking water systems and wastewater systems. In order to be eligible for this program, the system must be out of compliance with federal or state rules, regulations or permits, as evidenced by issuance of Notice of Non-Compliance by the appropriate regulatory agency. The funded project must be needed to meet state or federal regulations. Priority is given to communities under economic distress.

Similar to the SPWF, the W/W Financing Program is primarily a loan program, although grant funds are available in certain cases, based on economic need of the community. Although the maximum loan term is 25 years, loans are generally made for 20-year terms. The maximum loan amount for projects funded with direct W/W money is $500,000, while the maximum for projects financed with bond funds is $10 million.

Economic and Community Development Block Grant

The IFA administers the CDBG, but the funds are from the U.S. Department of Housing and Urban Development (HUD), so all federal grant management rules apply to the program. The federal eligibility standards are strict. There are two subcategories of Public Works projects eligible for funding, "Public Water and Wastewater," and "Public Works for New Housing." Only the former is considered in this discussion.

Grants are available for critically needed construction, improvement, or expansion of publicly owned water and wastewater systems for the benefit of current residents. Generally, projects must be necessary to resolve regulatory compliance problems identified by state and/or federal agencies and the project must serve a community that is comprised of more than 51% of low and moderate income persons.

The program separates projects into three parts. Grants are available for:

- Preliminary Engineering and Planning Projects

  Generally, these grants fund preparation or update of Water System Master Plans and Wastewater Facility Plans, as required by the Oregon Department of Environmental Quality or Oregon Health Division. In addition, funds for grant administration and preparation of a final design funding application can be included in the project budget. All plans produced with grant funds must be approved by the appropriate regulatory agency. Grants of up to $20,000 can also be made for problem identification studies to delineate problems and corrective measures, as required by a regulatory agency.

- Final Design and Engineering Projects

  Final design and engineering, bid specifications, environmental review, financial feasibility, rate analysis, grant administration, and preparing a construction funding application are all eligible project activities. The final design, plans and specifications must be approved by the appropriate regulatory agency before a grant will be awarded.

- Construction Projects

  These grants fund construction and related activities, grant administration, and land/permanent easement acquisition.

  IFA has established an evaluation system that gives priority to projects that provide system-wide benefits. The overall maximum grant amount per water or wastewater project is $3,000,000 (including all planning, final engineering, and construction). The project cannot be divided locally into phases with the expectation of receiving more than one $3,000,000 grant. In order to qualify for grant funding under this program, the water user rates must be at or above statewide averages.

Based on the 2021 guidelines for the Community Development Block Grant Program, approximately 33% of the families in Yachats are classified as having low or moderate incomes. This is below the 51% threshold to be eligible for a Community Development Block Grant. As such, it does not appear that the City qualifies for a Block Grant. However, the requirements for these funding programs do change periodically, so it is worth verifying with the IFA.

8.5.2.3 Clean Water State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund loan program provides low-cost loans to public agencies for the planning, design or construction of various projects that prevent or mitigate water pollution. The Oregon Department of Environmental Quality administers the program. Eligible agencies include federally recognized Indian tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities.

Four different types of loans are available within the program including loans for planning, design, construction, and local community projects. A portion of the fund is reserved for small communities, planning and green projects. All loans, except for planning loans, include an annual loan fee on the outstanding balance. Interest rates for the loan program change quarterly based on a percentage of the national municipal bond rate. Those percentages vary from 25 percent to 55 percent of the bond rate. For example, with a quarterly bond rate of 3.75 percent, CWSRF interest rates range from 0.94 percent to 2.06 percent depending on the length of the loan repayment period. Interest rates are found on DEQ's website. The low-interest rates and terms inherent with these loans make this program an attractive alternative to the municipal bond market. For example, a $4 million, 20-year loan with a CWSRF interest rate one-percentage point lower than a bond would reduce the interest cost by about $500,000 over the life of the loan.

DEQ accepts new applications year-round. Applicants must provide information on the project's water quality benefits, environmental impact and estimated cost. Applications are available by contacting DEQ's regional project officers as listed on DEQ's website.

8.5.3 Funding Recommendations

Based on the infrastructure improvements and cost projections presented in this plan, the existing user fee and SDC fee structures may not be sufficient to meet the planning period goals. This plan accordingly recommends that the City complete a full review of its user fee and SDC rate structure and update these fees accordingly. Should the City choose to pursue funding assistance from one of the state and federal agencies for any of the projects listed in this plan, an important early step is to schedule a "one stop meeting" with Oregon Infrastructure Finance Authority (IFA). These meetings are designed to gather staff from the various federal and state funding agencies to evaluate the applicability of the various funding sources to a particular municipal project.

APPENDIX A

NPDES PERMIT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Dr.
Telephone: 800-349-7677

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

ISSUED TO:	SOURCES COVERED BY THIS PERMIT: Type of Waste	Outfall Number	Outfall Location
City of Yachats PO Box 345 Yachats, OR 97498-0345	Treated Wastewater	001	Pacific Ocean Latitude: 44.314046 Longitude -124.109414

FACILITY LOCATION:

500 W. 7th Street
Yachats, OR 97498

Treatment System Class: Level III
Collection System Class: Level II

RECEIVING STREAM INFORMATION:

WRD Basin: Mid-Coast
USGS Sub-Basin: Alsea
Receiving Stream name: Pacific Ocean
LLID: 1240682445993

County: Lincoln

EPA REFERENCE NO. : OR0020290

Issued in response to Application No. 958734 received June 1, 2015. This permit is issued based on the land use findings in the permit record.

Ranei Nomura, Water Quality Manager Western Region	**October 11, 2018** Signature Date	**October 31, 2018** 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 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

List of Tables

SCHEDULE A: WASTE DISCHARGE LIMITS

1. **Outfall 001 – Permit Limits**

a. BOD_5 and TSS

i. May 1 – October 31. During this time period the permittee must comply with the limits in the following table:

Table A1: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum lbs/day
	Monthly	Weekly			
BOD_5	20	30	25	37	50
TSS	20	30	25	37	50

ii. November 1 – April 30: During this time period the permittee must comply with the limits in the following table:

Table A2: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum lbs/day
	Monthly	Weekly			
BOD_5	30	45	37	56	75
TSS	30	45	37	56	75

iii. Additional information for the limits in Tables A1 and A2 above.

Average dry weather design flow to the facility equals 0.33 MGD. Mass load limits have been calculated based on the average dry weather design flow for the previous facility, which was 0.15 MGD.

b. Additional Parameters.

Permittee must comply with the limits in the following table (year-round except as noted):

Table A3: Limits for Additional Parameters

Year-round (except as noted)	Limits
BOD_5 and TSS Removal Efficiency	May not be less than 85% monthly average for BOD_5 and TSS.
Enterococci Bacteria	Monthly geometric mean may not exceed 35 organisms per 100 mL. No single sample may exceed 104 organisms per 100 mL.
Fecal Coliform Bacteria	Monthly median concentration may not exceed 14 organisms per 100 ml. No more than 10% of the samples collected in a calendar month may exceed 43 organisms per 100 mL.
pH	Must be within the range of 6.0-9.0 SU.

2. Regulatory Mixing Zone

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

> *The regulatory mixing zone is that portion of the Pacific Ocean contained within a 100-foot radius of the point of discharge. The Zone of Immediate Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within ten (10) feet of the point of discharge.*

3. Groundwater Protection

The permittee may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

4. 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. Except when used for land reclamation and approved by DEQ, biosolids must be applied at or below the agronomic rate required for maximum crop yield.

c. The permittee must obtain written site authorization from DEQ for each land application site prior to land application (see Schedule D, Condition 5) and follow the site-specific management conditions in the DEQ-issued site authorization letter.

d. Biosolids must 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. Pollutants in biosolids may not exceed the ceiling concentrations shown in Table A4, below. Biosolids exceeding the pollutant concentrations in Table A4 must be applied at a rate that does not exceed the corresponding cumulative pollutant loading rates.

Table A4: Biosolids Limits

Pollutant	Ceiling concentrations[1] (mg/kg)	Pollutant concentrations[1] (mg/kg)	Cumulative pollutant loading rates[1] (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:

1. Biosolids pollutant limits are described in 40 CFR Section 503.13, which uses the terms *ceiling concentrations*, *pollutant concentrations*, and *cumulative pollutant loading rates*. Biosolids containing pollutants in excess of the ceiling concentrations may not be applied to the land. Biosolids containing pollutants in excess of the pollutant concentrations, but below the ceiling concentrations, may be applied to the land; however, the total quantity of biosolids applied may not exceed the cumulative pollutant loading rates.

