# Gleneden Sanitary District

**LINCOLN COUNTY, OREGON**

## Wastewater Treatment Plant
## Facility Plan

**June 2023**

**REV. Dec. 2023**

GLENEDEN GSD SANITARY DISTRICT

Civil West Engineering Services, Inc.

www.civilwest.com | Willamette Valley | North Coast | South Coast | Rogue Valley

# Gleneden Sanitary District

**LINCOLN COUNTY, OREGON**

## Wastewater Treatment Plant Facility Plan


**JUNE 2023**

**South Coast Office**
486 'E' Street
Coos Bay, OR 97420
541-266-8601

**Willamette Valley Office**
200 Ferry Street SW
Albany, OR 97321
541-223-5130

**Rogue Valley Office**
830 O'Hare Parkway, Ste. 102
Medford, OR 97504
541-326-4828

**North Coast Office**
409 SW 10th Street
Newport, OR 97365
541-264-7040

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# AGREEMENT

**THIS AGREEMENT, entered into this 31st day of December, 1998, by and between the City of Depoe Bay, a municipal corporation, hereinafter referred to as " City" and Gleneden Sanitary District, a Sanitary District formed under Chapter 450, hereinafter referred to as "District",**

**RECITALS:**

**A.** WHEREAS, the Parties hereto have entered into an Agreement dated October 14, 1991, wherein the District may discharge 400,000 gallons per day (gpd) of average flow and 800,000 gpd of peak flow to the Depoe Bay interceptor pump stations and lines, and wastewater treatment plant (WWTP) for treatment and disposal; and

**B.** WHEREAS, the City and the District desire to share in the Annual Total Cost of administering, building, maintaining and operating Shared Facilities for sewage transmission, treatment, disposal and bio-solids management; and

**C.** WHEREAS, the City has voter authorization to issue up to $902,000 in Revenue Bonds and up to $3,841,000 in General Obligation Bonds for the purpose of immediately expanding and making other improvements to the Shared Facilities that are required to meet the treatment requirements of DEQ and to provide sufficient excess capacity for growth; and

**D.** WHEREAS, the District has agreed to enter into this Agreement to provide for its share of the Annual Total Cost; and

**E.** WHEREAS, the Parties now wish to amend the previous agreement by striking and terminating that agreement in its entirety and replacing the same with the agreement contained herein, the terms and provisions hereof, being the sole agreement between the Parties hereafter, subject to future modifications;

NOW THEREFORE, the Parties hereto agree as follows:

**SECTION I. DEFINITIONS:** As used in this Agreement, the following words shall have the following meanings:

1. "Annual Total Cost" shall mean the City's annual cost of administration, construction not paid from bond or grant proceeds, operations, maintenance, and Debt Service for the Shared Facilities. The determination of Annual Total Cost for the current Fiscal Year will be based on the City's adopted Budget; and, determination of the actual Annual Total Cost for the preceding Fiscal Year shall be based upon the City's annual financial report.

2. “Budget” shall mean the City’s proposed and adopted Fiscal Year budget as required by ORS 294.305 - 294.565.

3. “City” shall mean the City of Depoe Bay.

4. “City’s Share” shall mean the percentage of Annual Total Cost established on the City’s number of EDUs, as compared to total EDU count of the City and the District combined, on an annual basis, which count shall be adjusted on December 31 of each year. The percentage determined each December 31 shall apply to the upcoming Fiscal Year.

5. “Debt Service” shall mean the annual payment of interest and principal due on general obligation bonds, revenue bonds, or any combination of these bonds that the City issues to pay for improvements to Shared Facilities.

6. “DEQ” shall mean the Oregon Department of Environmental Quality.

7. “District” shall mean the Gleneden Sanitary District.

8. “District’s Share” shall mean the percentage of Annual Total Cost established on the District’s number of EDUs, as compared to total EDU count of the City and the District combined, on an annual basis, which count shall be adjusted on December 31 of each year. The percentage determined each December 31 shall apply to the upcoming Fiscal Year.

9. “EDU” shall mean equivalent dwelling unit.

10. “EPA” shall mean the United States Environmental Protection Agency.

11. “Fiscal Year” shall mean period from July 1 through June 30 of the next year.

12. “Parties” shall mean the City and the District.

13. “Reserves” shall mean reserves for repair, replacement and betterment of the Shared Facilities.

14. “Shared Facilities” shall mean those facilities owned by the City and used by both Parties for sewage transmission, treatment, disposal and bio-solids management, including, but not limited to: the wastewater treatment plant (WWTP) and outfall, all disposal and bio-solids disposal facilities, interceptor sewer lines and pump stations that transport the District’s sewage to the treatment plant (beginning at Manhole No. 16, which is just south of the south entrance to Fogarty Creek Park near Highway 101).

**SECTION II. THE CITY AGREES:**

1. To permit the District to connect its system of sewage collection lines to the City system at the output of Manhole No. 16 on U.S. Highway 101, which is situated just south of Fogarty Creek Park south entrance road. This permission shall extend at least until all Debt Service is paid in full.

2. To administer, construct, operate and maintain the Shared Facilities as necessary to give effect to this Agreement.

3. To administer, construct, operate and maintain all capital improvements to the Shared Facilities, to obtain financing for the Shared Facilities and such capital improvements and to be liable for all Debt Service. The City shall fix and collect sewer rates and charges, including charges to the District, sufficient to provide for the payment of the Annual Total Cost.

**SECTION III. THE DISTRICT AGREES:**

1. Except for those areas where it is unfeasible or impractical to serve by the District's collection system, to discharge 100 percent of the sewage the District collects to the City's sewer system for at least until all Debt Service is paid in full or defeased. If the District at some earlier date wishes to terminate this agreement and to discharge its sewage elsewhere, it must, as a condition of termination and prior to termination of this agreement, repay, defease, or otherwise provide for the repayment of its share of any outstanding City bonds issued for Shared Facilities based on its then current share of Annual Total Cost.

2. That the design, construction and inspection of all facilities and improvements within the District shall be in accordance with plans and specifications approved by DEQ and EPA.

3. To adopt, keep current and enforce rules, regulations and standards concerning the collection and disposal of sewage within the District. Such rules, regulations and standards shall be compatible with current engineering practice, consistent with the requirements and the regulations of DEQ and, to the extent that they deal with the quality of the collection of sewage, shall be as nearly as practical identical with, or more stringent than, the rules and regulations adopted by the City now existing or adopted hereafter.

4. To pay its share of the Annual Total Cost. To secure those payments, the District will fix and collect rates and charges such that revenues are sufficient to pay its share of Total Annual Cost and all other annual costs of the District. To pay its share of Annual Total Cost, the District shall make equal monthly payments to the City based on the District's Share.

## SECTION IV. THE PARTIES AGREE:

1. That the City will be responsible for the administration, construction, operation and maintenance of the Shared Facilities. That the District will be responsible for the administration, construction, operation, maintenance, repair and replacement as necessary of facilities within its boundaries. A map of the City's and District's boundaries is attached, which is made a part of this agreement. Billing and collection of sewer service charges shall be handled by each party individually.

2. That each Party shall keep an accounting and shall provide by January 31 of each year a report to the other Party of the number of EDUs within their respective boundaries as of December 31 of each year. Each Party's percent of total EDUs shall be the basis upon which Annual Total Cost shall be shared.

3. That the City shall provide the District with its proposed Budget for the upcoming Fiscal Year. The Budget shall include and identify all components of Total Annual Cost for the Shared Facilities and shall be furnished to the District not later than April 30 of each year for the Fiscal Year beginning July 1 of the same year.

4. That before August 30 of each year, the City will provide the District with an accounting of actual Annual Total Costs for the Fiscal Year ending June 30 of the same year. Also, the City shall provide an accounting of each Party's payments of actual Annual Total Cost to the District. In the event the District's actual payments in the Fiscal Year ending June 30 of the same year are less than the District's share of the actual Annual Total Cost, the City will invoice the District for the underpayment and the District shall submit payment for such underpayment on or before September 30 of the same year. In the event the District overpaid for the Fiscal Year ending June 30, the District shall receive a credit against payments due during the current Fiscal Year. The intent of this provision and agreement being that the District shall share only in the actual Annual Total Costs directly relating to the Shared Facilities.

5. That each Party shall budget and maintain Reserves to be used for emergency or non-emergency capital improvements to the Shared Facilities. In no event shall each Party's contribution to the Reserve Fund be less than $20,000. The Reserve Fund shall be a joint account, with any interest earnings allocated proportionately to the benefit of each Party. The City will provide an annual accounting of the Reserve Fund to the District.

6. That each Party shall manage and maintain each Party's System Development Charges (SDC) separately.

7. That the City shall advise the District not less than 30 days in advance of any scheduled or unanticipated expenditure of $20,000 or more for a single major capital or repair item that is non-emergency.

8. That a one year and five year review of EDU and flow methodology for determining cost sharing will be addressed in Fiscal Year 1999-2000 and again in Fiscal Year 2004-2005 and at subsequent five year intervals thereafter.

9. The Parties agree to maintain all records required by law or by any ordinance or resolution of their operation and administration and that either Party shall have the privilege to conduct inspections of any facilities or any records at any time.

10. The Parties shall mutually agree on a flow meter that the District shall purchase and have installed at the Fogarty Creek Lift Station that measures total accumulated flow and records the daily and peak flows on a monthly basis. The meter shall measure the total sewage flow from the District and have a remote readout located at the wastewater treatment plant and the District's office. The City shall maintain an effluent flow meter at the wastewater treatment plant that is mutually acceptable to the Parties. This meter will measure total accumulated flow and record the daily and peak flows on a monthly basis. The meter shall measure the total treatment plant effluent flow to the outfall and have a remote readout located at the wastewater treatment plant and the District's office. Both meters shall be calibrated and certified annually by a qualified, licensed technician. Not withstanding the metering of flow, the allocation of costs shall be based upon the City's and the District's Share as previously defined.

11. The City and the District shall use the same methodology to establish a schedule of EDUs. A schedule of EDUs is attached, which is made a part of this agreement.

**SECTION V. IMPROVEMENTS:**

When eighty five percent (85%) of any component of the Shared Facilities' annual average capacity is reached, or by Fiscal Year 2014-15, whichever comes first, the Parties shall commence planning for additional capacity for the component(s) of the Shared Facilities that are determined to be at or over 85% of their capacity. If additional capital cost is required to upgrade or provide additional capacity, the Parties shall be required to enter into negotiations at the request of either party.

**SECTION VI. ADVISORY COMMITTEE:**

The City and the District have formed an Advisory Committee composed of three members from each Party to make recommendations to the City and the District concerning any aspect of the Shared Facilities. This committee shall meet quarterly. Prior to the February joint meeting of the Parties described in Section VIII herein, the Committee will meet to review the capacity utilization of all Shared Facilities as expressed in Section V, above; the number of EDUs and the Annual Total Cost for sufficiency and as expressed in Sections I, II and III above. It should complete its meeting to allow sufficient time to prepare a written or oral report, at the Committee's discretion, for the February joint meeting of the Parties.

## SECTION VII. AMENDMENTS:

Upon written request of either party to negotiate with the other Party relative to amending this agreement, the Advisory Committee shall meet to consider the suggested revision(s) and make recommendation to their respective governing bodies. Upon receiving the Committee's recommendation, the City's Council and the District's Board of Directors shall meet to make a determination on the proposed amendment(s). No amendment shall be permitted that is not in compliance with the covenants and representations made by the City to the holders of bonds issued by the City for its sewer system.

## SECTION VIII. COMPLIANCE:

The City's Council and the District's Board of Directors agree to meet jointly on an annual basis, during the first week in February, the date to be mutually decided upon, to discuss the operations, progress and any problems of each of the Parties and to ensure the enforcement of this agreement and compliance with its terms.

## SECTION IX. DISPUTE RESOLUTION:

In the event that a dispute arises over any of the terms and conditions of this Agreement, and the parties are unable to reach an agreement, then at the request of either party the dispute shall be submitted to arbitration. Each party shall select one arbitrator and shall bear the burden of expense of the same and the two arbitrators shall select a third arbitrator, the expense of which shall be borne equally by the Parties. The decision of the majority of the arbitrators shall be final.

## SECTION X. TERM AND TERMINATION:

This Agreement is an agreement in perpetuity, terminable upon five years prior notice. Not withstanding the foregoing, it is the intent of the Parties that each obtain the benefit of the Shared Facilities. Therefore, the term of this Agreement shall not be terminated prior to the payment of all Debt Service or defeasance thereof or the maturity of the revenue bonds and general obligation bonds. This Agreement shall be binding upon the successors and assigns of the Parties hereto. If the District terminates this Agreement prior to the repayment or defeasance of all Debt Service, except in case of breach of this Agreement by the City, the District shall continue to pay its share of the Debt Service and shall hold harmless the City from those financial responsibilities and obligations attributable to the District. The District shall provide for either a lump sum payoff of their debt, defeasance, or a security bond to guarantee payment for the remainder of the debt service. Prior to declaration of a default by the District, the District shall provide notice to the City of the alleged default and allow adequate time to cure the default before termination of the Agreement occurs. Notice shall be provided 30 days prior to declaration of a default, or such other longer time as is reasonably required to remedy the default, whichever is longer.

IN WITNESS WHEREOF, we have hereunto executed this Agreement on the date first written above and hereby certify that we are the Mayor and City Recorder of the City of Depoe Bay and the President and Secretary of the Gleneden Sanitary District and are authorized to sign on behalf of our respective jurisdictions.

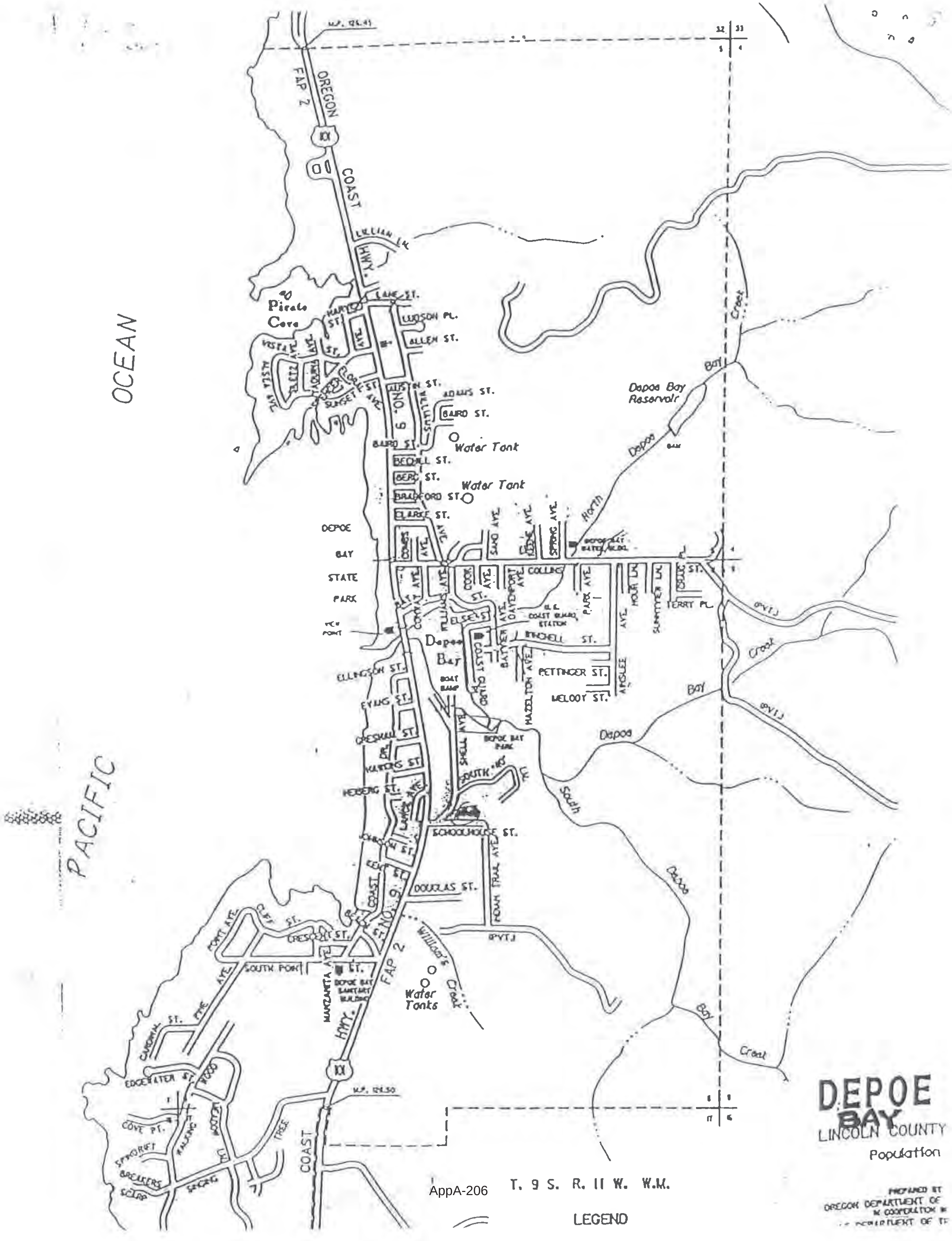
| CITY OF DEPOE BAY | GLENEDEN SANITARY DISTRICT |
|---|---|
| BY Robert Jackson | BY Joseph H Whalen |
| DATE 12-8-98 | DATE 12-14-98 |
| ATTEST: | ATTEST: |
| BY Perdita Murray | BY Mark L Snyder |
| DATE 12-8-98 | DATE 12-14-98 |

## EQUIVALENT DWELLING UNIT (EDU) TABLE

| DEVELOPMENT TYPE | EDUs per UNIT |
|---|---|
| Single Family Dwelling: | 1 |
| Multifamily: | 1 |
| Manufactured Home: | 1 |
| Tourist Accommodations: (i.e., hotel/motel units with kitchens or fixtures other than bathroom) | 1 |
| Tourist Accommodations: (i.e., hotel/motel units with bathroom only) | .5 |
| RV Parks/Campgrounds: | .5 |
| Other Commercial or Industrial: | Determined by water meter size, see schedule below: |

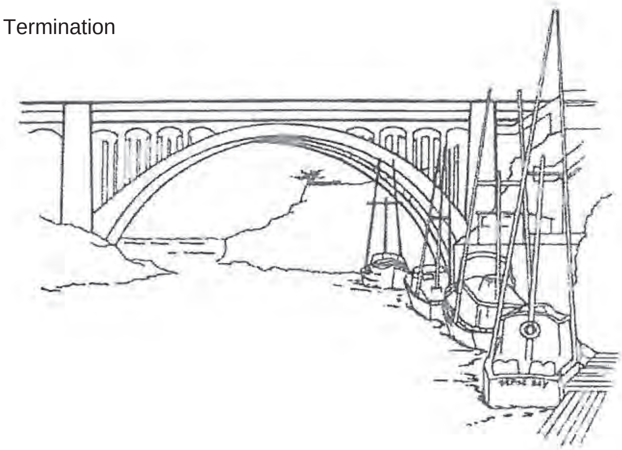
EQUIVALENT DWELLING UNIT METER SIZE
Based on equivalent flow capacity of meters

| Meter Size | EDUs |
|---|---|
| 5 / 8" - 3 / 4" | 1 |
| 1" | 2.5 |
| 1 ½" | 5 |
| 2" | 8 |
| 3" | 16 |
| 4" | 25 |
| 6" | 50 |
| 8" | 80 |


PACIFIC
OCEAN
OREGON COAST HWY. NO. 9
FAP 2
101
Pirate Cove
LANE ST.
ALLEN ST.
ADAMS ST.
BAIRD ST.
Water Tank
Water Tank
Water Tanks
Depoe Bay Reservoir
North Depoe Bay Creek
South Depoe Bay Creek
Depoe Bay
DEPOE BAY STATE PARK
COLLINS ST.
TERRY PL.
U.S. COAST GUARD STATION
PETTINGER ST.
MELODY ST.
ELLINGSON ST.
HEMBERG ST.
SCHOOLHOUSE ST.
DOUGLAS ST.
CRESCENT ST.
SOUTH POINT
EDGEWATER ST.
COVE PT.
BREAKERS
Willcox's Creek
(PVT.)
T. 9 S. R. 11 W. W.M.
LEGEND
DEPOE BAY
LINCOLN COUNTY
Population

# CITY of DEPOE BAY

Post Office Box 8 + Depoe Bay, Oregon 97341
Phone (541) 765-2361 + Fax (541) 765-2129
TDD# 1-800-735-2900



March 1, 2022

Gleneden Sanitary District
P.O. Box 96
Gleneden Beach, Oregon 97388

Re: Notice of Termination of December 31, 1998, Agreement

To Whom It May Concern

The City of Depoe Bay, by this letter, hereby issues the five-year notice of termination as provided for in the above Agreement in Section X. All negotiations (or attempts to negotiate) shall continue, and the City's readiness, willingness, and ableness to perform under the Agreement will not change in the interim. The City believes that this notice gives Gleneden Sanitary District ample time to prepare for the alternate provision of service. The City may continue providing service, albeit in a different manner than in the past. The underlying debt will be paid by the time of the expiration of the notice period. There will be no change in the other terms of the Agreement. Further negotiation is still recommended. It is not necessary that the relationship change due to the fact we have exercised our contractual right to give notice. Regardless, this is notice of termination, and termination will occur sometime after five years from this date.

Sincerely,

Kathy Short, Mayor
City of Depoe Bay

GLENEDEN SANITARY DISTRICT
Post Office Box 96
Gleneden Beach, Oregon 97388
Telephone 764-2475

Rec'd
2/15/10

February 23, 2010

Dear Clark and Wen,

The enclosed wastewater plan from Depoe Bay has been adopted by the Depoe Bay City Council.

My request and that of the Board of Directors is for your review of this document.

Given the "upgrade" of pipe sizing for the future growth in the city and of course the city would expect the GSD to pay their percentage of their plan.......are there some issues that should be addressed concerning the obligation of GSD?

Clark, does this new plan fit the legal obligations of the original agreement between the city and GSD? Are there some issues of "growth" that may not apply to the original contract? Typically, Depoe Bay holds a "gun" to GSD for whatever they want.

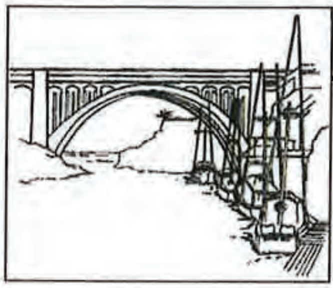
Wen, does the HBH engineering make sense? I suggest that the size of the line from Fogarty Creek to Depoe Bay is more for the development potential than for the actual need of sewage flows. You will probably see many other items that may raise questions.

Probably, the earliest that any discussion with the City council could take place, would be in June, according to the City Recorder, Pery Murray.

Thank you both for your professional work that you do for the GSD.

Best regards,
Mark
Mark

JUN 26 2009



# City of Depoe Bay
## Lincoln County, Oregon

# Wastewater Master Plan Update

June 2009
Project No. 2008-06

REGISTERED PROFESSIONAL ENGINEER
19,191
OREGON
JUNE 30, 1997
ROBERT M. HENRY

EXPIRES 06/30/09

Prepared By:

HBH Consulting Engineers
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mail@hbh-consulting.com

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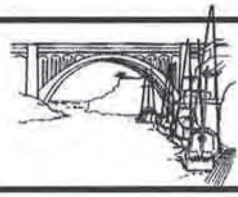

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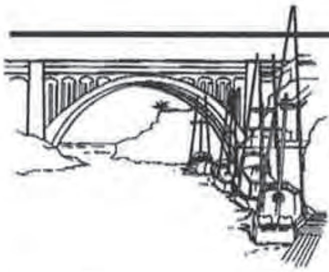
# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# EXECUTIVE SUMMARY



# City of Depoe Bay Wastewater Master Plan Update

# EXECUTIVE SUMMARY

## ES.1 Introduction

The City of Depoe Bay is located in Lincoln County on the Central Oregon Coast between Lincoln City and Newport. Depoe Bay's wastewater system collects and treats wastewater generated within its urban growth boundary (UGB) as well as flows generated in the Gleneden Sanitary District (GSD), located north of the City. Over the past decade, the City made numerous improvements to its wastewater treatment plant and the lift stations. However, few of the City's wastewater collection pipelines have been replaced since their construction in 1974. The age and deteriorating condition of these pipelines contribute to the significant level infiltration and inflow (I/I) in the system. Furthermore, many of the main collection lines are believed to be inadequately sized to meet future flow demands.

In addition to providing the technical and engineering information needed to administer and manage the City's wastewater system, this Master Plan has been prepared to provide the backing and basis for the City to establish a system development charge (SDC) program to help offset the financial burden that new development places on the wastewater system. This effort is part of a multi-phased approach that is intended to update SDC's for water, wastewater, and stormwater systems within the City of Depoe Bay.

## ES.2 Population and Dwelling Units

In 2007, the full-time population in Depoe Bay was estimated to be 1,355 according to the Portland State Population Research Center. The corresponding full-time population served by the GSD, based on information from the GSD's 2004 *Wastewater Collection Sanitary Plan*, was 4,992. This results in a total of 6,437 full-time residents served by the Depoe Bay wastewater system. Over the past seven years, the average annual growth rate (AAGR) has equaled 2.0% in Depoe Bay, 1.4% in GSD, and 1.5% for the overall wastewater system.

The capacity analysis of the Depoe Bay wastewater system are based on the method of equivalent dwelling units (EDUs). Utilizing this technique is especially useful in wastewater planning in tourist-driven economies, where the wastewater facilities must not only serve the year-round residents, but also the demands of part-time residents, businesses, and tourists.

The City of Depoe Bay maintains an inventory of EDUs for their wastewater system that is updated at the end of each calendar year. This includes the number of EDUs within the City as well as the number of EDUs associated with the Gleneden Sanitary District. The City calculates EDUs on type of usage (i.e. residential, commercial, etc.) and/or water meter size.

As of January 2008, the City's wastewater system served 3,731.5 EDUs, of which 1,532.5 (41.1%) were in Depoe Bay and 2,199 EDUs (58.9%) were in GSD. The AAGRs in wastewater EDUs in the City of Depoe Bay, GSD, and the overall system were 2.8%, 2.0%, and 2.2%, respectively.

The following table summarizes the projected 20-year population and number of EDUs in the Depoe Bay wastewater system.

**Table ES-1 – Full-Time Service Populations and EDU Projections**

| Year | City of Depoe Bay | | Gleneden Sanitary District | | Total System | |
|---|---|---|---|---|---|---|
| | Population 2.5% AAGR | EDUs 2.8% AAGR | Population 2.0% AAGR | EDUs 2.0% AAGR | Population 2.1% AAGR | EDUs 2.2% AAGR |
| 2008 | 1,382 | 1,578 | 5,092 | 2,243 | 6,474 | 3,821 |
| 2013 | 1,613 | 1,830 | 5,621 | 2,476 | 7,234 | 4,306 |
| 2018 | 1,819 | 2,121 | 6,207 | 2,734 | 8,026 | 4,856 |
| 2023 | 2,048 | 2,459 | 6,853 | 3,019 | 8,901 | 5,478 |
| 2028 | 2,285 | 2,851 | 7,566 | 3,333 | 9,851 | 6,184 |

## ES.3 Existing & Future Wastewater Characteristics

Design of wastewater facilities is primarily dependent on estimates of hydraulic and organic loads. These loads have been determined based on information obtained from the Discharge Monitor Reports (DMR) for the City's wastewater treatment plant (WWTP) from January 2004 through November 2008. Future wastewater hydraulic and organic loadings will be estimated using a unit design rate in conjunction with EDU projections.

### Existing Wastewater Characteristics

Current wastewater characteristics for the City of Depoe Bay, GSD, and the total system have been developed in Section 3 of this Plan. Hydraulic and organic loading conditions were determined by an analysis of DMRs for the past 5-years.

As recommended in "*Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF AND PIF*" published by the Oregon Department of Environmental Quality (DEQ), a statistical method was used to determine the system's $MMDWF_{10}$, $MMWWF_5$, $PDF_5$, and $PIF_5$.

Influent wastewater samples are taken for five-day biochemical oxygen demand ($BOD_5$) and total suspended solids (TSS) twice a week at the WWTP. This information is recorded in the City's daily monitoring reports (DMRs). DMRs from 2005-2008 were reviewed to analyze the existing organic wastewater influent loading.

The following table summarizes current, design unit rates wastewater flow characteristics for the City, GSD, and the overall wastewater system.

**Table ES-2 – Current Wastewater Unit Factors**

| | Current Rate | Per EDU[1] | Per Capita[2] | Typical Unit flow/Load[3] |
|---|---|---|---|---|
| *Wastewater Treatment Plant:* | | | | |
| ADF | 0.502 mgd | 140 gpd/EDU | 82 gpcd | 63-81 gpcd |
| ADDWF | 0.419 mgd | 117 gpd/EDU | 68 gpcd | 63-81 gpcd |
| ADWWF | 0.590 mgd | 165 gpd/EDU | 96 gpcd | 63-81 gpcd |
| MMDWF[4] | 0.493 mgd | 138 gpd/EDU | 81 gpcd | 63-81 gpcd |
| MMWWF[4] | 0.670 mgd | 187 gpd/EDU | 109 gpcd | 63-81 gpcd |
| PDF[4] | 1.514 mgd | 423 gpd/EDU | 247 gpcd | 142-182 gpcd |
| PIF[4] | 2.110 mgd | 590 gpd/EDU | 344 gpcd | 189-243 gpcd |
| BOD Average Wet-Weather | 867 lb/day | 0.242 lb/d/EDU | 0.141 lb/capita/d | 0.11-0.26 lb/capita/d |
| BOD Average Dry-Weather | 1,039 lb/day | 0.290 lb/d/EDU | 0.170 lb/capita/d | 0.11-0.26 lb/capita/d |
| BOD Maximum Month | 1,439 lb/day | 0.402 lb/d/EDU | 0.235 lb/capita/d | 0.11-0.26 lb/capita/d |
| TSS Average Wet-Weather | 703 lb/day | 0.196 lb/d/EDU | 0.115 lb/capita/d | 0.13-0.33 lb/capita/d |
| TSS Average Dry-Weather | 783 lb/day | 0.219 lb/d/EDU | 0.128 lb/capita/d | 0.13-0.33 lb/capita/d |
| TSS Maximum Month | 1,147 lb/day | 0.321 lb/d/EDU | 0.187 lb/capita/d | 0.13-0.33 lb/capita/d |
| *City of Depoe Bay:*[5] | | | | |
| ADDWF | 0.174 mgd | 121 gpd/EDU | 136 gpcd | 63-81 gpcd |
| ADWWF | 0.332 mgd | 230 gpd/EDU | 259 gpcd | 63-81 gpcd |
| MMDWF | 0.205 mgd | 142 gpd/EDU | 160 gpcd | 63-81 gpcd |
| MMWWF | 0.371 mgd | 257 gpd/EDU | 289 gpcd | 63-81 gpcd |
| PDF | 0.834 mgd | 578 gpd/EDU | 650 gpcd | 142-182 gpcd |
| PIF | 1.000 mgd | 693 gpd/EDU | 780 gpcd | 189-243 gpcd |
| *Gleneden Sanitary District:*[5] | | | | |
| ADDWF | 0.245 mgd | 115 gpd/EDU | 51 gpcd | 63-81 gpcd |
| ADWWF | 0.258 mgd | 121 gpd/EDU | 53 gpcd | 63-81 gpcd |
| MMDWF | 0.288 mgd | 135 gpd/EDU | 59 gpcd | 63-81 gpcd |
| MMWWF | 0.299 mgd | 140 gpd/EDU | 62 gpcd | 63-81 gpcd |
| PDF | 0.680 mgd | 318 gpd/EDU | 140 gpcd | 142-182 gpcd |
| PIF[6] | 1.110 mgd | 520 gpd/EDU | 229 gpcd | 189-243 gpcd |

## Future Wastewater Characteristics

For the projection of wastewater flows with significant influence from I/I, the use of unit flows would yield results significantly higher than reality. This is due to the fact that new construction techniques and material result in sanitary sewers which have much lower quantities of infiltration than the existing system.

Projected wastewater flows were determined by modifying unit factors determined in Table ES-2 to account for the assumed decreased in unit I/I flow in new developments. Maximum daily flow was assumed equal to 225% of the ADDWF and the peak instantaneous flow was set to 300% of the ADDWF.

YEAR?

**Table ES-3 – Future Flow Projections**

UNCLEAR WHERE DATA COMES FROM
NO PROPORTION AS STATED

| Flow Condition | Total System | City of Depoe Bay | Gleneden Sanitary District |
|---|---|---|---|
| ADDWF (mgd) | 0.71 | 0.33 | 0.38 |
| ADWWF (mgd) | 1.06 | 0.58 | 0.47 |
| MMDWF (mgd) | 0.84 | 0.40 | 0.44 |
| MMWWF (mgd) | 1.25 | 0.68 | 0.57 |
| PDF (mgd) | 2.51 | 1.37 | 1.14 |
| PIF (mgd) | 3.69 | 1.85 | 1.84 |

Biological and solids wastewater loads are independent of I/I flows. To project wastewater composition, the EDU unit loads (lbs/day/EDU) were multiplied by the projected number of EDUs. These projected wastewater loads are shown in the following table.

**Table ES-4 – Projected Wastewater Composition**

| Project Load | Unit Loading Per EDU (lbs/day/EDU) | 2028 EDUs | 2028 Load (lbs/day) |
|---|---|---|---|
| *BOD Loading* | | | |
| Average Wet-Weather | 0.24 | 6,184 | 1,498 |
| Average Dry-Weather | 0.29 | 6,184 | 1,795 |
| Maximum Month | 0.40 | 6,184 | 2,487 |
| *TSS Loading* | | | |
| Average Wet-Weather | 0.20 | 6,184 | 1,215 |
| Average Dry-Weather | 0.22 | 6,184 | 1,353 |
| Maximum Month | 0.32 | 6,184 | 1,982 |

## Existing Infiltration/Inflow

Infiltration and inflow (I/I) represents the most significant contributor to high flows within the City of Depoe Bay's wastewater system. Although I/I are of concern, the focus of this planning effort is to provide for adequate sizing of facilities under existing I/I conditions and not necessarily to eliminate the current amount of I/I in the system.

Estimates for infiltration and inflow are summarized in Table ES-5.

**Table ES-5 – Estimated I/I**

| | WWTP | GSD | Depoe Bay |
|---|---|---|---|
| Average. I/I (mgd) | 0.170 | 0.013 | 0.157 |
| Maximum Month I/I (mgd) | 0.251 | 0.054 | 0.197 |
| Peak Day I/I (mgd) | 1.094 | 0.435 | 0.659 |
| PIF I/I (mgd) | 1.691 | 0.865 | 0.826 |

The Environmental Protection Agency (EPA) has developed a system to determine if a community has "non- excessive" I/I levels within their wastewater system. The EPA method requires that the system be analyzed under differing and extreme conditions then compared against an established benchmark to determine if the I/I levels are significant. A summary of the non-excessive infiltration and inflow analysis is provided in Table ES-6.

**Table ES-6 – EPA Non-Excessive Infiltration & Inflow Analysis**

| | Total System | Depoe Bay | GSD |
|---|---|---|---|
| *Infiltration Analysis* | | | |
| 7-Day Flow Average | 68 | 162 | 43 |
| EPA Non-Excessive Criteria | 120 | 120 | 120 |
| *Inflow Analysis* | | | |
| 7-Day Flow Average | 175 | 463 | 103 |
| EPA Non-Excessive Criteria | 275 | 275 | 275 |

It should be noted that the currently available data for GSD and Depoe Bay are insufficient to a draw conclusive determination of the current level of I/I in either system. It is beyond the scope of this Mater Plan to fully detail the I/I problems existing in the Depoe Bay system or accurately project the contribution of I/I from GDS. The City should consider performing an I/I Survey to identify the basins that contribute the most I/I to the system and develop cost-effective alternatives to try to reduce I/I.

## ES.4 Existing System

The City's existing collection system and treatment facilities have been described in previous plans. City staff have provided information on system improvements that have been constructed since the last Master Plan (1999). These improvements have been included in the system map and described in further detail in Section 5 of this Plan.

### Collection System

The collection system conveys wastewater from the City of Depoe Bay and the Gleneden Sanitary District to the City's wastewater treatment plant located off of South Point Street, west of Highway 101. Most of the City's collection system was constructed in 1974 and over 65% of the system piping is asbestos cement (AC). AC pipe are particularly prone to leaks at joints as the material ages. An analysis of the GSD collection system is not within the scope of this study.

A condensed collection system analysis was performed. This analysis focuses on the primary sewer lines, such as those carrying flows from Gleneden Beach. Pipelines where development is expected to occur, or where existing problems have been identified, were also included in this analysis. This analysis determined that all of the current pipeline section seem to have adequate capacity to meet existing flow requirements, however, several of the existing main interceptors will be undersized within the next 20 years.

## Lift Stations

The City owns and maintains four sewer lift stations as part of its collection system: Vista Street lift station, Harbor lift station, and Little Whale Cove (LWC) lift station, and Edgewater lift station. All the existing stations have had substantial upgrades in the past seven years. Design specifications for these lift stations are presented in the following table:

**Table ES-7 – Lift Stations Specifications**

| | Vista Street | Harbor | LWC | Edgewater |
|---|---|---|---|---|
| Maximum Capacity | 1.73 mgd | 2.59 mgd | 1.08 mgd | 0.252 mgd |
| Total Dynamic Head | 69 ft | 125 ft | 75 ft | 28 ft |
| Pump Motor Size | 40 Hp | 100 Hp | 15 Hp | 3 Hp |
| Overflow Point | Pirate Cove | Depoe Bay | None | None |
| Pressure Line Diameter/Length | 8-in/850 ft | 10-in/1,214 ft | 8-in/1780 ft | 8-in/550 ft |
| Est. Existing Peak Flow | 0.86 mgd | 1.67 mgd | 0.27 mgd | 0.010 mgd |
| Est. 2028 Peak Flow | 2.40 mgd | 2.95 mgd | 0.48 mgd | 0.018 mgd |

The LWC and Edgewater lift station appear to have sufficient capacity to meet the projected 20-year flows. However, both the Vista Street and Harbor will need to be upgrade to meet projected demands. Currently the flows through the Harbor station already exceed its firm capacity.

## Wastewater Treatment Plant (WWTP)

Many upgrades to the City's WWTP were made in 2001 based on recommendation in the City's 1999 *Wastewater System Improvements Pre-Design Report*. Although this report noted that the WWTP has substantial capacity, individual unit processes were found to be deficient. These deficiencies resulted in several Notices of Noncompliance (NON) due to the systems inability to treat and discharge wastewater effluent within the permit limitations. These failures mandated the plant be both upgraded and expanded.

The existing liquid treatment process at the WWTP consists of primary treatment, secondary treatment, disinfection, and effluent disposal. The existing solids treatment consists of aerobic digestion and land disposal.

Wastewater collected in the City's conveyance system is pumped to the WWTP headworks through the facilities main pump station. The pump station has a firm capacity of 2,280 gpm (3.28 mgd). This capacity is insufficient to meet future flow requirements.

Secondary treatment is achieved using two "donut" activated sludge extended aeration treatment units. Each unit includes two aeration basins, secondary suction clarifier and aerobic digester. The WWTP's hydraulic and organic loading capacities of the secondary treatment are presented in Table ES-8.

**Table ES-8 – WWTP Capacity**

| Design Flow | Wastewater Treatment Plant Capacity[1] | 2028 Projected Flows |
|---|---|---|
| Maximum Monthly Dry Weather Flow | 1.60 MGD | 0.84 MGD |
| Maximum Monthly Wet Weather Flow | 1.60 MGD | 1.25 MGD |
| Peak Day Flow | 3.20 MGD | 2.51 MGD |
| Peak Instantaneous Flow | 4.80 MGD | 3.69 MGD |
| $BOD_5$ | 2,670 lbs/day | 2,490 lbs/day |
| Suspended Solids | 2,670 lbs/day | 1,980 lbs/day |

Wastewater effluent is disinfected using ultraviolet irradiation in an open channel low pressure system that was also installed in 2001. The UV system consists of a single channel includes two banks of lights, each with 56 lights. The capacity of the UV system is 3.6 mgd, slightly less than the projected 2028 $PIF_5$, however, with proper maintenance it is believed that this system should be sufficient through the planning period.

The existing outfall is located in the Pacific Ocean, west of the bend in Cardinal Street. The outfall pipe changes from a 15-inch gravity line to an 8-inch gravity line at the last manhole before the outfall. The 8-inch outfall ends with a 4-inch tee diffuser. The outfall has a calculated capacity of approximately 5 mgd.

Waste activated sludge (WAS) from the secondary clarifier is pumped to an aerobic digester. The aerobic digester tank has a volumetric capacity of 260,000 gallons. Solids retention time in the digester varies from 25-30 days. Sludge from the digester is then pumped to one of two holding cells, each with a capacity of 285,000 gallons. Sludge storage time in these cells ranges from 4 months during summer and 8 months during winter conditions. Sludge from the holding cell is eventually disposed via land application.

## ES.5 Improvement Alternatives

### Collection System

**Existing Gravity Collection System**

Many of the existing collection mainlines will become undersized within the 20-year planning period of this Plan. These sections must be replaced with larger pipelines to prevent sanitary overflows. Collection system improvements are shown in Figure ES-1.

Improvements to the collection system include replacing nearly 14,000 linear feet of pipeline at an expected to cost of nearly $6.9 million dollars (Table ES-9). However, because there are currently no deficiencies found in the system, all collection system improvements are eligible for system development charges (SDCs).

**Table ES-9– Pipe Sections Replacement for the 20-Year Planning Period**

| Pipe Section | | New Diameter (inches)' | Total Length (feet) | Total Costs | Estimated GSD Portion |
|---|---|---|---|---|---|
| From MH | To MH | | | | |
| ***5-Year Capital Improvements*** | | | | **$ 158,250** | **70%** |
| 23 | 22 | 21 | 500 | $ 158,250 | 70% |
| **10-year Capital Improvements** | | | | **$ 4,485,375** | **68%** |
| 43 | 32 | 21 | 3,900 | $ 1,820,250 | 85% |
| 19 | Harbor PS | 21 | 1,450 | $ 406,125 | 60% |
| 10 | 8 | 21 | 400 | $ 225,000 | 60% |
| 29 | 23 | 21 | 2,000 | $ 1,017,000 | 55% |
| 3 | WWTP | 24 | 875 | $ 1,017,000 | 55% |
| **15-Year Capital Improvements** | | | | **$ 2,233,500** | **100%** |
| Fogerty Creek | 43 | 21 | 5,000 | $ 2,233,500 | 100% |
| **Total** | | | | **$ 6,877,125** | **78%** |

All pipe sections that need will to be upgraded convey flows from the Gleneden Sanitary District. The portion of the expected flow that is attributed to GSD is also presented in Table ES-9. Gleneden flow contribution ranges from approximately 100% in the northern section of the City to approximately 55% at the mainline to the WWTP. Based on the portion of GSD wastewater flow through these pipeline sections, GSD should be responsible for 78% of the collection system improvement costs, or nearly $5.4 million dollars.

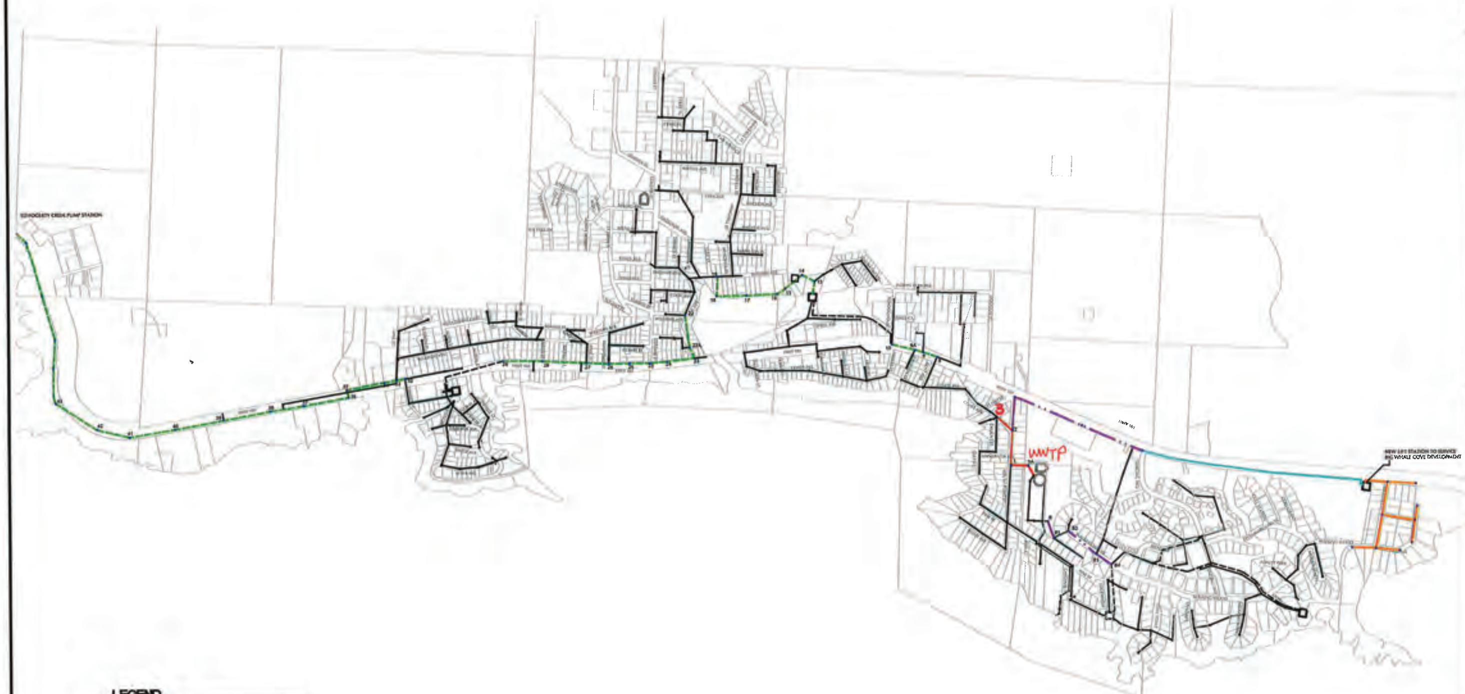
**Big Whale Cove Collection System**

The area of Big Whale Cove is not current served by the City's collection system, although the area does reside within the limits of Depoe Bay's UGB. To provide sewer services to the area would require installing approximately 2,500 feet of 8-inch gravity sewer system as well as a pump station with 6-inch forcemain. Based a preliminary cost estimate, the total cost for such a project is approximately $1.8 million. The cost of this project may be reduced significantly if the wastewater from Big Whale Cove could be diverted to the existing system in Little Whale Cove, however, it is unknown at this time if this is a viable option.

**Lift Stations**

Flow analyses for the Vista Street, Harbor, LWC, and Edgewater lift stations were performed in Section 5of this Plan. Both the LWC and Edgewater station have been recently updated and have sufficient capacity for the 20-year projected flows. The Vista Street and Harbor lift stations were updated in 2001 and currently have sufficient nominal capacity for existing flow conditions, however, 2028 projected flows appear to exceed both of these stations' firm capacity.

The cost estimate for the Vista Street and Harbor improvements are approximately $140,250 and $153,750, respectively. These costs include installing new pumps and controls, as well as the cost of by-pass pumping during construction. These estimates assume that no modifications to the existing wet well will be required (including mounting rails, electrical, etc.) and the existing auxiliary generator will meet power requirements. A detailed flow monitoring analysis should be completed prior to moving forward with any lift station improvement.




LEGEND

- NEW 12-INCH SANITARY LINE
- NEW 21-INCH SANITARY LINE
- NEW 24-INCH SANITARY LINE
- EXISTING SANITARY LINE
- EXISTING PRESSURE LINE
- NEW MANHOLE
- EXISTING MANHOLE
- LIFT STATION

GRAPHIC SCALE

( IN FEET )
1 inch = 1000 ft.

WASTEWATER MASTER PLAN UPDATE

H B H Consulting Engineers

City of Depoe Bay
WASTEWATER MASTER PLAN UPDATE

WASTEWATER SYSTEM IMPROVEMENTS

DRAWN BY: CLB
DATE: AUG 2008

FIG. ES-1

## Wastewater Treatment Plant

Overall, the City's wastewater facility plant is in good working condition. The hydraulic and organic capacity of the facility is sufficient to meet existing flow conditions and NPDES permit requirements. The only major component that is expected to become undersized in the next 20 years is the main influent pump station.

### Main Pump Station

The cost estimate for the improvements for the City's main pump station located at the WWTP include replacing the existing pumps with two 2,560 gpm submersible pumps with new controls, as well as the cost of by-pass pumping during construction. The total cost for these improvements is approximately $158,250. This estimate also assumes that no modifications to the existing wet well will be required and the existing auxiliary generator will meet power requirements.

### Site Improvements

The City has identified minor site improvements specifically, paving around the WWTP facility, to be included in the City's capital improvement plan (CIP). Based on an estimated 12,800 square feet of area to be paved, this project is estimated to cost nearly $96,300.

## ES.6 Recommended Plan

Through the analyses and studies that were completed within this planning effort, project recommendations have been developed and detailed in Section 6 of this Plan. These recommended improvement projects for the City's wastewater system primarily focus on increasing the capacity of its conveyance system.

As the projects vary in their criticality, the projects have been divided into three separate and distinct priority groups. The priority groups are further described below:

### Priority 1 Projects

- Collection System Improvements (5-Year Capital Improvements)
- Harbor Lift Station Improvements

### Priority 2 Projects

- Collection System Improvements (10-Year Capital Improvements)
- Replace Transmission Line to Fogerty Creek Pump Station
- Vista Street Lift Station Improvements
- Main Pump Station Improvements
- WWTP Site Improvements

### Priority 3 Projects

- Big Whale Cove Collection System:

### Priority Cost Summary

A summary of the recommended projects costs is provided in the Table ES-10 for all three project priority categories.

**Table ES-10 – Recommended Projects Costs Summary**

| Improvement Description | Total Project Cost |
|---|---|
| **Priority 1** | **$ 312,000** |
| Collection System Improvements (5-Year Capital Improvements) | $ 158,250 |
| Harbor Lift Station Improvements | $ 153,750 |
| **Priority 2** | **$ 7,110,675** |
| Collection System Improvements (10-Year Capital Improvements) | $ 4,485,375 |
| Replace Pipeline to Fogerty Creek | $ 2,233,500 |
| Vista Lift Station Improvements | $ 140,250 |
| Main Pump Station Improvements | $ 158,250 |
| WWTP Improvements | $ 96,300 |
| **Priority 3** | **$ 1,784,250** |
| BWC Collection System | $ 1,784,250 |
| **Overall Plan Costs** | **$ 9,206,925** |

## ES.7 Financing Strategy

At an estimated $9.2 million dollars, undertaking all recommended improvement projects will require the City to seek out and secure funding assistance in the form of grants, loans, and system development charges (SDCs). Section 8 of this Plan includes detailed information on the various forms of funding assistance that may be available to the City.

The first and most critical step in securing funding is attendance at a "one-stop meeting" with the various funding agencies. At this meeting, the various agencies will discuss and offer what their particular programs can provide in terms of funding. By the end of the one-stop meeting, the City will effectively know what is available to them in the form of grant and loan monies.

### Impact to Rate Payers

The final funding package will not be known until after the one-stop meeting and not confirmed until the City receives notice that they have secured the necessary funding. However, it is important to provide the City with some insight on the potential impact to rate payers so that they may begin educating the public and develop plans for increasing rate as needed to pay for the significant costs associated with these improvements.

The following table is provided showing the potential impact to rate payers assuming that 100-percent of the project must be funded through loans. For the purpose of this exercise, rate impacts are based upon a 20-year loan at a 3.75% interest rate. Any changes in the interest rate or term of the loan will significantly change the impact to the rate payers.

**Table ES-11 – Estimated Impact to Rate Payers (3.75% Interest Loan, 20-yr Payback)**

| | Recommended Improvements | | | |
|---|---|---|---|---|
| | Priority 1 Projects | Priority 2 Projects | Priority 3 Projects | All Projects |
| Total Costs | $ 312,000.00 | $ 7,110,675.00 | $ 1,784,250 .00 | $ 9,206,925 .00 |
| Monthly Debt Service | $ 1,979.30 | $ 45,109.45 | $ 11,319.11 | $ 58,407.86 |
| **Proposed Monthly Increase per EDU** | **$ 0.52** | **$ 11.81** | **$ 2.96** | **$ 15.29** |

## System Development Charges

System Development Charges (SDCs) are designed to help fund the identified system deficiencies created by future growth. Since no deficiencies have been identified in the City's existing wastewater system, nearly all improvements developed for the 20-yearing planning period are required due to future growth in the system. The only exception are the site improvements at the WWTP. Therefore all costs for collection system and pump station improvements are SDC eligible. Table ES-12 presents the SDC fees calculated for Priority 2, Priority 3, and total system improvements. As this table shows, the maximum improvement SDC fee that the system can charge is approximately $3,857.62 per new EDU.

**Table ES-12 – Estimated SDC Fee for Wastewater System Improvements**

| | Recommended Improvements | | | |
|---|---|---|---|---|
| | Priority 1 Projects | Priority 2 Projects[1] | Priority 3 Projects | Total |
| Total Costs for SDC Eligible projects | $ 312,000.00 | $ 7,017,375.00 | $ 1,784,250.00 | $ 9,113,625.00 |
| % EDC Eligible | 100% | 100% | 100% | 100% |
| New EDUs | 2,362.5 | 2,362.5 | 2,362.5 | 2,362.5 |
| **Improvement SDC Fee** | **$ 132.06** | **$ 2,970.32** | **$ 755.24** | **$ 3,857.62** |

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**CITY OF DEPOE BAY**

**Wastewater Master Plan Update**

# SECTION 1:

## INTRODUCTION

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 1
# INTRODUCTION

## 1.1 Background

The City of Depoe Bay is located in Lincoln County on the Central Oregon Coast (see Figure 1-1 – “Location Map). The City owns and operates a public wastewater collection and treatment system within the Depoe Bay City Limits. This system serves the community of Depoe Bay, as well as collecting and treating wastewater generated by Gleneden Beach Sanitary District (GSD) (see Figure 1-2 – “Vicinity Map).

The 2007 estimated full-time population in Depoe Bay is 1,355 persons. The number of full-time residents serviced in GSD is 4,992 resulting in a total full-time population served by the City’s wastewater system of 6,347 persons. By the year 2028, the population is anticipated to increase to 9,851 full-time residents correlating to an average annual growth rate of 2.12%. This increase in population will put additional stress on the City’s existing system and may require the City to invest in upgrading or replacing existing system components in order to service this new population.

In recent years, numerous improvements have been made to the City’s wastewater system. These improvements have included upgrades to the City’s wastewater treatment plant (WWTP) and replacing all three of the system’s pump stations. The City also maintains an annual budget for locating and repairing infiltration/inflow (I/I) in the collection system.

## 1.2 Previous Planning Efforts

The following studies were reviewed and/or used in the completion of this study:

1. HGE, Inc. Engineers & Planners. *City of Depoe Bay – Wastewater Engineering Feasibility Study.* April 1995

2. Curran-McLeod, Inc., Consulting Engineers. *City of Depoe Bay – Wastewater System Improvements, Pre-design Report & Facility Plan Amendment.* July 1999

3. Curran-McLeod, Inc., Consulting Engineers. *City of Depoe Bay – System Development Charge, Periodic Review.* March 2003.

4. Ace Consultants, Inc. *Wastewater Collection Sanitary Plan for the Gleneden Sanitary District.* June 2004

5. City of Depoe Bay. *Zoning Code, Comprehensive Plan, Estuarine Plan and Inventory.* June 2005.

## 1.3 Purpose and Need

The purpose of this study is to review the City's existing wastewater system, which includes the collection and treatment facilities. Each of the system's components has been assessed on their existing condition and ability to meet projected flows through the year 2028. Based on these assessments, recommendations have been developed for a capital improvement plan for the City's wastewater collection and treatment facilities.

In addition to providing the technical and engineering information needed to administer and manage the City's wastewater system, this Master Plan has been prepared to provide the backing and basis for the City to establish a system development charge (SDC) program to help offset the financial burden that new development places on the wastewater system. This effort is part of a multi-phased approach that is intended to update SDC's for water, wastewater, and stormwater systems within the City of Depoe Bay.

## 1.4 Scope of Engineering Services

This Wastewater Master Plan Update has been prepared to augment the previous planning efforts with special consideration for large scale developed that is expected to occur within the next 20 years, especially in the northern section of the City. Tasks that have been completed in the preparation of this Master Plan include the following:

- Flow Projections – Sanitary sewer flow records from the Depoe Bay wastewater treatment plant, as well as the Gleneden Beach pump station, have been analyzed to determine unit design flows. These unit design flows were used as the basis for projecting future wastewater flows.

- Collection System Analysis – A condensed collection system analysis was performed. This analysis focused on the primary sewer lines such as: mains carrying flows from Gleneden Beach, mains where development is slated to occur (including Big Whale Cove), or where existing problems have been identified. This task did not include a comprehensive I/I investigation.

- Pump System Analysis – System pump stations were analyzed to determine whether they are designed to pump projected flows.

- Treatment and disposal System Analysis – A brief analysis on was performed on the City's wastewater treatment and disposal systems to determine if they are designed to meet future hydraulic and organic loading requirements.

- Capital Improvement Plan – Under this task, all the data, analysis, and information gathered for the study will be compiled within a final report. The final plan includes a Capital Improvement Plan (CIP) for the City's wastewater collection system. The CIP includes an implementation schedule for the proposed improvements as well as financial projections of the anticipated project costs over the planning period. The CIP forms a portion of the basis for the methodology that will be developed for the Sanitary Sewer SDC.

## 1.5 Authorization

The City of Depoe Bay authorized the firm of HBH CONSULTING ENGINEERS, INC. to develop a Wastewater Master Plan Update by a contract dated February 13, 2008. Services are in accordance with this professional services contract and the HBH proposal for the project which was presented to the City in January 2008.

## 1.6 Acknowledgements

This Plan is the result of contributions made by a number of individuals and agencies. In particular, the following persons should be acknowledged for the important roles they played in the preparation, review, and development of this Plan:

Terry Owings .............................................. City of Depoe Bay, City Superintendent
Pery Murray ............................................... City of Depoe Bay, City Recorder
Brady Weidner ........................................... City of Depoe Bay, Field Supervisor
Daniel Arnold ............................................ City of Depoe Bay, Head Operator
Gary Walls ................................................ City of Depoe Bay, Operator

In addition to these key personnel, we wish to thank the City of Depoe Bay City Council and management staff for providing support and input on the project.

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H B H Consulting Engineers

City of Depoe Bay

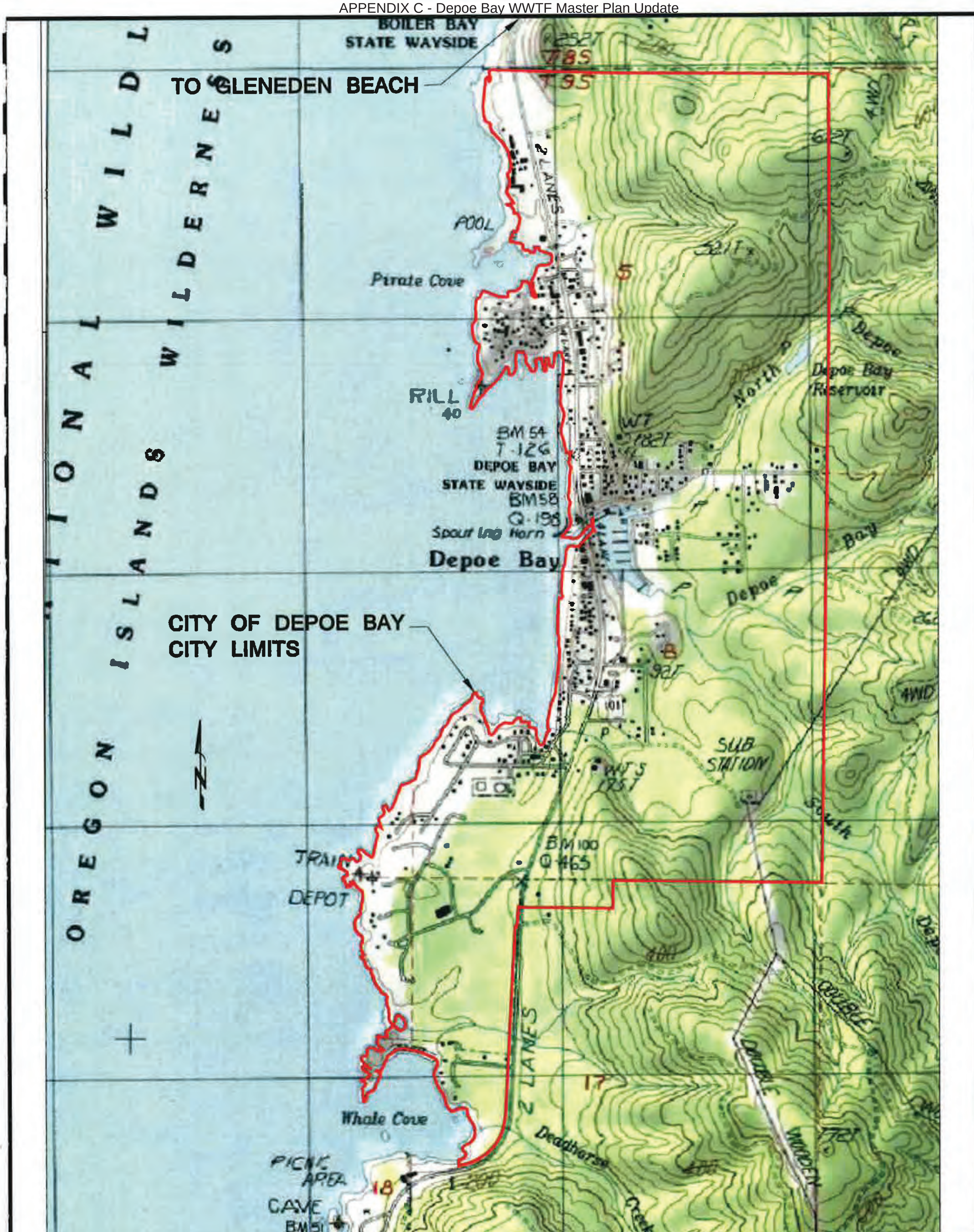
*WASTEWATER MASTER PLAN UPDATE*

LOCATION MAP

City of Depoe Bay

Lincoln County, Oregon

FIG. 1-1




| | | | |
|---|---|---|---|
| H B H Consulting Engineers | City of Depoe Bay<br>*WASTEWATER MASTER PLAN UPDATE* | AppC - 239 VICINITY MAP | FIG. 1-2 |

# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# SECTION 2:

## STUDY AREA

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 2
# STUDY AREA

## 2.1 Service Area & Land Use Planning

The study area for this Plan coincides with the area encompassed by Depoe Bay's Urban Growth Boundary (UGB). The City's also receives wastewater from the Gleneden Sanitary District (GSD). The GSD is a separate entity from the City and consideration of its impact on the City's wastewater system will be limited to an analysis of GSD wastewater characteristics and an estimate of GSD inflow and infiltration.

Land use patterns and development within the City are dictated by the City's zoning ordinance, which has been amended several times since its adoption in 1976. Figure 2-1 shows the delineation of the current city limits of Depoe Bay and its UGB.

## 2.2 Population

### Current Service Area Population

Depoe Bay is typical of many small coastal communities in that the full-time population is not indicative of the overall demands on City's facilities. The Depoe Bay wastewater system must not only meet the needs of the full-time population, but also serve the large volume of seasonal residents and tourist that flock to the area during summer. The 2000 US Census reported 23.5% of the houses in Depoe Bay are characterized as seasonal, recreational, or occasional use only.

For the purposes of planning, it is critical to understand the difference between full-time population and overall the wastewater system population, which includes the seasonal influx of part-time residents and tourist. Due to limited information available, quantifying additional summer population into an equivalent city population is extremely difficult. Furthermore, the growth in tourism and seasonal residents may or may not equal that of the full time residents, thus further complicating population projections. For these reasons this Plan only considers the full-time residents in population estimates. The affect on wastewater generation by the area's part-time population will be accounted for using the method of equivalent dwelling units (EDUs). See Section 2.3 for further discussion of EDUs.

Population information for the City of Depoe Bay was obtained from the US Census and Portland State University Population Research Center (PRC). Among other things, the US Census provides actual population counts within Depoe Bay's city limits for the years 1990 and 2000. For the years 2001 to 2007, the City's population has been estimated by PRC. Based on the 2007 Population Report published by PRC, the 2007 full-time population of the City of Depoe Bay is 1,355.

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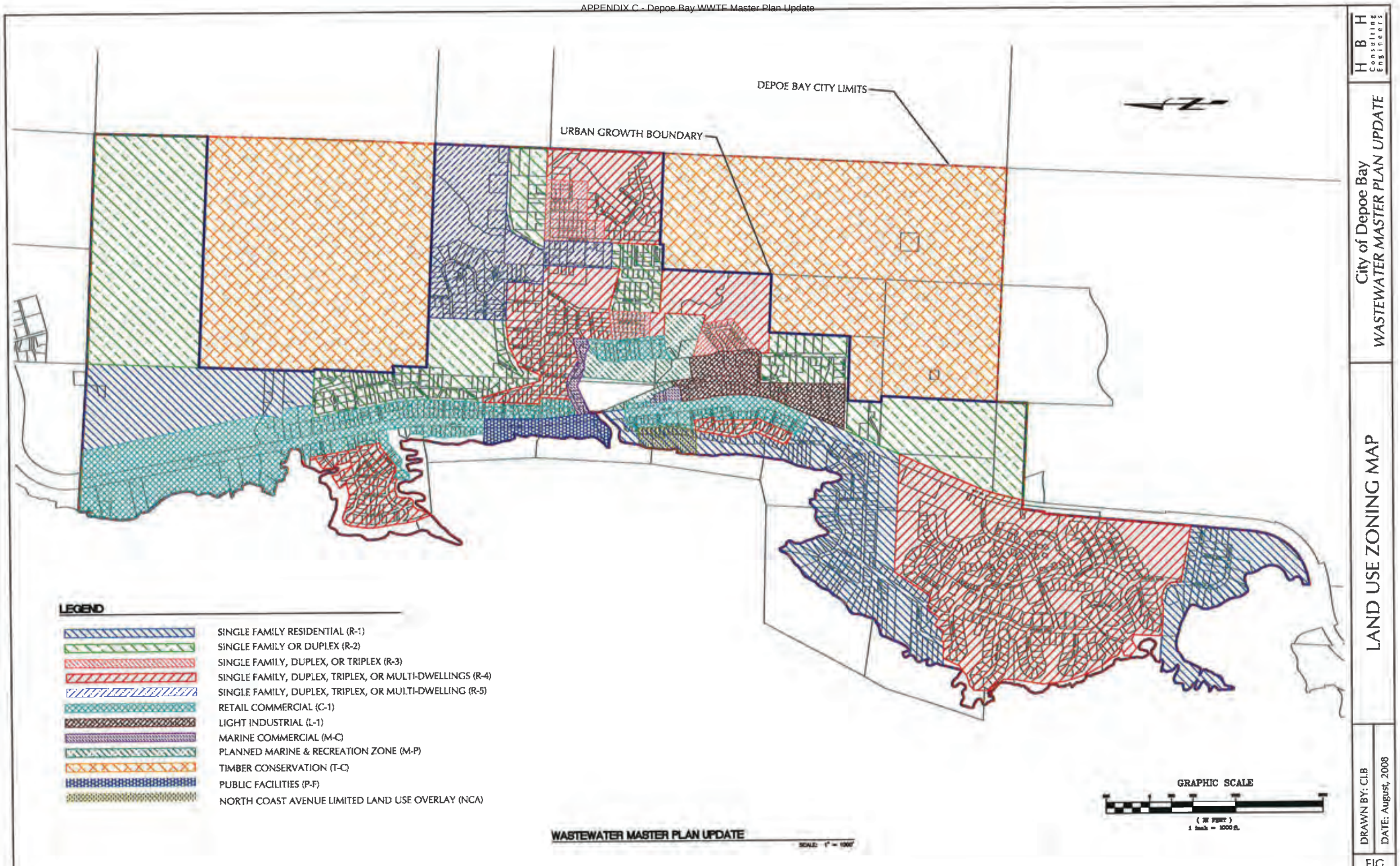
DEPOE BAY CITY LIMITS
URBAN GROWTH BOUNDARY
LEGEND
SINGLE FAMILY RESIDENTIAL (R-1)
SINGLE FAMILY OR DUPLEX (R-2)
SINGLE FAMILY, DUPLEX, OR TRIPLEX (R-3)
SINGLE FAMILY, DUPLEX, TRIPLEX, OR MULTI-DWELLINGS (R-4)
SINGLE FAMILY, DUPLEX, TRIPLEX, OR MULTI-DWELLING (R-5)
RETAIL COMMERCIAL (C-1)
LIGHT INDUSTRIAL (L-1)
MARINE COMMERCIAL (M-C)
PLANNED MARINE & RECREATION ZONE (M-P)
TIMBER CONSERVATION (T-C)
PUBLIC FACILITIES (P-F)
NORTH COAST AVENUE LIMITED LAND USE OVERLAY (NCA)
WASTEWATER MASTER PLAN UPDATE
GRAPHIC SCALE
H B H
City of Depoe Bay
WASTEWATER MASTER PLAN UPDATE
LAND USE ZONING MAP
DRAWN BY: CLB
DATE: August, 2008
FIG.
2-1

There is no information available from the US Census or PRC for the unincorporated area served by the Gleneden Sanitary District (GSD). The GSD's *2004 Wastewater Collection Sanitary Plan* estimated the area's population by assuming 2.27 people per EDU. This assumption has also been used in this Plan. Information on EDUs in Gleneden Beach was obtained from the City of Depoe Bay for the years 2000 to 2007. In 2007, the Gleneden Sanitary District had 2,199 EDUs or an equivalent population of 4,992 (Table 2-1).

Table 2-1 provides tabulated data for the system's full-time population including the City of Depoe Bay and GSD populations. The table also includes the annual growth rate for the service area. The 2007 full-time population served by the Depoe Bay wastewater system is estimated to be 6,347 people, correlating to an average annual growth rate (AAGR) over the last seven years of 1.54%.

**Table 2-1 – Full-Time Population Estimate for City of Depoe Bay's Wastewater System**

| Year | City of Depoe Bay[1] | Gleneden Sanitary District[2] | Total | Annual Population Increase |
|---|---|---|---|---|
| 2000 | 1,174 | 4,528 | 5,702 | N/A |
| 2001 | 1,190 | 4,568 | 5,758 | 1.00% |
| 2002 | 1,200 | 4,593 | 5,793 | 0.61% |
| 2003 | 1,230 | 4,658 | 5,888 | 1.63% |
| 2004 | 1,240 | 4,779 | 6,019 | 2.23% |
| 2005 | 1,275 | 4,865 | 6,140 | 2.00% |
| 2006 | 1,310 | 4,935 | 6,245 | 1.72% |
| 2007 | 1,355 | 4,992 | 6,347 | 1.63% |

[1] 1990 and 2000 populations based on US Census counts. Populations for 2001 through 2007 are based by Portland State Population Research Data.
[2] Gleneden Sanitary District population was estimated based on the assumption stated in the District's 2003 Wastewater Facility Plan of 2.27 people per EDU.

## Projected Service Area Population

As shown in Table 2-1, over the last seven years the annual growth of the Depoe Bay's wastewater system service area has ranged from 0.61% in 2002 to 2.23 % in 2004 with average annual growth rate (AARG) of 1.54%. The AARG for the City of Depoe Bay for this same period was 2.00% and the AARG for the Gleneden Sanitary District was 1.41%. The AAGR is extremely important for predicting future populations. Below is a summary of AAGRs that have been used in previous City planning documents:

- *City of Depoe Bay Comprehensive Plan* (1982) adopted a high AAGR of 3.3% and a low AAGR of 2%
- *City of Depoe Bay Water system Evaluation and Long Range Plan* (1989) adopted a 2% AAGR
- *City of Depoe Bay Wastewater Engineering Feasibility Study* (1995) adopted a 3% AAGR
- *Wastewater Collection Sanitary Plan for the Gleneden Sanitary District* (2004) adopted a 2% AARG

Large developments in the Depoe Bay area can result in short-term periods of higher than average population growth. Information on current and tentatively approved large developments within Depoe Bay's UGB was obtained by the City and is presented in the table below. These four developments alone are expected to add an additional 250 single-family and multi-family residential dwellings to the area, however, it is not likely that projects will be fully developed in the near future.

**Table 2-2 – Existing Planned Development**

| Development Name | Description | Status |
|---|---|---|
| Stonebridge | 56 Single Family Residential Lots | 28 Lots Developed (50%) |
| View of the Bay, Phase 2[1] | 31 Single Family Residential Lots | 14 Lots Developed (45%) |
| Majestic Pacific Vista[1] | 146 Multi-Family Dwellings | Tentative Approval 2007 |
| Kailani Ridge | 16 Single Family Residential Lots | Tentative Approval 2007 |

[1] Full development not likely in near future.

There are also 130 acres of undeveloped land located in the northern section of the City east of Highway 101. Current plans for this area currently include a 200 room hotel, 450-550 single-family residential units, and approximately 40,000 square feet of commercial buildings. There are also many undeveloped lots throughout the City that provide addition infill development potential.

Although the above developments may cause the AARG to increase rapidly over the next few years, the long-term growth rate should remain relatively constant over the 20-year planning period. Additionally, it is not likely that all potential developments within the City will occur within the next 20 years.

For the purpose of projecting future full time population in Depoe Bay, each of the potential developments were assess on their likely percentage of development in the next 5, 10, 15, and 20 years. It was assumed that all projects currently in development or have tentative approval would be completed in the planning period. It was also assumed that each housing unit was equivalent to 1.265 full-time residents, which is equal to the total City population (1,174) divided by all housing units (928) as reported in the 2000 US Census. This factor accounts for seasonal homes as well as any discrepancy in household sizes between single-family and multi-family residential units.

The full-time population projection for the City's wastewater system was determined for 5-, 10-, 15- and 20-year periods. The estimated full-time population in Depoe Bay is estimated to be 2,285 residents by 2028, equating to an average annual growth rate (AAGR) of 2.52%. Based on information found in the 2003 GSD Facility Plan, the GSD population was projected using a 2% AAGR, resulting in a 2028 population of 7,566. The 2028 population for the entire system is estimated to be 9,851 with an AARG of 2.12%.

**Table 2-3 – Projected Full-Time Population Estimate**

| Year | Depoe Bay | GSD | Total | Depoe Bay AAGR | Total System AAGR |
|---|---|---|---|---|---|
| 2008 | 1,382 | 5,092 | 6,474 | 2.00% | 2.00% |
| 2013 | 1,613 | 5,621 | 7,235 | 3.14% | 2.25% |
| 2018 | 1,819 | 6,207 | 8,026 | 2.44% | 2.10% |
| 2023 | 2,048 | 6,853 | 8,900 | 2.39% | 2.09% |
| 2028 | 2,285 | 7,566 | 9,851 | 2.22% | 2.05% |
| Average | | | | 2.52% | 2.12% |

## 2.3 Equivalent Dwelling Units (EDU)

A dwelling unit is defined as one typical single-family residential dwelling. Non-residential users (commercial, industrial, public facility, etc.) can be described as a number of equivalent dwelling units (EDUs) based on their wastewater generation compared to the generation of a residential unit. Capacity of a system can be defined based on the ability to service a certain number of EDUs and future checks can be made on system capacity at any time regardless of the growth patterns that have occurred in residential, commercial and industrial users. This technique is arguably a more accurate and flexible method to determine the current and future needs of public facilities than using population estimates and projections. Utilizing this technique is especially useful in wastewater planning in tourist-driven economies, where the wastewater facilities must not only serve the year-round residents, but also the demands of part-time residents, businesses, and tourists.

The City of Depoe Bay maintains an inventory of EDUs for their wastewater system that is updated at the end of each calendar year. This includes the number of EDUs within the City as well as the number of EDUs associated with the Gleneden Sanitary District. As shown in Table 2-4, EDUs for both the City and GSD are calculated based on the type of usage (i.e. residential, commercial, etc.) and/or water meter size (Table 2-4).

**Table 2-4 – Wastewater EDU Determination by Sector**

| Description | EDU per Connection |
|---|---|
| Single Family Residential | 1 |
| Multi-Family Residential | 1 per unit |
| Multi-Family Residential Facilities | Meter size (see Table 2-5) |
| Motel/RV Park | 0.5 per unit |
| Commercial | Meter size (see Table 2-5) |
| Public | Meter size (see Table 2-5) |

**Table 2-5 - Wastewater EDU Determination by Water Meter Size**

| Meter Size | EDUs |
|---|---|
| 5/8” x 3/4" | 1 |
| 1” | 2.5 |
| 1 ½” | 5 |
| 2” | 8 |
| 3” | 16 |

### Current Wastewater EDUs

A summary of the EDU history for the City and GSD over the past five years is presented in Table 2-6 and Table 2-7, respectively. In Depoe Bay, the number of overall EDU has increased by 160 or 11.7% since 2003 with an average annual increase of 2.8%. Residential, multi-family and public sectors have increased 17.6%, 9.8% and 76.7% over the last five years while both the number of motel/RV and commercial EDUs has declined. In the Gleneden Sanitary District, the overall number of EDUs has increased by 147 or 7.2% since 2003 with an average annual increase of 1.75%.

**Table 2-6 – EDU Summary for the City of Depoe Bay**

| Description | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Residential | 761.0 | 796.0 | 821.0 | 847.0 | 895.0 |
| Multi-Residential | 351.0 | 351.0 | 356.0 | 378 | 385.5 |
| Multi-Residential Facilities | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| Motel/RV Park | 84.0 | 84.0 | 79.0 | 79.0 | 80.0 |
| Commercial | 148.5 | 138.5 | 136.5 | 135.0 | 132.5 |
| Public | 15.0 | 24.0 | 24.0 | 26.5 | 26.5 |
| **Total** | **1,372.5** | **1,406.5** | **1,429.5** | **1,478.5** | **1,532.5** |

**Table 2-7 – EDU Summary for the Gleneden Sanitary District**

| Description | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Residential | 1,453.0 | 1,514.0 | 1,551.0 | 1,581.0 | 1,599.0 |
| Multi-Residential | 71.0 | 75.0 | 76.0 | 73.0 | 75.0 |
| Multi-Residential Facilities | 241.5 | 248.0 | 248.0 | 252.0 | 252.0 |
| Motel/RV Park | 231.5 | 209.5 | 210.0 | 209.0 | 210.0 |
| Commercial | 39.0 | 41.0 | 41.0 | 41.0 | 45.0 |
| Public | 16.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| **Total** | **2,052.0** | **2,105.5** | **2,143.0** | **2,174.0** | **2,199.0** |

Table 2-8 presents the 5-year EDU history for the entire wastewater system. Overall, 307 additional EDUs have been added to the system since 2003, resulting in an average annual increase of 2.2%. The highest overall percentage increase of 43.5% has occurred in the public sector, followed by single family residential with an increased 12.6%. Both motel/RV and commercial EDUs have decreased since 2003. The number of people per EDU has averaged 1.71 since 2003.

**Table 2-8 – Total EDU Summary for Depoe Bay's Wastewater System**

| Description | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Residential | 2,214.0 | 2,310.0 | 2,372.0 | 2,428.0 | 2,494.0 |
| Multi-Residential | 422.0 | 426.0 | 432.0 | 451.0 | 460.5 |
| Multi-Residential Facilities | 254.5 | 261.0 | 261.0 | 265.0 | 265.0 |
| Motel/RV Park | 315.5 | 293.5 | 289.0 | 288.0 | 290.0 |
| Commercial | 187.5 | 179.5 | 177.5 | 176.0 | 177.5 |
| Public | 31.0 | 42.0 | 42.0 | 44.5 | 44.5 |
| **Total** | **3,424.5** | **3,512.0** | **3,572.5** | **3,652.5** | **3,731.5** |
| **People/EDU** | **1.72** | **1.71** | **1.72** | **1.71** | **1.70** |
| Depoe Bay Contribution | 40.1% | 40.0% | 40.0% | 40.5% | 41.1% |
| Gleneden Contribution | 59.9% | 60.0% | 60.0% | 59.5% | 58.9% |

Comparing the above figures to those in Table 2-7 and Table 2-8, shows that users in Depoe Bay represents 41.1% of the system's total EDU count in 2007. The percentage of each sector EDU contribution compared to the total inventory in 2007 is as follows:

- 66.8% of Residential
- 12.3% of Multi-Family
- 7.1% of Multi-Family Residential Facilities
- 7.8% of Motel/RV
- 4.8% of Commercial EDUs
- 1.2% of Public

## Future Wastewater EDUs

Future EDU projections for the City and GSD were estimated based the EDU average annual growth rates (AAGR) determined from the City's inventory for the past five years. A consistent rate of growth, rather than an incremental rate used in the population projection, was used in this analysis because of limited information on the projected growth of tourism in the area. A 3% growth rate was used to project future EDUs within the City and a 2% rate was used for GSD. These rates were chosen to produce EDU projections that ensure the system has sufficient capacity to meet future demands.

By 2028, there will be an estimated 2,851 EDUs in Depoe Bay, 3,333 EDUs in GSD for an overall total of 6,184 EDUs in the system (Table 2-9). The average annual growth rates expected for the overall system is 2.44%.

**Table 2-9 – Projected Future Wastewater EDUs for Depoe Bay Wastewater System**

| Year | Depoe Bay EDU | GSD EDU | Total | System AARG |
|---|---|---|---|---|
| 2008 | 1,578 | 2,243 .59 | 3,821.5 | 2.41% |
| 2013 | 1,830 | 2,476 | 4,306.5 | 2.42% |
| 2018 | 2,121 | 2,734 | 4,856.5 | 2.43% |
| 2023 | 2,459 | 3,019 | 5,478.0 | 2.44% |
| 2028 | 2,851 | 3,333 .54 | 6,184.0 | 2.45% |
| Average | | | | 2.44% |

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**CITY OF DEPOE BAY**

**Wastewater Master Plan Update**

# SECTION 3:

## FLOW ANALYSIS

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 3
# FLOW ANALYSIS

## 3.1 Introduction

Design of wastewater facilities is primarily dependent on estimates of hydraulic and organic loading. These loads have been determined based information obtained from the Discharge Monitor Reports (DMR) for the City's wastewater treatment plant (WWTP) from January 2004 through November 2008. Future wastewater hydraulic and organic loadings will be estimated using a unit design rate in conjunction with EDU projections.

## 3.2 Current Wastewater Flows

Flow data from January 2004 to November 2008 were analyzed to determine current system flows, which includes the contributions from the City of Depoe Bay and Gleneden Sanitary District (GSD). Terminology for wastewater characteristics and terms used in the determination of future hydraulic loading are presented below:

Dry-Weather (Summer) Period: Defined as the period when precipitation and streamflows are low. This period is defined in the Oregon Administrative Rules (OAR 340-41-255) as May 1 through October 31.

Wet-Weather (Winter) Period: Defined as the period when precipitation and streamflows are high. This period is defined in OAR 340-41-255 as November 1 through April 30.

Average Daily Dry-Weather Flow (ADDWF): Total wastewater flow for the dry-weather period divided by the number of days in the period.

Maximum Monthly Dry-Weather Flow (MMDWF): Total wastewater flow for the month with the highest flow during the dry-weather period, divided by the number of days in the month. Based on DEQ guidelines, this is the maximum dry-weather monthly flow with a 10-year probability of exceedance.

Peak Daily Dry-Weather Flow (PDDWF): Total flow for the day with the highest wastewater flow during the dry-weather period.

Average Daily Wet-Weather Flow (ADWWF): Total wastewater flow for the wet-weather period divided by the number of days in the period.

Maximum Monthly Wet-Weather Flow (MMWWF): Total wastewater flow for the month with the highest flow during the wet-weather period, divided by the number of days in the month. Based on DEQ guidelines, this is the maximum dry-weather monthly flow with a 5-year probability of exceedance.

Peak Daily Wet-Weather Flow (PDWWF): Total flow for the day with the highest wastewater flow during the wet-weather period.

Peak Instantaneous Flow (PIF): Flow for the peak hour expressed as a daily flow. Based on DEQ guidelines, this is the peak hourly flow with a 5-year probability of exceedance.

## Observed Wastewater Flows

### Wastewater Treatment Plant Flows

*DMR logs from the WWTP were provided by the City for January 2004 to November 2008.*

Table 3-1 summarizes the dry- and wet-weather average daily, maximum month, and peak daily flows observed at Depoe Bay's WWTP. The average daily flow over the 5-year period was 0.502 million gallons per day (mgd), with the highest average annual flow occurring in 2006 and the lowest flow in 2008.

The dry-weather flow analysis shows that the daily flow over the last five years average 0.419 mgd. The average maximum month and peak daily flows were 0.464 mgd and 0.723 mgd, respectively. The largest dry-weather maximum monthly and peak pay flows occurred in October 2004. The monthly rainfall total for October 2004 was 8.4 inches.

