CITY OF COOS BAY

FACILITIES PLAN FOR

WASTEWATER TREATMENT PLANT NO. 1

February 2011

WEST YOST ASSOCIATES

Consulting Engineers

Oregon
John A. Kitzhaber, M.D., Governor

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January 20, 2011

Jim Hossley, Director
Public Works and Development Department
500 Central Ave.
Coos Bay, OR 97420

Dear Mr. Hossley:

The Department of Environmental Quality (DEQ) received the revised Executive Summary, Chapter 2 and Chapter 5 of the Coos Bay Wastewater System Facilities Plan prepared by West Yost & Associates in our Eugene office on November 10, 2010. These chapters were earlier reviewed by DEQ in February, 2007, but required revision. We provide comments on these revised chapters below; minor editorial comments are included in these comments.

Chapter 1-Executive Summary

1. Page ES2: The projected population of Bunker Hill is stated for the year 2027; this is also stated in Table 2-2. The projected population of the Coos Bay service area for WWTP #1 in the year 2027 is stated in Table 2-2. Why is the projected population for the Coos Bay service area not stated in the narrative in the Executive Summary, as is the projected population of Bunker Hill?
2. ES-1: Planning period used, 2007-2027, should be replaced by the true current period of use, 2010-2030. In fact, if start-up is not expected until 2013, the planning period should be 2013-2033. Population figures should be provided that reflect the expected population for this period.
3. ES-1: Remove the extraneous "for" in the 3rd sentence of the 2nd paragraph under **Service Area Characteristics.**
4. ES-1: The population estimate for the fraction of the City of Coos Bay served by WWTP #1 is rather old, especially since there was a national census completed in 2010. Is there a more recent population update for the City of Coos Bay that can be used to estimate the fraction of the City served by WWTP #1?

Chapter 2-Study Area Characteristics

1. Please provide documentation from DLCD that the revised growth rates are approved.

Chapter 5-Wastewater Characteristics

1. Why don't the values for the MMWWF and MMDWF in Table 5-2 and Figure 5-1 match?
2. Table 5-6, the 9th row should be "Annual".
3. The flow projections did not adequately address our 2/16/2007 comment, Chapter 5 comment 7. It does not make sense that the 2005 ADWF is the same as the 2027 ADWF (Table 5-9). (Chapter 5, comment 7 from 2/16/2007 concerned Page 5-10, Flow Projections: Please provide additional details on how the flow projections were made. For instance, it is unclear how the growth factors were applied.)
4. Page 5-6: Figure 5-2. Please provide a correlation coefficient (r^2) in Figure for goodness-of-fit for rainfall and plant flow data.
5. Page 5-3, 2nd sentence of 2nd paragraph under **Flow Analysis**. Although May is considered a "dry" month when computing flows, significant rain falls during the month, which contributes to RDII. Consequently, we would prefer to see the sentence read, "Since little rainfall occurs during these months (with the exception of May), rain dependent..."
6. Page 5-4, 1st paragraph. You stated in the previous paragraph, on page 5-3, that May RDII is not significant, due to May being considered a "dry-weather" month for computational purposes. However, in this paragraph, you write that groundwater levels are high in May and plant influent flow is greater in May than average October influent flow, although October rainfall is typically greater than May rainfall. This seems to be inconsistent with your earlier statement discounting May as being a month in which significant RDII may occur. Please reconcile these statements.

Additional CWSRF Requirements

As we stated in our review letter dated February 16, 2007, a s ewer use ordinance (SUO) prohibiting any new connections from inflow sources should be adopted. The ordinance should also prohibit that all discharges into the treatment works not contain toxics or pollutants in amounts or concentrations with the potential of endangering public safety and adversely affecting the treatment works or precluding the selection of the most cost-effective alternative for wastewater treatment and sludge disposal *(OAR 340-54-035 (2)(a))*.

A Department-approved user charge system (UCS) should be in place (*OAR 340-54-035 (2)(b)*) designed to produce adequate revenues to provide for operations, maintenance, debt service and reserves for system replacement costs. The UCS should be based in actual or estimated use and each user must pay its proportionate share of the cost. The UCS must provide that each user be notified annually, in conjunction with a regular bill, of the rate and that portion of the user charge that is attributable to wastewater treatment services.

A land use compatibility statement signed by the county land use planning official is also required under CWSRF rules *(OAR 340-54-035 (1)(b))*. In addition, a non-residential user survey identifying significant industrial discharges must be conducted and submitted to the Department *(OAR 340-045-0063)*. Construction projects using CWSRF funding must submit plans and specifications when available and a value engineering study (VE) if the project cost is over $10 million. The VE is completed during the design process.

Finally, once the Department's comments have been addressed, please submit two final copies of the Study in a standard [10x11½ in.] three ring binder. The spine of the binder should contain the following information: (1) name of the city; (2) title of the document; and (3) date [month and year].

Please call me at (541)687-7359 should you have any questions or comments.

Sincerely,

Robert Haberman
SRF Project Officer

cc: Walt Meyer—West Yost & Associates
Dave Belyea, Francis Dzata, Jon Gasik, Steve Nichols--DEQ

WEST YOST
ASSOCIATES
Consulting Engineers

February 11, 2011

Mr. Bob Haberman
SRF Project Officer
Oregon Department of Environmental Quality
1102 Lincoln Street, Suite 210
Eugene OR 97401

Project No.: 529-03-02

SUBJECT: Final Questions from Coos Bay WWTP #1 Facility Plan

Dear Mr. Haberman:

The Final Facilities Plan for Coos Bay WWTP (WWTP) #1 was sent to your office on February 7, 2011. Unfortunately, the letter you had sent with DEQ's comments was missing a page and therefore, our response did not address these comments which related to Chapter 5. This letter provides responses to these additional questions identified in the letter.

In the following section, your comments are in italics and our response is included directly following each comment.

CHAPTER 5 – WASTEWATER CHARACTERISTICS

1. *Why don't the values for the MMWWF and MMDWF in Table 5-2 and Figure 5-1 match?* The MMWWF shown in Figure 5-1 is correct and Table 5-2 has been revised.

2. *Table 5-6, the 9th row should be "Annual".* Change has been made.

3. *The flow projections did not adequately address our 2/16/2007 comment, Chapter 5 comment 7. It does not make sense that the 2005 ADWF is the same as the 2027 ADWF (Table 5-9). (Chapter 5, comment 7 from 2/16/2007 concerned Page 5-10, Flow Projections: Please provide additional details on how the flow projections were made. For instance, it is unclear how the growth factors were applied.)* At the growth rate of 0.1 percent, the increase is 0.03 mgd which rounds down to no change. Mathematically, the average dry weather flow increases from 1.59 mgd to 1.62 mgd and both of these values are rounded off to 1.6 mgd.

4. *Page 5-6: Figure 5-2. Please provide a correlation coefficient (r^2) in Figure for goodness-of-fit for rainfall and plant flow data.* Not surprisingly given the variability of plant data, the correlation coefficient is 0.1. Statistically this reflects a poor correlation but this is very common with this analysis for plants in Oregon. This information has been added to the text.

2020 Research Park Drive, Suite 100 Davis, California 95618 Phone 530 756 5905 Fax 530 756 5991 email mail@westyost.com

5. *Page 5-3, 2nd sentence of 2nd paragraph under* ***Flow Analysis****. Although May is considered a "dry" month when computing flows, significant rain falls during the month, which contributes to RDII. Consequently, we would prefer to see the sentence read, "Since little rainfall occurs during these months (with the exception of May), rain dependent..."* This change has been made.

6. *Page 5-4, 1st paragraph. You stated in the previous paragraph, on page 5-3, that May RDII is not significant, due to May being considered a "dry-weather" month for computational purposes. However, in this paragraph, you write that groundwater levels are high in May and plant influent flow is greater in May than average October influent flow, although October rainfall is typically greater than May rainfall. This seems to be inconsistent with your earlier statement discounting May as being a month in which significant RDII may occur. Please reconcile these statements* With the change made as recommended in the comment above, the inconsistency has been removed.

As we discussed, this addresses DEQ's comments which were inadvertently omitted from the letter that we received. Please print the new Chapter 5 from the enclosure and replace the chapter in the binders.

Sincerely yours,

Walter J. Meyer, P.E.

Cc: Jennifer Wirsing
Jim Hossley
Jon Gasik

Facilities Plan for Wastewater Treatment Plant No. 1

Prepared for

City of Coos Bay

February 2011

WEST YOST ASSOCIATES
Consulting Engineers

529-00-03-02

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EXECUTIVE SUMMARY

This facilities plan presents the results of the planning effort conducted for the City of Coos Bay's Wastewater Treatment Plant No. 1. The plan summarizes the service area and wastewater characteristics, identifies the components of the existing wastewater collection system and treatment system, evaluates the performance of the treatment system with respect to water quality and regulatory standards, and analyzes alternatives for improvements that will remedy system deficiencies and accommodate future growth. Based on this analysis, the facilities plan recommends specific projects for inclusion in the wastewater treatment system Capital Improvement Plan (CIP). These projects will ensure that Wastewater Treatment Plant No. 1 continues to provide adequate and reliable service for the community.