5. Chlorine Usage

No chlorine or chlorine compounds may be used for disinfection purposes and no chlorine residual resulting from chlorine used for maintenance purposes may be allowed in the effluent.

SCHEDULE B: MINIMUM MONITORING AND REPORTING REQUIREMENTS

1. Monitoring and Reporting Protocols

a. Paper Submissions. The permittee must submit to DEQ the results in Schedule B in a paper format as specified below.

i. Prior to December 21, 2016, and until directed by DEQ, the permittee must submit all monitoring results required in this permit via DEQ-approved Discharge Monitoring Report (DMR) forms until directed by DEQ to do otherwise.

ii. The reporting period is the calendar month.

iii. Any monitoring results required in this permit must be submitted by the permittee to DEQ by the 15th day of the month following the reporting period unless specified otherwise in this permit or as specified in writing by DEQ.

iv. Prior to December 21, 2020, and until directed by DEQ, the permittee must submit any Pre-treatment Program Reports, Biosolids/Sewage Sludge, Sewer Overflow/Bypass Event Reports, and other required information to DEQ.

v. The permittee must sign and certify submittals of DMRs, reports, and other information in accordance with the requirements of Section D8 within Schedule F of this permit.

b. Electronic Submissions. The permittee must submit to DEQ the results in Schedule B in an electronic format as specified below.

i. After December 21, 2016, and when directed by DEQ, the permittee must submit monitoring results required by this permit via DEQ-approved web-based Discharge Monitoring Report (DMR) forms to the NetDMR webpage at: https://netdmr.zendesk.com/home.

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.

iv. The permittee must report all of the monitoring requirements listed in Schedule B of this permit via NetDMR beginning after December 21, 2016 and when directed by DEQ. Any data used to calculate summary statistics must be submitted as a separate attachment approved by DEQ via NetDMR

v. Beginning after December 21, 2020, or when directed by DEQ, the permittee must submit electronic reports for Pretreatment Program Reports, Biosolids/Sewage Sludge, Sewer Overflow/Bypass Event Reports, and other required information to DEQ via NetDMR.

vi. The permittee must sign and certify all electronic submissions in accordance with the requirements of Section D8 within Schedule F of this permit.

c. The permittee must submit to DEQ monitoring reports as listed in Table B6.

d. Laboratory Quality Assurance and Quality Control

i. Laboratory Quality Assurance and Quality Control (QA/QC) – The permittee must develop and implement a written QA/QC program that conforms to the requirements of 40 CFR Section 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 a sample does not meet QA/QC requirements, the permittee must include the result in the discharge monitoring report (DMR) along with a notation (data qualifier) explaining how it does not meet QA/QC requirements, but the permittee must not use the result in any calculation required by the permit unless authorized by the DEQ permit writer or inspector.

e. Reporting Procedures

i. Reporting Period

The reporting period is the calendar month.

ii. Significant Figures

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

iii. Calculating 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

2. Influent Monitoring and Reporting Requirements

The permittee must monitor influent grab and composite samples and measurements must be taken at the head works and report results as listed below.

Table B1: Influent Monitoring

Item or Parameter (ICIS Code)	Units	Time Period	Minimum Frequency	Sample Type/Required Action	Report Statistic
Total Flow (50050)	MGD	Year-round	Daily	Measurement	1. Monthly maximum
BOD_5 (00310)	mg/L	Year-round	1/week	24-hr Composite	1. Monthly average
TSS (00530)	mg/L	Year-round	1/week	24-hr Composite	1. Monthly average
pH (00400)	SU	Year-round	2/week	Grab	1. Daily max 2. Daily min

3. Effluent Monitoring and Reporting Requirements

The permittee must monitor effluent Grab and Composite samples for Outfall 001 after UV disinfection. Flow measurements shall be measured after the equalization basin and prior to UV disinfection.

Table B2: Effluent Monitoring

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/Required Action	Report Statistic
Total Flow (50050)	MGD	Year-round	Daily	Continuous	1. Monthly maximum
BOD_5 (00310)	mg/L	Year-round	1/week	24-hr Composite	1. Monthly average 2. Weekly averages
TSS (00530)	mg/L	Year-round	1/week	24-hr Composite	1. Monthly average 2. Weekly averages
BOD_5 (00310)	lbs/day	Year-round	1/week	Calculation	1. Daily maximum 2. Monthly average 3. Weekly averages
TSS (00530)	lbs/day	Year-round	1/week	Calculation	1. Daily maximum 2. Monthly average 3. Weekly averages
BOD_5 Percent Removal; see Note a (81010)	%	Year-round	Monthly	Calculation	1. Monthly average
TSS Percent Removal; see Note a (81011)	%	Year-Round	Monthly	Calculation	1. Monthly average
pH (00400)	SU	Year-round	2/week	Grab	1. Daily maximum 2. Daily minimum
Temperature (00010)	°C	Year-round	2/week	Grab	1. Monthly maximum
Fecal Coliform (74055)	Number per 100 mL	Year-round	2/week	Grab	1. Monthly median 2. Percent of samples exceeding limit
Enterococci (61211)	Number per 100 mL	Year-round	2/week	Grab	1. Monthly geomean 2. Daily maximum
UV dose (61938)	mJ/cm^2	Year-Round	Daily	Reading	1. Daily minimum
Alkalinity (00410) (for effluent characterization purposes)	mg/L	Year-round	1/week	Grab	1. Monthly maximum

Notes:

a. Percent removal is to be calculated on a monthly basis. Percent removal = $((BOD_{inf} - BOD_{eff})/BOD_{inf}) \times 100$, where BOD_{inf} is the monthly average influent concentration in mg/L and BOD_{eff} is the monthly average effluent concentration in mg/L.

4. Biosolids Monitoring Requirements

The permittee must monitor biosolids land applied or produced for sale or distribution as listed in the tables below. The samples must be representative of the quality and quantity of biosolids generated and must have undergone the same treatment process used to prepare the biosolids.

Table B3: Biosolids Monitoring

Item or Parameter	Minimum Frequency	Sample Type
Nutrient and conventional parameters (% dry weight unless otherwise specified): 1) Total Kjeldahl Nitrogen (TKN) 2) Nitrate-Nitrogen (NO_3-N) 3) Ammonium Nitrogen (NH_4-N) 4) Total Phosphorus (P) 5) Potassium (K) 6) pH (S.U.) 7) Total Solids 8) Volatile Solids	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B6	As described in the DEQ-approved Biosolids Management Plan
Pollutants: As, Cd, Cu, Hg, Mo, Pb, Ni, Se, Zn, mg/kg dry weight	As described in the DEQ-approved Biosolids Management Plan, but not less than the frequency in Table B6	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 B6	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 B6	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 B4: 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)

5. **Permit Application Monitoring Requirements**

The renewal application for this permit requires 3 scans for the parameters listed in the table below. This data may be collected up to 4.5 years in advance of submittal of the renewal application. DEQ recognizes that some facilities may find it difficult to collect 3 scans that are representative of the seasonal variation in the discharge from each outfall within the permit renewal timeframe, and is therefore requiring that this monitoring be completed as part of compliance with this permit.

Table B5: Effluent Monitoring Required for NPDES Permit Application

(a minimum of 3 scans required)

Parameter	Units	Time period	Minimum Frequency	Report Statistic
Ammonia (as N)	mg/L	Year-round	1/year	Value
Dissolved Oxygen	mg/L	Year-round	1/year	Value
Total Kjeldahl Nitrogen (TKN)	mg/L	Year-round	1/year	Value
Nitrate Plus Nitrite Nitrogen	mg/L	Year-round	1/year	Value
Oil and Grease	mg/L	Year-round	1/year	Value
Note: 1. Year-round within the first 4-1/2 years from permit issuance date				

6. **Outfall Inspection**

During the year 2021 (3rd year of permit issuance), the permittee must inspect outfall 001 and submit a written report to DEQ within the same year regarding the integrity of the outfall. The report should include a description of the outfall as originally constructed, the current condition of the outfall and a discussion of any repairs that are necessary to return the outfall to its originally designed condition.