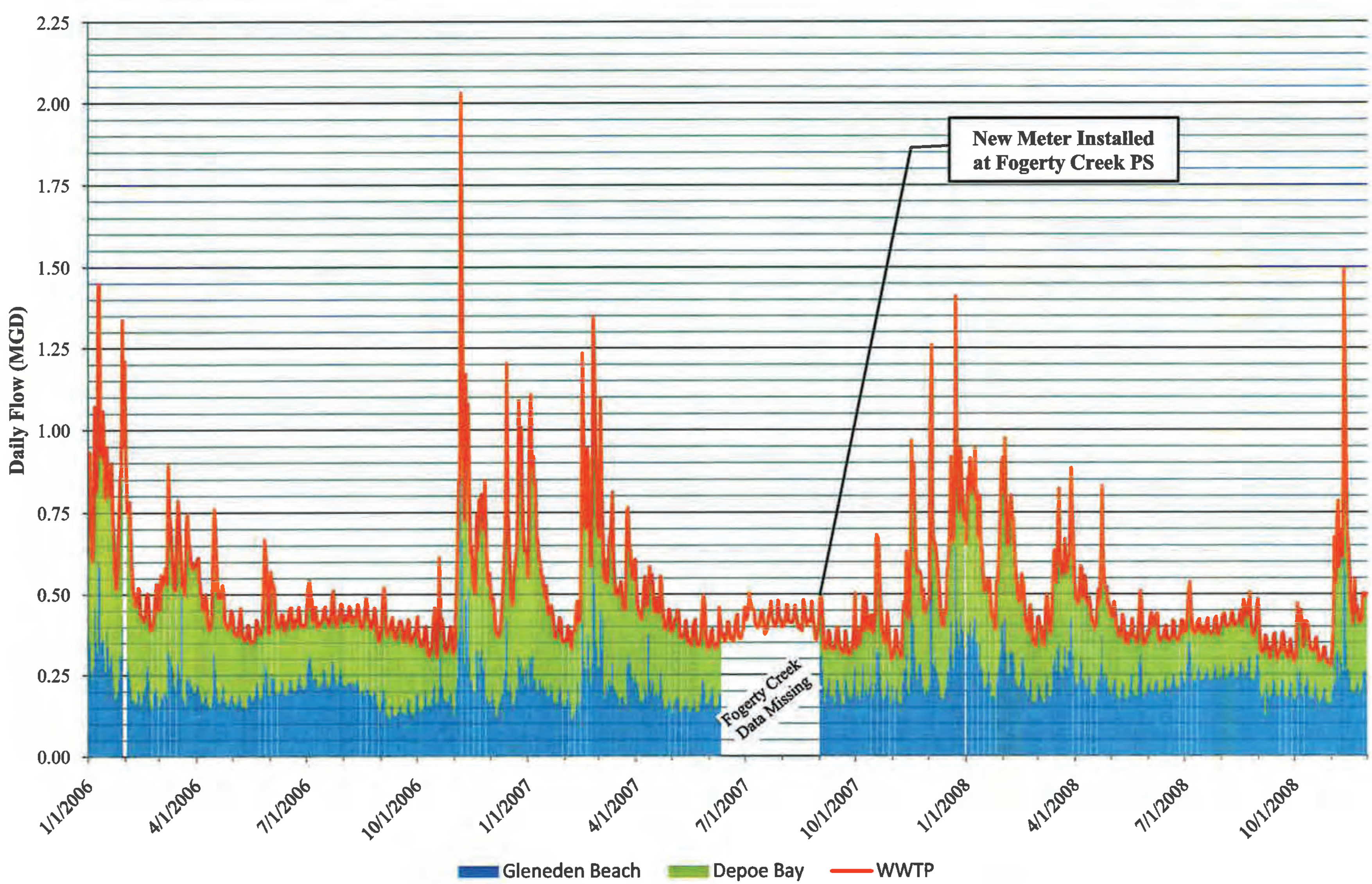
Wet-weather flow analysis determined the 5-year average daily flow between November and April was 0.590 mgd. The highest average daily flow occurred in 2006. The average maximum monthly and peak daily flows for this 5-year period also occurred in 2006. January had the maximum monthly flow of 0.762 mgd with a corresponding monthly rainfall of 24.4 inches. The peak daily flow of 1.641 mgd was observed on November 6, 2006 with a single day rainfall total of 6.5 inches.

**Table 3-1 - Wastewater Treatment Plant Observed Flows**

| | 2004 | 2005 | 2006 | 2007 | 2008 | Average |
|---|---|---|---|---|---|---|
| *Full-Year Flows (MGD):* | | | | | | |
| Ave. Daily | 0.505 | 0.508 | 0.534 | 0.494 | 0.470 | 0.502 |
| *Dry-Weather Flows (MGD):* | | | | | | |
| Ave Daily | 0.442 | 0.455 | 0.414 | 0.402 | 0.384 | 0.419 |
| Max. Month | 0.524 | 0.492 | 0.445 | 0.429 | 0.427 | 0.464 |
| Peak Daily | 0.950 | 0.773 | 0.670 | 0.682 | 0.538 | 0.723 |
| *Wet-Weather Flows (MGD):* | | | | | | |
| Ave Daily | 0.570 | 0.561 | 0.656 | 0.588 | 0.574 | 0.590 |
| Max. Month | 0.769 | 0.659 | 0.887 | 0.693 | 0.667 | 0.735 |
| Peak Daily | 1.590 | 1.275 | 2.030 | 1.412 | 1.494 | 1.560 |

Daily WWTP flows from January 2004 to November 2008 are shown in Figure 3-1. This figure also shows the contribution of flows generated by the City of Depoe Bay and the Gleneden Sanitary District, excluding flows for June 2007, July 2007 and August 2007 when flow data for GSD is not available.

## Figure 3-1 –WWTP, City of Depoe Bay, and Gleneden Sanitary District Daily Wastewater Flow



## Gleneden Sanitary District Flows

The City's DMRs also include the daily flows at Gleneden's Fogerty Creek pump station, which is the last pump station in the GSD before discharging into the Depoe Bay gravity system. The meter at the Fogerty Creek station was replaced in September 2007. Flow records prior to the meter replacement are suspect and not included in the following analysis.

Daily records from September 2007 through November 2008 were analyzed to determine the contributions of wastewater flow from Gleneden Sanitary District, as reported by the Fogerty Creek pump station. The average daily, maximum monthly, and peak daily flows observations for the GSD are shown in Table 3-2. Dry-weather flows average 0.222 mgd or approximately 57% of the WWTP total flows during data period. Average winter flow increases to 0.267, accounting for only 41% of the system flows. During the analyzed time period, GSD contribution to the overall daily flow at the WWTP has ranged from 33% to 72% with an average of 52%.

The data available for GSD flows is fairly limited compared to the data on the overall system flows at the WWTP. To ensure a balance in design flow calculations, the average percentage that GSD contributes to the total WWTP flow for each design characteristic (e.g. ADDWF, ADWWF, etc.) were determined using the available data from September 2007 through November 2008. These percentages were multiplied by the design flow characteristic for the WWTP (see Table 3-6) to produce an estimated design flow characteristic for GSD. Using this method ensures that the sum of flows generated by GSD and the City equals the total flow into the WWTP. Observed and estimated flow characteristics for GSD are shown in Table 3-2.

**Table 3-2 – Gleneden Sanitary District Observed & Estimated Wastewater Flows**

| Flow Characteristics | Observed Flow | Average % of WWTP Flows | Estimated Flow[1] |
|---|---|---|---|
| *Full-Year Flows (MGD):* | | | |
| Ave. Daily | 0.243 | 52.2% | 0.262 |
| *Dry-Weather Flows (MGD):* | | | |
| Average Daily Flow | 0.222 | 57.3% | 0.240 |
| Maximum Monthly Flow | 0.264 | 57.3% | 0.283 |
| Peak Daily Flow | 0.354 | 60.0% | 0.434 |
| *Wet-Weather Flows (MGD):* | | | |
| Average Daily Flow | 0.267 | 41.0% | 0.242 |
| Maximum Monthly Flow | 0.308 | 46.0% | 0.308 |
| Peak Daily Flow | 0.643 | 46.0% | 0.696 |

[1] Estimated flow is a product of the average percentage of WWTP flows generated by GSD and the WWTP design flow (see Table 3-6)

## City of Depoe Bay Wastewater Flows

The observed wastewater flow produced within the City of Depoe Bay was calculated as the difference in the flows recorded at the Fogerty Creek pump station and the WWTP. The average daily, maximum monthly, and peak daily flows for dry- and wet-weather periods are presented in Table 3-3. As shown in this table, there is a high degree of variation between the average dry- and wet-weather flows in Depoe Bay. Flow data indicates that the City of Depoe Bay contributes a higher percentage of infiltration and inflow (I/I) to the WWTP.

As done with the flows from GSD, the average percentage of Depoe Bay's contribution to the total WWTP flow were used to estimate design flow characteristics (Table 3-3).

**Table 3-3 – City of Depoe Bay Observed & Estimated Wastewater Flows**

| Flow Characteristics | Observed Flow | Average % of WWTP Flows | Estimated Flow[1] |
|---|---|---|---|
| *Full-Year Flows (MGD):* | | | |
| Ave. Daily | 0.236 | 47.8% | 0.240 |
| *Dry-Weather Flows (MGD):* | | | |
| Average Daily Flow | 0.165 | 42.7% | 0.179 |
| Maximum Monthly Flow | 0.209 | 42.7% | 0.211 |
| Peak Daily Flow | 0.362 | 40.0% | 0.289 |
| *Wet-Weather Flows (MGD):* | | | |
| Average Daily Flow | 0.318 | 59.0% | 0.348 |
| Maximum Monthly Flow | 0.385 | 54.0% | 0.362 |
| Peak Daily Flow | 0.865 | 54.0% | 0.818 |

[1] Estimated flow is a product of the average percentage of WWTP flows generated by the City of Depoe Bay and the WWTP design flow (see Table 3-6)

## Wastewater Flows Statistical Analysis

As recommended in "*Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF AND PIF*" published by the Oregon Department of Environmental Quality (DEQ), a statistical method was used to determine the system's design MMDWF, MMWWF, PDF, and PIF. This method assumes rainfall affects peak wastewater flows more than any other factor. This is the same method used in the City's 1995 *Wastewater Engineering Feasibility Study.*

### MMDWF$_5$ & MMWWF$_5$

Depoe Bay's DMRs contain information on both influent flows and daily rainfall totals observed at the WWTP dating back to October 2004. As recommended in the DEQ report, data were limited to the period January-May, as the groundwater level in Western Oregon tends to sink in June and stay deep until December. Data were also limited to the most recent year to avoid growth effects that may skew or mask the flow/rainfall correlation, including seasonal population fluctuations.

Monthly rainfall and wastewater flows were plotted to determine a linear statistical relationship between the two variables using linear regression. As Figure 3-2 shows, monthly wastewater flow may be predicted based on total monthly rainfall using the following equation:

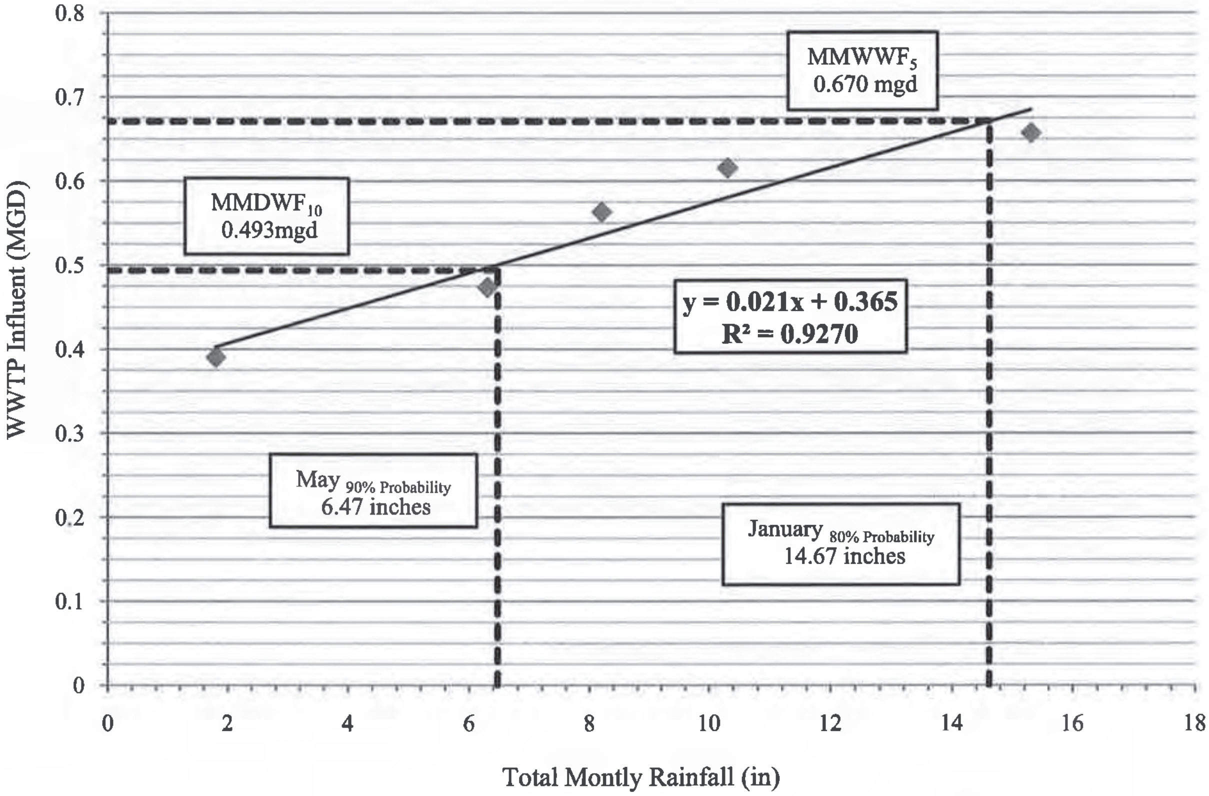
$$\text{Flow (mgd)} = 0.021x + 0.365$$

Where:

$$x = \text{Monthly rainfall total (inches)}$$

The R-squared (sample coefficient of determination) value for the linear regression is 0.927. This implies that there is a significant correlation between the two variables (rainfall and flow), although there does exist some variance in the data.

**Figure 3-2 - MMWWF and MMDWF Statistical Calculation**




Oregon Administrative Rule (OAR 34-41-120 (13) and (14)) requires that WWTP have design capacity to handle $MMWWF_5$ and $MMDWF_{10}$. The $MMWWF_5$ is the maximum monthly average wet-weather flow with a 20% probability of occurrence or 5-year return period and normally occurs in January. Similarly, the $MMDWF_{10}$ is the maximum monthly average wet-weather flow with a 10% probability of occurrence or 10-year return period and normally occurs in May. The above model can be used to calculate a theoretical maximum monthly dry and wet weather flows which are assumed to coincide with the peak months for wet and dry weather rainfall, January and May respectively.

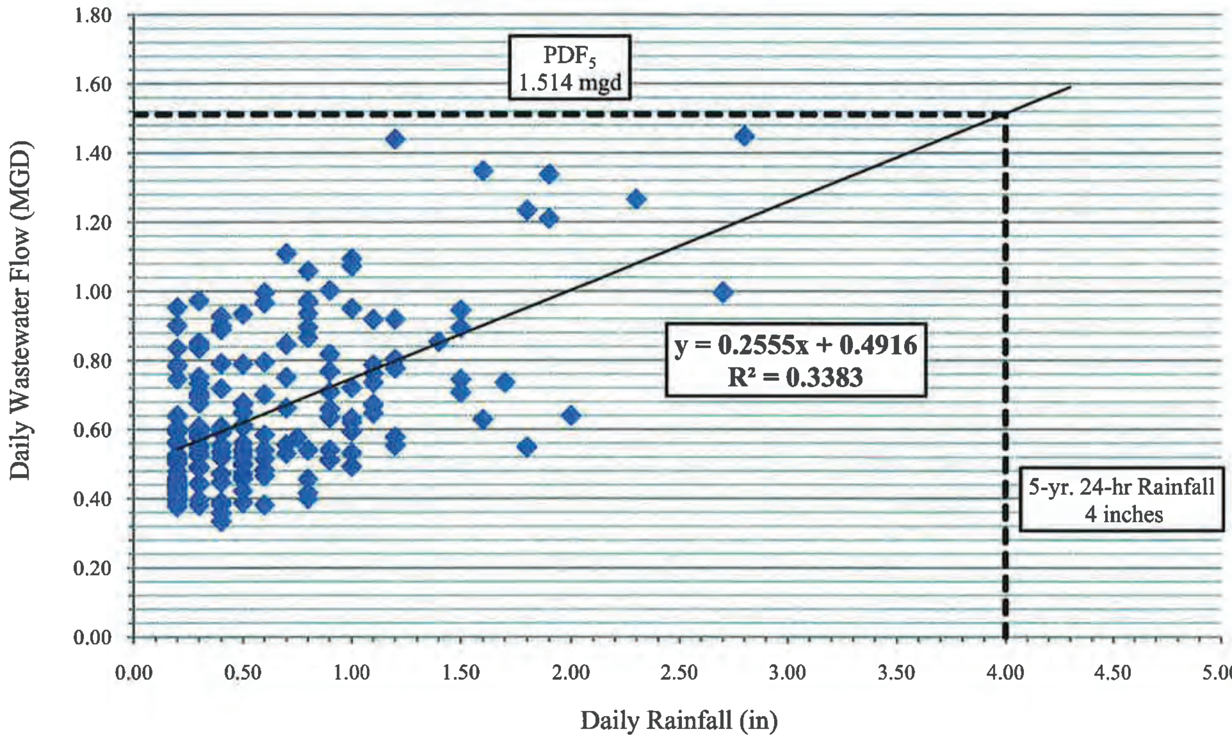
Monthly statistical data for precipitation probabilities in Newport is available from the National Oceanic and Atmospheric Administration (NOAA) in the Climatological Summary No. 20. Based on this information, the 5-year return period rainfall for January is 14.62 inches and the 10-year return period rainfall total for May is 6.47 inches. **Based on the linear regression model, the predicted $MMWWF_5$ is 0.670 mgd and the $MMDWF_{10}$ is 0.493 mgd (Figure 3-2).**

The observed 5-year MMWWF of 0.887 mgd occurred in January 2006 when the monthly rainfall totaled 24.4 inches, far higher than the statistical 5-year accumulation published by NOAA. The observed 5-year MMDWF occurred in October 2004, but unfortunately rainfall data at the WWTP is not available for this year. For the years when rainfall data is available (2005-2008), the MMDWF was 0.496 mgd in May 2006 when rainfall totaled 5.5 inches. Inserting these rainfall totals into the above model results in underestimating flows by approximate 5%.

## Peak Daily Flow ($PDF_5$)

Linear regression was also used to estimate the current peak daily flow for a 5-year storm. Daily WWTP influent flows were plotted against 24-hour rainfall totals for the period of January through May 2005 through 2007 (Figure 3-3). Days with less than 0.2 inches were excluded due to the limited amount of runoff expected from such storms.

**Figure 3-3 - Peak Daily Flow Statistical Calculation**




The R-squared (sample coefficient of determination) value for the linear regression is 0.338. This implies a significant amount of variance in the model and caution should be used when using a model with such a low R-squared value to make predictions.

The 5-year, 24-hour rainfall for Depoe Bay of 4.0[1] inches was used to calculate the peak flow based on the statistical relationship established in Figure 3-3. **This analysis determined a theoretical $PDF_5$ of 1.514 mgd.** In comparison to observed flows, a 24-hour rainfall of 2.8 inches resulted in a flow of 1.449 mgd, with is 16.7% higher than the model prediction, and a 24-hour rainfall of 2.7 inches resulted in a flow of 0.995 mgd, which is 18.7% lower than model prediction. These values reiterate the large variability in the data.

## Peak Instantaneous Flow ($PIF_5$)

The peak instantaneous wastewater flow (PIF) was estimated using a statistical method recommended by DEQ. This method calculates the PIF resulting from a 5-year storm during high groundwater periods by assuming that the MMWWF, PDF and PIF all occur in the same year. Table 3-4 lists of the observed average day, the calculated $MMWWF_5$ and the calculated $PDF^5$ along with the

[1] "Isopluvials of 5-years, 24-hour Precipitation", NOAA Atlas, Vol. X, Figure 26

associated probability of exceeding each design flow. The probability of exceeding design flow is equal to the inverse of the return period over the course of one year.

**Table 3-4 – Probability of Exceeding Existing Wastewater Flow Annual Design Values**

| | ADF | MMF | PDF | PIF |
|---|---|---|---|---|
| Exceeding Value Annually | 182.5 days | 1 month | 1 day | 1 hour |
| Probability of Exceedance (%) | 50 | 8.333 | 0.274 | 0.011 |
| Flow Value (MGD) | 0.502 | 0.607 | 1.514 | 2.110 |

These data were plotted on semi-logarithmic probability paper and logarithmic trend line was generated based on the observed data (Figure 3-4). This trend line is used to calculate the theoretical PIF for Depoe Bay's WWTP using the flowing equation:

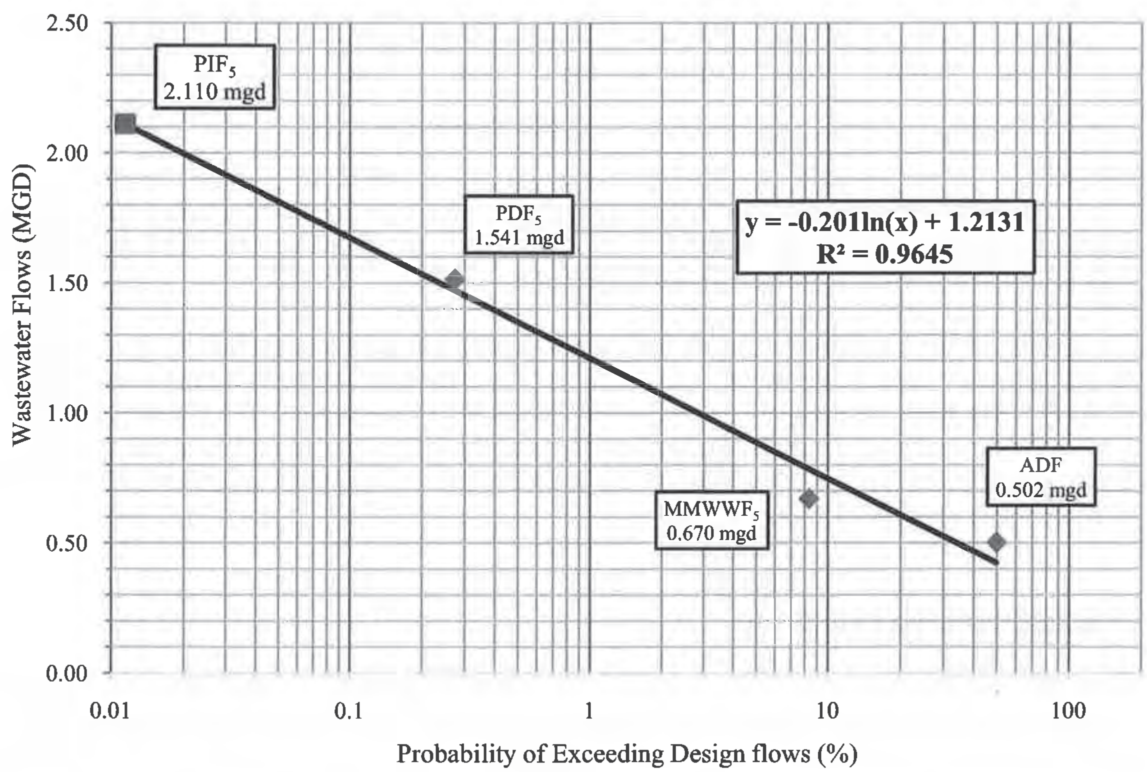
$$\text{Design Flow (mgd)} = -0.201\ln(x) + 1.2131$$

Where:

$x$ = Probability of exceeding design flow (%)

The R-squared (sample coefficient of determination) value for the linear regression is 0.988, which shows a high correlation between the data. **Based on this analysis, the calculated $PIF_5$ for the system is 2.110 mgd.**

**Figure 3-4- Peak Instantaneous Flow Calculation**



# 3.3 Current Wastewater Composition

Wastewater composition refers to the solids, chemicals, and other materials that make up municipal wastewater. Since wastewater is generated by residential, commercial, and industrial sources, the constituent within the wastewater can vary greatly. However, the treatment requirements remains consistent based upon the City's National Pollutant Discharge Elimination System (NPDES) permit requirements.

A detailed analysis of the City's DMRs from January 2004 to November2008 was conducted to aid in establishing a basis for long-term projections of organic loadings and wastewater composition for the planning period.

## Terminology

Biochemical Oxygen Demand, 5-day ($BOD_5$): Measure of the concentration of organic impurities in wastewater. The amount of oxygen required by bacteria while stabilizing organic matter under aerobic conditions, expressed in milligrams per liter, is determined entirely by the availability of material in the wastewater to be used as biological food and by the amount of oxygen utilized by the microorganisms during oxidation. The standard length of the BOD test is 5 days.

Total Suspended Solids (TSS): Solids that float on the surface of, or are in suspension in, water, wastewater, or other liquids, and that are largely removable by laboratory filtering.

Fecal Coliform Bacteria (FC): Bacteria that are naturally present in the intestines of people, dogs, cats, and other animals.

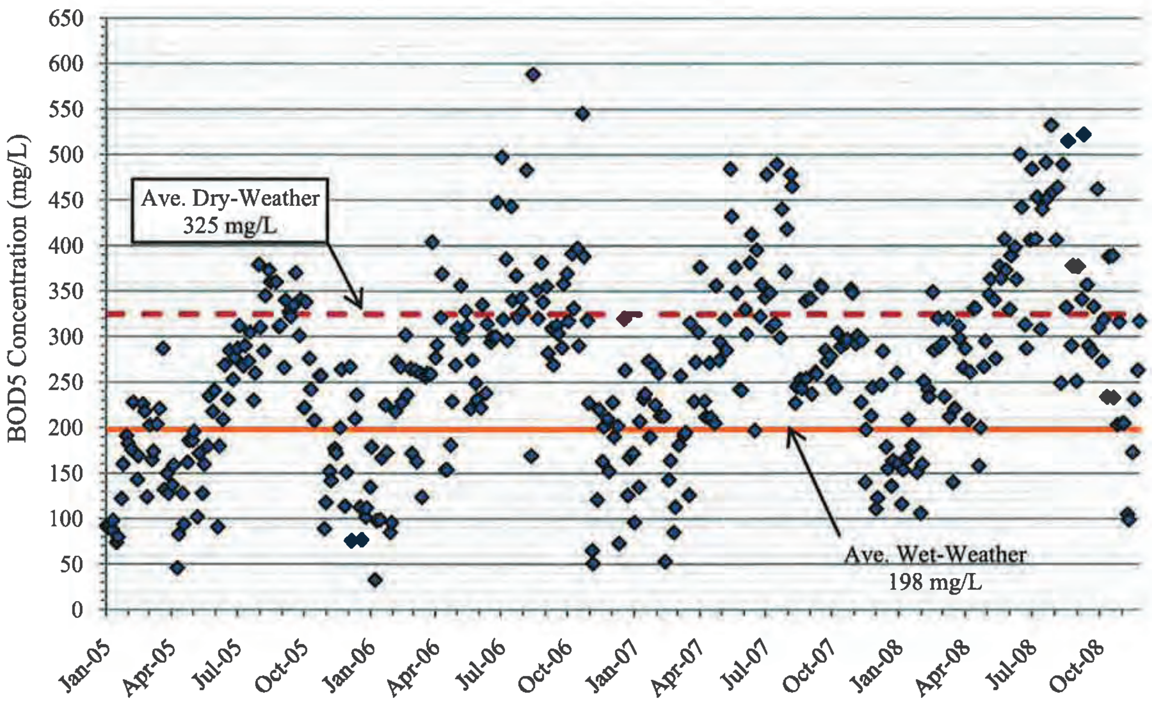
pH: The scale which is used to describe the concentration of acid or base. A pH of 7 is neutral. A pH above 7 is alkaline (basic); below 7 is acidic. The scale runs from close to zero, which is very acidic, to 14, which is highly alkaline.

## Analysis of Plant Records

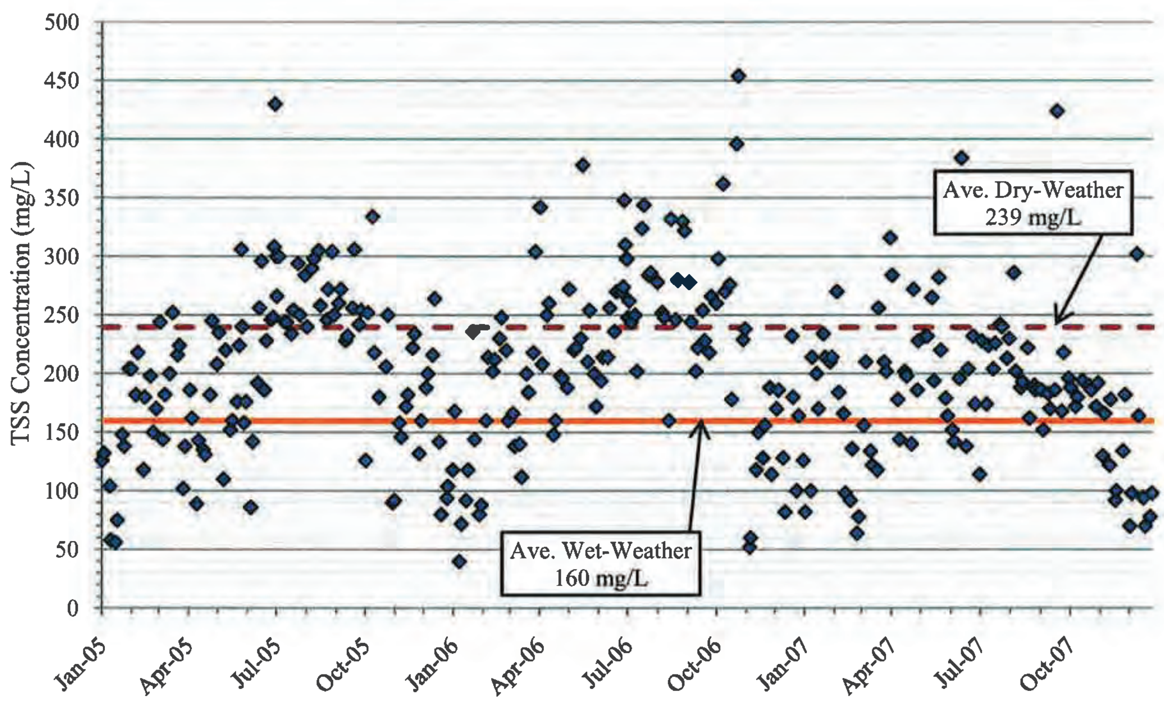
Influent and effluent wastewater samples are taken for five-day biochemical oxygen demand ($BOD_5$) and total suspended solids (TSS) twice a week at the WWTP. Daily monitoring reports (DMRs) were reviewed for the years 2005, 2006, 2007 and 2008.

Observed $BOD_5$ and TSS concentration data are presented in Figure 3-5 and Figure 3-6 to establish seasonal trends from January 2005 to November 2008. Both graphs show higher concentration in summer months and lower concentrations in winter months. This is typical since wet-weather flows include a larger quantity of infiltration and inflow that act to dilute loading concentrations.

## Figure 3-5 – Treatment Plant Influent $BOD_5$ Concentrations

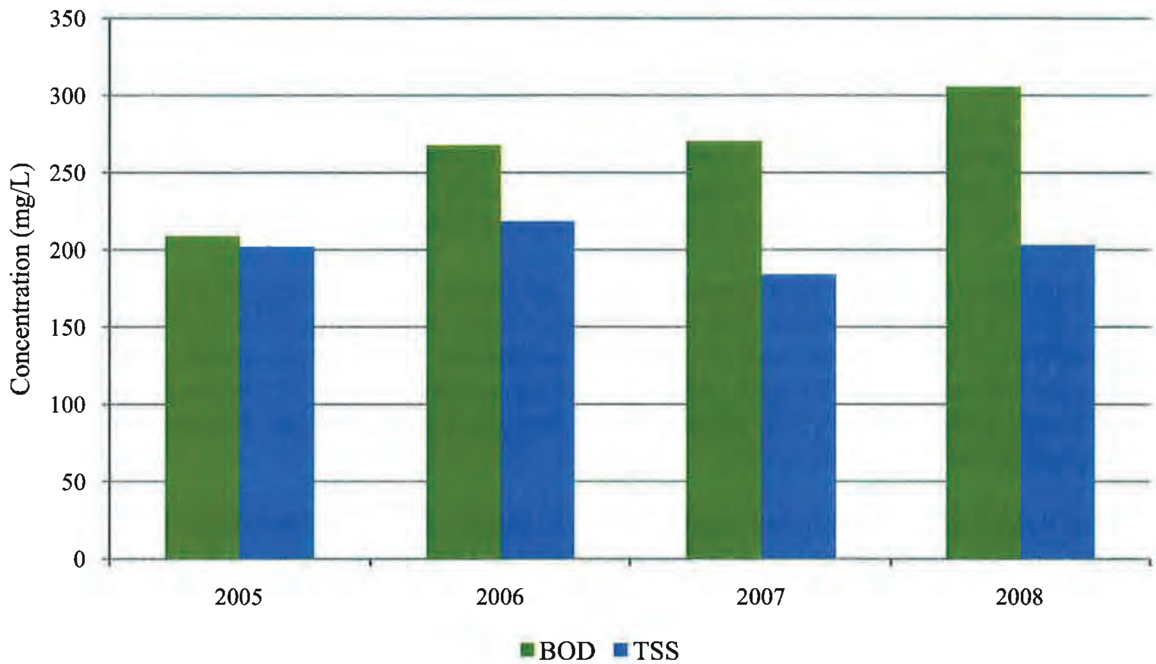



## Figure 3-6 – Treatment Plant Influent TSS Concentrations



Annual average concentration for BOD and TSS were analyzed to establish recent trends in organic loading to the City's WWTP (Figure 3-7). This analysis indicates that the concentration of BOD in wastewaters has steadily increased over the past four years. At this same time, TSS concentrations have remained relatively steady.

**Figure 3-7 – Average Annual Concentrations for BOD and TSS (2005-2008)**




The average and maximum $BOD_5$ and TSS concentrations and loadings are shown in Table 3-5. The average $BOD_5$ concentration (and loading) for dry- and wet-weather flows are 325 mg/L (1,039 lb) and 198 mg/L (867 lb), respectively. Average TSS concentrations (and loadings) are 239 mg/L (783 lb) during dry-weather and 160 mg/L (703lb) during wet-weather. While concentrations are normally lower in winter months, loading is typically higher.

**Table 3-5 –Treatment Plant Influent Wastewater Loading**

| | 5-Day Biological Oxygen Demand ($BOD_5$) | | Total Suspended Solids (TSS) | |
|---|---|---|---|---|
| | Concentration (mg/L) | Loading (lbs/day) | Concentration (mg/L) | Loading (lbs/day) |
| *Dry-Weather:* | | | | |
| Average | 198 | 867 | 160 | 703 |
| Maximum Month | 271 | 1,205 | 220 | 913 |
| *Wet-Weather:* | | | | |
| Average | 325 | 1,039 | 239 | 783 |
| Maximum Month | 443 | 1,439 | 303 | 1,147 |

## 3.4 Current Unit Factors

Current wastewater characteristics for the City of Depoe Bay, GSD, and the total system have been developed in Sections 3.2 and 3.3. Hydraulic and organic loading conditions determined by analysis of the past 5-years were divided by the average EDU and populations in the system, Depoe Bay, and Gleneden Beach to determine unit design factors. Table 3-6 summarizes current, design unit rates wastewater flow characteristics for the City, GSD, and the overall wastewater system.

The average daily per capita flow between 2004 and 2008 was 82 gpcd; this includes flows from Depoe Bay and GSD. This rate is very comparable to typical wastewater flow rates of communities with similar demographics which range from 63-81 gpcd[2]. However, the systems peak daily and instantaneous flows exceed typical flow rates by approximately 36% and 42%, respectively.

It is interesting to note the large discrepancies in per capita flows occurring in the City of Depoe Bay and GSD. In the City of Depoe Bay, average daily ranges from 136 gpcd (ADDWF) to 259 gpcd (ADWWF). These flows are well above typical wastewater flow rates as opposed to GSD where average flows range from 51 gpcd (ADDWF) to 53 gpcd (ADWWF). While *per capita* flow rates in GSD range from 63% to 80% of those in Depoe Bay, *per EDU* flow rates were much more comparable, varying by 5% to 47%.

Metcalf and Eddy also published typical per capita organic loading values (Table 3-12). Typical $BOD_5$ loading ranges form 0.11-0.26 lb/capita/day and TSS ranges from 0.13-0.33 lb/capita/day. Depoe Bay's WWTP average and maximum monthly dry- and wet-weather influent loading for $BOD_5$ and TSS are both within the typical range.

[2] *Wastewater Engineering Treatment and Reuse,* Metcalf & Eddy, 2003. Table 3-1.

## Table 3-6 – Current Wastewater Unit Factors

| | Current Rate | Per EDU[1] | Per Capita[2] | Typical Unit flow/Load[3] |
|---|---|---|---|---|
| *Wastewater Treatment Plant:* | | | | |
| ADF | 0.502 mgd | 140 gpd/EDU | 82 gpcd | 63-81 gpcd |
| ADDWF | 0.419 mgd | 117 gpd/EDU | 68 gpcd | 63-81 gpcd |
| ADWWF | 0.590 mgd | 165 gpd/EDU | 96 gpcd | 63-81 gpcd |
| MMDWF[4] | 0.493 mgd | 138 gpd/EDU | 81 gpcd | 63-81 gpcd |
| MMWWF[4] | 0.670 mgd | 187 gpd/EDU | 109 gpcd | 63-81 gpcd |
| PDF[4] | 1.514 mgd | 423 gpd/EDU | 247 gpcd | 142-182 gpcd |
| PIF[4] | 2.110 mgd | 590 gpd/EDU | 344 gpcd | 189-243 gpcd |
| BOD Average Wet-Weather | 867 lb/day | 0.242 lb/d/EDU | 0.141 lb/capita/d | 0.11-0.26 lb/capita/d |
| BOD Average Dry-Weather | 1,039 lb/day | 0.290 lb/d/EDU | 0.170 lb/capita/d | 0.11-0.26 lb/capita/d |
| BOD Maximum Month | 1,439 lb/day | 0.402 lb/d/EDU | 0.235 lb/capita/d | 0.11-0.26 lb/capita/d |
| TSS Average Wet-Weather | 703 lb/day | 0.196 lb/d/EDU | 0.115 lb/capita/d | 0.13-0.33 lb/capita/d |
| TSS Average Dry-Weather | 783 lb/day | 0.219 lb/d/EDU | 0.128 lb/capita/d | 0.13-0.33 lb/capita/d |
| TSS Maximum Month | 1,147 lb/day | 0.321 lb/d/EDU | 0.187 lb/capita/d | 0.13-0.33 lb/capita/d |
| *City of Depoe Bay:*[5] | | | | |
| ADDWF | 0.174 mgd | 121 gpd/EDU | 136 gpcd | 63-81 gpcd |
| ADWWF | 0.332 mgd | 230 gpd/EDU | 259 gpcd | 63-81 gpcd |
| MMDWF | 0.205 mgd | 142 gpd/EDU | 160 gpcd | 63-81 gpcd |
| MMWWF | 0.371 mgd | 257 gpd/EDU | 289 gpcd | 63-81 gpcd |
| PDF | 0.834 mgd | 578 gpd/EDU | 650 gpcd | 142-182 gpcd |
| PIF | 1.000 mgd | 693 gpd/EDU | 780 gpcd | 189-243 gpcd |
| *Gleneden Sanitary District:*[5] | | | | |
| ADDWF | 0.245 mgd | 115 gpd/EDU | 51 gpcd | 63-81 gpcd |
| ADWWF | 0.258 mgd | 121 gpd/EDU | 53 gpcd | 63-81 gpcd |
| MMDWF | 0.288 mgd | 135 gpd/EDU | 59 gpcd | 63-81 gpcd |
| MMWWF | 0.299 mgd | 140 gpd/EDU | 62 gpcd | 63-81 gpcd |
| PDF | 0.680 mgd | 318 gpd/EDU | 140 gpcd | 142-182 gpcd |
| PIF[6] | 1.110 mgd | 520 gpd/EDU | 229 gpcd | 189-243 gpcd |

1 Per EDU values based on 5-year EDU average: WWTP = 3,579; City = 1,444; and GSD = 2,135
2 Per Capita values based on 5-year population average: WWTP = 6,128; City = 1,282; and GSD = 4,846
3 Wastewater Engineering; Treatment and Reuse. Metcalf and Eddy, 2003.
4 Based on MMDWF, MMWWF, PDF, and PIF were determined based on a statistical methodology.
5 Flows for GSD and Depoe Bay are based on calculated flows determined in Table 3-2 and Table 3-3, respectively
6 PIF for GSD established by the District's 2004 Wastewater Collection Sanitary Plan

# 3.5 Projected Wastewater Characteristics

## Projected Wastewater Flows

Wastewater flows were projected through the 2028 design year. Flows for average daily flow (ADF) and average daily dry-weather flow (ADDWF) were projected based on the assumption that they will increase at the same rate as EDU growth. However, the unit values for flow conditions (i.e. ADWWF, MMWWF, PDF, etc.) determined in Table 3-6 included flow contribution from infiltration and inflow (I/I) and are not likely to increase at the same rate as EDU growth.

For the projection of wastewater flows with significant influence from I/I (ADWWF, MMDWF, MMWWF, PDF, and PIF), the use of unit flows would yield results significantly higher than reality. This is because new construction techniques and material result in sanitary sewers which have much lower quantities of infiltration than the existing system.

Additional I/I due to future growth was determined in a separate calculation. It was assumed that wet-weather flows, without the contribution from I/I, equal dry-weather flows. Since summer flows include an influx from seasonal and tourist populations, this assumption should provide conservative flow estimates for the planning period.

**Projection of I/I Related Flows**

Projected I/I related flow was determined based on expected development area (in acres) and a per acre unit I/I rates (chosen based on applicable land use) for various flow conditions. Each land use zone within the City has been analyzed for future developments. Potential developments within the 20-year planning period were determined by information provided by City staff, land use zoning, and future EDU estimates.

The acreage of expected development in each land use region was calculated and the number of additional EDU within each region estimated. This information, along with estimated were used to determine addition I/I added to the system by new developments. Table 3-7 shows the result of this analysis.

**Table 3-7 – Additional I/I Due to Future Development (2028)**

| | 2028 Additional Development (Acres) | | | I/I Per Acre (gpd) | 2028 I/I Added (gpd) | | |
|---|---|---|---|---|---|---|---|
| | Depoe Bay | GSD | Total | | Depoe Bay | GSD | Total |
| ADWWF | 244.6 | 226.3 | 470.9 | 375 | 91,725 | 84,863 | 176,588 |
| MMWWF | 244.6 | 226.3 | 470.9 | 500 | 122,300 | 113,150 | 235,450 |
| PDF | 244.6 | 226.3 | 470.9 | 750 | 183,450 | 169,725 | 353,175 |
| PIF | 244.6 | 226.3 | 470.9 | 1,500 | 366,900 | 339,450 | 706,350 |

**Future Flow Projections**

Unit factors determined in Section 3.4 need to be modified to account for the assumed decreased in unit I/I flow in future developments. Peak daily and instantaneous flows were adjusted using peaking factors obtain in Viessman &Hammer[3]. Maximum daily flow was assumed equal to 225% of the ADDWF and the peak instantaneous flow was set to 300% of the ADDWF.

**Table 3-8 – Future Wastewater Treatment Plant Flow Projections**

| Flow Condition | Current flows (mgd) *(Table 3-6)* | 2028 Added EDUs | Flow per EDU (gpd) | Flow Added (mgd) *(2x3)* | Future I/I Flow (mgd) *(Table 3-7)* | Added 2028 Flow (mgd) *(4+5)* | Projected 2028 Flow (mgd) *(1+6)* |
|---|---|---|---|---|---|---|---|
| *Column* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
| ADF | 0.50 | 2452.5 | 140.3 | 0.34 | --- | 0.34 | 0.85 |
| ADDWF | 0.42 | 2452.5 | 117.2 | 0.29 | --- | 0.29 | 0.71 |
| ADWWF | 0.59 | 2452.5 | 117.2 | 0.29 | 0.18 | 0.47 | 1.06 |
| MMDWF | 0.49 | 2452.5 | 140.6 | 0.34 | --- | 0.34 | 0.84 |
| MMWWF | 0.67 | 2452.5 | 140.6 | 0.34 | 0.24 | 0.58 | 1.25 |
| PDF | 1.51 | 2452.5 | 263.7 | 0.65 | 0.35 | 1.00 | 2.51 |
| PIF | 2.11 | 2452.5 | 351.6 | 0.87 | 0.71 | 1.58 | 3.69 |

**Table 3-9 – Future City of Depoe Bay Flow Projections**

| Flow Condition | Current flows (mgd) *(Table 3-6)* | 2028 Added EDUs | Flow per EDU (gpd) | Flow Added (mgd) *(2x3)* | Future I/I Flow (mgd) *(Table 3-7)* | Added 2028 Flow (mgd) *(4+5)* | Projected 2028 Flow (mgd) *(1+6)* |
|---|---|---|---|---|---|---|---|
| *Column* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
| ADDWF | 0.17 | 1316.5 | 120.8 | 0.16 | --- | 0.16 | 0.33 |
| ADWWF | 0.33 | 1316.5 | 120.8 | 0.16 | 0.09 | 0.25 | 0.58 |
| MMDWF | 0.21 | 1316.5 | 145.0 | 0.19 | --- | 0.19 | 0.40 |
| MMWWF | 0.37 | 1316.5 | 145.0 | 0.19 | 0.12 | 0.31 | 0.68 |
| PDF | 0.83 | 1316.5 | 271.8 | 0.36 | 0.18 | 0.54 | 1.37 |
| PIF | 1.00 | 1316.5 | 362.4 | 0.48 | 0.37 | 0.85 | 1.85 |

**Table 3-10 – Future Gleneden Sanitary District Flow Projections**

| Flow Condition | Current flows (mgd) *(Table 3-6)* | 2028 Added EDUs | Flow per EDU (gpd) | Flow Added (mgd) *(2x3)* | Future I/I Flow (mgd) *(Table 3-7)* | Added 2028 Flow (mgd) *(4+5)* | Projected 2028 Flow (mgd) *(1+6)* |
|---|---|---|---|---|---|---|---|
| *Column* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
| ADDWF | 0.24 | 1136.00 | 114.70 | 0.13 | --- | 0.13 | 0.38 |
| ADWWF | 0.26 | 1136.00 | 114.70 | 0.13 | 0.08 | 0.22 | 0.47 |
| MMDWF | 0.29 | 1136.00 | 137.60 | 0.16 | --- | 0.16 | 0.44 |
| MMWWF | 0.30 | 1136.00 | 137.60 | 0.16 | 0.11 | 0.27 | 0.57 |
| PDF | 0.68 | 1136.00 | 258.00 | 0.29 | 0.17 | 0.46 | 1.14 |
| PIF | 1.11 | 1136.00 | 344.00 | 0.39 | 0.34 | 0.73 | 1.84 |

.82 0.39 1.2 = 840gpm
=1,016gpm

[3] *Water Supply and Pollution Control*, Warren Viessman & Mark Hammer, 1998. (Table 4.8)

## Projected Wastewater Composition

Biological and solids wastewater loads are independent of infiltration and inflow. To project wastewater composition, per EDU organic loadings were multiplied by the projected number of EDUs. These projected wastewater loads are shown in Table 3-11.

**Table 3-11 – Projected Wastewater Composition**

| Project Load | Unit Loading (lbs/day) | | EDU | 2028 Load (lbs/day) |
|---|---|---|---|---|
| | Per EDU | Per Capita | | |
| *BOD5 Loading* | | | | |
| Average Wet-Weather | 0.24 | 0.14 | 6,184 | 1,498 |
| Average Dry-Weather | 0.29 | 0.17 | 6,184 | 1,795 |
| Maximum Month | 0.40 | 0.24 | 6,184 | 2,487 |
| *TSS Loading* | | | | |
| Average Wet-Weather | 0.20 | 0.12 | 6,184 | 1,215 |
| Average Dry-Weather | 0.22 | 0.13 | 6,184 | 1,353 |
| Maximum Month | 0.32 | 0.19 | 6,184 | 1,982 |

## 3.6 Infiltration/Inflow Estimates

Infiltration and inflow (I/I) represents the most significant contributor to high flows within the City of Depoe Bay's wastewater system. Although I/I are of a concern, the focus of this planning effort is to provide for adequate sizing of facilities under existing I/I conditions and not necessarily to eliminate the current amount of I/I in the system. Figure 3-8 shows the daily WWTP flows and daily rainfall totals from January 2005 through November 2008.

Nearly all coastal communities in Oregon struggle with the issue of infiltration and inflow (I&I) within their wastewater collection system. Infiltration and inflow are defined as follows:

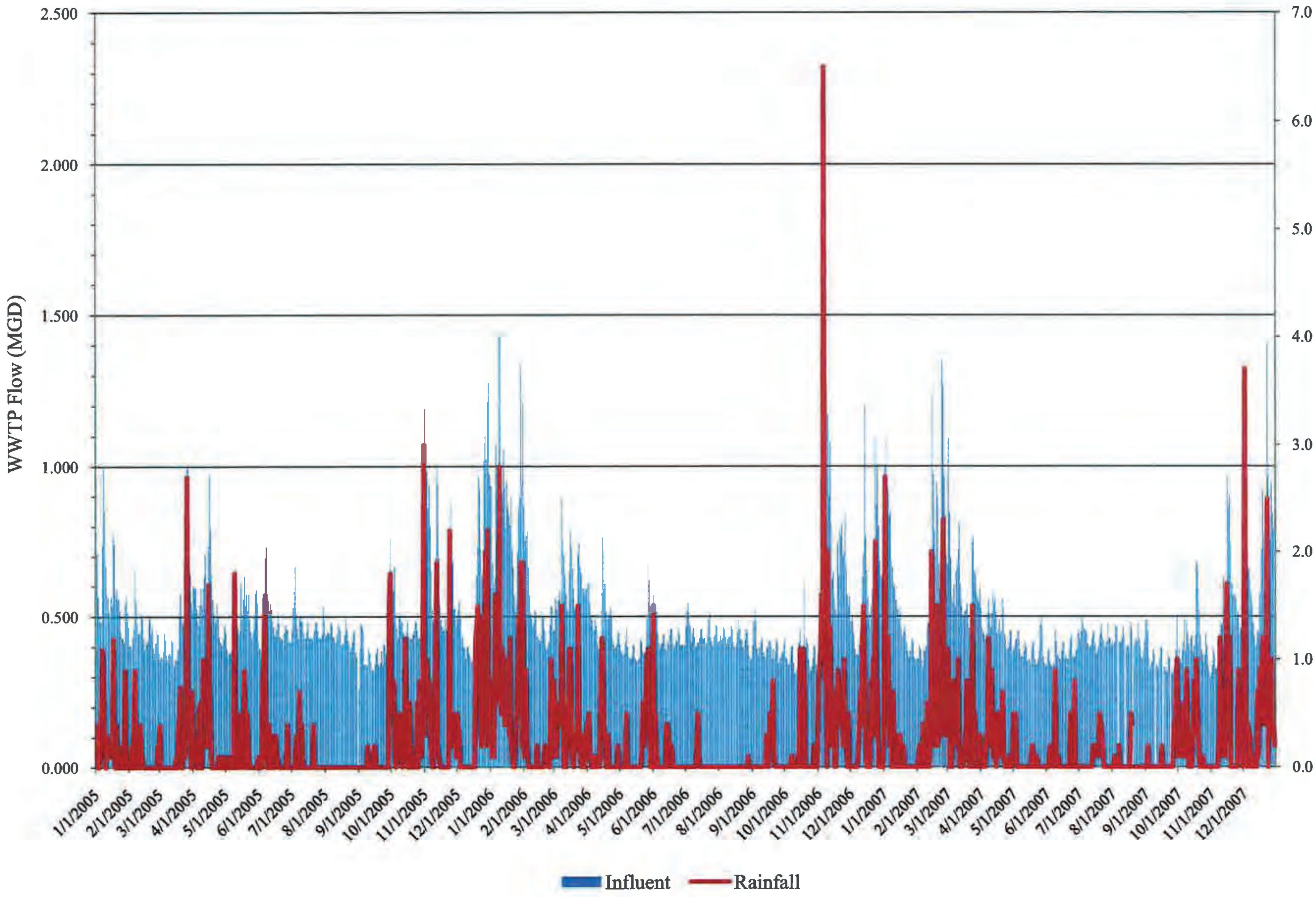
> Infiltration: Flows that enter the collection system through underground paths. Infiltration can be caused by high groundwater levels, rain-induced groundwater, leaky water and storm drain systems, and other sources. Infiltration flows make their way into the collection system through cracks in pipe, open or offset pipe joints, broken piping sections, leaks in manholes, and other below ground openings in system.

> Inflow: Flows that enter the collection system through above ground paths. Inflow is often related to building downspouts being connected to sanitary sewer service laterals, interconnections with storm drain systems that have not been severed, water flowing over manholes and entering in through the openings in the lids, catch basins or area drains being connected to the sewer system, and other surface water sources.

### Estimation of Total Infiltration and Inflow

When combined I/I can result in tremendous increases in flow during the winter and particularly during storm events.

**Figure 3-8 –Daily WWTP Flows vs. Rainfall for January 2005 – December 2007**



Current I/I levels can be approximated using the following equations:

| | | |
|---|---|---|
| Average I/I | = | ADWWF – ADDWF |
| Max. Month I/I | = | MMWWF – ADDWF |
| PDF I/I | = | PDF – ADDWF |
| PIF I/I | = | PIF - ADDWF |

Using the design flow conditions listed in Table 3-6, the I/I estimates for GSD, Depoe Bay, and the overall system are presented in the following table:

**Table 3-12 – Estimated I/I**

| | WWTP | GSD | Depoe Bay |
|---|---|---|---|
| Average. I/I (mgd) | 0.170 | 0.013 | 0.157 |
| Maximum Month I/I (mgd) | 0.251 | 0.054 | 0.197 |
| Peak Day I/I (mgd) | 1.094 | 0.435 | 0.659 |
| PIF I/I (mgd) | 1.691 | 0.865 | 0.826 |

## EPA "Non-Excessive" I/I Criteria

The Environmental Protection Agency (EPA) has developed a system to determine if a community has "non-excessive" I/I levels within their wastewater system. The EPA method requires that the system be analyzed under differing and extreme conditions then compared against an established benchmark to determine if the I/I levels are significant. The benchmarks established by EPA for non-excessive I/I are as follows:

EPA Criteria for Infiltration..............................120 gpcd
EPA Criteria for Inflow....................................275 gpcd

### Infiltration Analysis

The EPA requires that infiltration is analyzed by reviewing DMR and flow records for periods when the groundwater table is high (January through April), but there is no active rainfall. The rationale behind this method assumes that during these periods the flows are higher due to the elevated groundwater table and not active rainfall. Therefore, the increased flow is solely a result of infiltration into the system. It should be noted that this method does not include rain induced infiltration.

A summary of the non-excessive infiltration analysis is provided in Table 3-13. Sixteen 7-day periods between January and April (2005-2008) were examined. Each period had little or no rainfall occurred during the week or within the few days prior to the period. The 7-day averages within the period were calculated and divided by population to determine the per capita flow. It was determined that the average flow during these periods was 69 gpcd, which is well under the EPA's limit for non-excessive infiltration.

**Table 3-13 – Non-Excessive Infiltration Analysis**

| Dry Period | Total Rainfall (in) | 7-Day Average Flow | |
|---|---|---|---|
| | | MDG | GPCD |
| 1/22/2005 - 1/29/2005 | 0.40 | 0.481 | 78 |
| 2/21/2005 - 2/27/2005 | 0.20 | 0.428 | 71 |
| 3/2/2005 - 3/8/2005 | 0.00 | 0.388 | 63 |
| 3/9/2005 - 3/15/2005 | 0.00 | 0.380 | 62 |
| 4/20/2005 - 4/26/2005 | 0.10 | 0.482 | 79 |
| 12/4/2005 - 12/10/2005 | 0.00 | 0.417 | 68 |
| 2/7/2006 - 2/13/2006 | 0.20 | 0.488 | 78 |
| 2/14/2006 - 2/20/2006 | 0.20 | 0.453 | 72 |
| 4/22/2006 - 4/28/2006 | 0.00 | 0.437 | 70 |
| 12/1/2006 - 12/7/2006 | 0.00 | 0.434 | 70 |
| 1/20/2007 - 1/26/2007 | 0.00 | 0.407 | 64 |
| 1/27/2006 - 2/2/2007 | 0.10 | 0.377 | 59 |
| 1/23/2007 - 1/29/2007 | 0.00 | 0.390 | 62 |
| 4/23/2007 - 4/29/2007 | 0.10 | 0.423 | 67 |
| 2/13/2008 - 2/19/2008 | 0.20 | 0.497 | 77 |
| 2/22/2008 - 2/28/2008 | 0.20 | 0.391 | 60 |
| **Average** | | | **68** |
| EPA Criteria | | | 120 |

A similar analysis was performed to determine non-excessive infiltration in the individual collection systems of Depoe Bay and GSD. Only two of the dry periods listed in Table 3-13 could be used in the analysis due to the faulty meter Fogerty Creek that was replaced in September 2007. As Table 3-14 shows, the 7-day average per capita flow in Depoe Bay and GSD was 162 gpcd and 43 gpcd, respectively.

**Table 3-14 – Non-Excessive Infiltration Analysis for Depoe Bay & GSD Systems**

| Dry Period | Depoe Bay 7-Day Average Flow | | GSD 7-Day Average Flow | |
|---|---|---|---|---|
| | MDG | GPCD | MDG | GPCD |
| 2/13/2008 - 2/19/2008 | 0.25 | 181 | 0.25 | 77 |
| 2/22/2008 - 2/28/2008 | 0.20 | 143 | 0.91 | 60 |
| **Average** | | **162** | | **43** |
| EPA Criteria | | 120 | | 120 |

## Inflow Analysis

Inflow conditions were analyzed based on largest rain events and the corresponding flows that occurred during the data set (Table 3-15). It is assumed that an intense rain event makes it way quickly into the collection system through inflow points or through rain-induced infiltration. The average inflow condition for the entire system was calculated at 175 gpcd, which is also well below the EPA criteria for non-excessive inflow. Table 3-15 also includes available data for inflow conditions in the Depoe Bay and GSD collection systems, which estimated inflow conditions at 463 gpcd and 103 gpcd, respectively.

**Table 3-15 – Non-Excessive Inflow Analysis**

| Storm Event | Rainfall | Total System Flows | | Depoe Bay Flows | | GSD Flows | |
|---|---|---|---|---|---|---|---|
| | | MGD | gpcd | MGD | gpcd | MGD | gpcd |
| 12/7/2004 | 1.70 | 0.937 | 156 | | | | |
| 12/31/2004 | 1.50 | 0.895 | 149 | | | | |
| 3/26/2005 | 2.70 | 0.995 | 162 | | | | |
| 12/20/2005 | 1.50 | 0.732 | 119 | | | | |
| 12/29/2005 | 2.20 | 1.213 | 198 | | | | |
| 1/9/2006 | 2.80 | 1.449 | 232 | | | | |
| 1/29/2006 | 1.90 | 1.338 | 214 | | | | |
| 3/8/2006 | 1.50 | 0.894 | 143 | | | | |
| 12/24/2006 | 2.10 | 1.090 | 175 | | | | |
| 1/2/2007 | 2.70 | 0.998 | 157 | | | | |
| 2/15/2007 | 1.80 | 1.234 | 194 | | | | |
| 2/19/2007 | 1.50 | 0.945 | 149 | | | | |
| 2/24/2007 | 1.60 | 1.348 | 212 | | | | |
| 12/23/2007 | 2.50 | 1.412 | 222 | 0.769 | 568 | 0.643 | 129 |
| 1/30/2008 | 1.60 | 0.893 | 138 | 0.495 | 358 | 0.398 | 78 |
| **Average** | | | **175** | | **463** | | **103** |
| EPA Criteria | | | 275 | | 275 | | 275 |

Neither infiltration nor inflow conditions in the overall collection system exceeds the EPA non-excessive criteria. However, when Depoe Bay's and GSD's individual systems are analyzed separately there appears to be significantly more both infiltration and inflow in the Depoe Bay's system.

It should be noted that the currently available data for GSD and Depoe Bay are insufficient to a draw conclusive determination of the current level of I/I in either system. The existing data not only indicates that Depoe Bay has a significantly high rate of I/I, but also that there is virtually no I/I in the GSD system. This second conclusion is extremely suspect due to the high level of I/I experienced in nearly all coastal communities. Furthermore, the GSD's 2004 *Wastewater Collection Sanitary Plan* noted that a significant I/I problem existed in the district's collection system, noting that in some basins the wet-weather flows were ten times higher than average daily flows.

It is beyond the scope of this Mater Plan to fully detail the I/I problems existing in the Depoe Bay system or accurately project the contribution of I/I from GDS. The City should consider performing an I/I Survey to identify the basins that contribute the most I/I to the system and develop cost-effective alternatives to try to reduce I/I.

**CITY OF DEPOE BAY**

**Wastewater Master Plan Update**

# SECTION 4:

## BASIS OF PLANNING

# SECTION 4
# BASIS OF PLANNING

All planning and recommendations must be founded on established and accepted principals and methodologies. This section shall establish the methods and principals that will be utilized to prepare and analyze improvement alternatives as well as make final recommendations for improvements.

## 4.1 Basis for Design

Design criteria for future conveyance system expansions are based on topography, available undeveloped land, the existing UGB, and estimated future flows discussed in Section 2. Treatment planning must take into account existing and projected flows and loads, as well as regulatory requirements. General design considerations incorporated in the development and evaluation of alternatives in Section 5 are discussed below.

Sizing of both wastewater treatment facilities and conveyance system components is dominated by growth factors as well as inflow and infiltration (I/I) flows. It is critical to size both treatment facilities and the conveyance system for large winter flows in order to minimize overflows. Guidance documents published by the Oregon DEQ have been utilized in sizing recommendations presented in this Plan.

### Regulatory Requirements

The City of Depoe Bay operates its wastewater system under the jurisdiction of the Oregon Department of Environmental Quality, with a National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit.

The NPEDES permit allows the City to discharge effluent from the existing wastewater treatment plant to the Pacific Ocean. Effluent limitations specified in the permit are expected to approximate the design requirements for new wastewater treatment facilities recommended in this Plan.

### Effluent Quality

Effluent quality requirements identified in the NPDES permit include mass load limits for two separate six-month periods of the year. The wet season (November 1 through April 30) allows significantly higher $BOD_5$ and TSS mass loads to be discharged than during the dry season (May 1 through October 31). The permit specifies limits for *E.coli* bacteria and pH which apply year-round. A copy of the NPDES permit and permit evaluation is included in the appendix. The City also is required to provide notification of the cause and estimation of the flow associated with any sewage bypass or overflow, record all applicable equipment breakdowns, and report the method of sludge disposal.

## 4.2 Design Capacity of Conveyance System and Wastewater Treatment Plant

One of the primary objectives in facilities design is related to properly sizing facilities for proper service through the design period. The design period must be long enough to ensure the new facilities will be adequate for future needs but short enough to ensure that the facilities are effectively utilized within their economic and practical life.

The improvement plan for sizing wastewater treatment plant and pump stations serving the properties within the UGB will be based on a design period of 20 years. Collection system planning for piping and conduit will be based on ultimate buildout within the current UGB with considerations for existing and anticipated levels of I/I. If the UGB is expanded within the planning period, additional planning and analysis will be required for the areas that may be annexed.

### Gravity Sewer Systems

Gravity collection systems should be designed considering natural ground slope, subsurface conditions, capacity requirements, minimum slope considerations, minimum flow velocities required to maintain solids suspension, and potential sulfide and odor generation. Whenever possible, gravity collection systems should be utilized for wastewater service rather than systems that require a pump station.

Collection systems should be designed for the ultimate build-out of a sewer basin, taking into account zoning and UGB limitations. This will ensure that the piping is adequate for practically any type and amount of development that may occur within the basin.

The minimum diameter of sewers should be 8-inches. Smaller sewers are difficult to clean or maintain using modern cleaning, TV-inspection, and require equipment. Pipe diameter sizing should be based on anticipated flows and master planning, not minimum slope considerations.

Manholes should be spaced no more than 500 feet apart for sewer up to 24-inches in diameter. Manholes should be spaced no more than 500 feet apart for sewers up to 24-inches in diameter. Manholes should also be constructed where sewer alignment, slope, or pipe size changes occur. To facilitate self cleaning, a drop or elevation change should occur from the inlet side of the manhole to the outlet and should be required to be incorporated into the manhole base. Flow channels in manholes should include a minimum 0.1-foot drop when the flow is straight through the manhole. If a manhole is constructed with a channel where the flow direction changes by 90-degrees with piping of the same size, the channel should include a base with a drop of 0.2-feet between the inlet and outlet piping runs.

Manholes should have a minimum inside diameter of 48-inches at the bottom and have a standard 23-inch manhole access opening and lid. Manholes located in areas where standing water is common should be constructed with a water tight frame and lid to reduce the inflow into the manhole. Flat top manholes should be utilized for all manhole installations under 6-feet. Otherwise, standard eccentric cone type manholes should be used.

Manholes with pipes entering the manhole with inverts two feet or more above bottom of the manhole should be designed as a drop manhole. An outside drop manhole should be used for all inlets that are 4-inches in diameter or greater.

Minimum pipe slopes are established to ensure that flow velocities are high enough to provide a self cleaning action for the gravity piping sections. Current conventional design practice recommends that a minimum velocity of two feet per second (fps) be achieved regardless of pipe size to maintain a self-cleaning action in sanitary sewers. It is desirable to have a velocity of 3 fps or more whenever topography and existing conditions allow. Minimum pipe slope for service laterals should be 2%.

Standard methods of determining the slope for self-cleaning velocities are based on pipe flowing at least half-full. Where flows are expected to be less than half-full and adequate grade (topography) exists, a slope should be used that will provide velocities of three fps for full or half full pipes. In general, minimum pipe slopes should be established based on the information in Table 4-1.

**Table 4-1 – Recommended Slopes for Gravity Sewers (ft/ft)**
**(Based on Manning's 'n' of 0.013)**

| Nominal Pipe Diameter (in) | Minimum Slope (2fps) | Recommended Slope (3 fps) |
|---|---|---|
| 4 | 0.0200 | 0.02 |
| 6 | 0.0060 | 0.0110 |
| 8 | 0.0040 | 0.0075 |
| 10 | 0.0028 | 0.0056 |
| 12 | 0.0022 | 0.0044 |
| 14 | 0.0016 | 0.0035 |
| 15 | 0.0015 | 0.0033 |
| 16 | 0.0014 | 0.003 |
| 18 | 0.0012 | 0.0026 |
| 24 | 0.0008 | 0.0018 |
| 27 | 0.0007 | 0.0015 |
| 30 | 0.0006 | 0.0013 |

In addition to correct sizing of the force mains based around proper cleansing velocities, the number of high points should be kept to a minimum as these will create a point for air and other gases to be trapped. Trapped gases can reduce a pipe's capacity or cause a piping system to be become plugged. Typically, a designer should include a means of releasing trapped air at high points through the use of a combination air/vacuum release valve. If it is determined that velocities are high enough o keep entrained air moving, air release systems may not be required.

Detention times in force mains should also be studied to ensure that sanitary fluids do not reside within the piping too long. If so, high levels of hydrogen sulfide and other gases can form in the sewer causing odor issues and other problems. This problem can be reduced by injecting air directly into the force main. The oxygen rich air will prevent the degradation of the sewage and the formation of the undesirable gases. Generally, if detention times in the force main exceed 35 minutes, an air injection system should be included.

### Pump Stations

The correct design of pump stations is an important and critical element of any sanitary sewer collection system. Pump stations should be designed to hand the peak flows experienced by the system without bypassing or overflowing. The pump station should also be designed so as not to increase the total sulfide generation potential of the collection system.

Pumps should be sized so that the station can handle the peak hourly flow rates with the largest pump in the station off line. Station should be configured around duplex, triplex or greater and consider all flow ranges when sizing the pumps and combinations of pumps in operation at any one time.

Pump stations should have provisions for redundant power generation equipment. This can be accomplished through a standby generation system housed at the station or through the use of trailer-mounted portable generator and manual transfer switch gear. Power outages frequency and duration must be considered in pump station design to ensure that overflows do not occur due to power outages.

Proper level controls and alarms capable of autodial should be included in each pump station. Redundant high wetwell level sensors or floats should be included as a backup to the regular level sensors.

Designs for pump stations should meet the latest DEQ requirements for pump station design and construction.

### Wastewater Treatment Plant Facilities

Future wastewater flows and loads provide the basis for future liquid treatment process design for wastewater treatment plants. The anticipated facility needs, design basis, and reliability and redundancy requirements for each component of the liquid treatment process for the City of Depoe Bay wastewater treatment plan are summarized in Table 4-2.

**Table 4-2 – Summary of Unit Process Components and Design Capacities**

| Unit Process | Design Basis | Condition of Need |
|---|---|---|
| Influent Pumping | PIF | Firm capacity with largest unit out of service |
| Influent Screening | PIF | Firm capacity with one unit out of service |
| Aeration Basins | Peak Day | Total capacity |
| Clarification | Peak Day | Total capacity |
| Disinfection | PIF | Firm capacity |

## 4.3 Basis for Cost Estimate

### Construction Costs

Construction costs are estimated using a combination of engineering experience with similar past projects, materials cost data provided by equipment suppliers, and material and labor cost estimates and indexes published by such sources as the Engineering News Record and others.

Whenever possible, existing as-build drawings were studied to determine the scope of work required for constructing and implementing improvements to existing facilities. When appropriate, preliminary layouts were developed and utilized when preparing construction costs estimates.

Future changes in the cost of labor, equipment and materials will justify comparable changes in the cost estimates provide in this Plan. For this reason, common engineering practice is to tie planning costs estimates to a construction index which is updated regularly in response to changes in the economy and the construction marketplace.

The Engineering News Record (ENR) construction cost index is the most commonly used for engineering planning and estimating purposes. The ENR index is based on a beginning value of 100 established in the year 1913. Average yearly values for the past 18 years are summarized below in Table 4-3.

**Table 4-3 - ENR Index 1990 to 2008**

| YEAR | INDEX | % CHANGE/YR |
|---|---|---|
| 1990 | 4732 | 2.54% |
| 1991 | 4835 | 2.18% |
| 1992 | 4985 | 3.10% |
| 1993 | 5210 | 4.51% |
| 1994 | 5408 | 3.80% |
| 1995 | 5471 | 1.16% |
| 1996 | 5620 | 2.72% |
| 1997 | 5826 | 3.67% |
| 1998 | 5920 | 1.61% |
| 1999 | 6059 | 2.35% |
| 2000 | 6221 | 2.67% |
| 2001 | 6343 | 1.96% |
| 2002 | 6538 | 3.07% |
| 2003 | 6694 | 2.39% |
| 2004 | 7115 | 6.29% |
| 2005 | 7446 | 4.65% |
| 2006 | 7751 | 4.10% |
| 2007 | 7967 | 2.78% |
| 2008 (avg. Jan. to Jul.) | 8293 | 4.09% |
| | **Average Annual Change =** | **3.14%** |

Cost estimates prepared in this plan are based on the 2008 index (averaged January through July). Future costs should be compared to a baseline ENR Index value of 8,293.

If specific ENR index figures are not available, the historical ENR growth pattern has been around 3% per year.

## Contingencies

Contingencies are a prudent inclusion in planning cost estimates to account for unforeseen circumstances that may increase costs. For the purposes of this planning document and preliminary cost estimates provided, a contingency amount equal to 20% of the estimated cost is used. After design work is completed for a project and updated construction cost estimated are completed, contingency is typically reduced to 10% for estimated used immediately prior to construction.

## Engineering

Engineering costs include preliminary design, surveying, design, construction management, and inspection services provided by a consulting engineering firm. Engineering costs estimates range from approximately 25% of the estimated construction costs for small projects to 15% of construction costs for larger projects. For the planning purposes in this Plan, an average engineering cost equal to 20% of estimated construction cost is used.

## Legal and Administrative

Legal and administrative costs include such items as legal counsel require of contracts and contract documents, cost related to obtaining and recording easements and permits, costs of grant and/or loan administration, additional city administration expenses occurring during a project, and other miscellaneous legal and administrative costs. A cost equal to 5% of the estimated construction cost is used for the estimates in this Plan.

# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# SECTION 5:

## EXISTING SYSTEM

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 5
# EXISTING SYSTEM

The purpose of this section is to detail the existing wastewater system. In addition to the system description, this section will analyze the condition and capacity of existing system components.

Depoe Bay's gravity collection system piping and pumping systems have been identified in previous facilities plans. HBH has used these plans as the basis to develop a comprehensive map of the City's wastewater collection system (Figure 5-1). City staff have provided information on system improvements that have been constructed since the previous Facility Plan (1999) and these improvements are also included in the system map.

## 5.1 Gravity Collection System

The gravity collection system conveys wastewater from the City of Depoe Bay and the Gleneden Sanitary District (GSD) to the City's wastewater treatment plant (WWTP) located off of South Point Street, east of Highway 101. Most of the City's collection system was constructed in 1974. Over 65% of the system piping is asbestos cement (AC). AC lines tend to leak at joints as the material ages, which may be contributing to I/I problems in the City. An analysis of the GSD collection system is not within the scope of this study, although it should be noted that the general condition of their system is important to the overall amount of inflow and infiltration coming into the City's WWTP.

A condensed collection system analysis was performed as part of the scope of this Plan. This analysis focuses on the primary sewer mains, such as those carrying flows from Gleneden Beach. Main lines where development is expected to occur, or where existing problems have been identified, were also included in this analysis. Capacity analysis of the collection system consisted of verifying that pipe sections were capable of carrying flows for the 20-year design period. Maximum capacity flows were determined by use of Manning's equation:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

Where:

$Q$ = flow (cfs)
$n$ = roughness coefficient = 0.015
$A$ = pipe area (square feet)
$R$ = hydraulic radius (feet) = 1/4 pipe diameter for full pipe
$S$ = slope (feet/feet)

Information on pipe slopes, diameters, materials, and lengths have been provided by the City. This data was used in conjunction with information pertaining to existing and future developments and flow calculations to identify capacity issues. Pipe sections analyzed were generally identical to those assessed in the City's 1995 Wastewater Master Plan.

The results of the collection system analysis are presented in Table 5-1. Lines that have insufficient capacity are in bolded text. As shown in this table, all sections of pipe analyzed have sufficient capacity for existing PIF flows. However, seven of these sections will become insufficient within the 20-year planning period. A capital improvement plan for the collection system is developed in Section 6 of this Plan.

**Table 5-1 – Critical Pipe Section Capacity Analysis for 20-YearPeriod**

| Pipe | | | | Existing System[1] | | 20-Year System | |
|---|---|---|---|---|---|---|---|
| From MH | To MH | Size | Capacity (gpm) | EDU | Flow (gpm) | EDU | Flow (gpm)[2] |
| **42** | 41 | 15 | **1,155** | 2,135 | 771 | 3,333 | **1,278** |
| **33** | 32 | 15 | **1,245** | 2,433 | 873 | 4,316 | **2,496** |
| **22A** | 22 | 15 | **1,130** | 2,546 | 952 | 4,504 | **2,626** |
| 107 | 106 | 8 | 298 | 135.5 | 66 | 190 | 89 |
| **16** | 15 | 15 | **1,865** | 2,961 | 1,144 | 5,174 | **2,903** |
| **9** | 8 | 15 | **1,995** | 3,111 | 1,212 | 5,506 | **2,993** |
| **2** | 1 | 18 | **2,109** | 3,182 | 1,242 | 5,697 | **3,048** |
| 44 | 1 | 8 | 298 | 67 | 33 | 87 | 46 |
| B1 | B | 8 | 299 | 329 | 160 | 389 | 249 |
| **1A** | 1 | 18 | **2,292** | 3,249 | 1,275 | 5,784 | **3,094** |

## 5.2 Lift Stations

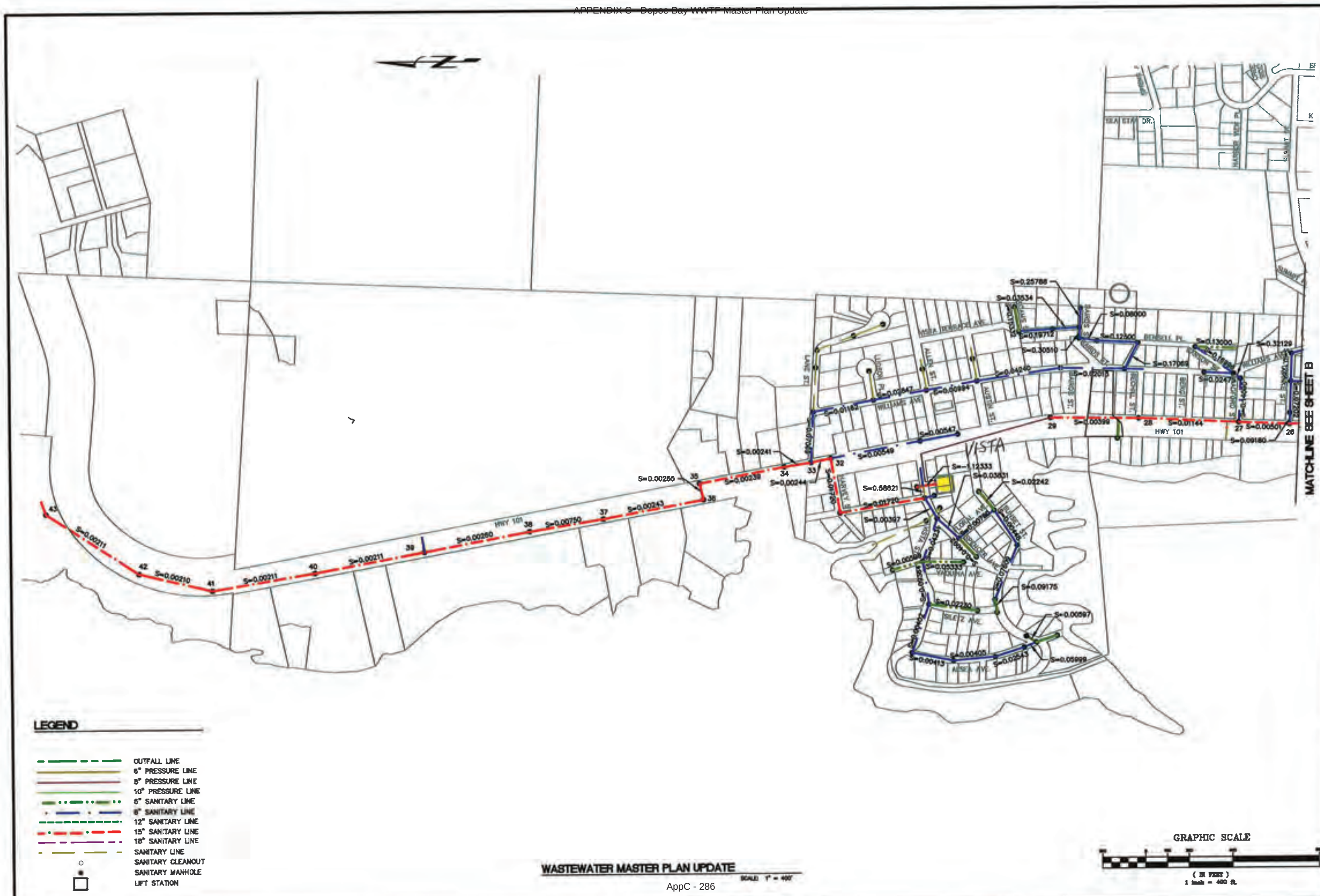
### Vista Street Lift Station

The Vista Street lift station is located on Vista Street west of Highway 101. The lift station transports flows generated north of Pirate Cove. A large portion of these flows include flows from GSD.

In 2001, this lift station was modified from a wet pit/dry pit type of configuration into a submersible duplex design with a non-clog centrifugal pump rated at 1,200 gpm with 69 feet of total dynamic head. The station has a 50 kW diesel engine backup generator which has a fuel tank capacity for 48 hours of operation. The existing 8-inch PVC forcemain extends 850 feet before discharging into Manhole No. 29 located on Highway 101.

Flows conveyed to the lift station are difficult to estimate because there are no flow meters for the pumps, however elapse run time meters can be used to estimate flows. City staff report that the pumps at the Vista Street lift station have a combined run time of 2 hours for average daily flows and 12 hours during peak flows. Based on pump capacity of 1200 gpm, average flow conveyed by the station is 0.144 MGD. The estimated peak flow 864,000 gpd, or approximately 41% of total flows.

Table 5-2 provides specifications on the Vista lift station.



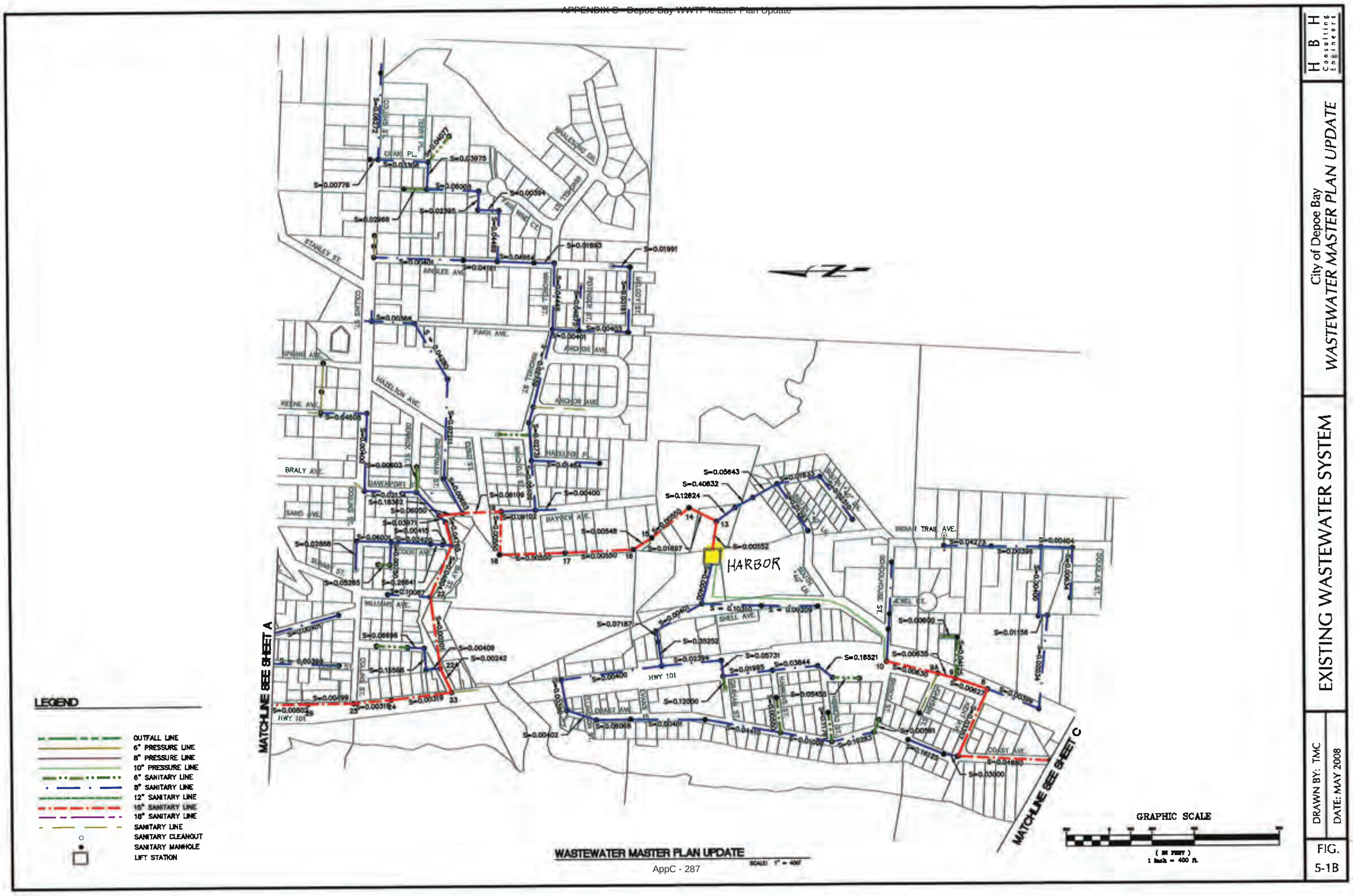

H B H Consulting Engineers

City of Depoe Bay
*WASTEWATER MASTER PLAN UPDATE*

EXISTING WASTEWATER SYSTEM

DRAWN BY: TMC
DATE: MAY 2008

FIG. 5-1A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WASTEWATER MASTER PLAN UPDATE
EXISTING WASTEWATER SYSTEM
DRAWN BY: TMC
DATE: MAY 2008
FIG. 5-1B
LEGEND
OUTFALL LINE
6" PRESSURE LINE
8" PRESSURE LINE
10" PRESSURE LINE
6" SANITARY LINE
8" SANITARY LINE
12" SANITARY LINE
15" SANITARY LINE
18" SANITARY LINE
SANITARY LINE
SANITARY CLEANOUT
SANITARY MANHOLE
LIFT STATION
MATCHLINE SEE SHEET A
MATCHLINE SEE SHEET C
HARBOR
GRAPHIC SCALE
WASTEWATER MASTER PLAN UPDATE

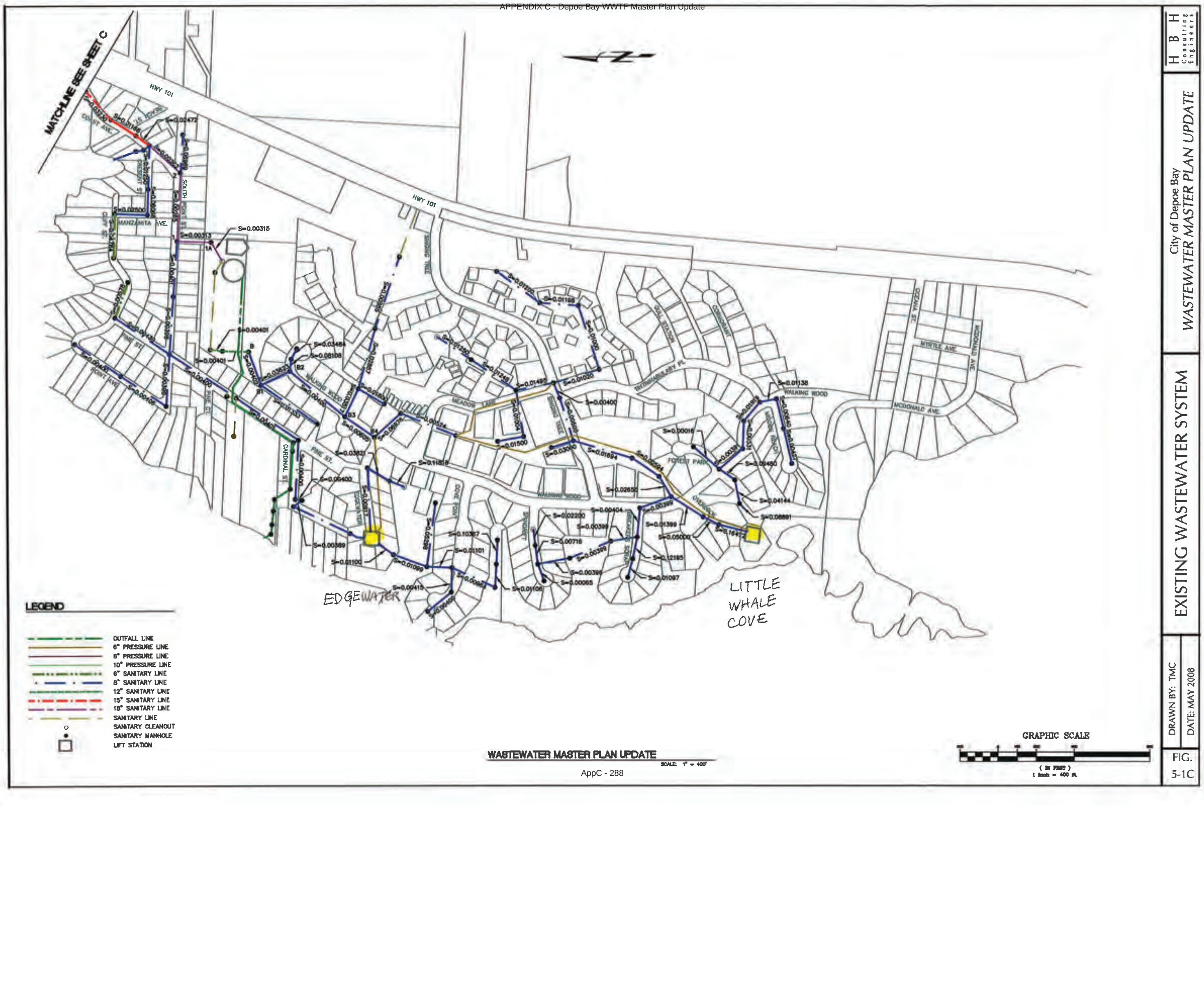

MATCHLINE SEE SHEET C
HWY 101
HWY 101
N
EDGEWATER
LITTLE
WHALE
COVE
LEGEND
OUTFALL LINE
6" PRESSURE LINE
8" PRESSURE LINE
10" PRESSURE LINE
6" SANITARY LINE
8" SANITARY LINE
12" SANITARY LINE
15" SANITARY LINE
18" SANITARY LINE
SANITARY LINE
SANITARY CLEANOUT
SANITARY MANHOLE
LIFT STATION
WASTEWATER MASTER PLAN UPDATE
SCALE: 1" = 400'
GRAPHIC SCALE
( IN FEET )
1 inch = 400 ft.
H B H
Consulting
Engineers
City of Depoe Bay
WASTEWATER MASTER PLAN UPDATE
EXISTING WASTEWATER SYSTEM
DRAWN BY: TMC
DATE: MAY 2008
FIG.
5-1C

**Table 5-2 – Vista Street Lift Station Specifications**

| | |
|---|---|
| Pump type | Submersible, Non-Clog Centrifugal |
| Pump Manufacturer/Model | Hydromatic S6LX |
| Maximum Capacity | 1,200 GPM |
| Total Dynamic Head | 69 |
| Pump Motor Size | 40 HP |
| RPM | 1750 |
| Discharge Point | Manhole 29 |
| Overflow Point | Pirate Cove |
| Auxiliary Power Type | 50kW Diesel Generator |
| Pressure Line Diameter/Length | 8-inch/850 feet |

There is a large potential for future growth in the area served by the Vista Street lift station. This station is expected to transport approximately 65% of the future flows. This equates to roughly 2.40 MGD (1,665) gpm during instantaneous peak flows by 2028.