This wastewater management planning study has been conducted to ensure a cost-effective and environmentally responsible approach. Planning for community growth and meeting water quality requirements were both influential factors that guided the development of the recommended plan. Since the planning period for this study is 20 years, the projections and analysis were conducted through the year 2027. With the delays in review and implementation, population projections are also provided for 2033. Following is a summary of the planning work that has been completed through 2007 and subsequent recommendations.

SERVICE AREA CHARACTERISTICS

The City of Coos Bay is located on the southwestern Oregon coast, approximately 200 miles south of the Columbia River as shown on Figure 2-1. The eastern part of Coos Bay is in the Coaledo basin, which is a small area of low hills. These hills divide the City's service area into two primary basins for gravity collection, served by two treatment plants. Wastewater from the eastern area is treated at Wastewater Treatment Plant No. 1, while Wastewater Treatment Plant No. 2 treats wastewater from the western area. Together these treatment plants serve the City of Coos Bay, Charleston Sanitary District and Bunker Hill Sanitary District. Wastewater Treatment Plant No. 1 serves 3,020 acres, totaling 48 percent of the City's serviceable land area.

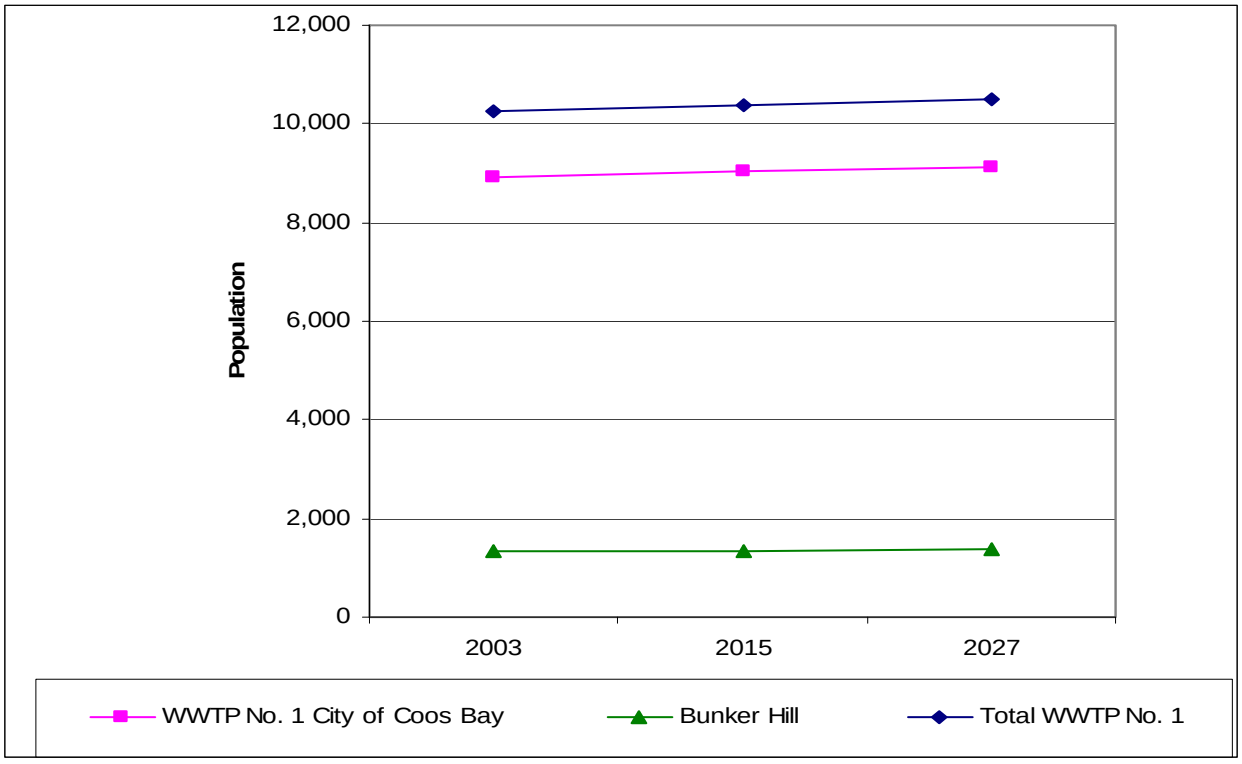
The current population and projected population growth within the service area are the key parameters in projecting future sewage flows and loads. These projections are used to assess the adequacy of existing infrastructure and develop design criteria for future treatment. Based on work by the Population Research Center at Portland State University, the 2003 certified population estimate for Coos Bay is 15,650 people. This estimate refers to the number of people living within the city limits of Coos Bay. The population served by Wastewater Treatment Plant No. 1 was estimated based on information regarding service area boundaries provided by city staff and a breakdown of the population developed for the City's Transportation System Plan (DKS Associates, 2004). The resulting year 2003 population within the Coos Bay city limits contributing to Wastewater Treatment Plant No. 1 is estimated to be 8,920.

The growth rate from 1990 to 2003 both in the city of Coos Bay and in Coos County was 0.3 percent according to Portland State University's Population Research Center. The Coos County Planning Department projects the growth rate for both the city and county to be 0.4 percent. The Transportation System Plan allows a more detailed look at expected growth patterns within the city and shows a higher rate of growth on the west side of the City in the area served by Wastewater Treatment Plant No. 2 than in the east side served by Wastewater Treatment Plant No. 1. However, based on communications with the South Coast Regional Representative, the acknowledged annual growth rate by the Department of Land Conservation and Development is 0.1 percent which is the basis for the projections included in this report.

The population of Bunker Hill was 1,462 in 2000 according to Census Data. The 2003 population was estimated to be 1,330 based on a 2007 population of 1,330. A future growth rate consistent with that used for Coos Bay gives a 2027 population of 1,362. The corresponding projection for the Coos Bay Plant No. 1 is a 2027 population of 9,138. The total population projection for the Plant No. 1 service area is 10,500 for 2027 and 10,560 for the year 2033.

Figure ES-1 illustrates the expected population growth for both the city and the Wastewater Treatment Plant No. 1 service area are very flat given the acknowledge growth rate for the area.

Figure ES-1. City of Coos Bay and Wastewater Treatment Plant No. 1 Service Area Population Projections



WASTEWATER CHARACTERISTICS

The key wastewater characteristics at a wastewater treatment plant are the flow, solids and organic loadings that are treated by the facility. Analysis of historical plant influent flow and loading data allows for a characterization of the City's system under current conditions and provides the basis for developing flow and load projections for the system in the future.

Table ES-1 summarizes current wastewater flows and Table ES-2 summarizes current loads.

Table ES-1. Current Wastewater Flows

Flow Parameter	Flow Rate, mgd
Average Dry Weather Flow (ADWF)	1.6
Average Wet Weather Flow (AWWF)	3.1
Maximum Month Dry Weather Flow (MMDWF)	3.2
Maximum Month Wet Weather Flow (MMWWF)	5.6
Peak Day Flow (PDF)	10.1
Peak Wet Weather Flow (PWWF)	16.0

Table ES-2. Current Plant Influent Loads

Parameter	BOD load, lbs/day	TSS load, lbs/day
Average	2,400	3,200
Max month	3,500	4,400
Peak day	5,400	9,400

The highest BOD and TSS recorded loads occurred in the late fall. Investigation into the rainfall data revealed that the high concentrations of BOD and TSS correspond to the first major storm event that occurs at the end of a dry season. Thus, the spikes in the BOD and TSS levels are likely due to the flushing of accumulated solids from the sewer system after the extended dry, low flow period.

Flow and load projections are based on current flow and loads and anticipated community growth. Using population growth information, future flows and loads projections are developed. Table ES-3 presents flow projections and Table ES-4 presents load projections for the year 2027. The peak flow projections take into account the effect of ongoing infiltration and inflow (I/I) reduction activities as well as lower levels of I/I from future sewer system extensions.

Table ES-3. Coos Bay WWTP No. 1 Projected Flow

Parameter	Year 2027, mgd
Average Dry Weather Flow (ADWF)	1.6
Average Wet Weather Flow (AWWF)	3.1
Maximum Month Dry Weather Flow (MMDWF)	3.3
Maximum Month Wet Weather Flow (MMWWF)	5.7
Peak Day Flow (PDF)	12
Peak Wet Weather Flow (PWWF)	20

Table ES-4. Coos Bay WWTP No. 1
Projected Plant Loads

Parameter	Year 2027	
	BOD, lbs/day	TSS, lbs/day
Annual Average	2,450	3,370
Maximum Month	3,580	4,800
Peak Day	6,540	9,700

TREATMENT REQUIREMENTS

The City of Coos Bay recognizes the importance of protecting the water quality of Coos Bay. The estuary provides recreational opportunities for tourists and local residents, serves as wildlife habitat, and is an important fishery and harbor resource.