7. **Minimum Reporting Requirements**

The permittee must report monitoring results as listed below.

Table B6: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:
1. Table B1: Influent Monitoring 2. Table B2: Effluent Monitoring	Monthly	15th day of the month following data collection	DEQ-approved discharge monitoring report (DMR) form, electronic. (See Notes b.through d.)	DEQ Regional Office
Wastewater solids annual report describing quality, quantity, and use or disposal of wastewater solids generated at the facility.	Annually	February 19	1 hard copy, and electronic copy in DEQ-approved format	One each to: • DEQ Regional Office • DEQ Biosolids Program Coordinator
1. Biosolids land application annual report describing solids handling activities for the previous year and includes the information described in OAR 340-050-0035(6)(a)-(e). 2. Table B3: Biosolids Monitoring	Annually	February 19	Electronic copy	One each to: • DEQ Regional Office • DEQ Biosolids Program Coordinator
Hauled Waste Control Plan (for description, see Schedule D, Condition 7)	One time	Within 60 days of permit effective date	1 hard copy and electronic copy in DEQ-approved format	DEQ Regional Office
Inflow and infiltration report (see Schedule D)	Annually	February 1	1 hard copy, and electronic copy in DEQ-approved format	DEQ Regional Office
Significant Industrial User Survey (see Schedule D)	Every 5 years	Within 24 months of permit effective date, and every 5 years after this date	1 hard copy, and electronic copy in DEQ-approved format	DEQ Pretreatment Coordinator
Outfall Inspection Report (see Schedule B, Condition 6)	Every 5 years	Within 36 months of permit effective date	1 hard copy, and electronic copy in DEQ-approved format	DEQ Regional Office

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:

Notes:

a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date.
b. Name, certificate classification, and grade level of each responsible principal operator as well as identification of each system classification must be included on DMRs. Font size must not be less than 10 pt.
c. Equipment breakdowns and bypass events must be noted on DMRs.
d. In accordance with 40 CFR § 122.41(l)(9), the permittee shall submit all monitoring and compliance data electronically as directed by DEQ starting after December 21, 2016. All data submitted to DEQ to meet permit requirements prior to December 21, 2016 may be submitted using the hardcopy Discharge Monitoring Report (DMR) form or Electronic Data Deliverable (EDD) via CD-ROM.

SCHEDULE D: SPECIAL CONDITIONS

1. Inflow and Infiltration

The permittee must submit to DEQ an annual inflow and infiltration report as directed in Schedule B. 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 ambient monitoring.

2. Emergency Response and Public Notification Plan

The permittee must develop and maintain an Emergency Response and Public Notification Plan (the Plan) per Schedule F, Section B, and Conditions 7 & 8. The permittee must develop the plan within six months of permit issuance and update the Plan annually to ensure that telephone and email contact information for applicable public agencies (permit writer should include specific contacts here as needed) are current and accurate. An updated copy of the plan must be kept on file at the wastewater treatment 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

The permittee is exempt from the recycled water use requirements in OAR 340-055 when recycled water is used for landscape irrigation or in-plant processes at the wastewater treatment system and 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 or both from the use does not occur off the site.

d. Public access to the site is restricted.

4. Biosolids Management Plan

The permittee must maintain a Biosolids Management Plan meeting the requirements in OAR 340-050-0031(5). The permittee must keep the plan updated and submit substantial modifications to an existing plan to DEQ for approval at least 60 days prior to making the proposed changes. Conditions in the plan are enforceable requirements under this permit.

5. Land Application Plan

a. Plan Contents

The permittee must maintain a land application plan that contains the information listed below.. The land application plan may be incorporated into the Biosolids Management Plan.

i. All known DEQ-approved sites that will receive biosolids while the permit is effective.

ii. The geographic location, identified by county or smaller unit, of new sites which are not specifically listed at the time of permit application.

iii. Criteria that will be used in the selection of new sites.

iv. Management practices that will be implemented at new sites authorized by the DEQ.

v. Procedures for notifying property owners adjacent to proposed sites of the proposed activity prior to the start of application.

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 may land apply biosolids to a DEQ-approved site only as described in 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. No DEQ-initiated public notice is required for continued use of sites identified in the DEQ-approved land application plan.

ii. For new sites that fail to meet the site selection criteria in the land application 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).

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

d. Exceptional Quality (EQ) Biosolids

The permittee is exempt from the requirements in condition 5.b.-c. above if:

i. Pollutant concentrations of biosolids are less than the pollutant concentration limits in Schedule A, Table A4;

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).

6. 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 monitor, report, and dispose of solids as required under the permit of the receiving facility.

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.

7. Hauled Waste Control

The permittee may accept hauled wastes at discharge points designated by the POTW. The permittee must submit a written hauled waste control plan within 60 days of permit issuance. The permittee must submit a revised hauled waste control plan within 60 days of receiving DEQ comments. 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. The permittee must keep the plan updated and submit substantial modifications to an existing plan to DEQ for approval at least 60 days prior to making the proposed changes.

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 p. 1 of this permit.

c. The permittee must have its system supervised on a part-time or full-time basis by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system the operator is supervising and at a grade equal to or greater than the wastewater system's classification specified on page one of this permit.

d. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervise 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. 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 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. Spill/Emergency Response Plan

The permittee must have an up-to-date spill response plan available for review during inspection, for prevention and handling of spills and unplanned discharges. The spill response plan must include all of the following:

a. A description of the reporting system that will be used to alert responsible managers and legal authorities in the event of a spill.

b. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) to prevent, contain, or treat spills.

c. A description of the permittee's training program to ensure that employees are properly trained at all times to respond to unplanned and emergency incidents.

d. A description of the applicable reporting requirements. These must be consistent with the reporting requirements found in Schedule F, condition D.5.

10. Industrial User Survey

The permittee must conduct an industrial user survey to determine the presence of any industrial users discharging wastewaters subject to pretreatment and submit a report on the findings to DEQ within 24 months of the permit effective date. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the POTW, and ensure regulatory oversight of these discharges to state waters. If the POTW has already completed a baseline IU Survey the results of this survey are to be provided to DEQ within two months of the permit effective date.

Guidance on conducting IU Surveys can be found at http://www.deq.state.or.us/wq/pretreatment/docs/guidance/IUSurveyGuidance.pdf. Once an initial baseline IU Survey is conducted it is to be maintained by the POTW and made available for inspection by DEQ. Every 5 years from the effective date of the permit, the permittee must submit an updated IU survey.

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 B7.

(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:

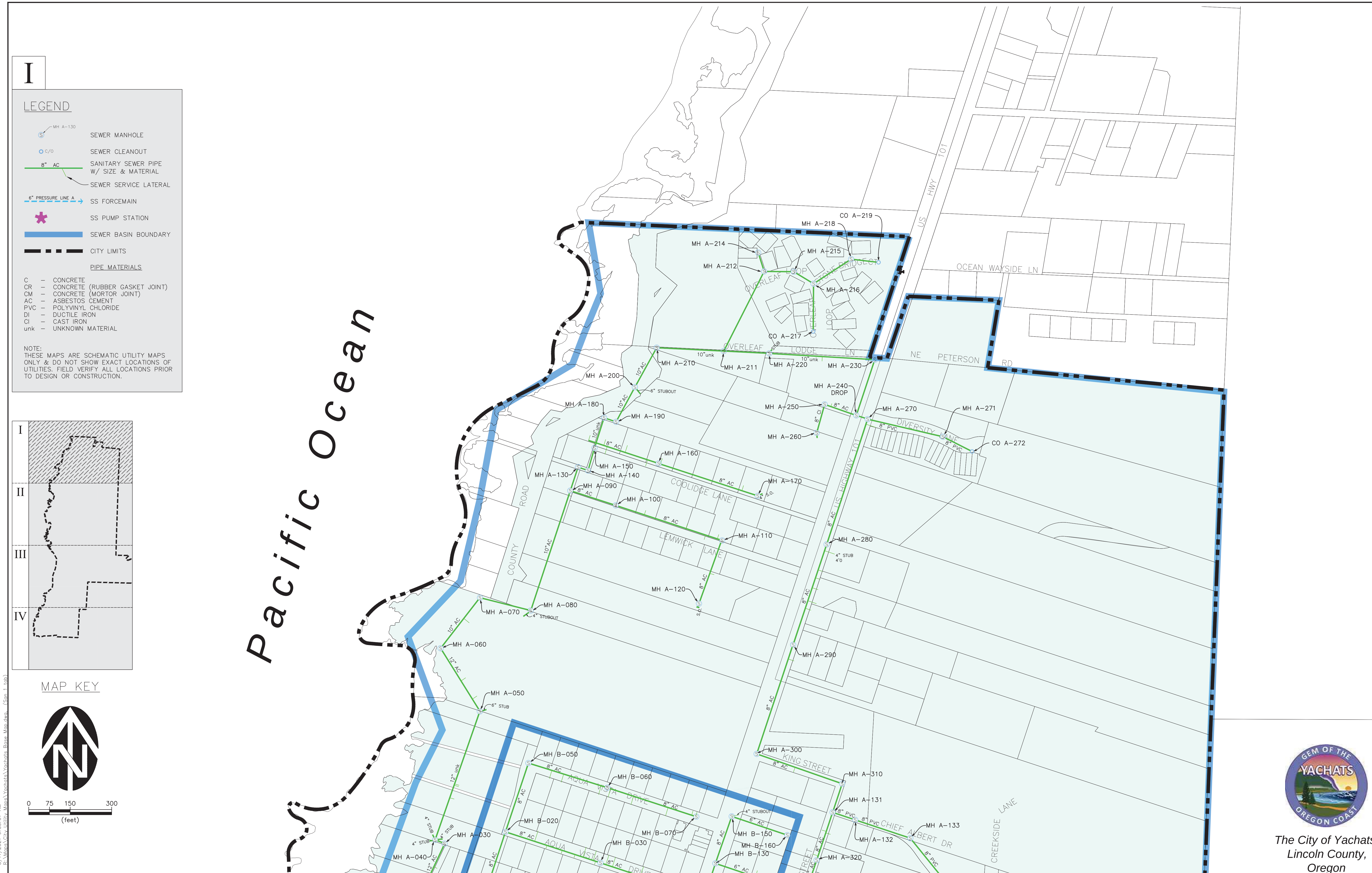
a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the federal Clean Water Act if it were directly discharging those pollutants and;
b. Any substantial change in the volume or character of pollutants being introduced into the 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.

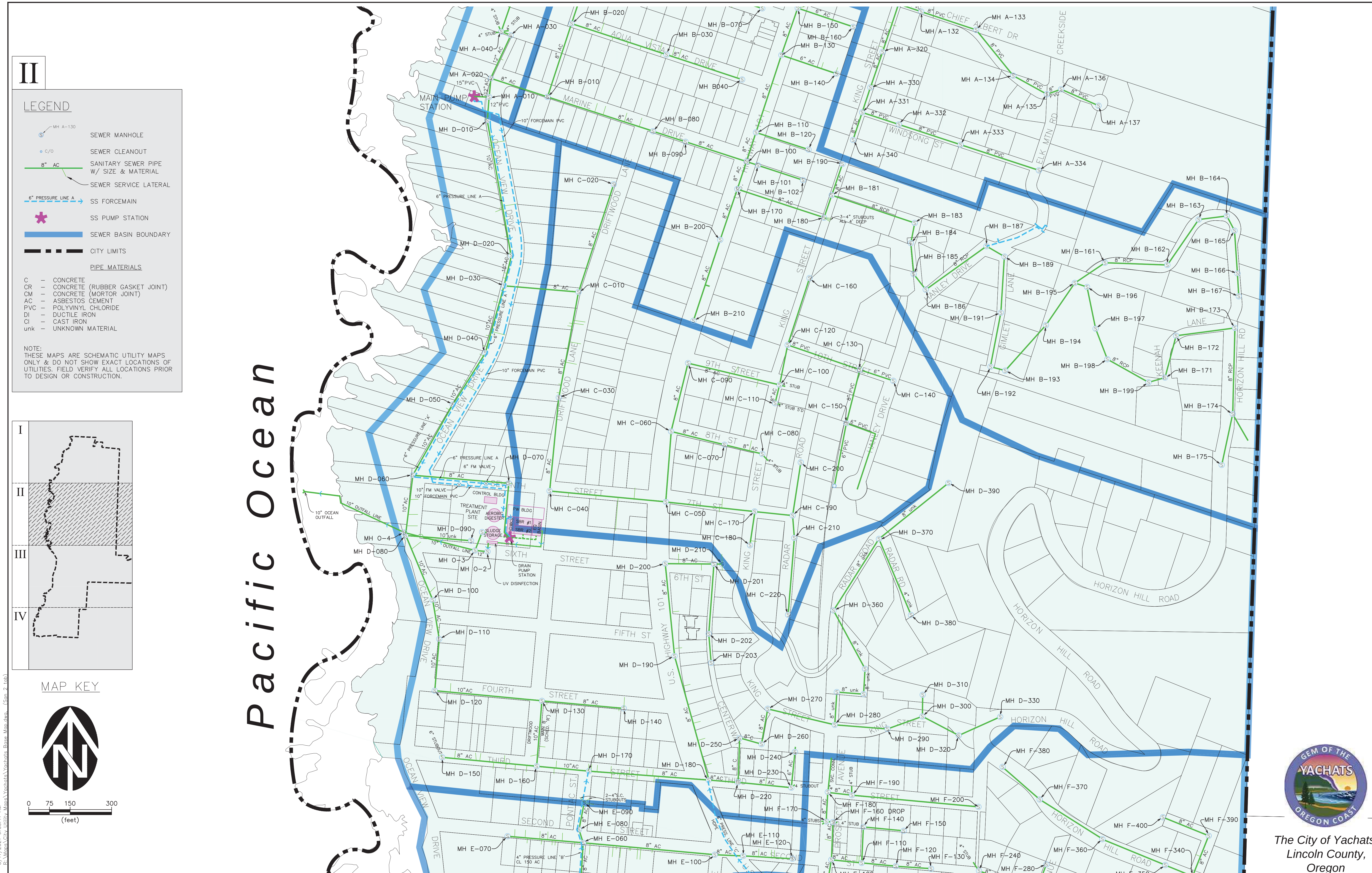
SECTION E. DEFINITIONS

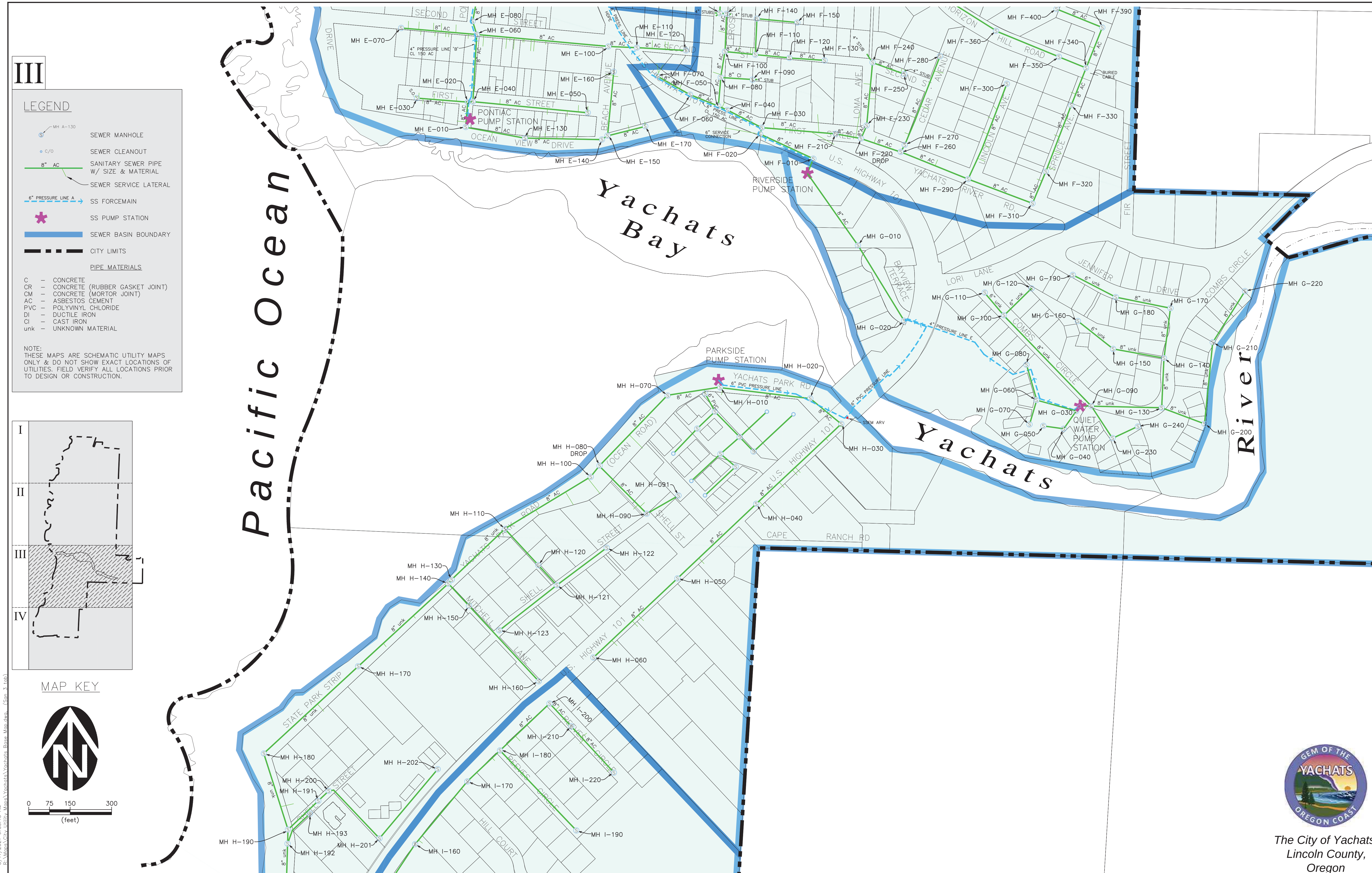
E1. *BOD* or *BOD_5* means five-day biochemical oxygen demand.
E2. *CBOD* or *$CBOD_5$* means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.
E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) 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.