## Harbor Lift Station

The Harbor lift station is located in a parking lot off Shell Avenue near the bay. In 2001, this lift station was also modified from a wet pit/dry pit type of configuration into a submersible duplex design with a non-clog centrifugal pump with variable frequency drive (VFD). The lift station transports flows generated north of the bay.

The lift station has a firm capacity of 1,800 gpm with 125 feet of total dynamic head. The station has a 125 kW diesel engine backup generator which has a fuel tank capacity for 48 hours of operation. The existing force main is a 10-inch PVC pipeline that runs 1,220 feet before discharging into Manhole No. 10 at the intersection of Highway 101 and Shell Avenue.

The table below provides specifications on the Harbor pump station.

**Table 5-3 – Harbor Lift Station Specifications**

| | |
|---|---|
| Pump type | Submersible Non-Clog Centrifugal w/ VFD |
| Pump Manufacturer/Model | Hydromatic S8LX |
| Maximum Capacity | 1,800 GPM |
| Total Dynamic Head | 125 |
| Pump Motor Size | 100 HP |
| RPM | 1750 |
| Discharge Point | Manhole 10 |
| Overflow Point | Depoe Bay |
| Auxiliary Power Type | Diesel Generator |
| Pressure Line Diameter/Length | 10-inch/1,220 feet |

During average daily flows, the station has a combined pump run time of 8 to 9 hours. This increases to 24-30 hours during peak flow conditions, indicating that both pumps are required to run during peak flow periods. Thus the firm capacity of the lift station is already exceeded by existing flow conditions. Flow estimates for Harbor lift station cannot be made based on runtimes because of the VFD on the pump motors.

During the next 20 years, instantaneous peak flow through this station is expected to increase to approximately 2,050 gpm, or approximately 80% of future wastewater flows.

## Little Whale Cove Lift Station

The Little Whale Cove (LWC) lift station is located at the south end of the Little Whale Cove Development and is responsible for pumping the majority of the wastewater in the development. The station was originally constructed 1977 and recently upgraded in 2008. Upgrades to the station included new pumps and new diesel generator. This station consists of two vacuum assisted pumps, each rated at 750 gpm (1.08 MGD) with 75 feet of total dynamic head. The existing 8-inch PVC forcemain pumps wastewater from the LWC lift station 1,780 feet to manhole B6, located near Meadow Lane.

The following table provides specifications on the LWC lift station.

**Table 5-4 – Little Whale Cove Lift Station Specifications**

| | |
|---|---|
| Pump type | Vacuum Assisted |
| Maximum Capacity | 750 GPM |
| Total Dynamic Head | 75 FT |
| Pump Motor Size | 15 HP |
| Discharge Point | Manhole B6 |
| Overflow Point | None |
| Auxiliary Power Type | 60 kW Diesel |
| Pressure Line Diameter/Length | 8-inch/1780 feet |

Operators estimate an average combined run time of 1 hour, with a peak time of 6 hours. Based on the pump capacity, the estimated average and peak flows conveyed by LWC lift station are 0.045MGD (31 gpm) and 0.27 MGD (188 gpm), respectively. Projected peak flows are expected to increase to 0.475 MGD (330 gpm). Therefore existing capacity of the station appears sufficient to meet existing and future peak demands.

## Edgewater Lift Station

This lift station is located at the end of Edgewater Street and also serves a portion of the Little Whale Cove development. The Edgewater lift station, however, only conveys wastewater collected from a small region in the southwest Little Whale Cove area. The station was originally constructed 1977 and upgraded in 2006 with two new submersible pumps. Each pump is rated at 175 gpm (0.25 MGD) with 28 feet of total dynamic head. The 8-inch PVC forcemain pumps wastewater from the Edgewater lift station 550 feet to manhole B4, located at the intersection of the streets Edgewater and Walking Woods.

Table 5-5 provides specifications on the LWC lift station.

**Table 5-5 – Edgewater Lift Station Specifications**

| | |
|---|---|
| Pump type | Submersible |
| Maximum Capacity | 175 GPM |
| Total Dynamic Head | 28 FT |
| Pump Motor Size | 3 HP |
| Discharge Point | Manhole B4 |
| Overflow Point | None |
| Auxiliary Power Type | None |
| Pressure Line Diameter/Length | 8-inch/550 feet |

Combined run times for the Edgewater lift station range from an average of 0.5 hours to a peak a 1 hour per day. Based on the pumps' operating capacity of 175 gpm, these run times correlate to an estimated average daily flow of 5,250 gpd (4 gpm) and a peak daily flow of 10,500 gpd (7 gpm). Projected average and daily flows at the station are 8,925 gpd (6 gpm) and 18,240 gpd (12 gpm), respectively.

## 5.3 Wastewater Treatment Plant

The City's original WWTP was constructed in 1974. This facility consisted of a single "donut" activated sludge, extended aeration treatment with secondary clarification and chlorine disinfection. Upgrades to the WWTP were made in 2001 based on recommendation in the City's 1999 *Wastewater System Improvements Pre-Design Report*. These improvements were necessary because a number of the individual unit processes were found to be deficient, which resulted in several Notices of Noncompliance (NON) due to the system's inability to treat and discharge wastewater effluent within the permit limitations.

The 2001 improvement project expanded the capacity of the existing facility by installing a duplicate treatment unit. In addition, the exiting unit was rehabilitated and new headworks, aeration systems, pumps, and UV disinfection system were installed. Although the upgrades resulted in a larger treatment capacity than required, it provided redundancy for each secondary process. Since the upgrades to the WWTP have been made, no new NON have occurred. No improvements have been made to the City's WWTP since the 2001 improvement project.

The existing liquid treatment process at the WWTP consists of a headworks, secondary treatment, disinfection, and effluent disposal. The existing solids treatment consists of an aerobic digester, storage, and land disposal. The WWTP capacity and effluent limit requirements are presented in Table 5-6 and Table 5-7, respectively.

**Table 5-6 – WWTP Capacity**

| Design Flow | Design Capacity[1] | Existing Demands | 2028 Projected Demands |
|---|---|---|---|
| Maximum Monthly Dry Weather Flow | 1.60 MGD | 0.49 MGD | 0.84 MGD |
| Maximum Monthly Wet Weather Flow | 1.60 MGD | 0.67 MGD | 1.25 MGD |
| Peak Day Flow | 3.20 MGD | 1.51 MGD | 2.51 MGD |
| Peak Instantaneous Flow | 4.80 MGD | 2.11 MGD | 3.69 MGD |
| $BOD_5$ | 2,670 lbs/day | 1,440 lbs/day | 2,490 lbs/day |
| Suspended Solids | 2,670 lbs/day | 1,150 lbs/day | 1,980 lbs/day |

[1] City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (G2a of 2)

**Table 5-7– WWTP Effluent Limits**

| | |
|---|---|
| Summer BOD/TSS | 20/20 mg/L |
| Winter BOD/TSS | 30/30 mg/L |
| Summer Mass Load (Monthly Average) | 114 lbs/Day |
| Winter Mass Load (Monthly Average) | 200 lbs/Day |
| EPA Reliability Class | Class 1 |

As shown in Table 5-6, the existing WWTP has sufficient capacity to meet the expected hydraulic and organic loading through the year 2028. However, by this time the MMWWF, PDF, and PIF are expected to be within 78% of the WWTP design flow capacities. The 20-year maximum month $BOD_5$ and TSS loadings are expected to be 93% and 74%, respectively, of the WWTP treatment capacity.

## Main Pump Station

The collection system conveys wastewater to the WWTP main pump station located at the WWTP facility. The main pump station at the WWTP was modified 2001 from a wet pit/dry pit design to a submersible duplex configuration with VFD. The pump has a capacity of 2,280 gpm with 48 feet of total dynamic head.

The station has a 400 kW diesel engine backup generator which has a fuel tank capacity for 48hours of operation. The existing force main is 10-inch PVC that runs 95 feet before discharging into the influent channel to the WWTP.

The table below provides specifications on the WWTP main pump station.

**Table 5-8 – Main Pump Station Specifications**

| | |
|---|---|
| Year Built | 2001 |
| Pump Station Type | Submersible, Duplex |
| Pump type | Non-Clog Centrifugal w/ VFD |
| Maximum Capacity | 2,280 GPM |
| Total Dynamic Head | 48 |
| Pump Motor Size | 40 HP |
| Discharge Point | WWTP |
| Overflow Point | Pacific Ocean |
| Auxiliary Power Type | Diesel Generator |
| Pressure Line Diameter/Length | 10-inch/96 feet |
| Elevation | 37.78 feet |

Current peak flows at the WWTP are estimated at 1,465 gpm, however, based on projected flow analysis, the PIF calculated for the WWTP in 2028 is approximately 2,560 gpm. If current wastewater trends continue, the existing pump station will not have sufficient capacity to meet this demand and will need to be upgraded within the 20-year planning period.

## Headworks

Wastewater influent is pumped from the main pump station, through a 10-inch force main to a headworks structure that was constructed as part of the 2001 WWTP upgrades. The headworks system includes raw screening which was designed to remove large solids from the process stream. The headworks structure is located in-line between the main pump station and the secondary treatment units. The structure is elevated to ensure sufficient head is available to each aeration basin. Prior to the aeration basin, composite samples are taken.

**Table 5-9 – Headworks Specifications**[1]

| **Raw Screening** | |
|---|---|
| Type | Drum Screen |
| Bar Spacing | ¼ inch |
| Drive Motor | 1 HP |
| Screw Compactor/Dewatering | 1 HP |
| Maximum Water Surface Elevation | 66.78 feet |
| Average Water Surface Elevation | 66.12 Feet |
| Top Elevation | 68.50 Feet |

[1] City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (Sht. G2a)

## Secondary Treatment

Secondary treatment at the City's WWTP is achieved by utilizing an activated sludge, extended aeration process with secondary clarification. The system consists of two treatment units in a "donut" configuration. The two units operate in parallel and each unit includes two aeration basins, secondary suction clarifier and sludge storage. Wastewater is recirculated from the clarifier back to the aeration basins through a return activated sludge (RAS) pump system. Currently, the RAS rate equals 18% of influent flow. Settled solids from the clarifier are pumped to the aerobic digester. Treated effluent from the secondary treatment units are discharged to the UV channel for disinfection.

Table 5-10 lists the various design specifications for the City's secondary treatment system. These data were obtained from the City's *Treatment Process Schematics & Design Criteria* sheet of the "as-builts" (2001).

**Table 5-10 – Secondary Treatment Unit Specifications[1]**

| | |
|---|---|
| **Aeration Basin (2)** | |
| Volume | 570,000 Gallons (Combined) |
| Design BOD Loading | 1,500 lbs/Day |
| Aeration Capacity (Total) | 1,200 CFM |
| Blowers (4) | Rotary Positive Displacement |
| Blower Capacity | 600 CFM |
| Motor Size | 140 Hp Summer/150 Hp Winter |
| Top Elevation | 66.0 Feet |
| Maximum Water Surface Elevation | 64.50 Feet |
| Average Water Surface Elevation | 64.33 Feet |
| **Secondary Clarifier (2)** | |
| Diameter | 48 Feet (Each) |
| Sidewater Depth | 14 Feet |
| Top Elevation | 66.0 Feet |
| Maximum Water Surface Elevation | 64.24 Feet |
| Average Water Surface Elevation | 64.19 Feet |
| **Return Activated Sludge** | |
| Pumps (2) | Recessed Impeller Centrifugal/Flooded Suction |
| Pump Capacity | 15-625 GPM |
| Motor Type | Variable Frequency Drive |
| Motor Size | 7.5 HP |

## Aeration Basin

Influent flows by gravity from the headworks to the aeration basins. The two aeration basins have a combined volume of 570,000 gallons. Each tank has 1.5 feet of free board. Typical design parameters from *Wastewater Engineering Treatment and Reuse, Fourth Edition* (Metcalf and Eddy, Table 8-16) show detention times of 4-8 hours for conventional flow. Detention times less than 4 hours lead to ineffective biologic treatment, as well as potential solids wash-out. For the existing aeration tanks the following flows fall into these design parameters for detention time:

- Approximately 1.52 to 3.42 MGD using both aeration tanks
- Approximately 0.76 to 1.71 MGD using one aeration tank

Design detention times are given in the following table. The detention times were also calculated based on projected 2028 influent flows plus an addition 18% to account for RAS. Based on this analysis, the existing aerations basins will provide adequate detention times for MMWWF and MMDWF utilizing a single aeration tank throughout the 20-year planning period.

**Table 5-11 – Aeration Basin Detention Time**

| Flow Condition | Design Detention Time[1] (hours) | 2028 Detention Time[2] (hours) | |
|---|---|---|---|
| | | Single Tank | Both Tanks |
| MMDWF | 16.0 | 6.9 | 13.8 |
| MMWWF | 15.2 | 4.7 | 9.3 |
| PDF | 7.6 | 2.3 | 4.6 |
| PIF | 3.8 | 1.6 | 3.1 |
| *Recommended Detention Times* | | | *4-8 Hours* |

[1] Based on Design Loading Rates on City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (Sht. G2a)
[2] Based on flow projections (*Table 5-6*) plus an addition 18% to account for RAS.

## Secondary Clarifier

Following the aeration basins, the secondary clarifiers provide for separation of the solids from liquid. Each clarifier was designed to operate as a center feed, sludge suction clarifier with launders on the perimeter.

Each clarifier has a 48-foot diameter and 14 feet of sidewater depth. The surface area is 1,810ft$^2$. Each tank has 1.76 feet of freeboard. The approximate volume of one clarifier is 189,600 gallons (379,200 gallons for both clarifiers).

Typical design information for the secondary clarifiers was obtained from *Wastewater Engineering Treatment and Reuse, Fourth Edition* (Metcalf and Eddy, Table 8-7). For settling following air activated sludge, average overflow rate should range from 400-700 gpd/sf and a peak rate range from 1,000-1,600 gpd/sf. The following flows fall into these ranges for the existing clarifiers:

- Approximately 1.44 to 2.54 MGD average using both clarifiers
- Approximately 3.62 to 5.80 MGD peak using both clarifiers
- Approximately 0.72 to 1.27 MGD average using one clarifier
- Approximately 1.81 to 2.90 MGD peak using one clarifier

Overflow design values are presented in Table 5-12. The overflow rate projections are based on 2028 influent flows plus an addition 18% to account for RAS. As this table shows, overflow rates in 2028 are within average range. Based on this analysis, the existing clarifiers have sufficient capacity (without redundancy) to provide adequate overflow rates less than recommended rate.

**Table 5-12 – Secondary Clarifier Overflow Values**

| Flow Condition | Design Overflow[1] (gpd/ft$^2$) | 2028 Overflow Rates[2] (gpd/ft$^2$) | |
|---|---|---|---|
| | | Single Clarifier | Both Clarifier |
| MMDWF | 235 | 548 | 274 |
| MMWWF | 250 | 815 | 407 |
| PDF | 500 | 1,636 | 818 |
| PIF | 1,000 | 2,406 | 1,203 |
| *Recommended Overflow Rates* | | | |
| Average Flows | | 400 - 700 gpd/ft$^2$ | |
| Peak Flows | | 1,000 - 1,600 gpd/ft$^2$ | |

[1] Based on Design Loading Rates on City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (Sht. G2a)
[2] Based on 2028 flow projections (*Table 5-6*) plus an addition 18% to account for RAS.

*Wastewater Engineering Treatment and Reuse, Fourth Edition* (Metcalf and Eddy, Table 8-7) provides Solids Loading Rates (SLR) for the settling following air-activated sludge. The values range from 0.8 to 1.2 lb/ft$^2$/hr for average and 1.6 lb/ ft$^2$/hr for peak. The SLR is calculated based on the mixed liquor suspended solids (MLSS) concentration in the aeration basin.

The MLSS concentration in the existing basins range from 2,200 to 2,400 mg/L. Based on a MLSS of 2,400 mg/L (worst case scenario), the following flow rates fall within the specified design parameters for the City's existing clarifiers:

- Approximately 2.94 to 4.41 MGD average using both clarifiers
- Approximately 5.86 MGD peak using both clarifiers
- Approximately 1.47 to 2.21 MGD average using one clarifier
- Approximately 2.94 MGD peak using one clarifier

Solids loading rates were determined for the projected 2028 influent flow (plus an addition 18%) and are presented in Table 5-13. As this table shows, an existing single clarifier has sufficient capacity to meet solids loading requirements during average flows, however both clarifiers must be in operation during peak flows to meet recommended design parameters.

**Table 5-13 – Secondary Clarifier Solids Loading**

| Flow Condition | 2028 Solids Loading Rate[1] ($lb/ft^2/h$) | |
|---|---|---|
| | Single Clarifier | Both Clarifiers |
| MMDWF | 0.46 | 0.23 |
| MMWWF | 0.68 | 0.34 |
| PDF | 1.36 | 0.68 |
| PIF | 2.00 | 1.00 |
| *Recommended Solids Loading Rate* | | |
| Average Flows | | 0.8 to 1.2 $lb/ft^2/h$ |
| Peak Flows | | 1.6 $lb/ft^2/h$ |

[1] Based on 2028 flow projections (*Table 5-6*) plus an addition 18% to account for RAS. MLSS = 2400 mg/L

*Wastewater Engineering Treatment and Reuse, Fourth Edition* (Metcalf and Eddy) also recommends a clarifier sidewater depth of approximately 12 feet to 20 feet. The sidewater depth of the existing clarifier is 14 feet.

## Effluent Disinfection

Wastewater effluent is disinfected using ultraviolet irradiation in an open channel low pressure system installed in 2001. The UV system consists of a single channel, approximately 40 feet long with a total volume of approximately 3,000 gallons. There are two banks of lights, each with 56 lights. This system does require manual cleaning periodically.

**Table 5-14 – Disinfection Specifications[1]**

| Effluent Disinfection | |
|---|---|
| Type | Ultraviolet Irradiation |
| Dosage Minimum | 30,000 $mW{\cdot}s/cm^2$ |
| Max Flow Capacity | 3.6 MGD |
| Top Elevation | 64.57 Feet |
| Bottom Elevation | 59.5 Feet |
| Maximum Water Surface Elevation | 62.74 Feet |
| Average Water Surface Elevation | 62.64 |

[1] City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (G2a of 2)

As shown in Table 5-14, the maximum flow capacity of the UV disinfection system is slightly less than the 20-year projected PIF of 3.69 MGD. UV systems are typically designed with relatively high safety factor to determine UV dose requirements. Given this fact, the City's UV system should be capable of treating projected PIFs through the year 2028. The City will need to ensure that effluent does not exceed coliform limits during periods of peak flow by performing regular maintenance and cleaning of the UV system. Also, if there are dramatic changes to the wastewater characteristics, the City may need to replace the system in the future.

## Outfall

The existing outfall is located in the Pacific Ocean, west of the bend in Cardinal. The outfall pipe changes from a 15-inch gravity line to an 8-inch gravity line at the last manhole before the outfall. The outfall pipe extends 10.5 feet past the 0 feet mean sea level (MSL) elevation in the ocean. The outfall invert is 8.3 feet below MSL. The absolute low water level is 6.5 feet below MSL. The 8-inch outfall ends with a 4-inch tee diffuser. The capacity of the outfall is approximately 5 million gallons per day.

## Solids Treatment

Waste activated sludge (WAS) is pumped from the secondary clarifier to an aerobic digester. The aerobic digester tank has a volumetric capacity of 260,000 gallons. Solids retention time in the digester varies from 25-30 days. Sludge from the digester is then pumped to one of two holding cells, each with a capacity of 285,000 gallons. Sludge storage time in these cells ranges from 4 months during summer and 8 months during winter conditions. Sludge from the holding cell is eventually disposed via land application.

WAS is treated by the facility to meet Class B biosolids requirements. The City can meet these requirements in one of two ways:

1. Monitor Sewage Sludge – the City may monitor sewage sludge for fecal coliform by collecting and testing seven samples of treated sewage sludge (biosolids). The geometric mean fecal coliform density of these samples must be less than 2 million MPN per dry gram biosolids. The WAS from the City's WWTP currently meets this criterion.

2. Pathogen Reduction – The City may also use one of the approved processes listed in appendix B of Part 503 to significantly reduce pathogens (PSRP). Existing PSRP utilized by the City include:

    - Aerobic digestion (#1) - sludge is treated in the presence of air for a specified residence time and specified temperature that meet mean cell residence time and temperature requirements.

    - Sufficient alkaline stabilization (#5) - A stabilization agent is added to the sewage sludge to raise the pH of the sewage sludge to 12 for 2 hours of contact.

The following table lists the design specifications for the City's solids treatment facilities:

**Table 5-15 – Solids Treatment Design Specifications**[1]

| | |
|---|---|
| **Aerobic Digester Tank** | |
| Volume Total | 262,000 Gallons |
| Storage | 25 – 30 Days |
| **Holding Cell (2)** | |
| Volume Total | 579,000 Gallons |
| Summer Storage | 4 months |
| Winter Storage | 8 months |
| **Sludge/Biosolids Mixing Air** | |
| Blowers (2) | Rotary Positive Displacement |
| Blower Capacity (WAS Blower) | 800 CFM |
| Motor Size | 50 HP |

[1] Based on Design Loading Rates on City of Depoe Bay Treatment Process Schematics & Design Criteria As-Built Drawing (Sht. G2a)

Solids removed from wastewater are hauled to a local farm for land application disposal. Typically, solids are disposed of in the spring (April/May) and in early fall (September). Records for solids disposal were reviewed from April 2003 through September 2008. As shown in Table 5-16, average annual solids disposal for these periods has been 525,750 gallons with an average solids concentration of 2.5%.

**Table 5-16 – WWTP Solids Production**

| Year | Solids Disposal (gallons) | | | Solids Concentration |
|---|---|---|---|---|
| | Spring | Fall | Total | |
| 2003 | 224,000 | 31,000 | 255,000 | 2.6% |
| 2004 | 368,000 | 291,000 | 659,000 | 2.6% |
| 2005 | 297,000 | 297,500 | 594,500 | 2.5% |
| 2006 | 272,000 | 221,000 | 493,000 | 2.4% |
| 2007 | 245,500 | 247,500 | 493,000 | 2.7% |
| 2008 | 275,000 | 385,000 | 660,000 | 2.2% |
| Average | 280,250 | 245,500 | 525,750 | 2.5% |

## WWTP Summary

Based on the current and projected wastewater flows and characteristics in the City of Depoe Bay, it is evident that the existing WWTP is able to effectively provide treatment to meet the effluent requirements designated in the NPDES permit.

**CITY OF DEPOE BAY**

**Wastewater Master Plan Update**

# SECTION 6:

## ANALYSIS OF ALTERNATIVES

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 6
# ANALYSIS OF ALTERNATIVES

## 6.1 Introduction

This Section will identify various improvement alternatives for each component of the City of Depoe Bay's wastewater system. Cost estimates will be provided for a specific alternative improvement. Also when appropriate, a discussion will be provided to outline the advantages and disadvantages of the various alternatives with a recommendation provided as to which alternative is most appropriate.

The City of Depoe Bay has invested substantial monies into its wastewater system over the past decade. Based on system analyses performed in previous sections of this Plan, these investments have resulted in a wastewater system that is capable of meeting the existing wastewater demands of the City and the Gleneden Sanitary District. Analyses of future flows also indicate that much of the system has sufficient capacity to meet these demands beyond the 20-year planning period. However, several components of the City's wastewater conveyance system will need to be improved to ensure the overall system continues to meet future service demands and regulatory requirements.

## 6.2 Collection System Improvements

### Existing Gravity System Improvements

As mentioned in Section 5.1, many of the existing collection mainlines are expected to become undersized within the 20-year planning period. These pipe sections must be replaced with larger pipelines to prevent sanitary overflows. The locations of these pipe sections are also shown in Figure 6-1As recommended, new pipelines have been sized to meet estimated flows generated by the ultimate build-out (UBO) of the area that each pipeline section serves.

A detail cost estimate for collection system improvements is presented in Figure 6-1. Improvements to the collection system include replacing nearly 14,000 linear feet of pipeline, which is expected to cost the City approximately $6.1 million dollars. However, because there are currently no deficiencies associated with the collection system, all collection system improvements are eligible for system development charges (SDCs).

Cost estimates for replacing existing undersized wastewater mains include allowances for construction in the right-of-way of the Oregon Department of Transportation (ODOT), connecting to existing wastewater system, connecting sewer service laterals and cleanouts to existing residences, and other incidental construction costs. Cost estimates do not include rock excavation because new pipelines will assumingly be laid at existing pipe locations thus minimizing rock excavation.

Included as part of the recommended improvements is the replacement of the line connecting the Fogerty Creek pump station to Manhole 43. City staff have estimated this reach of pipeline to be approximately one mile. The exact capacity of this pipeline has not been analyzed by this project because minimum pipe section slopes are unknown. It has been assumed that the capcity of this pipeline equals the capacity of the pipe line between Manholes 42 and 41 (see Table 5-1) thus the flows from GSD would exceed overall pipe capacity within the 20-year planning period. However, the City should attempt to obtain additional data on pipe capacity before moving forward with such a large (and costly) project.

**Table 6-1 - Wastewater Collection System Improvement Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization, Bonding & Insurance | LS | 1 | $ 400,000 | $ 400,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 90,250 | $ 90,250 |
| 3 | Traffic Control | LS | 1 | $ 113,000 | $ 113,000 |
| 4 | 21-in Sewer | LF | 1,950 | $ 140 | $ 273,000 |
| 5 | 21-in Sewer (ODOT) | LF | 11,300 | $ 240 | $ 2,712,000 |
| 6 | 24-in Sewer | LF | 875 | $ 150 | $ 131,250 |
| 7 | Manhole | EA | 13 | $ 3,000 | $ 39,000 |
| 8 | Manhole (ODOT) | EA | 34 | $ 6,000 | $ 204,000 |
| 9 | Service Laterals (w/cleanout) | EA | 66 | $ 1,500 | $ 99,000 |
| 10 | Connect to existing system | EA | 6 | $ 2,000 | $ 12,000 |
| | | Construction Total | | | $ 4,073,500 |
| | | Contingency (20%) | | | $ 814,700 |
| | | *Subtotal* | | | $ 4,888,200 |
| | | Engineering (20%) | | | $ 977,640 |
| | | Administrative & Legal Costs (5%) | | | $ 244,410 |
| | | **Total Project Cost** | | | **$ 6,110,250** |

Due to extensive collection system improvements that are expected to be required within the planning period, it is recommended that these improvements be completed in three separate 5-year phases. This will allow pipeline replacements to occur as capacities are expected to be exceeded. An attempt to prioritize replacements projects is presented in Table 6-2. This list is based on when future wastewater flows are expected to surpass pipe capacity. The City should update this list regularly depending on actual development and flows. Detailed cost estimates for each phase of the collection system improvements are found in the appendix.

**Table 6-2 – Pipe Sections Replacement Schedule**

| Pipe Section | | New Diameter (inches)[1] | Total Length (feet) | Total Costs | Estimated GSD Portion |
|---|---|---|---|---|---|
| From MH | To MH | | | | |
| ***5-Year Capital Improvements*** | | | | **$ 158,250** | **70%** |
| 23 | 22 | 21 | 500 | $ 158,250 | 70% |
| **10-year Capital Improvements** | | | | **$ 4,485,375** | **68%** |
| 43 | 32 | 21 | 3,900 | $ 1,820,250 | 85% |
| 19 | Harbor PS | 21 | 1,450 | $ 406,125 | 60% |
| 10 | 8 | 21 | 400 | $ 225,000 | 60% |
| 29 | 23 | 21 | 2,000 | $ 1,017,000 | 55% |
| 3 | WWTP | 24 | 875 | $ 1,017,000 | 55% |
| **15-Year Capital Improvements** | | | | **$ 2,233,500** | **100%** |
| Fogerty Creek | 43 | 21 | 5,000 | $ 2,233,500 | 100% |
| **Total** | | | | **$ 6,877,125** | **78%** |

All pipe sections that need will to be upgraded convey flows from the Gleneden Sanitary District. The portion of the expected flow that is attributed to GSD is also presented in Table 6-2. Gleneden flow contribution ranges from approximately 100% in the northern section of the City to approximately 55% at the mainline to the WWTP. Based on the portion of GSD wastewater flow through these pipeline sections, GSD should be responsible for 78% of the collection system improvement costs, or nearly $5.4 million dollars.

## Big Whale Cove Sewer System

The area of Big Whale Cove is not current served by the City's collection system, although the area does reside within the limits of Depoe Bay's UGB. This area includes approximately 36 residential lots. To provide sewer services to the area would require installing approximately 2,500 feet of 8-inch gravity sewer system as well as a pump station with 6-inch forcemain. Based a preliminary cost estimate, the total cost for such a project is estimated at approximately $1.8 million (Table 6-3). The cost of this project may be reduced significantly if the wastewater from Big Whale Cove could be diverted to the existing system in Little Whale Cove, however, it is unknown at this time if this is a viable option.

**Table 6-3 – Big Whale Cove Collection System Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization, Bonding & Insurance | LS | 1 | $ 120,000 | $ 120,000 |
| 2 | Traffic Control | LS | 1 | $ 28,000 | $ 28,000 |
| 3 | 8-in Sewer | LF | 2000 | $ 100 | $ 200,000 |
| 4 | 8-in Sewer (ODOT) | LF | 500 | $ 200 | $ 100,000 |
| 5 | 6-in Forcemain (ODOT) | LF | 2300 | $ 175 | $ 402,500 |
| 6 | Lift Station | LS | 1 | $ 250,000 | $ 250,000 |
| 7 | Manhole | EA | 7 | $ 3,000 | $ 21,000 |
| 8 | Manhole (ODOT) | EA | 2 | $ 6,000 | $ 12,000 |
| 9 | Connect to existing system | EA | 1 | $ 2,000 | $ 2,000 |
| 10 | Service Laterals (w/cleanout) | EA | 36 | $ 1,500 | $ 54,000 |
| | | Construction Total | | | $ 1,189,500 |
| | | Contingency (20%) | | | $ 237,900 |
| | | *Subtotal* | | | *$ 1,427,400* |
| | | Engineering (20%) | | | $ 285,480 |
| | | Administrative & Legal Costs (5%) | | | $ 71,370 |
| | | **Total Project Cost** | | | **$ 1,784,250** |

## Existing Lift Stations Improvements

Flow analyses for the Vista Street, Harbor, LWC, and Edgewater lift stations were performed in Section 5.2 of this Plan. Both the LWC and Edgewater station have been recently updated and have sufficient capacity for the 20-year projected flows. The Vista Street and Harbor lift stations were updated in 2001 and currently have sufficient nominal capacity for existing flow conditions, however, 2028 projected flows appear to exceed both of these stations' firm capacity.

To satisfy redundancy, the pump stations must be capable of handling the PIF with the largest pump out of service (firm pumping capacity). In addition to providing firm pumping capacity at PIF, the stations must also be capable of operating under low flow or dry weather conditions. Each pump should be controlled by variable frequency drive (VFD) controls so that additional operational flexibility is obtained.

## Vista Street Lift Station Improvements

The cost estimate for the Vista lift station improvements is presented in the following table. Associated costs include replacing the existing pumps with two 1,920 gpm submersible pumps with new controls, as well as the cost of by-pass pumping during construction. The total cost for these improvements is expected to be approximately $140,250. This estimate assumes that no modifications to the existing wet well will be required (including mounting rails, electrical, etc.) and the existing auxiliary generator will meet power requirements.

**Table 6-4 – Vista Street Lift Station Improvement Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 8,150 | $ 12,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 1,500 | $ 1,500 |
| 3 | Flow Meter | LS | 1 | $ 10,000 | $ 10,000 |
| 4 | 1,920 gpm submersible pump & Controls | EA | 2 | $ 35,000 | $ 70,000 |
| | | Construction Total | | | $ 93,500 |
| | | Contingency (20%) | | | $ 18,700 |
| | | *Subtotal* | | | *$ 112,200* |
| | | Engineering (20%) | | | $ 22,440 |
| | | Administrative & Legal Costs (5%) | | | $ 5,610 |
| | | **Total Project Cost** | | | **$ 140,250** |

Current flow projections predict that the existing capacity of the Vista Street lift station will be exceeded in the next ten years. However, since the area has such a high potential for future development, the upgrades to this lift station should be made in conjunction with any major developments in the area. Also, a detailed flow monitoring analysis should be completed prior to moving forward with any lift station improvement.

## Harbor Lift Station Improvements

Upgrades to the Harbor lift station should be complete before design peak flows exceed the station's firm capacity. Flow projections indicate this will occur within the next 10 years. However, based on observation data from the City, the station's firm capacity is exceeded regularly during peak flows. This may be an indication that the pump is not performing as designed and upgrades should be made sooner to ensure that the station's deficiencies does not result in avoidable overflows. The City may want to initiate a flow monitoring study at this station to determined current flow conditions.


WASTEWATER MASTER PLAN UPDATE

SCALE: 1" = 1000'

H B H Consulting Engineers

City of Depoe Bay
*WASTEWATER MASTER PLAN UPDATE*

WASTEWATER SYSTEM IMPROVEMENTS

DRAWN BY: CLB
DATE: AUG 2008

FIG. 6-1

The costs for the Harbor lift station improvements are detailed in Table 6-5. Associated costs include replacing the existing pumps with two 2,300 gpm submersible pumps with new controls, as well as the cost of by-pass pumping during construction. The total cost for these improvements is expected to be approximately $153,750. Similar to the estimate for the Vista lift station improvements, this estimate assumes that no modifications to the existing wet well will be required and the existing auxiliary generator will meet power requirements.

**Table 6-5 – Harbor Lift Station Improvement Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 11,000 | $ 11,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 1,500 | $ 1,500 |
| 3 | Flow Meter | LS | 1 | $ 10,000 | $ 10,000 |
| 4 | 2,300 gpm submersible pump & controls | EA | 2 | $ 40,000 | $ 80,000 |
| | | Construction Total | | | $ 102,500 |
| | | Contingency (20%) | | | $ 20,500 |
| | | *Subtotal* | | | *$ 123,000* |
| | | Engineering (20%) | | | $ 24,600 |
| | | Administrative & Legal Costs (5%) | | | $ 6,150 |
| | | **Total Project Cost** | | | **$ 153,750** |

## 6.3 Wastewater Treatment Plant Improvements

Overall, the City's wastewater facility plant is in good working condition. The hydraulic and organic capacity of the facility is sufficient to meet existing flow conditions and NPDES permit requirements. The only major component that is expected to become undersized in the next 20 years is the main influent pump station.

### Main Pump Station Improvements

The cost estimate for the improvements for the City's main pump station located at the WWTP include replacing the existing pumps with two 2,560 gpm submersible pumps with new controls, as well as the cost of by-pass pumping during construction. As shown in Table 6-6, the total cost for these improvements is expected to be approximately $158,250. This estimate also assumes that no modifications to the existing wet well will be required and the existing auxiliary generator will meet power requirements.

**Table 6-6 – Main Pump Station Improvement Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 9,150 | $ 14,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 1,500 | $ 1,500 |
| 3 | 2,560 gpm submersible pump & Controls | EA | 2 | $ 45,000 | $ 90,000 |
| | | Construction Total | | | $ 105,500 |
| | | Contingency (20%) | | | $ 21,100 |
| | | Subtotal | | | $ 126,600 |
| | | Engineering (20%) | | | $ 25,320 |
| | | Administrative & Legal Costs (5%) | | | $ 6,330 |
| | | **Total Project Cost** | | | **$ 158,250** |

Current flow projections that the firm capacity of the main pump station to the WWTP will be exceeded by peak design flows in the next 10 to 15 years.

## Site Improvements

The City has identified minor site improvements specifically, paving around the WWTP facility, to be included in the City's capital improvement plan (CIP). Based on an estimated 12,800 square feet of area to be paved, this project is estimated to cost nearly $96,300.

**Table 6-7 – WWTP Site Improvement Cost Estimate**

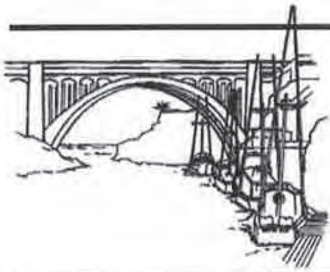
| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 6,000 | $ 6,000 |
| 2 | Demolition & Site Preparation | LS | 1 | $ 5,000 | $ 5,000 |
| 3 | Paving | SF | 12800 | $ 4 | $ 51,200 |
| | | Construction Total | | | $ 62,200 |
| | | Contingency (20%) | | | $ 12,440 |
| | | *Subtotal* | | | *$ 74,640* |
| | | Engineering (20%) | | | $ 14,928 |
| | | Administrative & Legal Costs (5%) | | | $ 3,732 |
| | | **Total Project Cost** | | | **$ 93,300** |

# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# SECTION 7:

## RECOMMENDED PLAN





# SECTION 7
# RECOMMENDED PLAN

## 7.1 Introduction

This Section is intended to summarize all the recommendations in this Plan and provide clear and concise information on project selection, capacity needs, project prioritization, project costs, and financing strategies.

This Section outlines the recommended improvement projects for the Depoe Bay's wastewater system, which primarily focus on increasing the capacity of its conveyance system. As the projects vary in their criticality, the projects have been divided into three separate and distinct priority groups. The priority groups are further described below:

**Priority 1 Projects:** Priority 1 projects are the most critical and must be undertaken as soon as possible in order to satisfy the current operational and regulatory requirements. Priority 1 projects should be considered as the most immediate needs for the City's wastewater system.

**Priority 2 Projects:** Priority 2 projects are projects that should be undertaken with the first half of the planning period to restore aging facilities to new operating conditions, and to increase system capacity. While they do not have to be undertaken immediately, the City should include them in their capital improvement plans (CIP) and obtain funding to undertake these projects.

**Priority 3 Projects:** Priority 3 projects are projects that are primarily dependent on development and expansion of the collection system to provide water service to new areas. Priority 3 projects are most likely to be driven by development and the need to expand the collection system to service new properties and new subdivisions. Funding for Priority 3 projects are likely to be financed through a combination of City funds, SDC funds, and developer contributions. As these projects are likely to be development driven, they need not be scheduled for implementation. They should however, be included within the CIP and considered within any wastewater system SDC methodology developed by the City.

With these priorities in mind, the remainder of this section will further describe the recommended projects, their costs, and financing strategies for the recommended projects.

## 7.2 Project Selection

Within this section, project selection descriptions will be provided for each priority group. Additional information on each recommended project is available in Section 6 of this Plan.

## Priority 1 Projects

- **Collection System Improvements (5-Year Capital Improvements):** It is recommended that the City begin replacing sewer lines in the collection system that will be at or near capacity within the next five years. This would entail installing approximately 500 linear feet of 21-inch pipe along Bay Street and 200 linear feet of 12-inch pipe east of Pine Street.

- **Harbor Lift Station Improvements:** The existing firm capacity of the station is already exceeded by current flow conditions. New pumps and controls should be should installed to ensure that no overflows occur due to deficiencies at this lift station.

## Priority 2 Projects

The following projects are selected as Priority 2 projects:

- **Collection System Improvements (10-Year Capital Improvements):** Additional sewer pipelines are expected to be undersized to meet future wastewater flows. This would include installing approximately 6,300 linear feet of 21-inch pipe along Highway, 1,450 linear feet of 21-inch pipe east of the harbor, and 900 feet of 24-inch pipe to the WWTP.

- **Replace Transmission Line to Fogerty Creek Pump Station:** As wastewater flows generated from GSD increase, it is very likely that the existing 15-inch pipeline will need to be upgraded to a 21-inch pipeline by the end of the 20-year planning period.

- **Vista Street Lift Station Improvements:** As development continues in Depoe Bay, especially in the northern portion of the City, pumps at this lift station will need to be replaced. It is expected that the pumps at the Vista Street station will need to be replaced in the next 10 years.

- **WWTP Improvements:** In general, the existing WWTP has sufficient capacity to meet current and future hydraulic and organic loading demands. However, the existing influent pump station will need to be updated to accommodate increased flows in the futures (10-15 years). Additionally, the area surrounding the WWTP should be paved.

## Priority 3 Projects

The following projects are selected as Priority 3 projects:

- **Big Whale Cove Collection System:** The City will need to eventually install a collection system to serve the Big Whale Cove area. The need for this improvement is entirely dependent on development in the region.

## Priority Cost Summary

Three project priority groups have been developed in this Section. As mentioned previously, the projects vary in their criticality with some requiring that they be undertaken as soon as possible, while other can be planned for and undertaken later in the planning period. A summary of the recommended projects costs is provided in the Table 7-1 for all three project priority categories. Detail cost estimates for each improvement is provided in Section 6 of this Plan and in the appendix.

**Table 7-1 – Recommended Projects Costs Summary**

| Improvement Description | Total Project Cost |
|---|---|
| **Priority 1** | **$ 312,000** |
| Collection System Improvements (5-Year Capital Improvements) | $ 158,250 |
| Harbor Lift Station Improvements | $ 153,750 |
| **Priority 2** | **$ 7,110,675** |
| Collection System Improvements (10-Year Capital Improvements) | $ 4,485,375 |
| Replace Pipeline to Fogerty Creek | $ 2,233,500 |
| Vista Lift Station Improvements | $ 140,250 |
| WWTP Improvements | $ 251,550 |
| **Priority 3** | **$ 1,784,250** |
| BWC Collection System | $ 1,784,250 |
| **Overall Plan Costs** | **$ 9,206,925** |

## 7.3 Financing Strategy

The City of Depoe Bay must upgrade and improve their wastewater facilities in order to provide reliable wastewater conveyance and treatment for upcoming planning period and beyond.

This *Wastewater Master Plan Update* outlines a plan for all necessary improvements, which represents a significant investment for the City. The City must develop a strategy and plan for financing the recommended improvements.

Section 8 of this Plan outlines a number of financing options that are available to the City for financing the recommended improvements. The financing options include local funding sources, state and federal loan and grant programs, tax programs, and others. While the financing package that the City will ultimately utilize depends on the results of coordination with the various funding agencies, this section will summarize the general direction the City should proceed with and provide some insight into the potential impacts to rate payers.

### Project Expenses

As previously outlined in this Section, improvement projects recommended in this Plan total more than $9.2 million dollars. The projects have been grouped into three main priority categories. Projects recommended are primarily driven by development and growth and are therefore prioritized based on the expected period that wastewater flow will exceed each component's capacity.

## Financing Strategy

The City should proceed with the following steps as they move forward with the financing strategy for the wastewater improvement projects:

1. As soon as the City receives approval for this completed *Wastewater Master Plan Update*, the City should contact OECDD and DEQ to schedule a "one-stop meeting". As this one-stop meeting all of the potential agencies who may be able to provide funding will send representatives to discuss the City's funding needs and develop a funding package for the improvements projects. The agencies will, in real time, make recommendations and will discuss what each agency can offer. The result will be a funding package made up of grants and loans from a number of agencies to fund the project.

2. Following the one-stop meeting, the City should immediately process the necessary paperwork to apply for the funding included in the funding package recommended at the one-stop meeting. This will require numerous applications and other administrative efforts to apply for funding. The City should apply to any and all programs or agencies that have potential to provide grant money to reduce the impact to rate payers.

3. Due to the magnitude of the required improvements, the City will not likely receive grants sufficient to cover all of the costs of the projects. In fact, the City will most likely be required to take out loans for a significant portion of the project costs. These loans will be paid back over a period of time that can likely be extended to as much as 40 years, though the final loan period will depend on the funding agency and their policies on payback. Because the City will have to pay back loan monies, a rate increase will be required to generate the revenue to pay back the loans. The City should immediately set up a time line and plan for the rate increase. The plan should include efforts to educate the public and provide for public meetings and other opportunities for the public to learn about the upcoming improvement projects, the project need, and the project costs.

4. Once the City receives notification that they have secured the necessary funding to complete the work, they can begin the pre-design and design activities in preparation for bidding and construction of the improvements.

## Impact to Rate Payers

As mentioned above, the funding package for the recommended project will likely include a loan component that will necessitate a rate increase for the average rate payer. While the final funding package will not be known until after the one-stop meeting and not confirmed until the City receives notice that they have secured the necessary funding, it is important that the City be provided with some insight on the potential impact to rate payers so that they may begin educating the public and develop plans for increasing rate as needed to pay for the significant costs associated with these improvements.

The following table is provided showing the potential impact to rate payers assuming that 100-percent of the project must be funded through loans. For the purpose of this exercise, rate impacts are based upon a 20-year loan at a 3.75% interest rate. When calculating monthly costs per EDU, a 7% addition has been made to the actual income needed to fund the loan repayment. This is typically done to ensure that sufficient revenues are generated by user fees to guarantee that the annual loan repayment can be met.

As shown, total monthly dept service for these projects is approximately $58,408. Based on the current system EDU count of 3,821 (determined in Section 2), the average financial impact for a "typical" user would be $15.29 per month.

**Table 7-2 – Estimated Impact to Rate Payers (3.75% Interest Loan, 20-yr Payback)**

| | Recommended Improvements | | | |
|---|---|---|---|---|
| | Priority 1 Projects | Priority 2 Projects | Priority 3 Projects | All Projects |
| Total Costs | $ 312,000.00 | $ 7,110,675.00 | $ 1,784,250 .00 | $ 9,206,925 .00 |
| Monthly Debt Service | $ 1,979.30 | $ 45,109.45 | $ 11,319.11 | $ 58,407.86 |
| **Proposed Monthly Increase per EDU** | **$ 0.52** | **$ 11.81** | **$ 2.96** | **$ 15.29** |

As mentioned before, the final impact to rate payers will not be known until the final funding package is confirmed and all variables are set. Should interest rates rise significantly before the funding package is secured, the impact to rate payers will be greater.

The City should begin in earnest in educating the public, developing a rate increase plan, and pursuing grant and loan monies.

## System Development Charges

System Development Charges (SDCs) are designed to help fund identified system deficiencies created by future growth. There are two types of SDC fees: (1) improvement SDCs and (2) reimbursement SDCs. Improvement SDC fees are fees for costs associated with capital improvements to be constructed. A reimbursement SDC fee is a fee for costs associated with capital improvements already constructed, or under construction when the fee is established, for which the local government determines that capacity exists.

### Improvement SDC Fee

In order for a municipality to set an SDC for new improvements (i.e. improvement SDC), the City must approve a capital improvement plan (CIP). This *Wastewater Master Plan Update* has provided a list of needed capital improvements for the City's wastewater system as well as providing cost estimates for each recommended improvement. This will provide the basis for the CIP and associated costs needed to establish an improvement SDC fee.

Since no deficiencies have been identified in the City's existing wastewater system, nearly all improvements developed for the 20-yearing planning period are required due to future growth in the system. The only project developed that is not SDC eligible is the WWTP site improvements. Therefore costs associated with collection and pump station improvements are SDC eligible. Table 7-3 presents the SDC fees calculated for Priority 1, Priority 2, Priority 3, and total system improvements.

**Table 7-3 – Estimated Improvement SDC Fee for Wastewater System**

| | Recommended Improvements | | | |
|---|---|---|---|---|
| | Priority 1 Projects | Priority 2 Projects[1] | Priority 3 Projects | Total |
| Total Costs for SDC Eligible projects | $ 312,000.00 | $ 7,017,375.00 | $ 1,784,250.00 | $ 9,113,625.00 |
| % EDC Eligible | 100% | 100% | 100% | 100% |
| New EDUs | 2,362.5 | 2,362.5 | 2,362.5 | 2,362.5 |
| **Improvement SDC Fee** | **$ 132.06** | **$ 2,970.32** | **$ 755.24** | **$ 3,857.62** |

[1] Site improvements at the WWTP are not eligible to be considered in improvement SDC fee

As discussed in Section 2.3 of this Plan, there are currently 3,821.5 EDUs served by the City of Depoe Bay's wastewater system. By 2028, it is estimated that there will be 6,184 EDUs. Therefore projected costs related to increasing capacity are distributed among the addition 2,362.5 new EDUs expected to be served by the system in the next 20-years. As shown in the Table 7-3 the maximum improvement SDC fee that the system can charge is approximately $ 3,857.62 per new EDU.

**CITY OF DEPOE BAY**

**Wastewater Master Plan Update**

# SECTION 8:

## FINANCING OPTIONS

**City of Depoe Bay**
**Wastewater Master Plan Update**

# SECTION 8
# FINANCING OPTIONS

Most communities are unable to finance major infrastructure improvements without some form of governmental funding assistance, such as low interest loans or grants. In this Section, a number of major Federal/State funding programs and local funding mechanisms that are appropriate for the recommended improvements are discussed. Projects are usually funding by a combination of grant, loans, and local funds.

## 8.1 Evaluation of Local Funding Resources

A number of local funding sources are available to the City for sharing the cost of the planned wastewater conveyance system improvements. The amount and type of local funding obligations for infrastructure improvements will depend in part on the amount of grant funding anticipated and the requirements of potential loan funding. Local revenue sources for capital expenditures include various types of bonds, capital construction funds, system development charges, system user fees, and ad valorem taxes. Local revenue sources for operating costs include system user fees and ad valorem taxes. Each of these financing mechanisms is briefly described below along with the appropriateness of each for the improvements recommended in this Plan.

### General Obligation Bonds

General obligations (GO) bonds are backed by the full faith and credit of the issuer. For payment of the principal and interest on the bond, the issuer may levy ad valorem general property taxes. Such taxes are not needed if revenue from assessments, user fees, or other sources is sufficient to cover debt service.

The Oregon Revised Statutes limit the maximum term to 40 years for cities. Except in the event that the Rural Development Administration will purchase the bonds, the realistic term for which GO bonds, should be issued is 15 to 20 years.

Financing of wastewater system improvements by GO bonds is usually accomplished by the following procedure:

- Determination of the capital costs required for the improvement.
- An election authorizing the sale of general obligation bonds.
- Following voter approval, the bonds are offered for sale
- The revenue from the bond sale is used to pay the capital costs associated with the project.

From a fund raising viewpoint, general obligation bonds are preferable to revenue bonds in matters of simplicity and cost of issuance. Since the bonds are secured by the power to tax, these bonds usually command a lower interest rate than other types of bonds. General obligation bonds lend themselves readily to competitive public sale at a reasonable interest rate because of their high degree of security, their tax-exempt status, and their general acceptance.

These bonds can be revenue supported wherein a portion of the user fee is pledged toward payment of the dept service. Using this method, the need to collect additional property taxes to retire the obligation bonds is eliminated. Such revenue supported general obligation bonds have most of the advantages of revenue bonds, but also maintain the lower interest rate and ready marketability of general obligation bonds. Because the users of the wastewater system pay their share of the debt load based on their usage fee, the share of the debt is distributed in an equitable manner.

Advantages of GO bonds over other types of bonds include:

- Laws authorizing GO bonds are less restrictive than those governing other types of bonds.
- By the levying of taxes, the debt is repaid by all property benefiting from the project and not just current system users.
- Taxes paid in the retirement of these bonds are IRS deductible.
- GO bonds offer flexibility to retire the bonds by tax levy and/or user fee revenue.

The disadvantage of GO bond debt is that it is often added to the debt ratios of the municipality, thereby restricting the flexibility of the municipality to issue debt for other purposes. Furthermore, GO bonds are generally associated with the financing of facilities that benefit an entire community and must be approved by a majority vote and often necessitate extensive public information programs. A majority vote often requires waiting for a general election in order to obtain adequate voter turnout. Waiting for a general election may take years, and too often a project needs to be undertaken in a much shorter amount of time.

### Revenue Bonds

Revenue bonds offer some advantages over general obligation bonds and are becoming a more frequently used option. Revenue bonds are payable solely for charges made for the services provided. These bonds cannot be paid from tax levies or special assessments. Their only security is the borrower's promise to operate the system in a way that will result in sufficient net revenue to meet the debt service and other obligations of the bond issue.

Many communities prefer revenue bonding, as opposed to general obligation bonding, because it insures that no tax will be levied. In addition, debt obligation will be limited to system users since repayment is derived from user fees. Another advantage of revenue bonds is that they do not count against a city's direct debt, but instead are considered "overlapping debt". This feature can be a critical advantage for a city near its debt limit or for the rating agencies, which consider very closely the amount of direct debt when assigning credit ratings. Revenue bonds also may be supported by a pledge of revenues received in any legitimate and ongoing area of operation, within or outside the geographical boundaries of the issuer.

Successful issuance of revenue bonds depends on the bond market evaluation of the revenue pledged. Revenue bonds are most commonly retired with revenue from user fees. Recent legislation has eliminated the requirement that revenues pledged to bond payment have a direct relationship to the services financed by the bonds. Revenue bonds may be paid with all or any portion of revenues derived by a public body or any other legally available monies. In addition, if additional security to finance revenue bonds is needed, a public body may grant security and interest in facilities, projects, utilities, or systems it owns and operates.

Normally there are no limitations on the amount of revenue bonds to be issued, but excessive issue amounts are generally unattractive to bond buyers because they represent high investment risks. In rating revenue bonds, buyers consider the economic justification for the project, reputation of the borrower, methods and effectiveness for billing and collecting, rate structures, provisions for rate increases as needed to meet debt service requirements, track record in obtaining rate increases, adequacy of reserve funds provided in the bond documents, supporting covenants to protect projected revenues, and the degree to which forecasts of net revenues are considered sound and economical.

Municipalities may elect to issue revenue bonds for revenue producing facilities without a vote of the electorate (ORS 288.805-288.945). In this case, certain notice and posting requirements must be met and a 60-day waiting period is mandatory. A petition signed by 5% of the municipality's registered voters may cause the issue to be referred to an election.

It is important to note that the City Charter of Depoe Bay requires the city to maintain zero debt without voter approval.

## Improvement Bonds

Improvement (Bancroft) bonds can be issued under an Oregon law called the Bancroft Act. These bonds are an intermediated form of financing that is less than full-fledged general obligation or revenue bonds. This type of bond is quite useful, especially for smaller issuers or for limited purposes.

An improvement bond is payable only from the receipts of special benefit assessments, not from general tax revenues. Such bonds are issued only where certain properties are recipients of special benefits not accruing to other properties. For a specific improvement, all property within the improvement area is assessed on an equal basis, regardless of whether it is developed or undeveloped. 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 improvements bond option is taken, the City sells Bancroft improvement bonds to finance the construction, and the assessment is paid over 20 years in 40 semiannual installments with interest. Cities and special districts are limited to improvement bonds not exceeding 3% of true cash value.

With improvement bond financing, an improvement district is formed, boundaries are established, and the benefiting properties and property owners are determined. The engineer usually determines an approximate assessment, either on a square foot or front-foot basis. Property owners are then given an opportunity to object to the project assessments. The assessments against the properties are usually not levied until the actual cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of making monthly payments to the contractor. Therefore, some method of interim financing must be arranged or a pre-assessment program based on the estimated total costs must be adopted. Commonly warrants are issued to cover debts, with warrants to be paid when the project is complete.

The primary disadvantage to this source of revenue is that the property to be assessed must have a true cash value at least equal to 50% of the total assessments to be levied. As a result, owners of undeveloped properties usually required a substantial cash payment. In addition, the development of an assessment district is very cumbersome and expensive when facilities for an entire community are contemplated. In comparison, general obligation bonds can be issued in lieu of improvements bonds and are usually more favorable.

## Capital Construction (Sinking) Funds

Sinking funds are often established by budgeting for a particular construction purpose. Budgeted amounts from each annual budget are carried in a sinking fund until sufficient revenues are available for the needed project. Such funds can also be developed with revenue derived from system development charges or serial levies.

The disadvantage of a sinking fund is that it is usually too small to underrate any significant projects. Also, setting aside money generated from user fees without a designated and specified project is not generally accepted in a municipal budgeting process.

## System Development Charges (SDCs)

System development charges (SDCs) are fees collected as previously undeveloped property is developed. The fees are used to finance the necessary capital improvements and municipal services required for the development. Such fees can only be used to recover the capital costs of infrastructure improvements. Operating, maintenance, and replacement costs cannot be finances through SDCs.

Two types of charges are permitted under the Oregon System Development Charges Act: improvement fees and reimbursement fees. SDCs that are charged before a project is undertaken are considered improvement fees and are used to finance capital improvements to be constructed. After construction, SDCs are considered reimbursement fees and are collected to recapture the costs associated with capital improvements already constructed or under construction. A reimbursement fee represents a charge for utilizing excess capacity in an existing facility paid for by others. The revenue generated by this fee is typically used to pay back existing loans for improvements.

Under the Oregon SDC Act methodologies for deriving improvements and reimbursements fees must be documented and available for review by the public. A capital improvement plan must also be prepared which lists the capital improvements that may be funded with improvement fee revenues. The estimated cost and timing of each improvement also must be included in the capital improvement plan. Thus revenue from the collection of SDCs can be used to finance specific items listed in a capital improvement plan. In addition, SDCs cannot be assessed on portions of the project paid for with grant funding.

## Ad Valorem Taxes

Ad valorem property taxes are often used as a revenue source for utility improvements. Property taxes may be levied on real estate, personal property, or both. Historically, ad valorem taxes were the traditional means of obtaining revenue to support all local governmental functions.

A major advantage of these taxes is the simplicity of the system. It requires no monitoring program for developing charges, additional accounting and billing work is minimal, and default on payments is rare. In addition, ad valorem taxation provides a means of financing that reaches all property owners that benefit from a wastewater system, whether a property is developed or not. The construction costs for a project are shared proportionally among all property owners based on the assessed value of each property.

Depending on the project, ad valorem taxation may result in property owners paying a disproportionate share of the project costs compared to the benefits received. Public hearings and an election with voter approval would be required to implement ad valorem taxation.

### System User Fees

System user fees can be used to retire general obligation bonds and are commonly the sole source of revenue used to retire revenue bonds and to finance operation and maintenance of a system. System user fees represent charges of all residences, businesses, and other users that are connected to the wastewater system. These fees are established by resolution and may be modified as needed to account for increased or decreased operating and maintenance costs. User fees may be based on a metered volume of water consumption and/or on the type of user (e.g. residential, commercial, industrial, etc.).

### Assessments

Under special circumstances, the beneficiary of a public works improvement may be assessed for the cost of a project. For example, the City may provide some improvements or services that directly benefit a particular development. The City may choose to assess the developer to provide up-front capital to pay for the improvements.

## 8.2 Evaluation of Federal and State Funding Resources

Some level of outside funding assistance in the form of grants or low interest loans will be necessary to make the proposed improvements projects affordable for the City of Depoe Bay and its citizens. The amount and types of outside funding will dictate the amount of local funding that the City must secure. In evaluating grant and local programs, the major objective is to select a program or combination of programs that is available and the most beneficial for the planned project.

This section provides a brief description of the major Federal and State funding programs that are typically utilized to assist qualifying communities in the financing of infrastructure improvement projects. Each of the government assistance programs has certain prerequisites and requirements in order for a community to qualify. The assistance programs promote goals such as aiding economic development, benefiting areas of low to moderate income families, and providing for specific community improvement projects. Because each program has specific requirements, not all communities or projects will qualify for each of the programs.

### Economic Development Administration – Public Works Grant Program

The EDA Public Works Grant Program, administered by the U.S. Department of Commerce, is aimed at projects which directly create permanent jobs or remove impediments to job creation in the project area. To be eligible for this grant, a community must be able to demonstrate the potential to create jobs from the project. Potential job creation is assessed with a survey of businesses to demonstrate the prospective number of jobs that might be created if the proposed project is completed.

Projects must be located within an EDA designated Economic Development District. Priority consideration is given to projects that improve opportunities for the establishment of expansion of industry and create or retain both short-term and long-term private sector jobs. Communities that can demonstrate that the existing system is at capacity (i.e. moratorium on new connections) have a greater chance of being awarded this type of grant. EDA grants are usually in the range of 50 to 80 percent of the project cost. Therefore, some type of local funding also is required. Grants typically do not exceed one million dollars.

## Water and Waste Disposal Loans and Grants (Rural Development)

The Rural Utilities Service administers a water and wastewater loan and grant program designed to improve the quality of life and promote economic development in rural America. The Rural Utilities Service program provide needed facilities to ensure health and safety and stimulate local economy by allowing access to new and advanced services and job opportunities. Program funds can be used for water, sewer, solid waste, and storm drainage projects. The most common uses are to restore deterioration water supplies, or to improve, enlarge, or modify inadequate water or waste facilities.

Eligible applicants for Rural Utilities funds include public bodies and Indian Tribes. Non-profit corporations with significant ties to the local rural community may also be eligible. Funding is targeted to rural areas with populations of 10,000 or less. Applicants must be unable to obtain commercial financing at reasonable rates and terms or finance the project from existing resources.

The proposed project must serve a rural area not likely to decline in population below that for which the project is designed. The project should serve the present population and provide for foreseeable growth. Proposed projects should be necessary for orderly community development consistent with a comprehensive community or county development plan. Facilities must be modest in design, size, and cost. Water meters, a primary instrument for promoting conservation, are required by the agency. All water and wastewater systems must meet the standards set by the State Department of Environmental Quality.

The Rural Utilities staff review each project to determine need based on various priority points. Prioritization is necessary due to limited funding and to make sure that most deserving projects receive assistance.

When possible, loan funds are combined with other federal and state financing to reduce the end cost to users of the system. Depending on median household income (MHI) and need, communities may qualify for grant funds of up to 75% of the eligible project costs. These grants can help reduce water and waste disposal rates to reasonable levels. Rural Utilities loans have a term of up to 40 years or for the useful life of the facilities, whichever is less.

There are three different interest rates available for Rural Utilities loans:

- ***Poverty Line Rate.*** The poverty line rate of 4.5% per annum applies to communities with a MHI below the state poverty level or 80% of the non-urban population. There must be a health standard violation to receive the poverty loan rate.

- ***Intermediate Rate.*** The intermediate rate applies to projects in communities that are not eligible for the poverty rate and have a MHI of less than 100% of the non-urban or state MHI. The intermediate interest rate is set halfway between the poverty line interest and the market rate.

- ***Market Rate.*** The market rate applies to projects in communities who do not qualify for the lower rates and who have MHI exceeding 100% of the non-urban income from the State. The agency sets the intermediate and market rates quarterly, based on the bond market. The final rate for the project is the lowest rate in effect at the time of loan approval or closing.

To ensure the federal investment, the best security position practicable must be acquired. Acceptable forms of security for utility systems and public bodies include revenue bonds, other pledges of taxes or assessments, general obligation bonds, and assignment of income.

Grant fund eligibility is determined based on population, MHI, and user rates. Priority for grant funding is given to projects with populations of less than 5,500. Communities with low MHI may receive grant funding to reduce user costs to a reasonable level for rural residents. User rates are considered reasonable if they are less than or equal to existing prevailing rates in similar communities with similar systems.

Total grant funding cannot exceed the following percentage of eligible project development costs:

- 75% when the community meets poverty line interest rate criteria
- 45% when the community meets intermediate interest rate criteria

Maximum grant amounts based on MHI are provided in the following table.

**Table 8-1 – Maximum Rural Development Grant Funds (based on MHI)**

| *Median Household Income (MHI)* | *Maximum Grant* | *Interest Rate*[1] |
|---|---|---|
| <$32,984 | 75% | 2.75 % |
| $32,984 - $41,230 | 45% | 3.75% |
| >$41,230 | 0% | 4.625% |

[1] Interest rates as of April 2009

The MHI of the City of Depoe Bay reported in the 2000 Census was $35,417. At that time, the MHI statewide was $40,916. Based on the cited MHI for the City, it is estimated that the City of Depoe Bay would qualify for grant assistance for Rural Development.

There are other restrictions and requirements associated with these loans and grants. If the City becomes eligible for grant assistance, the grant will apply only to eligible project costs. Additionally, grant funds are only available after the City has incurred long-term debt resulting in an annual debt service obligation equal to 0.5% of the MHI. In addition, an annual funding allocation limits the Rural Development funds. To receive a Rural Development loan, the City must secure bonding authority, usually in the form of general obligation bonds or revenue bonds.

## Oregon Community Development Block Grant Program

Since the late 1980's, the state of Oregon has administered the U.S. Department of Housing and Urban Development's Community Development Block Grant (CDBG) funds for the non-entitlement cities and counties of the State. The primary objective of the program is the development of viable (livable) urban communities by expanding economic opportunities and providing decent housing and a suitable living environment principally for persons of low- and moderate-income. Each year the state develops an annual "Method of Distribution" that establishes how the funds will be used for the calendar year. The Method of Distribution can be found on the department's web site.

Grant funding is subject to the applicant need, availability of funds and any other restrictions in the 2008 Method of Distribution. Under the 2008 program, a maximum grant amount of $1,000,000 is available for water and wastewater improvement projects. Applications for the CDBG program are accepted on a year round basis and evaluated quarterly in a competitive review process.

For additional information on the CDBG program, cal (503) 986-0123 or visit the OECDD website at http://www.econ.state.or.us/cdbg.htm.

## Special Public Works Fund

The Special Public Works Fund program provides funding for the infrastructure that supports job creation in Oregon. Loans and grants are made to eligible public entities for the purpose of studying, designing, and building public infrastructure that leads to job creation or retention.

The 2001 Legislative Assembly expanded the program to help municipalities cope with financial loss associated with natural disasters. For emerge projects, eligible municipalities can apply for funding to meet the match required to receive federal funds.

The public entities or "municipalities" that are eligible to apply for Special Public Works Fund assistance include cities, counties, county service districts, Indian tribal councils, ports, and districts as defined in ORS 198.010.

The Special Public Works Fund is comprehensive in terms of the types of project costs that can be financed. As well as actual construction, eligible project costs can include costs incurred in conducting feasibility and other preliminary studies and for the design and construction engineering.

The Fund is primarily a loan program. Grants can be awarded, up to the program limits, based on job creation or on a financial analysis of the applicant's capacity for carrying debt financing.

The total loan amount per project cannot exceed $15 million. The department is able to offer very attractive interest rates that typically reflect low market rates. In addition, the department absorbs the associated costs of debt issuance thereby saving applicants even more on the overall cost of borrowing. Loans are generally made for 20-year terms, but can be stretched to 25 years under special circumstances.

For infrastructure projects, grants are offered to projects creating or retaining jobs based on $5,000 per job created or retained. If a grant is offered it cannot exceed 85 percent of the project cost or $500,000, whichever is less. Additional grants may be awarded if there is a gap between the grant for jobs plus the loan and the total project costs.

For more information on the Special Public Works Fund program, call (503) 986-0123 or visit the OECDD website at http://www.econ.state.or.us/spwf.htm.

## Water/Wastewater Financing Program

The Water/Wastewater Fund was created by the Oregon State Legislature in 1993. It was initially capitalized with lottery funds appropriated each biennium and with the sale of state revenue bonds since 1999. The purpose of the program is to provide financing for the design and construction of public infrastructure needed to ensure compliance with the Safe Drinking Water Act or the Clean Water Act.

The public entities that are eligible to apply for the program include: cities, counties, county service districts (organized under ORS Chapter 451), Indian tribal councils, ports, and special districts as defined in ORS 198.010.

Eligible activities include reasonable costs for construction improvements or expansion of drinking water, wastewater, or stormwater systems. Eligible projects include those related to drinking water source, treatment, storage and distribution; wastewater collection and capacity; stormwater systems; purchase of rights-of-way and easements necessary for construction; and design and construction engineering. All projects must ensure that municipal water and wastewater systems comply with the Safe Drinking Water Act or the Clean Water Act.

To be eligible a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency, associated with the Safe Drinking Water Act or the Clean Water Act. Projects also must meet other state or federal water quality statures and standards.

The Fund provides both loans and grants, but it is primarily a loan program. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources and other factors).

The Water/Wastewater Financing Program's guidelines, project administration, loan terms and interest rates are similar to the Special Public Works Fund program. The maximum loan term in 25 years or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is $15,000,000 per project through a combination of direct and/or bond funded loans. Loans are generally repaid with utility revenues or voter approved bond issues. A limited tax general obligation pledge may also be required. "Credit worthy" borrowers may be funded through sale of state revenue bonds.

Grant awards are limited to a maximum of $10,000 per hookup. The maximum grant is $750,000 per project. An applicant is not eligible for grant funds if the annual median household in the affected area is equal or greater than 100 percent of the State average median household income for the same year.

For more information on the Water/Wastewater Financing Program, call (503) 986-0123 or visit the OECDD website at http://www.econ.state.or.us/wtww.htm.

## Clean Water State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund (CWSRF) Loan Program administered by the Oregon Department of Environmental Quality (DEQ) provides low-cost loans for the planning, design and construction of a variety of projects that address water pollution. The loans through the CWSRF program are available to Oregon's public agencies, including cities, counties, sanitary districts, soil and water conservation districts, irrigation districts and various special districts.

Congress established the CWSRF in 1987 to replace the Construction Grants program, which had provided direct grants to communities to complete sewer infrastructure projects. The CWSRF program provides several types of loans and varying interest rates.

There are six different types of loans available within the program. These include traditional planning, design and construction loans. There are also loans available for emergencies, urgent repairs and local community projects. Each of these loan types has different financial terms and is intended to provide communities with choices when financing water quality improvements. Interest rates are based on the nation's bond buyer index and fluctuate quarterly. The interest rates of the various loans are substantially discounted from the bond rate. As an example, with a quarterly bond rate of 4.5%, the CWSRF interest rates would range from 1.13% to 2.93%. Loans include an annual loan fee of 0.5% of the outstanding balance. Planning loans are exempt from this fee.

Eligible projects include water quality related planning or studies, septic system repairs, wastewater reuse, various non-point source best management practices, stormwater control, riparian or wetland restoration, wastewater treatment projects, irrigation improvements, interim financing for some USDA programs, major sewer replacement and rehabilitation, infiltration and inflow correction, estuary management activities, and others.

All eligible proposed projects are ranked based upon their application information and entered on the program's Project Priority List. Points are assigned based on specific ranking criteria. Newly ranked projects are integrated into the priority list on a regular basis. The Project Priority Lists is incorporated within DEQ's annual Intended Use Plan that indicates the proposed use of the funds each year.

Projects are funded based on the availability of loan monies. If monies are insufficient to fund all the approved projects, funds are distributed to as many projects as possible based on the Project Priority List. Each time new monies become available, those monies are allocated to as many unfunded or partially funded projects as possible.

For additional information on the CWSRF loan program, call (800) 452-4011 or visit the DEQ website at http://www.deq.state.or.us/wq/loans/srfloans.htm.

# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# APPENDIX A

## CITY OF DEPOE BAY'S NPDES PERMIT

# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
# WASTE DISCHARGE PERMIT

Department of Environmental Quality
Western Region – Salem Office
750 Front Street NE, Suite 120, Salem, OR 97301-1039
Telephone: (503) 378-8240

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

**ISSUED TO:**

City of Depoe Bay
PO Box 8
Depoe Bay, OR 97341

**SOURCES COVERED BY THIS PERMIT:**

| Type of Waste | Outfall Number | Outfall Location |
|---|---|---|
| Treated Wastewater | 001 | Pacific Ocean |

**FACILITY TYPE AND LOCATION: INFORMATION:**

Activated Sludge Sewage
Treatment Plant located at 212 SW South Point Ave.
Depoe Bay, OR 97341

**Treatment System Class:** Level II
**Collection System Class:** Level II

**RECEIVING STREAM**

Basin: Mid Coast
Sub-Basin: Siltez/Yaquina
Receiving Stream: Pacific Ocean
Hydro Code: 10=*PACI 176.70 D
LLID: 1239400456524
County: Lincoln

**EPA REFERENCE NO:** OR002610-7
Issued in response to Application No. 988473 received December 1, 2000.
This permit is issued based on the land use findings in the permit record.

Gary Messer, Water Quality Manager
Western Region

March 13, 2003
Date

## PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:



Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

## SCHEDULE A

**1. Waste Discharge Limitations not to be exceeded after permit issuance.**

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

| Parameter | Average Effluent Concentrations Monthly | Average Effluent Concentrations Weekly | Monthly* Average lb/day | Weekly* Average lb/day | Daily* Maximum lbs |
|---|---|---|---|---|---|
| $BOD_5$ | 20 mg/L | 30 mg/L | 114 | 170 | 230 |
| TSS | 20 mg/L | 30 mg/L | 114 | 170 | 230 |

(2) November 1 - April 30:

| Parameter | Average Effluent Concentrations Monthly | Average Effluent Concentrations Weekly | Monthly* Average lb/day | Weekly* Average lb/day | Daily* Maximum lbs |
|---|---|---|---|---|---|
| $BOD_5$ | 30 mg/L | 45 mg/L | 200 | 300 | 400 |
| TSS | 30 mg/L | 45 mg/L | 200 | 300 | 400 |

* Average dry weather design flow to the facility equals 0.85 MGD. Average wet weather design flow to the facility equals 0.90 MGD. Mass load limits for discharge to the Pacific Ocean are based on what the facility can reasonably achieve and the highest monthly average discharge flow with a two year recurrence at the 20 year design.

(3)

| Other parameters (year-round) | Limitations |
|---|---|
| Fecal Coliform Bacteria | Shall not exceed 200 colonies per 100 ml monthly geometric mean, and 400 colonies per 100 ml weekly geometric mean. |
| pH | Shall be within the range of 6.0 - 9.0 |
| $BOD_5$ and TSS Removal Efficiency | Shall not be less than 85 % monthly average. |

(4) Except as provided for in OAR 340-45-080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-41-0245 except in the following defined mixing zone:

That portion of the Pacific Ocean within a 100 foot radius of the point of discharge.

## SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent

The facility influent sampling locations are the following:

* Influent composite samples are taken at the headworks prior to screening and grit removal.

| Item or Parameter | Minimum Frequency | Type of Sample |
|---|---|---|
| Total Flow (MGD) | Daily | Measurement |
| Flow Meter Calibration | Annually | Record date of calibration |
| $BOD_5$ | 2/Week | Composite |
| TSS | 2/Week | Composite |
| pH | 3/Week | Grab |

b. Treated Effluent Outfall 001

The facility effluent sampling locations are the following:

* Effluent composite samples are taken from the outfall pipeline following UV disinfection before the Parshall Flume.

| Item or Parameter | Minimum Frequency | Type of Sample |
|---|---|---|
| $BOD_5$ | 2/Week | Composite |
| TSS | 2/Week | Composite |
| pH | 3/Week | Grab |
| Fecal Coliform Bacteria | 1/Week | Composite |
| UV Radiation Intensity | Daily | Reading (See Note1) |
| Pounds Discharged ($BOD_5$ and TSS) | 2/Week | Calculation |
| Average Percent Removed ($BOD_5$ and TSS) | Monthly | Calculation |

c. Biosolids Management

| Item or Parameter | Minimum Frequency | Type of Sample |
|---|---|---|
| Sludge analysis including:<br>Total Solids (% dry wt.)<br>Volatile solids (% dry wt.)<br>Biosolids nitrogen for:<br>$NH_3$-N; $NO_3$-N; & TKN<br>(% dry wt.)<br>Phosphorus (% dry wt.)<br>Potassium (% dry wt.)<br>pH (standard units) | Annually when land applying | Composite sample to be representative of the product to be land applied. (See Note 2) |
| Sludge metals content for: Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg. | Annually when land applying | Composite sample to be representative of the product to be land applied. (See Note 2) |
| Record of locations where biosolids are applied on each DEQ approved site. (Site location maps to be maintained at treatment facility for review upon request by DEQ) | Each Occurrence | Date, volume & locations where biosolids were applied recorded on site location map. |
| Record of % volatile solids reduction accomplished through stabilization. | Annually | Calculation (See Note 3) |
| Quantity and type of lime product used to stabilize biosolids when required to meet federal Process to Significantly Reduce Pathogens (PSRP) regulations. | Each Occurrence | Record |
| Initial time when solids that received alkaline agent ascended to pH >= 12 | Each batch | Date, time, and actual pH measurement (corrected to standard at 25°C) |
| 2 hours after initial alkaline addition and sustained at pH >= 12 | Each batch | Date, time, and actual pH measurement (corrected to standard at 25°C) |

2. **Reporting Procedures**

a. Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the appropriate Department Office by the 15th day of the following month.

b. State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports shall also identify each system classification as found on page one of this permit.

c. Monitoring reports shall also include a record of the quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.

3. **Report Submittals**

a. The permittee shall have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by February 1 each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report shall state those activities that have been done in the previous year and those activities planned for the following year.

b. For any year in which biosolids are land applied, a report shall be submitted to the Department by February 19th of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-50-035(6)(a)-(e).

**NOTES:**

1. The intensity of UV radiation passing through the water column will affect the systems ability to kill organisms. To track the reduction in intensity, the UV disinfection system must include a UV intensity meter with a sensor located in the water column at a specified distance from the UV bulbs. This meter will measure the intensity of UV radiation in mWatts-seconds/cm2. The daily UV radiation intensity shall be determined by reading the meter each day. If more than one meter is used, the daily recording will be an average of all meter readings each day.

2. Composite samples from the digester withdrawal line shall consist of at least four aliquots of equal volume collected over an eight hour period and combined.

   Inorganic pollutant monitoring must be conducted according to Test Methods for Evaluating Solid Waste. Physical/Chemical Methods, Second Edition (1982) with Updates I and II and third Edition (1986) with Revision I.

3. Calculation of the % volatile solids reduction is to be based on comparison of a representative grab sample of total and volatile solids entering each digester (a weighted blend of the primary and secondary clarifier solids) and a representative composite sample of Biosolids exiting each digester withdrawal line (as defined in note 2 above).

## NPDES GENERAL CONDITIONS
## (SCHEDULE F)

### SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall 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.

4. 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 shall be submitted at least 180 days before the expiration date of this permit.

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

5. Permit Actions

This permit may be modified, suspended, 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; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

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

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants 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.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

## SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which 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 which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, 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 shall not be 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.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. 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.

8. Removed Substances

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

## SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall 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 shall 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.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The 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 shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by 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.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall 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.

6. 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 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

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

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of 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, 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 the Director at any time.

9. Records Contents

Records of monitoring information shall 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.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative 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.

## SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. 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 the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. 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 shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall 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;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information which must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

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

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall 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.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

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

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department 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 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 shall 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.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 μg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

## SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.
2. TSS means total suspended solids.
3. mg/L means milligrams per liter.
4. kg means kilograms.
5. $m^3/d$ means cubic meters per day.
6. MGD means million gallons per day.
7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.
8. FC means fecal coliform bacteria.
9. 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 340-41.
10. CBOD means five day carbonaceous biochemical oxygen demand.
11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.
12. Quarter means January through March, April through June, July through September, or October through December.
13. Month means calendar month.
14. Week means a calendar week of Sunday through Saturday.
15. Total residual chlorine means combined chlorine forms plus free residual chlorine.
16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
17. POTW means a publicly owned treatment works.

# CITY OF DEPOE BAY

## Wastewater Master Plan Update

# APPENDIX B

## COLLECTION SYSTEM IMPROVEMENTS

## DETAILED COST ESTIMATES

**Collection System Improvement #1**

Description: Replace existing pipeline from MH 23 to MH 22

Priority: 1

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 10,000 | $ 10,000 |
| 2 | Bypass | LS | 1 | $ 2,500 | $ 2,500 |
| 3 | 21-in Sewer | LF | 500 | $ 140 | $ 70,000 |
| 4 | Manhole | EA | 2 | $ 3,000 | $ 6,000 |
| 5 | Connect to existing Manhole | EA | 1 | $ 2,000 | $ 2,000 |
| 6 | Service Laterals (w/cleanout) | EA | 10 | $ 1,500 | $ 15,000 |
| | Construction Costs | | | | $ 105,500 |
| | Contingency (20%) | | | | $ 21,100 |
| | Subtotal | | | | $ 126,600 |
| | Engineering | | | | $ 25,320 |
| | Administration & Legal | | | | $ 6,330 |
| **Total Project Costs** | | | | | **$ 158,250** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 66.98** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #2**

Description: Replace existing pipeline from MH 43 to MH 32

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 130,000 | $ 130,000 |
| 2 | Traffic Control | LS | 1 | $ 39,000 | $ 39,000 |
| 3 | Wastewater Bypass | LS | 1 | $ 19,500 | $ 19,500 |
| 4 | 21-in Sewer (ODOT) | LF | 3900 | $ 240 | $ 936,000 |
| 5 | Manhole (ODOT) | EA | 12 | $ 6,000 | $ 72,000 |
| 6 | Connect to existing system | EA | 1 | $ 2,000 | $ 2,000 |
| 7 | Service Laterals (w/cleanout) | EA | 10 | $ 1,500 | $ 15,000 |
| | Construction Costs | | | | $ 1,213,500 |
| | Contingency (20%) | | | | $ 242,700 |
| | Subtotal | | | | $ 1,456,200 |
| | Engineering | | | | $ 291,240.0 |
| | Administration & Legal | | | | $ 72,810.00 |
| **Total Project Costs** | | | | | **$ 1,820,250** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 770.48** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #3**

Description: Replace existing pipeline from MH 19 to Harbor Pump Station

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 30,000 | $ 30,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 7,250 | $ 7,250 |
| 3 | 21-in Sewer | LF | 1450 | $ 140 | $ 203,000 |
| 4 | Manhole | EA | 7 | $ 3,000 | $ 21,000 |
| 5 | Connect to existing system | EA | 1 | $ 2,000 | $ 2,000 |
| 6 | Service Laterals (w/cleanout) | EA | 5 | $ 1,500 | $ 7,500 |
| | Construction Costs | | | | $ 270,750 |
| | Contingency (20%) | | | | $ 54,150 |
| | Subtotal | | | | $ 324,900 |
| | Engineering | | | | $ 64,980.0 |
| | Administration & Legal | | | | $ 16,245.00 |
| **Total Project Costs** | | | | | **$ 406,125** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 171.90** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #4**

Description: Replace existing pipeline from MH 10 to MH 8

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 15,000 | $ 15,000 |
| 2 | Traffic Control | LS | 1 | $ 4,000 | $ 4,000 |
| 3 | Wastewater Bypass | LS | 1 | $ 2,000 | $ 2,000 |
| 4 | 21-in Sewer (ODOT) | LF | 400 | $ 240 | $ 96,000 |
| 5 | Manhole (ODOT) | EA | 4 | $ 6,000 | $ 24,000 |
| 6 | Service Laterals (w/cleanout) | EA | 6 | $ 1,500 | $ 9,000 |
| | Construction Costs | | | | $ 150,000 |
| | Contingency (20%) | | | | $ 30,000 |
| | Subtotal | | | | $ 180,000 |
| | Engineering | | | | $ 36,000.0 |
| | Administration & Legal | | | | $ 9,000.00 |
| **Total Project Costs** | | | | | **$ 225,000** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 95.24** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #5**

Description: Replace existing pipeline from MH 29 to MH 23

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 75,000 | $ 75,000 |
| 2 | Traffic Control | LS | 1 | $ 20,000 | $ 20,000 |
| 3 | Wastewater Bypass | LS | 1 | $ 10,000 | $ 10,000 |
| 4 | 21-in Sewer (ODOT) | LF | 2000 | $ 240 | $ 480,000 |
| 5 | Manhole (ODOT) | EA | 8 | $ 6,000 | $ 48,000 |
| 6 | Service Laterals (w/cleanout) | EA | 30 | $ 1,500 | $ 45,000 |
| | Construction Costs | | | | $ 678,000 |
| | Contingency (20%) | | | | $ 135,600 |
| | Subtotal | | | | $ 813,600 |
| | Engineering | | | | $ 162,720.0 |
| | Administration & Legal | | | | $ 40,680.00 |
| **Total Project Costs** | | | | | **$ 1,017,000** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 430.48** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #6**

Description: Replace existing pipeline from MH 3 to Wastewater Treatment Plant

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 20,000 | $ 20,000 |
| 2 | Wastewater Bypass | LS | 1 | $ 4,500 | $ 4,500 |
| 3 | 24-in Sewer | LF | 875 | $ 150 | $ 131,250 |
| 4 | Manhole | EA | 4 | $ 3,000 | $ 12,000 |
| 5 | Connect to existing system | EA | 1 | $ 2,000 | $ 2,000 |
| 6 | Service Laterals (w/cleanout) | EA | 5 | $ 1,500 | $ 7,500 |
| | Construction Costs | | | | $ 177,250 |
| | Contingency (20%) | | | | $ 35,450 |
| | Subtotal | | | | $ 212,700 |
| | Engineering | | | | $ 42,540 |
| | Administration & Legal | | | | $ 10,635 |
| **Total Project Costs** | | | | | **$ 265,875** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 112.54** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

**Collection System Improvement #7**

Description: Replace existing pipeline from Fogerty Creek Pump Station to MH 43

Priority: 2

| Item | Description | Unit | Quantity | Unit Price | Total Amount |
|---|---|---|---|---|---|
| 1 | Mobilization | LS | 1 | $ 20,000 | $ 150,000 |
| 2 | Traffic Control | LS | 1 | $ 50,000 | $ 50,000 |
| 3 | Wastewater Bypass | LS | 1 | $ 25,000 | $ 25,000 |
| 4 | 21-in Sewer (ODOT) | LF | 5000 | $ 240 | $ 1,200,000 |
| 5 | Manhole | EA | 10 | $ 6,000 | $ 60,000 |
| 6 | Connect to existing system | EA | 2 | $ 2,000 | $ 4,000 |
| | Construction Costs | | | | $ 1,489,000 |
| | Contingency (20%) | | | | $ 297,800 |
| | Subtotal | | | | $ 1,786,800 |
| | Engineering | | | | $ 357,360 |
| | Administration & Legal | | | | $ 89,340 |
| **Total Project Costs** | | | | | **$ 2,233,500** |
| | **% SDC Eligible** | | | | **100%** |
| | **New EDUs** | | | | **2,362.5** |
| **SDC Fee** | | | | | **$ 945.40** |

Note: Cost Estimate does not include any cost for rock excavation.
Number of laterals based on existing developed tax lot.
Assumes an average rate of installation of 70 LF/day

Expiration Date: Aug. 31, 2023
Permit Number: 101383
Federal ID: OR0026107
File Number: 24095


**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**
**WASTE DISCHARGE PERMIT**
Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Dr. SE
Telephone: 800-349-7677

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

**ISSUED TO:**
City of Depoe Bay Sewage Treatment Facility
PO Box 8
Depoe Bay, OR 97341

**SOURCES COVERED BY THIS PERMIT:**

| Type of Waste | Outfall Number | Outfall Location |
|---|---|---|
| Treated Wastewater | 001 | Pacific Ocean<br>Latitude: 44.900838<br>Longitude: -124.070353 |

**FACILITY LOCATION:**
City of Depoe Bay
212 South Point St.
Depoe Bay, OR 97341

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

**RECEIVING STREAM INFORMATION:**
WRD Basin: Mid Coast
USGS Sub-Basin: Siletz-Yaquina
Receiving Stream name: Pacific Ocean
LLID: 1239400456524

County: Lincoln

EPA REFERENCE NO. : OR0026107

Issued in response to Application No. 957510 received December 24, 2015. This permit is issued based on the land use findings in the permit record.

| | | |
|---|---|---|
| Ranei Nomura, Water Quality Manager<br>Western Region | September 17, 2018<br>Signature Date | October 7, 2018<br>Effective Date |

## MINOR 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.

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## 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 | 114 | 170 | 230 |
| TSS | 20 | 30 | 114 | 170 | 230 |

ii. November 1 – April 30: 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 | | | |
| $BOD_5$ | 30 | 45 | 200 | 300 | 400 |
| TSS | 30 | 45 | 200 | 300 | 400 |

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

(A) Average dry weather design flow to the facility equals 0.85 MGD. Mass loads have been individually assigned based on what the plant can reasonably achieve and the highest monthly average discharge flow with a two year recurrence at the 20 year design of the facility.

b. Additional Parameters.