The NPDES permit has recently been revised to reflect current water quality issues; therefore, no major changes in discharge requirements are anticipated. The projected flow for the plant is well within the current designated NPDES capacity so no restrictions related to dry weather mass loads are anticipated.

The bacteria standard for discharge into marine waters and estuarine shellfish growing waters are more stringent than other waters. The existing permit stipulates these requirements.

The Mutual Agreement Order (MAO) outlined requirements for dechlorination facilities at Treatment Plant #1. Dechlorination equipment has been installed to ensure compliance with the chlorine toxicity requirements.

DEQ conducted a reasonable potential analysis for heavy metals as part of the permit renewal process. Only silver indicated a reasonable potential for exceeding water quality criteria. Based on this finding, DEQ required additional monitoring of silver but this requirement was suspended in the permit modification based on the evaluation of the additional data.

The only pending TMDL for the Bay is for bacteria. Since the existing permit requires the plant to comply with the water quality standard at the end of pipe, the allocations from the TMDL should not be more restrictive.

LIQUID STREAM ALTERNATIVES

The liquid stream treatment facilities at Wastewater Treatment Plant No. 1 are currently able to satisfy the requirements set forth in its National Pollution Discharge Elimination System (NPDES) permit. Some process improvements are necessary in the near term to maintain regulatory compliance. In addition, long term upgrades are necessary to ensure that the facilities can handle increased flow and loads from the City's growing population.

Liquid Stream Improvement Alternatives by Treatment Process

Several of the liquid stream unit processes at Wastewater Treatment Plant No. 1 will require improvements over the next twenty years. For each process area, an evaluation was performed to determine the most appropriate approach to the improvements.

Headworks and Grit Removal. The existing mechanical screen is in poor condition. It and the manual bar rack are not sized to accommodate the design year peak flow of 20 mgd. The mechanical screen should be replaced and the manual bar screen should be replaced with a mechanical bar screen to provide a reliable 20 mgd screening capacity.

The existing aerated grit chamber has a design capacity of 10 mgd. Due to the sand content of the influent flow, grit removal should be provided for as much flow as feasible into the plant. Two alternatives for grit removal were evaluated:

> **Grit Removal Alternative G1.** Construct a second 10 mgd capacity aerated grit chamber.
>
> **Grit Removal Alternative G2.** Continue with one aerated grit chamber for 10 mgd of influent flow and treat up to 7 mgd of additional flow by degritting primary sludge. This alternative will provide grit removal for more than the maximum day flow.
>
> **Evaluation of Headworks Alternatives.** Alternative G2, continuing with one aerated grit chamber for 10 mgd flow and removing the remainder of the grit by degritting primary sludge is the least cost alternative because it does not require constructing an additional aerated grit tank. It is therefore the recommended alternative.

Treatment Facilities. New treatment facilities and upgrades to existing unit processes are required to provide reliability and comply with NPDES permit requirements as flows and loads increase. Two treatment alternatives were considered:

Alternative T1. This treatment alternative does not increase the primary sedimentation capacity. A secondary clarifier is added for redundancy and expanded secondary treatment capacity. Process flows will be treated via primary and/or secondary treatment unit processes according to the following flow scenarios:

- All flow scenarios up to 7 mgd will receive full primary and secondary treatment.
- When flow exceeds 7 mgd but is less than 13 mgd, 7 mgd will receive full primary and secondary treatment. Flow in excess of 7 mgd will bypass primary treatment and receive secondary treatment.
- When flow exceeds 13 mgd, 13 mgd receive secondary treatment and the excess flow receives primary treatment and disinfection.
- When flow reaches 20 mgd, 7 mgd will receive primary treatment only, and 13 mgd will receive secondary treatment only.

All flows will receive disinfection (chlorination) and dechlorination prior to discharge into the outfall. Table 7-2.5 includes a list of influent flow scenarios and treatment processes for Treatment Process Alternative T1.

Table 7-2.5 Treatment Process Alternative T1 – Blended Treatment

Influent Flow, mgd	Amount of flow which receives treatment process		
		Secondary Treatment	Disinfection
	Primary Clarification	Aeration Basin & Secondary Clarification	Chlorination & Dechlorination
Up to 7	ALL	ALL	ALL
7 to 13	7 mgd	ALL	ALL
	(bypass excess)		
13 to 20	7 mgd	Up to 7 mgd (bypass excess)	ALL
	6 to 13 mgd (bypass)	13 mgd	
20	7 mgd	7 mgd (bypass)	ALL
	13 mgd (bypass)	13 mgd	

Alternative T2. Full primary and secondary treatment for all flow.

Evaluation of Treatment Alternatives. Treatment alternative T1 provides secondary treatment for flows up to and above peak day flows. This alternative limits the flow through the primary sedimentation tank to its demonstrated treatment capacity and provides an additional secondary clarifier for reliability and secondary capacity. This alternative improves treatment without the addition of second primary sedimentation basin. Therefore, this is the lowest cost and preferred alternative.

Note: The EPA is currently developing guidance on peak wet weather flow diversions. The (expected) guidance will address bypassing around secondary treatment at high flow and will describe conditions under which diversion can be authorized in NPDES permits. The conditions will include demonstration that there is no feasible alternative to blending of flows within the treatment plant. We recommend that the City follow up this Facilities Plan by demonstrating that conditions allowing bypassing are met once the EPA guidance is adopted.

SOLIDS PROCESSING ALTERNATIVES

Alternative S1. This alternative includes the following:

- Thicken primary sludge in rectangular primary clarifier (existing practice).
- Thicken WAS in circular primary clarifier under all flow conditions.
- Sludge Digesters will process all thickened sludge at Plant #1 and thickened sludge from Plant #2 (until sludge handling capacity is reached).
- Once sludge handling capacity is reached or exceeded, Digester No. 1 at WWTP #2 will need to be rehabilitated and used to its capacity. A portion of WWTP #2 sludge would then be managed at Plant #2, with the balance managed at Plant #1.

Alternative S2. This alternative consists of thickening primary sludge in the existing circular primary clarifier under all flow conditions; thickening WAS with a gravity belt thickener, and on-site anaerobic digestion with thickened sludge from WWTP No. 2.

Evaluation of Alternatives. The solids processing alternatives were evaluated using both economic and non-economic factors. Removing dilute primary sludge from the rectangular sedimentation basin as recommended in Alternative S2, will significantly improve the performance of that basin. Removing dilute sludge from the primary sedimentation basin can also accommodate a lower cost grit removal alternative. Therefore, Alternative S2, considered with grit removal alternative G2 is the lower cost and preferred alternative.

RECOMMENDED PLAN

Based on an assessment of the capacity of the existing unit processes and alternatives for improvements, recommendations are made for the wastewater treatment system CIP. Estimated costs for the recommended improvements are summarized in Table 1-5. These costs are shown at year 2008 (June) cost levels and are adjusted when planning for projects that will be implemented in the future. CIP projects are organized according to the anticipated improvement period.

Table ES-5. Recommended Plan Cost Summary
(2008 Dollars at ENR CCI 8185)

Description	Cost			
	Construction	Contingency 25%	E&A 20%	Total
Phase 1 Improvement Projects				
Disinfection Improvements				See Note 1
Replace piston pump completed (Aug. 2007)	80,000	—	—	80,000
New level elements on influent flumes	22,630	5,658	4,526	32,814
Demo Cover on Digester 1	37,649	9,412	7,530	54,592
Replace floating cover on Digester 1	274,896	68,724	54,979	398,599
Improve cover on Digester 2	39,888	9,972	7,978	57,837
Construct new waste gas burner	60,031	15,008	12,006	87,045
Outfall	1,678,630	419,658	335,726	2,434,014
New handrails on digesters	51,078	12,770	10,216	74,064
Standby power	167,863	41,966	33,573	243,401
Total Phase 1 Cost				**3,462,365**
Phase 2 Improvements (2010 to 2014)				
New blower	134,290	33,573	26,858	194,721
Mixed liquor split box	123,100	30,775	24,620	178,494
New secondary clarifier	1,075,442	268,861	215,088	1,559,391
New RAS pump	134,290	33,573	26,858	194,721
New WAS pump	127,576	31,894	25,515	184,985
Chlorine Contact Basin Improvements	59,312	14,828	11,862	86,002
Site piping	90,646	22,662	18,129	131,437
Total Phase 2 Cost				**2,529,751**
Phase 3 Improvements (2018-2022)				
New boiler, heat exchangers, gas and hot water piping	381,396	95,349	76,279	553,024
Mixing heating and recirc for Digester 1	201,436	50,359	40,287	292,082
Mixing heating and recirc for Digester 2	201,436	50,539	40,287	292,082
Digester building repair	138,367	34,592	27,673	200,632
Total Phase 3 Cost				**1,337,820**