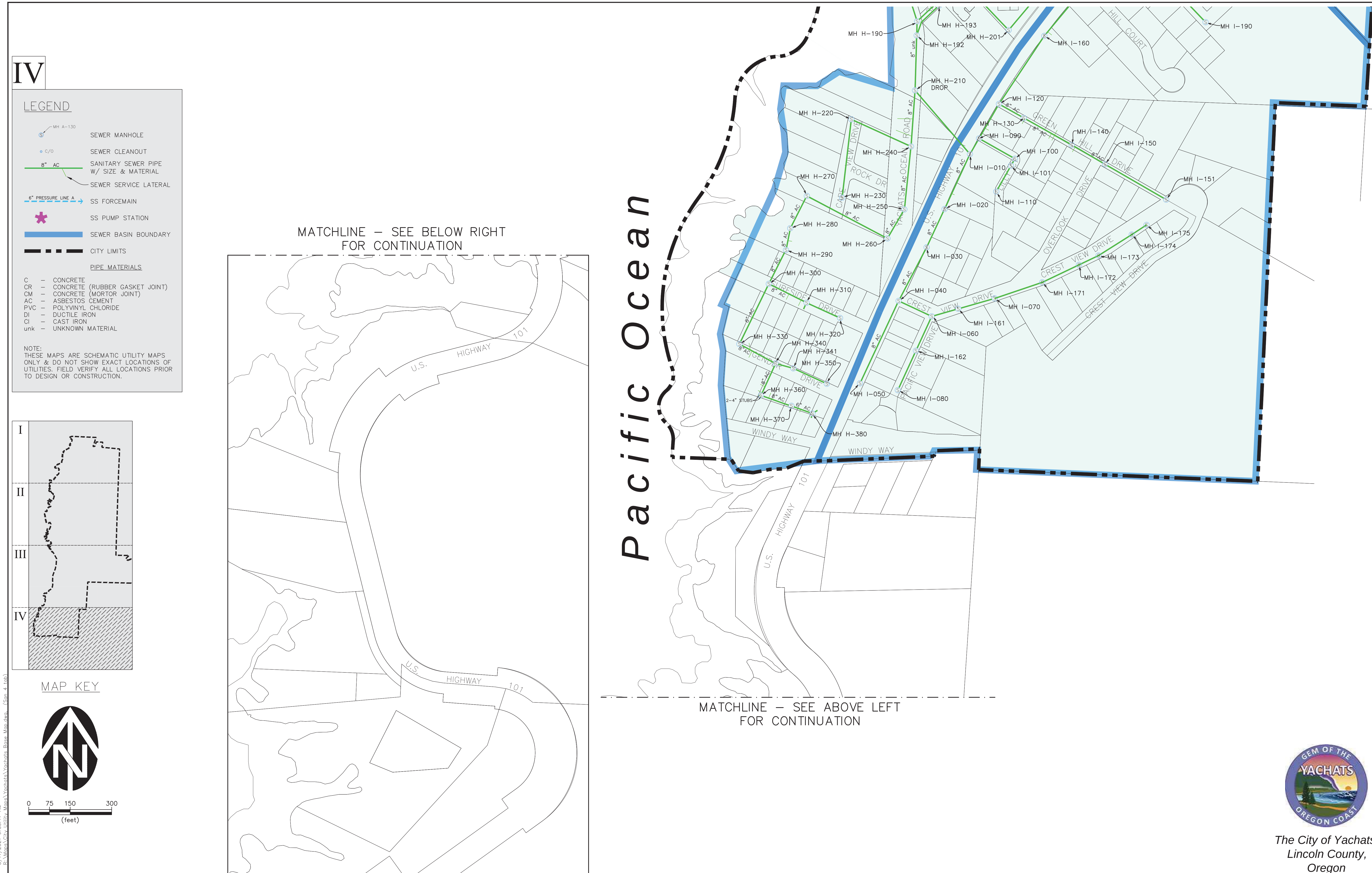
APPENDIX B

COLLECTION SYSTEM MAPS


I
LEGEND
SEWER MANHOLE
SEWER CLEANOUT
SANITARY SEWER PIPE W/ SIZE & MATERIAL
SEWER SERVICE LATERAL
SS FORCEMAIN
SS PUMP STATION
SEWER BASIN BOUNDARY
CITY LIMITS
PIPE MATERIALS
C – CONCRETE
CR – CONCRETE (RUBBER GASKET JOINT)
CM – CONCRETE (MORTOR JOINT)
AC – ASBESTOS CEMENT
PVC – POLYVINYL CHLORIDE
DI – DUCTILE IRON
CI – CAST IRON
unk – UNKNOWN MATERIAL
NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.
I
II
III
IV
MAP KEY
0 75 150 300
(feet)
Pacific Ocean
US HWY 101
OCEAN WAYSIDE LN
NE PETERSON RD
OVERLEAF LOOP
STONE BRIDGE CT
OVERLEAF LODGE LN
DIVERSITY LANE
COOLIDGE LANE
LEMWICK LANE
COUNTY ROAD
US HIGHWAY 101
KING STREET
AQUA VISTA DRIVE
CHIEF ALBERT DR
CREEKSIDE LANE
MH A-214
MH A-212
MH A-218
CO A-219
MH A-215
MH A-216
CO A-217
MH A-210
MH A-211
MH A-220
MH A-230
MH A-200
MH A-180
MH A-190
MH A-240 DROP
MH A-250
MH A-260
MH A-270
MH A-271
CO A-272
MH A-160
MH A-150
MH A-140
MH A-130
MH A-090
MH A-100
MH A-170
MH A-110
MH A-280
MH A-120
MH A-080
MH A-070
MH A-060
MH A-050
MH A-290
MH A-300
MH A-310
MH A-131
MH A-132
MH A-133
MH A-320
MH A-030
MH A-040
MH B-050
MH B-060
MH B-020
MH B-070
MH B-030
MH B-150
MH B-160
MH B-130
The City of Yachats, Lincoln County, Oregon