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

**Table A2: 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 | A monthly geometric mean of 35 organisms per 100 mL. No more than 10% of the samples may exceed 130 organisms per 100 mL. |
| Fecal Coliform Bacteria | A monthly median concentration of 14 organisms per 100 mL. No more than 10% of the samples may exceed 43 organisms per 100 mL |

| Year-round (except as noted) | Limits |
|---|---|
| pH | Must be within the range of 6.0 - 9.0 s.u. |

**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 within a one hundred (100) foot radius of the discharge. The Zone of Immediate Dilution (ZID) is 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 A3 below. Biosolids exceeding the pollutant concentrations in Table A3 must be applied at a rate that does not exceed the corresponding cumulative pollutant loading rates.

**Table A3: 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 |
| Molyb-denum | 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 § 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 Pre-treatment 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 § 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 prior to screening and grit removal according to the following table:

**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 | 2/Week | Composite | 1. Monthly average |
| TSS (00530) | mg/L | Year-round | 2/Week | Composite | 1. Monthly average |
| pH (00400) | SU | Year-round | 3/week | Grab | 1. Daily max<br>2. Daily min |

## 3. Effluent Monitoring and Reporting Requirements

The permittee must monitor effluent Grab and Composite samples for Outfall 001 after UV disinfection at the Parshall flume and report results as listed below.

**Table B2: Effluent Monitoring**

| Item or Parameter (ICIS Code) | 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 | 2/week | Composite | 1. Monthly average<br>2. Weekly averages |
| TSS (00530) | mg/L | Year-round | 2/week | Composite | 1. Monthly average<br>2. Weekly averages |
| $BOD_5$ (00310) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>3. Weekly averages |
| TSS (00530) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>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 |
| Temperature (00010) | °C | Year-round | 3/week | Grab | 1. Monthly maximum<br>2. Monthly minimum |
| Fecal Coliform (31641) | #/100 mL | Year-round | 2/week | Grab | 1. Monthly median<br>2. Percent of samples exceeding limit |
| Enterococci (61211) | #/100 mL | Year-round | 2/week | Grab | 1. Monthly geomean<br>2. Percent of samples exceeding limit |
| pH (00400) | SU | Year-round | 3/week | Grab | 1. Daily minimum<br>2. Daily maximum |

| Item or Parameter (ICIS Code) | Units | Time Period | Minimum Frequency | Sample Type/Required Action | Report Statistic |
|---|---|---|---|---|---|
| UV Intensity (49607) | $mW/cm^2$ | Year-round | Daily | Measurement | 1. Daily maximum<br>2. Daily minimum<br>3. Monthly average |
| UV Transmit-tance (51043) | % | Year-round | Daily | Measurement | 1. Daily maximum |
| Alkalinity (00410) (for effluent char-acterization purposes) | mg/L | Year-round | 2/week | Grab | 1. Weekly maximum<br>2. Weekly minimum |
| Notes:<br>a. Percent removal is to be calculated on a monthly basis. Percent removal = $((BOD_{inf} - BOD_{eff})/BOD_{inf})$ x 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):<br>1) Total Kjeldahl Nitrogen (TKN)<br>2) Nitrate-Nitrogen ($NO_3$-N)<br>3) Ammonium Nitrogen ($NH_4$-N)<br>4) Total Phosphorus (P)<br>5) Potassium (K)<br>6) pH (S.U.)<br>7) Total Solids<br>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 |

| Item or Parameter | Minimum Frequency | Sample Type |
|---|---|---|
| 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. |
| Record of biosolids hauled to landfill: date, quantity, location. | Each event | Record the date, quantity, and name of landfill. |

**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<br>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:<br>• DEQ Regional Office<br>• 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).<br>2. Table B3: Biosolids Monitoring | Annually | February 19 | Electronic copy | One each to:<br>• DEQ Regional Office<br>• DEQ Biosolids Program Coordinator. |
| Inflow and infiltration report | 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 48 months of permit effective date | 1 hard copy, and electronic copy in DEQ-approved format | DEQ Pretreatment Coordinator |

| Reporting Requirement | Frequency | Due Date (See note a.) | Report Form (unless otherwise specified in writing) | Submit To: |
|---|---|---|---|---|
| Outfall Inspection Report (see Schedule B) | Every 5 years | Within 36 months of permit effective date | 1 hard copy, and electronic copy in DEQ-approved format | DEQ Regional Office |

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 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 A3.

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 after receiving written DEQ approval of a hauled waste control plan. Hauled wastes may include wastewater solids from another wastewater treatment facility, septage, grease trap wastes, portable and chemical toilet wastes, landfill leachate, groundwater remediation wastewaters and commercial/industrial wastewaters.

**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 full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification as specified on p. 1 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.

b. 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.

c. 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.

d. 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.

e. 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 § 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.

Oregon Department of Environmental Quality

# National Pollutant Discharge Elimination System

## Permit Evaluation Report and Fact Sheet

**June 4, 2018 Draft**

ISSUED

DEQ
State of Oregon Department of Environmental Quality

Western Region
4026 Fairview Industrial Dr. SE
Salem, OR 97302
503-378-8240

| | |
|---|---|
| **Permittee:** | City of Depoe Bay<br>PO Box 8<br>Depoe Bay, OR 97341 |
| **Existing Permit Information:** | File Number: 24095<br>Permit Number: 101383<br>Expiration Date: June 30, 2016<br>EPA Reference Number: OR0026107 |
| **Source Contact:** | Brady Weidner, Superintendent<br>541-765-3005 |
| **Facility Site Location:** | Depoe Bay Wastewater Treatment Plant<br>212 South Point St.<br>Depoe Bay, OR 97341<br>Lincoln County |
| **LLID:** | 1239400456524, Pacific Ocean |
| **Receiving Stream/Basin:** | Pacific Ocean<br>Mid Coast Basin<br>USGS Sub-basin: Siletz-Yaquina |
| **Proposed Action:** | Renew Permit<br>Application Number: 957510<br>Date Received: December 24, 2015 |
| **Source Category:** | NPDES Minor – Domestic |
| **Sources Covered:** | Domestic Wastewater |
| **Permit Type:** | NPDES Domestic C2a |
| **Permit Writer:** | Robert Dicksa<br>Senior Water Quality Permit Writer, Western Region-Salem |

**City of Depoe Bay**
**NPDES Permit Renewal Evaluation Report**

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# 1.0 Introduction

The Department of Environmental Quality (DEQ) proposes to renew the National Pollutant Discharge Elimination System (NPDES) wastewater permit for the City of Depoe Bay located at 212 S Point St, Depoe Bay, Oregon (Latitude 44.800646, Longitude -124.066471). This permit regulates the discharge of treated domestic wastewater effluent through Outfall 001 to the Pacific Ocean. The permit also authorizes the City of Depoe Bay to process, dispose of, or beneficially reuse wastewater solids.

The purpose of this permit fact sheet is to explain and provide justification for the permit.

The Federal Water Pollution Control Act of 1972 (also known as the Clean Water Act) and its subsequent amendments, as well as Oregon Revised Statutes (ORS 468B.050), require a NPDES permit for the discharge of wastewater to surface waters. This proposed permit action by DEQ complies with both federal and state requirements.

# 2.0 Permit History

## 2.1 Issuance, Renewal and Modifications

The current NPDES Permit expired on June 30, 2016. DEQ received renewal application number 957510 from the City of Depoe Bay on December 24, 2015. Because the permittee submitted a renewal application to DEQ in a timely manner, the current permit will not expire until DEQ takes final action on the renewal application as per Oregon Administrative Rules (OAR 340-045-0040).

## 2.2 Compliance History

The facility was last inspected on February 23, 2017. No violations were noted during the inspection. The permittee did not receive any permit violations since the last permit renewal. The collection system experienced multiple sanitary sewer overflows (SSOs) every winter during winter storm events. These events were reported by the permittee in a timely manner and determined to be beyond the reasonable control of the permittee. Therefore, DEQ used enforcement discretion and did not take any enforcement actions based upon these events.

# 3.0 Facility description

## 3.1 Wastewater Facilities Description

The City of Depoe Bay wastewater treatment facility was originally constructed in 1975 and upgraded in 2000 with the addition of a second aeration basin. The facility uses the conventional activated sludge process to treat raw sewage. The current facility consists of a head works that has rag and grit removal, influent composite sampling, and in-line magnetic flow meter that measures influent flows from the main pump station. The secondary treatment unit comprises two annular aeration basins, two secondary clarifiers, and sludge storage. The sludge is treated with lime to meet state biosolids rules in accordance with OAR 340-050. The facility uses Ultra Violet (UV) sterilization to disinfect the treated wastewater prior to discharge to the Pacific Ocean through Outfall 001.

**Figure 1: Aerial Photo of Depoe Bay Wastewater Treatment Plant and Outfall 001**

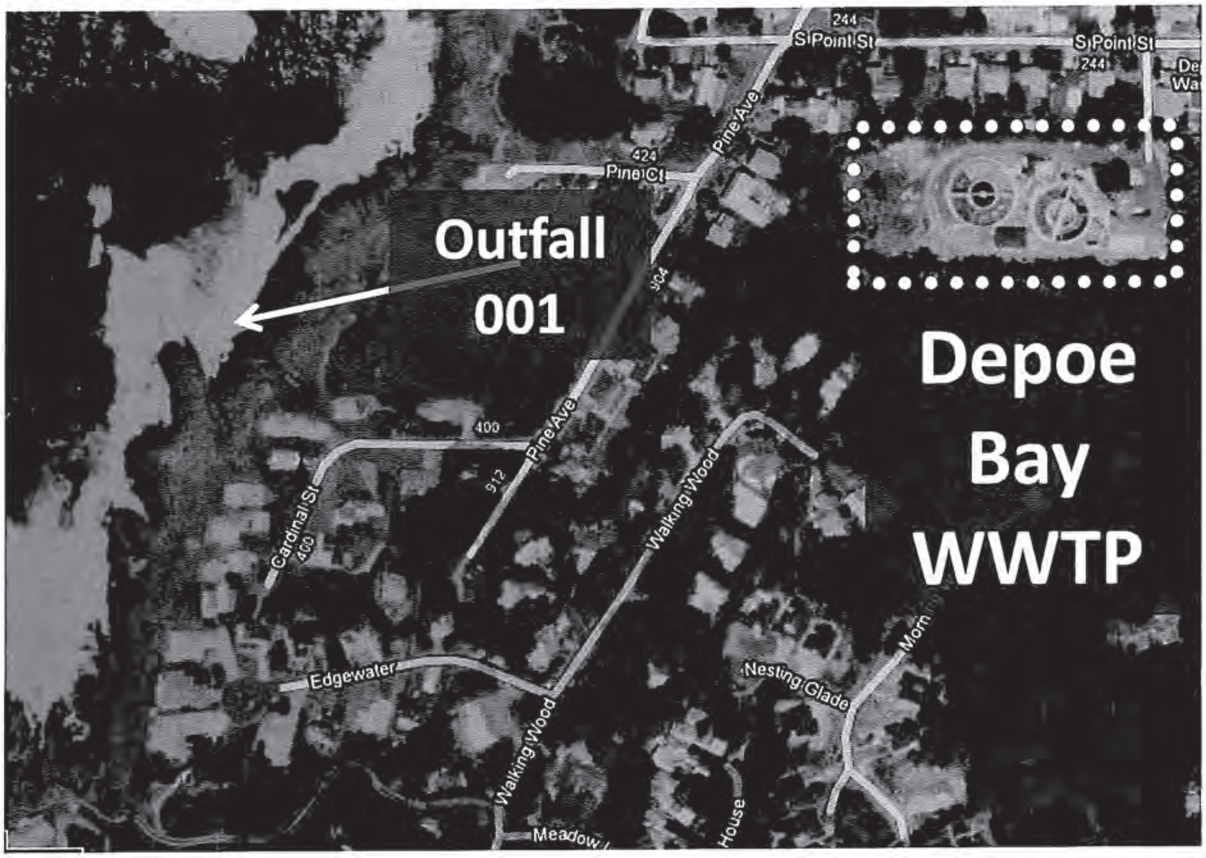
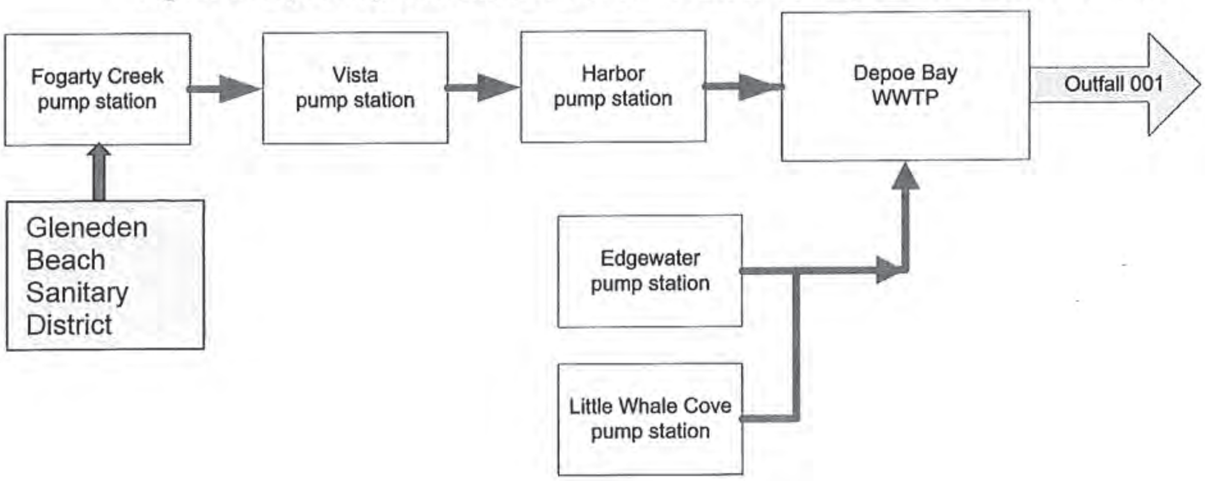



**Figure 2: Depoe Bay Wastewater Treatment Plant and Pump Station Flow Schematic**




## 3.2 Outfalls

The City measures effluent flow using a Parshall flume and then treated, sterilized, wastewater flows about ½ mile through Outfall 001 into the Pacific Ocean. Outfall 001 discharges approximately 6 feet from shore at a depth of about 4 feet. The outfall pipe is an 8-inch ductile iron pipe with two 4-inch diffusers. The outfall is submerged in the surf zone at all times and is located approximately at Latitude 44.80210, Longitude -124.071589.

## 3.3 Sewage Collection System

Sewage collection systems are designed to collect and transport raw sewage from residences and businesses to the municipality's wastewater treatment facility. The Depoe Bay collection system is a conventional gravity flow system that consists of four lift stations (Vista, Harbor, Little Whale Cove, and Edgewater) in addition to the influent pump station. The facility also receives sewage from Gleneden Beach Sanitary District. The Gleneden Sanitary District has several small lift stations and on large one at Fogarty Creek State Park. The Fogarty Creek lift station pumps sewage the other lift stations in sanitary district to the northern section of the Depoe Bay collection system.

As collection systems age, the pipes develop cracks, allowing the infiltration of groundwater. Stormwater may also enter the system. Though no longer allowed under current plumbing codes, it was common to connect stormwater drains directly to sewers. The entry of groundwater and stormwater into the collection system is known as infiltration and inflow, or I/I.

When a collections system experiences excessive I/I, most of the flow that makes it to the treatment plant may be stormwater or groundwater that by itself does not require treatment. This can result in the following:

- Overflows from the sanitary sewer system when it rains. These are referred to as SSOs (sanitary sewer overflows).
- The release of untreated or partially treated sewage from all or a portion of the treatment plant. Such a release is termed a bypass. Bypasses may be necessary to avoid damaging the plant.
- Increased operation and maintenance costs.
- Prevent the facility from meeting the percent removal limits for Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS).

DEQ uses the ratio of the maximum monthly average flow to the actual average dry weather flow to assess inflow and infiltration (I/I) because DEQ believes that I/I results from cumulative rainfall events. The highest monthly average flow in the last three years was 1.061 MGD in, December 2015; the actual average dry weather flow, calculated using flow data submitted on the application forms and monthly discharge monitoring reports (DMRs) for the last three years is 0.443 MGD. The ratio of the maximum monthly average flow to the average dry weather flow determines a Peaking Factor (PF). Peaking factors less than five, indicate that a collection system does not experience significant I/I. DEQ calculated a peaking factor of 2.4 for the City of Depoe Bay collection system which indicates the system is not experiencing significant I/I.

DEQ recognizes that it is not practical to attempt to build and operate treatment plants and collection systems to eliminate all bypasses or overflows, and attempts to do so represent a poor investment of public funds. Therefore, DEQ is interested in encouraging communities to reduce the rate of SSOs and bypasses. Therefore, the permit requires the following:

- The municipality must develop a program to reduce I/I and submit a progress report on an annual basis (see Schedule D, Condition 1).
- The municipality must develop and maintain an emergency response and public notification plan to cover bypass and SSO events (Schedule F, sections B.7 and B.8).

The municipality must report all SSOs and bypasses (Schedule F, sections B.6, B.7 and B.8).

## 3.4 Recycled Water

The permit holder does not currently operate a recycled water program and does not intend to do so during the term of this permit.

## 3.5 Wastewater Solids

The purpose of this section is to describe and document how wastewater solids are handled in the treatment plant. The term wastewater solid includes sewage sludge and biosolids. Sewage sludge refers to solids from primary, secondary, or advanced treatment of domestic wastewater that have not been treated or determined to be suitable for land application as fertilizer or soil amendment. The term biosolids refers to domestic wastewater treatment facility solids that have undergone adequate treatment and are suitable for application to the land as a fertilizer or soil amendment.

The City uses aerobic digestion for Volatile Solids Reduction (VSR) as the main method of pathogen reduction and vector control for generating Class B biosolids. A licensed contractor hauls the digested biosolids for land application to a DEQ approved site in Logsden, Oregon on a semi-annual basis. The specific site location and authorization letter may be obtained from the current biosolids management plan and is available upon request.

The City is proposing to install a new dewatering screw press to generate dried Class B biosolids that will be transported to a landfill. This will help reduce the urgency and amount of liquid Class B biosolids to be land applied.

The City's biosolids management plan (BMP) was last updated on October 13, 2011. The existing BMP will be updated to include the process of producing the dried Class B solids to be hauled to the land fill for beneficial use. The updated BMP will be available for public comment as part of the public notice process for this proposed permit renewal.

The City submits annual biosolids reports in compliance with the existing permits Schedule B reporting requirements. The last report was submitted on February 10, 2017. The proposed permit will retain the Schedule B monitoring and annual biosolids land application report requirements. In addition, the proposed permit will include the requirements for hauling the Class B solids to the landfill for beneficial use. Schedule D contains other special conditions for biosolids requirements.

## 3.6 Storm Water

Stormwater is not addressed in this permit. General NPDES permits for stormwater are not required for facilities with a design flow of less than 1 MGD.

## 3.7 Groundwater

Based on DEQ's current information, this facility has a low potential for adversely impacting groundwater quality. All treatment units are constructed of impervious materials. All wastewater and process related residuals shall be managed and disposed of in a manner that will prevent any violation of the DEQ's groundwater quality protection rules (OAR 340-040). Schedule A of the proposed permit includes a condition prohibiting adverse impacts to groundwater.

## 3.8 Industrial Pre-treatment

Municipalities that receive wastewater from certain categories of industries must have in place approved pre-treatment programs. These programs are designed to reduce the discharge of pollutants from identified industries that the treatment plant is not able to treat. These pollutants can interfere with treatment plant operation, reduce the value of wastewater and biosolids for reuse, cause worker health or safety concerns, and pose a risk to the public or the environment.

The permittee does not have a DEQ-approved industrial pre-treatment program. No industrial pre-treatment program is needed for this facility based on the information in the application. Schedule D of the proposed permit has a requirement for the permittee to conduct an industrial user survey every five years. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the wastewater facility, and ensure regulatory oversight of these discharges to state waters.

# 4.0 Receiving Water

## 4.1 Designated Uses

Under the Clean Water Act, DEQ is required to identify the beneficial uses of every waterbody in Oregon. The intent of this requirement is to insure that the water quality standards DEQ develops are consistent with how the waterbody is used. Permits issued by DEQ must in turn reflect the water quality standards that apply to the basin in which permits are issued.

The City of Depoe Bay discharges to the Pacific Ocean. The following beneficial uses have been identified for the marine waters of the Pacific Ocean.

- industrial water supply,
- fish and aquatic life (not including salmonid rearing, migration and spawning),
- wildlife and hunting,
- fishing,
- boating,
- water contact recreation,
- aesthetic quality, and
- commercial navigation and transportation

The water quality standards for the Mid-Coast Basin developed to protect these beneficial uses can be found in Oregon Administrative Rules 340-041-0220.

## 4.2 Receiving Stream Water Quality

The Pacific Ocean in the vicinity of the Depoe Bay outfall is not water quality limited and therefore, not on DEQ's list of impaired waterbodies (303(d) List).

Federal rules (40 CFR § 125.120 – 40 CFR § 125.124) require that a discharge into territorial seas that is to be permitted under the NPDES program be evaluated as to whether the discharge will cause unreasonable degradation of the marine environment. Goals 6 and 19 of Oregon's Statewide Planning Goals and Guidelines and Oregon's Territorial Seas Plan require that the State's marine resources be conserved.

DEQ believes that the intent of these criteria is to reduce or prevent the discharge of those persistent pollutants that bio-accumulate in the marine food chain. Pollutants found in sewage that are amenable to treatment by typical wastewater treatment facilities include Biochemical Oxygen Demand, Total Suspended Solids, pH, bacteria, nutrients, and potentially toxic substances like chlorine used for disinfection of pathogenic organisms.

BOD, TSS and pH are not discrete substances that can accumulate in living organisms. BOD is a measure of the oxygen used by microorganisms when they break down organic matter. TSS is a measure of organic and inorganic solid materials that are suspended in the water column. The pH parameter is a measure of the amount of hydrogen ions in solution.

Residual chlorine in treated wastewater, if any, immediately reacts with bromide naturally present in seawater to produce other oxidants that are toxic to living organisms, i.e., have the same sanitizing effects as chlorine. These other oxidants are referred to as chlorine produced oxidants. Chlorine, which is still present in the reaction products, is too reactive to be bioavailable from soil, water, or other environmental media and too reactive to bio-accumulate in the food chain.

Bacteria do not bio-accumulate in other living organisms.

Nutrient, e.g., nitrogen and phosphorus, can have deleterious effects on the marine environment by stimulating algal blooms. These algal blooms have the potential to cause turbidity problems and fluctuation in dissolved oxygen and pH. However, nutrients do not bio-accumulate in the tissues of living organisms and do not bio-magnify in the trophic levels of marine food chains.

There is little potential to impact recreational beach users because of the outfall location. Access to the outfall location is limited and dangerous because it is located at the base of a cliff. The findings for threatened and endangered species, both federal and state listings, indicated that of those which may possibly occur in Lincoln County, "the review of the species determined that none of the listed species present or possibly present with the 1.0 mile radius are likely to be adversely affected by the outfall." The effluent is disinfected using ultra violet light so the potential impacts to aquatic life from residual chlorine in not an issue. The findings also included mapping and listing of marine and near-shore resources of the area, including a habitat refuge just beyond the 1.0 mile radius of the outfall. DEQ has concluded that the discharge from the Depoe Bay wastewater treatment plant will not cause unreasonable degradation of the marine environment.

## 4.3 Mixing Zone Analysis

Permits issued by DEQ sometimes specify mixing zones. Also known as, "allocated impact zones" or "regulatory mixing zones", mixing zones are allowed under both state and federal regulation. They are areas in the vicinity of outfalls in which all or some of Oregon's water quality standards can be suspended. DEQ allows mixing zones when the overall impact, evaluated with respect to Oregon's Mixing Zone Rule (OAR 340-041-0053) appears to be negligible.

Two mixing zones can be developed for each discharge: 1) The acute mixing zone, also known as the "zone of initial dilution" (ZID), and 2) the chronic mixing zone, usually referred to as "the mixing zone." The ZID is a small area where acute criteria can be exceeded as long as it does not cause acute toxicity to organisms drifting through it. The mixing zone is an area where acute criteria must be met but chronic criteria can be exceeded. It must be designed to protect the integrity of the entire water body.

The existing permit for the City of Depoe Bay Outfall 001, specifies a mixing zone as follows:

*The regulatory mixing zone is that portion of the Pacific Ocean within a one hundred (100) foot radius of the 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.*

The City of Depoe Bay submitted their permit renewal application prior to DEQ's 2007 Internal Management Directive on Regulatory Mixing Zones and the City was not required to submit an updated study. Performing a field study was not possible due to safety reasons and the location of Outfall 001. DEQ decided to use a simplified computer modeling approach. Using available data, DEQ was able to model the mixing zone and establish RMZ and ZID dilutions. The CORMIX modeling analysis results are contained in a memo dated September 27, 2011, and is available for review. The results of the modeling analysis are in the table below:

**Depoe Bay Dilution Analysis Results**

| | Effluent Flow (mgd) | Depth (feet) | Velocity (ft/s) | Dilution |
|---|---|---|---|---|
| Summer ZID | 0.93 | 4 | 0.8 | 10 |
| Summer MZ | 0.85 | 4 | 0.8 | 54 |
| Winter ZID | 1.5 | 6 | 1.5 | 13 |
| Winter MZ | 0.89 | 6 | 1.5 | 99 |

Schedule A of the proposed permit retains the same mixing zone language as the existing permit.

# 5.0 Overview of permit development

## 5.1 Types of Permit Limits

Effluent limitations serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants or limits that are protective of the water quality standards for the receiving water. These two types of permit limits are referred to as technology-based effluent limitations (TBELs) and water quality-based effluent limits (WQBELs) respectively. When a TBEL is not restrictive enough to protect the receiving stream, a WQBEL must be placed in the permit. More explanation of each is provided below.

- TBELs:
  - The intent of TBELs is to require a minimum level of treatment of pollutants based on available treatment technologies, while allowing the discharger to use any available control technique to meet the limits
  - TBELs for municipal treatment plants, also known as federal secondary treatment standards have been developed for the following parameters: biochemical oxygen demand measured over 5 days (BOD5), total suspended solids (TSS) and pH. These are found in the Code of Federal of Federal Regulations (CFR) and are known as secondary treatment standards. The CFR also allows special considerations and exceptions to these standards for certain circumstances and types of treatment facilities such as lagoons.
- WQBELs:
  - The intent of WQBELs is to ensure the water quality standards of a receiving stream are met. The water quality standards are developed to protect the beneficial uses of the receiving stream such as swimming and fishing. In many cases TBELs are not restrictive enough to ensure the receiving stream meets water quality standards. In these cases, WQBELs need to be established to protect the receiving stream.
  - Oregon is unique in that it has minimum design criteria for BOD and TSS that are only applicable to sewage treatment plants. These design criteria vary by watershed basin and were developed to protect water quality in their respective basins. These are often times more stringent than the federal secondary treatment standards. When this is the case, the basin standards supersede the federal standards.

TBELs are likely to be the most stringent if the receiving stream is large relative to the discharge, and WQBELs are likely to be the most stringent when the receiving stream is small or does not meet water quality standards.

In some cases, both a TBEL and a WQBEL will be developed for a particular parameter. Permit writers must include the more stringent of the two in the permit.

Permit limits for bacteria are WQBELs when they are derived from the water quality standards found in OAR 340-041-0009 for freshwater, marine, and estuarine waters or 40 CFR § 131.41 for coastal recreation waters. Bacteria limits are designed to protect human health when swimming or eating shellfish. Note: When enforcing permit limits, the department evaluates bacteria limitation violations without any mixing because bacteria violations are typically due to the failure of disinfection equipment.

Each time a permit is renewed, the permit writer evaluates the existing limits to see if they need to be modified as a result of changes to technology based standards or water quality standards that may have occurred during the permit term. Anti-backsliding provisions (described in 40 CFR § 122.44(l)) generally do not allow relaxation of effluent limits in renewed/reissued permits. The more stringent of the existing or new limits must be included in the renewal permit.

## 5.2 Existing Permit Limits

The existing permit limits are as follows:

Treated Effluent Outfall 001

(1) May 1 – October 31

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly* Average (lbs/day) | Weekly* Average (lbs/day) | Daily* Maximum (lbs/day) |
|---|---|---|---|---|---|
| $BOD_5$ | 20 mg/L | 30 mg/L | 114 | 170 | 230 |
| TSS | 20 mg/L | 30 mg/L | 114 | 170 | 230 |

(2) November 1 – April 30

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly* Average (lbs/day) | Weekly* Average (lbs/day) | Daily* Maximum (lbs/day) |
|---|---|---|---|---|---|
| $BOD_5$ | 30 mg/L | 45 mg/L | 200 | 300 | 400 |
| TSS | 30 mg/L | 45 mg/L | 200 | 300 | 400 |

**Average dry weather design flow to the facility equals 0.85 MGD. Mass load limits have been individually assigned and have been retained from a previous permit.*

(3) Other Parameters

| Year-round (except as noted) | Limitations |
|---|---|
| Fecal Coliform Bacteria | May not exceed a monthly median of 14 organisms per 100 mL with no more than ten percent of the samples exceeding 43 organisms per 100 mL. |
| Enterococci Bacteria | May not exceed a monthly geometric mean of 35 organisms per 100 mL. |
| pH | Must be within the range of 6.0 - 9.0 |
| $BOD_5$ and TSS Removal Efficiency | Must not be less than 85% monthly average for $BOD_5$ and 85% monthly for TSS. |

As part of this renewal, some of these permit limits are being modified. The basis for developing the new limits is described in detail in Section 6.2.

## 5.3 Overview of Whole Effluent Toxicity (WET) Analysis

There are no WET test requirements for this draft permit renewal.

## 5.4 Trading

There are no trading requirements included in this draft permit renewal.

## 5.5 Recycled Water

There are no recycled water requirements included in this draft permit renewal.

## 5.6 Biosolids

Biosolids may be used as a soil amendment and fertilizer on agricultural land. For this beneficial use to be allowed, wastewater solids must meet federal criteria for pathogen reduction (Class A or Class B biosolids), vector attraction reduction for sludge stability, nutrients and pollutant concentrations (40 CFR Part 503).

OAR 340-050-0031 requires facilities that reuse biosolids through land application to maintain a biosolids management plan and land application plan. The biosolids management plan describes how the facility will generate biosolids that are suitable for beneficial use as a fertilizer or soil amendment via land application. The land application plan identifies and describes the management of current and potential biosolids land application sites. Conditions in the biosolids management plan and land application plan are enforceable permit conditions. The existing biosolids management plan and land application plan were last updated October 13, 2011. This plan describes the biosolids process, the required testing to meet vector attraction reduction and pathogen reduction requirements and describes how the biosolids will be land applied. The plan is a separate document and available for review upon request.

All biosolids used for beneficial reuse by application to land must meet the management practices described under 40 CFR § 503.14. Class B biosolids must be land applied following the site restrictions described under 40 CFR § 503.32(b)(5). In addition, biosolids land applied in bulk must follow the best management practices for site selection and the use and application of biosolids described under OAR 340-050-0060, -0065, -0070, and -0080. The specific site management practices followed by the facility are described in the Biosolids Management Plan, Land Application Plan and site authorization letters. All site management practices followed by the permit holder must meet or exceed the referenced standards.

The permit holder may add new biosolids land application sites during the term of the permit. New sites must meet the site selection criteria described in the land application plan. The permit holder will notify the public of newly added sites as describes in the land application plan.

### 5.6.1 Biosolids Production

Historically, the treatment facility generates an average of 78 dry tons of biosolids per year as summarized in the most recent biosolids management report.

### 5.6.2 Beneficial Reuse of Biosolids

OAR 340-050-0031 requires facilities that reuse biosolids through land application to maintain a biosolids management plan and land application plan. The biosolids management plan describes how the facility will generate biosolids that are suitable for beneficial use as a fertilizer or soil amendment via land application. The land application plan identifies and describes the management of current and potential biosolids land application sites. Conditions in the biosolids management plan and land application plan are enforceable permit conditions. The permit holder's biosolids management plan and land application plan were last updated in 2018.

### 5.6.3 Pollutant Limits

Pollutant concentrations from the facility's most recent year of biosolids production are given in the most recent biosolids management plan.

### 5.6.4 Agronomic Limits

Biosolids must be land applied at or below the agronomic loading rate needed for maximum crop production, based on the nitrogen requirement of the crop being grown. Nutrient concentrations from the facility's most recent year of biosolids production are given in the most recent biosolids management plan.

## 5.7 Anti-degradation

As part of renewing a permit, DEQ must demonstrate that the discharge does not lower water quality from the existing condition. DEQ is required to make this demonstration under Oregon's Anti-Degradation Policy for Surface Waters found in OAR 340-041-0004.

DEQ has performed an anti-degradation review for this discharge. The proposed permit contains the same discharge loadings as the existing permit. Permit renewals with the same discharge loadings as the previous permit are not considered to lower water quality from the existing condition. DEQ is not aware of any information that existing limits are not protective of the designated beneficial uses listed in Section 5.2. In accordance with the anti-degradation rules, DEQ recommends proceeding with the proposed permit renewal **(See Attachment 1).**

# 6.0 Permit Draft Discussion

## 6.1 Face Page

The face page provides information about the permittee, description of the wastewater, outfall locations, receiving stream information, permit approval authority, and a description of permitted activities. The permit allows discharge to the Pacific Ocean within limits set by Schedule A and the following schedules. It prohibits all other discharges.

In accordance with state and federal law, NPDES permits are effective for a fixed term not to exceed 5 years. Upon issuance, this permit will be effective for no more than 5 years.

DEQ evaluated the classifications for the treatment and collection systems **(see Attachment 2).** The treatment system is considered a Class II system and the collection system is considered a Class II system. DEQ is not proposing any changes to the system classifications.

## 6.2 Permit Limit Derivation

### 6.2.1 Technology-Based Effluent Limits (TBELs)

EPA developed concentration-based TBEL's for municipal wastewater treatment facilities as discussed in section 5.1. TBELs must be met at the outfall. The applicable TBELs for this facility are the most stringent of the federal secondary treatment standards and the Oregon basin standards, adjusted as necessary for the type of treatment system.

Table 1 shows a comparison of the federal secondary treatment standards and Oregon basin standards.

**Table 1: Comparison of Federal Secondary Treatment and Basin Standards**

| Parameter | Federal Secondary Treatment Standards | | Applicable Mid-Coast Basin Standards (OAR 340-041-0220) |
|---|---|---|---|
| | 30-Day Average | 7-Day Average | 30-Day Average |
| 5-Day BOD | 30 mg/L | 45 mg/L | 20 mg/L during defined summer months, 30 mg/L during winter. |
| TSS | 30 mg/L | 45 mg/L | |
| pH | 6.0 – 9.0. (instantaneous) | | 7.0 - 8.5<br>Note: basin standards for pH do not have to be met at the outfall and can instead be met at the edge of the mixing zone. |
| % Removal | 85% $BOD_5$ and TSS | | Not specified |

The existing permit contains limits in accordance with the applicable Mid-Coast Basin Standards, which are more stringent than the federal secondary treatment standards. The winter and summer mass load limits for $BOD_5$ and TSS were derived based on what the treatment plant could reasonably achieve and the highest monthly average discharge flow with a two year recurrence at the 20 year design of the facility. When the existing facility was designed, the consulting engineer determined the $BOD_5$ and TSS mass loads to be a monthly average of 114 lbs/day in summer and 200 lbs/day in winter. These permit limits will be retained in the proposed permit and are summarized below:

Treated Effluent Outfall 001

(1) May 1-October 31 (summer):

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly* Average (lbs/day) | Weekly* Average (lbs/day) | Daily* Maximum (lbs/day) |
|---|---|---|---|---|---|
| $BOD_5$ | 20 mg/L | 30 mg/L | 114 | 170 | 230 |
| TSS | 20 mg/L | 30 mg/L | 114 | 170 | 230 |

(2) November 1-April 30 (winter):

| Parameter | Average Effluent Concentrations Monthly | Weekly | Monthly* Average (lbs/day) | Weekly* Average (lbs/day) | Daily* Maximum (lbs/day) |
|---|---|---|---|---|---|
| $BOD_5$ | 30 mg/L | 45 mg/L | 200 | 300 | 400 |
| TSS | 30 mg/L | 45 mg/L | 200 | 300 | 400 |

The limits for $BOD_5$ and TSS weekly and daily mass load limit calculations are shown below:

The weekly average and daily maximum mass loads are calculated from the monthly average multiplied by 1.5 and 2 respectively.

Monthly Avg. Mass Load = POTW design flow x Conc.-based limit x Conversion factor

The summer calculations are:

Monthly Average: 0.68 MGD x 20 mg/L x 8.34 = 114 lbs/day

Weekly Average: 114 lbs/day monthly average x 1.5 = 170* lbs/day

Daily Maximum: 114 lbs/day monthly x 2.0 = 230* lbs/day

The winter calculations are:

Monthly Average: 0.79 MGD x 30 mg/L x 8.34 = 200 lbs/day

Weekly Average: 200 lbs/day monthly average x 1.5 = 300 lbs/day

Daily Maximum: 200 lbs/day monthly average x 2.0 = 400 lbs/day

*rounded to 2 significant figures

## 6.2.2 Water Quality-Based Effluent Limits

Once TBELs and applicable basin standards have been established for the treatment facility, WQBELs must be developed. DEQ performs an analysis to determine if there is a reasonable potential to cause or contribute to violations of instream water quality criteria. WQBELs are generally developed as a result of a Reasonable Potential Analysis. An exception to this is when DEQ has developed a TMDL for the receiving stream. When there is a TMDL, the permit limit(s) must be developed based on the waste load allocation (WLA) developed for the facility as part of the TMDL.

#### 6.2.2.1 General Discussion of Reasonable Potential Analysis

EPA has developed a methodology called Reasonable Potential Analysis (RPA) for determining if there is a reasonable potential for a discharge to cause or contribute to violations of water quality standards for a particular parameter. It takes into account effluent variability, available dilution (if applicable), receiving stream water quality and water quality standards for the protection of aquatic life and human health. If the RPA results indicate that there is a potential for the discharge to cause or contribute to exceedances of water quality standards, the methodology is then used to establish permit limits that will not cause or contribute to violations of water quality standards. DEQ has adopted EPA's methodology for RPA, and has developed spreadsheets that incorporate this analysis.

#### 6.2.2.2 Reasonable Potential for Bacteria

The existing permit includes effluent limits based on fecal coliform and *Enterococci* bacteria. Since the discharge is to marine waters, Oregon Administrative Rule 340-041-0009(1)(b) established the numeric criteria of 14 fecal coliform organisms per 100 mL, with not more than ten percent of the samples exceeding 43 organisms per 100 mL.

In August 2016, Oregon's Environmental Quality Commission adopted revised water quality standards for bacteria which were submitted for approval to the USEPA on September 7, 2016, in accordance with Clean Water Act Section 303(c), 33 U.S.C. § 1313(c). On November 17, 2017, the USEPA approved Oregon's revisions to the Surface Water Quality Standards for Bacteria.

Therefore the numeric criteria limits for bacteria in the proposed permit for discharge to marine waters pursuant to OAR 340-041-0009(1)(b) are:

**Coastal water contact recreation:**

A monthly geometric mean of 35 *enterococci* organisms per 100 mL;

Not more than 10% of the samples may exceed 130 organisms per 100 mL.

**Shellfish harvesting:**

A fecal coliform median concentration of 14 organisms per 100 mL;

Not more than 10% of the samples may exceed 43 organisms per 100 mL.

The proposed permit limits are achievable through proper operation and maintenance.

#### 6.2.2.3 Reasonable Potential Analysis for pH

The pH of water is a measure of how acidic or basic a solution is. At a pH of 7.0, the solution is considered neutral. Most aquatic organisms can tolerate a fairly narrow range around 7.0.

As indicated in the last section (7.2.1), the applicable basin standard for pH in marine waters for the City of Depoe Bay's discharge to the Pacific Ocean is 7.0 to 8.5. The City of Depoe Bay's existing pH limits of 6.0 to 9.0, ensure that the standard is met at the edge of the mixing zone. This limit is based on federal wastewater treatment guidelines for sewage treatment facilities. Within the permittee's mixing zone, the water quality standard for pH does not have to be met. DEQ evaluated pH using the spreadsheet that derives the pH at the mixing zone boundary **(See Attachment 3).** This analysis demonstrates there is no reasonable potential to violate the pH standard at the edge of the mixing zone and DEQ considers the existing permit limits to be protective of the water quality standard. DEQ is proposing to retain the existing permit limits in the permit renewal.

#### 6.2.2.4 Reasonable Potential Analysis for Temperature

Water temperatures affect the life cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations. The purpose of the temperature criteria in OAR 340-041-0028 is to protect designated, temperature-sensitive beneficial uses (including salmonid life cycle stages) from adverse warming caused by human activities.

*Thermal Plume*

In addition to the temperature criteria, the mixing zone rule contains limitations regarding thermal plumes. DEQ evaluated the facility's discharge for compliance with the thermal plume limitations in accordance with OAR 340-041-0053(2)(d) to ensure the discharge does not potentially cause adverse effects to salmonids that may result from thermal plumes.

Impairment of an active salmonid spawning area where spawning redds are located or likely to be located is prevented or minimized by limiting potential fish exposure to temperatures of 13°C or more for salmon and steelhead. The Pacific Ocean is designated as no spawning; therefore the spawning requirement is met.

Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32°C or more to less than two seconds. Acute impairment requirements are met because all of Depoe Bay's effluent temperature data is below this temperature.

Thermal shock is prevented or minimized by limiting potential fish exposure to temperatures of 25°C or more to less than 5 percent of the cross section of the water body. Thermal shock requirements are met because all of Depoe Bay's effluent temperature data was below this temperature.

Migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21°C or more to less than 25 percent of the cross section of the water body. Migration blockage requirements are met because Depoe Bay's discharge will not increase the temperature of the Pacific Ocean above 21 °C and would not cause migration blockage in the Pacific Ocean.

OAR 340-041-0028(7) limits the warming of ocean waters to 0.3°C or less. DEQ did a Reasonable Potential Analysis for potential thermal effects of the Depoe Bay effluent using the allowable temperature increase of 0.3 °C for discharge to Oceans and Bays. The results of the RPA indicates that there is no potential for exceedance for temperature at the outfall or edge of the mixing zone. Based on this result, the permit does not contain a permit limit for temperature **(See Attachment 4).**

#### 6.2.2.5 Reasonable Potential Analysis for Ammonia

Water quality criteria for ammonia vary with pH and temperature, and with the presence of salmonids. The RPA for ammonia was performed by evaluating effluent data in a DEQ spreadsheet. The highest ammonia effluent result was used in the RPA. The results of the RPA for ammonia indicate that there no reasonable potential for the discharge to cause or contribute to exceedances of the water quality criteria for ammonia **(See Attachment 5).** Based on these results, the permit will not contain a permit limit for ammonia.

#### 6.2.2.6 Total Dissolved Solids

DEQ conducted a statewide analysis showing that limits for total dissolved solids are not warranted for any domestic wastewater treatment plants because TDS concentrations that are typically found in domestic effluent do not have the reasonable potential to violate water quality standards.

# 7.0 Schedule A. Waste Discharge Limits

The proposed permit limits for the City of Depoe Bay are included in Schedule A of the draft permit. The numeric limits in Schedule A are reproduced below. These limits are the result of the analyses described in Section 6.2.

The proposed effluent limits for Outfall 001 are as follows:

1. **Outfall 001 - Treated Effluent**

   a. $BOD_5$,and TSS

      i. May 1 – October 31(summer):

| Parameter | Average Effluent Concentrations, mg/L | | Monthly Average (lbs/day) | Weekly Average (lbs/day) | Daily Maximum (lbs/day) |
|---|---|---|---|---|---|
| | Monthly | Weekly | | | |
| $BOD_5$ | 20 | 30 | 114 | 170 | 230 |
| TSS | 20 | 30 | 114 | 170 | 230 |

      ii. November 1 – April 30 (winter):

| Parameter | Average Effluent Concentrations, mg/L | | Monthly Average (lbs/day) | Weekly Average (lbs/day) | Daily Maximum (lbs/day) |
|---|---|---|---|---|---|
| | Monthly | Weekly | | | |
| $BOD_5$ | 30 | 45 | 200 | 300 | 400 |
| TSS | 30 | 45 | 200 | 300 | 400 |

Average dry weather design flow to the facility equals 0.85 MGD. Mass load limits have been individually assigned based on what the plant can reasonably achieve and the highest monthly average discharge flow with a two-year recurrence at the 20-year design of the facility.

   b. 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 | A monthly geometric mean of 35 organisms per 100 mL.<br>No more than 10% of the samples may exceed 130 organisms per 100 mL. |
| *Fecal Coliform* Bacteria | A median concentration of 14 organisms per 100 mL.<br>No more than 10% of the samples may exceed 43 organisms per 100 mL. |
| pH | Must be within the range of 6.0 – 9.0 s.u. |

The limits in Tables A1, A2 and A3 are discussed below:

- **$BOD_5$ and TSS Concentration, Mass Load and Percent Removal Limits**

$BOD_5$ and TSS can be thought of as indicators of the "strength" of the effluent. The development of concentration and mass limits for $BOD_5$ and TSS are TBELs was described in Section 6.2.1. The applicable TBELs for concentration are from the Oregon Mid-Coast Basin standard and are more stringent that the federal secondary treatment standards. The winter and summer mass loads were derived based on what the treatment plant could reasonably achieve when the existing facility was designed by the consulting engineer. The removal efficiency required by the permit is 85%. The derivation of this removal efficiency was described in Section 6 and is consistent with 40 CFR § 133 for any type of activated sludge system.

- **Bacteria**

Limits for bacteria are considered to be WQBELS. Since the City of Depoe Bay discharges to marine waters and estuarine shellfish growing waters, the proposed limits are based on the fecal coliform standard contained OAR 340-041-0009(1)(b). The proposed limits are a monthly median concentration of 14 organisms per 100 milliliters, with not more than ten percent of the samples exceeding 43 organisms per 100 mL. On December 16, 2004, the US EPA promulgated the Beach Act in Oregon, which established an additional standard for coastal recreation waters (40 CFR § 131.41). The applicable standard to protect this use is a monthly geometric mean of not more than 35 organisms per 100 mL for enterococcus bacteria.

- **pH**

These limits were developed with respect to the basin standards adjusted for dilution at edge of the mixing zone and are therefore WQBELs.

- **Total Residual Chlorine**

The Depoe Bay facility uses UV to disinfect the wastewater. Therefore, no chlorine limits are applied to this permit.

- **Ammonia**

Ammonia is a substance normally found in wastewater. The wastewater treatment processes, particularly aeration and biological treatment, can convert a large portion to nitrate and nitrite, but the treated effluent still contains some ammonia. After discharge, the continued process of oxidizing the ammonia removes dissolved oxygen from the receiving stream.

Unionized ammonia is also a toxic agent and may have to be limited to prevent toxicity. The water outside the boundary of the mixing zone must be free of materials in concentrations that will cause chronic (sublethal) toxicity while the water outside the ZID must be free of pollutants that will cause acute toxicity.

Finally, nitrogen compounds (including ammonia) are nutrients that can contribute to excessive biological growth that cause violations of water quality standards. The problems could manifest as visual or aesthetic impairment or could be the cause of excessive dissolved oxygen or pH fluctuations.

If ammonia is discharged at a level, which will cause, has the reasonable potential to cause, or contribute to an excursion above any water quality criteria (either as a nutrient, or to prevent dissolved oxygen depletion or toxicity), ammonia must be limited by the permit.

The Depoe Bay facility's wastewater didn't demonstrate a reasonable potential to violate the ammonia water quality criteria after mixing.

*Discussion of Other Schedule A Requirements*

In addition to permit limits for specific parameters, Schedule A also contains requirements pertaining to the mixing zone, groundwater protection, and biosolids. These are discussed in more detail below, in the following order:

- **Mixing Zone**

The permittee has been granted a regulatory mixing zone.

- Groundwater Protection

The permittee may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater.

- **Biosolids**

The permit describes what discharge limits and management practices the City of Depoe Bay must satisfy to beneficially reuse biosolids as a soil amendment or fertilizer. The requirements in Schedule A of the permit contain limits for biosolids and are derived from OAR 340-050.

## 7.1 Schedule B – Minimum Monitoring and Reporting Requirements

Schedule B also describes the minimum monitoring and reporting necessary to demonstrate compliance with the conditions of this permit. The authority to require periodic reporting by permittees is included in ORS 468.065(5). Self-monitoring requirements are the primary means of ensuring that permit limits are being met. Other parameters may also need to be monitored when insufficient data exist to establish a limit, but where there is a potential for a water quality concern.

DEQ has developed monitoring and reporting matrices that establish monitoring and reporting frequencies based on the size and complexity of the facility. These matrices were used to establish the monitoring and reporting requirements for the City of Depoe Bay.

In addition to monitoring and reporting requirements, Schedule B includes the following:

- Requirements to develop and implement a Quality Assurance/Quality Control (QA/QC) program
- What to do if QA/QC requirements are not met.
- Requirements pertaining to reporting procedures. These include:
    - The correct use of significant figures
    - Reporting of detection levels and quantitation limits
    - Calculating and reporting mass loads.

Monitoring requirements are found in the following tables:

Table B1: Influent Monitoring
Table B2: Effluent Monitoring
Table B3: Biosolids Monitoring
Table B4: Biosolids Minimum Monitoring Frequency
Table B5: Monitoring Requirements for permit renewal
Table B6: Reporting Requirements and Due Dates

### Tables B1 and B2: Influent and Effluent Monitoring

These tables specify the parameters to be monitored on a regular basis in the influent and effluent, along with associated monitoring frequencies, sample types and related reporting requirements.

**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. Daily maximum<br>2. Monthly maximum |
| $BOD_5$ (00310) | mg/L | Year-round | 2/Week | Composite | 1. Daily maximum<br>2. Monthly average<br>3. Weekly average |
| TSS (00530) | mg/L | Year-round | 2/Week | Composite | 1. Daily maximum<br>2. Monthly average<br>3. Weekly average |
| pH (00400) | SU | Year-round | 3/week | Grab | 1. Daily max<br>2. Daily min |

**Effluent Monitoring and Reporting Requirements**

The permittee must monitor effluent Grab and Composite samples for Outfall 001 after UV disinfection at the Parshall flume and report results as listed below.

**Table B2: Effluent Monitoring**

| Item or Parameter (ICIS Code) | Units | Time Period | Minimum Frequency (see Note a) | Sample Type/Required Action | Report Statistic |
|---|---|---|---|---|---|
| Total Flow (50050) | MGD | Year-round | Daily | Continuous | 1. Daily maximum<br>2. Monthly max |
| $BOD_5$ (00310) | mg/L | Year-round | 2/week | Composite | 1. Daily maximum<br>2. Monthly average<br>3. Weekly averages |
| TSS (00530) | mg/L | Year-round | 2/week | Composite | 1. Daily maximum<br>2. Monthly average<br>3. Weekly average |
| $BOD_5$ (00310) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>3. Weekly averages |
| TSS (00530) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>3. Weekly average |

| Item or Parameter (ICIS Code) | Units | Time Period | Minimum Frequency (see Note a) | Sample Type/Required Action | Report Statistic |
|---|---|---|---|---|---|
| $BOD_5$ Percent Removal (81010) | % | Year- round | Monthly | Calculation | 1. Monthly Average |
| TSS Percent Removal (81011) | % | Year- round | Monthly | Calculation | 1. Monthly Average |
| Temperature (00010) | °C | Year-round | 3/week | Grab | 1. Monthly maximum |
| Fecal Coliform (31641) | CFU/100 mL | Year-round | 2/week | Grab | 1. Monthly median<br>2. Daily maximum<br>3. 10% of samples |
| Enterococci (61211) | CFU/100 mL | Year-round | 2/week | Grab | 1. Daily maximum<br>2. Monthly geomean<br>3. 10% of samples |
| UV Intensity | $mW/cm^2$ | Year-round | Daily | Reading | 1. Daily maximum<br>2. Daily minimum<br>3. Monthly Average |
| UV Transmittance | % | Year-round | Daily | Reading | 1. Daily maximum |
| Alkalinity (for effluent characterization purposes) | mg/L | Year-round | 2/week | Grab | 1. Weekly maximum<br>2. Weekly minimum |

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.

## Tables B3 and B4: Biosolids Monitoring Requirements and Monitoring Frequency

This table lists the monitoring requirements that pertain to biosolids, consistent with OAR 340-050-0035. Specific details on how and where biosolids monitoring will be conducted provided in the Biosolids Management Plan.

In addition to biosolids monitoring at the treatment facility, the facility is required to maintain records on the land application of biosolids. Records must be sufficient to demonstrate that biosolids were applied within agronomic loading rates and following required site management practices. The permit requires the permittee to record the date, quantity, and location of biosolids applied to the land on a site map or electronic GIS system.

**Table B3: Biosolids Monitoring**

| Item or Parameter | Minimum Frequency | Sample Type |
|---|---|---|
| Nutrient and conventional parameters (% dry weight unless otherwise specified):<br>1) Total Kjeldahl Nitrogen (TKN)<br>2) Nitrate-Nitrogen ($NO_3$-N)<br>3) Ammonium Nitrogen ($NH_4$-N)<br>4) Total Phosphorus (P)<br>5) Potassium (K)<br>6) pH (S.U.)<br>7) Total Solids<br>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. |
| Record of biosolids hauled to landfill: date, quantity, location. | Each event | Record the date, quantity, and name of landfill. |

**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) |

## Table B5: Effluent Monitoring Required for NPDES Permit Application

This table lists parameters for which monitoring data is required for the renewal of this permit. The renewal application for this permit requires a minimum of 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 three scans required)

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

## Table B6: Reporting Requirements and Due Dates

This table summarizes, for the convenience of the permit holder, the information contained in the previously-listed tables.

**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<br>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:<br>• DEQ Regional Office<br>• 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).<br>2. Table B3: Biosolids Monitoring | Annually | February 19 | Electronic copy | One each to:<br>• DEQ Regional Office<br>• DEQ Biosolids Program Coordinator. |
| Inflow and infiltration report | 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 48 months of permit effective date | 1 hard copy, and electronic copy in DEQ-approved format | DEQ Pretreatment Coordinator |
| Outfall Inspection Report (see Schedule B) | 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:<br>a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date.<br>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.<br>c. Equipment breakdowns and bypass events must be noted on DMRs.<br>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. | | | | |

## 7.2 Schedule D - Special Conditions

### 7.2.1 Inflow and Infiltration

In the sewage collection system, it is important for the permit holder to assess and take steps to reduce the rate of infiltration and inflow of stormwater and groundwater into the sewer system. Consistent with this, Schedule D of the permit requires the permit holder to undertake activities to track and reduce I/I in the sewer system.

### 7.2.2 Emergency Response and Public Notification Plan

Municipal wastewater treatment facilities are required, under General Condition B.8. in Schedule F, to have an Emergency Response and Public Notification Plan. Information on what DEQ looks for in such plans can be found in DEQ's Internal Management Directive on Sanitary Sewer Overflows at: http://deq05/wq/wqpermits/Guidance/SSOEnforceIMD1110.pdf

### 7.2.3 Exempt Wastewater Reuse at the Treatment System

Schedule D exempts the permit holder from the recycled water requirements in OAR 340-055, when recycled water is used for landscape irrigation at the treatment facility or for in-plant processes, such as in plant maintenance activities. Landscape irrigation includes water applied to small-scale irrigation such as supplying supplemental irrigation to turf grass, shrubs, and ornamental trees.

### 7.2.4 Hauled Waste Control

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

### 7.2.5 Biosolids Management Plan and Land Application Plan

Conditions requiring the permit holder to develop and maintain a biosolids management plan and land application plan are provided in Schedule D. The biosolids management plan and the land application plan must meet the requirements in OAR 340-050-0031 and describe where and how the land application of biosolids is managed to protect public health and the environment.

The land application plan includes all sites authorized by DEQ for land application of Class B biosolids and described in individual, DEQ-issued site authorization letters. During permit renewal, all previously authorized biosolids land application sites are available for public comment with the biosolids management plan and land application plan. During the term of the permit, DEQ-initiated public notice of previously authorized sites identified in the land application plan is not required.

When the permit holder needs a new land application site, the permit holder is responsible for getting authorization from DEQ as well as notifying neighbors and providing them with an opportunity to comment. Any proposed new site must meet the site selection and site management criteria described in the land application plan. DEQ-initiated public notice will be provided for any new site that does not meet these criteria and/or that DEQ considers sensitive with respect to residential housing, runoff potential, and/or threat to groundwater.

### 7.2.6 Wastewater Solids Transfers

The permit allows the facility to transfer treated or untreated wastewater solids to other in-state or out-of-state facilities that are permitted to accept the wastewater solids. The permittee is required to monitor, report, and dispose of solids as required by the permit of the receiving facility. Wastewater solids that are transferred out-of-state must meet all requirements for the use of disposal or wastewater solids as required by both Oregon and the receiving state.

### 7.2.7 Operator Certification

The permit holder is required to have a certified operator consistent with the size and type of treatment plant covered by the permit. The language in this section of the permit describes the requirements relating to operator certification. An updated copy of the wastewater classification worksheet for the City of Depoe Bay is attached as **Attachment 2.**

### 7.2.8 Industrial User Survey

The permit holder is required to conduct an industrial user survey every five years. 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.

## 7.3 Schedule E – Pre-treatment

The permittee does not have a DEQ-approved industrial pre-treatment program. Based on current information, no industrial pre-treatment program is needed.

## 7.4 Schedule F – NPDES General Conditions

These conditions are standard to all domestic NPDES permits and include language regarding operation and maintenance of facilities, monitoring and record keeping, and reporting requirements. The General Conditions for all individual permits issued by DEQ were substantially revised in August 2009. Minor modifications have been made since then. A summary of the changes is as follows:

- There are additional citations to the federal Clean Water Act and CFR, including references to standards for sewage sludge use or disposal.
- There is additional language regarding federal penalties.
- Bypass language has been made consistent with the Code of Federal Regulations and with other EPA Region 10 states.
- Reporting requirements regarding overflows have been made more explicit.
- Requirements regarding emergency response and public notification plans have been made more explicit.
- Language pertaining to duty to provide information has been made more explicit.
- Confidentiality of information is addressed.

# 8.0 Next Steps

## 8.1 Public Comment Period

The proposed NPDES permit will be made available for public comment for 35 days. Public notice and links to the proposed permit will be posted on DEQ's website, and sent to subscribers to DEQ's pertinent public notice e-mail lists. A Public Hearing will be scheduled if requested by 10 or more people, or by an authorized person representing an organization of at least 10 people. If a public hearing is to be held, then an additional public notice would be published to advertise the public hearing.

## 8.2 Response to Comments

DEQ will respond to comments received during the comment period. All those providing comment will receive a copy of DEQ's response. Interested parties may also request a copy of DEQ's response. Once comments are received and evaluated, DEQ will decide whether to issue the permit as proposed, to make changes to the permit, or to deny the permit. DEQ will notify the permittee of DEQ's decision.

## 8.3 Modifications to Permit Evaluation Report and Fact Sheet

Depending on the nature of the comments and any changes made to the permit as result of comments, DEQ may modify this permit evaluation report and fact sheet. DEQ may also choose to update the permit evaluation report and fact sheet through memorandum or addendum. If substantive changes are made to the permit, then an additional round of public comment may occur.

## 8.4 Issuance

The DEQ mails the finalized, signed permit to the permittee. The permit is effective 20 days from the mailing date.

# Attachment 1: Anti-degradation Review Worksheet for a Proposed Individual NPDES Discharge

Applicant: **City of Depoe Bay**

1. What is the name of the surface water that receives the discharge? **Pacific Ocean**

   Briefly describe the proposed activity: **NPDES Permit Renewal for the City of Depoe Bay's treated municipal wastewater discharge.**

   Go to Step 2.

2. Are there any existing uses associated with the water body that are not included in the list of designated uses? Example: DEQ's Fish Use Designation Maps identify the waterbody as supporting salmonid migration; however ODFW has determined that it also supports salmonid spawning.

   **No.** Go to Step 3.

3. Was the analysis of the impact of the proposed activity performed relative to criteria applicable to the most sensitive beneficial use?

   **Yes.** Go to Step 4.

4. Is this surface water an **Outstanding Resource Water** or **upstream** from an **Outstanding Resource Water**?

   **No.** Go to Step 5.

5. Is this surface water a **High Quality Water**? A High Quality Water is one for which none of the pollutants are Water Quality Limited.

   **Yes.** Go to Step 10.

6. Is this surface water a **Water Quality Limited Water**? To determine, use the same database query as Step 5.

   ☐ Yes. Go to Step 16. ☐ No. Go to Step 4 (you must answer "yes" to either question 4, 5, or 6)

   Note: The surface water must fall into one of 3 categories: Outstanding Resource Water (Step 4), High Quality Water (Step 5), or Water Quality Limited Water (Step 6).

7. Will the proposed activity result in a permanent new or expanded source of pollutants directly to or affecting the **Outstanding Resource Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

   ☐ Yes, Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

   ☐ No. Please provide basis for conclusion: . Go to Step8.

8. Will the proposed activity result in a lowering of water quality in the **Outstanding Resource Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from antidegradation review;

otherwise see "Is an Activity Likely to Lower Water Quality?" in *Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

☐ Yes. Provide basis for conclusion: Go to Step 9.

☐ No. Provide basis for conclusion: Go to Step 20.

9. If the proposed activity results in a non-permanent new or expanded source of pollutants directly to or affecting an **Outstanding Resource Water**, will the lowering of water quality in the **Outstanding Resource Water** be on a short-term basis in response to an emergency or to protect human health and welfare?

☐ Yes. Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 23.

☐ No. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 20.

10. Will the proposed activity result in a Lowering of Water Quality in the **High Quality Water**[see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from antidegradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

**No. Proceed with Permit Application. Applicant should provide basis for conclusion.**

**Explanation: This conclusion is explained and supported by data and evaluations used in the Permit Fact Sheet and attachments accompanying the proposed NPDES Permit Renewal. This is an existing discharge and there is no request for a mass load increase. The discharge must meet the water quality criteria for all parameters at the edge of the mixing zone. Effluent limitations are the same or more stringent as the existing permit and are protective of water quality.**

Go to Step 23.

11. OAR 340-041-0004(6)(c) of the *High Quality Waters Policy* requires that the Department evaluate the application to determine that all water quality standards will be met and beneficial uses protected after allowing discharge to **High Quality Waters**. Will all water quality standards be met and beneficial uses protected?

☐ Yes. Provide basis for conclusion: Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 12.

☐ No. Provide basis for conclusion. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

12. OAR 340-041-0004(6)(a) of the High Quality Waters Policy requires that the Department evaluate the application to determine if no other reasonable alternatives exist except to discharge to High Quality Waters. At a minimum, the following list must be considered:

- Improved operation and maintenance of existing treatment system
- Recycling or reuse with no discharge
- Discharge to on-site system
- Seasonal or controlled discharges to avoid critical water quality periods
- Discharge to sanitary sewer

- Land application

Were any of the alternatives feasible?

☐ Yes. Provide basis for conclusion (see below for information requirements): Recommend Preliminary Decision that applicant use alternative. Go to Step10.

☐ No. Provide basis for conclusion (see below for information requirements): Go to Step 13.

In a separate statement to this application, please explain the *technical feasibility* of the alternative, explain the *economic feasibility* of the alternative, and provide an *estimated cost* of NPDES permit alternative for a five-year period from start-up.

13. OAR 340-041-0004(6)(b) of the *High Quality Waters Policy* requires that the Department evaluate the application to determine if there are social and economic benefits that outweigh the environmental costs of allowing discharge to High Quality Waters. Do the social and economic benefits outweigh the environmental costs of lowering the water quality?

☐ Yes. Provide basis for conclusion (see below for information requirements): Go to Step 14.

☐ No. Provide basis for conclusion (see below for information requirements): Go to Step 23.

The basis for conclusion should include a discussion of whether the lowering of water quality is necessary and important. "Necessary" means that the same social and economic benefits cannot be achieved with some other approach. "Important" means that the value of the social and economic benefits due to lowering water quality is greater than the environmental costs of lowering water quality.

Benefits can be created from measures such as:

- Creating or expanding employment (provide current/expected number of employees, type & relative amount of each type
- Increasing median family income
- Increasing community tax base (provide current/expected annual sales, tax info)
- Providing necessary social services
- Enhancing environmental attributes

Environmental Costs can include:

- Losing assimilative capacity otherwise used for other industries/development
- Impacting fishing, recreation, and tourism industries negatively
- Impacting health protection negatively
- Impacting societal value for environmental quality negatively

14. OAR 340-041-0004(6)(d) of the *High Quality Waters Policy* requires that DEQ prevent federal threatened and endangered aquatic species from being adversèly affected. Will lowering the water quality likely result in adverse effects on federal threatened and endangered aquatic species?

☐ Yes, please provide basis for conclusion (see below for information requirements): Go to Step 23.

☐ No, please provide basis for conclusion (see below for information requirements): Go to Step 15.

15. Will lowering water quality in the **High Quality Water** be on a short-term basis in response to an emergency or to protect human health and welfare?

☐ Yes, go to Step 20.

☐ No, recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23

16. Will the proposed activity result in a lowering water quality in the **Water Quality Limited Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

☐ Yes, go to Step 17.

☐ No, proceed with Permit Application. Permit writer should provide basis for determination in permit evaluation report: Go to Step 23.

17. OAR 340-041-0004(9)(a)(A) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application to determine that all water quality standards will be met. Will all water quality standards be met?

☐ Yes, please provide basis for conclusion: Go to Step 18.

☐ No, please provide basis for conclusion. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

18. OAR 340-041-0004(9)(a)(C) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application to determine that all recognized beneficial uses will be met and that threatened or endangered species will not be adversely affected. Will all beneficial uses be met and will threatened or endangered species be protected from adverse effects?

☐ Yes, please provide basis for conclusion: Go to Step 19.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

19. OAR 340-041-0004(9)(a)(D)(i-iv) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application for ***one of the following***:

- 19A. Will the discharge be associated (directly or indirectly) with the pollution parameter(s) causing the waterbody to be designated a Water Quality Limited Water?

☐ Yes, please provide basis for conclusion: . Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

☐ No, please provide basis for conclusion: Go to Step 20.

- 19B. Have TMDLs, WLAs, LAs, and reserve capacity been established, compliance plans been established, and is there sufficient reserve capacity to assimilate the increased load under the established TMDL?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

- 19C. Will the proposed activity meet the requirements, as specified under OAR 340-041-0004(9)(a)(D)(iii) of the *Water Quality Limited Waters Policy*, for dissolved oxygen?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

- 19D. Will the activity solve an existing, immediate, and critical environmental problem?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

20. Is the proposed activity consistent with local land use plans?

☐ Yes, go to Step 21.

☐No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

21. OAR 340-041-0004(9)(c)(A) requires the Department to consider alternatives to lowering water quality. At a minimum, the following list must be considered:

- Improved operation and maintenance of existing treatment system
- Recycling or reuse with no discharge
- Discharge to on-site system
- Seasonal or controlled discharges to avoid critical water quality periods
- Discharge to sanitary sewer
- Land application

Were any of the alternatives feasible?

☐ Yes, please provide basis for conclusion (see below for information requirements): Recommend Preliminary Decision that applicant use alternative. Go to Step 16.

☐ No, please provide basis for conclusion (see below for information requirements: Go to Step 22.

In a separate statement to this application, please explain the *technical feasibility* of the alternative, explain the *economic feasibility* of the alternative, and provide an *estimated cost* of NPDES permit alternative for a five-year period from start-up.

22. OAR 340-041-0004(9)(c)(B) of the *Water Quality Limited Waters Policy* requires the Department to consider the economic effects of the proposed activity, which in this context consists of determining if the social and economic benefits of the activity outweigh the environmental costs of allowing a lowering of water quality. Do the social and economic benefits outweigh the environmental costs of lowering the water quality?

☐ Yes. Provide basis for conclusion: Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 23.

☐ No. Provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

The basis for conclusion should include a discussion of whether the lowering of water quality is necessary and important. "Necessary" means that the same social and economic benefits cannot be achieved with some other approach. "Important" means that the value of the social and economic benefits due to lowering water quality is greater than the environmental costs of lowering water quality.

Benefits can be created from measures such as:

- Creating or expanding employment (provide current/expected number of employees, type & relative amount of each type
- Increasing median family income
- Increasing community tax base (provide current/expected annual sales, tax info)
- Providing necessary social services
- Enhancing environmental attributes

Environmental Costs can include:

- Losing assimilative capacity otherwise used for other industries/development
- Impacting fishing, recreation, and tourism industries negatively
- Impacting health protection negatively
- Impacting societal value for environmental quality negatively

23. On the basis of the Anti-degradation Review, the following is recommended:

**Proceed with Application to Interagency Coordination and Public Comment Phase.**

**ACTION APPROVED**

Review prepared by:

Name: **Robert Dicksa, Water Quality Permitting Specialist**

**Water Quality Permitting**

Phone: **503-378-5039**

Date Prepared: **January 4, 2018**

# Attachment 2: Wastewater System Classification Worksheet for Operator Certification

Oregon Department of Environmental Quality
**Wastewater System Classification Worksheet for Operator Certification**

**STEP 1: Criteria for Classifying Wastewater Treatment Systems (OAR 340-049-0025)**

NOTE: see bottom two spreadsheet tabs for Worksheet Instructions & Worksheet Information. See Classification chart at bottom of this worksheet for Classes I-IV.

| | | | |
|---|---|---|---|
| Wastewater System Common Name: | Depoe Bay Wastewater Treatment Plant | | |
| Location: | 212 S Point Street Depoe Bay, OR | Region: | Western |
| County: | Lincoln | Date: | 12/21/2017 |
| Facility File #: | 24095 | Classified by: | Robert Dicksa |
| Design ADWF (Influent MDG): | 0.85 | WWC Class: | II |
| Design Population*: | 7380 | WWT Class: | II |
| Design BOD (Influent lbs/day): | 978 | Small WWS: | |
| | | If Small WWS, # of connections: | |
| Is this a change from a prior classification? (yes/no) | | Total Points: | 55.0 |

| | | | |
|---|---|---|---|
| 1. Design Population | 7380 | or Population Equivalent | |
| Based on: | Flow (gallons/person/day) | | BOD (pounds/person/day) |

| WWC Classification | (based on population size) |
|---|---|
| Less than 500 | Eligible for Small WW System classification if treatment points < 30 |
| 1500 or less | WWC Class 1 |
| 1501 to 15,000 | WWC Class 2 |
| 15,001 to 50,000 | WWC Class 3 |
| over 50,000 | WWC Class 4 |

| WWT Classification (based on total points) | | Points | Selected |
|---|---|---|---|
| Less than 750 | | 0.5 | |
| 751 to 2,000 | | 1.0 | |
| 2,001 to 5,000 | | 1.5 | |
| 5,001 to 10,000 | | 2.0 | 2.0 |
| Greater than 10,000 | (3 + 1 for each additional 10 K) | 3.0 | |
| **2. Average Dry Weather Flow (Design Capacity)** | | | |
| Less than 0.075 MGD | | 0.5 | |
| Greater than 0.075 MGD to 0.1 MGD | | 1.0 | |
| Greater than 0.1 to 0.5 MGD | | 1.5 | |
| Greater than 0.5 to 1.0 MGD | | 2.0 | 2.0 |
| Greater than 1.0 MGD | (3 + 1 for each additional 1.0 MGD) | 3.0 | |

| 3. Unit Processes | | Points | Selected |
|---|---|---|---|
| *Preliminary Treatment and Plant Hydraulics* | | | |
| Comminution (cutter, shredder, grinder, barminutor, etc.) | | 1.0 | |
| Grit Removal (gravity) | | 1.0 | |
| Grit Removal (mechanical) | | 2.0 | 2.0 |
| Screen(s) (in-situ or mechanical, coarse solids only) | | 1.0 | 1.0 |
| Pump/Lift Station(s) (pumping of main flow) | | 2.0 | 2.0 |
| Flow Equalization (any type) | | 1.0 | |
| *Primary Treatment* | | | |
| Community Septic Tank(s) (STEP, STEG, etc.) | | 2.0 | |
| Clarifier(s) | | 5.0 | |
| Flotation Clarifier(s) | | 7.0 | |
| Chemical Addition System | | 2.0 | |
| Imhoff Tanks (large septic tank or similar sedimentation & digestion) | | 3.0 | |
| *Secondary, Advanced, and Tertiary Treatment* | | | |
| Low Rate Trickling Filter(s) (no recirculation) | | 7.0 | |
| High Rate Trickling Filter(s) (recirculating) | | 15.0 | |
| Trickling Filter - Solids Contact System | | 12.0 | |
| Activated Sludge (includes SBR & basic MBR process) | | 15.0 | 15.0 |
| Pure Oxygen Activated Sludge | | 20.0 | |
| Activated Bio Filter Tower (less than 0.1 MGD) | | 6.0 | |
| Activated Bio Filter Tower (greater than 0.1 MGD) | | 12.0 | |
| Rotating Biological Contactors (1 to 4 shafts) | | 7.0 | |
| Rotating Biological Contactors (5 or more shafts) | | 12.0 | |
| Stabilization Lagoons (1 to 3 cells without aeration) | | 5.0 | |
| Stabilization Lagoons (1 or more cells with primary aeration) | | 7.0 | |
| Stabilization Lagoons (2 or more cells with full aeration) | | 9.0 | |
| Recirculating Gravel Filter (or recirculating textile filters) | | 7.0 | |
| Chemical Precipitation Unit(s) | | 3.0 | |
| Gravity Filtration Unit(s) | | 2.0 | |
| Pressure Filtration Unit(s) | | 4.0 | |
| Nitrogen Removal (Biological (BNR) or Chemical/Biological System) | | 4.0 | |
| Nitrogen Removal (Design Extended Aeration Only - Nitrification) | | 2.0 | |
| Phosphorous Removal Unit(s) | | 4.0 | |
| Effluent Microscreen(s) | | 2.0 | |
| Chemical Flocculation Unit(s) | | 3.0 | |
| Ultra Filtration Membrane(s) | | 15.0 | |
| Chemical Addition System | Description: | 2.0 | |

| | | |
|---|---|---|
| *Solids Handling (excludes long-term storage in treatment lagoons above)* | | |
| Anaerobic Primary Sludge Digester(s) w/o Mixing and Heating | 5.0 | |
| Anaerobic Primary Sludge Digester(s) with Mixing and Heating | 7.0 | |
| Anaerobic Primary and Secondary Sludge Digesters | 10.0 | |
| Sludge Digester Gas Reuse | 3.0 | |
| Aerobic Sludge Digester(s) | 8.0 | 8.0 |
| Sludge Storage Lagoon(s) (List Basin(s) or Tank(s) in Step 2) | 2.0 | |
| Sludge Lagoon(s) with Aeration | 3.0 | |
| Sludge Drying Bed(s) | 1.0 | |
| Sludge Air or Gravity Thickening | 3.0 | |
| Sludge Composting (in Vessel) | 12.0 | |
| Sludge Belt(s) or Vacuum Press/Dewatering | 5.0 | |
| Sludge Centrifuge(s) | 5.0 | |
| Sludge Incineration | 12.0 | |
| Sludge Chemical Addition Unit(s) (alum, polymer, alkaline stab, etc.) | 2.0 | |
| Non-Beneficial Sludge Disposal (landfill or burial) | 1.0 | |
| Beneficial Sludge Utilization (see also Step 2) | 3.0 | 3.0 |
| Solids Reduction Processing | 4.0 | |
| *Disinfection* | | |
| Liquid Chlorine Disinfection | 2.0 | |
| Gas Chlorine Disinfection | 5.0 | |
| Dechlorination System | 4.0 | |
| Other Disinfection System including Ultraviolet and Ozonation | 5.0 | 5.0 |
| On-Site Chlorine Generation of Disinfectants | 5.0 | |
| 4. Effluent Permit Requirements | | |
| Minimum of Secondary Effluent Limitation for BOD and/or TSS | 2.0 | |
| Minimum of 20 mg/L BOD and/or Total Suspended Solids | 3.0 | 3.0 |
| Minimum of 10 mg/L and/or Total Suspended Solids | 4.0 | |
| Minimum of 5 mg/L BOD and/or Total Suspended Solids | 5.0 | |
| Effluent Limitations for Effluent Oxygen | 1.0 | |
| Other Limits (see Step 2) | | |
| 5. Variation in Raw Waste | | |
| *Points in this category will be awarded only when conditions are extreme to the extent that operation and handling procedure changes are needed to adequately treat waste due to variation of raw waste (strength or flow).* | | |
| Recurring deviations or excessive variations (100 - 200 %) | 2.0 | |
| Recurring deviations or excessive variations of more than 200 %, or conveyance and treatment of industrial wastes covered by the pretreatment program. | 4.0 | |
| Septage or truck-hauled waste | 2.0 | |
| 6. Sampling and Laboratory Testing | | |
| Sample for BOD, Total Suspended Solids (performed by outside lab) | 2.0 | |
| BOD or Total Suspended Solids analysis (performed at treatment plant) | 4.0 | 4.0 |
| Bacteriological analysis (performed by outside lab) | 1.0 | |
| Bacteriological analysis (performed at wastewater treatment plant lab) | 2.0 | 2.0 |
| Nutrient, Heavy Metals, or Organic analysis (performed by outside lab, ≤ 1 per month = 1 pt) | *3.0 | 1.0 |
| Nutrient, Heavy Metals or Organic analysis (performed at WWTP) | 5.0 | |
| | Points based on 340-049-0025: | 50.0 |
| | Classification based on 340-049-0025 | Class 2 |

| | | |
|---|---|---|
| **STEP 2: Complexity Reflected in OAR 340-049 0020(4)** | | |
| *Note: Include additional points from Step 2 only if the complexity of the wastewater treatement system is not reflected in the points from Step 1. Be sure to justify any additional points from Step 2 in the permit Fact Sheet. Points shown below are given as guidance.* | | |
| Fine Screen Preliminary Treatment (includes washing & compaction) | 2.0 | 2.0 |
| SCADA or similar instrumentation providing data/w process op. | 2.0 - 4.0 | 2.0 |
| Post-aeration (includes mechanical and diffused aeration - not cascade) | 1.0 | 1.0 |
| Class A recycled water (storage, distribution & monitoring) | 6.0 | |
| Class B, C, D and Non-disinfected Recycle (surface & subsurface) | 3.0 | |
| Sludge dewatering using bag or tube system | 1.0 | |
| Solids Composting (ASP or windrow) | 6.0 | |
| Land application of biosolids by system operator | 5.0 | |
| Odor or corrosion control (separate or combined) | 2.0 | |
| Chemical/physical advanced waste treatment | 10 - 15.0 | |
| Reverse Osmosis, Electro-dialysis, Membrane Filtration | 15.0 | |
| Standby power | 1.0 - 3.0 | |
| Digester Gas Recovery Systems | 1.0 - 3.0 | |
| Other Effluent Limitations (describe below) | 1.0 | |
| Description: | | |
| | Total | 55.0 |
| | Classification based on 340-049-0025 | Class 2 |

# Attachment 3: Reasonable Potential Analysis for pH

## Attachment 3 Calculation of pH of a mixture of two flows.

Basic calculations are based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

| Facility Name: City of Depoe Bay | RPA for pH | |
|---|---|---|
| INPUT | Lower pH Criteria | Upper pH Criteria |
| 1. DILUTION FACTOR AT MZ BOUNDARY - (Qe+Qr)/Qe | 54 | 54 |
| 2. UPSTREAM/BACKGROUND CHARACTERISTICS @ Critical Flow | | |
| Temperature (deg C): | 12.7 | 12.7 |
| pH: | 8.3 | 8.3 |
| Alkalinity (mg CaCO3/L): | 140.0 | 140.0 |
| 3. EFFLUENT CHARACTERISTICS | | |
| Temperature (deg C): | 11.2 | 21.7 |
| pH: | 6.0 | 9.0 |
| Alkalinity (mg CaCO3/L): | 75.0 | 75.0 |
| 4. APPLICABLE PH CRITERIA | 7.0 | 8.5 |
| OUTPUT | | |
| 1. IONIZATION CONSTANTS | | |
| Upstream/Background pKa: | 6.44 | 6.44 |
| Effluent pKa: | 6.45 | 6.37 |
| 2. IONIZATION FRACTIONS | | |
| Upstream/Background Ionization Fraction: | 0.99 | 0.99 |
| Effluent Ionization Fraction: | 0.26 | 1.00 |
| 3. TOTAL INORGANIC CARBON | | |
| Upstream/Background Total Inorganic Carbon (mg CaCO3 | 141.93 | 141.93 |
| Effluent Total Inorganic Carbon (mg CaCO3/L): | 287.79 | 75.18 |
| 4. CONDITIONS AT MIXING ZONE BOUNDARY | | |
| Temperature (deg C): | 12.67 | 12.87 |
| Alkalinity (mg CaCO3/L): | 138.80 | 138.80 |
| Total Inorganic Carbon (mg CaCO3/L): | 144.63 | 140.69 |
| pKa: | 6.44 | 6.44 |
| **pH at Mixing Zone Boundary:** | **7.816** | **8.302** |
| **Is there Reasonable Potential?** | **No** | **No** |

**Step 1:** Specify the dilution factor from either the mixing zone study or Toxics RPA spreadsheet dilution calucaltion.

**Step 2:** Specify the upstream characteristics, including temperature, pH, and alkalinity. The 90th %iles during the critical season are recommended. If no data are available, it is desirable to collect data describing upstream temperature, pH, and alkalinity during the critical season. Where this is not practicable, an alternate ambient site could be used that has similar stream characteristics.

**Step 3:** Specify the effluent characteristics, including temperature, pH, and alkalinity. For NPDES permit limits, a reasonable worst case estimate of each may be estimated from DMR data use 90th percentile values from the DMR data for alkalinity and temperature during the critical season. If effluent data are not available, then data should be collected or alternative ambient site

**Output/Results:** The user does not need to enter or change any values or formulas in the Output or Results Sections. The spreadsheet calculates and displays the pH at the mixing zone boundary in the Results Section. It also will indicate if there is Reasonable Potential (RP). In the event of a finding of RP, the user should iterate the effluent pH until there is no RP and use the value as the permit effluent limit.