Description	Cost			
	Construction	Contingency 25%	E&A 20%	Total
Phase 4 Improvements (2023-2026)				
Demolish manual bar screen	22,382	5,595	4,476	32,454
New mechanical bar screen	187,695	46,924	37,539	272,158
Replace mechanical bar screen	187,695	46,924	37,539	272,158
Demolish existing stairs	20,392	5,098	4,078	29,568
New grit chamber bypass channel and gate	61,798	15,450	12,360	89,607
New grit cyclone and classifier	150,766	37,691	30,153	218,610
Degritted primary sludge pump	62,358	15,589	12,472	90,419
Site piping	22,630	5,658	4,526	32,814
Inline primary sludge grinder	124,006	31,001	24,801	179,809
WAS Gravity Belt Thickener	761,885	190,471	152,377	1,104,734
Thickened WAS pump	154,221	38,555	30,844	223,621
Thickening Building	138,367	34,592	27,673	200,632
Yard piping	54,436	13,609	10,887	78,932
Total Phase 4 Cost				**2,825,516**
Total Cost				**10,155,453**

Note 1: Changes in the water quality requirements associated with the designation of the discharge area as supporting shell fish will require upgrading of the disinfection system. This was not evaluated during the preparation of the plan since DEQ changed the designation after the plan was completed.

CHAPTER 1. INTRODUCTION, PURPOSE, AND NEED

INTRODUCTION AND PURPOSE

This facilities plan presents the results of the planning effort conducted for the City of Coos Bay's Wastewater Treatment Plant No. 1 (WWTP #1). The purpose of this plan is to:

- Summarize the service area and wastewater characteristics tributary to WWTP #1
- Identify the components of the existing wastewater collection system and treatment system
- Evaluate the performance of the treatment system with respect to water quality and regulatory standards
- Analyze alternatives for improvements that will remedy system deficiencies and accommodate future growth
- Recommend specific projects for inclusion in the wastewater treatment system Capital Improvement Plan (CIP) to ensure that WWTP #1 continues to provide adequate and reliable service for the community.

This wastewater management planning study has been conducted to ensure a cost-effective and environmentally responsible approach. Planning for community growth and meeting water quality requirements are both influential factors that guided the development of the recommended plan. This facility plan has been prepared using data available through 2007. Since the planning period for this study is 20 years, the projections and analysis are conducted through the year 2027.

BACKGROUND AND NEED

The City of Coos Bay's WWTP #1 treats domestic sewerage and discharges treated effluent into the Coos Bay Estuary under an NPDES Permit (Permit #100699) dated April 21, 2003. On August 21, 2003 the Oregon Department of Environmental Quality (DEQ) issued a Mutual Agreement and Order (MAO) to the City of Coos Bay for each of the City's wastewater treatment plants.

The MAO for WWTP #1 (WQ WQ/M-WR-02-202) stipulated a completion schedule to meet chlorine limits in the effluent, including construction of a dechlorination system. There was also mention of a requirement to implement an industrial pre-treatment program, but this requirement was de-listed per memo from DEQ dated September 29, 2004. Schedule C of the NPDES Permit includes a compliance schedule for monitoring and reporting sewage overflows, identifying and removing all inflow sources, and submittal of an overflow report.

The MAO for WWTP #2 (WQ WQ/M-WR-03-022) stipulated completion of dechlorination facilities and a Facility Plan document to improve treatment capacity, quality, and reliability at Plant #2 – with specific completion deadlines for planning and design commencement. The WWTP #2 Facility Plan was completed by West Yost Associates and a final plan was submitted in October, 2007.

The City of Coos Bay has chosen to prepare a Facility Plan document for both of its Wastewater Treatment Plants in order to plan for city-wide wastewater system improvements in a complete, comprehensive effort. In addition, some components of facility planning at one WWTP can affect planning at the other WWTP (such as operation & maintenance programs, sludge management, and CIP budget prioritization). For these reasons, the City of Coos Bay has prepared this Facility Plan document to accompany (and compliment) the WWTP #2 Facility Plan.

DEFINITIONS

The flow rates and related parameters discussed in this document are defined below:

- The *average annual flow* (AAF) is the average flow for the entire year.
- The *average dry weather flow* (ADWF) is the average daily flow at the plant during the dry weather season, typically May through October.
- The *average wet weather flow* (AWWF) is the average daily flow at the plant during the wet weather season, typically November through April.
- The *maximum month dry weather flow* (MMDWF) is defined as the flow recorded at the plant when total rainfall quantities are at the 1-in-10 year probability level for the month of May (average for the month).
- The *maximum month wet weather flow* (MMWWF) is defined as the plant flow when total rainfall quantities are at the 1-in-5 year probability level for the month of January. However, the wet season maximum month for this facility occurs in December. Therefore, based on DEQ's recommendation, December rainfall and flow data was used to determine the MMWWF (average for the month).
- The *maximum week wet weather flow* (MWWWF) is the week's flow with a recurrence probability of 1.92 percent in a given year (average for week).
- The *peak day flow* (PDF) is the flow rate that corresponds to a 24-hour storm event with a 1-in-5 year recurrence interval that occurs during a period of high groundwater and saturated soils.
- The *peak wet weather flow* (PWWF) is expected to occur during the peak day flow. The PWWF is the highest flow at the plant sustained for one hour. The PWWF dictates the hydraulic capacity of the treatment system. PWWF is also referred to as the peak instantaneous flow, or peak hour flow.
- *Infiltration and inflow* (I/I) refers to water that enters the wastewater collection system due to deterioration or illicit connections. Infiltration is groundwater that enters the system from the surrounding soil through defective pipes, joints, or manholes. Inflow is storm water that directly enters the system from sources such as drainage connections, flooded manhole covers, and sewer defects that respond quickly to saturated ground conditions.

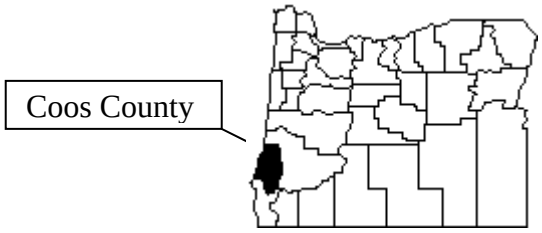
CHAPTER 2. STUDY AREA CHARACTERISTICS

A review of the region's study area characteristics is an important initial step in the process of developing facility plans for wastewater treatment plants in the City of Coos Bay. The description of the study area characteristics includes the study area location, physical environment and socioeconomic environment. These characteristics provide the context for evaluating alternative strategies for long-term wastewater treatment and disposal.

STUDY AREA LOCATION

The City of Coos Bay is located on the southwestern Oregon coast, approximately 200 miles south of the Columbia River as shown on Figure 2-1. The eastern part of Coos Bay is in the Coaledo basin, which is a small area of low hills. These hills divide the City's service area into two primary basins for gravity collection, served by two treatment plants. Wastewater from the eastern area is treated at Wastewater Treatment Plant No. 1, while Wastewater Treatment Plant No. 2 treats wastewater from the western area. Together these treatment plants serve the City of Coos Bay, Charleston Sanitary District and Bunker Hill Sanitary District. Figure 2-2 shows the service area of Wastewater Treatment Plant No. 1.

Figure 2-1. Location of Coos County in Oregon



In total, Wastewater Treatment Plant No. 1 serves 3,020 acres, totaling 48 percent of the city's serviceable land area. Due to topography constraints and collection system infrastructure, some residents of North Bend receive sewer service from Coos Bay, and some residents of Coos Bay receive sewer service from North Bend. There are currently 23 residential units in Coos Bay which are served by North Bend's sewer collection and treatment system. There are 17 residential units in North Bend which are served by Coos Bay's sewer collection and treatment system (at Plant #1). There are also two residential units in Coos Bay which receive sewer service from Charleston. A detailed list of residential units (addresses) which are served by the neighboring sanitary district is included in Appendix C.