II
LEGEND
SEWER MANHOLE
SEWER CLEANOUT
SANITARY SEWER PIPE W/ SIZE & MATERIAL
SEWER SERVICE LATERAL
SS FORCEMAIN
SS PUMP STATION
SEWER BASIN BOUNDARY
CITY LIMITS
PIPE MATERIALS
C – CONCRETE
CR – CONCRETE (RUBBER GASKET JOINT)
CM – CONCRETE (MORTOR JOINT)
AC – ASBESTOS CEMENT
PVC – POLYVINYL CHLORIDE
DI – DUCTILE IRON
CI – CAST IRON
unk – UNKNOWN MATERIAL
NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.
I
II
III
IV
MAP KEY
0 75 150 300
(feet)
Pacific Ocean
MAIN PUMP STATION
TREATMENT PLANT SITE
CONTROL BLDG
AEROBIC DIGESTER
SLUDGE STORAGE
PW BLDG
SBR #1
SBR #2
EQ BASIN
DRAIN PUMP STATION
UV DISINFECTION
10" OCEAN OUTFALL
10" OUTFALL LINE
10" FORCEMAIN PVC
6" PRESSURE LINE A
OCEAN VIEW DRIVE
AQUA VISTA DRIVE
MARINE DRIVE
DRIFTWOOD LANE
HIGHWAY 101
U.S. HIGHWAY 101
KING STREET
9TH STREET
10TH STREET
8TH ST
7TH ST
SEVENTH STREET
SIXTH STREET
6TH ST
FIFTH ST
FOURTH STREET
THIRD STREET
SECOND STREET
RADAR ROAD
RADAR RD
HANLEY DRIVE
GIMLET LANE
KEENAH LANE
CHIEF ALBERT DR
WINDSONG ST
ELK MTN RD
CREEKSIDE
HORIZON HILL ROAD
HORIZON HILL RD
CENTER ST
PONTIAC ST
PROSPECT AVENUE
The City of Yachats, Lincoln County, Oregon
GEM OF THE YACHATS OREGON COAST


III
LEGEND
MH A-130
SEWER MANHOLE
C/O
SEWER CLEANOUT
8" AC
SANITARY SEWER PIPE W/ SIZE & MATERIAL
SEWER SERVICE LATERAL
6" PRESSURE LINE A
SS FORCEMAIN
SS PUMP STATION
SEWER BASIN BOUNDARY
CITY LIMITS
PIPE MATERIALS
C – CONCRETE
CR – CONCRETE (RUBBER GASKET JOINT)
CM – CONCRETE (MORTOR JOINT)
AC – ASBESTOS CEMENT
PVC – POLYVINYL CHLORIDE
DI – DUCTILE IRON
CI – CAST IRON
unk – UNKNOWN MATERIAL
NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.
I
II
III
IV
MAP KEY
0 75 150 300
(feet)
Pacific Ocean
Yachats Bay
Yachats River
PONTIAC PUMP STATION
RIVERSIDE PUMP STATION
PARKSIDE PUMP STATION
QUIET WATER PUMP STATION
OCEAN VIEW DRIVE
U.S. HIGHWAY 101
YACHATS RIVER RD.
YACHATS PARK RD
YACHATS PARK ROAD
(OCEAN ROAD)
STATE PARK STRIP
SHELL STREET
SHELL ST
MITCHELL LANE
REEVES CIRCLE
HILL COURT
CAPE RANCH RD
LORI LANE
JENNIFER DRIVE
COMBS CIRCLE
BAYVIEW TERRACE
HORIZON HILL ROAD
LINCOLN AVE.
SPRUCE AVE.
CEDAR AVENUE
LOMA AVE.
BEACH AVENUE
FIRST STREET
SECOND STREET
FIR STREET
4" PRESSURE LINE E
6" PVC PRESSURE LINE
SSFM ARV
BURIED CABLE
6" SERVICE CONNECTION
The City of Yachats, Lincoln County, Oregon
GEM OF THE YACHATS OREGON COAST



IV
LEGEND
SEWER MANHOLE
SEWER CLEANOUT
SANITARY SEWER PIPE W/ SIZE & MATERIAL
SEWER SERVICE LATERAL
SS FORCEMAIN
SS PUMP STATION
SEWER BASIN BOUNDARY
CITY LIMITS
PIPE MATERIALS
C – CONCRETE
CR – CONCRETE (RUBBER GASKET JOINT)
CM – CONCRETE (MORTOR JOINT)
AC – ASBESTOS CEMENT
PVC – POLYVINYL CHLORIDE
DI – DUCTILE IRON
CI – CAST IRON
unk – UNKNOWN MATERIAL
NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.
MAP KEY
I
II
III
IV
0 75 150 300
(feet)
MATCHLINE – SEE BELOW RIGHT FOR CONTINUATION
MATCHLINE – SEE ABOVE LEFT FOR CONTINUATION
Pacific Ocean
U.S. HIGHWAY 101
WINDY WAY
CAPE VIEW DRIVE
ROCK DR
YACHATS OCEAN ROAD
FIRESIDE DRIVE
GLEN DRIVE
CREST VIEW DRIVE
PACIFIC VIEW DRIVE
OVERLOOK DRIVE
GREEN HILL DRIVE
HILL COURT
MH H-190
MH H-192
MH H-193
MH H-201
MH H-210 DROP
MH H-220
MH H-230
MH H-240
MH H-250
MH H-260
MH H-270
MH H-280
MH H-290
MH H-300
MH H-310
MH H-320
MH H-330
MH H-340
MH H-341
MH H-350
MH H-360
MH H-370
MH H-380
2-4" STUBS
MH I-010
MH I-020
MH I-030
MH I-040
MH I-050
MH I-060
MH I-070
MH I-080
MH I-090
MH I-100
MH I-101
MH I-110
MH I-120
MH I-130
MH I-140
MH I-150
MH I-151
MH I-160
MH I-161
MH I-162
MH I-171
MH I-172
MH I-173
MH I-174
MH I-175
MH I-190
The City of Yachats, Lincoln County, Oregon

APPENDIX C

COST ESTIMATES

Table C-1

Recommended Budget Level Cost Estimates
Yachats Wastewater System Facilities Plan
3096.3000.0