# Attachment 4: Reasonable Potential Analysis for Temperature

## Discharge to Ocean/Bays (OAR 340-0028(7))

### Analysis at Edge of Mixing Zone

### Section 5.7 of the Temperature IMD

**Facility Name:** Depoe Bay **Date:** 3/8/2018

Enter data into white cells below:

| | | |
|---|---|---|
| Mixing Zone Dilution = | 54 | |
| Ambient Temperature = | 8.3 | °C |
| Effluent Temperature = | 22.3 | °C |
| Allowable Increase = | 0.3 | °C |
| Effluent Flow = | 1.28 | mgd |

**ΔT at MZ edge= 0.26 °C No Reasonable Potential**

**Thermal Load Limit = N/A Million Kcals**

Note 1: The ambient temperature used above is the minimum temperature measured (in 10 minute increments) during 2016-2017 at an ocean buoy approximately 16 miles from the discharge location. (ODI Station 46097: http://www.ndbc.noaa.gov/station_page.php?station=46097). The use of this temperature value is considered very conservative because:
- the ocean temperature that corresponds with the max effluent temperature will be much higher
- The mixing zone dilution when ocean temperatures in this range occur is 99 (winter dilution)
- the ocean temperature used is a minimum of values measured at 10 minute intervals - the normal statistic is the 7-day average, which will be higher.

Note 2: The effluent temperature used above is the maximum temperature of the monthly maximums from the Discharge Monitoring Reports submitted for 2015-2017.

# Attachment 5: Reasonable Potential Analysis for Ammonia

## Ammonia RPA Calculation (2013 Criteria) Revision 1.3

### RPA Run Information

| | |
|---|---|
| Facility Name: | City of Depoe Bay |
| DEQ File Number: | 24095 |
| Permit Writer Name: | Robert Dicksa |
| Outfall Number: | 1 |
| Date of RPA Run: | Enter data here |
| RPA Run Notes: | |

| KEY: | | |
|---|---|---|
| * Enter data here | -- | Calculated results |
| | — | Intermediate calc.s |

### Please complete the following General Facility Information

| | | |
|---|---|---|
| 1. Enter Facility Design Flow (MGD) | | 0.85 |
| 2. Do I have dilution values from a | | Yes |
| 3. If answered "No" to *Question 2*, then fill in the following table | | |
| Stream Flow: 7Q10 | CFS | na |
| Stream Flow: 30Q | CFS | na |
| Stream Flow: 1Q10 | CFS | na |
| % dilution at ZID | % | 10% |
| % dilution at MZ | % | 25% |
| Calculated Dilution Fact. | | |
| Dilution @ ZID | | #VALUE! |
| Dilution @ MZ (7Q10) | | #VALUE! |
| Dilution @ MZ (30Q5) | | #VALUE! |

| | | |
|---|---|---|
| 4. If answered "Yes" to *Question 2*, then fill in dilution factors from mixing zone study | | |
| Dilution @ ZID (from study) | | 10 |
| Dilution @ MZ 7Q10 (from study) | | 54 |
| Dilution @ MZ 30Q5 (from study) | | 54 |
| 5. Is the receiving waterbody fresh or salt | | Salt |
| 6. If answered "*Salt*" to *Question 4*, then enter | | |
| Ambient Salinity | ppt | 30 |
| Effluent Salinity | ppt | 0 |
| 7. Are Salmonid present? (Yes/No) (Mussels presumed present) | | Yes |
| 8. Please enter statistical *Confidence* and *Probability* values (note: defaults already entered) | | |
| Confidence Level | %ile | 99% |
| Probability Basis | %ile | 95% |

### Dilution Calculations

**Inputs**

| | | ZID | MZ (7Q10) | MZ (30Q5) |
|---|---|---|---|---|
| Dilution Factors | | 10.0 | 54.0 | 54.0 |

**Upstream Characterization**

| | | | |
|---|---|---|---|
| Temperature | deg. C | 13 | |
| pH | | 8.3 | |
| Alkalinity | mg/L CaCO3 | 140 | 10% |

**Effluent Characterization**

| | | | |
|---|---|---|---|
| Temperature | deg. C | 20.7 | |
| pH | | 7.1 | |
| Alkalinity | mg/L CaCO3 | 75 | 90% |

*Calculation of pH of a mixture of two flows based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of
** Selection of alkalinity %ile is based on pH of effluent vs ambient.

**Outputs**

| | | ZID | MZ (7Q10) | MZ (30Q5) |
|---|---|---|---|---|
| **Upstream** | | | | |
| pKa | | 6.4 | 6.4 | 6.4 |
| Ionization Fraction | | 1.0 | 1.0 | 1.0 |
| Total Inorganic Carbon | mg/L CaCO3 | 141.9 | 141.9 | 141.9 |
| **Effluent** | | | | |
| pKa | | 6.4 | 6.4 | 6.4 |
| Ionization Fraction | | 0.8 | 0.8 | 0.8 |
| Total Inorganic Carbon | mg/L CaCO3 | 89.2 | 89.2 | 89.2 |
| **Mixing Zone** | | | | |
| Temperature | deg. C | 13.8 | 13.1 | 13.1 |
| Alkalinity | mg/L CaCO3 | 133.5 | 138.8 | 138.8 |
| Total Inorganic Carbon | mg/L CaCO3 | 136.6 | 140.9 | 140.9 |
| pKa | | 6.4 | 6.4 | 6.4 |
| pH | | 8.1 | 8.2 | 8.2 |
| Salinity | ppt | 27.0 | 29.4 | |

### Reasonable Potential Analysis

| | Identify Pollutants of Concern | | | | | Determine In-Stream Conc. | | | | WQ CRITERIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pollutant Parameter | # of Samples | Highest Effluent Conc. | Coefficent of Variation | Est. Maximum Effluent Conc. | RP at end of pipe? | Ambient Conc. | Max Total Conc. at ZID | Max Total Conc. at RMZ (7Q10) | Max Total Conc. at RMZ (30Q5) | Acute CMC | Chronic Calc. (4-day avg.) | Chronic Calc. (7Q10) | Chronic Calc. (30 day avg.) |
| | | mg/l | Default=0.6 | mg/l | (Yes/No) | mg/l | mg/l | mg/l | mg/l | mg/l | mg/L | mg/l | mg/l |
| Ammonia (Freshwater Salmonids) | na | na | na | -- | — | na | -- | -- | -- | -- | -- | | -- |
| Ammonia (Freshwater, Salmonids absent) | na | na | na | -- | — | na | -- | -- | -- | -- | -- | | -- |
| Ammonia (Salt Water) | 3 | 1.8 | 0.6 | 7.0 | Yes | 0 | 0.7 | 0.1 | | 8.0 | | 0.85 | |

| Pollutant Parameter | Det. Reasonable Potential: Is there Reasonable Potential to Exceed? (Yes/No) | | | |
|---|---|---|---|---|
| | Acute | Chronic (4 day avg.) | Chronic (7Q10) | Chronic (30 day avg.) |
| Ammonia (Freshwater Salmonids) | — | — | | — |
| Ammonia (Freshwater, Salmonids absent) | — | — | | — |
| Ammonia (Salt Water) | NO | | NO | |

### Effluent Limits

| Pollutant Parameter | # of Req's Samples | Waste Load Allocations | | | | Long Term Average | | | | | Effluent Limits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Acute WLA | Chronic WLA (4 day avg.) | Chronic WLA (7Q10) | Chronic WLA (30Q5) | Acute LTA | Chronic LTA (4 day avg.) | Chronic LTA (7Q10) | Chronic LTA (30Q5) | Min. LTA | Max Daily (MDL) | Monthly (AML) |
| | #/month | mg/l | mg/l | mg/l | mg/l | mg/l | mg/l | mg/l | mg/l | mg/l | 99% | 95% |
| Ammonia (Freshwater Salmonids) | na | -- | -- | | -- | — | -- | | -- | -- | — | — |
| Ammonia (Freshwater, Salmonids absent) | na | -- | -- | | -- | — | -- | | — | -- | — | — |
| Ammonia (Salt Water) | na | na | | na | | na | | na | | na | na | na |

*It should be noted that this spreadsheet reflects a slightly simplified calucation approach. In the case where RP is found by a very small margin, the user should request technical assistance for calculation and use of alternate Effluent Characterization Data.

Harper
Houf Peterson
Righellis Inc.

# Gleneden Sanitary District

GSD-02

## Phase 1
## Wastewater Treatment Facilities Plan
## Analysis of WWTP Options

August 2020

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LANDSCAPE ARCHITECTS ◆ SURVEYORS

# GLENEDEN SANITARY DISTRICT

# PHASE 1
# WASTEWATER TREATMENT STUDY
# ANALYSIS OF WWTP OPTIONS

**August 2020**

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**Gleneden Sanitary District**
**Phase 1 WW Treatment Facilities Plan**
**Analysis of Treatment Options**

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AAGR | average annual growth rate |
| AC | asphalt concrete (pavement) |
| ADF | Average Design Flow |
| ADWF | Average Dry-Weather Flow |
| AVG. | average |
| AWWF | Average Wet-Weather Flow |
| BOD | Biochemical Oxygen Demand |
| C | Celsius |
| CIP | capital improvements plan, cast in place |
| CMOM | capacity, management, operations and maintenance |
| CMU | cement masonry unit |
| CR | Creek |
| DEQ | Department of Environmental Quality |
| DMR | Discharge Monitoring Report |
| DOGAMI | Department of Geology and Mineral Industries |
| EDU | equivalent dwelling unit |
| FAA | Federal Aviation Administration |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Maps |
| FRP | fiberglass reinforced plastic |
| ft. | feet |
| FWS | Fish and Wildlife Service |
| FY | fiscal year |
| gpd | gallons per day |
| gpm | gallons per minute |
| GSD | Gleneden Sanitary District |
| HDPE | high density polyethylene (pipe) |
| hp | horsepower |
| Hwy | Highway |
| IGA | Intergovernmental Agreement |
| in. | inches |
| I/I | infiltration and inflow |

# ACRONYMS AND ABBREVIATIONS (continued)

| | |
|---|---|
| kW | kilowatt |
| kW-Hr | kilowatt-hour |
| K-GB-LB | Kernville-Gleneden Beach-Lincoln Beach |
| MBR | membrane bioreactor |
| MC | Mission Communications, LLC |
| MGD | million gallons per day |
| Mg/L | milligrams per liter |
| MH | manhole |
| MI | miles |
| MMDWF | Maximum Monthly Average Dry-Weather Flow (10% Probability of Occurrence) |
| MMWWF5 | Maximum Monthly Average Wet-Weather Flows (20% Probability of Occurrence) |
| NEPA | National Environmental Policy Act |
| NFPA | National Fire Protection Association |
| NHMP | Natural Hazards Mitigation Plan |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollution Discharge System |
| NWI | National Wetlands Inventory |
| NWR | National Wildlife Refuge |
| N/R | Not Reported |
| OAR | Oregon Administrative Rules |
| ODA | Oregon Department of Aviation |
| ODOT | Oregon Department of Transportation |
| OESC | Oregon Electrical Specialty Code |
| OPRD | Oregon Parks and Recreation Department |
| OSHA | Occupational Safety and Health Administration |
| OSSC | Oregon Structural Specialty Code |
| O&M | operations and maintenance |
| PDAF5 | Peak Daily Average Flow (associated with statistical 5-Year Storm) |
| PIF5 | Peak Instantaneous Flow (during a 5-Year PDAF) |
| PPH | people per household |
| PS | pump station(s) |

# ACRONYMS AND ABBREVIATIONS (continued)

| | |
|---|---|
| PSU | Portland State University |
| PVC | polyvinyl chloride (pipe) |
| REC | recreation |
| R-O-W | right of way |
| RPZ | Runway Protection Zone |
| rpm | revolutions per minute |
| SBR | sequencing batch reactor |
| SCADA | Supervisory Control and Data Acquisition |
| SDC | system development charge |
| SRA | State Recreation Area |
| SS | stainless steel |
| SSD | Salishan Sanitary District |
| S&L | Smith & Loveless Inc. |
| TSS | Total Suspended Solids |
| UG | underground |
| UGB | urban growth boundary |
| USACE | United States Army Corps of Engineers |
| USDA | United States Department of Agriculture |
| USEPA | United States Environmental Protection Agency |
| UV | ultraviolet (light) |
| WPCF | Water Pollution Control Facility |
| WQ | water quality |
| WQS | water quality standards |
| WW | wastewater |
| WWTP | wastewater treatment plant |

# CHAPTER 1
# Introduction

## 1.1 BACKGROUND

**General.** The Gleneden Sanitary District (GSD) owns, operates, and maintains a wastewater (WW) collection system that serves unincorporated communities along the central Oregon coast. The system was first placed into service in 1976 and covers the area between Salishan and Fogarty Creek (see Figure 1-1).

The WW collected and conveyed by the GSD system is pumped into the City of Depoe Bay collection system south of the Fogarty Creek State Recreational Area. From there, the WW is conveyed, treated and discharged by Depoe Bay through shared facilities. The District and City use these shared facilities according to an intergovernmental agreement (IGA) last updated in 1998 (Appendix A). The IGA requires GSD and the City to share financial responsibility for the joint facilities in proportion to the equivalent dwelling units served by each party.

GSD contracts with the K-GB-LB Water District to operate and maintain the WW collection system. This arrangement allows the two districts to share staff, offices, vehicles and some materials, thereby controlling costs by avoiding unnecessary duplications. The water district covers the area served by GSD, plus the Salishan, Keys, and Kernville areas to the north.

**Previous GSD Studies.** GSD has previously had the following three planning reports prepared since the collection system was initially constructed:

- Sewerage Facilities, Final Study Report (HGE Inc., 1990);
- Collection System Facilities Plan (ACE Consultants Inc., 2004); and
- Collection System Facilities Plan Update (HHPR Inc., 2018).

At the time of the 1990 study, the collection system was less than 15 years old and no system deficiencies were identified. Instead that study focused on wastewater treatment alternatives and recommended the District continue the practice of discharging to the Depoe Bay system.

Neither the 2004 report nor the 2018 report evaluated treatment alternatives. The 2004 planning effort included a hydraulic analysis of the sewer system, a comprehensive evaluation of the pump stations, and a study of projected 20-year service needs. Brief supplements to the 2004 report were issued in 2009 and 2016 to update estimates of probable costs for recommended pump station upgrades.

The 2018 Plan Update provided updated population projections, a collection system inventory, condition assessments of system components, a current WW flow analysis, and a current capital improvements plan.

**Previous Depoe Bay Studies.** The City of Depoe Bay had separate engineering reports on their wastewater facilities prepared in 1995, 1999 and 2009. The 2009 Wastewater Master Plan Update, prepared by HBH Consulting Engineers, provided a review of the existing wastewater facilities and identified projected needs through 2028.

## 1.2 NEED FOR PLANNING EFFORT

This analysis of WW treatment options is provided to support long-term planning for the District's WW treatment and overall customer service needs. The District has not had an analysis of WW treatment alternatives completed in about 30 years and a current alternatives evaluation is essential for planning purposes.

There is uncertainty regarding the future reliability and cost effectiveness of continuing to rely on and help finance the extensive network of existing joint facilities in Depoe Bay. Concerns about available capacity and space, combined with disagreements over the fairness of the cost sharing basis have prompted both GSD and the City to consider withdrawing from the IGA.

Each party is required to provide 5-year notice of an intent to terminate the IGA and end the practice of sharing existing joint WW facilities. These joint facilities include major portions of the existing Depoe Bay collection system and the existing treatment plant. The District must prepare a facilities plan to prepare for the potential need to provide separate treatment facilities to process WW from the GSD collection system.

## 1.3 PURPOSE AND SCOPE OF STUDY

The purpose of this study is to identify and evaluate feasible WW treatment options to meet the District's projected service needs. Our analysis is a high-level planning effort that is intended to be a first stage in comparing the relative cost-effectiveness of WWTP options. This reports serves as a supplement to the 2018 Plan Update and, to avoid duplication of effort, draws upon information in that previous report.

The scope of this WW treatment analysis generally consists of the following main elements.

1. Planning Area Description.
   - Address existing conditions, natural resources, and cultural resources.
   - Describe potential receiving streams for treated effluent from WW facilities.
2. Basis of Planning.
   - Update 20-year population, EDU, and flow projections.
   - Address potential impacts of developments beyond the 20 years on WW treatment needs.
3. Existing Facilities. Provide summary descriptions of existing local WW facilities and refer to planning reports that provide more detailed information.
4. Development of Wastewater Treatment Options.
   - Identify and present alternatives treatment options.
   - Describe key considerations for selecting a new WWTP site.
   - Identify and describe siting options for a new WWTP
   - Describe options for joint WW treatment facilities with nearby jurisdictions.
   - Describe potential WWTP discharge options.
   - Provide background on required treatment levels and potential treatment processes
   - Describe key issues regarding continued use of shared facilities in Depoe Bay.
5. Cost Effectiveness Analysis.
   - Describe the basis for alternatives analysis/comparison.
   - Summarize treatment options.
   - Present estimates of probable life-cycle costs.
   - Present analysis of nonmonetary factors and summary of scoring and ranking.
6. Recommended Plan and Implementation.
   - Present an overview of the analysis results.
   - Identify the options that appear worth further evaluation.
   - Identify the main steps the District would need to take to continue planning for WW treatment needs and the implementation of selected plan.

## 1.4 WWTP PERMITS AND REGULATORY FRAMEWORK

### *1.4.1 Discharge Permits for WW Treatment Facilities*

A permit must be obtained from the Department of Environmental Quality to construct and operate a WWTP in Oregon and to discharge treated effluent from the facility. DEQ issues two types of permits. An NPDES permit is required for WWTPs that discharge into surface waters and a WPCF permit is required for facilities that recycle effluent according to DEQ regulations.

DEQ's authority to issue these permits is established in OAR 340-045. The permits are required to keep WW facilities in compliance with the Federal Water Pollution Control (Clean Water) Act and related State statutes. The conditions of operation described in the permits generally fall into the following categories:

- limit on discharge flow rate;
- minimum required treatment level and limits on pollutant loads that can be discharged;
- limits on concentrations of potential pollutants in biosolids that are land applied;
- effluent monitoring and reporting to document discharge quantity and quality;
- biosolids monitoring and reporting to track production, quality, and land application rates;
- minimum required training level for supervising operators; and
- other general conditions of operation.

The Depoe Bay WWTP has been issued NPDES Permit No. 101383 (Appendix B). If the District wants to construct a separate WWTP, an application would need to be submitted to DEQ before the preparation of preliminary engineering report for the proposed facilities.

### *1.4.2 Treatment Requirements*

**Surface Water Discharges and Water Quality Standards.** NPDES permits for a surface-water discharge contain effluent quality limitations that are either based on WQS or a minimum required treatment level. The effluent limitations in a permit determine required WWTP treatment levels beyond the required minimum, if effluent quality could potentially violate published WQS outside a mixing zone.

Current WQS for Oregon waters are published in OAR 340-041 and include both state-wide and basin-specific water quality criteria. GSD and the surrounding vicinity are located in the Mid Coast Basin. This basin encompasses watersheds and near-shore ocean waters from the Salmon River, north of Lincoln City, to streams in the Oregon Dunes National Recreation Area, south of Florence.

Water quality criteria for each specific water body are impacted by the designated beneficial uses identified in the WQS for the respective water body. The beneficial uses DEQ has designated for water bodies in the Mid Coast Basin are summarized is Chapter 2.

The criteria for a water body are also impacted by the current conditions in the water body. When the biological, chemical, and/or physical conditions in a water body do not meet published numerical standards, then the water body is categorized as water quality impaired. When water bodies are determined to be water quality impaired, DEQ must issue Total Maximum Daily Loads (TMDLs). The issuance of TMDLs can result in more strict treatment requirements for a WWTP.

The WQS also include narrative standards that apply to all waters of the State and are important when considering WWTP discharges to small receiving streams. One standard establishes an antidegradation policy (OAR 240-041-0004) that is intended to prevent the further degradation of water quality from new or increased pollution sources. This policy would require the District to provide an analysis showing a proposed discharge would not degrade water quality before DEQ could issue a permit. Another narrative standard pertains to dilution of organic material and results in strict limitations for discharging organic material to any stream with low seasonal flows.

**Water Recycling.** The use of treated effluent from WWTPs as recycled water is regulated in Oregon by DEQ according to OAR 340-055. These rules define recycled-water classes, identify minimum treatment and monitoring requirements for each class, and list the allowable beneficial uses for each class. WPCF permits contain required treatment levels based on recycled water uses proposed by the permittee and potential levels of public exposure.

Recycled water is most-commonly used for irrigation of agricultural land, horticultural land, or landscaping. Various industrial, commercial, and construction applications are also allowed as beneficial uses. Artificial groundwater recharge can also permitted. Regardless of use, recycled water is not allowed to impact groundwater quality.

Agencies with permits that only allow recycling cannot discharge to surface waters and often need storage ponds to hold treated effluent during winter or wet weather when recycling is not feasible. To avoid the need for seasonal storage capacity, an agency may obtain a permit to discharge to a receiving stream for part of the year when flows are higher and then recycle for the rest of the year. This practice is advantageous, if a nearby stream has high-enough flows during the wet season to provide adequate dilution and mixing.

## 1.5 ADDITIONAL REGULATORY FACTORS

### *1.5.1 Collection System Requirements*

GSD operates the collection system according to rules it has adopted by a sewer use ordinance. The agreement between the District and the City of Depoe Bay requires these rules to be consistent with rules adopted by the City and the State. The agreement also requires GSD to measure and record the daily and peak WW flows pumped from Fogarty Creek PS into the Depoe Bay system.

The Depoe Bay NPDES permit contains the following requirements relating to operation of the GSD collection system.

- The permittee must control all wastes it allows to be discharged into the system.
- The system must be operated under the supervision of a WW collections operator with Oregon Class II certification.

Consistent with these requirements, GSD enforces the sewer use ordinance to regulate waste discharges and employs operators with Class II certification for collections system operations.

### *1.5.2 Applicable State and Federal Rules, Codes and Standards*

**General.** The following paragraphs summarize the key rules, codes and standards that impact the design, operation, maintenance, and management of WW facilities, including a WWTP. These rules and guidelines would apply to all treatment options evaluated in this study.

**Occupational Safety and Health.** Operations and maintenance (O&M) activities and constructed system improvements must conform to applicable rules published and administered by the Oregon OSHA. These State rules are based on, and mostly coincide with, Federal OSHA rules. Many of the general occupational safety and health regulations issued by the State under OAR 437-002 apply to O&M tasks that staff must perform and also affect the design of system improvements.

A few key examples of OSHA rules that impact the District include those that relate to the following:

- stairs, ladders, and fall protection systems;
- ventilation and noise exposure;
- personal protective equipment;
- lockout/tag-out procedures;
- confined spaces; and
- fire protection.

**Design Criteria.** The USEPA published guidelines WW treatment facilities titled *Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability*. This technical bulletin presents general standards for the design of WWTPs to maintain a minimum level of reliability for the facilities.

**Pump Station Standards.** The DEQ issued *Oregon Standards for Design and Construction of WW Pump Stations* in May 2001 and these guidelines continue to apply to engineered pump station improvements. The standards would apply to a WWTP influent pump station and any collection system pump station that may need to be constructed to pump flows to a WWTP.

**Codes.** The State of Oregon adopts amended versions of national codes to establish requirements for new construction. The Lincoln County building authority typically requires conformance with these current Oregon codes as a condition of issuing construction permits.

The design of any new building or major building renovation must comply with applicable requirements of the following Oregon codes:

- Structural Specialty Code (OSSC);
- Electrical Specialty Code;
- Energy Efficiency Specialty Code;
- Mechanical Specialty Code; and
- Plumbing Specialty Code.

The Oregon specialty codes are typically updated and readopted every 4 or 5 years following the reissuance of the respective national code.

**Fire Protection Standards.** The NFPA has developed a specific Standard for Fire Protection In Wastewater Treatment and Collection Facilities (Standard 820). This document identifies design requirements intended to prevent fires and explosions from potential hazards at WW facilities.

**Regulations of Public Funding Agencies.** If the District obtains a loan from a Federal or state agency, the GSD will be required to meet certain planning, administrative, financial conditions established by the funding agency.

### *1.5.3 Federal Aviation Administration Standards for Airports*

Federal Aviation Administration (FAA) guidelines place constraints on potential WWTP sites in close proximity to the airport. The FAA has published guidance identifying WWTPs as potential wildlife attractants that should not be located near airports. As a result, a mitigation plan for deterring wildlife attraction would need to be developed by the District and accepted by the FAA for any WWTP planned near the Siletz Bay State Airport. The FAA relies on the United States Department of Agriculture – Wildlife Services to review and approve mitigation plans.

### *1.5.4 Potential for Regulatory Changes*

**DEQ Permit.** In general, it can be costly and time consuming to obtain an NPDES permit for a new surface-water discharge. The regulatory climate generally favors regional WW treatment facilities over smaller, local facilities with separate discharges.

The regulatory climate is also generally more favorable toward water recycling practices as a beneficial use rather than a surface water discharge. WQS are more prone to revisions than the rule for water recycling. However, the treatment requirements for a direct marine discharge would be less likely to undergo revisions than the requirements for a discharge to a river, creek, or bay.

**Codes and Standards.** The Oregon specialty codes are typically updated and readopted every 4 or 5 years following the reissuance of the respective national code. NFPA 820 is also periodically updated and reissued. One code that historically has been subject to significant revisions is the OSSC as it pertains to seismic design (earthquake resilience).

The DEQ standards and USEPA guidelines are still current to typical industry practices. Therefore, major changes to the document do not appear likely within the next 5 years.

## 1.6 ACKNOWLEDGEMENTS

HHPR appreciates the valuable input, data-collection efforts, and other support provided by District staff. We particularly wish to acknowledge the contributions of the following individuals:

Mike Bauman

Patsy Ingram


**Figure 1-1: District Location Map (excerpt from ODOT Lincoln County North Map)**

# CHAPTER 2
# Planning Area Description

## 2.1 STUDY AREA

The study area for the analysis of WWTP options consists of the lands within the existing Gleneden Sanitary District boundaries and the immediate coastal areas to the north and south. The District encompasses Gleneden Beach, Coronado Shores, Lincoln Beach, and adjacent developments. Although these communities are unincorporated, they are designated as an urbanized exception area for land-use planning and regulation by Lincoln County.

Since our analysis included investigating WWTP options located outside the District boundaries, this study considers potential impacts on resources in surrounding areas. Figure 2-1 shows an overall map of the District and the immediate surrounding areas from the south side of Lincoln City to the City of Depoe Bay. This chapter includes brief descriptions of these nearby areas and provides references to other studies that cover facilities located in adjacent areas.

Figure 2-2 shows a map of the District. The existing GSD service area lies mostly to the west of Highway 101 with only four relatively small developed areas served on the east side. Due to land use constraints and the lack of development pressures the District does not have reason to plan for expansions of the District's boundaries.

## 2.2 DESCRIPTIONS IN OTHER PLANNING DOCUMENTS

**Previous GSD Studies.** Descriptions of the physical environment and socio-economic conditions in and near the GSD were previously presented in the 2004 Collection System Facilities Plan and the 2018 Plan Update. This chapter combines and expands on the information previously included in those 2004 and 2018 reports.

**Salishan Sanitary District Facilities Plan.** A draft WW Master Plan was prepared in 2019 by Curran–McLeod, Inc. and was under review by DEQ in early 2020. The study area covered by the plan includes the area within the SSD, the Salishan Spit, Siletz Keys, .

**Lincoln City Facilities Plan.** The 2004 WW Facilities Plan prepared for Lincoln City jointly by Richwine Environmental and MWH includes description of study area characteristics. The study area covered the incorporated and unincorporated lands within the Lincoln City UGB. The plan provides extensive descriptions of the area's physical and socio-economic environments.

**City of Depoe Bay Master Plan.** Depoe Bay had a WW Master Plan prepared in 2009 by HBH Consulting Engineers. Revisions to the plan were completed by HBH in August 2010. The study area for the master plan encompassed the land within the City's UGB. Study area descriptions presented in the plan were limited to information on current and projected populations and EDUs within the Depoe Bay service area.

## 2.3 CLIMATE SUMMARY

The study area experiences a temporate oceanic climate that is typical of the central Oregon coast. The climate generally features moderate temperatures, high seasonal rainfall, and cool to warm summers. Table 2-1 (following page) summarizes climate data measured at the Otis, Oregon weather station for the period from 1981 through 2010.

Climate data is also available from a NOAA weather station in Newport, OR that is approximately the same distance from the planning area. But climate data show higher rainfall amounts occur at Otis, OR and rainfall amounts generally decline to the south of GSD.

**Table 2-1**
**Otis 2 NE, OR 30-Year Climate Summary**

| MONTH | PRECIP (IN) | MIN TMP (°F) | AVG TMP (°F) | MAX TMP (°F) |
|---|---|---|---|---|
| JANUARY | 14.59 | 37.5 | 42.8 | 48.1 |
| FEBRUARY | 10.52 | 37.6 | 44.4 | 51.3 |
| MARCH | 10.59 | 38.8 | 46.8 | 54.8 |
| APRIL | 7.32 | 40.3 | 49.3 | 58.2 |
| MAY | 5.16 | 44.1 | 53.4 | 62.6 |
| JUNE | 3.91 | 47.9 | 56.8 | 65.7 |
| JULY | 1.39 | 50.2 | 60.4 | 70.5 |
| AUGUST | 1.47 | 50.7 | 61.2 | 71.7 |
| SEPTEMBER | 3.15 | 48.1 | 58.9 | 69.6 |
| OCTOBER | 7.5 | 44.5 | 52.8 | 61.1 |
| NOVEMBER | 14.64 | 40.2 | 46.1 | 52 |
| DECEMBER | 14.75 | 36.4 | 41.5 | 46.7 |

Source: NOAA, National Centers for Environmental Information, Climate Data Online

Rainfall at Otis, OR may tend to be slightly higher than in the study area. However, to be conservative, data from the Otis station was used in the flow analysis completed for the 2018 Plan Update to establish design wet-weather flows.

## 2.4 AREA WATERSHEDS

The land inside GSD lies within portions of the coastal watersheds for Sijota, Schoolhouse, and Fogarty Creeks. Elevations above the ocean beaches vary from approximately 25 to 110 feet above sea level. Sijota Creek generally flows west and then north into the south end of Siletz Bay. The other two creeks flow directly into the ocean, with Schoolhouse generally flowing west through the central part of the District and Fogarty Creek flowing west, then south, and finally west.

Fogarty Creek is the largest of the three watersheds, but all are relatively small compared to the watersheds immediately north of the District. The three watersheds begin in hills that lie on the west side of the Siletz River basin and extend up to about 900 feet ASL. But Fogarty rises less than a mile west of a bend in the Siletz River and the ridge between these streams extends only up to about 450 feet ASL.

The area north of GSD is dominated by Siletz Bay and adjacent marsh lands. The Siletz River, Drift Creek and Schooner Creek all empty into the bay. The Siletz River watershed is by far the largest in the area, draining about 370 square miles, and winding over 65 miles through the Coast Range.

Drift Creek is the second largest watershed draining into the bay, rising in the Coast Range about 11 to 12 miles west of the bay in a straight line. It serves as the main drinking-water supply for the K-GB-LB Water District. Schooner Creek is formed about 4.5 miles straight west of Lincoln City by the confluence of the North and South Forks of the creek. It serves as the primary water supply for Lincoln City and as the receiving stream for the Lincoln City WWTP. The WWTP outfall is only about a mile upstream of the bay and the creek is influenced by the tides at the outfall.

To the south, Depoe Bay receives flows from the small creeks of North Depoe Bay, Depoe Bay, and South Depoe Bay. The Rocky Creek watershed lies immediately south of the Depoe Bay City limits. The City of Depoe Bay uses North Depoe Bay Creek and Rocky Creek as their primary sources of water.

## 2.5 GEOLOGY

In general, land above the beaches within GSD boundaries is generally underlain by coastal terrace deposits of the Pliestocene Epoch. These deposits are predominately fine- to medium-grained, marine and non-marine sand with local lenses of cobbles and pebbles. Alluvial deposits of silt, sand, and gravel are found along Sijota and Fogarty Creeks. Fishing Rock and the rocky cliffs on each side of the mouth of Fogarty Creek consist of Miocene age basalt. The preliminary geological assessment included as Appendix E provides additional descriptions of the main geological characteristics of the planning area.

The area surrounding Siletz Bay and the lowland areas along Siletz River, Drift Creek and Schooner Creek are characterized by alluvial deposits of silt, sand, and gravel. The Salishan spit consists of Holocene age beach, bar, and dune sands. Siltstone and sandstone formations of Oligocene age are predominant at higher elevations west of the Bay and between these two creeks.

The areas south of GSD and into the north side of Depoe Bay are characterized by formations of sandstone and siltstone of the middle Miocene. These formations also predominate in the watersheds of the three creeks that flow into Depoe Bay. Basalt formations are present along the immediate coastline and in small pockets inland. The south side of Depoe Bay where the WWTP is located is underlain by the same coastal terrace deposits that predominate in GSD.

## 2.6 SOILS

Soil survey maps published by the Natural Resources Conservation Service show the soils in the planning area are mainly made up of a variety of silt loams, silty clay loams, and sandy loams. These soils are generally suitable for building. They tend to have moderate to slow permeability in the horizons above and through cemented pans whereas permeability is often more rapid below the cemented layer.

## 2.7 UPDATED HAZARD MAPS

### *2.4.1 FEMA Flood Maps*

The FEMA publishes Flood Insurance Rate Maps (FIRM) that identify Special Flood Hazard Areas, floodway areas, and other flood areas. These maps are produced for use in administering the National Flood Insurance Program and were updated in 2019.

The planning area for this study is cover by FIRM Nos. 41041C0117E, 41041C0120E, 41041C0233E, and 41041C0235E, with effective dates of October 18, 2019. The above-referenced maps show small portions of the District to be within Special Flood Hazard Areas. These are lands considered to be subject to inundation by the 1% annual-chance (100-year) flood.

The siting and design of PS #1 (Fogarty Creek PS) was impacted in 2008 by the flood hazards shown in the previous edition of FIRM . However, the 2019 FIRM (# 41041C0233E) has reduced the flood hazard area in Fogarty Creek SRA and PS #1 is no longer close to the hazard area.

The Salishan and Lincoln City WWTPs are both close to flood hazard areas and were specifically designed to be above areas subject to the 100-year flood. In both cases the flood hazard area extend up to approximately 14 feet above sea level. The Depoe Bay WWTP site is about 60 feet above sea level and well outside flood hazard areas.

### *2.4.2 Earthquake and Tsunami Hazard Potential*

The planning area is vulnerable to the effects of shaking caused by a major earthquake along the Cascadia Subduction Zone and also potentially from movement along local crustal faults. Coastal areas are also subject to major tsunamis caused by activity along the CSZ. Information on seismic and tsunami hazards from these features is presented in the preliminary geological assessment included as Appendix E.

The Oregon DOGAMI has developed an online geohazards viewing tool that shows the potential severity of ground shaking that could occur from either a Cascadia earthquake or a nearby crustal earthquake. The viewer shows severe shaking could be expected to result over most or all of the GSD from either one of these earthquake sources. Maps printed from this viewing tool that show expected shaking hazards in the planning area are presented in Appendix C, Figures C-1 and C-2.

DOGAMI also published a series of Tsunami Inundation Maps for the Oregon coast in 2013 that includes maps covering the planning area (Maps Linc-02, Linc-03, and Linc-04). The maps show anticipated inundation zones from simulated tsunamis generated by Cascadia earthquakes of differing magnitudes. Map Linc-02 shows the north end of Siletz Bay and the south end of Lincoln City. Map Linc-03 shows the area covered by GSD and Map Linc-04 shows the area from Fogarty Creek SRA to the south end of Depoe Bay. Appendix C, Figures C-3, C-4 and C-5 present excerpts from these maps.

Most of the District's pump stations are located in areas that are likely to be vulnerable to tsunami inundation following a local-source earthquake of magnitude 9.0 or greater. Some of these stations, including the main pump station at Fogarty Creek (PS #1), are also considered vulnerable to inundation from tsunamis caused by Cascadia earthquakes of magnitude 8.9.

The existing Lincoln City and Salishan WWTPs are located inside potential inundation zones and the existing Depoe Bay WWTP is located on the edge of the potential inundation zone. The Salishan WWTP site is the most vulnerable to tsunamis due to its location near Siletz Bay. But both the Lincoln City and the Depoe Bay WWTP sites could also experience major damage from a tsunami generated by a major Cascadia earthquake.

## 2.8 NATURAL RESOURCES

### *2.5.1 Designated Stream Uses*

Water quality standards for the Mid Coast Basin (OAR 340-041-220) identify the following beneficial uses for the Siletz River and creeks in the planning area:

- WQS Figure 220A designates creeks in the planning area for use as salmon and trout rearing and migration streams (see Figure 2-3).
- WQS Figure 220B designates Fogarty Creek for use as salmon and steelhead spawning grounds from October 15 through May 15 (see Figure 2-4).

### *2.5.2 National Wildlife Refuge*

Siletz Bay and some adjacent areas, including parcels of land near the Siletz River and Drift Creek, were designated in 1991 as the Siletz Bay National Wildlife Refuge (NWR). Overall the NWR encompasses 568 acres that include tidal salt marsh, brackish marsh, tidal sloughs, mudflats, and forest land (Figure 2-5).

Siletz Bay NWR is one unit of the NWR system managed by the U.S. Fish and Wildlife Service. The 1997 National Wildlife Refuge System Improvement Act and resulting Federal regulations provide the most recent guidance on the management of NWRs and any restoration projects undertaken on these lands.

### *2.5.3 Wetlands*

The National Wetlands Inventory identifies estuarine and marine wetlands, freshwater emergent wetlands, and freshwater forested/shrub wetlands within the planning area. Figure 2-6 shows the locations of these wetlands. The United States FWS publishes the NWI as a source of information to support the understanding, conservation and restoration of wetlands.

### *2.5.4 State Park Lands*

The State of Oregon manages the following recreational areas in the planning area.

- Gleneden Beach State Recreation Site. This site encompasses 12.5 acres between the Worldmark resort on the north and Coronado Shores on the south. The area is managed for day use.
- Fogarty Creek State Recreation Area. This park covers 165 acres around Fogarty Creek where it flows into the ocean at the south end of GSD. The site extends from the beach at the mouth of the creek to inland forests within the lower reaches of the watershed. The area is managed for day use.
- Boiler Bay State Scenic Viewpoint. This site covers 33 acres along the coast on both sides of Hwy 101. The site borders the north city limit of Depoe Bay and encompasses Government Point.

In addition to the above recreational areas, the planning area includes Boiler Bay Intertidal Research Reserve. This area is managed by ODFW and extends between the mouth of Fogarty Creek on the north and the Boiler Bay viewpoint on the south. The reserve includes all rocky areas, tide pools, and sand beaches situated between extreme high tide and extreme low tide.

The land that lies above extreme high tide, south of Fogarty Creek SRA, and outside the Boiler Bay viewpoint is privately owned, except for the Hwy 101 R-O-W.

## **2.9 DRINKING WATER**

The K-GB-LB Water District had a *Water System Master Plan* prepared by CH2M Hill and dated January 2017 that addressed system needs for the next 20 years. Information reported in that document on population projections and water demands are relevant to this study.

Drift Creek and an unnamed tributary continue to serve as the local water supply. The watersheds of these sources lie outside the GSD service area. The Water District operates and maintains a treatment plant and a network of transmission, storage, and distribution facilities to serve the planning area, as well as customers to the north. The District also sells water to the Lower Siletz Water District.

## 2.10 UPDATED SOCIO-ECONOMIC INFORMATION

### *2.7.1 General*

The most significant socio-economic factors to impact the planning area over the last 20 years were the advent of the "Great Recession" and the subsequent economic recovery. Since the economic downturn in 2007-2009, minimal development has occurred in the Planning Area and tourism has been slow to recover. As a result, population growth has been slower than was projected by the original 2004 Collection System Facilities Plan.

### *2.7.2 Updated Economic Data*

Lincoln County had a *Ten Year Update on Lincoln County, Oregon's Economy* prepared and published in 2014 by The Research Group, LLC. This economic study is an update to previous economic analyses and social implications studies commissioned by the Oregon Coastal Zone Management Association.

The reason for the update was to review the many changes that occurred to Lincoln County's regional economy over the previous decade. The study did not separately analyze and report on socio-economic conditions in the planning area. However, the broader study does offer economic information relevant to the area.

### *2.7.3 Current Land Use and Housing*

Land use patterns within GSD boundaries have not changed since the 2004 Collection System Facilities Plan. Figure 2-7 shows current County zoning in the planning area. Zoning for the GSD service area is consistent with its designation as an urbanized exception area outside City UGBs.

Data from the Census Bureau, as reported by the PSU Population Research Center and the County's economic study, show the following housing trends:

- The housing stock in Lincoln County is aging.
- The proportion of dwelling units in the County that serve as second homes has increased. In 2010 over 25% of the total housing stock served as second homes.
- The housing vacancy rates in Lincoln County are higher than the state-wide rate.
- The average number of people per household has been decreasing since the 2000 Census in Depoe Bay, Lincoln City, and the County as a whole. The trend is consistent with the trend of an aging population.

### *2.7.4 Recent Population Trends*

The GSD tracks customer base using EDUs. Each EDU represents the estimated average sewage contribution from a single-family residence. The District's 2017 Annual Report on EDU Count identifies an estimated 2,210 EDUs being served. Recent EDU counts in previous years show the following trends.

- Five-Year Trend. Annual reports on District EDU counts for the period from 2012 through 2016 show less than a 0.8% increase in EDUs over the 5-year period (about 0.15% per year).
- Trend Since Previous Study. The 2004 Facilities Plan reported an estimated EDU count of 2,052 for the Year 2003. This count compared to the 2017 count shows a 7.7% increase in EDUs served over 14 years, which equates to a 0.53% average annual growth rate (AAGR).

By comparison, the 2017 K-GB-LB Water Master Plan reported an 11.9% increase in customer accounts from 2002 to 2015, which translates to a 0.87% AAGR.

Table 2-2 summarizes recent population data reported by the United States Census Bureau and the Population Research Center at PSU for Depoe Bay, Lincoln City, and Lincoln County.

**Table 2-2**
**Recent Local Population Data**

| Location | 2000 | 2010 | 2017 ** | AAGR (2000 – 2010) | AAGR (2000 – 2017) |
|---|---|---|---|---|---|
| Depoe Bay UGB | 1,174 | 1,394 | 1,459 | 1.73% | 1.29% |
| Lincoln City UGB | 8,717 | 8,969 | 9,329 | 0.29% | 0.40% |
| Lincoln County | 44,479 | 46,034 | 47,944 | 0.34% | 0.44% |

** PSU Estimate reported in 2017 Coordinated Population Forecast

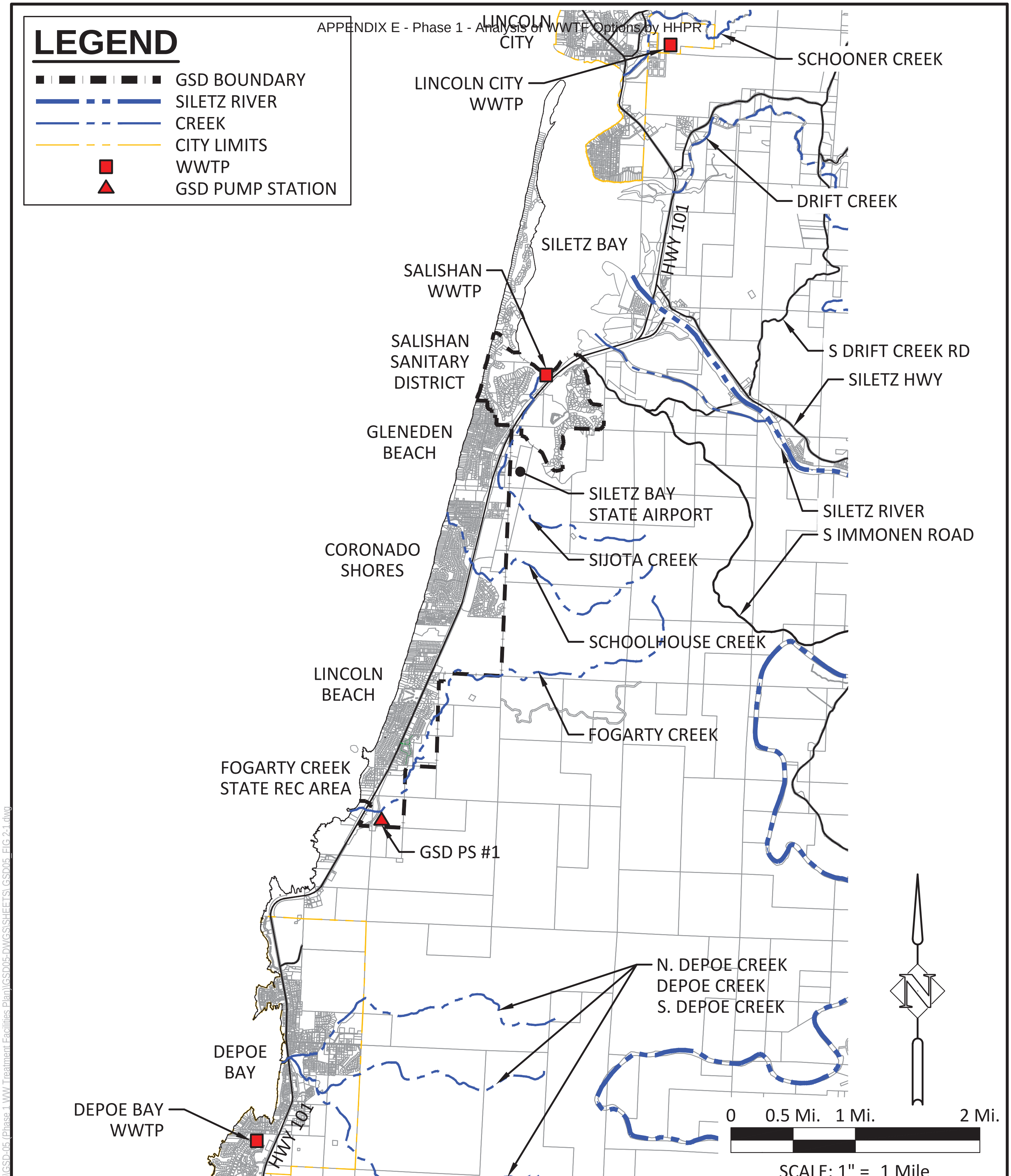
The estimates of recent AAGR for local jurisdictions are summarized below.

- GSD Annual EDU Counts, 2003 – 2017: 0.53% AAGR
- K-GB-LB Customer Accounts, 2002 – 2015: 0.87% AAGR
- Depoe Bay UGB Population, 2000 – 2017: 1.29% AAGR
- Lincoln City UGB Population, 2000 – 2017: 0.40% AAGR

The only potential expansion of the current service area considered in this study is at the south end of the District, in the Fogarty Creek State Recreation Area. The State of Oregon may develop an RV campground in the recreation area that would most likely be served by GSD and result in a very small service area expansion in the area of the District's main pump station (PS #1).

The largest contiguous tracts of developable land remaining in the District are located on the east side of Highway 101. One tract is mainly to the north of Schoolhouse Creek and the Seagrove community. A second tract is immediately south of Seagrove and north of Fogarty Creek.

Other developments in the District are anticipated to be residential and commercial construction on vacant lots within existing communities. The most recent EDU counts by GSD show there are 348 vacant lots in the District.

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VICINITY MAP

# GLENEDEN WW TREATMENT FACILITIES PLAN

GLENEDEN SANITARY DISTRICT, OREGON

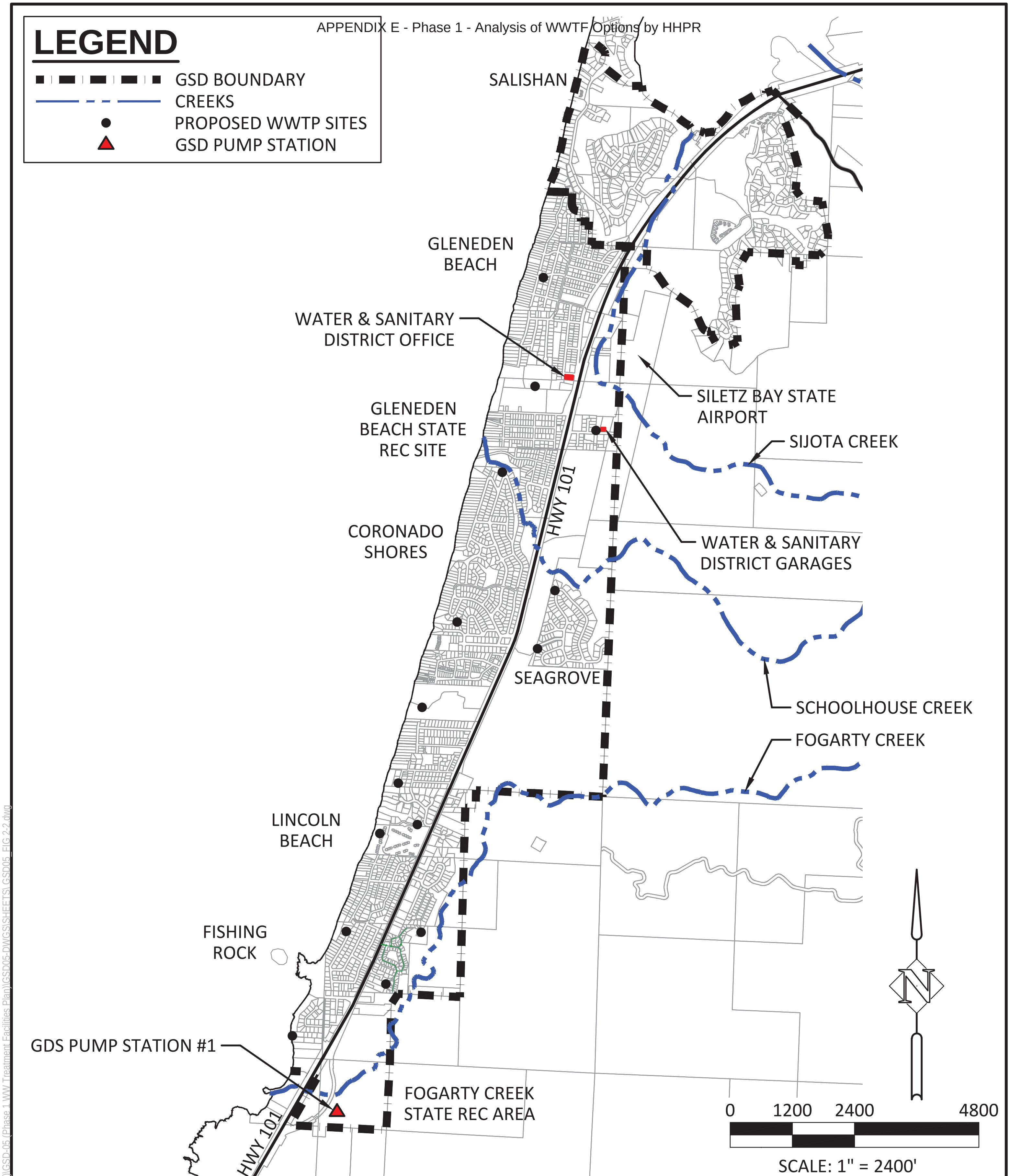
SHEET NO.

FIG 2-1

JOB NO.

GSD-05

P:\GSD (Gleneden Sanitary District)\GSD-05 (Phase 1 WW Treatment Facilities Plan)\GSD05-DWGS\SHEETS\GSD05_FIG 2-1.dwg

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OVERALL DISTRICT MAP

GLENEDEN WW TREATMENT FACILITIES PLAN

GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.

FIG 2-2

JOB NO.

GSD-05

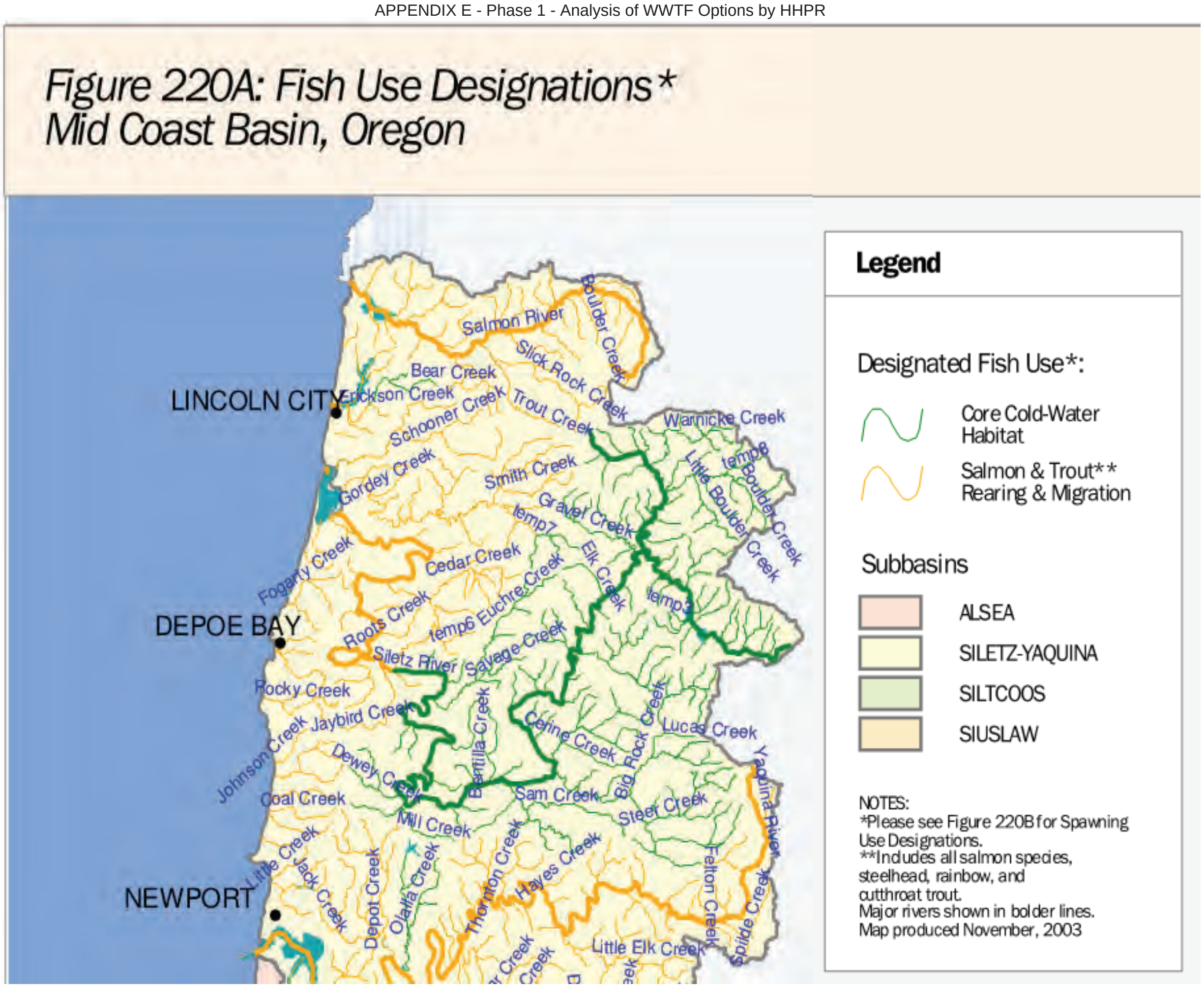



**Figure 2-3: Fish Use Designations (DEQ WQ Standards)**

APPENDIX E - Phase 1 - Analysis of WWTF Options by HHPR

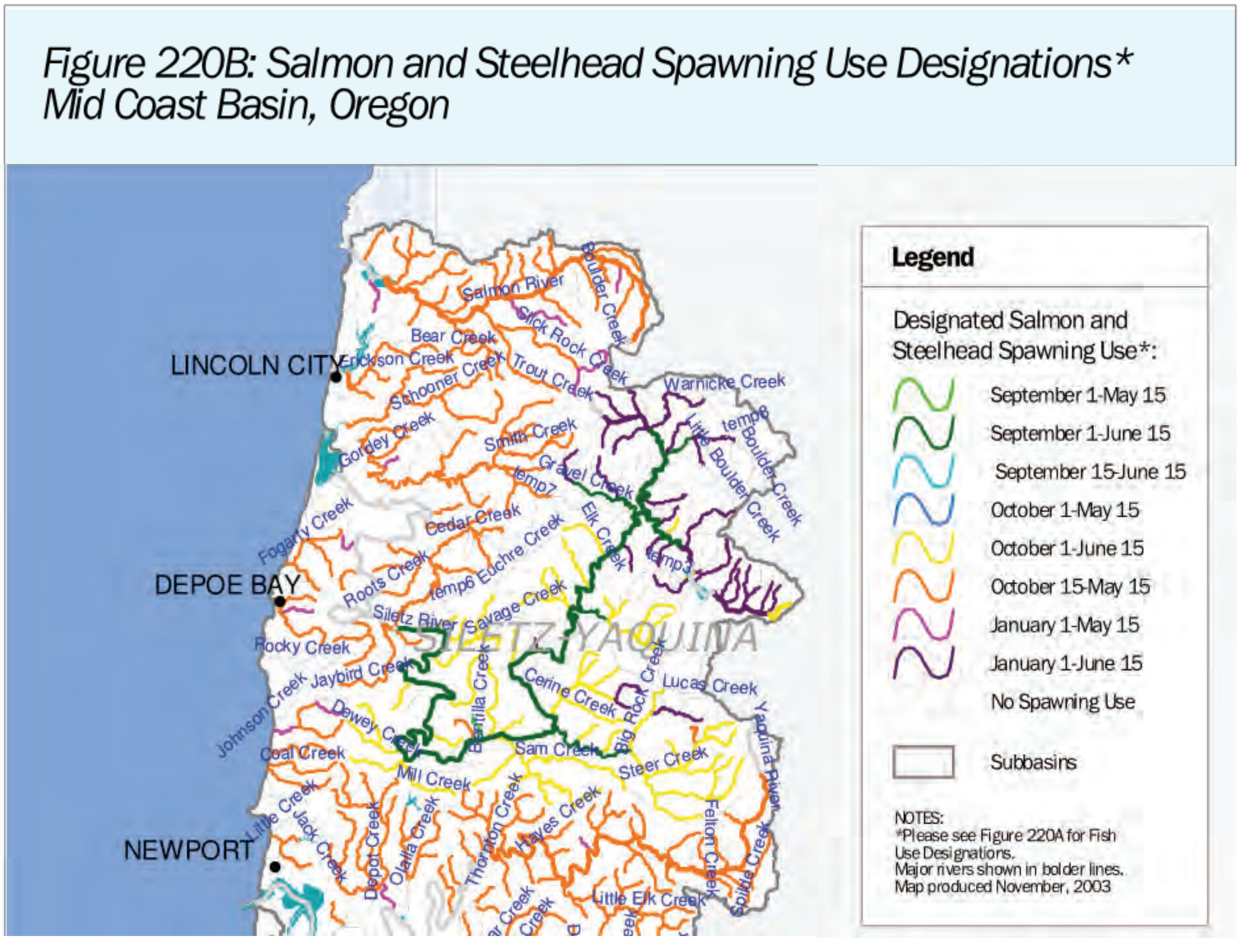



**Figure 2-4: Salmon and Steelhead Spawning Use Designations (DEQ WQ Standards)**

APPENDIX E - Phase 1 - Analysis of WWTF Options by HHPR


**Figure 2-5: Siletz Bay NWR Boundaries (USFWS National Cadastral Data, 2019)**

## USFWS National Cadastral Data – NWRS/NFH Web Mapper (last updated 08-14-2019)

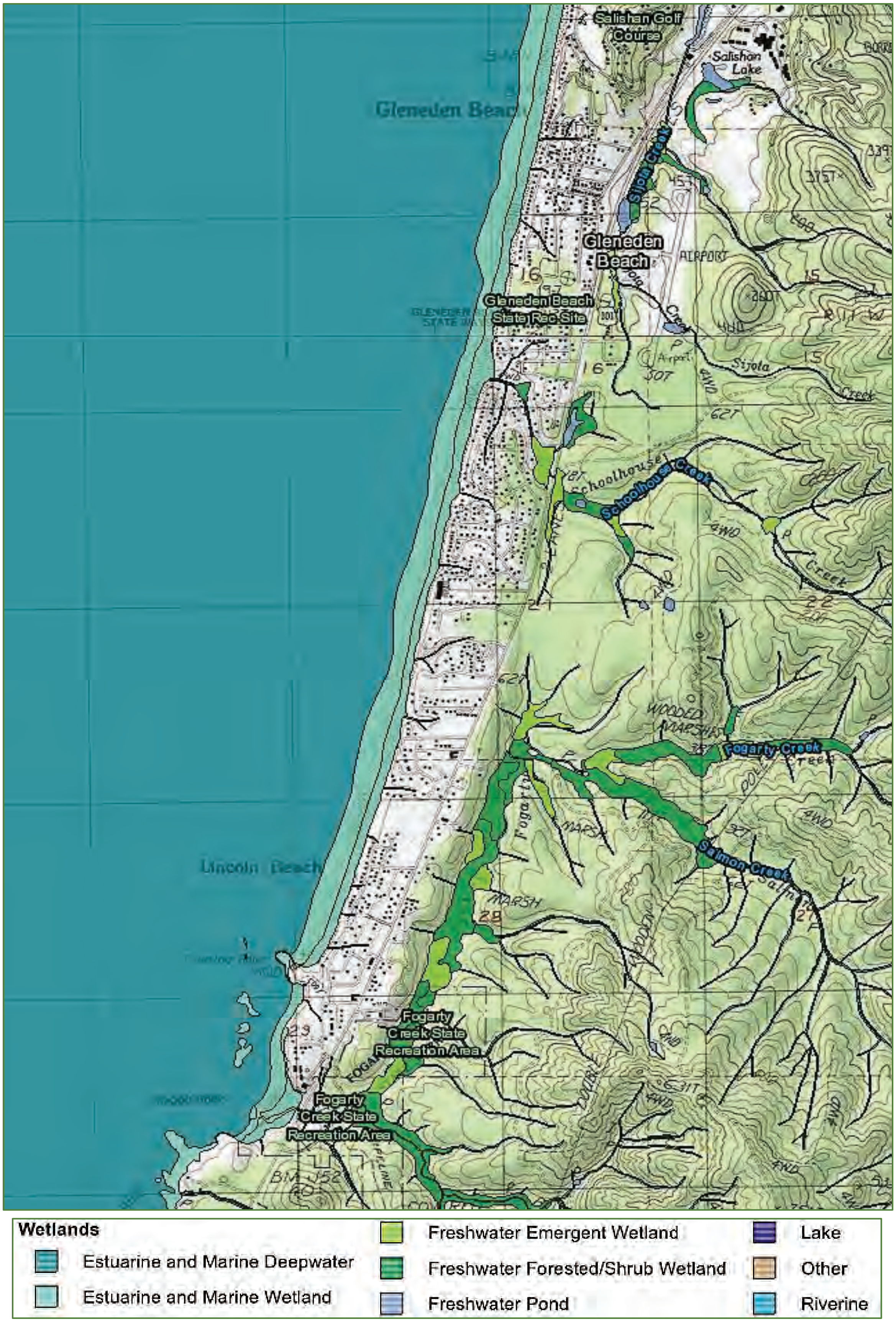



**Figure 2-6: Wetlands - GSD Service Area (USFWS NWI)**

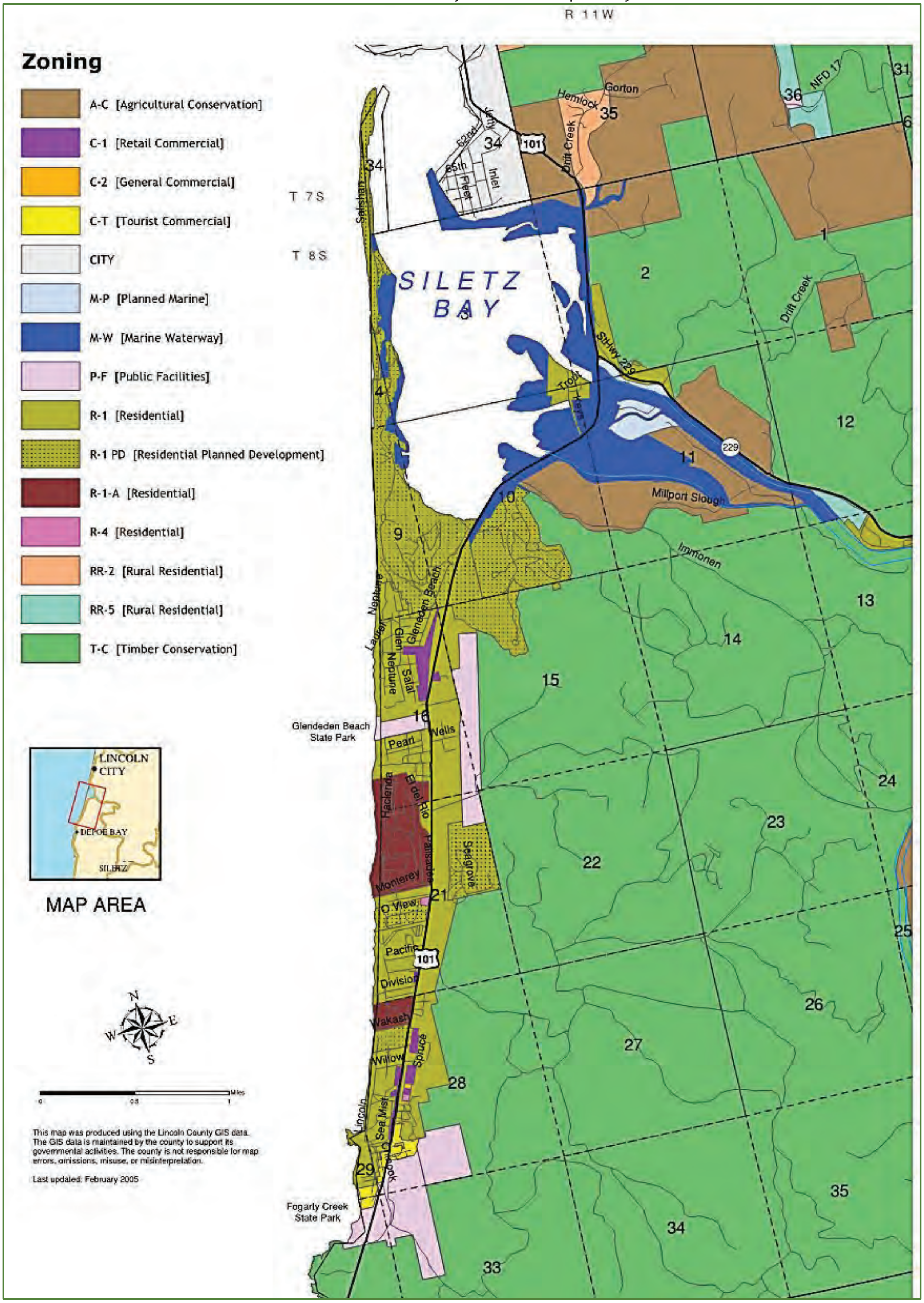



**Figure 2-7: Zoning Map - Gleneden Beach/Lincoln Beach Area (Lincoln County GIS, 2005)**

# CHAPTER 3
# BASIS OF PLANNING

## 3.1 POPULATION AND DEVELOPMENT

### 3.1.1 *Coordinated Lincoln County Forecasts.*

The latest population forecasts for Lincoln County and each UGB in the County are reported in the PSU *Coordinated Population Forecast for Lincoln County* dated June 30, 2017. The Population Research Center at PSU prepared this report under the Oregon Population Forecast Program. Forecasts prepared under the forecast program must be used for land-use planning according to Oregon state law and the policies of Department of Land Conservation and Development. The next PSU forecasts for Lincoln County and the County UGBs are scheduled to be released in 2021.

Table 3-1 lists the 2017 PSU population forecasts for Depoe Bay, Lincoln City, all smaller UGBs (including Depoe Bay), County areas outside UGBs, and Lincoln County as a whole.

**Table 3-1**
**PSU Coordinated Population Forecasts (1)**

| Location | 2017 | 2035 | 2065 | AAGR (2017 – 2035) | AAGR (2035 – 2065) |
|---|---|---|---|---|---|
| Depoe Bay UGB | 1,459 | 1,826 | 2,342 | 1.3% | 0.8% |
| Lincoln City UGB | 9,329 | 10,352 | 11,854 | 0.6% | 0.4% |
| Smaller UGBs (2) | 9,633 | 11,135 | 13,278 | 0.8% | 0.6% |
| Outside UGBs | 18,156 | 18,747 | 19,739 | 0.2% | 0.2% |
| Lincoln County | 47,944 | 52,962 | 60,628 | 0.6% | 0.4% |

(1) PSU Forecasts presented in 2017 Coordinated Population Forecast
(2) Includes all other UGBs in Lincoln County besides Newport and Lincoln City.

### 3.1.2 *Gleneden Sanitary District Forecast*

The 2018 GSD Collection System Facilities Plan Update used an estimated AAGR of 0.9% to project 20-year WW flows for the District. This AAGR matches that used in the 2017 K-GB-LB Water Master Plan and is an intermediate forecast between those for Depoe Bay and Lincoln City.

The 2017 *Coordinated Population Forecast for Lincoln County* assumes that household occupancy rates and the average number of people per household (PPH) in Lincoln County will "stay relatively stable over the forecast period." Similarly, our forecasts assume that commercial development and employment in the GSD will grow in proportion to population growth. Therefore, the 2018 Plan Update and this analysis assumed the AAGR for EDUs and sewage production will correspond to the AAGRs we identified for population projections.

The 2018 Plan Update did not provide a population forecast for a longer period or for buildout conditions. For this analysis have included a 40-year projection using the long-term 2017 PSU forecast (2035 – 2065). As with the 20-year forecast, we have assumed the AAGR for EDUs will be comparable to that population growth.

#### *3.1.3 City of Depoe Bay Forecast*

The 2017 PSU report forecasts an AAGR in Depoe Bay of 1.3% through 2035 and 0.8% from 2035 to 2065. By contrast, the 2009/2010 Depoe Bay Plan used an AAGR of 2.5% in Depoe Bay through 2028.

PSU reported an AAGR in Depoe Bay of 1.7% from 2000 to 2010 and the EDU count for Depoe Bay from 2008 through 2018 only increased from 1,578 to 1,590. Therefore, the PSU AAGR forecasts of 1.3% and 0.8% appear reasonably conservative for 20-year and 40-year projections.

A growth rate higher than the PSU forecast could occur if a large development such as The Hills of Depoe Bay on the north side becomes successful. However, the PSU forecasts provide the best available data at this time.

#### *3.1.4 Summary of EDU Projections*

Table 3-2 lists EDU projections for both GSD and Depoe Bay using the AAGRs described above. The higher near-term growth rates were applied through 2040 and the lower long-term rates were used for the 2060 projections. The 2040 EDU projection for Depoe Bay is about equal to the projection for 2018 reported in the previous 2009 Depoe Bay Plan.

**Table 3-2**
**EDU Forecasts for GSD and Depoe Bay (1)**

| Year | Total GSD EDUs (2) | Total Depoe Bay EDUs (3) | Total EDUs | GSD EDU Share |
|---|---|---|---|---|
| 2020 | 2,254 | 1,632 | 3,886 | 57.9% |
| 2025 | 2,357 | 1,741 | 4,098 | 57.5% |
| 2030 | 2,465 | 1,857 | 4,322 | 57.0% |
| 2035 | 2,578 | 1,981 | 4,559 | 56.6% |
| 2040 | 2,696 | 2,113 | 4,809 | 56.1% |
| 2060 | 3,100 | 2,478 | 5,578 | 55.6% |

(1) Projections based on 2017 PSU population growth forecasts and EDU counts for December 2018. Two-year growth added for base year (2020).
(2) Forecast GSD AAGR = 0.9% thru 2040 and 0.7% from 2041 thru 2060.
(3) Forecast Depoe Bay AAGR = 1.3% thru 2040 and 0.8% from 2041 thru 2060.

## 3.2 BASIS OF ALTERNATIVES DEVELOPMENT

#### *3.2.1 Projected WW Flows for Planning Purposes*

The 2018 Plan Update for GSD generated projections for design dry-weather and wet-weather flows that take into account both base sewage flows and I/I contributions. Since growth has been low over the last 2 years and available data show I/I contributions are stable, the 20-year flow projections from 2018 require only small changes to adjust them to 2040. We then applied the lower long-term growth rate to estimate projected 40-year flows.

The 2018 flow analysis showed that dry-weather sewage flows in summer, when I/I is minimal, produce the maximum month condition used for design loading to a WWTP. The projected peak flow during design storm conditions must be used for hydraulic capacities of collection system and WWTP components.

The 2017 PSU growth projections indicate the flow projections presented in the 2009 Depoe Bay plan are not current and higher than current data would support. Also, because there has been virtually no EDU growth in Depoe Bay since 2008, our 2020 base year has only a 3.4% higher EDU estimate than the 2008 count.

Given the available data and in the absence of current planning information for Depoe Bay, we used the 2028 projections in that 2009 report as the basis for projected 40-year flows in our analysis.

Table 3-3 presents the projected flow rates we used as the basis for our analysis. The net available ADF capacity listed in Table 3-3 is the difference between the combined maximum-monthly flow projections and the ADF capacity reported in the 2009 Plan for the Depoe Bay WWTP.

**Table 3-3**
**Wastewater Facilities Capacity Requirements (in MGD)**

| | GSD Flows | | Combined Flows (1) | | Available |
|---|---|---|---|---|---|
| Year | Max. Month | Peak Hour | Max. Month | Peak Hour | WWTP Capacity (2) |
| 2040 | 0.35 | 1.70 | --- | --- | --- |
| 2060 (3) | 0.40 | 1.75 | 0.80 | 3.60 | 0.80 |

(1) GSD & Depoe Bay combined flows for joint WWTP.
(2) Based on Depoe Bay WWTP MMDWF capacity of 1.6 MGD reported in 2009 Depoe Bay Plan.
(3) Approximates build-out condition for GSD.

### 3.2.2 *Required Treatment Capacity for Separate WWTP*

Table 3-4 summarizes the influent WW characteristics we have used as the basis for sizing a separate WWTP to would meet the long-term service needs for GSD. Given the major investment required for new WW facilities and the modest growth projections for GSD, we believe the 40-year projections serve as a sound basis for our analysis.

**Table 3-4**
**Influent Wastewater Characteristics**

| WW Parameter | Value | |
|---|---|---|
| **A. Flow Rates** | | |
| Maximum Monthly Dry-Weather Flow | 0.40 | MGD |
| Peak Hourly Flow | 1.75 | MGD |
| **B. Pollutant Concentrations (Maximum Monthly Average)** | | |
| BOD5 and TSS (1) | 350 | mg/L |
| Total Nitrogen (2) | 40 | mg/L |
| **C. Design Influent Temperatures (3)** | | |
| Average Summer | 12.8 | Degrees C |
| Average Winter | 5.0 | Degrees C |

(1) BOD and TSS concentrations estimated from Depoe Bay DMRs for 2010 through 2017.
(2) Assumed value of total kjeldahl nitrogen based on similar municipal WW.
(3) Temperatures based on 30-yr. climate summary for Otis, OR weather station (see Chapter 2).

The maximum-monthly flow is used to establish the total ADF capacity required for secondary WW treatment. The peak hourly flow is used to establish the hydraulic capacity required for the collection system and for WWTP processes. We used the flow projections to develop the preliminary sizing of WWTP processes and a preliminary layout for a potential WWTP serving only GSD.

### *3.2.3 Salishan and Lincoln City Flow Projections*

The 2019 SSD Facilities Plan lists 0.25 MGD and 0.57 MGD design ADF and peak daily flow, respectively, for the service area under a projected build-out condition. This includes service extension to the Salishan Spit and full development of the current areas served.

The existing Lincoln City WWTP was sized to meet service needs based on the flow projections in the amended 2004 Facilities Plan. Since the City reports capacity is not available at the Lincoln City WWTP, that facility would need to be expanded to handle the GSD flows listed in Table 3-4.

### *3.2.4 Basis of Engineering Opinions (Estimates) of Probable Costs*

We have developed the preliminary estimates of probable costs presented in this study from information available at the time this study was prepared. The cost information used to generate the estimates has been updated to December 2019 using the Engineering News-Record Construction Cost Index of 12,112 for the Seattle, WA region.

The probable construction costs presented in this study are feasibility-level estimates and their level of detail falls within Estimate Class 5 as defined by the Association for the Advancement of Cost Engineering International (Recommended Practice #18R-97, Rev. March 2019). Consistent with this estimate class, the accuracy is anticipated to be within +50% to -20% of the actual cost.

The estimates of probable construction costs include allowances for contractor overhead and profit, mobilization/demobilization, and construction contingencies. We added a 20% allowance for construction contingences to all projects to account for the fact we have developed only concepts for the implementation of these other projects.

A nonconstruction cost allowance was also added to each project to include environmental planning, engineering studies and designs, permitting, administrative and legal costs. We used a nonconstruction cost allowance of 40% for implementation of a new WWTP and outfall pipeline project. We used a nonconstruction allowance of 30% to implement improvements to shared facilities in Depoe Bay or a project that entails constructing a joint WWTP at an existing plant site. The higher allowance for a new site is intended to account for the additional work outlined below:

- Complete extensive environmental documentation and reviews of the project.
- Prepare modeling studies for an outfall.
- Acquire land through lease or purchase for a WWTP and easements for pipelines.
- Obtain permits from Federal, State and County jurisdictions.

Actual project costs would depend on the scope identified during project development. Actual construction costs would also be affected by labor and material costs and competitive market conditions at the time bids are solicited, as well as by site-specific conditions and other factors. Consequently, the actual construction costs will vary from our estimates.

### *3.2.5 Component Service Life*

Table 3-5 summarizes the projected service lives of major components we used in our analysis to estimate salvage value of components. These estimated service lives are also briefly discussed in the following paragraphs.

**Table 3-5**
**Recommended Service Lives for Major Components**

| Component Category | Estimated Service Life |
|---|---|
| Concrete Structures & CMU Buildings | 50 Years |
| Mechanical, Electrical & Process Equipment | 25 Years |
| Process Controls & SCADA | 20 Years |
| Exposed Piping & process Valves | 30 Years |
| Buried Piping | 50 Years |

Cast-in-place concrete and cement masonry unit (CMU) structures can be anticipated to last 60 to 75 years and roof framing can last 50 to 60 years, if surfaces receive protective coatings. However, ocean air, heavy rains, and aggressive soils can shorten the life of process structures. As a conservative estimate, we used a service life of 50 years for structures and building. Roof decking will require replacement in 30 to 35 years as part of facilities maintenance.

Precast concrete structures such as PS vaults and wet wells are generally not as robust as CIP concrete, with thinner wall construction. Embedded hatches can also experience considerable wear and deterioration over time. But a 50-year service life for precast concrete structures should still be adequately conservative for estimating purposes. .

Major equipment and other electrical, mechanical, and process components should last 25 to 30 years, and can last longer if well maintained. For estimating purposes, we recommend that a conservative service life of 25-year be used for these components.

Wearable parts of pumps and other pieces of equipment typically need to be rebuilt or replaced more frequently. But these costs are included as part of ongoing O&M efforts. Similarly, small pumps and most minor instrumentation & controls are not made to last long in the severe service associated with WWTPs and pump stations. Therefore, these items must be replaced regularly as part of O&M efforts.

Exposed piping, valves and appurtenances should typically last longer than 30 years. Therefore, a 30-year service life is sufficiently conservative for estimating purposes.

# CHAPTER 4
# EXISTING WASTEWATER FACILITIES

## 4.1 GENERAL

The GSD collection system serves Gleneden Beach, Lincoln Beach, and adjacent developments. The system conveys the WW generally from north to south and at the south end PS #1 (Fogarty Creek) pumps all flows to a gravity sewer at the north end of the Depoe Bay system. A full description of the GSD system is provided in Chapter 4 of the 2018 Plan Update.

Shared collection-system components carry GSD flows and a portion of Depoe Bay flows through the City to a single WWTP on the south side of town. This WWTP processes all the WW collected by the Depoe Bay sewer system and discharges to the ocean.

There are two other jurisdictions that currently provide wastewater treatment services in the immediate area of the GSD: the Salishan Sanitary District, and the City of Lincoln City. Each of these jurisdictions operates and maintains a single WWTP that processes all the WW conveyed by their respective collection systems.

The following sections provide summary descriptions of the Depoe Bay, Salishan, and Lincoln City sanitary facilities. These jurisdictions have each had separate planning documents and design reports prepared. References to those documents are included in the following sections to identify where more in-depth descriptions can be found.

## 4.2 LINCOLN CITY

The existing Lincoln City WWTP site is located on the southerly side of Schooner Creek and east of Hwy 101, at the end of SE 54$^{th}$ Drive. The existing facilities were mostly replaced over the period from 2008 – 2012 through a major upgrade. The influent screening structure and aerobic digesters were originally constructed in 1978 and were renovated during the recent upgrade.

The existing processes include screening, grit removal, an SBR process, filters, and UV disinfection. Biosolids from the SBR process are partially stabilized in aerobic digesters, then dewatered and trucked to a landfill. The City previously land-applied liquid biosolids to farmland, but the lack of available fields forced a switch to dewatering and hauling.

The WWTP has a 3.0-MGD ADF capacity and an 11.0 MGD peak flow capacity. The collection system experiences high I/I rates during wet weather and the City has embarked on a major sewer rehabilitation program to reduce I/I rates.

Large ponds that previously served as treatment lagoons in the 1960s and 1970s are still present on the WWTP site. One pond is available for emergency bypass storage and two others were used as biosolids storage and stabilization lagoons. The 2004 Facilities Plan proposed converting the biosolids lagoons to wetlands.

## 4.3 SALISHAN SANITARY DISTRICT

The SSD currently serves the Salishan resort area and the nearby Siletz Keys community. The existing SSD WWTP is located on a 0.33 acre parcel of land near the main entrance to the Salishan resort and commercial center (The Shops). The site is at the south end of Siletz Bay and along the east bank of Sijota Creek. The Salishan Spa is just to the east of the plant site. The existing WWTP occupies most of the available space on the existing site and there is very little potential for expanding the site.

The treatment facilities were upgraded and expanded to the current capacity in 1979 and those facilities are mainly in use today. The WWTP was originally design to treat an average daily flow of 0.20 MGD and a peak wet-weather flow of 0.36 MGD.

A standby generator was subsequently added in 1987 and a new UV disinfection process was added in 2017 to replace the existing chlorination and dechlorination processes. Effluent from the WWTP was previously reused as irrigation water for the golf course. However this practice has been discontinued and all effluent is discharged through a short outfall pipe to Sijota Creek, below the tidal gates.

The draft 2019 SSD Facilities Plan recommends renovating and retrofitting the existing facilities to convert the secondary process to a membrane bioreactor process. The advanced MBR process will improve effluent quality and accommodate future expansion. At full buildout, the facility would need to treat an ADF of 0.25 MGD.

## 4.4 CITY OF DEPOE BAY FACILITIES

### *4.2.1 Shared Collection System Facilities*

The existing Depoe Bay WW facilities were initially placed into service in 1974, making them approximately the same age as the original GSD facilities. The facilities serve most of the area within the UGB, as well as GSD. Collection system components in Depoe Bay on which GSD relies include the following:

- A gravity interceptor sewer that begins at the terminus of the PS #1 force main and extends into the City along Hwy 101.
- The Vista Street PS and force main on the north side of the bay.
- Gravity sewers that extend around the east side of the harbor.
- The Harbor PS and force main on the south side of the harbor.
- Main gravity interceptor sewers that extend to the WWTP site.
- The Main PS at the WWTP.

The 2009 Depoe Bay Plan lists the capacities of the Vista and Harbor pump stations as 1.73 MGD and 2.59 MGD, respectively. The Main PS capacity is reported to be 3.28 MGD. The 2009 Depoe Bay Plan does not provide inventories and conditions assessments of the major pumping station components.

### *4.2.2 WWTP Facilities*

The WWTP is located west of Hwy 101 and south of Southpoint St. The facility was last expanded and upgraded in 2001 and processes all WW collected in GSD and Depoe Bay. The ADF and peak flow capacities of the WWTP are reported to be 1.6 MGD and 3.6 MGD, respectively, in the 2009 Depoe Bay Plan. The peak flow capacity is based on the reported capacity of the UV system.

The main processes of the WWTP include influent screening, an extended aeration process, clarifiers, and UV disinfection. The treated effluent is discharged through an outfall pipe to the ocean. Biosolids wasted from the clarifiers are stabilized in aerobic digesters, dewatered in a screw press and trucked to a landfill. The 2009 Depoe Bay Plan does not provide conditions assessments of the major WWTP components.

# CHAPTER 5
# DEVELOPMENT OF TREATMENT OPTIONS

## 5.1 INTRODUCTION

This chapter documents the initial development of WWTP alternatives. We describe WW treatment options potentially available to GSD and identify the key factors impacting the feasibility of these options. Chapter 6 presents our cost-effectiveness analysis of the options that we found to be potentially feasible.

## 5.2 TREATMENT OPTIONS

### *5.2.1 General Descriptions*

**Technically-feasible Options.** Table 5-3 summarizes the WW treatment options we identified as technically feasible and that GSD could potentially implement.

**Table 5-1**
**Optional WW Treatment Scenarios**

| | |
|---|---|
| **Option 1:** | Construct a separate WWTP at one of the alternative sites we identified to serve only GSD. Sites are described in the following subsection. |
| **Option 2:** | Jointly construct a WWTP at one of the same alternative sites to serve both GSD and Salishan. |
| **Option 3:** | Purchase capacity at the existing Lincoln City WWTP and convey all GSD flows to that facility. |
| **Option 4:** | Continue pumping all flows to Depoe Bay for treatment and discharge. |

**te Acquisition.** Options 1 and 2 involve procuring rights to and approvals for a new site either through a long-term lease or by purchasing the land. Additional easements and permits would also be required. Options 3 and 4 would involve the use of an existing WWTP site and the existing outfall.