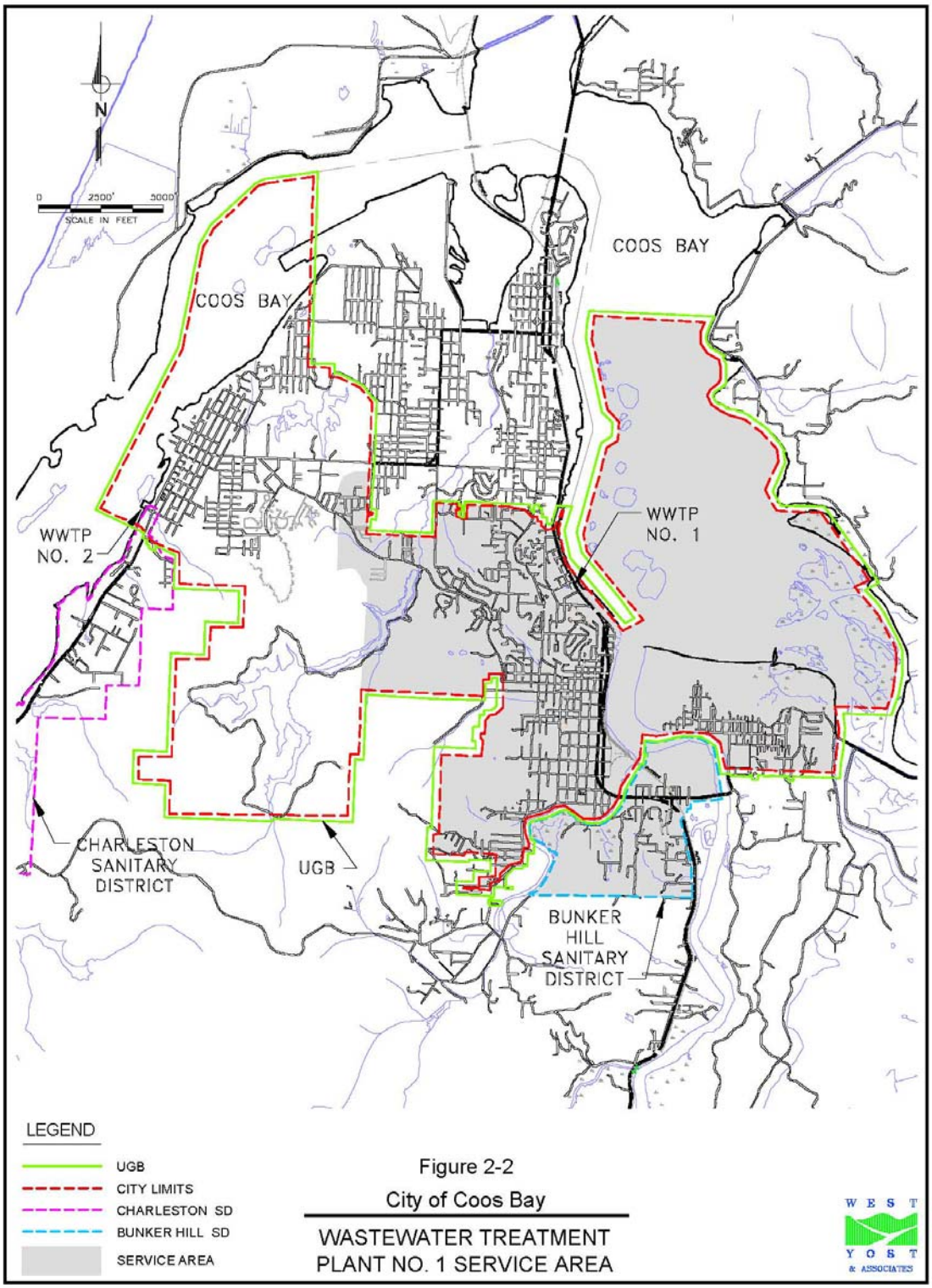


Figure 2-2. Wastewater Treatment Plant No. 1 Service Area

PHYSICAL ENVIRONMENT

The physical environment includes the topography, geology, soils, and climate of the region. This section presents a brief overview of these physical characteristics as they relate to wastewater facilities planning. The topography, geology and soils of a region can have a significant impact on the design and construction of wastewater collection and treatment systems. Climatic characteristics such as precipitation and temperature influence the amount of wastewater entering the system, treatment system performance, and the potential for temperature impacts on discharges to Coos Bay.

Topography

The City of Coos Bay is bordered to the east and west by Coos Bay, by the city of North Bend to the north, and by the Coast Mountain Range to the south. A ridge running north to south just west of 35th Street defines the City's drainage basins. Wastewater Treatment Plant No. 1 serves the area east of the ridge.

Geology and Soils

Coos Bay is underlain with bedrock, clayey and silty material, sandstone and marine terraces. Minable coal deposits can be found in the sandstone layer. There are no significant beaches in Coos Bay. Stabilized dunes, mountainous areas, and filled land generally characterize the city's geology.

A survey conducted by the Natural Resources Conservation Service and the United States Department of Agriculture identifies approximately 46 different named soils in Coos County. The City of Coos Bay is dominated primarily by loamy and sandy soils that are either poorly or excessively drained. Sandy soils, including the Bandon and Westport soils, that are formed in eolian material are common in sand dune areas on the west side of the city and near the bay. This area is also dominated by the alluvial or water-deposited soils that appear as sand and gravel deposits. The eastern and central parts of the City have sandy and silty soils (Bullard soils). A major problem associated with these soils is erosion; particularly after protective vegetative covering is removed.

Climate

The climate of Coos Bay can be described as mid-latitude marine with mild summers and wet, cool winters. Although the nearest weather station is located in North Bend, the weather data is applicable to Coos Bay due to its proximity and similarity in geographic and topographic conditions. Monthly average temperatures and precipitation are summarized in Table 2-1. Extreme temperatures are usually not experienced in the area due to the moderating influence of the Pacific Ocean. As shown in Table 2-1, there is only a 15-degree difference between the mean temperature during the coldest and warmest months.

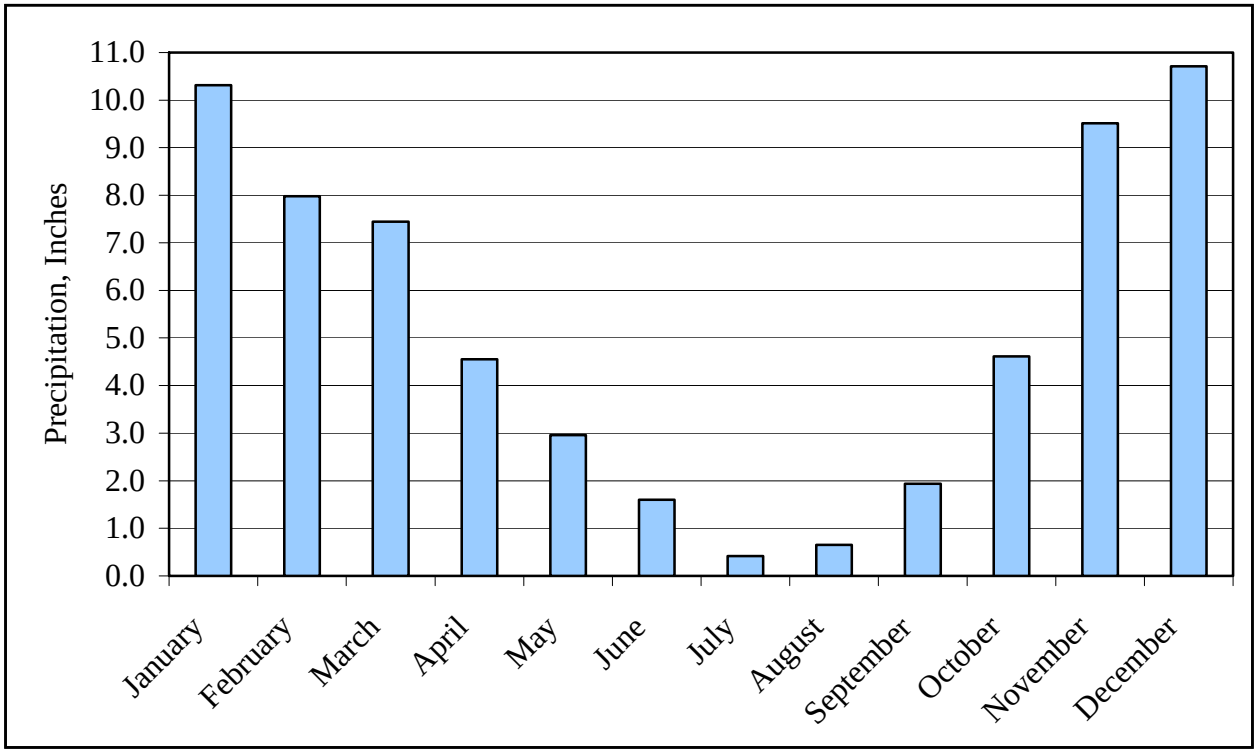
Figure 2-3 illustrates the variation in monthly average precipitation over the course of a year. Most of the precipitation occurs in the months of November through March in the form of rain. Only mild, occasional snowfall is seen in the area. Figure 2-4 shows the historical annual precipitation for last 30 years.