Priority Ranking
1= priority 1
2= priority 2
3= priority 3

Project Code	Priority	Project & Location(s)	Size/capacity	Open Cut Length (ft)	Open Cut Pipe Cost ($/ft)	New Manholes Each	New Manhole Cost ($)	Service Laterals #	Service Lateral Cost ($)	Other Costs	Construction Cost	10% Construction Contingency	20% Engineering	10% Legal, Permits, Easement, Admin	Total Project	Rounded Total	*Total project costs rounded to nearest $1000* Prior 1	Prior 2
Gravity Collection System Improvements																		
G-1	1	Sewer Line from King Street to 3rd Street (Manhole D-220 to Manhole D-270) (Note 1)	8 inch	0	$ 175.00	0	$ -	0	$ -	$ 100,000.00	$ 100,000.00	$ 10,000.00	$ 20,000.00	$ 10,000.00	$ 140,000.00	$ 140,000	$140,000	$0
G-2	1	Mainline A Manhole A-040 to Manhole A-050	12 inch	475	$ 170.00	2	$ 12,000.00	4	$ 8,000.00	$ -	$ 100,750.00	$ 10,075.00	$ 20,150.00	$ 10,075.00	$ 141,050.00	$ 141,000	$141,000	$0
G-3	1	Mainline D Manhole D-010 to D-030, Ocean View Drive	15 inch	670	$ 200.00	4	$ 24,000.00	15	$ 30,000.00	$ -	$ 188,000.00	$ 18,800.00	$ 37,600.00	$ 18,800.00	$ 263,200.00	$ 263,000	$263,000	$0
G-4	1	Hanley Drive Sewer Manholes	NA			3	$ 18,000.00	0	$ -	$ -	$ 18,000.00	$ 1,800.00	$ 3,600.00	$ 1,800.00	$ 25,200.00	$ 25,000	$25,000	$0
G-5	1	Wastewater Collection System Design Standards							Not Used						$ 5,000.00	$ 5,000	$5,000	$0
Pump Station Improvements																		
P-1	1	Pump Station Disconnect Panel Improvements					See Table C-2				$ 189,000.00	$ 18,900.00	$ 37,800.00	$ 18,900.00	$ 264,600.00	$ 265,000	$265,000	$0
P-2	1	New Portable Generator							Not Used						$ 40,000.00	$ 40,000	$40,000	$0
P-3	1	Wastewater Collection System Design Standards+E15:P15					See Table C-3				$ 352,000.00	$ 35,200.00	$ 70,400.00	$ 35,200.00	$ 492,800.00	$ 493,000	$493,000	$0
P-4	2	Main Pump Station Improvements					See Table C-4				$ 273,000.00	$ 27,300.00	$ 54,600.00	$ 27,300.00	$ 382,200.00	$ 382,000	$0	$382,000
P-5	2	Parkside Pump Station Improvements					See Table C-5				$ 156,000.00	$ 15,600.00	$ 31,200.00	$ 15,600.00	$ 218,400.00	$ 218,000	$0	$218,000
P-6	2	Riverside Pump Station Improvements					See Table C-5				$ 156,000.00	$ 15,600.00	$ 31,200.00	$ 15,600.00	$ 218,400.00	$ 218,000	$0	$218,000
P-7	2	Pontiac Pump Station Improvements					See Table C-5				$ 156,000.00	$ 15,600.00	$ 31,200.00	$ 15,600.00	$ 218,400.00	$ 218,000	$0	$218,000
Forcemain Improvements																		
F-1	2	Pontiac Pump Station Forcemain Improvements	4 inch	575	$ 150.00	0	$ -	0	$ -	$ -	$ 86,250.00	$ 8,625.00	$ 17,250.00	$ 8,625.00	$ 120,750.00	$ 121,000	$0	$121,000
F-2	2	Riverside Pump Station Forcemain Improvements	8 inch	930	$ 250.00	0	$ -	0	$ -	$ -	$ 232,500.00	$ 23,250.00	$ 46,500.00	$ 23,250.00	$ 325,500.00	$ 326,000	$0	$326,000
Wastewater Treatment Plant Improvements																		
T-1	1	Headworks and Grit Removal Baggers							Not Used						$ 10,000.00	$ 10,000	$10,000	$0
T-2	1	SBR and Digester Diffuser Membrane Replacement							Not Used						$ 15,000.00	$ 15,000	$15,000	$0
T-3	1	New Tractor for the Treatment Plant							Not Used						$ 35,000.00	$ 35,000	$35,000	$0
T-4	1	Public Works Building, Headworks Shelter, and Dewatering Building Rehab					See Table C-6				$ 500,000.00	$ 50,000.00	$ 100,000.00	$ 50,000.00	$ 700,000.00	$ 700,000	$700,000	$0
T-5	1	Outfall Pipeline Improvements					See Table C-7				$ 68,400.00	$ 6,840.00	$ 13,680.00	$ 6,840.00	$ 95,760.00	$ 96,000	$96,000	$0
T-6	2	Biosolids Drying Beds					See Table C-8				$ 113,000.00	$ 11,300.00	$ 22,600.00	$ 11,300.00	$ 158,200.00	$ 158,000	$0	$158,000
T-7	2	New Biosoilds Disposal Site Acquisition							Not Used						$ 50,000.00	$ 50,000	$0	$50,000
T-8	2	Biosolids Manure Spreader							Not Used						$ 100,000.00	$ 100,000	$0	$100,000
T-9	2	Aerobic Digester and Sludge Storage Tank Air Supply System Improvements					See Table C-9				$ 159,000.00	$ 15,900.00	$ 31,800.00	$ 15,900.00	$ 222,600.00	$ 223,000	$0	$223,000
T-10	2	Aerobic Digester and Sludge Storage Tank Coating and Piping Improvements					See Table C-10				$ 236,000.00	$ 23,600.00	$ 47,200.00	$ 23,600.00	$ 330,400.00	$ 330,000	$0	$330,000
T-11	2	SBR, EQ Basin, & Digester Control System Upgrades					See Table C-11				$ 694,000.00	$ 69,400.00	$ 138,800.00	$ 69,400.00	$ 971,600.00	$ 972,000	$0	$972,000
T-12	2	UV Disinfection Control System Upgrades							Not Used						$ 40,000.00	$ 40,000	$0	$40,000
T-13	2	SBR Basin #3					See Table C-12				$ 883,000.00	$ 88,300.00	$ 176,600.00	$ 88,300.00	$ 1,236,200.00	$ 1,236,000	$0	$1,236,000
															Totals	$ 6,820,000	$ 2,228,000	$ 4,592,000

Notes

1. Other costs include the costs for the curred in place pipe liner.

Table C-2

Project P-1: Pump Station Disconnect Panel Improvements
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	LS	$14,000	$14,000
Disconnect Panels for Duplex Pump Stations	3	Each	$15,000	$45,000
Disconnect Panel for Triplex Pump Staiton	1	Each	$20,000	$20,000
Disconnect Panel Stand and Cable Raceways	4	Each	$7,500	$30,000
Disconnect Panel and Stand Installation	4	Each	$20,000	$80,000
Construction Total				$189,000

Table C-3

Project P-3: Quiet Water Pump Station Improvements
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	L.S.	$10,000	$10,000
Erosion Control and Construction Staking	1	L.S.	$2,500	$2,500
Site Preparation	1	L.S.	$5,000	$5,000
Gravity Influent Sewer	25	L.F.	$110	$2,800
Influent Sewer Manhole	1	L.S.	$5,000	$5,000
Forcemain Pipe	25	L.F.	$80	$2,000
Connection to Exisitng Forcemain	1	L.S.	$3,000	$3,000
Washdown Water System	1	L.S.	$3,000	$3,000
Wetwell, Top Slab, and Hatch	1	L.S.	$60,000	$60,000
Pump Discharge Piping	1	L.S.	$15,000	$15,000
Valve Vault Structure, Piping, and Valves	1	L.S.	$45,000	$45,000
Control Panel Concrete Slab	1	L.S.	$1,500	$1,500
Miscellaneous Civil Improvements	1	L.S.	$15,000	$15,000
Miscellaneous Mechanical Improvements	1	L.S.	$15,000	$15,000
Decomission Existing Station	1	L.S.	$5,000	$5,000
New Pumps and Appurtenances	1	L.S.	$25,000	$25,000
New Power Service	1	L.S.	$10,000	$10,000
New Telephone Service	1	L.S.	$2,500	$2,500
Pump Disconnect Panel and Stand	1	L.S.	$20,000	$20,000
Pump Control Panel and Instruments	1	L.S.	$40,000	$40,000
Miscellaneous Electrical and Controls	1	L.S.	$65,000	$65,000
Construction Total				$352,000

Table C-4

Project P-4: Main Pump Station Improvements
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	L.S.	$7,600	$7,600
Erosion Control and Construction Staking	1	L.S.	$2,000	$2,000
Overflow Pipe	15	L.F.	$100	$1,500
Overflow Pipe Connection to Existing Wetwell	1	L.S.	$2,000	$2,000
Manhole on 30 inch Storm Drain for Overflow	1	L.S.	$5,000	$5,000
Bypass Pumping Port Installation	1	L.S.	$5,000	$5,000
Bypass Pumping	1	L.S.	$25,000	$25,000
Miscellaneous Civil Improvements	1	L.S.	$15,000	$15,000
Miscellaneous Mechanical Improvements	1	L.S.	$15,000	$15,000
New Pumps and Appurtenances	1	L.S.	$100,000	$100,000
Pump Control Panel and Instruments	1	L.S.	$60,000	$60,000
Miscellaneous Electrical and Controls	1	L.S.	$35,000	$35,000
Construction Total				$273,000

Table C-5

Project P-5, P-6, & P-7: Duplex Pump Station Pump and Control Imps.
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	L.S.	$6,000	$6,000
Bypass Pumping Port Installation	1	L.S.	$5,000	$5,000
Bypass Pumping	1	L.S.	$25,000	$25,000
Miscellaneous Mechanical Improvements	1	L.S.	$15,000	$15,000
New Pumps and Appurtenances	1	L.S.	$30,000	$30,000
Pump Control Panel and Instruments	1	L.S.	$45,000	$45,000
Miscellaneous Electrical and Controls	1	L.S.	$30,000	$30,000
Construction Total				$156,000