**Collection System.** Options 1 through 3 would all require modifications to the GSD collection system to reroute flows to a new WWTP site. Option 4 avoids the need for modifications to the GSD collection system but continues reliance on collection-system components in Depoe Bay that, according to the 2009 Depoe Bay Plan, will require improvements. Based on the information presented in Chapter 3 and the 2018 Plan Update, no expansion of existing GSD system components needs to be included in this analysis.

**Outfall Pipe.** A WWTP at any of the new sites (Options 1 and 2) would require a new discharge pipeline and outfall. We considered the potential of implementing a new ocean outfall pipe or a new outfall pipe to a local receiving stream.

**Joint Agreement.** Option 1 would eliminate the need for an intergovernmental agreement with Depoe Bay or any other jurisdiction, unless a joint outfall were used as a shared facility. Option 2 would require a new agreement with SSD and Option 3 would require a new agreement with the City of Lincoln City.

We analyzed Option 2 as a technically feasible alternative for planning purposes even though SSD is not currently interested in a joint facility. The 2019 Salishan Facilities Plan recommends they renovate and upgrade their existing WWTP solely for SSD use.

Similarly, Lincoln City has shown no interest in any joint planning effort with GSD. But we have also analyzed Option 3 as a technically feasible alternative since conditions could change and interest in a joint effort increase.

Option 4 would require either continuing the current agreement for sharing annual operations and maintenance costs or reaching a new agreement that uses an alternative method of cost sharing. An acceptable agreement must also be reached to establish the basis for sharing capital costs to maintain sufficient capacity in shared facilities in Depoe Bay.

### *5.2.2 Key Considerations for New WWTP Site*

This study has evaluated the feasibility of GSD constructing a WWTP at a new site within or near GSD boundaries. The following paragraphs identify key issues that would need to be addressed to implement this option.

1. **Collection-System.** GSD would need to construct new or modified collection system components to transport WW flows to a new WWTP site. These changes would at least include modifications to PS #1 and the associated force main. A new WWTP adjacent to the existing GSD system could result in a more efficient collection system than the current system that relies on extensive shared components in Depoe Bay.
2. **WWTP Discharge and Permit.** GSD would need to apply for a new discharge permit and construct a new pipeline and outfall pipe to discharge treated effluent to a receiving water body.
3. **Land Procurement.** GSD would either need to purchase land or obtain a long-term lease for a site. Influent pipelines to the site and new effluent discharge and outfall piping would also require easements, if they could not be kept within existing public rights of way or easements.
4. **Site Permitting.** GSD would need to obtain the following permits for a new WWTP.
   - The DEQ would need to issue an NPDES permit for any new discharge or a WPCF permit for a WWTP that would recycle effluent.
   - Lincoln County would need to issue a conditional use permit for the site.
   - The Oregon Department of State Lands would need to issue a permit for any work within stream banks.
   - The U.S. Army Corps of Engineers would need to issue a permit for an ocean outfall, if that discharge option were selected.
   - Lincoln County would need to issue building permits for construction of new buildings that would house process equipment and tanks.
5. **Applicable Codes and Earthquake/Tsunami Resilience.** New structures for a WWTP would need to be designed to meet current OSSC requirements and preferably would be located outside the tsunami inundation zone. Upgrades to any of the other existing facilities in the vicinity would also need to meet current OSSC requirements.
6. **Buy-in from Residents and Homeowner's Associations.** A public outreach and education program would be needed to engage local residents and others who may be impacted by site development and use.
7. **Federal Aviation Administration (FAA) Regulations.** A key land-use restriction at the airport is a runway protection zone (RPZ) designated at each end of the airport. No structures can be constructed within the RPZ.

Land-use guidance from the FAA also identifies WWTPs as potential wildlife attractants. This guidance recommends 10,000 feet of separation between wildlife attractants and airports serving turbine-powered planes.

A WWTP at a site within this buffer zone for the Siletz airport would need to incorporate wildlife attractant mitigation that would be acceptable to the FAA. Failure to obtain FAA approval for a WWTP in the buffer zone could impact the airport's operating license.

### *5.2.3 Alternative WWTP Sites for Options 1 and 2.*

**General.** The District and HHPR jointly investigated potential sites for a new WWTP and identified the alternative sites shown in Figure 5-1 and summarized below. Figure 5-2 shows locations for potential ocean outfalls that could serve these alternative sites.

The same alternative sites could also potentially serve as a location for a joint Salishan/GSD WWTP. However, the extent and cost of the modifications needed to convey SSD flows to a joint site increase the further south the site is located. Therefore, only a site north of Schoolhouse Creek has been considered in this study for a joint Salishan/GSD WWTP (Option 2).

**Option 1A – Fogarty Creek South.** This option would entail a new WWTP site located near existing PS #1 in Fogarty Creek State Recreation Area (park) or on adjacent property south of the park. Figure 5-3 shows a potential site for Option 1A in the park, near existing PS #1 and the PS force main. A site close to PS #1 would require only rerouting the PS #1 force main and installing new pumps designed for the changed discharge pressure conditions. No other collection system modifications would be necessary.

We contacted the Oregon Parks and Recreation Department (OPRD) regarding the potential for procuring a site in the park and OPRD has indicated it would be difficult to procure a site in the park. OPRD managers voiced considerable concern regarding the effect of a WWTP site near a high use recreation area.

The OAR pertaining to an exchange of park property require a need for overwhelming public benefit to the Oregon State Parks system in order to complete the transaction. OPRD has considered the development of an RV campground at the park and GSD could potentially negotiate with the State regarding the sewer charges that would be levied to serve the campground. However, forgiving user charges may not be viewed as an overwhelming public benefit.

The District and HHPR also contacted a representative for the owner of property immediately south of the park about acquiring a small piece of their property. However, no response was provided to a written inquiry and a brief conversation with the representative indicated the property owners preferred to have the land become part of a conservatorship.

The District could also pursue the purchase of land somewhere north of the Depoe Bay city limit. However, site options are limited in this area by rugged terrain. A site close to existing PS #1 would likely be in the mapped tsunami inundation zone and a site outside the tsunami zone would pose challenges for reliable access.

Another potential disadvantage to Option 1A is the probable presence of local active faults in the immediate area of the mouth of Fogarty Creek and Fishing Rock. Seismic activity along these faults could cause significant displacement of pipelines that cross the fault, such as an outfall pipe.

**Option 1B – Fogarty Creek North.** Potential sites for this option would be across Hwy 101 from Lincolnshire and Division Streets, near the location where Fogarty Creek turns south along the District boundary (see Figure 5-4). The WWTP could potentially be located on a 2-acre parcel owned by ODOT that is adjacent to Hwy 101 or on a site just to the northeast of the ODOT parcel.

When GSD contacted ODOT regarding the parcel, they said the current plan is to keep the site for storage. But GSD was placed on a waiting list as an interested party. The site adjacent to the ODOT property would need to be procured from the potential developer who owns the large tract east of Hwy 101 and south of Seagrove. We met with the eastside landowners about the potential for procuring a site and they showed tentative interest in the concept.

The simplest way to reconfigure the collection system for this option would be to install a new force main north from PS #1 and new pumps designed for the changed discharge conditions. Our analysis is based on installing a force main alongside the existing interceptor that conveys flows by gravity to PS #1. The route would include a trenchless crossing under Fogarty Creek and the adjacent parklands between the north and south parking lots.

In the future, if increased flows approach the capacity of the Hwy 101 interceptor, it might be cost effective to divert some flows from the Hwy 101 interceptor directing to Site 1B. Diverting part of the flows would avoid the need to expand sewer capacity south of the diversion point and could allow PS #1 to be downsized rather than expanded to handle the flow increases.

**Option 1C – Seagrove Area.** The site for Option 1C would be immediately south of the Seagrove development, between low-lying areas to the east and west that may be categorized as wetlands (see Figure 5-4). This WWTP site would need to be procured from the same eastside landowner who owns the large tract between Seagrove and the Hemlock Place neighborhood.

Collection system modifications for this option would be similar to those for Option 1B, except the PS #1 force main would need to extend further north. In the future, it could be cost effective to divert all flows entering the upstream end of the existing Hwy 101 sewer to this site. This would allow the sewer to be lined with a smaller pipe and PS #1 to be downsized.

**Option 1D and Option 2 – Airport Area.** Potential sites for these options would either be on part of a state-owned parcel or on part of a parcel owned by the eastside landowner (see Figure 5-5). To stay out of the restricted Runway Protection Zone, the site on the State-owned parcel would need to be south of existing Lyons Club Ball Park Road. The potential site on the privately-owned parcel would be located to the northeast of wetlands near Schoolhouse Creek and to the west of airport land.

We contacted the Oregon Department of Aviation (ODA) about procuring a site on airport land for the WWTP and ODA is receptive to the concept. ODA cannot sell airport land, but a 30-year lease could be executed for piece of land just as was done for the GSD storage garage on Wells St.

Our analysis of Option 1D included collection system modifications that would result in all flows currently pumped to the north end of the Hwy 101 sewer being rerouted north. Only flows entering the Hwy 101 sewer south of the upstream end would be conveyed to PS #1 and pumped back north. Different modifications to the system that involve further rerouting of flows might also be cost effective. Therefore, if a WWTP site near the airport appears to be the most cost-effective option, further investigation into alternative system configurations should be considered.

### 5.2.4 *Existing Wastewater Facilities*

**General.** This study considered the feasibility of GSD transporting its WW to each of the three existing treatment facilities in the area: Salishan, Lincoln City, or Depoe Bay. Chapter 4 provides summary descriptions of these existing WWTPs. Figure 2-1 shows the locations of these WWTPs.

The use of an existing WWTP, or at least an existing plant site, could have less environmental impact than developing a new site. But capacity must be available to transport and treat projected flows. This can involve modifications and expansions to conveyance and treatment facilities. Also, the District must be able to reach an equitable, long-term agreement with the owner of the jointly facilities.

**Salishan Sanitary District.** Since SSD is north of GSD and the overall direction of flow in the GSD system is north to south, all flows would need to be pumped back north to the existing SSD WWTP site. The distance from PS #1 to the SSD WWTP is approximately 4.0 miles.

Any pipeline would most likely be installed almost entirely in the Hwy 101 right of way and would require crossing Fogarty, Schoolhouse, and Sijota Creeks. In the case of the latter two streams, it would probably be feasible to install a pipe over existing culverts.

As described in Chapter 4, the existing WWTP site has limited space for expansion and is constrained by adjacent developments, Sijota Creek, and Siletz Bay. It would not be feasible to construct an expanded facility to serve both districts within the limits of the existing site while maintaining the WWTP in service. The only opportunity for site expansion might be to the east and northeast where a small storage building and a small amount of open space are located. However, the presence of the Spa at Salishan to the east creates opposition to any site expansion.

The draft 2019 SSD Facilities Plan recommends Salishan renovate and upgrade their existing WWTP to serve SSD and potentially homes on the spit. The plan determined this approach to be the most cost effective for SSD for the following main reasons.

1. It would take advantage of existing WWTP structures that the SSD Facilities Plan found to be in adequate condition for renovation and continued use.
2. Pumping flows to an alternative site and paying for capacity at a new or existing WWTP would cost more than renovating and retrofitting the existing WWTP.
3. Continued use of the existing outfall and upgrading to a membrane treatment system without capacity expansion mean SSD does not need to apply for a new NPDES permit.

Given the above considerations, a combined facility at the existing SSD WWTP site serving GSD and SSD was not evaluated in this study.

**Lincoln City.** The existing WWTP site in Lincoln City is approximately 3.7 miles north of the entrance to Salishan along Hwy 101 and SE 54th St. other existing rights of way. Overall, flows entering PS #1 would need to be conveyed about 7.7 miles to the existing Lincoln City WWTP site.

The stretch north of Salishan along Hwy 101 includes bridges over Millport Slough, the Siletz River, and Drift Creek. Pipeline crossings of these waterways, in addition to the three creek crossings between PS #1 and Salishan, would be needed to convey WW to the Lincoln City WWTP.

In response to our inquiries, the Public Works Department for Lincoln City has stated they do not have capacity available at the existing WWTP for GSD, either by purchasing or through another form of agreement. Therefore, an expansion of the plant would be required to provide capacity for GSD. An expansion of capacity beyond the currently permitted discharge rate would require the City to apply for a new NPDES permit.

Due to the size of the existing WWTP, it would probably be feasible to modify the existing SBR process to add enough capacity for GSD. Alternatively, one of the existing biosolids ponds could be converted to an aerated lagoon process for the District, if the City were willing to allow it. Adding sufficient capacity for GSD at the headworks for preliminary treatment and at the effluent end for filtration and disinfection would most likely require the construction of new, and probably separate, treatment units. Additional biosolids handling capacity would also be required.

**Depoe Bay.** The 2009 Depoe Bay Plan reported that the existing Depoe Bay WWTP had enough capacity and was in adequate condition to treat projected joint flows through 2028. But the 2009 Plan recommended replacements and expansions of shared collection-system facilities to address deteriorating conditions and handle projected flows.

The flow projections in the 2009 Plan were based on higher growth projections than proposed by PSU under the statewide forecast program. Therefore, it continues to be unlikely an expansion of the WWTP will be needed within 20 years. However, the age of the WWTP makes it probable that significant capital spending will be needed within 20 years to keep the plant functioning properly and maintain safe work conditions.

Since the existing WWTP is located on the south side of Depoe Bay, GSD must rely on shared collection-system components through the north side and central part of the City. This inherent inefficiency means GSD not only must maintain its own system, but also share in the costs of maintaining a large portion of the Depoe Bay system.

## 5.3 BACKGROUND FOR ALTERNATIVES DEVELOPMENT

### *5.3.1 WWTP Effluent Recycling*

Chapter 1 provides a summary of the regulations that govern effluent recycling. As described in that summary, the regulatory climate generally favors effluent recycling as a beneficial use. However, options for effluent recycling are constrained by the coastal climate, the limited availability of land for irrigation, and the lack of suitable land for effluent storage.

The experience of SSD with reusing effluent to irrigate the Salishan golf course is an example of the obstacles to recycling on the central coast. SSD had to discontinue irrigating the golf course with effluent due to runoff and overflowing from the pond.

The one potential opportunity we identified for effluent recycling would be the seasonal irrigation of land at the Siletz Bay State Airport. Discussions with the State suggest the application of effluent within the runway protection zones and along the airport perimeter could be allowed, if the practice did not attract birds and other wildlife. Approvals would be required by both Federal and State regulators, including USFW, DEQ, and potentially other agencies.

Other recycling opportunities do not appear to exist due to the wet climate, and the lack of nearby farmland, forestland, or other open space in an upland area with mild-enough slopes. Lowland pastures along local streams would have high groundwater that would be susceptible to pollution. Upland forests in the area are typically on moderate to steep slopes that would be prone to effluent runoff, especially if fall rains occur earlier than average.

Any plan for recycling would require a seasonal WWTP discharge to surface waters during the extended rainy period from early fall through early spring. It is not feasible to store all the effluent treated during the rainy season due to the lack of a site that has enough land with mild slopes for a large storage pond. However, some short-term storage capacity would be needed to hold effluent during periods when unsuitable weather for irrigation occurs in the spring and summer.

### *5.3.2 WWTP Discharges to Surface Water*

Discharges to surface water can be either seasonal or all year. Seasonal discharges are needed when stream flows that provide enough dilution and mixing only occur during part of the year. A seasonal discharge for GSD would require effluent recycling when the discharge is not permitted because of the lack of available land for seasonal effluent storage in the study area.

As described in Chapter 1, DEQ regulates surface-water discharges in the study area to maintain compliance with published WQS for the Mid Coast Basin. An NPDES permit from DEQ will be required for any surface-water discharge and the application process will require GSD to provide a study that shows the discharge will meet WQS. Such a study would need to characterize water quality conditions and stream flows or ocean currents. The study would also need to include a mixing zone analysis with modeling to establish the outfall pipe design basis.

Designated beneficial uses of the receiving water must be evaluated to identify a suitable location and configuration for an outfall diffuser. Subsurface conditions must be investigated at a proposed outfall location to determine what installation method(s) might be suitable for a pipe and diffuser.

Once an outfall location is established a permit must be obtained for construction activities in the water body. Work on an ocean outfall would require a permit for dredging and filling through the U.S. Army Corps of Engineers (USACE). Work within a river or creek would require a removal-fill permit from the Oregon DSL. Because all the potential receiving waters in the planning area have been designated for beneficial use by endangered fish species, consultation with the NMFS will be required during the permit application review.

The following paragraphs describe key issues that may impact efforts to obtain a permit for a surface-water discharge to potential receiving waters in the planning area.

1. **Ocean Discharge.** Any new NPDES permit for a separate GSD WWTP with an ocean outfall would most likely contain similar discharge limitations to the permit for the Depoe Bay WWTP. That Depoe Bay permit was renewed in September 2018 with no changes to effluent discharge limitations. Monitoring requirements would probably also be similar to those in the Depoe Bay permit.

   A study into an ocean outfall would need to be prepared that evaluates mixing-zone currents, impacts from storms, stability of the ocean bottom, protection from fishing practices, protection of water quality during construction, accessibility for repairs, and potentially other factors. A preliminary geological assessment of potential ocean outfalls in the planning area was prepared for this study to address the general geologic conditions and seismic hazards that might be encountered. This geological assessment is included as Appendix E.

Our analysis is based on the outfall pipe extending below the ocean bottom out to a diffuser installed above the bottom on the end of the pipe. To avoid water quality impacts, the pipe under the ocean bottom would be installed by horizontal directional drilling.

2. **Siletz Bay and Tributary Streams.** DEQ has designated Siletz Bay, the lower Siletz River and other tributaries as water quality impaired. The bay and the lower reach of Siletz River are impaired due to temperatures not meeting the WQS.

   The lower reaches of Schooner and Drift Creeks are impaired due to the presence bacteria (E. coli) above the WQS. Low dissolved oxygen is also listed as a cause of impairment for Schooner Creek and the Siletz River upstream of approximately River Mile 20.

   The shallowness of the bay and the influence of tides might prevent adequate mixing for a discharge, particularly during lower stream flows in summer. Tidal influences would also complicate mixing in the lower Siletz River.

3. **Local Creeks.** The low flow rates that occur most of the year in Sijota and Schoolhouse Creeks would probably not be sufficient to provide adequate dilution and mixing for a WWTP discharge. Therefore, we did not evaluate discharge options for those creeks.

   Fogarty Creek may have sufficient flows during the wet season to support the dilution and mixing necessary to meet WQS. But it may not be technically feasible to provide WW treatment that lowers contaminant levels in the discharge enough to meet WQS all year. A detailed study of flows and WQ conditions would be needed to determine what time of year Fogarty Creek could reliably support a discharge. The outlet diffuser on a creek outfall may need to be installed in a gravel bed under the creek.

4. **Summary.** The surface-water options that appear to have enough potential of being technically feasible to justify consideration in the analysis are a year-round discharge to an ocean outfall, a seasonal discharge to Fogarty Creek, or a year-round or seasonal discharge to the Siletz River.

   Fogarty Creek would be the only realistic receiving stream for a WWTP site closer to the south end of GSD. An outfall pipeline to the Siletz River would be technically difficult to construct for any option and we only considered it for alternative sites north of Schoolhouse Creek.

   Potential outfalls we considered for each new WWTP site are listed below.

   - Options 1A, 1B and 1C – Ocean outfall or Fogarty Creek outfall.
   - Options 1D and 2 – Ocean outfall, Fogarty Creek outfall, or Siletz River outfall.

#### *5.3.3 Biosolids Disposal*

Municipal WWTPs generate biosolids as a byproduct of the biological treatment processes that are typically employed to meet permit requirements. Biosolids are treated at the three WWTPs in the study area to stabilize or partially stabilize the organic material prior to disposal.

As with effluent recycling, it is common practice to recycle biosolids by applying the material to farmland, golf courses, or parkland as a soil amendment. In the past, the stabilized biosolids from Lincoln City and Depoe Bay have been applied to farmland in dilute liquid form.

Unfortunately, as with effluent recycling, it is difficult along the coast to find suitable land with owners willing to accept the biosolids. Because of this difficulty, both Lincoln City and Depoe Bay have installed biosolids dewatering equipment and now have the material hauled by truck to a landfill in the Willamette Valley.

### *5.3.4 Treatment Level and Treatment Processes*

**General.** All WWTP options would require secondary treatment and disinfection plus biosolids processing as the minimum level of treatment for ocean outfalls. An additional level of WW treatment, referred to as advanced treatment, would be required for a seasonal discharge to Fogarty Creek and may also be required for a Siletz River discharge.

We included advanced treatment in the WWTP options that involve seasonal recycling since these options would also require a seasonal discharge. Providing advanced treatment before recycling would avoid vector attraction, reduce limits on public exposure, eliminate the need for perimeter buffers, and minimize the risk of impacting groundwater quality. An effluent storage tank was included for recycling options to provide 7 days storage during poor weather.

The following paragraphs summarize the treatment processes we included as the basis for comparing options.

**Processes for Secondary Level of Treatment.** WWTP options that would involve an ocean discharge would require secondary treatment with disinfection. The following paragraphs describe the main processes we included in our analysis of ocean-outfall options using secondary treatment.

1. Preliminary Treatment. Headworks are required at the influent end of a WWTP to provide preliminary treatment that screens out coarse materials and settles out heavy grit particles from the influent sewage. A new WWTP should include a mechanically-cleaned screen and a grit removal unit to protect the downstream equipment from damage and prevent grit accumulation in tanks and channels. A manually-cleaned bar screen would also be provided as a bypass.

2. Secondary Treatment. Secondary treatment typically consists of a biological process that oxidizes and stabilizes the WW. Biological processes promote the growth of microorganisms that consume organic matter and, as a byproduct, generate biosolids. These processes require some type of solids separation to clarify secondary effluent as part of the process.

   The biological processes considered for secondary treatment in this study include extended aeration or sequencing batch reactors (SBRs). These two alternatives are both activated sludge processes. To be conservative, we based the process sizing on an extended aeration system because it would require more space than the SBRs.

   There are other alternatives for biological treatment that can be further investigated, if GSD decides to proceed with the next stage facilities planning for a WWTP. However, extended aeration and SBRs would both be cost competitive alternatives for a new WWTP.

   At large WWTPs, primary settling tanks are sometimes installed upstream of secondary treatment to reduce the size of the secondary process. But for smaller plants the incremental cost of constructing and operating primary tanks is generally more than the potential savings in the secondary process. Therefore, primary clarifiers were not evaluated for this study.

3. Disinfection. Disinfection inactivates or destroys a high proportion of the microorganisms present in the treated WW, particularly pathogens (disease-causing organisms). Our analysis includes an ultraviolet (UV) disinfection process in all new WWTP options. Each of the three existing WWTPs in the planning area currently use UV disinfection and the process is widely used in the WW industry for disinfection.

   Chlorine is commonly used for WW disinfection. However, all chlorine residual would need to be removed before discharging to any surface waters. The result is both chlorination and dechlorination equipment must be provided meaning two different chemicals must be purchased, stored, and injected into the effluent.

   A UV system provides the benefit of eliminating the O&M requirements and costs associated with using both chlorine and the dechlorination chemical. Therefore, our analysis includes UV disinfection with each WWTP option.

**Advanced Treatment.** Advanced treatment processes are provided for further removal of suspended solids, organic matter, nitrogen and sometimes phosphorus to meet strict treatment requirements. Advanced treatment would either be provided as a separate process after secondary treatment and before disinfection or as an alternative to conventional secondary treatment.

Common advanced treatment processes include filtration, membrane technology, and occasionally constructed wetlands. Both filtration and membrane technology are feasible options for a GSD WWTP with a discharge to Fogarty Creek or the Siletz River. Wetlands are not feasible in the planning area due to the climate and lack of suitable land.

The options with advanced treatment also include the headworks with screening and grit removal, secondary biological treatment, and UV disinfection. There can be some differences in these processes when advanced treatment is provided. However, the processes in general are similar.

**Biosolids Treatment and Disposal.** Given the lack of local farmland with owners who are willing to accept biosolids for land application, our analysis has been based on the need to dewater the material and haul it to a landfill. The processes required for this practice are described in the following paragraphs.

1. Biosolids storage. A holding tank would store the biosolids as a dilute liquid and partially stabilizes the material. The storage volume is necessary to allow flexibility in the operation of dewatering equipment and in the hauling of biosolids to a landfill. We have been conservative in sizing the holding tank to allow time for the partial decomposition of microorganisms in an aerated state. This reduces odors and the amount of solids that must be hauled.

2. Dewatering. We have included the same type of dewatering process in our analysis that Depoe Bay recently installed. The process requires a chemical addition system to combine polymer with the biosolids and support the process of separating water from the solid material.

   There are alternative types of dewatering equipment that could be evaluated as part of preliminary design, if GSD decides to proceed with plans for a new WWTP. Similarly, the District could consider alternative biosolids drying technologies instead of dewatering.

3. Trucking Loading. A conveyance system similar to the Depoe Bay installation must be provided to load the dewatered biosolids into dedicated dumpster bins for hauling.

**Other Facilities.** Additional facilities common to all new WWTP options have been included in our analysis to develop preliminary estimates of land requirements and probable costs. The following is a list of the additional facilities we included for Options 1A through 1D and Option 2.

1. A secondary-process equipment building with a control room, an office and a small laboratory.
2. Piping gallery with required piping, pumps, valves, and associated components.
3. A dewatering building to house the screw press and associated components.
4. Buried yard piping outside the WWTP structures.
5. Utility power service, an onsite transformer, and a fixed standby generator in an enclosure.
6. A perimeter access roadway, a perimeter fence, and landscaping to screen the facilities.

### *5.3.5 Improvements to Existing Shared Facilities*

**Collection System.** Option 4 includes the collection-system and Main PS improvements recommended in the 2009 Depoe Plan, with the exception of the Vista PS force main. The City completed that force main replacement in 2015.

We also based the replacement cost for the Fogarty Creek gravity sewer on the installation of an 18-inch pipe rather than the 21-inch pipe size identified in the 2009 plan. Current projections for GSD show peak design flows will not exceed the capacity of an 18-inch pipe. Probable project costs for the improvements were updated to be current to December 2019.

**WWTP.** Given the age of the Depoe Bay WWTP, an upgrade of the facilities will be necessary within the planning period to maintain reliable service. The plant could be renovated to keep existing treatment processes, retrofitted to modify existing treatment processes, or replaced with a new facility. To provide a consistent basis for comparing alternatives, we included the following WWTP improvements in our analysis of Option 4.

1. Replacement of influent screen at existing headworks structure.
2. Addition of grit removal unit adjacent to existing headworks.
3. Replacement of the older secondary process train with a new compact (donut) extended aeration system in a new structure and renovation of the newer secondary process train.
4. Replacement of UV disinfection equipment.

There is space at the existing WWTP site to install the replacement secondary process train while the existing WWTP remains in service.

The timing of this work might be similar to the timing for construction of a new WWTP since the last major improvements to the Depoe Bay WWTP were completed in 2001.

### *5.3.6 Joint Agreement with Depoe Bay*

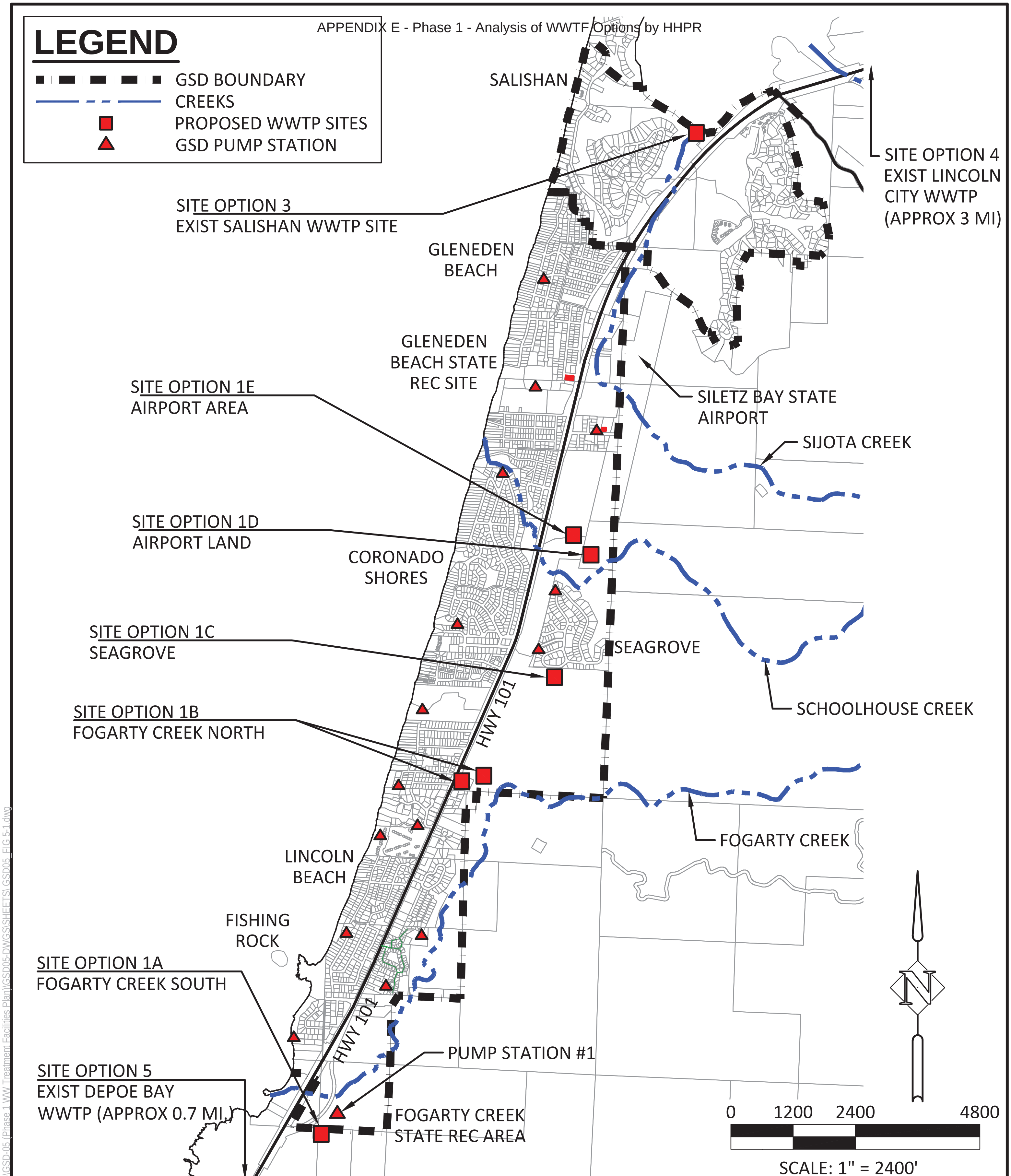
Continuing the practice of pumping flows to Depoe Bay would require the two parties to continue sharing costs under mutually acceptable terms. GSD maintains that the current agreement forces GSD customers to pay more of the annual costs for shared facilities than is fair based on relative flow contributions.

The joint agreement with Depoe Bay also does not establish a clear basis for sharing capital costs for expansions. Each party can set system development charges at their own discretion. Therefore, the proportion of costs for expansions that are covered by SDCs are up to Depoe Bay.

According to the agreement the parties must begin planning for expansions of shared components when components are at or over 85% of their capacity. At the request of either party, negotiations must be held to work out a basis for sharing capital costs for needed upgrades or expansions.

Depoe Bay may claim both parties should share in costs to expand shared facilities regardless of where development occurs that may require expansions. If the parties cannot reach an agreement on relative responsibilities for capital costs, the City can give a 5-year notice to stop accepting GSD flows any time after the current debt is retired in 2023. GSD does not own dedicated capacity under the 1999 agreement.

Given the above factors, there is concern the continued arrangement of pumping all flows to Depoe City may not be a viable long-term option.

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OVERALL MAP - POTENTIAL WWTP SITES

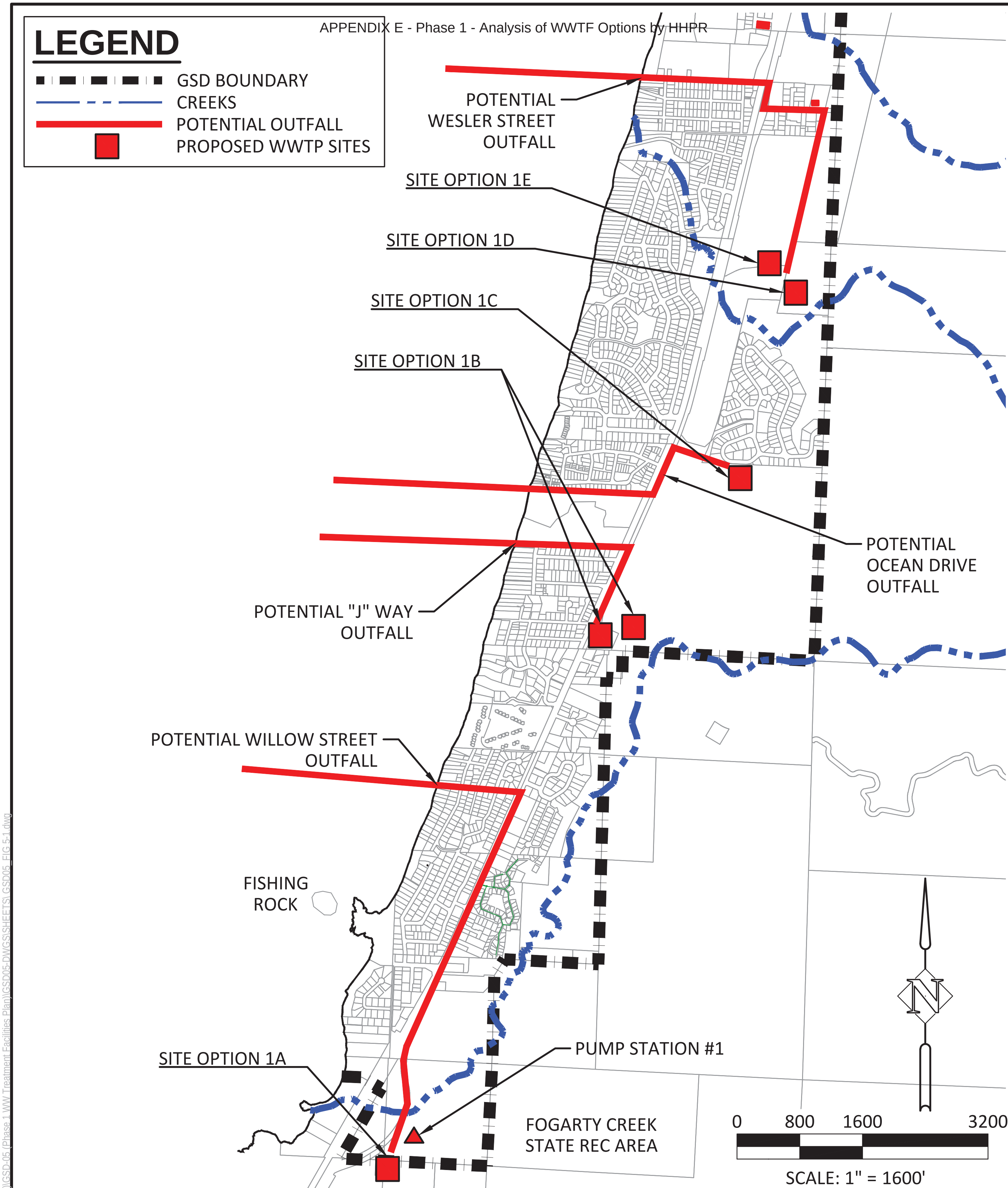
# GLENEDEN WW TREATMENT FACILITIES PLAN

GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.
FIG 5-1

JOB NO.
GSD-05

P:\GSD (Gleneden Sanitary District)\GSD-05 (Phase 1 WW Treatment Facilities Plan)\GSD05-DWGS\SHEETS\ GSD05_FIG 5-1.dwg

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OVERALL MAP - POTENTIAL WWTP SITES

GLENEDEN WW TREATMENT FACILITIES PLAN

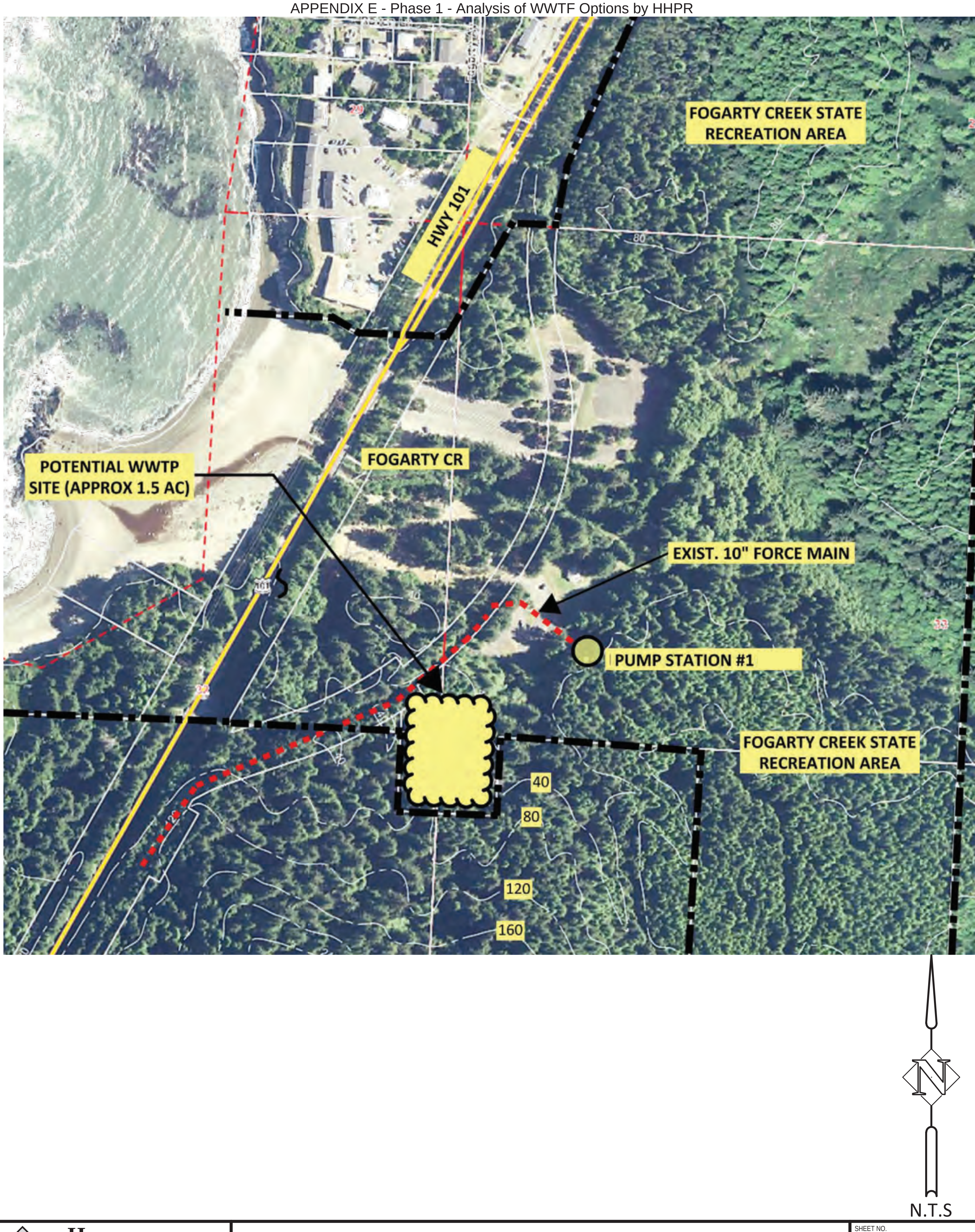
GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.

FIG 5-2

JOB NO.

GSD-05



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OPTION 1A - SOUTH SITE

ANALYSIS OF WWTP OPTIONS

GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.

FIG 5-3

JOB NO.

GSD-05


N.T.S

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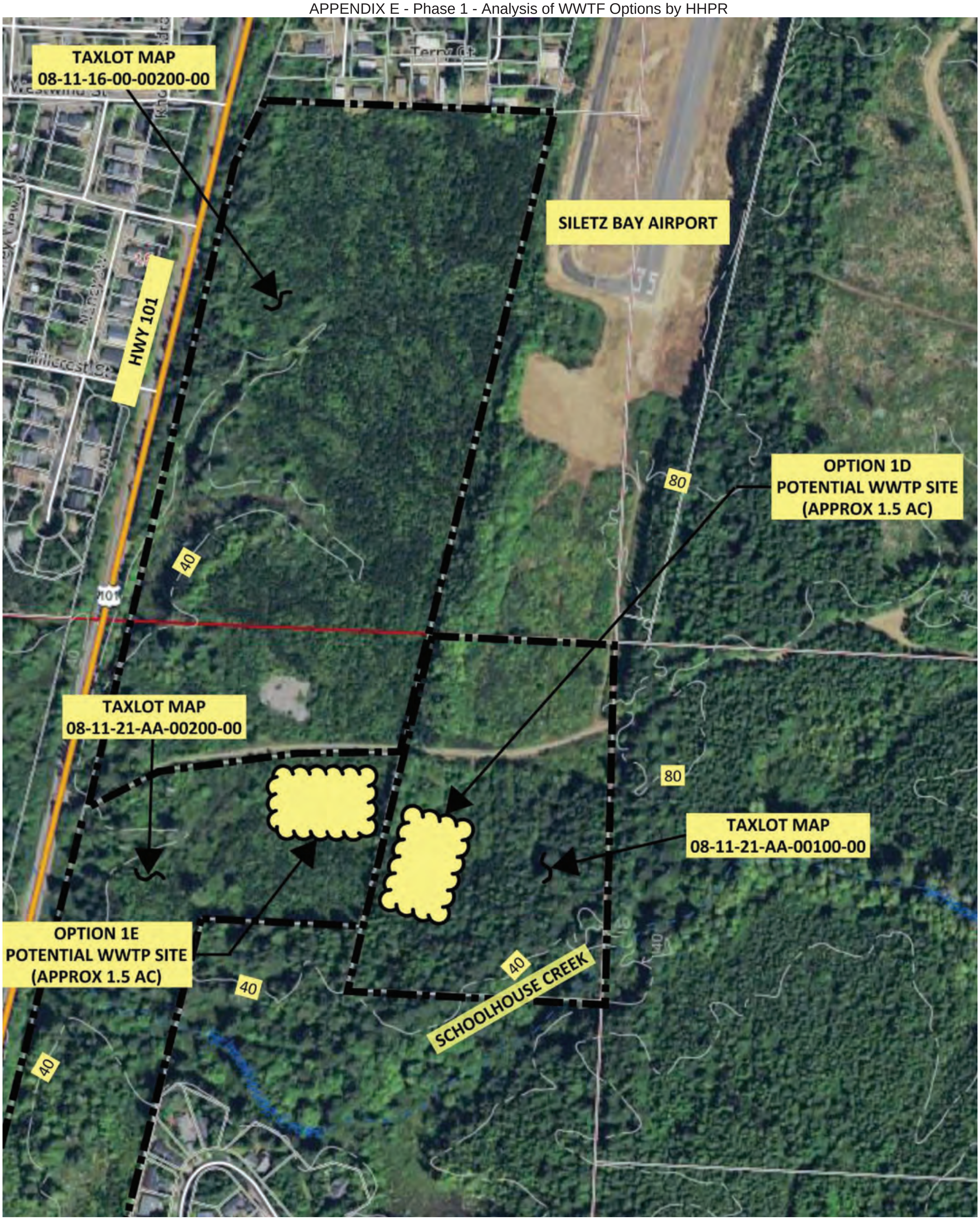
OPTION 1B & 1C - CENTRAL SITES

ANALYSIS OF WWTP OPTIONS

GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.
FIG 5-4

JOB NO.
GSD-05




N.T.S

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OPTION 1D & 1E - NORTH SITES

ANALYSIS OF WWTP OPTIONS

GLENEDEN SANITARY DISTRICT, OREGON

SHEET NO.
FIG 5-5

JOB NO.
GSD-05

P:\GSD (Gleneden Sanitary District)\GSD-05 (Phase 1 WW Treatment Facilities Plan)\GSD05-DWGS\SHEETS\ GSD05_FIG WWTP OPTIONS.dwg

# CHAPTER 6
# EVALUATION OF TREATMENT OPTIONS

## 6.1 OVERVIEW OF ALTERNATIVES EVALUATION

### *6.1.1 General*

This chapter describes the cost-effectiveness analysis we performed to evaluate the WWTP options identified in Chapter 5. We also present the results of the analysis and identify the preferred option.

All options being considered would involve major capital investments, but none of the options would be implemented within 5 years. Therefore, our analysis considered long-term projections. But we still used a 20-year period to evaluate present worth costs, as is typical for engineering studies, because process equipment is approaching the end of its service life after 20 years.

To simplify the analysis, we initially evaluated the options with a new WWTP site (Options 1A through 1D and Option 2) based strictly on discharging year-round through an ocean outfall. Since these options could potentially discharge to an alternative receiving stream, we subsequently compared an alternative outfall to an ocean outfall for the WWTP option that had the highest score.

### *6.1.2 Criteria for Evaluating Alternatives*

Table 6-1 summarizes the criteria that we used to evaluate the attributes of each option and rank their relative cost effectiveness. These criteria were chosen as a means to fully consider the relative financial, social, and environmental affects each alternative would potentially have.

**Table 6-1**
**Summary of Criteria for Alternatives Ranking**

| | |
|---|---|
| **Present Worth Cost:** | probable life-cycle costs (construction cost, O&M costs, and salvage value). |
| **Land Use/Environment:** | land and permitting requirements, disturbance of local resources, and potential for environmental impacts. |
| **Complexity:** | overall technical, operational, and administrative complexity of project implementation and resulting facilities. |
| **Reliability/Resilience:** | long-term reliability of components and degree of resilience in case of natural disaster/emergency. |
| **Local Control:** | flexibility to address future conditions and administrative control over planning for expansions and upgrades. |
| **Energy Use:** | relative energy consumption and conservation opportunities. |

We established a separate ranking for each option based on our estimates of probable present worth costs. We then generated a matrix to establish an overall ranking for each option based on a combined score for the 5 nonmonetary criteria presented above. This allowed each option to be ranked separately based on monetary and nonmonetary factors.

The alternative with the highest ranking for a specific criterion was assigned a score equal to the number of options included in the comparison (seven). The second-highest ranked alternative was assigned one fewer point, and so on. If our evaluation did not identify a significant difference between alternatives for a certain criterion, these alternatives were assigned the same score. The result is the option with the higher score receives a higher ranking.

The ranking assigned all nonmonetary criteria an equal level of importance, meaning we did not assign differing weights to the scoring based on a relative importance for a criterion. This approach was followed to prevent the evaluation from becoming unnecessarily complex and overly subjective.

Although the relative present-worth cost may be viewed as the bottom line for determining the preferred alternative, other factors such as environmental consideration and greater reliability may be sufficient to offset a higher overall cost. Once the rankings established in this initial analysis are approved, any options that scored close the top could be further analyzed in a subsequent planning phase to identify the most cost-effective option.

### *6.1.3 Estimates of Probable Costs*

**General.** Preliminary estimates of probable, life-cycle costs over a 20-year period were generated for each alternative. These probable life-cycle costs include estimates of construction costs and the present worth of both annual O&M costs and salvage values at the end of 20 years. The estimates are based on the descriptions provided in this study and from information available at the time this analysis was performed.

We used 2019 dollars as a consistent basis for comparisons, even though major improvement to the Depoe Bay WWTP are not immediately necessary and construction of a new WWTP would not occur for over 5 years. When planning for the implementation of a recommended option, it would be appropriate to use an inflation factor to develop a projected estimate of probable cost according to a project schedule.

**Construction Costs.** The probable construction costs presented in this study were developed for comparative evaluations and are feasibility-level estimates. Chapter 3 provides additional information on the basis of these estimates.

**O&M Costs.** Annual O & M costs generally result from power consumption, labor, repair/replacement parts, and biosolids hauling. Estimates of probable O&M costs were generated from information provided by equipment vendors, prior HHPR studies and available literature.

Estimates of horsepower requirements and an average cost of $0.10 per kilowatt-hour (kW-Hr) provided the basis for power costs. An average hourly rate of $50 was used for labor costs to include allowances for benefits, payroll costs, and direct overhead. We used a discount rate of 1.5 percent to calculate the present worth of probable, annual O&M costs for each alternative.

## 6.2 SUMMARY OF POTENTIAL TREATMENT OPTIONS

### *6.2.1 Options 1A through 1D – New Separate WWTP*

1. Perform additional facilities planning to establish details of recommended plan.
2. Prepare environmental information document and complete environmental reviews.
3. Conduct outfall analysis to characterize existing conditions and perform mixing zone modeling.
4. Apply for and obtain a discharge permit. Complete permitting process for outfall approval.
5. Complete permitting process for WWTP site approval.
6. Design and construct a separate WWTP at a site in or near the GSD service area.
7. Design and construct modifications to the collection system to convey flows to the new site and end the reliance on shared facilities in Depoe Bay.
8. Design and construct a new WWTP discharge pipeline and outfall.

#### 6.2.2 *Option 2 – New Joint GSD-SSD WWTP*

1. Complete the same steps described above for Option 1, except for joint GSD-SSD facilities instead of separate facilities.
2. Negotiate and execute an intergovernmental agreement with SSD.
3. Coordinate with SSD regarding required modifications to SSD system to transport flows to new WWTP site. SSD modifications not included in analysis.

#### 6.2.3 *Option 3 – New Joint GSD-Lincoln City WWTP at Existing WWTP Site*

1. Perform additional facilities planning to establish details of recommended plan for expansion of Lincoln City WWTP.
2. Prepare environmental information document and complete environmental review for recommended plan to convey WW to Lincoln City.
3. Perform outfall mixing zone modeling. Apply for and obtain a discharge permit for expanded WWTP.
4. Design and construct collection system modifications and WWTP expansion.

#### 6.2.4 *Option 4 – Depoe Bay Shared Facilities*

1. Continue current practice of pumping flows to the north end of Depoe Bay and relying on shared facilities.
2. Negotiate agreement that establishes basis for sharing capital costs of replacing, renovating, and/or expanded shared facilities.
3. Renegotiate agreement for sharing annual costs to operate and maintain shared facilities.

### 6.3 PRELIMINARY ESTIMATES OF PROBABLE COSTS

Table 6-2 summarizes the preliminary estimates of probable costs for each option. The potential scope of each option is based on the descriptions provided in Chapter 5. Appendix D presents breakdowns of the preliminary estimates of probable costs.

**Table 6-2**
**Estimates of Probable Costs for WW Treatment Options**

| Alternative | Present Worth Costs (in millions – Dec. 2019) | | | | |
|---|---|---|---|---|---|
| | Capital (1) | O&M (2) | Salvage Value (2) | Total Life Cycle | Rank |
| Option 1A – Fogarty Creek SRA | $ 14.31 | $ 6.40 | $ 2.60 | $ 18.11 | 3 |
| Option 1B – Central Site (south) | $ 15.25 | $ 6.47 | $ 2.80 | 18.92 | 4 |
| Option 1C – Central Site (north) | $ 15.75 | $ 6.47 | $ 2.89 | 19.33 | 5 |
| Option 1D – Airport Area | $ 16.33 | $ 6.57 | $ 2.97 | 19.93 | 7 |
| Option 2 – Joint GSD/SSD (3) | $ 14.51 | $ 5.61 | $ 2.54 | 17.58 | 2 |
| Option 3 – Lincoln City | $ 17.68 | $ 5.36 | $ 3.36 | 19.68 | 6 |
| Option 4 – Depoe Bay (4) | $ 9.12 | $ 7.49 | $ 1.44 | 15.17 | 1 |

(1) Probable project costs with allowances for nonconstruction costs and construction contingencies.
(2) Probable present worth costs were calculated using 1.5% discount over 20-year planning period.
(3) Costs for joint GSD/SSD WWTP are prorated based on GSD's share of average design flow capacity.
(4) Costs for shared GSD/Depoe Bay facilities are prorated based on current agreement for annual costs.

The current agreement between GSD and Depoe Bay has no set basis for sharing capital costs for expansions or for improvements that require financing. Therefore, we assumed the current cost sharing basis for annual costs would be used. Negotiations required by the agreement to determine capital cost sharing may result in a different method.

Option 4 provides a clear advantage in probable capital costs over the other options because of cost sharing and continued use of some existing facilities, particularly the existing outfall. However, probable O&M costs are estimated to be higher for Option 4.

Options 1A through 1D are all estimated to have very similar probable present worth costs since they all share common features. Our estimate of the capital cost for Option 1A might be lower, if the ocean outfall could be routed westward, directly through Fogarty Creek SRA to the ocean. However, uncertainties about gaining approval and concerns about potential variability in underlying sand and rock, make it difficult to estimate the feasibility and cost of this alignment.

Options 2 and 3 are both estimated to provide some cost benefit from sharing joint facilities. However, neither SSD nor Lincoln City have any incentive to enter into a joint agreement with GSD. Also, both Options 2 and 3 would require more extensive collection system modifications than all other options except Option 1D.

## 6.4 EVALUATION OF NONMONETARY FACTORS

### *6.4.1 General*

We evaluated the characteristics of the different options with regard to the nonmonetary criteria summarized in Table 6.1. The following paragraphs summarize key factors associated with these criteria.

### *6.4.2 Land Use and Environmental Considerations*

1. Water bodies in the planning area all have designated uses for endangered species. Therefore, any work affecting a local water body would result in environmental reviews.
2. Options 1A through 1D and Option 2 have the disadvantage of requiring a new WWTP and outfall pipeline. These new facilities would carry more land-use approvals and permitting requirements that would trigger environmental reviews.
3. A new outfall requires permitting from DEQ for the discharge and permitting for installation work in the receiving water body.
4. Options 3 and 4 have the advantage of using existing WWTP sites that should reduce permitting requirements and environmental reviews. However, an expansion of an existing WWTP would require a new NPDES permit and could trigger requirements for environmental reviews.
5. The airport land is currently zoned for public facilities and ODA expressed willingness to lease land for a WWTP. Therefore, land use approvals could potentially be less difficult to obtain for this site relative to other potential new sites.
6. The site within the Fogarty Creek SRA could potentially face more hurdles for land use approvals than other potential new sites, unless OPRD could help streamline the process.
7. The potential new sites located on the privately-owned parcels (Options 1C and 1D) are zoned for residential use and would require a zoning exemption for public facilities. Option 1C site would be close to existing and planned residential neighborhoods.

8. All options would include pipeline installations in public rights of way that would cause local disruptions during construction.
    - Option 3 would require the most extensive pipeline construction, including along Hwy 101 through the Siletz Bay NWR.
    - Options 1D and 2 would require the second-most extensive pipeline construction and would require additional easements.

### *6.4.3 System Complexity*

1. Options 1A, 1B and 1C would simplify collection-system pumping requirements relative to the existing shared facilities that would remain under Option 4. These options would rely on modifications to PS #1 and end reliance on the 3 shared pump stations in Depoe Bay. Currently, all GSD flows must be pumped at least 4 separate times to reach the Depoe Bay WWTP.
2. Collection-system modifications would be simplest for Option 1A and most complex for Options 1D, 2 and 3. Option 2 would also require a new Salishan force main to convey flows pumped from Salishan to new WWTP site.
3. Options 1A through 1D and Option 2 require new outfalls that would involve technically complex designs and construction work. However, an outfall would be designed according to current practices and regulations, potentially providing stable long-term solution for effluent disposal.
4. Options 1A through 1D would simplify system ownership and administration by ending reliance on a joint agreement.
5. Option 3 would involve relatively complex designs for pipeline crossings of Millport Slough, Siletz River, and Drift Creek.
6. Option 4 would require improvements to and continued reliance on shared pipelines, pump stations, and treatment facilities. Work would involve replacements in congested areas. WWTP would need to remain in service during renovations.

### *6.4.4 Overall Reliability and Resilience*

1. Options 1A through 1D and Options 2 would result in all new WWTP facilities and outfall that would be designed and constructed to meet current codes and regulations.

    The preliminary geological assessment for an ocean outfall (Appendix E) concluded a central outfall location, north of Fogarty Creek and south of Schoolhouse Creek, would likely carry lower risks of encountering variable underlying rock during construction and pipe damage from seismic activity.
2. Options 3 and 4 would rely in part on maintaining existing structures in service that were not constructed according to current code.
3. Options 1A through 1D and Options 2 would rely on new WWTP facilities located above the statutory tsunami inundation line. The Lincoln City WWTP is located partially below this statutory inundation line, whereas the Depoe Bay WWTP is located above this line.
4. Option 4 would require continued reliance on Depoe Bay to provide maintenance management, financial tracking, and financial reporting for shared facilities.

### *6.4.5 Flexibility and Administrative Control*

1. Options 1B through 1D would provide the most flexibility in facilities planning and project implementation. These options also provide the greatest amount of administrative control for financial tracking, budgeting, and reporting.
2. Option 1A facilities planning and future modifications could be constrained by OPRD management of Fogarty Creek SRA.
3. Options 2 and 3 would rely on implementation of a new agreement with SSD or Lincoln City and on coordination of facilities planning, financing, and project implementation.
4. The existing Depoe Bay WWTP has space available for expansion within the site boundaries that allows flexibility in future planning under Option 4. Alternatively, Option 1A with a potential site in Fogarty Creek SRA may
5. Option 4 would require continued efforts to coordinate facilities planning and project implementation. This option also requires the negotiation of cost sharing for major capital improvements that require financing.

### *6.4.6 Sustainability*

1. All options would include improvements that would be designed and constructed with energy efficient equipment. It would also probably be feasible to include solar panels in WWTP improvements under all options.
2. The larger joint WWTP in Option 3 may provide greater potential for an efficiency of scale.
3. Options 1A through 1D would involve the construction of new buildings that could incorporate sustainable practices to the extent it is feasible. Similarly, the new WWTP sites would include compact layouts designed to make efficient use of limited space.
4. Options 3 and 4 could allow some opportunity for conservation of resources through continued use of existing structures, if they are in adequate condition.

### *6.4.7 Summary of Scoring for Nonmonetary Factors*

We ranked all the options under each nonmonetary criterion based on our initial evaluation of the project attributes. A total score and an overall rank were then established for each option from the sum of the individual rankings for all nonmonetary factors. Table 6-3 (following page) presents the assigned scores and overall rankings that resulted.

Option 1B is the highest ranked alternative based on the nonmonetary criteria. But Options 1A through 1D all score fairly close together, reflecting the fact that these alternatives have many of the same components.

The score for Option 1A is lowered by the location of the potential site in the Fogarty Creek SRA. If a site could be procured on private land south of the park, that could simplify land use approvals and reduce project constraints.

The proximity of Option 1C to the Seagrove community and adjacent wetlands is the main reason that option ranks lower than Option 1B. Option 1D scoring was lowered due to somewhat more complex collection system modifications that would include the need for a pipeline crossing of Schoolhouse Creek.

Option 4 benefits from the lack of significant land use and environmental issues. That option would also take advantage of some existing facilities and the joint WWTP would be more efficient than the addition of a separate GSD WWTP. However, the option scores low for complexity and resilience. These low scores are due to the need for GSD to rely on dual collection systems and on the reliance on older components not designed to current code.

Options 2 and 3 rank at the bottom mainly because of the relative complexities of the projects and uncertainties regarding a new joint agreement with either SSD or Lincoln City.

**Table 6-3**
**Assigned Rankings for Nonmonetary Factors**

| | Evaluation Criteria | | | | | | |
|---|---|---|---|---|---|---|---|
| **Alternative** | **Land Use/ Environment (1)** | **Complexity (2)** | **Reliability/ Resilience (3)** | **Flexibility and Administration (4)** | **Energy Use (5)** | **Combined Score (6)** | **Overall Rank** |
| Option 1A – Fogarty Creek SRA | 1 | 7 | 5 | 4 | 4 | 21 | 4 |
| Option 1B – Central Site (south) | 3 | 6 | 7 | 7 | 3 | 26 | 1 |
| Option 1C – Central Site (north) | 2 | 5 | 7 | 7 | 3 | 24 | 2 |
| Option 1D – Airport Area | 6 | 4 | 4 | 7 | 3 | 24 | 3 |
| Option 2 – Joint GSD/SSD | 5 | 2 | 3 | 3 | 5 | 18 | 6 |
| Option 3 – Lincoln City | 5 | 1 | 1 | 3 | 7 | 17 | 7 |
| Option 4 – Depoe Bay | 7 | 3 | 2 | 1 | 6 | 19 | 5 |

(1) Land Use/Environment: land requirements, future expandability, and impacts on existing land uses.
(2) Complexity: energy consumption, conservation opportunities, and other environmental issues.
(3) Reliability/Resilience: process stability (sensitivity to changed treatment conditions).
(4) Flexibility: relative flexibility in process control and modifications.
(5) Energy Use: relative energy consumption and conservation opportunities.
(6) Total Score: sum of rankings for five nonmonetary criteria, higher score represents higher ranking.

# CHAPTER 7
# SUMMARY OF ANALYSIS

## 7.1 OVERVIEW OF ANALYSIS

### *7.1.1 Continue Current Practice – Option 4*

1. The analysis shows a probable cost benefit for continued use of shared Depoe Bay facilities (Option 4) relative to the other options. Our preliminary estimates show Option 4 would have a probable life-cycle cost approximately 20% below Option 1A and more than 20% below Options 1B - 1D. There is, however, uncertainty over estimates of probable capital costs due to a lack of current planning information and no recent conditions assessment of the existing facilities.

   A Facilities Plan that includes an asset inventory and condition assessment of shared facilities would reduce uncertainty regarding potential capital outlays over the next 20 years.
2. The low ranking for Option 4 based on nonmonetary factors is partially due to the lack of administrative control, lack of flexibility and control regarding planning efforts, and uncertainty regarding capital cost sharing.
3. Option 4 could potentially show a larger relative cost benefit, if GSD were able to negotiate terms for cost sharing based on relative average-flow contributions.

### *7.1.2 Separate WWTP Options*

1. Options 1A and 1D all require a new WWTP discharge to either the ocean or a receiving stream. The capital cost for an ocean outfall is hard to estimate at this stage. Conservative estimates are necessary because construction efforts would be specialized and difficult to execute.

   There are also significant costs involved to prepare the technical reports needed to gain permit approvals. Discussions with DEQ about permitting hurdles for a new outfall would be appropriate, if GSD believes further consideration of a separate WWTP is warranted.

2. There is uncertainty over the WWTP site and outfall pipeline alignments that would be approved for these options. Option 1A could potentially be cost competitive relative to Option 4, if an outfall can be installed westward, out to the ocean from a WWTP in Fogarty Creek SRA. This approach would be contingent on the State allowing GSD to use a small portion of the SRA for a WWTP site and approving an easement for the pipeline. Also, the preliminary geological assessment found an ocean outfall near Fogarty Creek carries higher geologic and seismic risks.

3. Option 1A with a discharge to Fogarty Creek would reduce the probable cost for an outfall, but costs for a WWTP would increase significantly due to more strict treatment requirements. If the summer creek flows are not sufficient to support a year-round discharge, then there would be added cost for a system to pump effluent up to the airport for irrigation.

4. Options 1B and 1C are estimated to have competitive costs relative to Option 1A based on our assumptions for ocean outfall alignments. If a site in or near Fogarty Creek SRA turns out not to be feasible, then these options would be potential alternatives for a separate WWTP.

5. Land-use approvals for the use of a WWTP site on airport land (Option 1D) might be less difficult to obtain. But the collection system modifications are more extensive for this option because the site is north of Schoolhouse Creek.

### *7.1.3 Other Joint WWTP Options*

1. Option 2, with a joint GSD/SSD WWTP would potentially have cost benefits relative to options for a separate WWTP due to cost sharing. But it does not appear SSD has any reason to pursue a joint agreement and project with GSD at this time. If conditions change for SSD, Option 2 may be a viable option.

2. Option 3 does not appear to be worth further consideration at this time. The high cost of conveying WW to Lincoln City would only have the potential of being cost competitive, if conditions change and Lincoln City decides it has capacity available for GSD.

## 7.2 POTENTIAL FOLLOWUP STEPS

Initial decisions to make regarding WWTP options include the following:

- The District must decide whether there is significant potential for reaching an agreement with Depoe Bay regarding cost sharing for capital improvements.
- If Depoe Bay proceeds with a Facilities Plan Update, a second question is what portion of the study's cost might GSD be willing to pay to have a thorough asset inventory, condition assessment, and cost effectiveness analysis performed for shared facilities. The District should not be expected to pay any portion of planning costs related to portions of the collection system that are not shared and to financing options for the City.
- The District should consider the rate impacts of a large upfront capital investment for a new separate facilities and decide whether such capital outlays appear to be have enough merit for further consideration.

If further consideration of a separate option seems to be worth more study, a separate preliminary engineering report should be conducted. The report would include the following main components:

- Investigate an ocean outfall location, alignment, length to the offshore diffuser and probable construction method.
- Establish a recommended WWTP site, a treatment process configuration, requirements for a process building, a preliminary site layout, access requirements, and related site considerations.
- Determine the required scope for an outfall mixing zone analysis and establish a scope for complying with permitting requirements for both the WWTP and an outfall.
- Prepare an updated estimate of probable project cost for a recommended option.
- Establish a scope for preparation of environmental information/review documentation.

# Gleneden Sanitary District
# Draft analysis of WWTP Options

# APPENDIX A

## Gleneden Sanitary District
## Current Agreement w/City of Depoe Bay

# AGREEMENT

**THIS AGREEMENT, entered into this 31st day of December, 1998, by and between the City of Depoe Bay, a municipal corporation, hereinafter referred to as " City" and Gleneden Sanitary District, a Sanitary District formed under Chapter 450, hereinafter referred to as "District",**

**RECITALS:**

**A.** WHEREAS, the Parties hereto have entered into an Agreement dated October 14, 1991, wherein the District may discharge 400,000 gallons per day (gpd) of average flow and 800,000 gpd of peak flow to the Depoe Bay interceptor pump stations and lines, and wastewater treatment plant (WWTP) for treatment and disposal; and

**B.** WHEREAS, the City and the District desire to share in the Annual Total Cost of administering, building, maintaining and operating Shared Facilities for sewage transmission, treatment, disposal and bio-solids management; and

**C.** WHEREAS, the City has voter authorization to issue up to $902,000 in Revenue Bonds and up to $3,841,000 in General Obligation Bonds for the purpose of immediately expanding and making other improvements to the Shared Facilities that are required to meet the treatment requirements of DEQ and to provide sufficient excess capacity for growth; and

**D.** WHEREAS, the District has agreed to enter into this Agreement to provide for its share of the Annual Total Cost; and

**E.** WHEREAS, the Parties now wish to amend the previous agreement by striking and terminating that agreement in its entirety and replacing the same with the agreement contained herein, the terms and provisions hereof, being the sole agreement between the Parties hereafter, subject to future modifications;

NOW THEREFORE, the Parties hereto agree as follows:

**SECTION I. DEFINITIONS:** As used in this Agreement, the following words shall have the following meanings:

1. "Annual Total Cost" shall mean the City's annual cost of administration, construction not paid from bond or grant proceeds, operations, maintenance, and Debt Service for the Shared Facilities. The determination of Annual Total Cost for the current Fiscal Year will be based on the City's adopted Budget; and, determination of the actual Annual Total Cost for the preceding Fiscal Year shall be based upon the City's annual financial report.

2. "Budget" shall mean the City's proposed and adopted Fiscal Year budget as required by ORS 294.305 - 294.565.

3. "City" shall mean the City of Depoe Bay.

4. "City's Share" shall mean the percentage of Annual Total Cost established on the City's number of EDUs, as compared to total EDU count of the City and the District combined, on an annual basis, which count shall be adjusted on December 31 of each year. The percentage determined each December 31 shall apply to the upcoming Fiscal Year.

5. "Debt Service" shall mean the annual payment of interest and principal due on general obligation bonds, revenue bonds, or any combination of these bonds that the City issues to pay for improvements to Shared Facilities.

6. "DEQ" shall mean the Oregon Department of Environmental Quality.

7. "District" shall mean the Gleneden Sanitary District.

8. "District's Share" shall mean the percentage of Annual Total Cost established on the District's number of EDUs, as compared to total EDU count of the City and the District combined, on an annual basis, which count shall be adjusted on December 31 of each year. The percentage determined each December 31 shall apply to the upcoming Fiscal Year.

9. "EDU" shall mean equivalent dwelling unit.

10. "EPA" shall mean the United States Environmental Protection Agency.

11. "Fiscal Year" shall mean period from July 1 through June 30 of the next year.

12. "Parties" shall mean the City and the District.

13. "Reserves" shall mean reserves for repair, replacement and betterment of the Shared Facilities.

14. "Shared Facilities" shall mean those facilities owned by the City and used by both Parties for sewage transmission, treatment, disposal and bio-solids management, including, but not limited to: the wastewater treatment plant (WWTP) and outfall, all disposal and bio-solids disposal facilities, interceptor sewer lines and pump stations that transport the District's sewage to the treatment plant (beginning at Manhole No. 16, which is just south of the south entrance to Fogarty Creek Park near Highway 101).

**SECTION II. THE CITY AGREES:**

1. To permit the District to connect its system of sewage collection lines to the City system at the output of Manhole No. 16 on U.S. Highway 101, which is situated just south of Fogarty Creek Park south entrance road. This permission shall extend at least until all Debt Service is paid in full.

2. To administer, construct, operate and maintain the Shared Facilities as necessary to give effect to this Agreement.

3. To administer, construct, operate and maintain all capital improvements to the Shared Facilities, to obtain financing for the Shared Facilities and such capital improvements and to be liable for all Debt Service. The City shall fix and collect sewer rates and charges, including charges to the District, sufficient to provide for the payment of the Annual Total Cost.

**SECTION III. THE DISTRICT AGREES:**

1. Except for those areas where it is unfeasible or impractical to serve by the District's collection system, to discharge 100 percent of the sewage the District collects to the City's sewer system for at least until all Debt Service is paid in full or defeased. If the District at some earlier date wishes to terminate this agreement and to discharge its sewage elsewhere, it must, as a condition of termination and prior to termination of this agreement, repay, defease, or otherwise provide for the repayment of its share of any outstanding City bonds issued for Shared Facilities based on its then current share of Annual Total Cost.

2. That the design, construction and inspection of all facilities and improvements within the District shall be in accordance with plans and specifications approved by DEQ and EPA.

3. To adopt, keep current and enforce rules, regulations and standards concerning the collection and disposal of sewage within the District. Such rules, regulations and standards shall be compatible with current engineering practice, consistent with the requirements and the regulations of DEQ and, to the extent that they deal with the quality of the collection of sewage, shall be as nearly as practical identical with, or more stringent than, the rules and regulations adopted by the City now existing or adopted hereafter.

4. To pay its share of the Annual Total Cost. To secure those payments, the District will fix and collect rates and charges such that revenues are sufficient to pay its share of Total Annual Cost and all other annual costs of the District. To pay its share of Annual Total Cost, the District shall make equal monthly payments to the City based on the District's Share.

## SECTION IV. THE PARTIES AGREE:

1. That the City will be responsible for the administration, construction, operation and maintenance of the Shared Facilities. That the District will be responsible for the administration, construction, operation, maintenance, repair and replacement as necessary of facilities within its boundaries. A map of the City's and District's boundaries is attached, which is made a part of this agreement. Billing and collection of sewer service charges shall be handled by each party individually.

2. That each Party shall keep an accounting and shall provide by January 31 of each year a report to the other Party of the number of EDUs within their respective boundaries as of December 31 of each year. Each Party's percent of total EDUs shall be the basis upon which Annual Total Cost shall be shared.

3. That the City shall provide the District with its proposed Budget for the upcoming Fiscal Year. The Budget shall include and identify all components of Total Annual Cost for the Shared Facilities and shall be furnished to the District not later than April 30 of each year for the Fiscal Year beginning July 1 of the same year.

4. That before August 30 of each year, the City will provide the District with an accounting of actual Annual Total Costs for the Fiscal Year ending June 30 of the same year. Also, the City shall provide an accounting of each Party's payments of actual Annual Total Cost to the District. In the event the District's actual payments in the Fiscal Year ending June 30 of the same year are less than the District's share of the actual Annual Total Cost, the City will invoice the District for the underpayment and the District shall submit payment for such underpayment on or before September 30 of the same year. In the event the District overpaid for the Fiscal Year ending June 30, the District shall receive a credit against payments due during the current Fiscal Year. The intent of this provision and agreement being that the District shall share only in the actual Annual Total Costs directly relating to the Shared Facilities.

5. That each Party shall budget and maintain Reserves to be used for emergency or non-emergency capital improvements to the Shared Facilities. In no event shall each Party's contribution to the Reserve Fund be less than $20,000. The Reserve Fund shall be a joint account, with any interest earnings allocated proportionately to the benefit of each Party. The City will provide an annual accounting of the Reserve Fund to the District.

6. That each Party shall manage and maintain each Party's System Development Charges (SDC) separately.

7. That the City shall advise the District not less than 30 days in advance of any scheduled or unanticipated expenditure of $20,000 or more for a single major capital or repair item that is non-emergency.

8. That a one year and five year review of EDU and flow methodology for determining cost sharing will be addressed in Fiscal Year 1999-2000 and again in Fiscal Year 2004-2005 and at subsequent five year intervals thereafter.

9. The Parties agree to maintain all records required by law or by any ordinance or resolution of their operation and administration and that either Party shall have the privilege to conduct inspections of any facilities or any records at any time.

10. The Parties shall mutually agree on a flow meter that the District shall purchase and have installed at the Fogarty Creek Lift Station that measures total accumulated flow and records the daily and peak flows on a monthly basis. The meter shall measure the total sewage flow from the District and have a remote readout located at the wastewater treatment plant and the District's office. The City shall maintain an effluent flow meter at the wastewater treatment plant that is mutually acceptable to the Parties. This meter will measure total accumulated flow and record the daily and peak flows on a monthly basis. The meter shall measure the total treatment plant effluent flow to the outfall and have a remote readout located at the wastewater treatment plant and the District's office. Both meters shall be calibrated and certified annually by a qualified, licensed technician. Not withstanding the metering of flow, the allocation of costs shall be based upon the City's and the District's Share as previously defined.

11. The City and the District shall use the same methodology to establish a schedule of EDUs. A schedule of EDUs is attached, which is made a part of this agreement.

**SECTION V. IMPROVEMENTS:**

When eighty five percent (85%) of any component of the Shared Facilities' annual average capacity is reached, or by Fiscal Year 2014-15, whichever comes first, the Parties shall commence planning for additional capacity for the component(s) of the Shared Facilities that are determined to be at or over 85% of their capacity. If additional capital cost is required to upgrade or provide additional capacity, the Parties shall be required to enter into negotiations at the request of either party.

**SECTION VI. ADVISORY COMMITTEE:**

The City and the District have formed an Advisory Committee composed of three members from each Party to make recommendations to the City and the District concerning any aspect of the Shared Facilities. This committee shall meet quarterly. Prior to the February joint meeting of the Parties described in Section VIII herein, the Committee will meet to review the capacity utilization of all Shared Facilities as expressed in Section V, above; the number of EDUs and the Annual Total Cost for sufficiency and as expressed in Sections I, II and III above. It should complete its meeting to allow sufficient time to prepare a written or oral report, at the Committee's discretion, for the February joint meeting of the Parties.

## SECTION VII. AMENDMENTS:

Upon written request of either party to negotiate with the other Party relative to amending this agreement, the Advisory Committee shall meet to consider the suggested revision(s) and make recommendation to their respective governing bodies. Upon receiving the Committee's recommendation, the City's Council and the District's Board of Directors shall meet to make a determination on the proposed amendment(s). No amendment shall be permitted that is not in compliance with the covenants and representations made by the City to the holders of bonds issued by the City for its sewer system.

## SECTION VIII. COMPLIANCE:

The City's Council and the District's Board of Directors agree to meet jointly on an annual basis, during the first week in February, the date to be mutually decided upon, to discuss the operations, progress and any problems of each of the Parties and to ensure the enforcement of this agreement and compliance with its terms.

## SECTION IX. DISPUTE RESOLUTION:

In the event that a dispute arises over any of the terms and conditions of this Agreement, and the parties are unable to reach an agreement, then at the request of either party the dispute shall be submitted to arbitration. Each party shall select one arbitrator and shall bear the burden of expense of the same and the two arbitrators shall select a third arbitrator, the expense of which shall be borne equally by the Parties. The decision of the majority of the arbitrators shall be final.

## SECTION X. TERM AND TERMINATION:

This Agreement is an agreement in perpetuity, terminable upon five years prior notice. Not withstanding the foregoing, it is the intent of the Parties that each obtain the benefit of the Shared Facilities. Therefore, the term of this Agreement shall not be terminated prior to the payment of all Debt Service or defeasance thereof or the maturity of the revenue bonds and general obligation bonds. This Agreement shall be binding upon the successors and assigns of the Parties hereto. If the District terminates this Agreement prior to the repayment or defeasance of all Debt Service, except in case of breach of this Agreement by the City, the District shall continue to pay its share of the Debt Service and shall hold harmless the City from those financial responsibilities and obligations attributable to the District. The District shall provide for either a lump sum payoff of their debt, defeasance, or a security bond to guarantee payment for the remainder of the debt service. Prior to declaration of a default by the District, the District shall provide notice to the City of the alleged default and allow adequate time to cure the default before termination of the Agreement occurs. Notice shall be provided 30 days prior to declaration of a default, or such other longer time as is reasonably required to remedy the default, whichever is longer.

IN WITNESS WHEREOF, we have hereunto executed this Agreement on the date first written above and hereby certify that we are the Mayor and City Recorder of the City of Depoe Bay and the President and Secretary of the Gleneden Sanitary District and are authorized to sign on behalf of our respective jurisdictions.

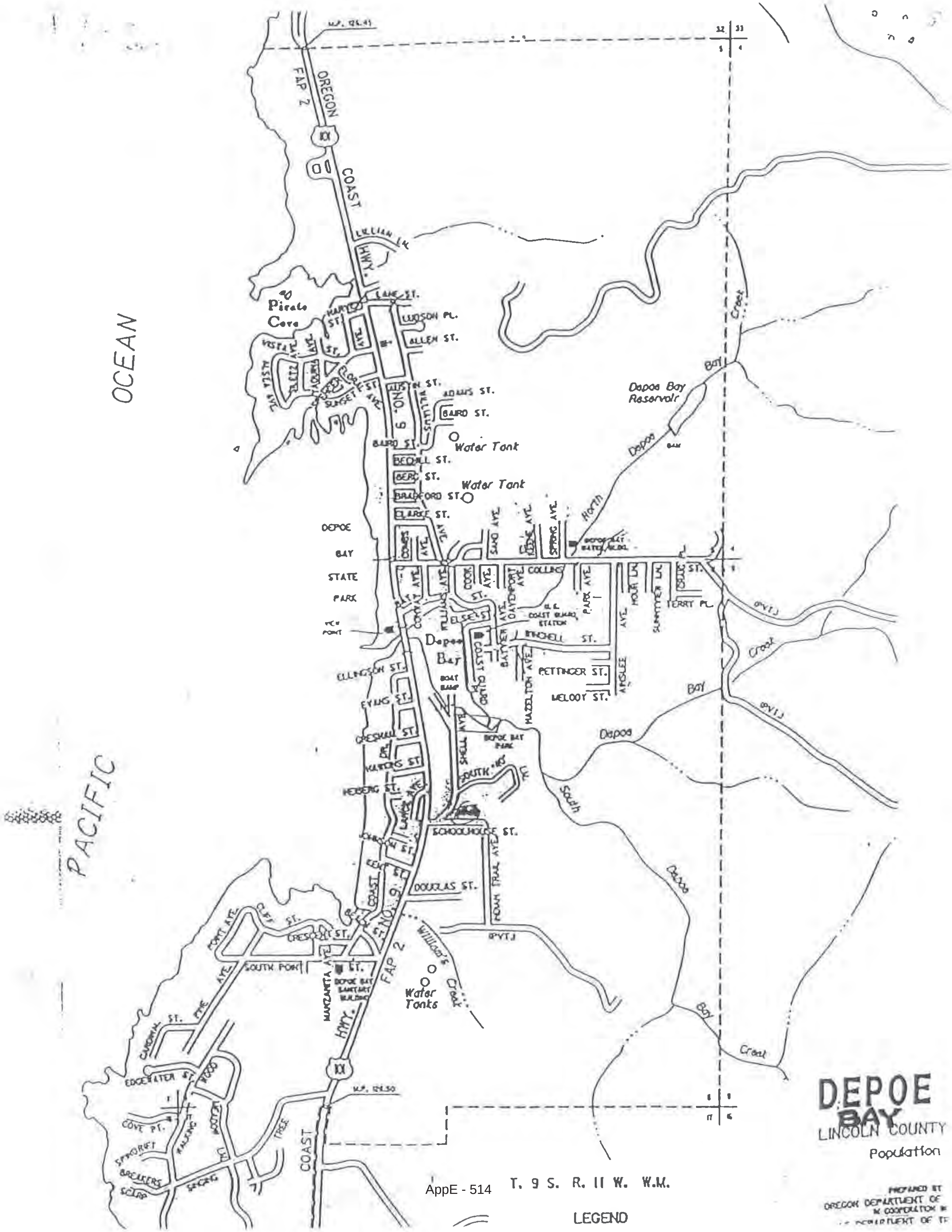
| CITY OF DEPOE BAY | GLENEDEN SANITARY DISTRICT |
|---|---|
| BY Robert Jackson | BY Joseph H Whalen |
| DATE 12-8-98 | DATE 12-14-98 |
| ATTEST: | ATTEST: |
| BY Perdita Murray | BY Mark L Snyder |
| DATE 12-8-98 | DATE 12-14-98 |

# EQUIVALENT DWELLING UNIT (EDU) TABLE

| DEVELOPMENT TYPE | EDUs per UNIT |
|---|---|
| Single Family Dwelling: | 1 |
| Multifamily: | 1 |
| Manufactured Home: | 1 |
| Tourist Accommodations: (i.e., hotel/motel units with kitchens or fixtures other than bathroom) | 1 |
| Tourist Accommodations: (i.e., hotel/motel units with bathroom only) | .5 |
| RV Parks/Campgrounds: | .5 |
| Other Commercial or Industrial: | Determined by water meter size, see schedule below: |

EQUIVALENT DWELLING UNIT METER SIZE
Based on equivalent flow capacity of meters

| Meter Size | EDUs |
|---|---|
| 5 / 8" - 3 / 4" | 1 |
| 1" | 2.5 |
| 1 ½" | 5 |
| 2" | 8 |
| 3" | 16 |
| 4" | 25 |
| 6" | 50 |
| 8" | 80 |


OCEAN
PACIFIC
OREGON
COAST
HWY. NO. 9
FAP 2
Pirate Cove
LAKE ST.
ALLEN ST.
ADAMS ST.
BAIRD ST.
Water Tank
Water Tank
Depoe Bay Reservoir
North Depoe Bay Creek
DEPOE BAY STATE PARK
COLLINS
Depoe Bay
ELLINGSON ST.
PETTINGER ST.
MELODY ST.
South Depoe Bay Creek
SCHOOLHOUSE ST.
DOUGLAS ST.
CRESCENT ST.
SOUTH POINT
Water Tanks
EDGEWATER ST.
COVE PT.
DEPOE BAY
LINCOLN COUNTY
Population
T. 9 S. R. 11 W. W.M.
LEGEND

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS

# GLENEDEN SANITARY DISTRICT
# DRAFT ANALYSIS OF WWTP OPTIONS

# APPENDIX B

## CITY OF DEPOE BAY NPDES PERMIT
## ISSUED BY DEQ – SEPTEMBER 2018

APPENDIX B
DEPOE BAY NEPDES PERMIT EXCERPT
SCHEDULES A & B



**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**
**WASTE DISCHARGE PERMIT**

Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Dr. SE
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 Depoe Bay Sewage Treatment Facility<br>PO Box 8<br>Depoe Bay, OR 97341 | Treated Wastewater | 001 | Pacific Ocean<br>Latitude: 44.900838<br>Longitude: -124.070353 |

**FACILITY LOCATION:**
City of Depoe Bay
212 South Point St.
Depoe Bay, OR 97341

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

**RECEIVING STREAM INFORMATION:**
WRD Basin: Mid Coast
USGS Sub-Basin: Siletz-Yaquina
Receiving Stream name: Pacific Ocean
LLID: 1239400456524

County: Lincoln

EPA REFERENCE NO. : OR0026107

Issued in response to Application No. 957510 received December 24, 2015. This permit is issued based on the land use findings in the permit record.

| | | |
|---|---|---|
| Ranei Nomura, Water Quality Manager<br>Western Region | September 17, 2018<br>Signature Date | October 7, 2018<br>Effective Date |

## MINOR 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.

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**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 | 114 | 170 | 230 |
| TSS | 20 | 30 | 114 | 170 | 230 |

ii. November 1 – April 30: 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 | | | |
| $BOD_5$ | 30 | 45 | 200 | 300 | 400 |
| TSS | 30 | 45 | 200 | 300 | 400 |

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

(A) Average dry weather design flow to the facility equals 0.85 MGD. Mass loads have been individually assigned based on what the plant can reasonably achieve and the highest monthly average discharge flow with a two year recurrence at the 20 year design of the facility.

b. Additional Parameters.

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

**Table A2: 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 | A monthly geometric mean of 35 organisms per 100 mL. No more than 10% of the samples may exceed 130 organisms per 100 mL. |
| Fecal Coliform Bacteria | A monthly median concentration of 14 organisms per 100 mL. No more than 10% of the samples may exceed 43 organisms per 100 mL |

| Year-round (except as noted) | Limits |
|---|---|
| pH | Must be within the range of 6.0 - 9.0 s.u. |

**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 within a one hundred (100) foot radius of the discharge. The Zone of Immediate Dilution (ZID) is 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 A3 below. Biosolids exceeding the pollutant concentrations in Table A3 must be applied at a rate that does not exceed the corresponding cumulative pollutant loading rates.

**Table A3: 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 |
| Molyb-denum | 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 § 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 Pre-treatment 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 § 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 prior to screening and grit removal according to the following table:

**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 | 2/Week | Composite | 1. Monthly average |
| TSS (00530) | mg/L | Year-round | 2/Week | Composite | 1. Monthly average |
| pH (00400) | SU | Year-round | 3/week | Grab | 1. Daily max<br>2. Daily min |

## 3. Effluent Monitoring and Reporting Requirements

The permittee must monitor effluent Grab and Composite samples for Outfall 001 after UV disinfection at the Parshall flume and report results as listed below.