Table 2-1. Climatic Summary for North Bend

Month	Temperature[(1)], degrees F			Precipitation[(2)] Average, Inches
	Average	Average Daily		
		Maximum	Minimum	
January	46.05	52.59	39.52	10.31
February	47.63	54.56	40.7	7.98
March	48.26	55.26	41.26	7.44
April	49.83	56.84	42.82	4.55
May	53.69	60.57	46.8	2.96
June	57.29	63.93	50.65	1.60
July	59.53	66.39	52.68	0.42
August	60.24	67.46	53.01	0.65
September	58.8	67.18	50.43	1.94
October	54.77	63.19	46.35	4.61
November	50.21	57.15	43.28	9.52
December	46.62	52.97	40.28	10.71
Annual	52.72	59.81	45.62	62.70

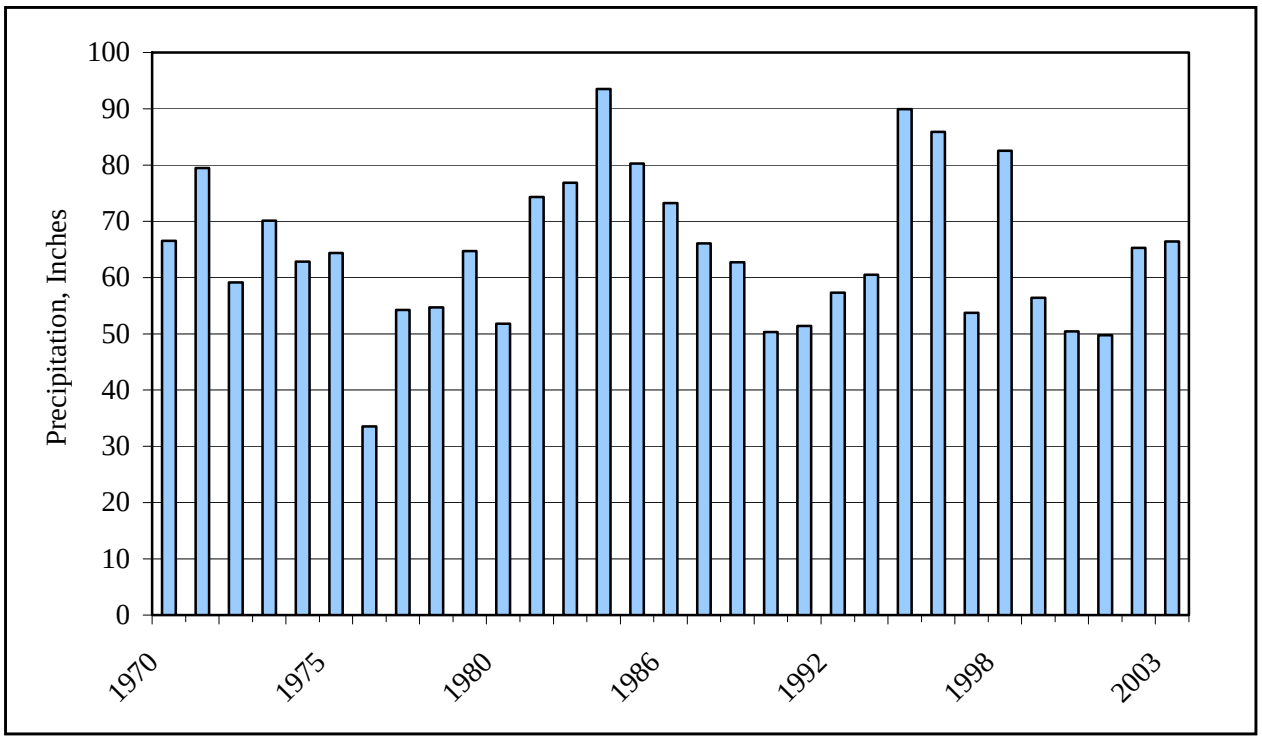
Source: Oregon Climate Services, for North Bend, Oregon.
(1) Averages from 1961 to 2003.
(2) Averages from 1911 to 2002.

Figure 2-3. North Bend Monthly Average Precipitation (1911-2002)



Source: Oregon Climate Services

Figure 2-4. North Bend Historical Annual Precipitation



Natural and Geologic Hazards

The Coos Bay area is prone to flooding, tsunamis, earthquakes, erosion, high groundwater, ponding, and windthrow.

The existing WWTP No. 1 site contains three different zones mapped by the Federal Emergency Management Agency (FEMA, 1984). Zone A2, the 100-year floodplain of Coos Bay, is the southern third of the site. Zone B, (an area between the limits of the 100-year floodplain and the 500-year floodplain of Coos Bay), is mapped for the central and northern portions of the site. Zone B may be subject to 100-year flooding with average depths less than one foot. Zone B also includes areas protected by levees from the base flood and areas where the contributing drainage area is less than one square mile (FEMA, 1984). Lastly, Zone C, an area of minimal flood potential, is within Zone B in the center of the site. The existing outfall is within the 100-year floodplain of Coos Bay (FEMA, 1984).

Earthquakes are generally not a major hazard in the area, however earthquakes centered in California are capable of causing some local damage.

The WWTP No. 1 is in the tsunami hazard zone. A tsunami is a series of sea waves usually caused by a displacement of the ocean floor by an undersea earthquake. As tsunamis enter shallow water near land, they increase in height and can cause great loss of life and property damage. For the Coos Bay – North Bend area, the tsunami evacuation routes were developed by local officials and reviewed by the Oregon Department of Emergency Management. These maps are published by the Oregon Department of Geology and Mineral Industries.

Public Health Hazards

The WWTP No. 1 service area comprises of eastern part of the City of Coos Bay and Bunker Hill Sanitary District. All the developments within the City limits are sewered and flow in to the WWTPs. The old part of the City (2nd Street and 3rd Street) has aged cedar wood pipe that are leaky and are deemed to be at the end of their useful life. These sewers flood the streets and basements of several houses routinely during high rainfall and high tide periods (November through February).

The Bunker Hill area has several old on-site systems such as old rusted septic tanks, cesspools, and gray water discharges that need to be replaced/repaired.

Energy Production and Consumption

The principal energy source utilized in the Coos Bay area is electricity, most of which is consumed by the growing residential sector. Few, in any non-renewable sources exist in the Coos Bay area and there are no hydro-electric, thermal, or nuclear energy-producing plants. Utilization of alternative energy sources such as solar, wind, waste biomass, and tides is minimal.

Water Resources

The Coos Bay estuary, a sub-basin of the South Coast Watershed, covers approximately 13,348 acres and is fed by a number of creeks and rivers including Coos River, Willanch Creek, Kentuck Creek, Larson Creek, and Palouse Creek. The town of North Bend and the City of Coos Bay are situated on a peninsula that roughly divides Coos Bay into a western and an eastern portion. The western portion of Coos Bay is protected by North Spit - a narrow landmass with sand dunes. The tidally influenced mud flats along the shores of Coos Bay are ideal for shellfish production. Land use surrounding the bay includes agriculture, private and public timberlands, the Oregon Dunes National Recreation Area, wildlife reserves, and urban centers.

Domestic Water Supply

The domestic water supply for City of Coos Bay and surrounding areas are served by the Coos Bay North Bend Water Board from the Pony Creek Reservoir. The reservoir water is treated by the Pony Creek Treatment Plant located on Ocean Boulevard. This plant was placed in service in 1991 and produces water meeting or exceeding all United States Environmental Protection Agency (EPA) and Oregon Health Division (OHD) primary water quality standards.

The water treatment plant's current design capacity is 8.0 million gallons per day. Current annual daily average demand for treated water is 4.0 million gallons per day with occasional summer demands of 7.1 million gallons per day.

Flora and Fauna

The presence of fish, wildlife, and vegetation in the study area was determined from a review of the Oregon Natural Heritage Information Center database (ONHIC, 2005), and a site visit on January 26, 2005. The affected environment includes the existing WWTP site and Coos Bay near the existing outfall. The existing WWTP site is developed and provides limited wildlife habitat. Common birds observed at the facility in January 2005 were the yellow-rumped warbler, common crow, and various gull species. Other common wildlife species anticipated to occur adjacent to the WWTP in residential areas include the American robins, black-capped chickadee, wrens, woodpeckers, squirrels, raccoons, opossums, and small rodents. The little amount of vegetation present on the WWTP No. 1 site includes mowed grass and a few landscaped trees.

The effluent outfall is located in Coos Bay. In general, estuaries are highly productive systems that provide habitat for a multitude of resident and migratory species, including fish, marine mammals, terrestrial mammals, and birds. No shellfish beds are located within the mixing zone of the WWTP No. 1 outfall on the east side of Coos Bay. Fish and aquatic species present in Coos Bay include: rock fish, Dungeness crab, Pacific lamprey, sturgeon, anchovy, herring, chum salmon, coho salmon, steelhead, surf perch, and lingcod.

Air Quality

The climate of Coos Bay is characterized by mild summers and wet, cool winters. Temperatures range from 46 to 67° F between May and October and 39 to 57° F from November to April. The average annual precipitation is 62 inches with most of the rainfall occurring October to April (National Weather Services, 2003).