Table C-6

Project T-4: Headworks Shelter, Public Works Bldg, and Solids Bldg Rehab.
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Remove Headworks Shelter				
Mobilization (percentage of total)	8.0%	L.S.	$1,800	$1,800
Demolish Headworks Shelter	1	L.S.	$5,000	$5,000
Repair Public Wks Bldg at Shelter Interface	1	L.S.	$2,500	$2,500
Install New Lighting for Headworks	1	L.S.	$10,000	$10,000
Miscellaneous Structural Modifications	1	L.S.	$5,000	$5,000
Subtotal Remove Headworks Shelter				$24,300
Replace Overhead Doors				
Mobilization (percentage of total)	8.0%	L.S.	$8,300	$8,300
Remove Existing Door and Prep. Openning	6	Each	$1,500	$9,000
Install New Roll-Up Door	6	Each	$15,000	$90,000
Miscellaneous Structural Modifications	1	L.S.	$5,000	$5,000
Subtotal Replace Overhead Doors				$112,300
Replace Metal Roofing				
Mobilization (percentage of total)	8.0%	L.S.	$10,700	$10,700
Remove Existing Roofing and Prep. Framing	1	L.S.	$20,000	$20,000
Install New Metal Roofing	6600	S.F.	$15	$99,000
Miscellaneous Structural Modifications	1	L.S.	$5,000	$5,000
Miscellaneous Electrical Modifications	1	L.S.	$5,000	$5,000
Miscellaneous Mechanical Modifications	1	L.S.	$5,000	$5,000
Subtotal Replace Metal Roofing				$144,700
Replace Metal Siding Panels				
Mobilization (percentage of total)	8.0%	L.S.	$16,200	$16,200
Remove Existing Roofing and Prep. Framing	1	L.S.	$20,000	$20,000
Install New Metal Roofing	4400	S.F.	$30	$132,000
Miscellaneous Structural Modifications	1	L.S.	$20,000	$20,000
Miscellaneous Electrical Modifications	1	L.S.	$20,000	$20,000
Miscellaneous Mechanical Modifications	1	L.S.	$10,000	$10,000
Replace Metal Siding Panels				$218,200
Construction Total				$500,000

Table C-7

Project T-5: Outfall Pipeline Improvements
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	L.S.	$5,100	$5,100
Bypass Pumping	1	L.S.	$10,000	$10,000
12-Inch PVC Pipe from Treatment Plant to Ocean View Drive	265	L.F.	$150	$39,800
New Manhole	1	Each	$6,000	$6,000
Miscellaneous Surface Restoration	1	L.S.	$7,500	$7,500
Construction Total				$68,400

Table C-8

Project T-6: Biosoilds Drying Beds
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs Item	Qty	Unit	Unit Cost	Total Cost
Mobilization (percentage of total)	8.0%	L.S.	$7,800	$7,800
Excavation, Pavement Removal, Subgrade Prep.	75	C.Y.	$100	$7,500
Baserock	45	C.Y.	$40	$1,800
Concrete Walls	110	L.F.	$400	$44,000
Concrete Paving	1850	S.F.	$10	$18,500
Catch Basin	1	Each	$2,500	$2,500
Manhole	1	Each	$4,500	$4,500
Drainage Piping	80	L.F.	$80	$6,400
Miscellaneous Civil Improvements	1	L.S.	$20,000	$20,000
Construction Total				$113,000

Table C-9

Project T-9: Aerobic Digester and Sludge Storage Tank Air Supply
Recommended Budget Level Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs Item	Qty	Unit	Unit Cost	Total Cost
Mobilization (percentage of total)	8.0%	LS	$11,800	$11,800
Blower Manifold Piping Modifications	1	L.S.	$5,000	$5,000
Blower Room Concrete Slab Removal/Repair	1	L.S.	$5,000	$5,000
Underground Air Piping to Digester Air Pipe	1	L.S.	$7,500	$7,500
Actuated Air Valves	7	Each	$6,000	$42,000
Air Valve Installation	7	Each	$2,500	$17,500
Power and Control Wiring	1	L.S.	$30,000	$30,000
Control System Programming	1	L.S.	$25,000	$25,000
Miscellaneous Civil Improvements	1	LS	$5,000	$5,000
Miscellaneous Mechanical Improvements	1	LS	$5,000	$5,000
Miscellanous Electrical Improvements	1	LS	$5,000	$5,000
Construction Total				$159,000

Table C-10

Project T-10: Aerobic Digester and Sludge Storage Tank Coating & Piping Improvements
Recommended Budget Level Construction Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	L.S.	$17,500	$17,500
Digester 1				
Cleaning and Surface Preparation	1	L.S.	$5,000	$5,000
Apply Coating System	1550	S.F.	$18	$27,900
Digester 2				
Cleaning and Surface Preparation	1	L.S.	$5,000	$5,000
Apply Coating System	1550	S.F.	$18	$27,900
Digester 3				
Cleaning and Surface Preparation	1	L.S.	$5,000	$5,000
Apply Coating System	1550	S.F.	$18	$27,900
Digester 4				
Cleaning and Surface Preparation	1	L.S.	$5,000	$5,000
Apply Coating System	1550	S.F.	$18	$27,900
Sludge Transfer Basin				
Cleaning and Surface Preparation	1	L.S.	$2,500	$2,500
Apply Coating System	775	S.F.	$18	$14,000
Sludge Storage Tank				
Cleaning and Surface Preparation	1	L.S.	$7,500	$7,500
Apply Coating System	2800	S.F.	$18	$50,400
Miscellaneous Improvements				
Digester Cell 2 to 3 Transfer Piping and Valve	1	L.S.	$10,000	$10,000
Fill Sludge Storage Tank Launder with Concrete	1	L.S.	$2,500	$2,500
Miscellaneous Structural Improvements	1	L.S.	$5,000	$5,000
Miscellaneous Piping Improvements	1	L.S.	$5,000	$5,000
Construction Total				$236,000

Table C-11

Project T-11: SBR, EQ Basin, & Digester Control System Upgrades
Recommended Budget Level Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	LS	$51,400	$51,400
Main Plant Control Panel Upgrade	1	L.S.	$75,000	$75,000
SBR Control System Program Update	1	L.S.	$25,000	$25,000
New SCADA Computer	1	L.S.	$20,000	$20,000
Plant SCADA System Integration	1	L.S.	$50,000	$50,000
New WAS Pumps	2	Each	$12,000	$24,000
New Sludge Transfer Pumps	2	Each	$12,000	$24,000
Blower VFDs	5	Each	$30,000	$150,000
DO Probes	2	Each	$5,000	$10,000
Level Sensors	5	Each	$5,000	$25,000
Decanter Actuator	2	Each	$20,000	$40,000
Air Piping Valve Actuators	2	Each	$10,000	$20,000
EQ Basin Valve Actuator	1	Each	$20,000	$20,000
Equipment Installation	1	LS	$50,000	$50,000
Miscellaneous Mechanical Improvements	1	LS	$25,000	$25,000
Miscellanous Electrical Improvements	1	LS	$85,000	$85,000
Construction Total				$694,000

Table C-12

Project T-13: SBR Basin #3
Recommended Budget Level Cost Estimate
Yachats Wastewater System Facilities Plan
3096.3000.0

Construction Costs **Item**	**Qty**	**Unit**	**Unit Cost**	**Total Cost**
Mobilization (percentage of total)	8.0%	LS	$65,400	$65,400
Sitework				
Erosion Control	1	LS	$2,500	$2,500
Excavation	700	CY	$10	$7,000
Structural Backfill	250	CY	$45	$11,250
Baserock	110	CY	$45	$4,950
Miscellaneous Civil	1	LS	$25,000	$25,000
Piping				
Drain Piping	1	LS	$5,000	$5,000
Influent Piping (Headworks to SBR #3)	1	LS	$5,000	$5,000
Effluent Piping (SBR #3 to EQ Basin)	1	LS	$5,000	$5,000
Washdown Water Piping	1	LS	$2,500	$2,500
Foundation Perimeter Drain	150	LF	$20	$3,000
Air Piping	1	LS	$10,000	$10,000
WAS Piping	1	LS	$10,000	$10,000
Concrete				
Bottom Slab	200	CY	$500	$100,000
Walls	200	CY	$750	$150,000
Walkways	35	CY	$1,000	$35,000
Handrailing	350	LF	$75	$26,250
Grating	100	SF	$60	$6,000
Sluice Gates	1	EA	$7,500	$7,500
Flow Meter for SBR #3 Parshall Flume	1	LS	$10,000	$10,000
Misc Mechanical	1	LS	$25,000	$25,000
Blower Room Modificaitons	1	LS	$10,000	$10,000
SBR Equipment (Blower, Decanter, Instruments, valves, etc.)	1	LS	$180,000	$180,000
Equipment Installation (40% of Equip Cost)	1	LS	$72,000	$72,000
Control System Integration	1	LS	$30,000	$30,000
Electrical & Controls	1	LS	$75,000	$75,000
Construction Total				$883,000