**Table B2: Effluent Monitoring**

| Item or Parameter (ICIS Code) | 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 | 2/week | Composite | 1. Monthly average<br>2. Weekly averages |
| TSS (00530) | mg/L | Year-round | 2/week | Composite | 1. Monthly average<br>2. Weekly averages |
| $BOD_5$ (00310) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>3. Weekly averages |
| TSS (00530) | lbs/day | Year-round | 2/week | Calculation | 1. Daily maximum<br>2. Monthly average<br>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 |
| Temperature (00010) | °C | Year-round | 3/week | Grab | 1. Monthly maximum<br>2. Monthly minimum |
| Fecal Coliform (31641) | #/100 mL | Year-round | 2/week | Grab | 1. Monthly median<br>2. Percent of samples exceeding limit |
| Enterococci (61211) | #/100 mL | Year-round | 2/week | Grab | 1. Monthly geomean<br>2. Percent of samples exceeding limit |
| pH (00400) | SU | Year-round | 3/week | Grab | 1. Daily minimum<br>2. Daily maximum |

| Item or Parameter (ICIS Code) | Units | Time Period | Minimum Frequency | Sample Type/Required Action | Report Statistic |
|---|---|---|---|---|---|
| UV Intensity<br><br>(49607) | $mW/cm^2$ | Year-round | Daily | Measurement | 1. Daily maximum<br>2. Daily minimum<br>3. Monthly average |
| UV Transmit-tance<br><br>(51043) | % | Year-round | Daily | Measurement | 1. Daily maximum |
| Alkalinity (00410) (for effluent char-acterization purposes) | mg/L | Year-round | 2/week | Grab | 1. Weekly maximum<br>2. Weekly minimum |

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):<br>1) Total Kjeldahl Nitrogen (TKN)<br>2) Nitrate-Nitrogen ($NO_3$-N)<br>3) Ammonium Nitrogen ($NH_4$-N)<br>4) Total Phosphorus (P)<br>5) Potassium (K)<br>6) pH (S.U.)<br>7) Total Solids<br>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 |

| Item or Parameter | Minimum Frequency | Sample Type |
|---|---|---|
| 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. |
| Record of biosolids hauled to landfill: date, quantity, location. | Each event | Record the date, quantity, and name of landfill. |

**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:<br>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<br>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:<br>• DEQ Regional Office<br>• 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).<br>2. Table B3: Biosolids Monitoring | Annually | February 19 | Electronic copy | One each to:<br>• DEQ Regional Office<br>• DEQ Biosolids Program Coordinator. |
| Inflow and infiltration report | 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 48 months of permit effective date | 1 hard copy, and electronic copy in DEQ-approved format | DEQ Pretreatment Coordinator |

| Reporting Requirement | Frequency | Due Date (See note a.) | Report Form (unless otherwise specified in writing) | Submit To: |
|---|---|---|---|---|
| Outfall Inspection Report (see Schedule B) | Every 5 years | Within 36 months of permit effective date | 1 hard copy, and electronic copy in DEQ-approved format | DEQ Regional Office |

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.

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# GLENEDEN SANITARY DISTRICT
# DRAFT ANALYSIS OF WWTP OPTIONS

# APPENDIX C

## DOGAMI ONLINE GEOHAZARDS VIEWER
## EARTHQUAKE GROUND SHAKING &
## TSUNAMI INUNDATION ZONES




**Figure C-1: Excerpt - Expected Shaking from Cascadia Earthquake (DOGAMI Online Geohazards Viewer)**

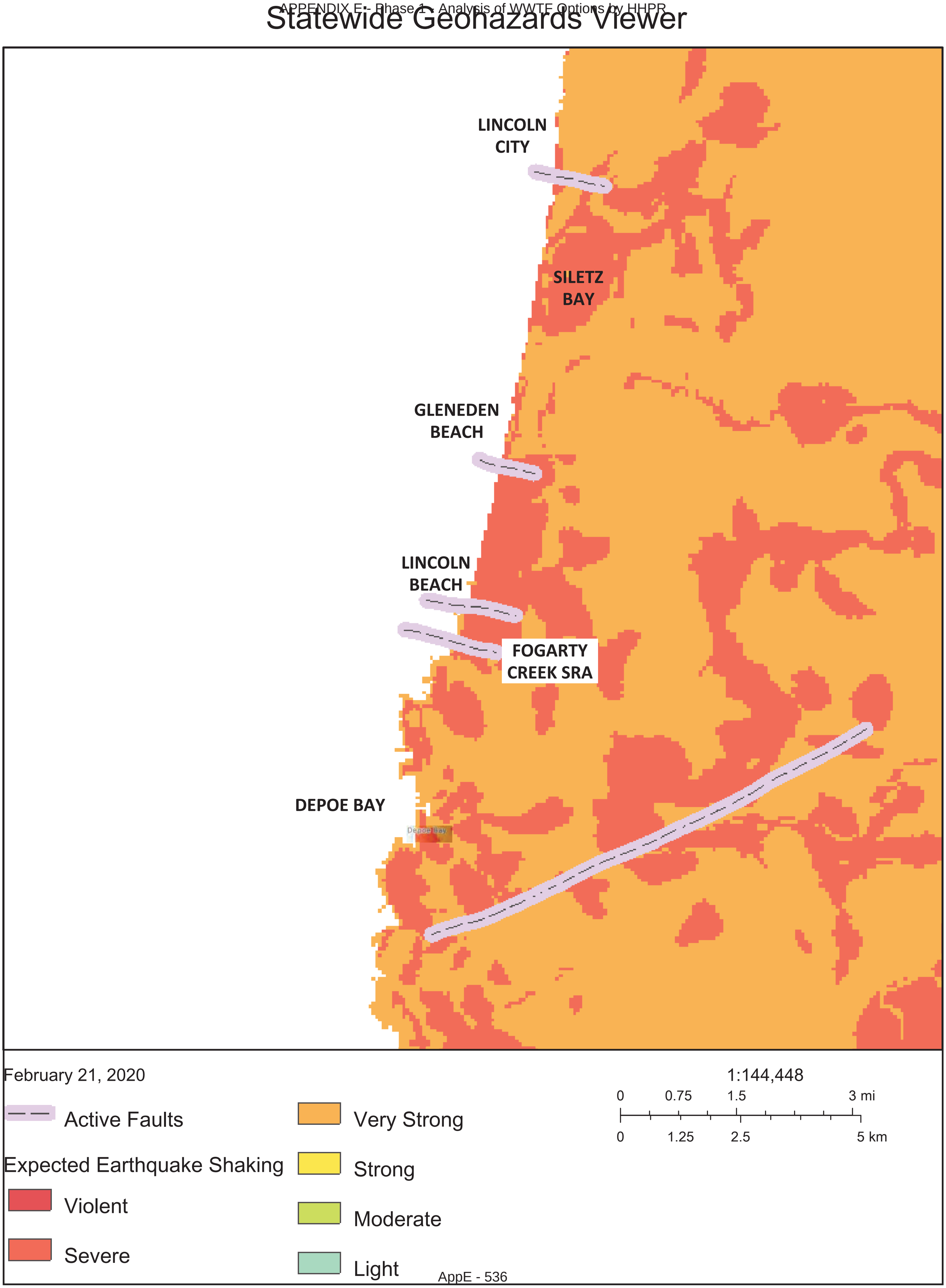




**Figure C-2: Excerpt - Expected Shaking from Crustal Fault Earthquake (DOGAMI Online Geohazards Viewer)**

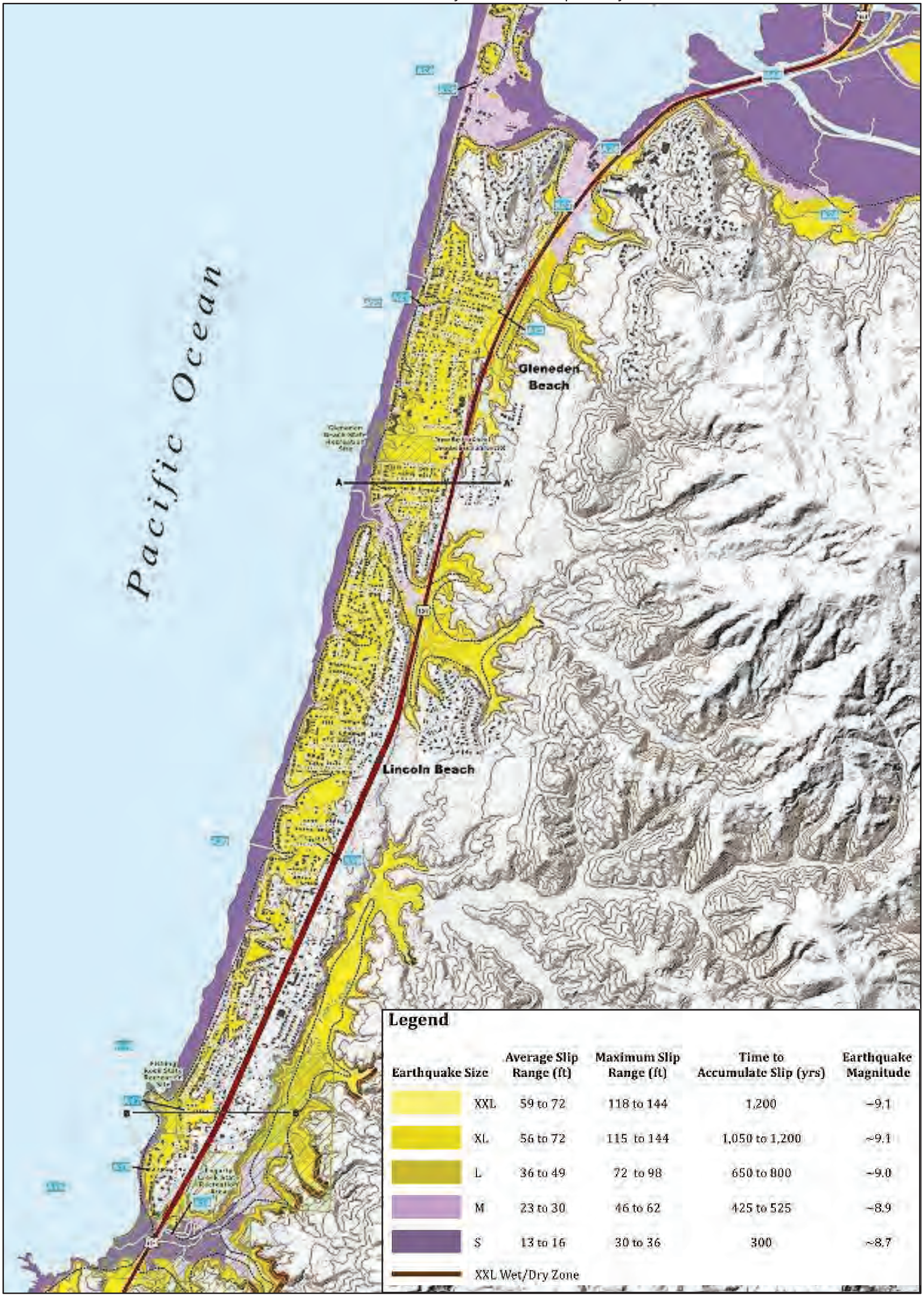


**Figure C-3: Excerpt – Gleneden Beach/Lincoln Beach Tsunami Inundation Map (DOGAMI, 2013)**

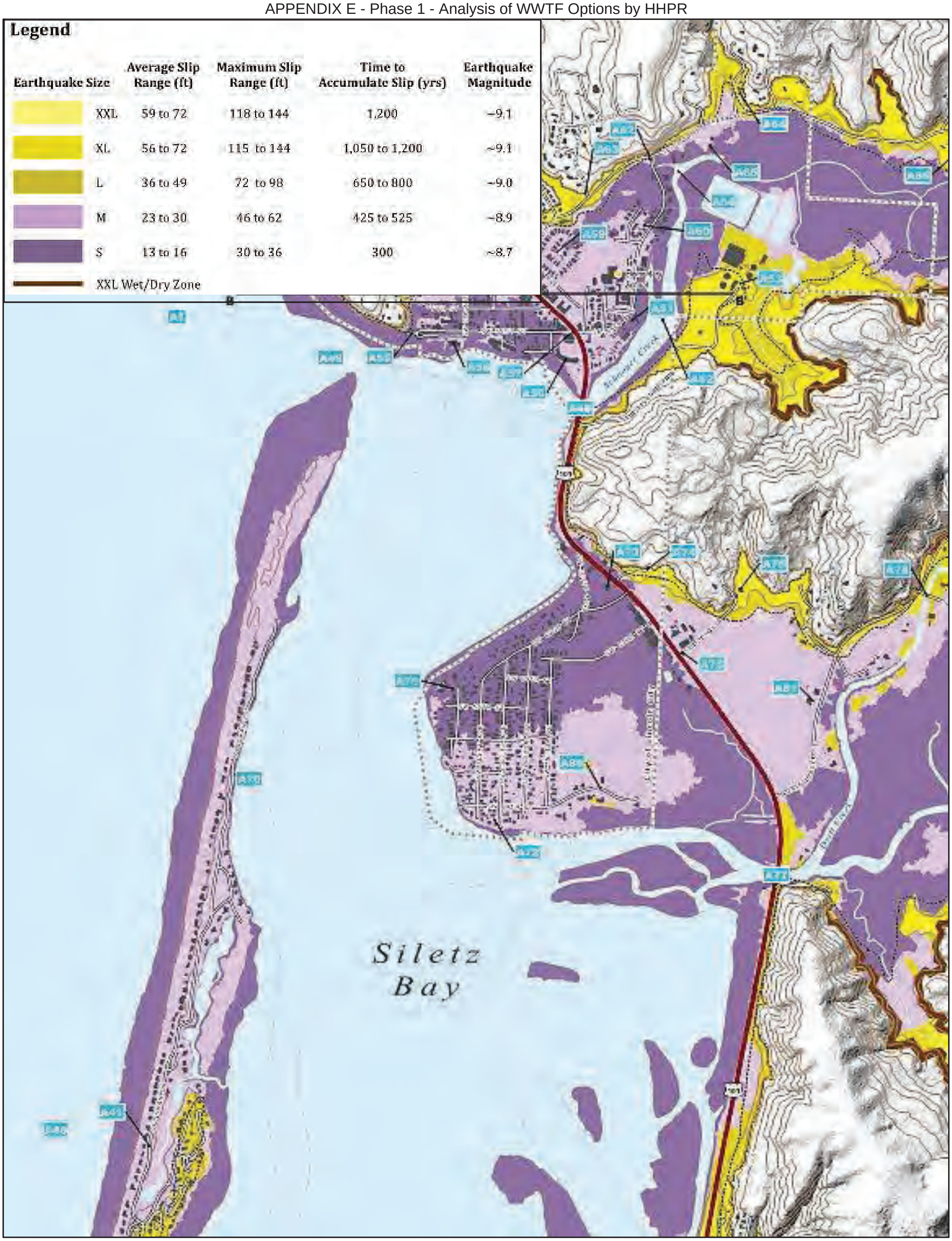


**Figure C-4: Excerpt – South Lincoln City/Siletz Bay Tsunami Inundation Map (DOGAMI, 2013)**

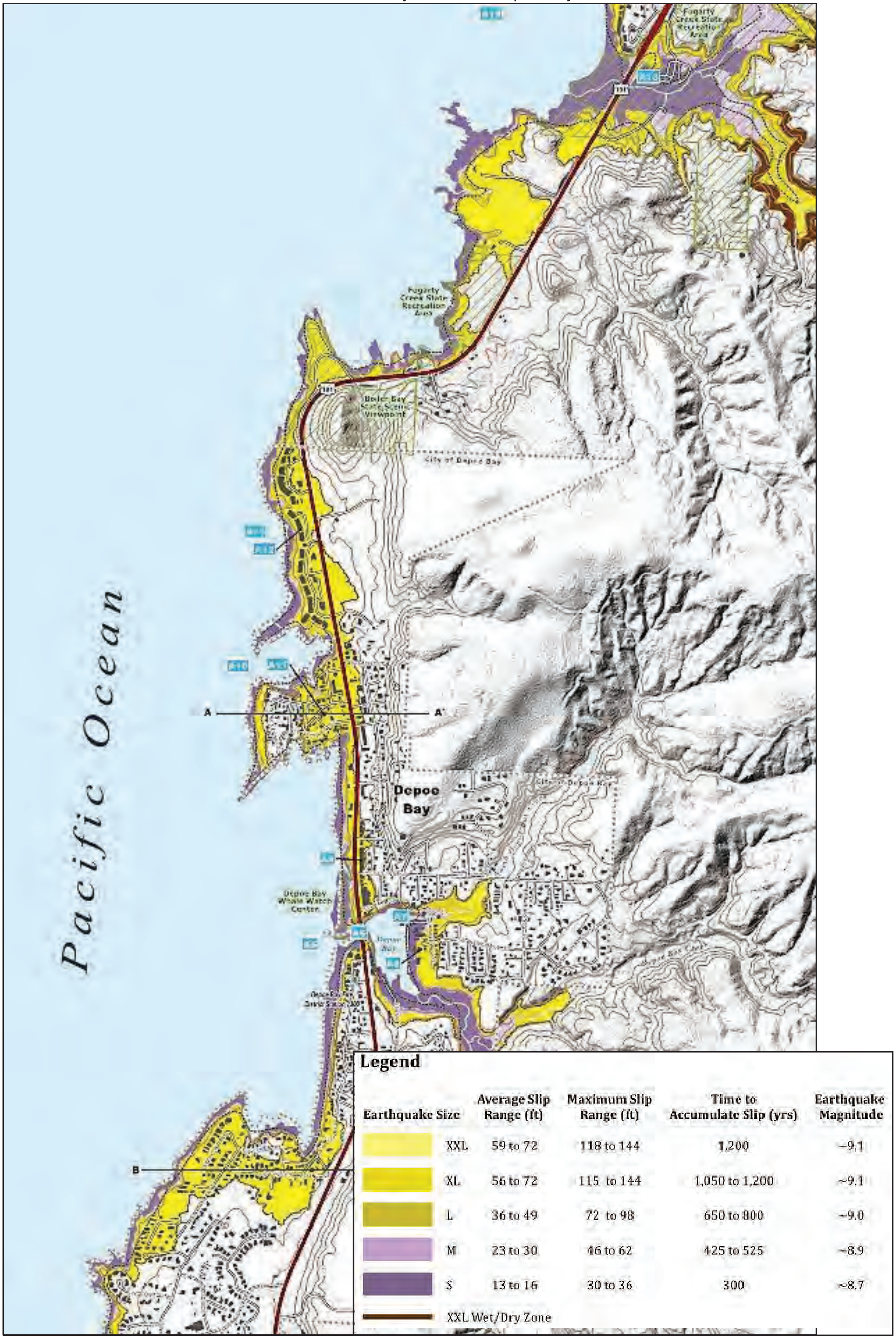


**Figure C-5: Excerpt – Depoe Bay Tsunami Inundation Map (DOGAMI, 2013)**

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# GLENEDEN SANITARY DISTRICT WASTEWATER FACILITIES PLAN UPDATE

# APPENDIX D

## SUMMARY SHEETS
## ESTIMATES OF PROBABLE COSTS FOR WWTP OPTIONS

## Gleneden Sanitary District
## Analysis of WWTP Options

### Planning-Level Estimates of Probable Present Worth Costs
### Summary of Alternatives

| Option Description | Construction Cost | Annual O&M Costs | O&M PW (20-yrs) | Salvage Value | Salvage Value PW (20-yrs) | Total PW Cost (Dec 2019) |
|---|---|---|---|---|---|---|
| **A Option 1A - Fogarty Creek South** | | | | | | |
| 1 Subtotal - Collection System & WWTP Discharge | $4,351,000 | ---- | ---- | $1,420,000 | $1,050,000 | |
| 2 Subtotal - New WWTP Construction | $9,962,000 | $372,500 | $6,396,000 | $2,100,000 | $1,550,000 | |
| 3 Total - Option 1A Improvements | $14,313,000 | ---- | $6,396,000 | $3,520,000 | $2,600,000 | $18,109,000 |
| **B Option 1B - Central Area (South Site)** | | | | | | |
| 1 Subtotal - Collection System & WWTP Discharge | $5,476,000 | $4,000 | $69,000 | $1,690,000 | $1,250,000 | |
| 2 Subtotal - New WWTP Construction | $9,778,000 | $372,500 | $6,396,000 | $2,100,000 | $1,550,000 | |
| 3 Total - Option 1B Improvements | $15,254,000 | ---- | $6,465,000 | $3,790,000 | $2,800,000 | $18,919,000 |
| **C Option 1C - Central Area (North Site)** | | | | | | |
| 1 Subtotal - Collection System & WWTP Discharge | $5,787,000 | $4,000 | $69,000 | $1,810,000 | $1,340,000 | |
| 2 Subtotal - New WWTP Construction | $9,962,000 | $372,500 | $6,396,000 | $2,100,000 | $1,550,000 | |
| 3 Total - Option 1C Improvements | $15,749,000 | ---- | $6,465,000 | $3,910,000 | $2,890,000 | $19,324,000 |
| **D Option 1D - Airport Area** | | | | | | |
| 1 Subtotal - Collection System & WWTP Discharge | $6,552,000 | $10,000 | $170,000 | $1,920,000 | $1,420,000 | |
| 2 Subtotal - New WWTP Construction | $9,778,000 | $372,500 | $6,396,000 | $2,100,000 | $1,550,000 | |
| 3 Total - Option 1D Improvements | $16,330,000 | ---- | $6,566,000 | $4,020,000 | $2,970,000 | $19,926,000 |

Use Recommended Treatment Processes for New WWTP Options (headworks, extended aeration, UV disinfection, biosolids holding/stabilization & screwpress)

**Gleneden Sanitary District**
**Analysis of WWTP Options**

**Planning-Level Estimates of Probable Present Worth Costs**
**Summary of Alternatives**

| | Option Description | Construction Cost | Annual O&M Costs | O&M PW (20-yrs) | Salvage Value | Salvage Value PW (20-yrs) | Total PW Cost (Dec 2019) |
|---|---|---|---|---|---|---|---|
| E | **Option 2 - Joint SSD/GSD (Airport Area Site)** | | | | | | |
| 1 | Subtotal - Collection System & WWTP Discharge | $6,200,000 | $10,000 | $170,000 | $1,920,000 | $1,420,000 | |
| 2 | Subtotal - New WWTP Construction | $8,310,000 | $317,000 | $5,442,000 | $1,512,000 | $1,120,000 | |
| 3 | Total - Option 2 Improvements | $14,510,000 | ---- | $5,612,000 | $3,432,000 | $2,540,000 | $17,582,000 |
| F | **Option 3 - Joint Lincoln City/GSD (Exist. WWTP Site)** | | | | | | |
| 1 | Subtotal - Collection System & Outfall Connection | $9,280,000 | $10,000 | $170,000 | $3,284,000 | $2,430,000 | |
| 2 | Subtotal - Existing WWTP Expansion | $8,400,000 | $302,000 | $5,185,000 | $1,520,000 | $910,000 | |
| 3 | Total - Option 3 Improvements | $17,680,000 | ---- | $5,355,000 | $4,804,000 | $3,340,000 | $19,695,000 |
| G | **Option 4 - Joint Depoe Bay/GSD (Exist. WWTP Site)** | | | | | | |
| 1 | Subtotal - Collection System Facilities | $6,944,000 | ---- | ---- | $1,930,000 | $1,430,000 | |
| 2 | Subtotal - WWTP Facilities Upgrade | $8,784,000 | ---- | ---- | $1,430,000 | $1,060,000 | |
| 2 | Total - Option 4 Shared Facilities | $15,728,000 | $752,000 | $12,910,000 | $3,360,000 | $2,490,000 | |
| 3 | GSD Portion of Option 4 Shared Facilities | $9,123,000 | $436,160 | $7,490,000 | $1,940,000 | $1,440,000 | $15,173,000 |





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**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

**Option 1A - Separate Facilities w/New WWTP at Fogarty Cr SRA**

**A. Collection System, Effluent Pipeline & Outfall**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $150,000 | |
| 2 | PS #1 Force Main Rerouting | $50,000 | |
| 3 | Effluent PS & Pipeline (approx. 5,200 l.f.) | $820,000 | |
| 4 | Outfall Pipeline (approx. 3,800 l.f. w/end diffuser) | $1,770,000 | |
| | **Subtotal - Collection System Facilities** | | **$2,790,000** |
| | Construction Contingencies (20%) | | $558,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$3,348,000** |
| | Nonconstruction Costs (40%) | | $1,003,000 |
| | **Total - Estimate of Probable Project Cost** | | **$4,351,000** |

**B. WWTP Facilities Upgrade**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,920,000 | |
| 3 | New UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $750,000 | |
| 5 | Plant Water System & Potable Water Service | $50,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $150,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $150,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,930,000 |
| | Construction Contingencies (20%) | | $1,186,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$7,116,000** |
| | Nonconstruction Costs (40%) | | $2,846,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,962,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$14,313,000** |


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**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

**Option 1B - Separate Facilities w/New WWTP at Central Site (near Fogarty Cr)**

**A. Collection System, Effluent Pipeline & Outfall**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $170,000 | |
| 2 | PS #1 Force Main Rerouting | $750,000 | |
| 3 | Influent PS & Force Main | $380,000 | |
| 4 | Effluent PS & Pipeline (approx. 1,600 l.f.) | $440,000 | |
| 5 | Outfall Pipeline (approx. 3,800 l.f. w/end diffuser) | $1,770,000 | |
| | **Subtotal - Collection System Facilities** | | **$3,510,000** |
| | Construction Contingencies (20%) | | $702,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$4,212,000** |
| | Nonconstruction Costs (40%) | | $1,264,000 |
| | **Total - Estimate of Probable Project Cost** | | **$5,476,000** |

**B. WWTP Facilities Upgrade**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,870,000 | |
| 3 | New UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $720,000 | |
| 5 | Plant Water System & Potable Water Service | $50,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $150,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $120,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,820,000 |
| | Construction Contingencies (20%) | | $1,164,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$6,984,000** |
| | Nonconstruction Costs (40%) | | $2,794,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,778,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$15,254,000** |

**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

**Option 1C - Separate Facilities w/New WWTP at Central Site (near Seagrove)**

**A. Collection System, Effluent Pipeline & Outfall**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $170,000 | |
| 2 | PS #1 Force Main Rerouting | $930,000 | |
| 3 | Influent PS & Force Main | $380,000 | |
| 4 | Effluent PS & Pipeline (approx. 1800 l.f.) | $460,000 | |
| 5 | Outfall Pipeline (approx. 3,800 l.f. w/end diffuser) | $1,770,000 | |
| | **Subtotal - Collection System Facilities** | | **$3,710,000** |
| | Construction Contingencies (20%) | | $742,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$4,452,000** |
| | Nonconstruction Costs (40%) | | $1,335,000 |
| | **Total - Estimate of Probable Project Cost** | | **$5,787,000** |

**B. WWTP Facilities Upgrade**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,920,000 | |
| 3 | New UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $750,000 | |
| 5 | Plant Water System & Potable Water Service | $50,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $150,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $150,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,930,000 |
| | Construction Contingencies (20%) | | $1,186,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$7,116,000** |
| | Nonconstruction Costs (40%) | | $2,846,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,962,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$15,749,000** |

**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

## Option 1D - Separate Facilities w/New WWTP at Airport Area

### A. Collection System, Effluent Pipeline & Outfall

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $170,000 | |
| 2 | PS #1 Force Main Rerouting | $980,000 | |
| 3 | Influent Sewer, PS & Force Main | $690,000 | |
| 4 | Effluent PS & Pipeline (approx. 4,500 l.f.) | $710,000 | |
| 5 | Outfall Pipeline (approx. 3,500 l.f. w/end diffuser) | $1,650,000 | |
| | **Subtotal - Collection System Facilities** | | **$4,200,000** |
| | Construction Contingencies (20%) | | $840,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$5,040,000** |
| | Nonconstruction Costs (40%) | | $1,512,000 |
| | **Total - Estimate of Probable Project Cost** | | **$6,552,000** |

### B. WWTP Facilities Upgrade

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,870,000 | |
| 3 | New UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $720,000 | |
| 5 | Plant Water System & Potable Water Service | $50,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $150,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $120,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,820,000 |
| | Construction Contingencies (20%) | | $1,164,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$6,984,000** |
| | Nonconstruction Costs (40%) | | $2,794,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,778,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$16,330,000** |


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**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

## Option 2 - Joint SSD/GSD WWTP & Site 1D

### A. Collection System, Effluent Pipeline & Outfall

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $170,000 | |
| 2 | PS #1 Force Main Rerouting | $980,000 | |
| 3 | Influent Sewer, PS & Force Main | $690,000 | |
| 4 | Effluent PS & Pipeline (approx. 4,500 l.f.) | $640,000 | |
| 5 | Outfall Pipeline (approx. 3,500 l.f. w/end diffuser) | $1,490,000 | |
| | **Subtotal - Collection System Facilities** | | **$3,970,000** |
| | Construction Contingencies (20%) | | $794,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$4,764,000** |
| | Nonconstruction Costs (40%) | | $1,429,000 |
| | **Total - Estimate of Probable Project Cost** | | **$6,193,000** |

### B. WWTP Facilities Upgrade

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,870,000 | |
| 3 | New UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $720,000 | |
| 5 | Plant Water System & Potable Water Service | $50,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $150,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $120,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,820,000 |
| | Construction Contingencies (20%) | | $1,164,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$6,984,000** |
| | Nonconstruction Costs (40%) | | $2,794,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,778,000** |
| | | | **$8,310,000** |
| **C.** | **Total Shared Facilities-Probable Project Costs** | | **$14,503,000** |



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**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

**Option 1D - Separate Facilities w/New WWTP at Airport Area**

**A. Collection System, Effluent Pipeline & Outfall**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Pump Station #1 Modifications | $170,000 | |
| 2 | PS #1 Force Main Rerouting | $950,000 | |
| 3 | Gravity Sewer, PS & Force Main | $4,800,000 | |
| 4 | Effluent PS & Pipeline | $30,000 | |
| 5 | Outfall Pipeline (use existing outfall to Schooner Creek) | $0 | |
| | **Subtotal - Collection System Facilities** | | **$5,950,000** |
| | Construction Contingencies (20%) | | $1,190,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$7,140,000** |
| | Nonconstruction Costs (40%) | | $2,140,000 |
| | **Total - Estimate of Probable Project Cost** | | **$9,280,000** |

**B. WWTP Facilities Upgrade**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $590,000 | |
| 2 | Secondary Process-Dual Train & Biosolids Holding w/Bldg | $3,200,000 | |
| 3 | UV Disinfection System | $320,000 | |
| 4 | Dewatering System in Dewatering Bldg | $570,000 | |
| 5 | Plant Water System & Potable Water Service | $20,000 | |
| 6 | Yard Piping Including Influent & Effluent Pipes | $250,000 | |
| 7 | Access Road, Fence & Other Site Improvements | $50,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,000,000 |
| | Construction Contingencies (20%) | | $1,000,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$6,000,000** |
| | Nonconstruction Costs (40%) | | $2,400,000 |
| | **Total - Estimate of Probable Project Cost** | | **$8,400,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$17,680,000** |



DRAFT

**Gleneden Sanitary District**
**Analysis of WWTP Options**
**Planning-Level Estimates of Probable Construction Costs - Dec 2019**

**Option 4 - Renovation of Existing Shared Facilities**

**A. Shared Collection System Facilities**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Fogarty Creek Sewer (Replace 4,370 lf w/18" pipe) | $1,440,000 | |
| 2 | North Side Sewer - MH43 to MH32 (Replace 3,930 lf w/21" pipe) | $1,510,000 | |
| 3 | Harbor Sewer - MH19 to Harbor PS (Replace 1,450 lf w/21" pipe) | $348,000 | |
| 4 | Central Sewer - MH10 to MH08 (Replace 400 lf w/21" pipe) | $186,000 | |
| 5 | South Side Sewer - MH03 to WWTP (Replace 875 lf w/24" pipe) | $227,000 | |
| 6 | Vista St Lift Station Improvements | $131,000 | |
| 7 | Harbor Lift Station Improvements | $144,000 | |
| 8 | Main Pump Station Lift Station Improvements | $141,000 | |
| | **Subtotal - Collection System Facilities** | | **$4,128,000** |
| | Construction Contingencies (20%) | | $826,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$4,954,000** |
| | Nonconstruction Costs (30%) | | $1,990,000 |
| | **Total - Estimate of Probable Project Cost** | | **$6,944,000** |

**B. WWTP Facilities Upgrade**

| | Item Description | Itemized Cost | Total Cost |
|---|---|---|---|
| 1 | Headworks Upgrade (New Screen & Add Grit Chamber) | $830,000 | |
| 2 | Secondary Process - Replace Old Unit & Renovate 2001 Unit | $4,320,000 | |
| 3 | Demolish Older Existing Secondary Process Train | $20,000 | |
| 4 | Replacement UV Disninfection Equipment | $340,000 | |
| 5 | Yard Piping & Miscellaneous Site Improvements | $120,000 | |
| | **Subtotal - WWTP Facilities Upgrade** | | $5,631,000 |
| | Construction Contingencies (20%) | | $1,126,000 |
| | **Total - Estimate of Probable Construction Cost** | | **$6,757,000** |
| | Nonconstruction Costs (30%) | | $2,027,000 |
| | **Total - Estimate of Probable Project Cost** | | **$8,784,000** |

| | |
|---|---|
| **C. Total Shared Facilities-Probable Project Costs** | **$15,728,000** |
| **D. GSD Portion** | **$9,123,000** |

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS

# GLENEDEN SANITARY DISTRICT
# WASTEWATER FACILITIES PLAN UPDATE

# APPENDIX E

## PRELIMINARY GEOLOGICAL ASSESSMENT OF POTENTIAL OCEAN OUTFALL LOCATIONS

April 21, 2020 6376-A GEOLOGICAL ASSESSMENT RPT

Harper Houf Peterson Righellis, Inc.
205 SE Spokane Street, Suite 200
Portland, OR 97202

***DRAFT***

Attention: Ken Condit, PE

**SUBJECT: Preliminary Geological Assessment**
**Gleneden Sanitary Outfalls**
**Gleneden Beach, Oregon**

At your request, GRI prepared this preliminary geological assessment for a potential new treated-effluent outfall in Lincoln County, Oregon. We understand the Gleneden Sanitary District is evaluating the feasibility of a location for a new ocean outfall as part of evaluating wastewater treatment plant (WWTP) options.

The purpose of our work was to evaluate, on a preliminary basis, anticipated geologic conditions in the four areas being considered as alternative locations for the outfall diffuser and to evaluate potential risks to a WWTP and outfall from a potential earthquake generated at a local crustal faults. Our services consisted of a review of available geologic, topographic, and bathymetric information for the site and surrounding area and preparation of this summary memorandum.

## PROJECT DESCRIPTION

We understand the project consists of siting and constructing a WWTP and new treated effluent pipeline and ocean outfall. Of the seven potential new WWTP sites, there are five potential pipeline routes to four potential ocean outfall locations, as shown on Figure 2. We evaluated the following four potential ocean outfall locations:

**Airport Outfall:** WWTP Site Option 1E (Airport Area) and Site Option 1D (Airport Land)

**Seagrove Outfall:** WWTP Site Option 1C (Seagrove) and Site Option 1B (Fogarty Creek North)

**Fishing Rock Outfall:** WWTP Site Option 1A (Fogarty Creek South)

**Fogarty Creek Outfall:** WWTP Site Option 1A (Fogarty Creek South)

## SITE DESCRIPTION

### General

The Gleneden Sanitary District includes the communities of Gleneden Beach, Coronado Shores, and Lincoln Beach and is located on the Oregon Coast between Lincoln City and Depot Bay, Oregon. The region is characterized by rugged mountains with steep-sided stream valleys in the uplands, narrow floodplains in the interior, bays with spits, and narrow sandy beaches.

The area is separated by the coastal headlands of Cascade Head to the north and Government Point to the south along the coast. The major drainage is the Siletz River, which empties into a small bay north of the project area. The coast is bordered by marine terraces, which form vertical bluffs along the coast and extend as much as a mile inland. The proposed WWTP sites are located on coastal terraces that are generally flat with a slight slope to the west toward the Pacific Ocean.

**Tectonic Setting**

Geologic evidence suggests a convergent plate margin has existed off the present-day Oregon and northern California coast for over 150 million years. The Cascadia Subduction Zone (CSZ) is an active convergent plate boundary between the subducting Juan de Fuca Plate and the overriding North American Plate. Convergence of these plates dominates the regional tectonics. Offshore, subduction causes a deformation zone along the western edge of the accretionary wedge complex, strike-slip faulting in the North American Plate, and a zone of folding extending from the coast westward. Onshore, the major structural elements associated with the subduction zone include a deformed forearc basin (the Coast Range and Willamette Valley), a volcanic arc complex (the Cascade Range), and a back arc (eastern Oregon). The four areas under consideration are in the forearc basin of the CSZ system and situated in the Oregon Coast Range structural geologic province.

The U.S. Geological Survey (USGS) Quaternary Fault and Fold database indicates a series of faults, termed the Siletz Bay faults (USGS Fault ID 833), identified in the project area, Figure 3 (Personius, et al., 2002). The inferred faults comprise individual normal faults ranging in length from less than 10 km and a slip rate of less than 0.2 mm per year.

The Siletz Bay faults are a group of north-northwest-striking high-angle faults that apparently offset marine-terrace platforms and overlying deposits between Government Point and the mouth of the Siletz River. The faults apparently offset marine-terrace wave-cut platforms and overlying sediment dated by correlation to approximately 80,000-year-old Pleistocene marine terrace (Personius, et al., 2002). Most of these faults are projected to offshore structures mapped in seismic-reflection profiles (Goldfinger, 1994; McNeill et al., 1998).

**Geology**

Rock units ranging in age, from early Eocene through middle Miocene, and unconsolidated deposits of Quaternary age underlie the project area (Figure 3). The consolidated units include submarine and subaerial basaltic flows, breccia, tuff, marine siltstone, clayey siltstone, sandstone, and intrusive volcanic rock (Snavely et al., 1976).

**Beach Deposits (Holocene).** The beach deposits consist of sand and gravel along the shoreline.

**Alluvial Deposits (Holocene).** Silt, sand, and gravel along rivers and streams.

**Coastal Terrace Deposits (Pleistocene).** Thin- to thick-bedded, planar to cross-bedded, and fine- to medium-grained marine and non-marine sand that locally contain cobble and gravel lenses and fossil wood. Locally covered by stabilized sand dunes. Older dunes are iron-stained and contain relic soil zones. Includes lenses of talus from basalt headlands.

**Intrusive Basalt (Middle Miocene).** Thick long walls (dikes) and thick flat pools (sills) of basalt.

**Depot Bay Basalt (Middle Miocene).** Isolated pillow lava and breccia, lapilli tuff, columnar-jointed basalt lava flows.

**Astoria Formation (Middle Miocene).** Thin- to thick-bedded, very fine- to medium-grained micaceous and carbonaceous arkosic marine sandstone and massive sandy siltstone.

**Nye Mudstone (Lower Miocene).** Massive to poorly bedded fossiliferous marine siltstone and very fine-grained silty sandstone.

**Yaquina Formation (Upper Oligocene and Lower Miocene).** Thin- to thick-bedded, fine- to coarse-grained sandstone, conglomerate, and tuffaceous siltstone of delta origin.

**Alsea Formation (Oligocene).** Massive to thick-bedded, fossiliferous, tuffaceous marine siltstone and fine-grained sandstone.

## SUBSURFACE CONDITIONS

### General

Geotechnical information generated from GRI projects completed in the surrounding area were reviewed for details on subsurface conditions. This information includes several borings and test pits completed by GRI.

### Previous GRI Projects in the Gleneden Beach Area

GRI has completed 16 test pits to depths of up to 12.5 ft and two borings to depths of up to 50 ft in the Gleneden Beach area. The explorations indicate the area is typically mantled with a layer of loose sand that grades to a medium-stiff to very stiff silt and weakly cemented, fine- to medium-grained brown sand that is typically medium dense to dense and very dense at the bottom of the depths explored. The silt and sand are underlain by a very soft (R1) to medium-hard (R3) sandstone.

## SEISMIC HAZARDS

The Oregon coast is in a seismically active region and hazards to the project, such as soil liquefaction susceptibility, relative ground motion, ground surface fault rupture, and tsunami inundation, may occur in the areas of proposed WWTPs and outfalls resulting from an earthquake generated at the CSZ or active crustal faults within the area. Identified seismic hazards to proposed WWTPs, pipeline routes, and outfall locations are discussed below.

### Seismic Hazards

**Earthquakes.** The CSZ is the dominant tectonic feature in western Oregon, and various lines of geologic evidence indicate the CSZ has produced megathrust earthquakes (Atwater et al., 1995; Goldfinger et al., 2012). Megathrust earthquakes occur when the fault between the tectonic oceanic plate subducting beneath the continental North American Plate suddenly slips (Audet et al. 2010). It is anticipated that each of the site options could be affected in a similar manner by very strong ground shaking from a CSZ earthquake.

**Faults.** Fault-related hazards for active faults include ground displacement, which includes movement along the fault (offset) and ground-surface rupture.

Quaternary crustal faults, Figures 3 and 4, are mapped across pipeline routes from the proposed Site Options 1A, 1E, and 1D WWTP sites to the Airport, Fishing Rock, and Fogarty Creek outfall options. Earthquake movement along one of these faults may produce an offset across the fault that could rupture the outfall pipeline. USGS Quaternary faults have not been identified across the Seagrove pipeline route.

**Soil Liquefaction.** Field and laboratory studies have demonstrated that if saturated, loose to medium-dense sands and some softer, low-plasticity, fine-grained soils such as sandy silts are subject to loss of shear strength in the saturated material. Liquefiable soils are present throughout the areas, with depths varying with location. Liquefaction may result in ground settlement, and potential lateral ground movement if occurring in sloping terrain, that could impact buried pipes. The Oregon Department of Geology and Mineral Industries (DOGAMI) produced soil-liquefaction hazard maps for an earthquake (Madin and Burns, 2013). As shown on Figure 4, the proposed WWTP sites are in areas of relatively low liquefaction susceptibility. Except for the Fogarty Creek pipeline route, pipelines only cross medium-liquefaction-susceptible soils when crossing the beach. The pipeline for the Fogarty Creek option is located within alluvial soils deposited by the creek that have a medium-susceptibility soil.

**Tsunamis.** The U.S. west coast has historically been subject to inundation from tsunamis. DOGAMI produced tsunami hazard maps for a tsunami generated by a megathrust earthquake on the CSZ for most of the Oregon coast (DOGAMI, 2013). Studies include run-up scenarios with variable wave height and co-seismic subsidence.

The tsunami hazard has been evaluated for a subduction zone rupture consistent with the latest DOGAMI rupture scenarios, "L" and "XL," which represent the 2,475- and 10,000-year events. Recent numerical modeling (DOGAMI, 2013) indicates a tsunami generated by a megathrust earthquake on the CSZ may present a tsunami inundation risk. Based on this modeling, the proposed WWTP sites are located outside of the XL tsunami inundation scenario. Pipeline routes could be subject to scour and damage due to tsunami wave force.

## BATHYMETRY

Airborne laser elevation point cloud data collected in 2014 by light detection and ranging (Lidar) methods were obtained from the National Ocean and Atmospheric Association (NOAA, 2020) and processed to produce a Lidar-derived digital elevation model (DEM) used in the evaluation of upland topography and near shore at the proposed outfall sites. In addition, bathymetric data from a 1928 survey of ocean bottom close to the shore produced soundings of seafloor. Sounding point data were converted from mean lower low water elevation to the North American Vertical Datum of 1988 (NAVD 88).

The 2014 Lidar data show a linear bathymetric feature extending from Fogarty Creek in a roughly north-south orientation. It appears that this feature may represent an offshore continuation of the Fogarty Creek drainage. To the southwest, the 1928 sounding data show a long, linear bedrock ridge oriented to the northwest from the upland areas around Government Point. In our opinion, the ridge likely is an offshore continuation of the basalt headland that composes Government Point.

## FINDINGS

### General

Gleneden Sanitary District is currently in the process of evaluating the feasibility of a location for a new ocean outfall as part of evaluating WWTP options. Based on the information described above, we developed the following findings:

1) The geologic units likely encountered during subsurface construction include coastal terrace deposits, beach deposits, and alluvial deposits, with the potential of encountering intrusive basalt and the Depot Bay Basalt. At Fishing Rock, outcrops of the Astoria Formation, Depot Bay Basalt, and intrusive basalt related to the Depot Bay Basalt were observed. A dike of intrusive basalt was observed on the beach near Lincoln Beach. In general, anticipated subsurface conditions will likely include mostly sand with some silty sand to sandy silt with lesser amounts of gravel and cobbles. In addition, pipeline routes may encounter concealed basalt dikes or sills buried in the sand. In our opinion, the Fogarty Creek and Fishing Rock options present a higher risk for encountering variable rock conditions compared to the Airport and Seagrove options.

2) The Oregon Coast is subject to strong ground shaking from a CSZ earthquake. USGS Quaternary crustal faults are mapped across pipeline routes from the proposed Site Options 1A, 1E, and 1D WWTP sites to the Airport, Fishing Rock, and Fogarty Creek outfall options. Earthquake movement along one of these crustal faults may produce an offset across the fault that could rupture the outfall pipeline. USGS Quaternary faults have not been identified across the Seagrove pipeline route. In our opinion, the Seagrove options are at the least risk of ground rupture resulting from an earthquake along one of the known USGS Quaternary crustal faults.

3) The proposed WWTP sites are mapped by DOGAMI in low-liquefaction-susceptibility areas. Except for the Fogarty Creek pipeline route, pipelines only cross medium-liquefaction-susceptible soils when crossing the beach a short distance, as mapped by DOGAMI. The pipeline for Fogarty Creek travels down alluvial soils deposited by the creek that have a medium-susceptibility soil. In our opinion, the Fogarty Creek pipeline route has a relatively higher risk for liquefaction compared to the other options.

4) Recent numerical modeling by DOGAMI indicates the proposed WWTP sites are located outside of the XL tsunami inundation scenario. However, pipeline routes could be subject to scour and damage due to tsunami wave forces. It is anticipated that each of the pipeline route options would likely be affected in a similar manner by a tsunami wave.

5) Ocean bathymetry appears to show a linear bathymetric feature extending from Fogarty Creek that may represent an offshore continuation of the creek drainage. To the southwest of the project areas, a long bedrock ridge oriented to the northwest from the upland areas around Government Point projects out into the Pacific Ocean. In our opinion, the Airport and Seagrove options appear to present the least risk of encountering variable ocean-bottom elevations.

6) Based on the information gathered for this report, in our opinion, the Seagrove options appear to present the least overall risk of being affected by variable geologic conditions and hazards identified and described above.

## LIMITATIONS

This report has been prepared to aid the Gleneden Sanitary District and Harper Houf Peterson Righellis, Inc., in the preliminary siting concepts of the proposed project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects of the project relevant to preliminary site evaluation. In the event that any changes in the design and location of the project elements as outlined in this report are planned, we should be given the opportunity to review the changes and modify or reaffirm the conclusions and recommendations of this report in writing.

The conclusions and recommendations submitted in this report are based on the data obtained from the literature review, digital image analysis and interpretation, and other sources of information discussed herein. Areas identified with some level of hazard are based on the information available at the time the work was completed and observations made.

Please contact the undersigned if you have any questions.

Submitted for GRI,

George A. Freitag, CEG
Principal

Mike S. Marshall, CEG
Senior Geologist

This document has been submitted electronically.

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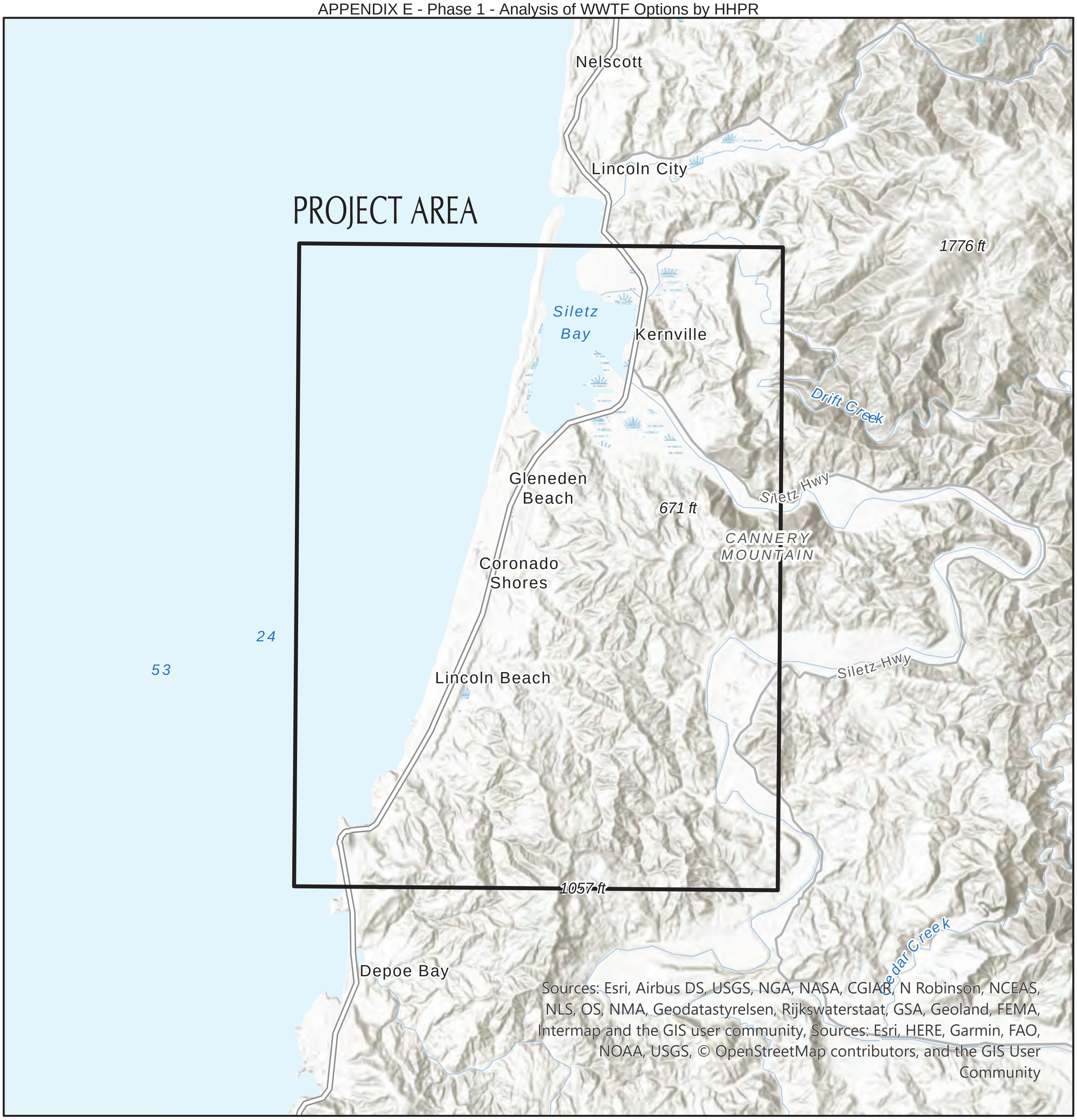



North

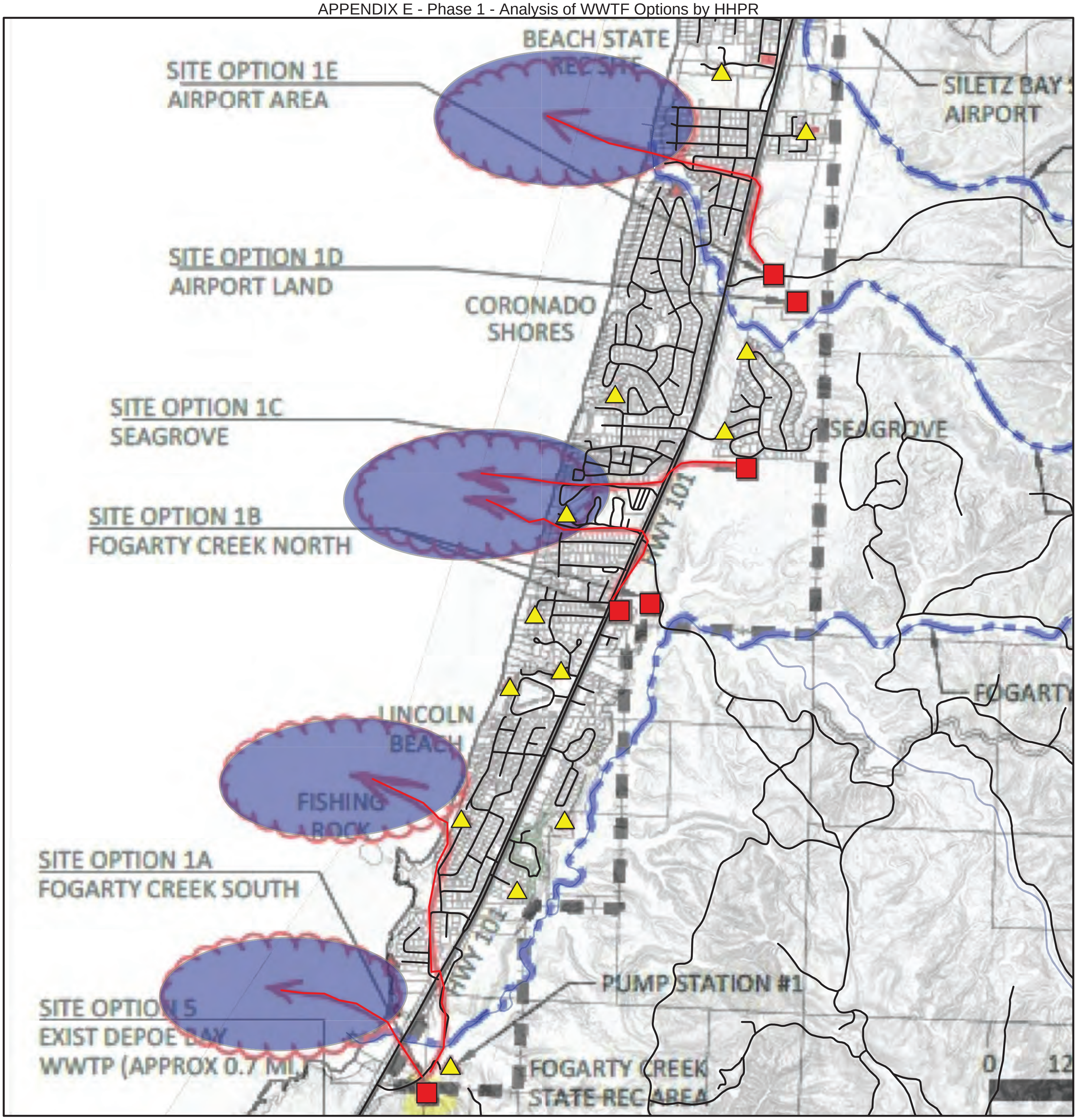
0 8,000 16,000 FT

GRI

HARPER HOUF PETERSON RIGHELLIS, INC.
GLENEDEN TREATMENT FACILITIES

# VICINITY MAP

APR. 2020 | JOB NO. 6376-A | FIG. 1




SITE MAP PROVIDED BY HHPR

North

0 2,000 4,000 FT

PROPOSED WWTP SITE

GSD PUMP STATION

PIPELINE ROUTE OPTION

OUTFALL OPTION

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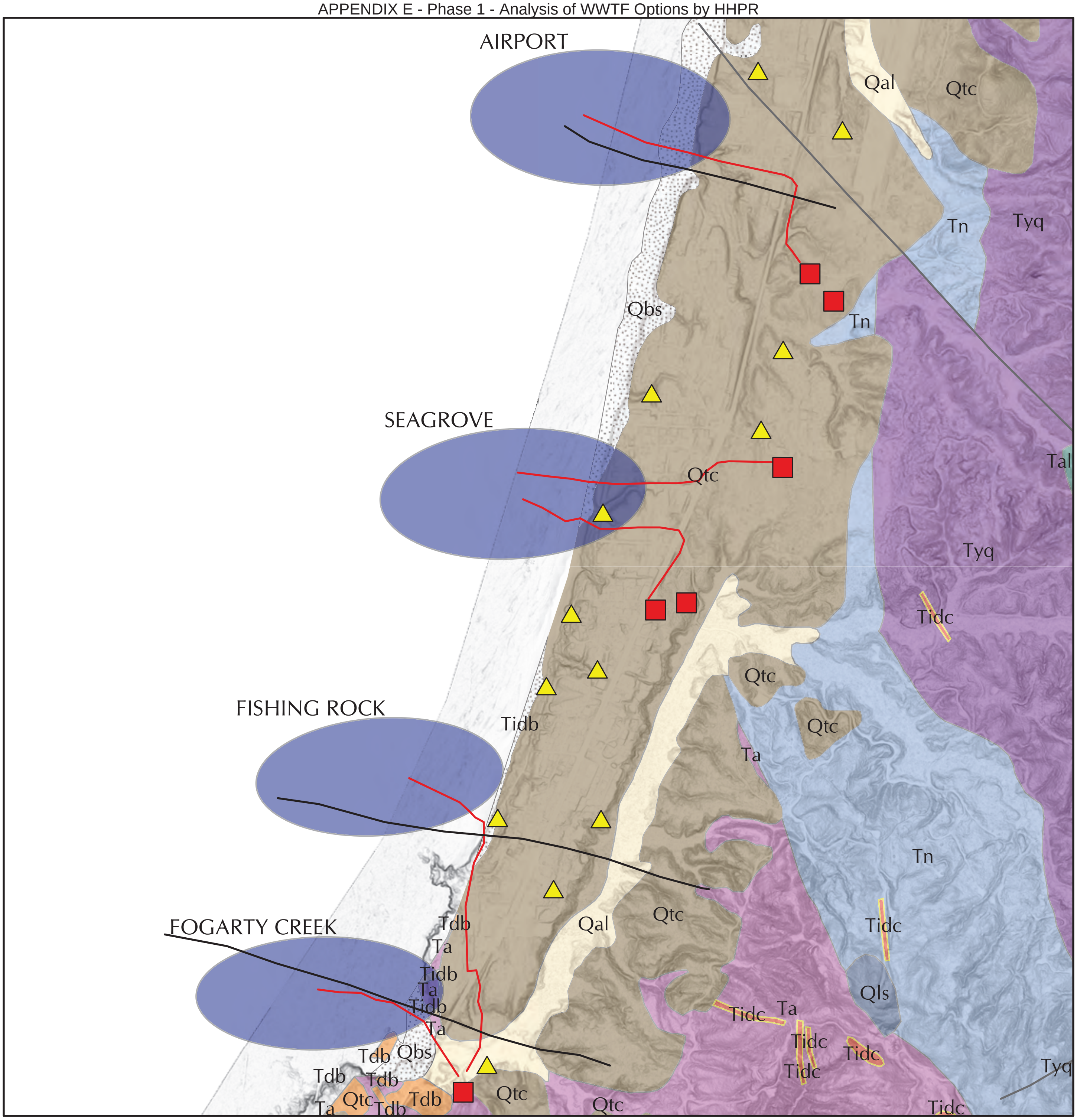
GLENEDEN TREATMENT FACILITIES

# SITE MAP

APR. 2020 JOB NO. 6376-A FIG. 2




PROPOSED WWTP SITE
PUMP STATION
PIPELINE ROUTE OPTION
DOGAMI TERTIARY FAULTS
USGS QUATERNARY FAULTS

GEOLOGIC UNITS
QAL,ALLUVIAL DEPOSITS
QBS,BEACH, BAR, AND DUNE SAND
QLS,LANDSLIDE DEBRIS
QTC,COASTAL TERRACE DEPOSITS
TA,ASTORIA FORMATION
TAL,ALSEA FORMATION
TDB,DEPOE BAY BASALT
TIDB,DEPOE BAY BASALT, INTRUSIVE BASALT
TIDC,INTRUSIVE BASALT, UNDIVIDED
TN,NYE MUDSTONE
TYQ,YAQUINA FORMATION

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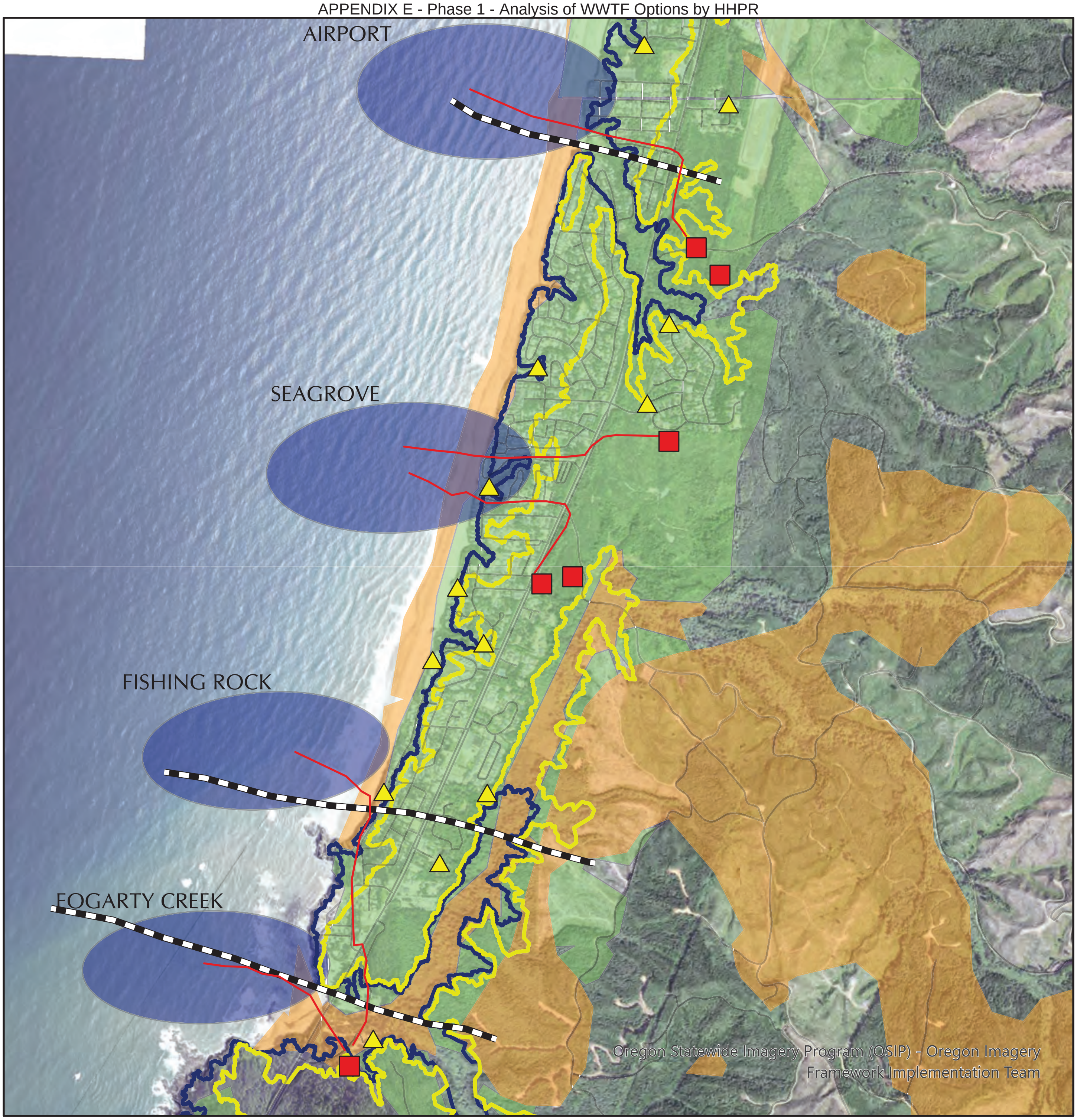
# GEOLOGIC MAP

APR. 2020 | JOB NO. 6376-A | FIG. 3




WWSP SITE OPTION
PUMP STATION
OUTFALL PIPELINE ROUTE OPTION
OUTFALLAREA
USGS QUATERNARY FAULTS
XL TSUNAMI INUNDATION SCENARIO
L TSUNAMI INUNDATION SCENARIO
LIQUEFACTION SUSCEPTIBILITY
LOW
MEDIUM

North

0 2,000 4,000 FT

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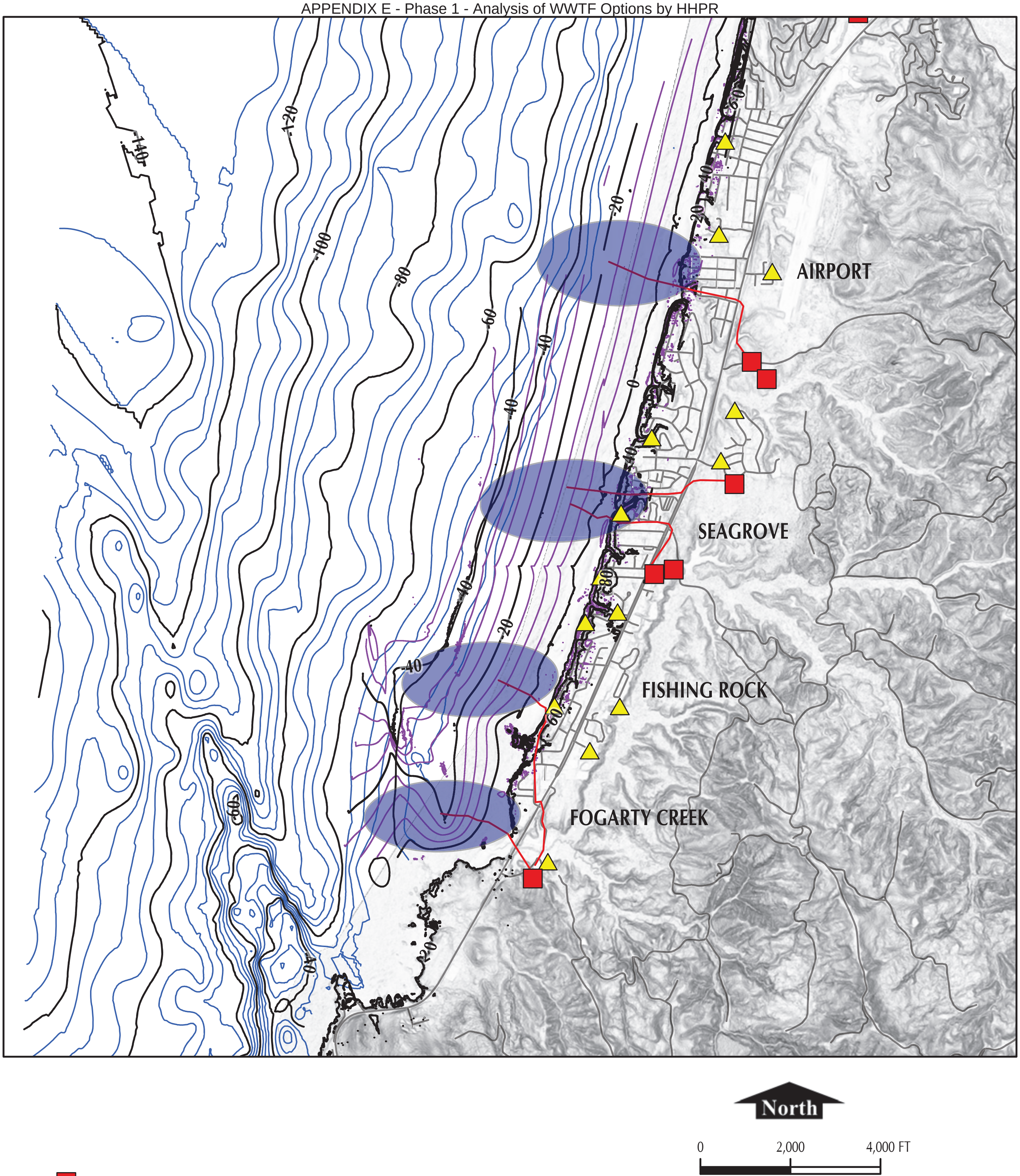
HARPER HOUF PETERSON RIGHELLIS, INC.
GLENEDEN TREATMENT FACILITIES

# SEISMIC HAZARDS MAP

APR. 2020 | JOB NO. 6376-A | FIG. 4

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GLENEDEN TREATMENT FACILITIES

# BATHYMETRY MAP

APR. 2020 | JOB NO. 6376-A | FIG. 5

# Memo

**To: City of Siletz NPDES Permit File #81276**

**From: David Feldman; DEQ Senior Permit Writer**

**Date: May 14, 2018**

**Subject: Proposed NPDES Permit – Response to Public Comments**

State of Oregon
Department of Environmental Quality

Water Quality PPD,
700 NE Multnomah Street, Suite 600, Portland, OR 97232-4100
Phone. 503-229-6850

Fax: 503-229-6124
Contact. David Feldman
Email:
feldman.david@deq.state.or.us
www.oregon.gov/DEQ

The Department of Environmental Quality (DEQ) has received and reviewed the comments submitted during the public comment period for the proposed City of Siletz National Pollutant Discharge Elimination System (NPDES) permit. The permit is necessary in order to operate and discharge treated wastewater from the City's wastewater treatment plant.

DEQ received one comment from the City of Siletz. The comment addressed an inconsistency between the reporting requirements in Schedule B for sanitary sewer overflows (SSOs) and the standard language in Schedule F of the permit.

The following is summary of the comment received from the public and the DEQ's response to those comments.

**Comment #1**

It is regarding "written reporting period" for submitting SSO's.

**Schedule B: Table B5 states 48 hours**
**Schedule F: Section D5 gives 5 days (which is our current time allowed)**

Can we adjust this so that both places read "5 days"?

**Department Response**

DEQ agrees and the language in Table B5 will be updated from "Within 48 hours of an SSO event" to "Within 5 days of an SSO event."

Oregon Department of Environmental Quality

# National Pollutant Discharge Elimination System

## Permit Evaluation Report and Fact Sheet

**May 14, 2018**

State of Oregon
Department of Environmental Quality

Headquarters Office
700 NE Multnomah Street, Suite 600
Portland OR 97232

**Contact: David Feldman 503-229-6850 FELDMAN.David@deq.state.or.us**

| | |
|---|---|
| **Permittee:** | City of Siletz<br>P.O. Box 318<br>Siletz, OR 97380 |
| **Existing Permit Information:** | File Number: 81276<br>Permit Number: 101680<br>Expiration Date: 03/31/2009<br>EPA Reference Number: OR0020419 |
| **Source Contact:** | Allen Middaugh; 541-444-2521<br>Head Operator |
| **Facility Location:** | 1264 James Frank Road<br>Siletz, Oregon 97380<br>Lincoln County |
| **LLID:** | 1240230449267-36.9 |
| **Receiving Stream/Basin:** | Receiving Stream: Siletz River<br>WRD Basin: Mid Coast<br>USGS Subbasin: Siletz-Yaquina |
| **Proposed Action:** | Renew Permit<br>Application Number: 972611<br>Date Received: 08/12/2008 |
| **Source Category:** | NPDES Minor – Domestic |
| **Sources Covered:** | Domestic wastewater |
| **Permit Type:** | NPDES-Dom-Db |
| **Permit Writer:** | David Feldman<br>Senior Permit Writer/HQ/WQPPD |

**City of Siletz STP**
**NPDES Permit Renewal Fact Sheet**

# Table of Contents

## Figures



## Tables

**City of Siletz STP**
**NPDES Permit Renewal Fact Sheet**

# 1.0 Introduction

The Department of Environmental Quality (DEQ) proposes to renew the National Pollutant Discharge Elimination System (NPDES) wastewater permit for City of Siletz sewage treatment plant (STP) located at 1264 James Frank Road, Siletz, OR 97380. This permit allows and regulates the discharge of domestic wastewater to the Siletz River. The permit also allows the City of Siletz STP to dispose of wastewater solids.

The purpose of this fact sheet is to explain and provide justification for the permit.

# 2.0 Permit History

## 2.1 Issuance, Renewal and Modifications

The current permit was issued on April 5, 2004 and expired on March 31, 2009. DEQ received renewal application number 972611 from The City of Siletz on 8/12/2008. Because the permittee submitted a renewal application to DEQ in a timely manner, the current permit is administratively extend and valid until DEQ takes final action on the renewal application as per OAR 340-045-0040.

## 2.2 Compliance History

The permittee has received several warning letters since the previous permit was issued.

- March 21, 2011: The effluent was measured at a pH below 6.0 on several occasions.
- January 3, 2013: A warning letter was issued because the 85% percent removal requirement for Total Suspended Solids (TSS) in the permit was not met. The actual TSS percent removal level achieved was 79%.
- January 14, 2013: DEQ issued a warning letter because the percent removal for TSS was reported at 58%.
- The permittee also reported several sanitary sewer overflow (SSO) events since the 2004 permit was issued. The SSO events occurred on the following dates: January 18, 2011, January 23, 2012, December 21, 2012, December 11, 2015, December 15, 2015, December 18, 2015, and December 21, 2015.

DEQ inspected the sewage treatment plant on November 16, 2016, no violations were noted on that visit. However, the permittee was instructed to move a fuel truck to a location with secondary containment available.

# 3.0 Proposed Revisions to Permit

The proposed permit contains the following substantive changes from the 2004 permit:

- Schedule A – No Changes.
- Schedule B – The sampling requirements for all parameters are now included in Schedule B.
- Schedule C – A compliance schedule is not included in this permit.
- Schedule D – There are no changes to Schedule D of this permit.
- Schedule E – There are no changes to Schedule E of this permit.
- Schedule F – Updated to the October 2015 version

# 4.0 Facility description

## 4.1 Wastewater Facilities Description

The city treats its domestic wastewater with a sequencing batch reactor (SBR). The city has maintained the current sewage treatment plant at this location since 1992. Figure 1 shows the location of the Siletz STP and the location of outfall 001. Appendix A depicts the wastewater flows through the STP. Raw sewage from the collection system enters the treatment facility at the headworks where there is mechanical bar screening. There is a pressure sensor flowmeter at the 6" Parshall flume-throat. The capacity of the headworks is 1.2 MGD. The influent flow is then split between two dual-operating intermittent cycle extended aeration system (ICEAS) basins, entering each unit's pre-reaction zone, where it is mixed with return activated sludge from the main chamber. The mixed liquor is aerated with coarse bubble diffusers until it passes under a baffle wall to the main chamber for clarification. Treated water flows into a 42,000 gallon equalization tank, passes through ultra violet disinfection (0.62 MGD capacity) and is discharged into the Siletz River. The disinfection unit is equipped with a magnetic flowmeter and a flow control gate. Waste activated sludge from the main chamber is pumped to each aerobic digester cell (32,000 gallons each). Hydraulic and solids retention time in the digester is 20 and 32 days, respectively. Supernatant from the digester is decanted back to the influent pump station for retreatment.

Each of the two basins in the SBR has a treatment capacity of 0.31 MGD with a 0.072-pound BOD per day loading capacity. The total maximum volume of the two basins is 170,000 gallons. The SBR detention time at maximum month wet weather flow is 18 hours.

Conditioned sludge from the two 32,000 gallon aerobic digesters is wasted to the facultative sludge lagoon (FSL), which has a water surface area of 0.88 acres and a holding capacity of 2,100,000 gallons. The loading capacity of the FSL is 20 pounds of volatile suspended solids (VSS) per 1000 sq.ft. per day, and the solids detention time is 11 months.

If necessary, raw sewage exiting the headworks can be diverted to a surge basin, which can in turn overflow into a surge overflow basin. The surge basin can hold 510,000 gallons with a surface area of 0.33 acres and is equipped with a magnetic flow meter. The surge overflow basin can hold 4,500,000 gallons with a surface area of 2.58 acres.


**Figure 1: Facility Location**

## 4.2 Outfalls

Outfall 001 consists of an 8-inch pipe fitted with a 90-degree elbow pointing downstream. It is located in the Siletz River approximately 20 feet off the shore northeast of the STP (Latitude 44.726322, Longitude -123.931247) at river mile 36.9.

## 4.3 Sewage Collection System

Sewage collection systems are designed to collect and transport raw sewage from residences and businesses to the city's treatment plant. As collection systems age, the pipes develop cracks, allowing the infiltration of groundwater. Stormwater may also enter the system. Though no longer allowed under current plumbing codes, in the past it was common to connect stormwater drains directly to sewers. The entry of groundwater and stormwater into the collection system is known as infiltration and inflow or I/I for short.

When a collections system experiences excessive I/I, most of the flow that makes it to the treatment plant may in fact be stormwater or groundwater that by itself does not require treatment. This can result in the following:

- Overflows from the sanitary sewer system when it rains. These are referred to as SSOs (sanitary sewer overflows).
- The release of untreated or partially treated sewage from all or a portion of the treatment plant. Such a release is termed a bypass. Bypasses may be necessary to avoid damaging the plant.
- Increased operation and maintenance costs.

The ratio of wet weather to dry weather flows measured at the treatment plant is an indication of how much I/I is occurring in the collection system. This information is summarized below.

**Table 1: Average and Peak Flow Statistics for City of Siletz STP**

| Flow Statistic | Millions of Gallons/Day (MGD) | Ratio to Average Dry Weather Design Flow (ADWDF) |
|---|---|---|
| Average Dry Weather Design Flow (ADWDF) | 0.157 | 1 |
| Average Wet Weather Flow over last 5 years | 0.103 | 0.7 |
| Highest Monthly Average over last 5 years (December/2012) | 0.411 | 2.6 |
| Peak Daily Flow over last 5 years (December 22, 2014) | 0.481 | 3.1 |

As can be seen from this table, the collection system and treatment plant does exhibit some I/I.

DEQ recognizes that it is not practical to attempt to build and operate treatment plants and collection systems so as to eliminate any and all bypasses or overflows, and that at some point, attempts to do so represent a poor investment of public funds. Therefore, DEQ is interested in encouraging communities to reduce the rate at which SSOs and bypasses occur. To this end, the permit requires the following:

- The permittee must develop a program to reduce I/I and submit a progress report on an annual basis (see Schedule D, Condition 1)
- The permittee must develop and maintain an emergency response and public notification plan to cover bypass and SSO events (Schedule F, sections B.7 and B.8)

The permittee must report all SSOs and bypasses (Schedule F, sections B.6, B.7 and B.8).

## 4.4 Recycled Water

The permittee does not currently operate a recycled water program and does not intend to do so during the term of this permit.

## 4.5 Wastewater Solids

The term wastewater solid includes sewage sludge and biosolids. Sewage sludge refers to solids from primary, secondary, or advanced treatment of domestic wastewater that have not been treated or determined to be suitable for land application as fertilizer or soil amendment. The term biosolids refers to domestic wastewater treatment facility solids that have undergone adequate treatment and are suitable for application to the land as a fertilizer or soil amendment.

The permittee must maintain a Biosolids Management Plan meeting the requirements in OAR 340-050-0031(5). DEQ approved the latest version of the permittee's plan on September 9, 2008. 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.

### 4.5.1 Transfer and Disposal

The permittee is not planning on transferring or disposing sewage sludge at any facility.

### 4.5.2 Land Application

The permittee does not currently land apply biosolids or produce biosolids for sale or distribution, and does not intend to do so during the term of this permit.

### 4.5.3 Other Beneficial Reuse

The permittee does not currently practice other types of beneficial reuse, such as energy recovery.

## 4.6 Stormwater

Stormwater is not addressed in this permit. NPDES permits for stormwater are not required for facilities with a design flow of less than 1 MGD.

## 4.7 Groundwater

There are no known groundwater effects associated with this facility.

## 4.8 Industrial Pretreatment

Municipalities that receive wastewater from certain categories of industries must have in place approved pretreatment programs. These programs are designed to reduce the discharge of pollutants from identified industries that the treatment plant is not able to treat. These pollutants can interfere with treatment plant operation, reduce the value of wastewater and biosolids for reuse, cause worker health or safety concerns, and pose a risk to the public or the environment.

The permittee does not have a DEQ-approved industrial pretreatment program. Based on current information, no industrial pretreatment program is needed.

# 5.0 Receiving Water

## 5.1 Flows

The impact of City of Siletz's discharge on the Siletz River is likely to be the greatest in the late summer and early fall when flows in the Siletz River are lowest. This period is referred to as the critical period.

The impact of a discharge on the receiving stream is evaluated with respect to flows likely to occur during the critical period. To standardize this analysis, DEQ makes use of three different flow statistics. Each is designed to work with a different type of water quality impact and associated water quality criteria. The nearest flow gage is about 4.5 miles upstream from the City's outfall. In order to calculate the critical flow statistic at the outfall, USGS's StreamStats web application was used. This application uses regression models based on the watershed characteristics to calculate streams flows at a specific location on a river. These flow statistics and their application are summarized below

**Table 2: Summary of Flow Statistics**

| Streamflow Statistic | What It Is | Potential Impacts[1] Statistic is Used to Analyze | Values for the Siletz River (cfs) |
|---|---|---|---|
| 1Q10 | The lowest one day average flow with a recurrence frequency of once in 10 years. | Acute toxicity to aquatic life | 60 |
| 7Q10 | The lowest seven day average flow with a recurrence frequency of once in 10 years. | Chronic toxicity to aquatic life | 60 |
| 30Q5 | The lowest 30 day average flow with a recurrence frequency of once in 5 years. | Impacts to human health from toxics classified as non-carcinogens | 77 |

[1]Impacts are evaluated with respect to pollutants for which DEQ has developed water quality criteria.

## 5.2 Designated Uses

Under the Clean Water Act, DEQ is required to identify the beneficial uses of every waterbody in Oregon. The intent of this requirement is to insure that the water quality standards DEQ develops are consistent with how the waterbody is used. Permits issued by DEQ must in turn reflect the water quality standards that apply to the basin in which permits are issued.

The City of Siletz discharges to the Siletz River. The following beneficial uses have been identified for the Siletz River:

- public and private domestic water supply,
- industrial water supply,
- irrigation and livestock watering,
- fish and aquatic life (including salmonid rearing, migration and spawning),
- wildlife and hunting,
- fishing,
- boating,
- water contact recreation,
- aesthetic quality, and
- hydro power.

The water quality standards for the Mid Coast Basin developed to protect these beneficial uses can be found in OAR 340-041-0220.

## 5.3 Receiving Stream Water Quality

Outfall 001 is located within a reach of the Siletz River that exceeds water quality standards for some parameters and is therefore deemed to be water quality-limited for those parameters. The parameters are listed in Table 3 below.

**Table 3: Water Quality Limited Parameters**

| Waterbody Name | River Mile | Parameter | Criteria | Season |
|---|---|---|---|---|
| Siletz River | 21.6 to 65.3 | Dissolved Oxygen | Spawning: Not less than 11.0 mg/L, or 95% of saturation | September 1 – June 15 |
| Siletz River | 7 to 46.8 | Temperature | Rearing: 16.0 degrees Celsius | June 16 – August 31 |

## 5.4 Mixing Zone Analysis

Permits issued by DEQ sometimes specify mixing zones. Also known as "allocated impact zones" or "regulatory mixing zones", mixing zones are allowed under both state and federal regulation. They are areas in the vicinity of outfalls in which all or some of Oregon's water quality standards can be suspended. DEQ allows mixing zones when the overall impact, evaluated with respect to Oregon's Mixing Zone Rule (OAR 340-041-0053) appears to be negligible.

Two mixing zones can be developed for each discharge: 1) The acute mixing zone, also known as the "zone of initial dilution" ("ZID"), and 2) the chronic mixing zone, usually referred to as "the mixing zone." The ZID is a small area where acute criteria can be exceeded as long as it does not cause acute toxicity to organisms drifting through it. The mixing zone is an area where acute criteria must be met but chronic criteria can be exceeded. It must be designed to protect the integrity of the entire water body.

The DEQ conducted a Level 2 mixing zone study for the Siletz STP on August 24, 2010. DEQ used the data from that study to simulate the discharge using the CORMIX mixing zone modeling software. This software provided estimated ZID and mixing zone dilutions for critical case, low stream flow conditions. Details of this analysis are contained in an October 16, 2017 mixing zone memo[1].

In summary the memo contains two sets of dilution values: one set is for the facility when it is at its average dry weather design flow capacity of 0.157 mgd, the other set is for the facility's existing flow rate projected out 7-8 years. When a facility's existing flow rate is less than 85 percent of the design flow, DEQ's policy is to use the existing flow rate projected out at least five years. In this case the existing average dry weather flow is 0.08 mgd - about 50 percent of the design flow. The two sets of dilution values are shown in Table 4:

DEQ also reviewed the existing description of the mixing zone and determined that it needed to be changed to better reflect the area impacted by the facility's discharge. The existing mixing zone is defined as a 50-foot radius. Mixing zones that extend upstream (i.e. radius) are typically used in tidally influenced waterbodies. The Siletz River has no tidal influence at the outfall location – there is no reversal of stream flow. The mixing zone

[1] "Mixing Zone Study Analysis," Schnurbusch, Steve, revised, October 16, 2017

was modified to extend 100 feet downstream to reflect this. This distance is similar in size to other mixing zones discharging to similar sized rivers and should be protective of the overall integrity of the waterbody.

**Table 4: Water Quality Standards, Applicable Flow Rates and Dilutions**

| **Dilutions At <85% Dry Weather Design** | | | |
|---|---|---|---|
| **Water Quality Standards** | **Applicable River Flow Conditions** | **Applicable Effluent Flow Rate** | **Model-Predicted Dilution after Mixing** |
| Aquatic Life, Freshwater Acute | 60 cfs (1Q10) | Projected max daily flow: 0.13 MGD | 5 at edge of ZID |
| Aquatic Life, Freshwater Chronic | 60 cfs (7Q10) | Projected avg max daily flow: 0.09 MGD | 60 at edge of RMZ |
| Human Health, Non-Carcinogen | 77 cfs (30Q5) | Projected avg max daily flow: 0.09 MGD | 139 at edge of RMZ |
| **Dilutions At Dry Weather Design** | | | |
| **Water Quality Standards** | **Applicable River Flow Conditions** | **Applicable Effluent Flow Rate** | **Model-Predicted Dilution after Mixing** |
| Aquatic Life, Freshwater Acute | 60 cfs (1Q10) | Max. daily: 0.22 MGD | 3 at edge of ZID |
| Aquatic Life, Freshwater Chronic | 60 cfs (7Q10) | Avg. dry weather design flow: 0.157 MGD | 22 at edge of RMZ |
| Human Health, Non-Carcinogen | 77 cfs (30Q5) | Avg. dry weather design flow: 0.157 MGD | 32 at edge of RMZ |

Explanation of terms:
ZID - Zone of Initial Dilution
RMZ - Regulatory mixing zone

The model-predicted dilutions based on projected flows of less than 85% of design shown above were used to determine if water quality-based permit limits are needed. The process of developing permit limits is described in more detail in Section 7.