The average wind velocity for the project vicinity is approximately 8 miles per hour with gusting up to 29 and 38 mph (National Weather Service, 2005). Wind direction is variable. Sufficient wind is present in the project area throughout the year to disperse air pollutants released into the atmosphere.

Potential odor and air pollutant-producing activities on the site include the primary sedimentation, aeration, and the digester. The digesters are in need of repair, including the floating cover on Digester No. HH1. Nearby sources of odor include exhaust from vehicles on Highway 101 and exposed mud and sand at low tide.

No significant sources of air pollution are designated by the Environmental Protection Agency (EPA) for the project site or vicinity (EPA, 2004). The nearest area that exceeds ambient air quality standards is the Eugene-Springfield area (EPA, 2004).

Noise

Residences are located at west of the WWTP No. 1 site with the closest residences located between 75 and 150 feet away. Sensitive receptors also include patrons at the Best Western and Red Lion hotels located one block away. It was noted during the January 2005 field visit that the operating equipment at the existing facility was audible from western perimeter, but blended in with traffic noise from Highway 101.

The human ear responds to a wide range of sound intensities. The decibel scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 decibels (dBA). Hence, a 70 dBA sound level will sound twice as loud as a 60 dBA sound level. People generally cannot detect differences of 1 dBA, but a 5 dBA change would likely be perceived under normal conditions.

Environmentally Sensitive Areas

No wetlands are mapped for the project site or immediate vicinity at the existing WWTP No. 1 site, according to the National Wetlands Inventory (USFWS, 1989). The nearest mapped wetlands are intertidal mudflats located approximately 0.25 miles to the east in Coos Bay. The existing WWTP is built on historic fill and no wetland vegetation, soils, or hydrology were observed during a January 2005 visit.

Zoning

Plant 1 is zoned "Industrial Commercial (I-C)" and the facility fits within zoning designation. However, a Site Plan and Architectural Review are required for the intensification of a use within 400 feet of a residential zone.

The western boundary of the site is adjacent to a R-2 zoning district; therefore, a SPAR approval by the Planning Commission is required for Plant upgrades.

The outer edges of the eastern portion of the property lies in ZONE B of the floodplain. The northeast corner of the property lies in ZONE A, the 100-year floodplain.

SOCIOECONOMIC ENVIRONMENT

The City of Coos Bay's population and land use patterns have the most important influence on flows and loads to the wastewater treatment system. The current population and projected population growth within the service area are the key parameters used in projecting future sewage flows and loads. These projections are used to assess the adequacy of existing infrastructure and develop design criteria for future treatment systems.

The planning period for this study is 20 years. Since the planning period should extend 20 years beyond the time when plant improvements are implemented, projections are provided through the year 2027. (This facility plan has been prepared using data available through 2007.)

Economic Conditions

The median family income for the City of Coos Bay residents in the year 1999 was $38,721 (Census 2000 Summary File 3, Series P-77, Median Family Income, U.S. Census Bureau, 2003). Approximately 90 percent of the residents of the City of Coos Bay are white, with 5 percent a mix of two or more races and the rest of the ethnic groups in the population representing 2 percent or less. In comparison, Coos County residents are 92 percent white, 4 percent a mix of other races, 3 percent American Indian, and the remaining ethnic groups in the population representing 1 percent or less (Census 2000 Summary File 3, Series P-6 Race, U.S. Census Bureau, 2003).

Low-income populations were identified using statistical poverty thresholds from the Census 2000 Summary File 3, Series P-87 Poverty Status in 1999 by Age (U.S. Census Bureau, 2003). These thresholds were derived from information collected in the Census 2000. Poverty status is defined by a set of income thresholds that vary by family size and composition. Families or individuals with income below their appropriate poverty thresholds are classified as poor. In 1999, 17 percent of City of Coos Bay residents were at or below poverty level standards compared to 15 percent of Coos County residents. The percentage of residents at or below poverty level at the national and state level is approximately 12 percent. No readily identifiable groups of low-income persons living in geographic proximity to the project area were identified from the income data.

Population Projections

Based on work by the Population Research Center at Portland State University, the 2003 certified population estimate for Coos Bay is 15,650 people. This estimate refers to the number of people living within the city limits of Coos Bay. The population served by Wastewater Treatment Plant No. 1 was estimated based on information regarding service area boundaries provided by city personnel and a breakdown of the population developed for the city's Transportation System Plan (DKS Associates, 2004). In the modeling work that was done for the Plan, the city's population was broken down into Transportation Analysis Zones (TAZ). Using the TAZ estimates and mapping data, the population was proportionately allocated to each of the City's two treatment plants based on the plants' service areas.

The resulting year 2003 population within the Coos Bay city limits contributing to Wastewater Treatment Plant No. 1 is estimated to be 8,920.

The growth rate from 1990 to 2003 both in the city of Coos Bay and in Coos County was 0.3 percent according to Portland State University's Population Research Center. The Coos County Planning Department projects the growth rate for both the city and county to be 0.4 percent. The Transportation System Plan allows a more detailed look at expected growth patterns within the city and shows a higher rate of growth on the west side of the City in the area served by Wastewater Treatment Plant No. 2 than in the east side served by Wastewater Treatment Plant No. 1. However, based on communications with the South Coast Regional Representative, the acknowledged annual growth rate by the Department of Land Conservation and Development is 0.1 percent which is the basis for the projections included in this report. In an email dated July 28, 2010, Dave Perry of the Community Services Division confirmed that the acknowledged growth rate for the City is 0.1 percent.

The population of Bunker Hill was 1,462 in 2000 according to Census Data. The 2003 population was estimated to be 1,330 based on a 2007 population of 1,330. A future growth rate consistent with that used for Coos Bay gives a 2027 population of 1,362. The corresponding projection for the Coos Bay Plant No. 1 is a 2027 population of 9,138. The total population projection for the Plant No. 1 service area is 10,500 for 2027 and 10,560 for the year 2033.

Table 2-2 summarizes current and future population estimates for the City and the Wastewater Treatment Plant No. 1 service area, including Bunker Hill. Figure 2-5 illustrates the expected population growth. These population projections are used later in the Facilities Plan to project future wastewater flows and loads.

Table 2-2. City of Coos Bay and Wastewater Treatment Plant No. 1 Service Area Population Projections

	2003	2015	2027
City of Coos Bay	15,650	15,840	16,030
City of Coos Bay WWTP No. 1 Service Area	8,920	9,028	9,138
Bunker Hill Sanitary District	1330	1,346	1,362
Total WWTP No. 1 Service Area	10,250	10,374	10,500

Land Use

Land use in the city of Coos Bay and surrounding service areas consists of a typical mix of urban development including residential, commercial, industrial, and public land. Table 2-3 identifies the acreage within each of the primary land use categories for properties within the city limits and within the service areas of the city's wastewater treatment plants.

Figure 2-5. Wastewater Treatment Plant No. 1
Service Area Population Projections

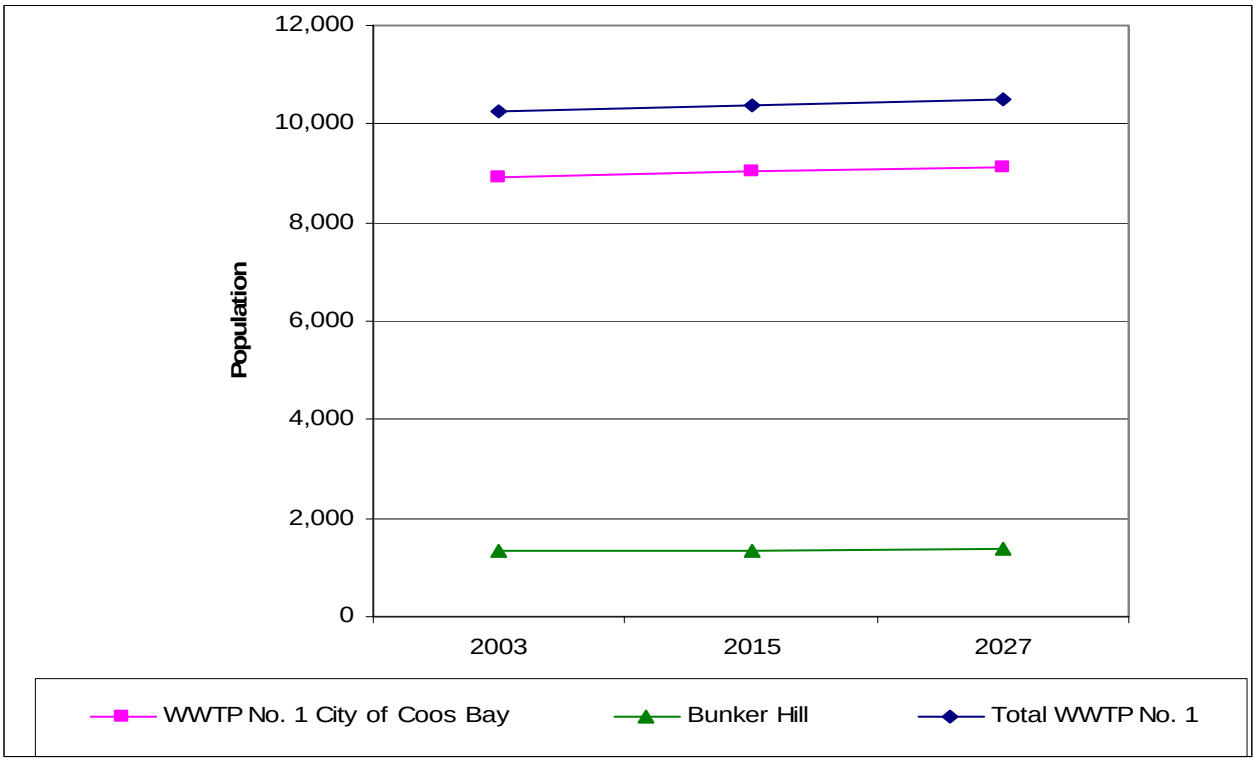


Table 2-3. Land Use Designations within the Coos Bay City Limits and Surrounding Service Districts(1)