# 6.0 Overview of permit development

## 6.1 Types of Permit Limits

Effluent limitations serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants or limits that are protective of the water quality standards for the receiving water. These two types of permit limits are referred to as technology-based effluent limitations (TBELs) and water quality-based effluent limits (WQBELs) respectively. When a TBEL is not restrictive enough to protect the receiving stream, a WQBEL must be placed in the permit. More explanation of each is provided below.

- TBELs:
  - The intent of TBELs is to require a minimum level of treatment of pollutants based on available treatment technologies, while allowing the discharger to use any available control technique to meet the limits
  - TBELs for municipal treatment plants, also known as federal secondary treatment standards have been developed for the following parameters: biochemical oxygen demand measured over 5 days ($BOD_5$), total suspended solids (TSS) and pH. These are found in the Code of Federal Regulations (CFR) and are known as secondary treatment standards. The CFR also allows special considerations and exceptions to these standards for certain circumstances and types of treatment facilities such as lagoons.
- WQBELs:
  - The intent of WQBELs is to ensure the water quality standards of a receiving stream are met. The water quality standards are developed to protect the beneficial uses of the receiving stream such as swimming and fishing. In many cases TBELs are not restrictive enough to ensure the receiving stream meets water quality standards. In these cases, WQBELs need to be established to protect the receiving stream.
  - Oregon has minimum design criteria for BOD and TSS that are only applicable to sewage treatment plants. These design criteria vary by watershed basin and were developed to protect water quality in their respective basins. These are often times more stringent than the federal secondary treatment standards. When this is the case, the basin standards supersede the federal standards.

TBELs are likely to be the most stringent if the receiving stream is large relative to the discharge, and WQBELs are likely to be the most stringent when the receiving stream is small or does not meet water quality standards.

In some cases, both a TBEL and a WQBEL will be developed for a particular parameter. Permit writers must include the more stringent of the two in the permit.

Permit limits for bacteria are WQBELs when they are derived from the water quality standards found in OAR 340-041-0009 for freshwater, marine, and estuarine waters or 40 CFR § 131.41 for coastal recreation waters. Bacteria limits are designed to protect human health when swimming or eating shellfish.

Each time a permit is renewed, the permit writer evaluates the existing limits to see if they need to be modified as a result of changes to technology based standards or water quality standards that may have occurred during the permit term. Anti-backsliding provisions (described in 40 CFR § 122.44(l)) generally do not allow relaxation of effluent limits in renewed/reissued permits. The more stringent of the existing or new limits must be included in the renewal permit.

## 6.2 Existing Permit Limits

The existing permit limits are as follows:

| | | Average Effluent Concentrations (mg/L) | | Mass Loadings | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Timeframe** | **Monthly** | **Weekly** | **Monthly Average (lbs/Day)** | **Weekly Average (lbs/Day)** | **Daily Maximum (lbs)** |
| $CBOD_5$ | May 1 – October 31 | 15 | 25 | 20 | 29 | 39 |
| TSS | May 1 – October 31 | 20 | 30 | 26 | 39 | 52 |
| $CBOD_5$ | November 1 – April 30 | 15 | 25 | 46 | 77 | 93 |
| TSS | November 1 – April 30 | 20 | 30 | 62 | 93 | 120 |
| pH | Year round | 6.0 – 9.0 | | | | |
| *E. coli* | Shall not exceed 126 organisms per 100 ml monthly geometric mean. No single sample shall exceed 406 organisms per 100 ml | | | | | |
| $CBOD_5$ and TSS Removal Efficiency | Shall not be less than 85% monthly average | | | | | |

## 6.3 Anti-degradation

As part of renewing a permit, DEQ must demonstrate that the discharge does not lower water quality from the existing condition. DEQ is required to make this demonstration under Oregon's Anti-Degradation Policy for Surface Waters in OAR 340-041-0004.

DEQ has performed an antidegradation review for this discharge. The proposed permit contains the same discharge loadings as the existing permit. Permit renewals with the same discharge loadings as the previous permit are not considered to lower water quality from the existing condition. DEQ is not aware of any information that existing limits are not protective of the designated beneficial uses listed in Section 5.2. These uses are very broad and include, salmonid and steelhead migration, spawning and rearing). DEQ is also not aware of any existing uses present within the waterbody that are not currently protected by standards developed to protect the designated uses. Therefore, DEQ has determined that the proposed discharge complies with DEQ's antidegradation policy (see Antidegradation Review Worksheet in Appendix C).

# 7.0 Permit Draft Discussion

## 7.1 Face Page

The face page provides information about the permittee, description of the wastewater, outfall locations, receiving stream information, permit approval authority, and a description of permitted activities. The permit allows the city to discharge to the Siletz River within limits set by Schedule A and the following schedules. It prohibits all other discharges.

In accordance with state and federal law, NPDES permits will be effective for a fixed term not to exceed 5 years. Upon issuance, this permit will be effective for no more than 5 years.

DEQ evaluated the classifications for the treatment and collection systems (see Appendix D). The treatment system is considered a Class II system and the collection system is considered a Class II system. DEQ is not proposing any changes to the system classifications.

## 7.2 Permit Limit Derivation

## 7.2.1 Technology-Based Effluent Limits (TBELs)

TBELs must be met at the outfall. The applicable TBELs for this facility are the most stringent of the federal secondary treatment standards and the Oregon basin standards, adjusted as necessary for the type of treatment system. The table below shows a comparison of the federal secondary treatment standards and Oregon basin standards.

Table 5 represents a comparison of potential TBELS that could be used in the existing permit.

**Table 5: Comparison of Federal Secondary Treatment and Basin Standards**

| Parameter | Federal Secondary Treatment Standards | | Applicable Mid Coast Basin Standards (OAR 340-041-0225) |
|---|---|---|---|
| | 30-Day Average | 7-Day Average | 30-Day Average |
| $CBOD_5$ See note 1. | 25 mg/L | 40 mg/L | May 1 – October 31: $BOD_5$: 20 mg/L |
| TSS | 30 mg/L | 45 mg/L | May 1 – October 31: 20 mg/L |
| pH | 6.0 – 9.0. (instantaneous) | | pH: 6.5-8.5<br>Note: basin standards for pH do not have to be met at the outfall and can instead be met at the edge of the mixing zone. |
| % Removal | 85% $BOD_5$ and TSS | | Not specified |

Notes:
1. Where nitrification is occurring in a treatment process, $BOD_5$ may not provide a reasonable measure of the oxygen to consume unoxidized nitrogen and ammonia-nitrogen and convert these to oxidized nitrate. In these instances, basing permit limits on Carbonaceous $BOD_5$ ($CBOD_5$) instead of $BOD_5$ eliminates the influence of nitrification on effluent limits. Therefore, EPA and DEQ allow for the use of $CBOD_5$ limits to minimize false indications of poor facility performance as a result of nitrogenous pollutants (see 40 CFR § 133.102(a)(4)).

Table 6 summarizes the concentration-based TBELs applied to the current version of the permit. Additionally, Federal regulations allow the replacement of BOD limits with Carbonaceous BOD limits where it can be demonstrated that nitrification is occurring. For wastewaters with significant nitrogen content, basing permit limitations on $CBOD_5$ instead of $BOD_5$ eliminates the impact of nitrification on discharge limitations and compliance determinations.

**Table 6: Summary of Existing Technology-Based Effluent Limits for Siletz STP**

| Effluent Parameter | Concentration | | Percent Removal | Comments |
|---|---|---|---|---|
| | Monthly | Weekly | | |
| $CBOD_5$ | 15 mg/L | 25 mg/L | 85% | These were the limits from the previous permit. |
| TSS | 20 mg/L | 30 mg/L | 85% | This is equivalent to the basin standards for the Mid Coast. |
| pH | Must not be outside the range of 6.5 and 8.5 | | | This is the basin standard for fresh water in the Mid Coast. |

The use of $CBOD_5$ instead of $BOD_5$ must be confirmed each permit renewal. Paired monitoring for both parameters will be included for a two-year period in this permit to determine if $CBOD_5$ is still the appropriate TBEL requirement for the Siletz STP.

## Monthly Average Mass Load Limits

The following equation is used to develop the monthly average mass load:

Monthly Avg. Mass Load = POTW design flow x Conc.-based limit x Conversion factor

The weekly average and maximum daily mass loads are developed from the monthly average by multiplying by 1.5 and 2 respectively.

The Siletz STP has summer mass load limits for $CBOD_5$ and TSS based on the average dry weather design flow of 0.157 MGD and a concentration of 15 mg/L for $CBOD_5$ and 20 mg/L for TSS, respectfully. The summer calculations (May 1 – October 31) are:

$CBOD_5$:

Monthly Average: 0.157 MGD x 15 mg/L x 8.34 = 19.6 lbs/day, rounded to 20

Weekly Average: 19.6 lbs/day monthly average x 1.5 = 29 lbs/day

Daily Maximum: 19.6 lbs/day monthly x 2 = 39 lbs/day

TSS:

Monthly Average: 0.157 MGD x 20 mg/L x 8.34 = 26 lbs/day

Weekly Average: 26 lbs/day monthly average x 1.5 = 39 lbs/day

Daily Maximum: 26 lbs/day monthly x 2 = 52 lbs/day

The facility's winter mass limits (monthly and weekly average and daily maximum) for $CBOD_5$ and TSS are based on the flow of 0.37 MGD and a concentration of 15 mg/L for $CBOD_5$ and 20 mg/L for TSS, respectfully. The winter calculations (November 1 – April 30) are:

$CBOD_5$:

Monthly Average: 0.37 MGD x 15 mg/L x 8.34 = 46 lbs/day

Weekly Average: 46 lbs/day monthly average x 1.5 = 69 lbs/day

Daily Maximum: 46 lbs/day monthly x 2 = 92 lbs/day

TSS:

Monthly Average: 0.37 MGD x 20 mg/L x 8.34 = 62 lbs/day

Weekly Average: 62 lbs/day monthly average x 1.5 = 93 lbs/day

Daily Maximum: 62 lbs/day monthly x 2 = 124 lbs/day (rounded down to two significant figures: 120 mg/L).

To summarize, the TBELs and applicable basin standards for the Siletz STP are as follows:

**Table 7: Complete Technology Based Effluent Limitations for May 1 – October 31**

| Parameter | Units | Average Monthly | Average Weekly | Daily Maximum |
|---|---|---|---|---|
| $CBOD_5$ | mg/L | 15 | 25 | -- |
| | lbs/day | 20 | 29 | 39 |
| TSS | mg/L | 20 | 30 | -- |
| | lbs/day | 26 | 39 | 52 |

**Table 8: Complete Technology Based Effluent Limitations for November 1 – April 30**

| Parameter | Units | Average Monthly | Average Weekly | Daily Maximum |
|---|---|---|---|---|
| $CBOD_5$ | mg/L | 15 | 25 | -- |
| | lbs/day | 46 | 69 | 93 |
| TSS | mg/L | 20 | 30 | -- |
| | lbs/day | 62 | 93 | 120 |

All mass load limitations are again rounded to two significant figures, consistent with the number of significant figures associated with flow measurements with this facility, and with the accuracy of CBOD measurements of 10 or greater.

### 7.2.2 Bacteria Limit Discussion

| Summary of Federal and State Standards for Bacteria |
|---|
| From OAR 340-041-009(1)(a) for Freshwater Contact Recreation:<br>• Monthly log mean may not exceed 126 *E. coli* organisms per 100 milliliters, and<br>• No single sample may exceed 406 *E. coli* organisms per 100 milliliters. |

Limits for bacteria are considered to be WQBELs. Since the Siletz STP discharges to freshwater, the permit limit for bacteria is based on *Escherichia coli* (*E. coli*).

### 7.2.3 Water Quality-Based Effluent Limits

Once TBELs and applicable basin standards have been established for the treatment facility, DEQ must determine if WQBELs are necessary to protect water quality. DEQ first conducts a reasonable potential analysis to determine if the discharge has the potential to exceed water quality standards. If there is reasonable potential to exceed a standard, DEQ must calculate effluent limit to ensure compliance with the standard.

### 7.2.4 General Discussion of Reasonable Potential Analysis

EPA has developed a methodology called Reasonable Potential Analysis (RPA) for determining if there is a reasonable potential for a discharge to cause or contribute to violations of water quality standards for a particular parameter. It takes into account effluent variability, available dilution (if applicable), receiving stream water quality and water quality standards for the protection of aquatic life and human health. If the RPA results indicate that there is a potential for the discharge to cause or contribute to exceedances of water quality standards, the methodology is then used to establish permit limits that will not cause or contribute to violations of water quality standards. DEQ has adopted EPA's methodology for RPA, and has developed spreadsheets that incorporate this analysis.

The parameters for which a RPA must be performed will vary with the size and type of discharge. They are listed in the NPDES Permit Testing Requirements for Publicly Owned Treatment Works contained in Appendix J of 40 CFR § 122. The relevant sections are reproduced below.

**Table 9: Testing Requirements for Publicly-Owned Treatment Works**

| Pollutant List | Parameters for which RPA Needed |
|---|---|
| Table 1A – Effluent Parameters for All POTWs | pH, Temperature |
| Table 1 – Effluent Parameters for All POTWs w. Flow ≥ 0.1 MGD | Ammonia, Dissolved Oxygen |

Each of the parameters for which a RPA was performed is discussed in the sections below.

The following dataset was used for all RPAs preformed:

| Siletz River Station# 10391 | | | | Outfall 001 | | | |
|---|---|---|---|---|---|---|---|
| **Parameter (Units)** | **Dates** | **RPA (Statistic 1)** | **RPA (Statistic 2)** | **Dates** | **RPA (Statistic 1)** | **RPA (Statistic 2)** | **RPA (Statistic 3)** |
| pH (s.u.) | 1/12/2000 – 4/10/2012 | 7.2 (10th Percentile) | 7.8 (90th Percentile) | 1/12/2004 – 4/10/2012 | 6.0 (TBEL) | 9.0 (TBEL) | 7.0 (90th Percentile) |
| Temperature (°C) | 1/12/2000 – 4/10/2012 | 20 °C (90th Percentile) | 20.5°C (Max 7-day average) | 12/1/2011 – 1/31/2016 | 19.9 °C (90th Percentile) | 21.8 °C (Max 7-day average) | 21.6 °C (Seasonal Max 7-day average) |
| Alkalinity (mg/L) | 1/12/2000 – 4/10/2012 | 11 (10th Percentile) | N/A | 12/1/2011 – 1/31/2016 | 8.1 | N/A | N/A |
| Ammonia (mg/L) | 1/12/2000 – 4/10/2012 | 0.03 (90th Percentile) | N/A | 12/1/2011 – 1/31/2016 | 29.1 (Max) | 19 (Max 30-day avg) | N/A |

## Reasonable Potential Analysis for pH

As indicated in the last section (7.2.1), the applicable basin standard for Siletz STP's discharge to the Siletz River is 6.5 to 8.5. Siletz STP's current pH limits of 6.0 – 9.0 ensure that the standard is met at the edge of the mixing zone (see Appendix B1). The proposed limits remain the same as the existing permit at 6.0 – 9.0.

## Reasonable Potential Analysis for Temperature

Applicable Temperature Criteria

The designated fish uses for this segment of the Siletz River are core cold-water habitat (June 16 – August 31) and salmonid and steelhead spawning (from September 1 to June 15). These uses are identified on the Mid Coast Basin fish use and salmonid spawning use maps contained in OAR 340-041 (Figures 220A and 220B),

For streams identified as having salmon and steelhead spawning use, OAR 340-041-0028(4)(a) states that the 7-day-average maximum temperature may not exceed 13.0°C (55.4°F) at the times indicated on the salmonid spawning use maps. This criterion applies in the Siletz River from September 1 to June 15. For the streams identified as core cold water habitat, OAR 340-041-0028(4)(b) states that the 7-day average maximum temperature (7DADM) may not exceed 16°C (60.8°F). This criterion applies in the Siletz River from June 16 – August 31. If the waterbody exceeds the numeric criterion and a TMDL has not been completed, the standard contains a human use allowance provision that allows a discharge to increase the temperature of the waterbody by 0.3°C at the edge of the mixing zone or with 25 percent of the critical stream flow (the most stringent applies).

The Siletz River, from river mile from 7 to 46.8, has been identified as water quality limited for temperature on DEQ's 303(d) list. The impaired beneficial use identified on the 303(d) list is salmon fish rearing and anadromous fish passage based on an old rearing criteria of 17.8 °C (64.04°F). The 303(d) listing has not been updated to reflect the current core cold water criterion of 16°C (60.8°F). However, since the new temperature criteria is lower than the previous criteria and protective of rearing and migration, DEQ believes that the impairment continues to exist and covers the existing core cold water habitat time period from June 16 – August 31.

**Table 10: Applicable Temperature Criteria**

| Criteria | Rule | Temperature | Dates Applicable |
|---|---|---|---|
| Salmon and Steelhead Spawning | OAR 340-041-0028(4)(a) | 13.0ºC (55.4ºF) | September 1 to June 15 |
| Core Cold Water Habitat | OAR 340-041-0028(4)(b) | 16ºC (60.8ºF) | June 16 – August 31 |

OAR 340-041-0028(4)(a) - Salmon and Steelhead Spawning:

Salmon and steelhead spawning is applicable to the facility discharge from September 1 to June 15. DEQ performed an analysis to determine if the discharge complies the spawning criterion and the associated human use allowance. The maximum 7-day average effluent temperature of 21.6ºC for this time period and the dilution value of 60 was used for this analysis. The results indicate there is no reasonable potential to exceed the spawning criterion. Therefore, no thermal load limit will be applied to the permit. A summary of this analysis is presented in Appendix B3.

It is important to note that if the city continues to grow and reaches the summer average dry weather design flow of 0.157 MGD, the analysis would indicate the facility would not be in compliance with the spawning criterion using existing effluent temperatures and the dilution achieved through the existing single port outfall.

OAR 340-041-0028(4)(b) - Core Cold Water Habitat:

The core cold water criterion applies from June 16 – August 31. The maximum 7-day average temperature reported by the Siletz facility during this time period was 21.8ºC. DEQ performed an analysis to determine if the discharge complies the spawning criterion and the associated human use allowance. The results indicate that the city's discharge at the projected effluent flow will not have a reasonable potential to exceed the criteria. A summary of this analysis is presented in Appendix B4.

Thermal Plume Criteria

In addition to the temperature standard discussed above, DEQ's water quality standards also include "temperature thermal plume limitations" in OAR 340-041-0053(2)(d). This rule contains criteria designed to prevent potential adverse impacts that may result from thermal plumes. The criteria as they apply to the city's discharge are discussed below:

- *OAR 340-041-0053(2)(d)(A): Impairment of an active salmonid spawning area where spawning redds are located or likely to be located. This adverse effect is prevented or minimized by limiting potential fish exposure to temperatures of 13 degrees Celsius (55.4 Fahrenheit) or more for salmon and steelhead, and 9 degrees Celsius (48 degrees Fahrenheit) or more for bull trout.*

  Siletz STP discharge: There are no documented salmonid spawning areas near the outfall location.

- *OAR 340-041-0053(2)(d)(B): Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32ºC or more to less than 2 seconds.*

  Siletz STP discharge: Maximum effluent temperature recorded was 26.6 ºC over the previous permit cycle. This is well below the 32 ºC exposure. There is no reasonable potential for the discharge to contribute to instantaneous lethality.

- *OAR 340-041-0053(2)(d)(C): Thermal shock caused by a sudden increase in water temperature is prevented or minimized by limiting potential fish exposure to temperatures of 25°C or more to less than 5% of the cross-section of 100% of the 7Q10 low flow of the waterbody.*

  Siletz STP discharge: At the critical (maximum) effluent flows and associated temperatures documented, the analysis summarized in Appendix B5 indicates that the temperature of the effluent when it mixes with 5% of the cross-section of 100% of the 7Q10 flow of the Siletz River will be 20.4°C well below 25°C.

- *OAR 340-041-0053(2)(d)(D): Unless ambient temperature is 21°C or greater, migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21°C or more to less than 25% of the cross-section of 100% of the 7Q10 low flow of the waterbody.*

  Siletz STP discharge: At the critical (maximum) effluent flows and associated temperatures documented, the analysis summarized in Appendix B6 indicates that the temperature of the effluent when it mixes with 25% of the cross-section of 100% of the 7Q10 flow of the Siletz River will be 16.0°C well below 25°C. Therefore, migration blockage is prevented or minimized.

Thus, the analysis indicates that the discharge from the Siletz facility meets the temperature thermal plume limits in OAR 340-041-0053(2)(d).

***Reasonable Potential Analysis for Dissolved Oxygen***

When treated wastewater is discharged to a river, it exerts an oxygen demand on the river. The greater the level of BOD associated with the discharge, the more oxygen it will consume from the river. A mathematical model known as the Streeter-Phelps model is used to quantify this impact, and make sure that the oxygen demand does not cause the river to violate water quality standards for dissolved oxygen. This model takes into account BOD levels in the effluent, the BOD decay rate, the rate at which the river can be expected to absorb oxygen from the atmosphere and the flow rates of both the discharge and the river.

The impact of City of Siletz's discharge on dissolved oxygen (DO) levels in the Siletz River has been analyzed using the Streeter-Phelps model. The results indicate that the discharge is not likely to cause DO levels to drop below the water quality standard of 95% saturation, (i.e., 10.05 mg/L) or 11.0 mg/L. This is based on an average river temperature of 18.24 degrees Celsius during the critical period and with Siletz STP at an elevation of 130 ft. The model showed that the background DO levels in the river drop below both of the thresholds one half mile downstream of the outfall. Also, under OAR 340-041-0004(3)(d), there cannot be a DO deficit greater than 0.1 mg/L. The largest DO deficit caused by the discharge is 0.06 mg/L. There is no reasonable potential for the discharge to violate the DO standard for the Siletz River. Therefore, the $CBOD_5$ limits applied to this permit will be used as a surrogate for dissolved oxygen. The results of this analysis are included in Appendix B7.

## Reasonable Potential Analysis for Ammonia

Water quality criteria for ammonia vary depending on pH, temperature, and the presence of aquatic species (salmonids, freshwater mussels and snails). The RPA for ammonia was performed using the data collected upstream of Outfall 001 in the Siletz River and their effluent as summarized in the table below:

| Parameter | Units | Upstream | Effluent |
|---|---|---|---|
| Temperature | °C | 20 | 19.9 |
| pH | S.U. | 7.8 | 7.0 |
| Alkalinity | mg/L | 11 | 8.1 |
| Total Ammonia as N[1] | mg/L | 0.03 | 29 |
| Notes:<br>1. See discussion and figures below. | | | |

There were several ammonia data points from the effluent (eight in total) with very high values measured over the course of two months. These data points were measured when the facility had a malfunction and do not represent the normal operation of the facility. The city made repairs and as can be seen in Figure 2, the ammonia returned to a level more indicative of normal operations. These ammonia values were not used in the analysis because they are not representative of normal operations.

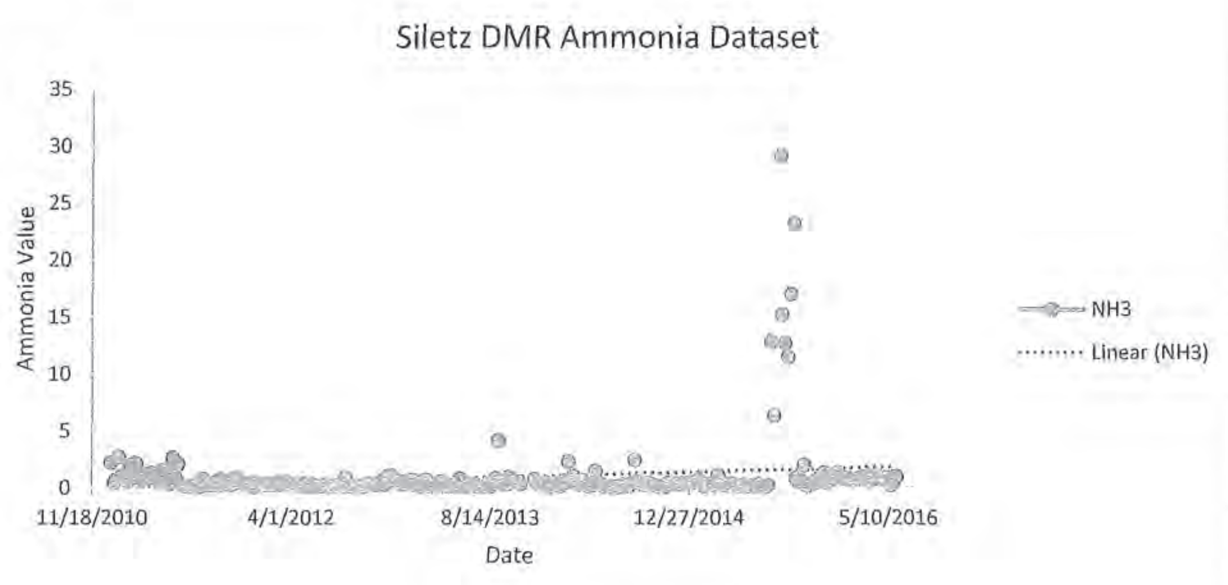



**Figure 2: Ammonia DMR Data**

The results of the ammonia RPA indicate that there is no reasonable potential for the discharge to cause or contribute to exceedances of the water quality criteria for ammonia at both the ZID and end of the regulatory mixing zone. Based on these results, no limits for ammonia are needed.

RPA results are included in Appendix B.

## Reasonable Potential Analysis for Total Dissolved Solids

The Mid Coast Basin guide concentration for Total Dissolved Solids (TDS), found in OAR 340-041-0225(2), is a guide concentration of 100.0 mg/L. The current permit does not have a limit for TDS.

DEQ conducted a statewide analysis showing that limits for total dissolved solids are not warranted for domestic wastewater treatment plants because TDS concentrations that are typically found in domestic effluent do not have the reasonable potential to negatively impact beneficial uses.

***E. coli***

The proposed permit limits are based on the E. coli standard contained in OAR 340-041-0009(1)(a). The proposed limits are a monthly geometric mean of 126 E. coli per 100 ml, with no single sample exceeding 406 E. coli per 100 ml. If a single sample exceeds 406 E. coli per 100 ml, then the permittee may take at least five consecutive re-samples. If the log mean of the five re-samples is less than or equal to 126, a violation is not triggered. The re-sampling must be taken at four hour intervals beginning within 48 hours after the original sample was taken.

## 7.3 Schedule A. Waste Discharge Limits

The proposed permit limits for the Siletz STP are included in Schedule A of the permit. The numeric limits in Schedule A are reproduced below. These limits are the result of the analyses described in Section 7.2. Schedule A of the permit also contains conditions relating to the mixing zone and biosolids.

The proposed effluent limits for Outfall 001 are as follows:

1. **Outfall 001 - Treated Effluent**
   a. Final Permit Limits
      i. May 1 – October 31: During this time period the permittee must comply with the limits in the following table:

**Table A11: Summer Permit Limits**

| Parameter | Units | Monthly | Weekly | Daily |
|---|---|---|---|---|
| $CBOD_5$ | mg/L | 15 | 25 | -- |
| | lbs/day | 20 | 29 | 39 |
| | % removal | 85 | -- | -- |
| TSS | mg/L | 20 | 30 | -- |
| | lbs/day | 26 | 39 | 52 |
| | % | 85 | -- | -- |
| *E. coli* | MPN | 126 | -- | 406 |
| pH | S.U. | 6.0 – 9.0 | | |

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

**Table A12: Winter Limits**

| Parameter | Units | Monthly | Weekly | Daily |
|---|---|---|---|---|
| $CBOD_5$ | mg/L | 15 | 25 | -- |
| | lbs/day | 46 | 77 | 93 |
| | % removal | 85 | -- | -- |
| TSS | mg/L | 20 | 30 | -- |
| | lbs/day | 62 | 93 | 120 |
| | % | 85 | -- | -- |
| *E. coli* | MPN | 126 | -- | 406 |
| pH | S.U. | 6.0 – 9.0 | | |

### 7.3.1 Discussion of other Schedule A Requirements

In addition to permit limits for specific parameters, Schedule A also contains requirements pertaining to:

a. Regulatory Mixing Zone
b. Groundwater Protection
c. Use of Recycled Water
d. Biosolids
e. Chlorine Usage

These are discussed in more detail below:

**a. Regulatory Mixing Zone**
The proposed permit includes a regulatory mixing zone defined as the portion of the Siletz River extending 100 feet downstream and 129 feet across stream from Outfall 001. The zone of initial dilution for the mixing zone is defined as the portion of the river extending 10 feet downstream from Outfall 001.

**b. Groundwater Protection**
Schedule A includes a condition that prohibits activities that could cause an adverse impact on existing or potential beneficial uses of groundwater.

**c. Biosolids**
The permit describes what discharge limits and management practices the permittee must satisfy to beneficially reuse biosolids as a soil amendment or fertilizer. The requirements in Schedule A of the permit contain limits for biosolids and are derived from OAR 340-050.

**d. Septage Requirements**
The permit prohibits the permittee from accepting septage for treatment or processing without written approval from DEQ.

**e. Chlorine Usage**
Because the permittee uses UV disinfection, the permit prohibits the use of chlorine or chlorine compounds for disinfection.

## 7.4 Schedule B. Minimum Monitoring and Reporting Requirements

Section 1 of Schedule B describes monitoring and reporting protocols for the permittee and includes the following:

a. Assurance and Quality Control (QA/QC)
b. Re-analysis and Re-sampling if QA/QC Requirements Not Met
c. Reporting Procedures

Schedule B also describes the minimum monitoring and reporting necessary to demonstrate compliance with the conditions of this permit. DEQ is authorized by ORS 468.065(5) to require periodic reporting by permittees. Self-monitoring requirements are the primary means of ensuring that permit limits are being met. Other parameters may also need to be monitored when insufficient data exist to establish a limit, but where there is a potential for a water quality concern.

DEQ has developed monitoring and reporting matrices that establish monitoring and reporting frequencies based on the size and complexity of the facility. These matrices maybe found at:

http://www.deq.state.or.us/wq/wqpermit/docs/TemplateGuidance/MonMatrix.pdf

http://www.deq.state.or.us/wq/wqpermit/docs/ReportingMatrix.pdf

In addition to monitoring and reporting requirements, Schedule B includes the following:

- Requirements to develop and implement a Quality Assurance/Quality Control (QA/QC) program
- What to do if QA/QC requirements are not met.
- Requirements pertaining to reporting procedures. These include:

- The correct use of significant figures
- Reporting of detection levels and quantitation limits
- Calculating and reporting mass loads.

Monitoring requirements are found in the following tables:
Table B1: Influent Monitoring
Table B2: Effluent Monitoring
Table B3: Biosolids Monitoring
Table B4: Biosolids Monitoring Frequency
Table B5: Reporting Requirements and Due Dates

Each of these tables is discussed in more detail below.

**Tables B1 and B2: Influent and Effluent Monitoring**
These tables specify the parameters to be monitored on a regular basis in the influent and effluent, along with associated monitoring frequencies, sample types and related reporting requirements. Table B2 includes parameters for which monitoring data is required for the renewal of this permit.

**Tables B3 and B4: Biosolids Monitoring Requirements and Monitoring Frequency**
This table lists the monitoring requirements that pertain to biosolids, consistent with OAR 340-050-0035. Specific details on how and where biosolids monitoring will be conducted provided in the Biosolids Management Plan.

In addition to biosolids monitoring at the treatment facility, the facility is required to maintain records on the land application of biosolids. Records must be sufficient to demonstrate that biosolids were applied within agronomic loading rates and following required site management practices. The permit requires the permittee to record the date, quantity, and location of biosolids applied to the land on a site map or electronic GIS system.

**Table B5: Reporting Requirements and Due Dates**
This table summarizes, for the convenience of the permittee, the information contained in the previously-listed tables.

## 7.5 Schedule C. Compliance Schedules and Conditions

The permittee does not have a compliance schedule.

## 7.6 Schedule D. Special Conditions

### 7.6.1 Inflow Removal

It is important for the permittee to assess and take steps to reduce the rate of infiltration and inflow of stormwater and groundwater into the sewer system. Consistent with this, Schedule D of the permit requires the permittee to undertake activities to track and reduce I/I in the sewer system.

### 7.6.2 Exempt Wastewater Reuse at the Treatment System

Schedule D exempts the permittee from the recycled water requirements in OAR 340-055 when recycled water is used for landscape irrigation at the treatment facility or for in-plant processes, such as in plant maintenance activities. Landscape irrigation includes water applied to small-scale irrigation such as supplying supplemental irrigation to turf grass, shrubs, and ornamental trees. Landscape irrigation may include the irrigation of native vegetation along dikes, banks, and earthen impounds around wastewater lagoons—especially as needed to reduce erosion and maintain structural integrity. Landscape irrigation does not include large-scale of pasture, hayfields, or native vegetation adjacent to wastewater treatment facility (i.e., these activities are subject to OAR 340-055 and require development of a recycled water use plan). All of the conditions listed in sections 6.a through 6.d must be satisfied for an exempt use to be valid.

### 7.6.3 Biosolids Management Plan and Land Application Plan

Conditions requiring the permittee to develop and maintain a biosolids management plan and land application plan are provided in Schedule D. The biosolids management plan and the land application plan must meet the requirements in OAR 340-050-0031 and describe where and how the land application of biosolids is managed to protect public health and the environment.

The land application plan includes all sites authorized by DEQ for land application of Class B biosolids and described in individual, DEQ-issued site authorization letters. During permit renewal, all previously authorized biosolids land application sites are available for public comment with the biosolids management plan and land application plan. During the term of the permit, DEQ-initiated public notice of previously authorized sites identified in the land application plan is not required.

When the permittee needs a new land application site, the permittee is responsible for getting authorization from DEQ as well as notifying neighbors and providing them with an opportunity to comment. Any proposed new site must meet the site selection and site management criteria described in the land application plan. DEQ-initiated public notice will be provided for any new site that does not meet these criteria and/or that DEQ considers sensitive with respect to residential housing, runoff potential, and/or threat to groundwater.

The permittee's biosolids management plan, which included the land application plan, was last updated in July of 2008. The permittee must continue to comply with the provisions included in the July 2008 biosolids management plan.

### 7.6.4 Wastewater Solids Transfers

The permittee is allowed to transfer treated or untreated wastewater solids to other in-state or out-of-state facilities that are permitted to accept the wastewater solids. If solids are transferred, the permittee is required to monitor, report, and dispose of solids as required by the permit of the receiving facility. Wastewater solids that are transferred out-of-state must meet all requirements for the use of disposal or wastewater solids as required by both Oregon and the receiving state.

### 7.6.5 Hauled Waste

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

### 7.6.6 Operator Certification

The permittee is required to have a certified operator consistent with the size and type of treatment plant covered by the permit. The language in this section of the permit describes the requirements relating to operator certification. An updated copy of the wastewater classification worksheet for the Siletz STP is attached as Appendix D.

### 7.6.7 Industrial User Survey

The permittee is required to conduct an industrial user survey every five years. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the Siletz STP, and ensure regulatory oversight of these discharges to state waters.

## 7.7 Schedule E. Pretreatment

The permittee does not have a DEQ-approved industrial pretreatment program. Based on current information, no industrial pretreatment program is needed.

## 7.8 Schedule F. NPDES General Conditions

These conditions are standard to all domestic NPDES permits and include language regarding operation and maintenance of facilities, monitoring and record keeping, and reporting requirements. The General Conditions for all individual permits issued by DEQ were substantially revised in August 2009. Minor modifications have been made since then. A summary of the changes is as follows:

- There are additional citations to the federal Clean Water Act and CFR, including references to standards for sewage sludge use or disposal.
- There is additional language regarding federal penalties.
- Bypass language has been made consistent with the CFR and with other EPA Region 10 states.
- Reporting requirements regarding overflows have been made more explicit.
- Requirements regarding emergency response and public notification plans have been made more explicit.
- Language pertaining to duty to provide information has been made more explicit.
- Confidentiality of information is addressed.
- A definition of CBOD has been added.

# 8.0 Next Steps

## 8.1 Public Comment Period

The proposed NPDES permit will be made available for public comment for a least 35 days. Public notice will be posted on DEQ's website and sent to subscribers of DEQ's pertinent public notice email lists. DEQ will schedule a public hearing if requested by 10 or more people, or by an authorized person representing an organization of at least 10 people. If a public hearing is to be held, then DEQ will provide an additional 30-day public notice of the public hearing.

## 8.2 Response to Comments

DEQ will respond to comments received during the comment period. All those providing comment will receive a copy of DEQ's response. Interested parties may also request a copy of DEQ's response. Once comments are received and evaluated, DEQ will decide whether to issue the permit as proposed, make changes to the permit, or deny the permit. DEQ will notify the permittee of its decision.

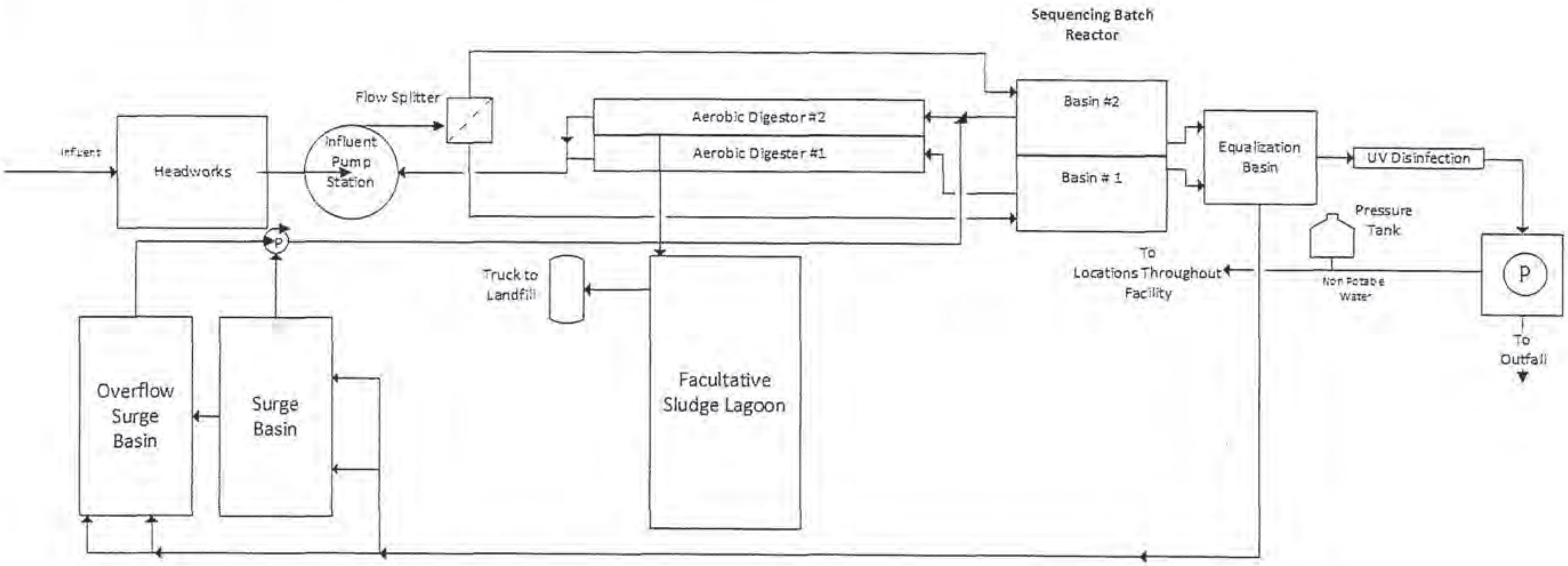
## 8.3 Modifications to Permit Evaluation Report

Depending on the nature of the comments and any changes made to the permit as result of comments, DEQ may modify this permit evaluation report. DEQ may also choose to update the permit evaluation report through memorandum or addendum. If substantive changes are made to the permit, then an additional round of public comment may occur.

## 8.4 Issuance

DEQ will issue the permit upon signature of the Director's authorized designee. Once the permit is issued, DEQ mails the issued permit to the permittee. The permit is effective 20 days from the DEQ signature date.

# APPENDIX A: WASTEWATER TREATMENT DIAGRAM



# APPENDIX B1: REASONABLE POTENTIAL ANALYSIS - pH

| Facility Name: Siletz STP | RPA for pH | |
|---|---|---|
| INPUT | **Lower pH Criteria** | **Upper pH Criteria** |
| 1. DILUTION FACTOR AT MZ BOUNDARY - (Qe+Qr)/Qe | 60 | 60 |
| 2. UPSTREAM/BACKGROUND CHARACTERISTICS @ Critical Flow | | |
| Temperature (deg C): | 20.0 | 20.0 |
| pH: | 7.2 | 7.8 |
| Alkalinity (mg CaCO3/L): | 11.0 | 11.0 |
| 3. EFFLUENT CHARACTERISTICS | | |
| Temperature (deg C): | 19.9 | 19.9 |
| pH: | 6.0 | 9.0 |
| Alkalinity (mg CaCO3/L): | 8.1 | 8.1 |
| 4. APPLICABLE PH CRITERIA | 6.5 | 8.5 |
| OUTPUT | | |
| 1. IONIZATION CONSTANTS | | |
| Upstream/Background pKa: | 6.38 | 6.38 |
| Effluent pKa: | 6.38 | 6.38 |
| 2. IONIZATION FRACTIONS | | |
| Upstream/Background Ionization Fraction: | 0.87 | 0.96 |
| Effluent Ionization Fraction: | 0.29 | 1.00 |
| 3. TOTAL INORGANIC CARBON | | |
| Upstream/Background Total Inorganic Carbon (mg CaCO3/L): | 12.67 | 11.42 |
| Effluent Total Inorganic Carbon (mg CaCO3/L): | 27.65 | 8.12 |
| 4. CONDITIONS AT MIXING ZONE BOUNDARY | | |
| Temperature (deg C): | 20.00 | 20.00 |
| Alkalinity (mg CaCO3/L): | 10.95 | 10.95 |
| Total Inorganic Carbon (mg CaCO3/L): | 12.92 | 11.37 |
| pKa: | 6.38 | 6.38 |
| **pH at Mixing Zone Boundary:** | **7.127** | **7.805** |
| **Is there Reasonable Potential?** | **No** | **No** |

# APPENDIX B2: REASONABLE POTENTIAL ANALYSIS – AMMONIA

## Ammonia RPA Calculation (2013 Criteria) Revision 1.3

**RPA Run Information**

| | |
|---|---|
| Facility Name: | Siletz STP |
| DEQ File Number: | 81276 |
| Permit Writer Name: | D. Feldman |
| Outfall Number: | 001 |
| Date of RPA Run: | 10/17/2017 |
| RPA Run Notes: New run with updated mixing zone values from Schnurbusch 2017 memo | |

| KEY: | | |
|---|---|---|
| * Enter data here | -- | Intermediate calc.s |
| | --- | Calculated results |

**Please complete the following General Facility Information**

| | | |
|---|---|---|
| 1. Enter Facility Design Flow (MGD) | | 0.157 |
| 2. Do I have dilution values from a mixing zone study? (Yes/No) | | Yes |
| 3. If answered "No" to *Question 2*, then fill in the following table | | |
| Stream Flow: 7Q10 | CFS | na |
| Stream Flow: 30Q5 | CFS | na |
| Stream Flow: 1Q10 | CFS | na |
| % dilution at ZID | % | 10% |
| % dilution at MZ | % | 25% |
| Calculated Dilution Fact. | | |
| Dilution @ ZID | | #VALUE! |
| Dilution @ MZ (7Q10) | | #VALUE! |
| Dilution @ MZ (30Q5) | | #VALUE! |

| | | |
|---|---|---|
| 4. If answered "Yes" to *Question 2*, then fill in dilution factors from mixing zone study | | |
| Dilution @ ZID (from study) | | 5 |
| Dilution @ MZ 7Q10 (from study) | | 60 |
| Dilution @ MZ 30Q5 (from study) | | 139 |
| 5. Is the receiving waterbody fresh or salt water? (Fresh/Salt) | | Fresh |
| 6. If answered "Salt" to Question 4, then enter salinity (ppt) | | |
| Ambient Salinity | ppt | na |
| Effluent Salinity | ppt | na |
| 7. Are Salmonid present? (Yes/No) (Mussels presumed present) | | Yes |
| 8. Please enter statistical *Confidence* and *Probability* values (note: defaults already entered) | | |
| Confidence Level | %'ile | 99% |
| Probability Basis | %'ile | 95% |

### Dilution Calculations

**Inputs**

| | ZID | MZ (7Q10) | MZ (30Q5) |
|---|---|---|---|
| Dilution Factors | 5.0 | 60.0 | 139.0 |

**Upstream Characterization**

| | | | |
|---|---|---|---|
| Temperature | deg. C | 20 | |
| pH | | 7.8 | |
| Alkalinity | mg/L $CaCO_3$ | 11 | 10% |

**Effluent Characterization**

| | | | |
|---|---|---|---|
| Temperature | deg. C | 19.9 | |
| pH | | 7 | |
| Alkalinity | mg/L $CaCO_3$ | 8.1 | 90% |

*Calculation of pH of a mixture of two flows based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water,

** Selection of alkalinity %ile is based on pH of effluent vs ambient.

**Outputs**

| | | ZID | MZ (7Q10) | MZ (30Q5) |
|---|---|---|---|---|
| **Upstream** | | | | |
| pKa | | 6.4 | 6.4 | 6.4 |
| Ionization Fraction | | 1.0 | 1.0 | 1.0 |
| Total Inorganic Carbo | mg/L $CaCO_3$ | 11.4 | 11.4 | 11.4 |
| **Effluent** | | | | |
| pKa | | 6.4 | 6.4 | 6.4 |
| Ionization Fraction | | 0.8 | 0.8 | 0.8 |
| Total Inorganic Carbo | mg/L $CaCO_3$ | 10.1 | 10.1 | 10.1 |
| **Mixing Zone** | | | | |
| Temperature | deg. C | 20.0 | 20.0 | 20.0 |
| Alkalinity | mg/L $CaCO_3$ | 10.4 | 11.0 | 11.0 |
| Total Inorganic Carbo | mg/L $CaCO_3$ | 11.1 | 11.4 | 11.4 |
| pKa | | 6.4 | 6.4 | 6.4 |
| pH | | 7.5 | 7.8 | 7.8 |
| Salinity | ppt | -- | -- | |

### Reasonable Potential Analysis

| Pollutant Parameter | Identify Pollutants of Concern | | | | | Determine In-Stream Conc. | | | | WQ CRITERIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | # of Samples | Highest Effluent Conc. | Coefficent of Variation | Est. Maximum Effluent Conc. | RP at end of pipe? | Ambient Conc. | Max Total Conc. at ZID | Max Total Conc. at RMZ (7Q10) | Max Total Conc. at RMZ (30Q5) | Acute CMC | Chronic Calc. (4-day avg.) | Chronic Calc. (7Q10) | Chronic Calc. (30 day avg.) |
| | | mg/l | Default=0.6 | mg/l | (Yes/No) | mg/l | mg/l | mg/l | mg/l | mg/l | mg/L | mg/l | mg/l |
| Ammonia (Freshwater Salmonids) | 280 | 29 | 3 | 29.0 | Yes | 0.03 | 5.82 | 0.51 | 0.24 | 8.73 | 2.58 | | 1.0 |
| Ammonia (Freshwater, Salmonids absent) | na | na | na | -- | -- | na | -- | -- | -- | -- | -- | | -- |
| Ammonia (Salt Water) | na | na | na | -- | -- | na | -- | -- | | -- | | -- | |

| Pollutant Parameter | Det. Reasonable Potential: Is there Reasonable Potential to Exceed? (Yes/No) | | | |
|---|---|---|---|---|
| | Acute | Chronic (4 day avg.) | Chronic (7Q10) | Chronic (30 day avg.) |
| Ammonia (Freshwater Salmonids) | NO | NO | | NO |
| Ammonia (Freshwater, Salmonids absent) | -- | -- | | -- |
| Ammonia (Salt Water) | | | -- | |

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# APPENDIX B3: REASONABLE POTENTIAL ANALYSIS – SALMON AND STEELHEAD SPAWNING

– OAR 340-041-0028(4)(a)

**Facility Name:** Siletz STP **Date:** 10/17/2017

Enter data into white cells below:

| | | |
|---|---|---|
| Mixing Zone Dilution = | 60 | |
| 7Q10 = | 60 | cfs |
| Effluent Flow = | 0.09 | mgd |
| Applicable Temperature Criterion | 13 | °C |
| Effluent Temperature | 21.6 | °C |
| Allowable increase = | 0.3 | °C |
| Dilution at 25% Stream Flow = | 109 | 108.735 |

| | | | |
|---|---|---|---|
| **ΔT at edge of MZ=** | **0.14** | °C | **No Reasonable Potential** |
| **ΔT at 25% Stream Flow=** | **0.08** | °C | |

Equation used to calculate ΔT at edge of MZ

$$\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a$$

Equation used to calculate thermal load limit

$$TLL = 3.78541 Q_e S \Delta T_{all} C_p \rho$$

Where:

Qe = Effluent Flow in mgd

S = Dilution

$\Delta T_{all}$ = Allowable temperature increase at edge of MZ (°C)

Cp = Specific Heat of Water (1 cal/g °C)

ρ = Density of Water (1 g/cm³)

3785.41 = Flow conversion from mgd to m³/day

# APPENDIX B4: REASONABLE POTENTIAL ANALYSIS – CORE COLD WATER HABITAT

– OAR 340-041-0028(4)(b)

**Facility Name:** Siletz STP **Date:** 10/17/2017

Enter data into white cells below:

| | | |
|---|---|---|
| Mixing Zone Dilution = | 60 | |
| 7Q10 = | 60 | cfs |
| Effluent Flow = | 0.09 | mgd |
| Applicable Temperature Criterion | 16 | °C |
| Effluent Temperature | 21.8 | °C |
| Allowable increase = | 0.3 | °C |

Dilution at 25% Stream Flow = **109** 108.735

| | | | |
|---|---|---|---|
| **ΔT at edge of MZ=** | **0.10** | **°C** | **No Reasonable Potential** |
| **ΔT at 25% Stream Flow=** | **0.05** | **°C** | |

Equation used to calculate ΔT at edge of MZ

$$\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a$$

Equation used to calculate thermal load limit

$$TLL = 3.78541 Q_e S \Delta T_{all} C_p \rho$$

Where:

Qe = Effluent Flow in mgd

S = Dilution

$\Delta T_{all}$ = Allowable temperature increase at edge of MZ (°C)

Cp = Specific Heat of Water (1 cal/g °C)

ρ = Density of Water (1 g/cm³)

3785.41 = Flow conversion from mgd to m³/day

# APPENDIX B5: REASONABLE POTENTIAL ANALYSIS – THERMAL PLUME OAR 340-041-0053(2)(D)

**Facility Name** Siletz STP **Date:** 10/17/2017

Enter data into white cells below:

| | | |
|---|---|---|
| 7Q10 = | **60** | cfs |
| Ambient Temperature or Criterion = | **13** | °C |
| Effluent Flow = | **0.09** | mgd |
| Max Effluent Temperature = | **26.6** | °C |
| 7 day Max Effluent Temperature = | **21.8** | °C |

| | | |
|---|---|---|
| 5% of 7Q10 = | **3.0** | cfs |
| 5% dilution = | **23** | |
| 25% of 7Q10 = | **15.0** | cfs |
| 25% dilution = | **109** | dilution = (Qe+Qr)/Qe |

| | | | |
|---|---|---|---|
| **Temperature at 5% cross section =** | **13.60** | **°C** | **No Reasonable Potential** |

| | | | |
|---|---|---|---|
| **Temperature at 25% cross section =** | **13.08** | **°C** | **No Reasonable Potential** |
| **ΔT at 25% Stream Flow=** | **0.08** | **°C** | |

Equation used to calculate ΔT at edge of MZ

$$\boxed{\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a}$$

Equation used to calculate thermal load limit

$$\boxed{TLL = 3.78541 Q_e S \Delta T_{all} C_p \rho}$$

Where:

Qe = Effluent Flow in mgd
S = Dilution
$\Delta T_{all}$ = Allowable temperature increase at edge of MZ (°C)
Cp = Specific Heat of Water (1 cal/g °C)
ρ = Density of Water (1 g/cm$^3$)
3785.41 = Flow conversion from mgd to m$^3$/day

# APPENDIX B6: REASONABLE POTENTIAL ANALYSIS – HUMAN USE ALLOWANCE

**Human Use Allowance - Stream Exceeds Water Quality Criterion (OAR 340-041-0028(12)(b)(A))**
**Analysis at Edge of Mixing Zone and 25% Stream Flow**
**Section 5.3 of the Temperature IMD**

**Facility Name:** Siletz STP  **Date:** 9/20/2017

Enter data into white cells below:

| | | |
|---|---|---|
| Mixing Zone Dilution = | 22 | |
| 7Q10 = | 60 | cfs |
| Effluent Flow = | 0.09 | mgd |
| Applicable Temperature Criterion | 16 | °C |
| Effluent Temperature | 21.6 | °C |
| Allowable increase = | 0.3 | °C |

Dilution at 25% Stream Flow = 109  108.735

| | | | |
|---|---|---|---|
| **ΔT at edge of MZ=** | **0.25** | °C | **No Reasonable Potential** |
| **ΔT at 25% Stream Flow=** | **0.05** | °C | |

| | | |
|---|---|---|
| **Thermal Load Limit =** | **N/A** | **Million Kcals** |

Equation used to calculate ΔT at edge of MZ

$$\boxed{\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a}$$

Equation used to calculate thermal load limit

$$\boxed{TLL = 3.78541 Q_e S \Delta T_{all} C_p \rho}$$

Where:

$Q_e$ = Effluent Flow in mgd
S = Dilution
$\Delta T_{all}$ = Allowable temperature increase at edge of MZ (°C)
Cp = Specific Heat of Water (1 cal/g °C)
$\rho$ = Density of Water (1 g/cm$^3$)
3785.41 = Flow conversion from mgd to m$^3$/day

# APPENDIX B7: REASONABLE POTENTIAL ANALYSIS – DISSOLVED OXYGEN

**Streeter-Phelps Dissolved Oxygen Model**

| Effluent | | |
|---|---|---|
| Temp (C) | 18.24 | 18.24 |
| DO(mg/L) | 6.5 | 6.5 |
| $CBOD_5$(mg/L) | 3.69 | 3.69 |
| $NH_3$-N(mg/L) | 1.32 | 1.32 |
| TKN (mg/L) | 2 | 2 |
| $Q_e$ (mgd) | 0.16 | 0.16 |
| $K_1$(@20 C) | 0.07 | 0.0653 |
| **River** | | |
| Temp (C) | 12.7 | 12.7 |
| DO | 11.14 | 11.14 |
| CBOD5 | 6 | 6 |
| NH3 | 0.02 | 0.02 |
| TKN | 0.442 | 0.442 |
| Qr (cfs) | 53 | 53 |
| $K_d$ | 0.07 | 0.050 |
| $K_{oa}$ | 0.701 | 0.400 |
| $K_{ai}$ | 0.700 | 0.399 |
| $K_{in}$ | 0.702 | 0.400 |
| $K_e$ | 0 | |
| $K_r$ | 0.050 | |
| Depth(ft) | 20 | 20 |
| Width (ft) | 150 | 150 |
| U (fps) | 0.02 | |
| U (mpd) | 0.29 | |
| $K_a$ (see comment) | na | na |
| $K_a$ (see comment) | 0.019 | 0.016 |
| $S_B$ g O2/m2 day | 2 | 1.263 |
| **Temperature coefficients** | | |
| Theta CBOD | 1.047 | |
| Theta O2 | 1.024 | |
| Theta SOD | 1.065 | |
| Theta NBOD | 1.08 | |

| Note: |
|---|
| black = entered values |
| blue = calculated values |

| | |
|---|---|
| RM counter | 0.5 |

| Calculations | | |
|---|---|---|
| Tmix | 12.7 | 285.9 |
| UBODe (mg/L) | 12.5 | |
| UBODr (mg/L) | 20.318 | |
| $UBOD_m$ ($L_o$) | 20.28 | |
| $NH3_m$ | 0.03 | |
| $Norg_m$ | 0.42 | |
| $DO_{sat}$ mix | 10.58 | |
| DO mix | 11.12 | |
| Do | -0.54 | |

| Rearation equations | |
|---|---|
| O'Connor Dobbins | 0.019 |
| Churchill (1962) | 0.002 |
| Owens (1964) | 0.006 |

| DO 100% sat | |
|---|---|
| mg/L | |
| 10.58 | /;. |
| 0 | Salinity |
| 50 | Elevation |

| RM | Time | Deficit | Deficit | River Only | River+Source | Source-Ambient | Remaining | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (mi) | (days) | CBOD | NBOD | DO | DO | DO Deficit | CBOD | Organic N | NH3-N | Nitrite | Nitrate |
| 0.00 | 0.00 | -0.54 | 0.00 | 11.14 | 11.12 | 0.02 | 20.28 | 0.423 | 0.03 | 0.00 | 0.00 |
| 0.50 | 1.72 | 1.48 | 0.49 | 8.65 | 8.61 | 0.04 | 18.61 | 0.213 | 0.16 | 0.06 | 0.02 |
| 1.00 | 3.44 | 3.31 | 1.26 | 6.06 | 6.01 | 0.05 | 17.07 | 0.107 | 0.15 | 0.11 | 0.08 |
| 1.50 | 5.17 | 4.96 | 1.94 | 3.74 | 3.69 | 0.05 | 15.66 | 0.054 | 0.11 | 0.12 | 0.16 |
| 2.00 | 6.89 | 6.45 | 2.42 | 1.76 | 1.71 | 0.06 | 14.37 | 0.027 | 0.08 | 0.11 | 0.24 |
| 2.50 | 8.61 | 7.79 | 2.74 | 0.11 | 0.05 | 0.05 | 13.18 | 0.014 | - 0.05 | 0.08 | 0.30 |
| 3.00 | 10.33 | 9.00 | 2.91 | -1.28 | -1.33 | 0.05 | 12.09 | 0.007 | 0.03 | 0.06 | 0.35 |
| 3.50 | 12.05 | 10.09 | 2.99 | -2.45 | -2.50 | 0.05 | 11.09 | 0.003 | 0.02 | 0.04 | 0.39 |
| 4.00 | 13.77 | 11.07 | 3.00 | -3.44 | -3.49 | 0.05 | 10.18 | 0.002 | 0.01 | 0.03 | 0.41 |
| 4.50 | 15.50 | 11.95 | 2.98 | -4.30 | -4.35 | 0.05 | 9.34 | 0.001 | 0.01 | 0.02 | 0.43 |
| 5.00 | 17.22 | 12.73 | 2.93 | -5.04 | -5.08 | 0.04 | 8.57 | 0.000 | 0.00 | 0.01 | 0.44 |
| 5.50 | 18.94 | 13.43 | 2.87 | -5.68 | -5.72 | 0.04 | 7.86 | 0.000 | 0.00 | 0.01 | 0.44 |
| 6.00 | 20.66 | 14.06 | 2.81 | -6.24 | -6.28 | 0.04 | 7.21 | 0.000 | 0.00 | 0.00 | 0.44 |
| 6.50 | 22.38 | 14.61 | 2.74 | -6.72 | -6.76 | 0.04 | 6.61 | 0.000 | 0.00 | 0.00 | 0.45 |
| 7.00 | 24.10 | 15.10 | 2.66 | -7.14 | -7.18 | 0.03 | 6.07 | 0.000 | 0.00 | 0.00 | 0.45 |
| 7.50 | 25.83 | 15.53 | 2.59 | -7.51 | -7.54 | 0.03 | 5.57 | 0.000 | 0.00 | 0.00 | 0.45 |
| 8.00 | 27.55 | 15.91 | 2.52 | -7.82 | -7.85 | 0.03 | 5.11 | 0.000 | 0.00 | 0.00 | 0.45 |
| 8.50 | 29.27 | 16.24 | 2.45 | -8.08 | -8.11 | 0.03 | 4.69 | 0.000 | 0.00 | 0.00 | 0.45 |
| 9.00 | 30.99 | 16.53 | 2.39 | -8.30 | -8.33 | 0.03 | 4.30 | 0.000 | 0.00 | 0.00 | 0.45 |
| 9.50 | 32.71 | 16.77 | 2.32 | -8.49 | -8.51 | 0.03 | 3.94 | 0.000 | 0.00 | 0.00 | 0.45 |
| 10.00 | 34.43 | 16.99 | 2.26 | -8.64 | -8.66 | 0.02 | 3.62 | 0.000 | 0.00 | 0.00 | 0.45 |
| 10.50 | 36.16 | 17.17 | 2.20 | -8.76 | -8.78 | 0.02 | 3.32 | 0.000 | 0.00 | 0.00 | 0.45 |
| 11.00 | 37.88 | 17.32 | 2.14 | -8.85 | -8.87 | 0.02 | 3.05 | 0.000 | 0.00 | 0.00 | 0.45 |
| 11.50 | 39.60 | 17.44 | 2.08 | -8.92 | -8.94 | 0.02 | 2.79 | 0.000 | 0.00 | 0.00 | 0.45 |
| 12.00 | 41.32 | 17.54 | 2.02 | -8.96 | -8.98 | 0.02 | 2.56 | 0.000 | 0.00 | 0.00 | 0.45 |
| 12.50 | 43.04 | 17.62 | 1.97 | -8.98 | -9.00 | 0.02 | 2.35 | 0.000 | 0.00 | 0.00 | 0.45 |

# APPENDIX C: ANTIDEGRADATION REVIEW SHEET FOR A PROPOSED INDIVIDUAL NPDES DISCHARGE

Applicant: City of Siletz

1. What is the name of the surface water that receives the discharge? Siletz River

   Briefly describe the proposed activity: Municiple Discharge

   This review is for a: ☒Renewal ☐New

   Go to Step 2.

2. Are there any existing uses associated with the water body that are not included in the list of designated uses? Example: DEQ's Fish Use Designation Maps identify the waterbody as supporting salmonid migration; however ODFW has determined that it also supports salmonid spawning.

   ☒Yes. Identify additional use(s), the basis for conclusion, and the applicable criteria: Salmon and Steelhead Spawning September 1-June 15. Go to Step 3.

   ☐ No. Go to Step 3.

3. Was the analysis of the impact of the proposed activity performed relative to criteria applicable to the most sensitive beneficial use?

   ☒ Yes. Go to Step 4.

   ☐ No. Re-do analysis to develop permit limits using correct criteria, and modify permit as necessary. Go to Step 4.

4. Is this surface water an **Outstanding Resource Water** or **upstream** from an **Outstanding Resource Water**? Note: No waters in Oregon have been designated as Outstanding Resource Waters. OAR 340-041-0004(8)(a) contains criteria for designating such waters. Example: they are found in State or National parks.

   ☐ Yes. Go to Step 7. ☒ No. Go to Step 5.

5. Is this surface water a **High Quality Water**? A High Quality Water is one for which none of the pollutants are Water Quality Limited. To determine, go to the database at http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp and under Listing Status, select "Water Quality Limited – All (Categories 4 and 5)".

   ☐ Yes. Go to Step 10. ☒ No. Go to Step 6.

6. Is this surface water a **Water Quality Limited Water**? To determine, use the same database query as Step 5.

   ☒ Yes. Go to Step 16. ☐ No. Go to Step 4 (you must answer "yes" to either question 4, 5, or 6)

   Note: The surface water must fall into one of 3 categories: Outstanding Resource Water (Step 4), High Quality Water (Step 5), or Water Quality Limited Water (Step 6).

7. Will the proposed activity result in a permanent new or expanded source of pollutants directly to or affecting the **Outstanding Resource Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are

otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

☐ Yes, Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

☐ No. Please provide basis for conclusion: . Go to Step8.

8. Will the proposed activity result in a lowering of water quality in the **Outstanding Resource Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from antidegradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

   ☐ Yes. Provide basis for conclusion: Go to Step 9.

   ☐ No. Provide basis for conclusion: Go to Step 20.

9. If the proposed activity results in a non-permanent new or expanded source of pollutants directly to or affecting an **Outstanding Resource Water**, will the lowering of water quality in the **Outstanding Resource Water** be on a short-term basis in response to an emergency or to protect human health and welfare?

   ☐ Yes. Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 23.

   ☐ No. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 20.

10. Will the proposed activity result in a Lowering of Water Quality in the **High Quality Water**[see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from antidegradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

    ☐ Yes. Go to Step 11.

    ☐ No. Proceed with Permit Application. Applicant should provide basis for conclusion: Go to Step 23.

11. OAR 340-041-0004(6)(c) of the *High Quality Waters Policy* requires that the Department evaluate the application to determine that all water quality standards will be met and beneficial uses protected after allowing discharge to **High Quality Waters**. Will all water quality standards be met and beneficial uses protected?

    ☐ Yes. Provide basis for conclusion: Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 12.

☐ No. Provide basis for conclusion. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

12. OAR 340-041-0004(6)(a) of the High Quality Waters Policy requires that the Department evaluate the application to determine if no other reasonable alternatives exist except to discharge to High Quality Waters. At a minimum, the following list must be considered:

    - Improved operation and maintenance of existing treatment system
    - Recycling or reuse with no discharge
    - Discharge to on-site system
    - Seasonal or controlled discharges to avoid critical water quality periods
    - Discharge to sanitary sewer
    - Land application

    Were any of the alternatives feasible?

    ☐ Yes. Provide basis for conclusion (see below for information requirements): Recommend Preliminary Decision that applicant use alternative. Go to Step 10.

    ☐ No. Provide basis for conclusion (see below for information requirements): Go to Step 13.

    In a separate statement to this application, please explain the *technical feasibility* of the alternative, explain the *economic feasibility* of the alternative, and provide an *estimated cost* of NPDES permit alternative for a five-year period from start-up.

13. OAR 340-041-0004(6)(b) of the *High Quality Waters Policy* requires that the Department evaluate the application to determine if there are social and economic benefits that outweigh the environmental costs of allowing discharge to High Quality Waters. Do the social and economic benefits outweigh the environmental costs of lowering the water quality?

    ☐ Yes. Provide basis for conclusion (see below for information requirements): Go to Step 14.

    ☐ No. Provide basis for conclusion (see below for information requirements): Go to Step 23.

    The basis for conclusion should include a discussion of whether the lowering of water quality is necessary and important. "Necessary" means that the same social and economic benefits cannot be achieved with some other approach. "Important" means that the value of the social and economic benefits due to lowering water quality is greater than the environmental costs of lowering water quality.

    Benefits can be created from measures such as:

    - Creating or expanding employment (provide current/expected number of employees, type & relative amount of each type
    - Increasing median family income
    - Increasing community tax base (provide current/expected annual sales, tax info)
    - Providing necessary social services
    - Enhancing environmental attributes

Environmental Costs can include:

- Losing assimilative capacity otherwise used for other industries/development
- Impacting fishing, recreation, and tourism industries negatively
- Impacting health protection negatively
- Impacting societal value for environmental quality negatively

14. OAR 340-041-0004(6)(d) of the *High Quality Waters Policy* requires that DEQ prevent federal threatened and endangered aquatic species from being adversely affected. Will lowering the water quality likely result in adverse effects on federal threatened and endangered aquatic species?

    ☐ Yes, please provide basis for conclusion (see below for information requirements): Go to Step 23.

    ☐ No, please provide basis for conclusion (see below for information requirements): Go to Step 15.

15. Will lowering water quality in the **High Quality Water** be on a short-term basis in response to an emergency or to protect human health and welfare?

    ☐ Yes, go to Step 20.

    ☐ No, recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23

16. Will the proposed activity result in a lowering water quality in the **Water Quality Limited Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications.*]

    ☐ Yes, go to Step 17.

    ☒ No, proceed with Permit Application. Permit writer should provide basis for determination in permit evaluation report: No increase from previous permit Go to Step 23.

17. OAR 340-041-0004(9)(a)(A) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application to determine that all water quality standards will be met. Will all water quality standards be met?

    ☐ Yes, please provide basis for conclusion: Go to Step 18.

    ☐ No, please provide basis for conclusion. Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

18. OAR 340-041-0004(9)(a)(C) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application to determine that all recognized beneficial uses will be met and that threatened or endangered species will not be adversely affected. Will all beneficial uses be met and will threatened or endangered species be protected from adverse effects?

    ☐ Yes, please provide basis for conclusion: Go to Step 19.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

19. OAR 340-041-0004(9)(a)(DI(i-iv) of the *Water Quality Limited Waters Policy* requires that the Department evaluate the application for ***one of the following***:

19A. Will the discharge be associated (directly or indirectly) with the pollution parameter(s) causing the waterbody to be designated a Water Quality Limited Water?

☐ Yes, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

☐ No, please provide basis for conclusion: Go to Step 20.

19B. Have TMDLs, WLAs, LAs, and reserve capacity been established, compliance plans been established, and is there sufficient reserve capacity to assimilate the increased load under the established TMDL?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

19C. Will the proposed activity meet the requirements, as specified under OAR 340-041-0004(9)(a)(D)(iii) of the *Water Quality Limited Waters Policy*, for dissolved oxygen?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

19D. Will the activity solve an existing, immediate, and critical environmental problem?

☐ Yes, please provide basis for conclusion: Go to Step 20.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

20. Is the proposed activity consistent with local land use plans?

☐ Yes, go to Step 21.

☐ No, please provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

21. OAR 340-041-0004(9)(c)(A) requires the Department to consider alternatives to lowering water quality. At a minimum, the following list must be considered:

- Improved operation and maintenance of existing treatment system
- Recycling or reuse with no discharge
- Discharge to on-site system
- Seasonal or controlled discharges to avoid critical water quality periods
- Discharge to sanitary sewer
- Land application

Were any of the alternatives feasible?

☐ Yes, please provide basis for conclusion (see below for information requirements): Recommend Preliminary Decision that applicant use alternative. Go to Step 16.

☐ No, please provide basis for conclusion (see below for information requirements: Go to Step 22.

In a separate statement to this application, please explain the *technical feasibility* of the alternative, explain the *economic feasibility* of the alternative, and provide an *estimated cost* of NPDES permit alternative for a five-year period from start-up.

22. OAR 340-041-0004(9)(c)(B) of the *Water Quality Limited Waters Policy* requires the Department to consider the economic effects of the proposed activity, which in this context consists of determining if the social and economic benefits of the activity outweigh the environmental costs of allowing a lowering of water quality. Do the social and economic benefits outweigh the environmental costs of lowering the water quality?

☐ Yes. Provide basis for conclusion: Proceed with Application Process to Interagency Coordination and Public Comment. Go to Step 23.

☐ No. Provide basis for conclusion: Recommend Preliminary Decision to deny proposed activity (subject to Interagency Coordination and Public Comment). Go to Step 23.

The basis for conclusion should include a discussion of whether the lowering of water quality is necessary and important. "Necessary" means that the same social and economic benefits cannot be achieved with some other approach. "Important" means that the value of the social and economic benefits due to lowering water quality is greater than the environmental costs of lowering water quality.

Benefits can be created from measures such as:

- Creating or expanding employment (provide current/expected number of employees, type & relative amount of each type
- Increasing median family income
- Increasing community tax base (provide current/expected annual sales, tax info)
- Providing necessary social services
- Enhancing environmental attributes

Environmental Costs can include:

- Losing assimilative capacity otherwise used for other industries/development
- Impacting fishing, recreation, and tourism industries negatively
- Impacting health protection negatively
- Impacting societal value for environmental quality negatively

23. On the basis of the Anti-degradation Review, the following is recommended:

☐ Proceed with Application to Interagency Coordination and Public Comment Phase.

☐ Deny Application; return to applicant and provide public notice

☒ ACTION APPROVED

Review prepared by ☒ DEQ, go to DEQ info ☐ Other, go to Other info

**DEQ info**

Name: David Feldman

Phone: 503-229-6850

Date Prepared: 1/19/17

# APPENDIX D: OPERATOR CLASSIFICATION WORKSHEET

Oregon Department of Environmental Quality

## Wastewater System Classification Worksheet for Operator Certification

**STEP 1: Criteria for Classifying Wastewater Treatment Systems (OAR 340-049-0025)**

NOTE : see bottom two spreadsheet tabs for Worksheet Instructions & Worksheet Information. See Classification chart at bottom of this worksheet for Classes I-IV.

| | | | |
|---|---|---|---|
| Wastewater System Common Name: | Siletz STP | | |
| Location: | 1264 James Frank Road | Region: | WR |
| County: | Lincoln | Date: | 1/23/2017 |
| Facility File #: | 81276 | Classified by: | D. Feldman |
| Design ADWF (Influent MDG): | 0.18 | WWC Class: | 2 |
| Design Population*: | 1850 | WWT Class: | 2 |
| Design BOD (Influent lbs/day): | 742 | Small WWS: | |
| | | If Small WWS, # of connections: | |
| Is this a change from a prior classification? (yes/no) | No | Total Points: | 54.5 |

1. Design Population: 1850 — or Population Equivalent: 

Based on: Flow (gallons/person/day): 97.3 — BOD (pounds/person/day): 

WWC Classification (based on population size)

| | |
|---|---|
| Less than 500 | Eligible for Small WW System classification if treatment points < 30 |
| 1500 or less | WWC Class 1 |
| 1501 to 15,000 | WWC Class 2 |
| 15,001 to 50,000 | WWC Class 3 |
| over 50,000 | WWC Class 4 |

WWT Classification (based on total points)

| | | | |
|---|---|---|---|
| Less than 750 | | 0.5 | |
| 751 to 2,000 | | 1.0 | 1.0 |
| 2,001 to 5,000 | | 1.5 | |
| 5,001 to 10,000 | | 2.0 | |
| Greater than 10,000 | (3 + 1 for each additional 10 K) | 3.0 | |
| **2. Average Dry Weather Flow (Design Capacity)** | | | |
| Less than 0.075 MGD | | 0.5 | |
| Greater than 0.075 MGD to 0.1 MGD | | 1.0 | |
| Greater than 0.1 to 0.5 MGD | | 1.5 | 1.5 |
| Greater than 0.5 to 1.0 MGD | | 2.0 | |
| Greater than 1.0 MGD | (3 + 1 for each additional 1.0 MGD) | 3.0 | |
| **3. Unit Processes** | | | |
| *Preliminary Treatment and Plant Hydraulics* | | | |
| Comminution (cutter, shredder, grinder, barminutor, etc.) | | 1.0 | |
| Grit Removal (gravity) | | 1.0 | |
| Grit Removal (mechanical) | | 2.0 | |
| Screen(s) (in-situ or mechanical, coarse solids only) | | 1.0 | 1.0 |
| Pump/Lift Station(s) (pumping of main flow) | | 2.0 | |
| Flow Equalization (any type) | | 1.0 | 1.0 |
| *Primary Treatment* | | | |
| Community Septic Tank(s) (STEP, STEG, etc.) | | 2.0 | |
| Clarifier(s) | | 5.0 | |
| Flotation Clarifier(s) | | 7.0 | |
| Chemical Addition System | | 2.0 | |
| Imhoff Tanks (large septic tank or similar sedimentation & digestion) | | 3.0 | |
| *Secondary, Advanced, and Tertiary Treatment* | | | |
| Low Rate Trickling Filter(s) (no recirculation) | | 7.0 | |

| | | |
|---|---|---|
| High Rate Trickling Filter(s) (recirculating) | 10.0 | |
| Trickling Filter - Solids Contact System | 12.0 | |
| Activated Sludge (includes SBR & basic MBR process) | 15.0 | 15.0 |
| Pure Oxygen Activated Sludge | 20.0 | |
| Activated Bio Filter Tower (less than 0.1 MGD) | 6.0 | |
| Activated Bio Filter Tower (greater than 0.1 MGD) | 12.0 | |
| Rotating Biological Contactors (1 to 4 shafts) | 7.0 | |
| Rotating Biological Contactors (5 or more shafts) | 12.0 | |
| Stabilization Lagoons (1 to 3 cells without aeration) | 5.0 | |
| Stabilization Lagoons (1 or more cells with primary aeration) | 7.0 | |
| Stabilization Lagoons (2 or more cells with full aeration) | 9.0 | |
| Recirculating Gravel Filter (or recirculating textile filters) | 7.0 | |
| Chemical Precipitation Unit(s) | 3.0 | |
| Gravity Filtration Unit(s) | 2.0 | |
| Pressure Filtration Unit(s) | 4.0 | |
| Nitrogen Removal (Biological (BNR) or Chemical/Biological System) | 4.0 | |
| Nitrogen Removal (Design Extended Aeration Only - Nitrification) | 2.0 | 2.0 |
| Phosphorous Removal Unit(s) | 4.0 | 4.0 |
| Effluent Microscreen(s) | 2.0 | |
| Chemical Flocculation Unit(s) | 3.0 | |
| Ultra Filtration Membrane(s) | 15.0 | |
| Chemical Addition System *Description:* | 2.0 | |
| *Solids Handling (excludes long-term storage in treatment lagoons above)* | | |
| Anaerobic Primary Sludge Digester(s) w/o Mixing and Heating | 5.0 | |
| Anaerobic Primary Sludge Digester(s) with Mixing and Heating | 7.0 | |
| Anaerobic Primary and Secondary Sludge Digesters | 10.0 | |
| Sludge Digester Gas Reuse | 3.0 | |
| Aerobic Sludge Digester(s) | 8.0 | 8.0 |
| Sludge Storage Lagoon(s) (List Basin(s) or Tank(s) in Step 2) | 2.0 | 2.0 |
| Sludge Lagoon(s) with Aeration | 3.0 | 3.0 |
| Sludge Drying Bed(s) | 1.0 | |
| Sludge Air or Gravity Thickening | 3.0 | |
| Sludge Composting (in Vessel) | 12.0 | |
| Sludge Belt(s) or Vacuum Press/Dewatering | 5.0 | |
| Sludge Centrifuge(s) | 5.0 | |
| Sludge Incineration | 12.0 | |
| Sludge Chemical Addition Unit(s) (alum, polymer, alkaline stab, etc.) | 2.0 | |
| Non-Beneficial Sludge Disposal (landfill or burial) | 1.0 | |
| Beneficial Sludge Utilization (see also Step 2) | 3.0 | |
| Solids Reduction Processing | 4.0 | |
| *Disinfection* | | |
| Liquid Chlorine Disinfection | 2.0 | |
| Gas Chlorine Disinfection | 5.0 | |
| Dechlorination System | 4.0 | |
| Other Disinfection System including Ultraviolet and Ozonation | 5.0 | 5.0 |
| On-Site Chlorine Generation of Disinfectants | 5.0 | |
| 4. Effluent Permit Requirements | | |
| Minimum of Secondary Effluent Limitation for BOD and/or TSS | 2.0 | |
| Minimum of 20 mg/L BOD and/or Total Suspended Solids | 3.0 | 3.0 |
| Minimum of 10 mg/L and/or Total Suspended Solids | 4.0 | |
| Minimum of 5 mg/L BOD and/or Total Suspended Solids | 5.0 | |
| Effluent Limitations for Effluent Oxygen | 1.0 | |
| Other Limits (see Step 2) | | |
| 5. Variation in Raw Waste | | |

*Points in this category will be awarded only when conditions are extreme to the extent that operation and handling procedure changes are needed to adequately treat waste due to variation of raw waste (strength or flow).*

| | | |
|---|---|---|
| Recurring deviations or excessive variations (100 - 200 %) | 2.0 | |
| Recurring deviations or excessive variations of more than 200 %, or conveyance and treatment of industrial wastes covered by the pretreatment program. | 4.0 | |
| Septage or truck-hauled waste | 2.0 | 2.0 |
| 6. Sampling and Laboratory Testing | | |
| Sample for BOD, Total Suspended Solids (performed by outside lab) | 2.0 | 2.0 |
| BOD or Total Suspended Solids analysis (performed at treatment plant) | 4.0 | 4.0 |
| Bacteriological analysis (performed by outside lab) | 1.0 | |
| Bacteriological analysis (performed at wastewater treatment plant lab) | 2.0 | |
| Nutrient, Heavy Metals, or Organic analysis (performed by outside lab, ≤ 1 per month = 1 pt ) | *3.0 | |
| Nutrient, Heavy Metals or Organic analysis (performed at WWTP) | 5.0 | |
| | Points based on 340-049-0025: | 54.5 |
| | Classification based on 340-049-0025 | Class 2 |

**STEP 2: Complexity Reflected in OAR 340-049 0020(4)**

*Note: Include additional points from Step 2 only if the complexity of the wastewater treatement system is not reflected in the points from Step 1. Be sure to justify any additional points from Step 2 in the permit Fact Sheet. Points shown below are given as guidance.*

| | | |
|---|---|---|
| Fine Screen Preliminary Treatment (includes washing & compaction) | 2.0 | |
| SCADA or similar instrumentation providing data/w process op. | 2.0 - 4.0 | |
| Post-aeration (includes mechanical and diffused aeration - not cascade) | 1.0 | |
| Class A recycled water (storage, distribution & monitoring) | 6.0 | |
| Class B, C, D and Non-disinfected Recycle (surface & subsurface) | 3.0 | |
| Sludge dewatering using bag or tube system | 1.0 | |
| Solids Composting (ASP or windrow) | 6.0 | |
| Land application of biosolids by system operator | 5.0 | |
| Odor or corrosion control (separate or combined) | 2.0 | |
| Chemical/physical advanced waste treatment | 10 - 15.0 | |
| Reverse Osmosis, Electro-dialysis, Membrane Filtration | 15.0 | |
| Standby power | 1.0 - 3.0 | |
| Digester Gas Recovery Systems | 1.0 - 3.0 | |
| Other Effluent Limitations (describe below) | 1.0 | |
| Description: | | |
| | Total | 54.5 |
| | Classification based on 340-049-0025 | Class 2 |

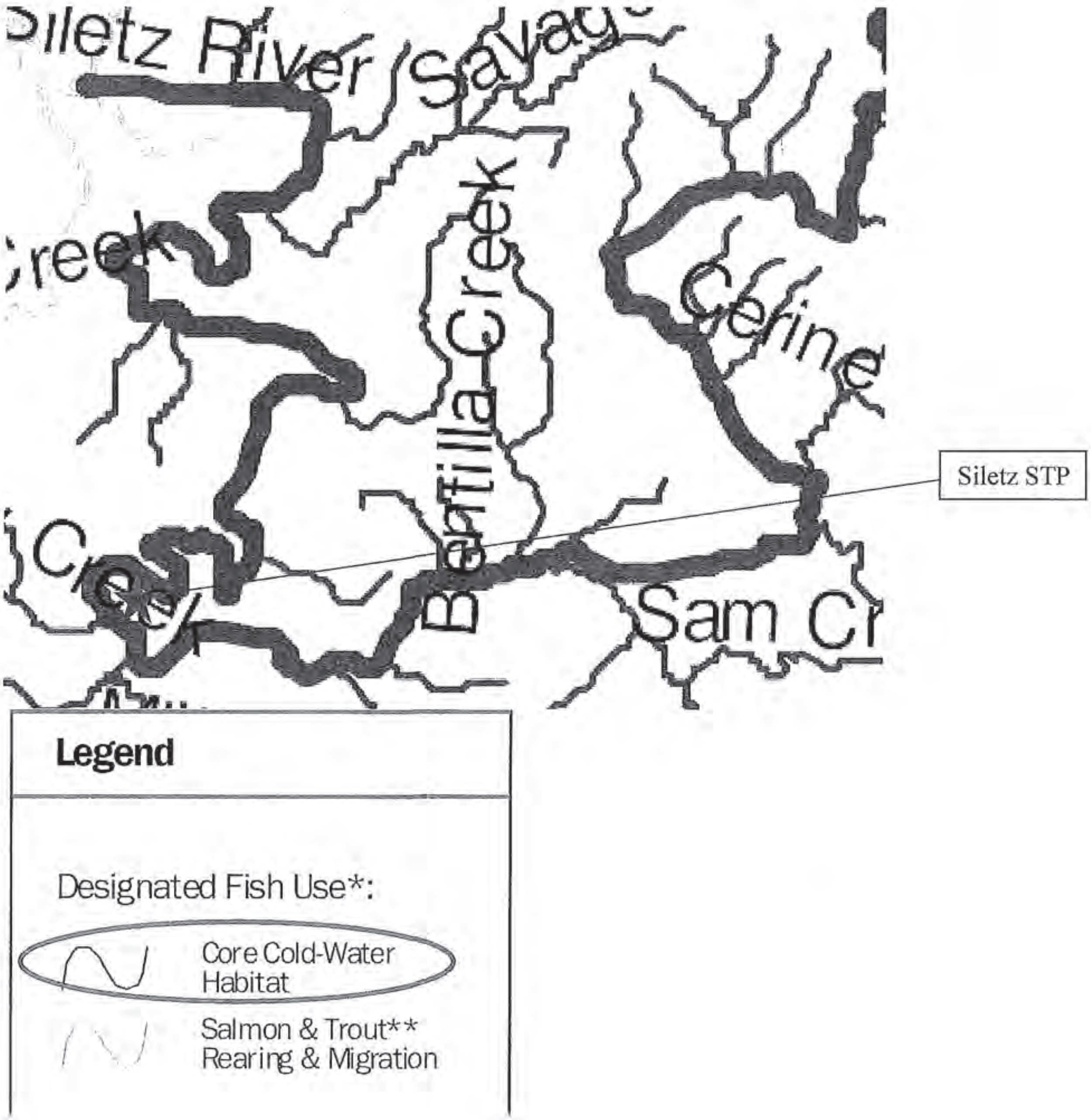
> If you receive warning/error, near the top of Excel select the "options" for security warning, and "enable this content," "OK," then submit.

> *After its submitted, check your sent email in Outlook to confirm it was automatically sent.*

| Small Wastewater Treatment and Collection Systems | | | |
|---|---|---|---|
| less than 500 design population or < 150 connections, and 30 total points or less | | | |
| Wastewater Treatment Systems | | Wastewater Collection Systems | |
| Class I: | 30 total points or less | Class I: | 1,500 or less design population |
| Class II: | 31-55 total points | Class II: | 1,501 15,000 design population |
| Class III: | 56-75 total points | Class III: | 15,001 to 50,000 design population |
| Class IV: | 76 or more points | Class IV: | 50,001 or more design population |

# APPENDIX E1: DESIGNATED FISH USE MAPS - HABITAT

**OAR 340-041-0220 – Figure 220A**



# APPENDIX E2: DESIGNATED FISH USE MAPS – SPAWNING

**OAR 340-041-0220 – Figure 220B**