Land Use Category	Acreage			
	Within City Limits[2]	Bunker Hill	Charleston	Total
Developed				
Residential	800	362	732	1,894
Commercial	320		14	334
Industrial	70	33		103
Public And Semi-Public	540		4	544
Total Developed	1730	395	750	2,875
Vacant And Open	2160		474	2,634
Not Developable	3010	155	892	4,057
Total Area	6900	550	2,116	9,566

(1) City limits include 3,561 acres in the Coos Bay waterway. This acreage is not included in the total land acreage.
(2) Estimated from City mapping and City's Comprehensive Plan (2000).

Along with land inside the city limits there is an additional inventory of land within the urban growth boundary (UGB) that will become eligible for wastewater service upon annexation to the city. This land totals 81 acres and is currently not zoned (no designation). If all 81 acres within the UGB is annexed into the City, WWTP No. 2 would serve 66 acres and 15 acres would be served by WWTP No. 1. Figure 2-6 illustrates these land use designations within the service area.

City Comprehensive Plan

The most recent Comprehensive Plan was completed in 2000. The document merged the previously developed Eastside Comprehensive Plan and Comprehensive Plan to provide an encompassing plan for the City. The City has subsequently developed a Transportation Master Plan which was financed and approved by the Department of Land Conservation and Development (DLCD). A growth rate of 0.7 percent for the area was developed in the Transportation Plan and has been adopted by the City and County. However, communications from the DLCD indicate that the acknowledged growth rate for the city is 0.1 percent which is used in this plan.

City or County Zoning Ordinance

Plant 1 is zoned "Industrial Commercial (I-C)." The use is permitted outright. However, a Site Plan and Architectural Review is required for the intensification of a use within 400 feet of a residential zone.

The western boundary of the site is adjacent to a R-2 zoning district; therefore, a SPAR approval by the Planning Commission is required.

The outer edges of the eastern portion of the WWTP #1 property lies in ZONE B of the floodplain. The northeast corner of the property lies in ZONE A, the 100-year floodplain.

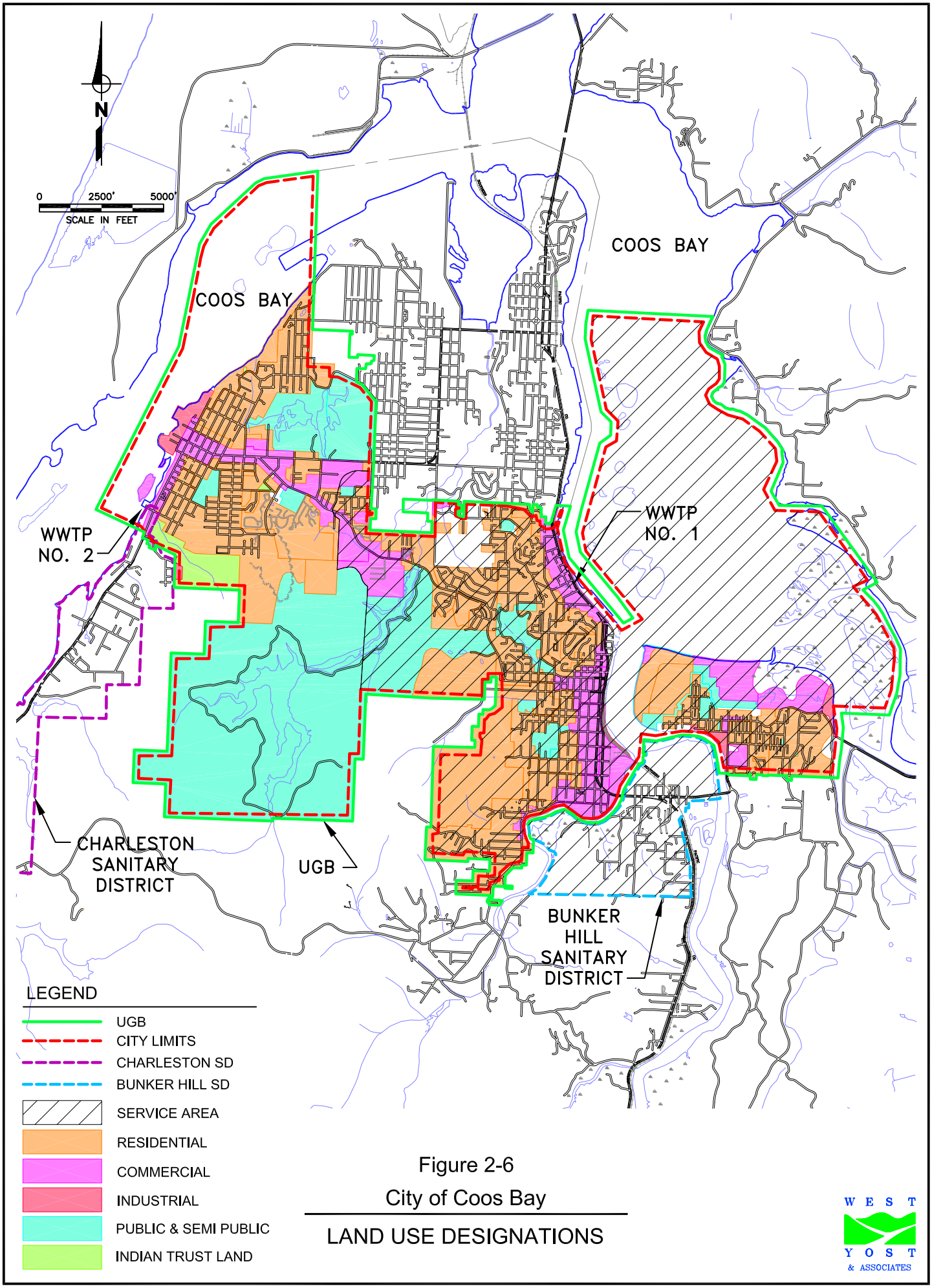


Figure 2-6

City of Coos Bay

LAND USE DESIGNATIONS

WEST YOST & ASSOCIATES

CHAPTER 3. WASTEWATER COLLECTION SYSTEM

The collection system conveys wastewater from residential, commercial, and public users to the City's wastewater treatment facilities. Wastewater Treatment Plant No. 1 serves the city's east side and the Bunker Hill Sanitary District. The City is responsible for operating and maintaining the collection system within the City's boundaries. The Bunker Hill Sanitary District operates and maintains facilities within its service area. This chapter describes the existing collection system, and estimates the influence of infiltration and inflow (I/I) in the system.

Note: This Chapter 3 is not intended to be a Collection System Master Plan, rather a quick inventory of existing infrastructure and operation. A Wastewater Collection System Master Plan was prepared in 2006 by HBH Consulting Engineers.

SYSTEM DESCRIPTION

The City's collection system that is tributary to Wastewater Treatment Plant No. 1 consists of approximately 220,000 ft of gravity sewers, 16,000 ft of force mains and 15 pump stations. The area is served by a separate storm drain system. The collection system generally flows south and east from the ridge in the central area of town toward the treatment plant. The existing collection system is shown in Figure 3-1. Table 3-1 provides an inventory of gravity pipes in the collection system according to pipe diameter. Pipelines with a diameter of 4-inches should be replaced.

Table 3-1. Coos Bay Wastewater Treatment Plant No. 1
Collection System Inventory – Gravity Sewers

Pipe Diameter, inches	Pipe Material	Pipe Length, feet
4	ABS	650
6	Concrete, PVC, AC, Cast Iron	16,480
8	Concrete, PVC, AC, B&S	166,530
10	Concrete, PVC, AC	14,300
12	Concrete	12,790
14	Concrete	2,510
15	Concrete	4,370
18	Concrete	1,320
24	Concrete	240
30	Concrete	520
Total		220,000

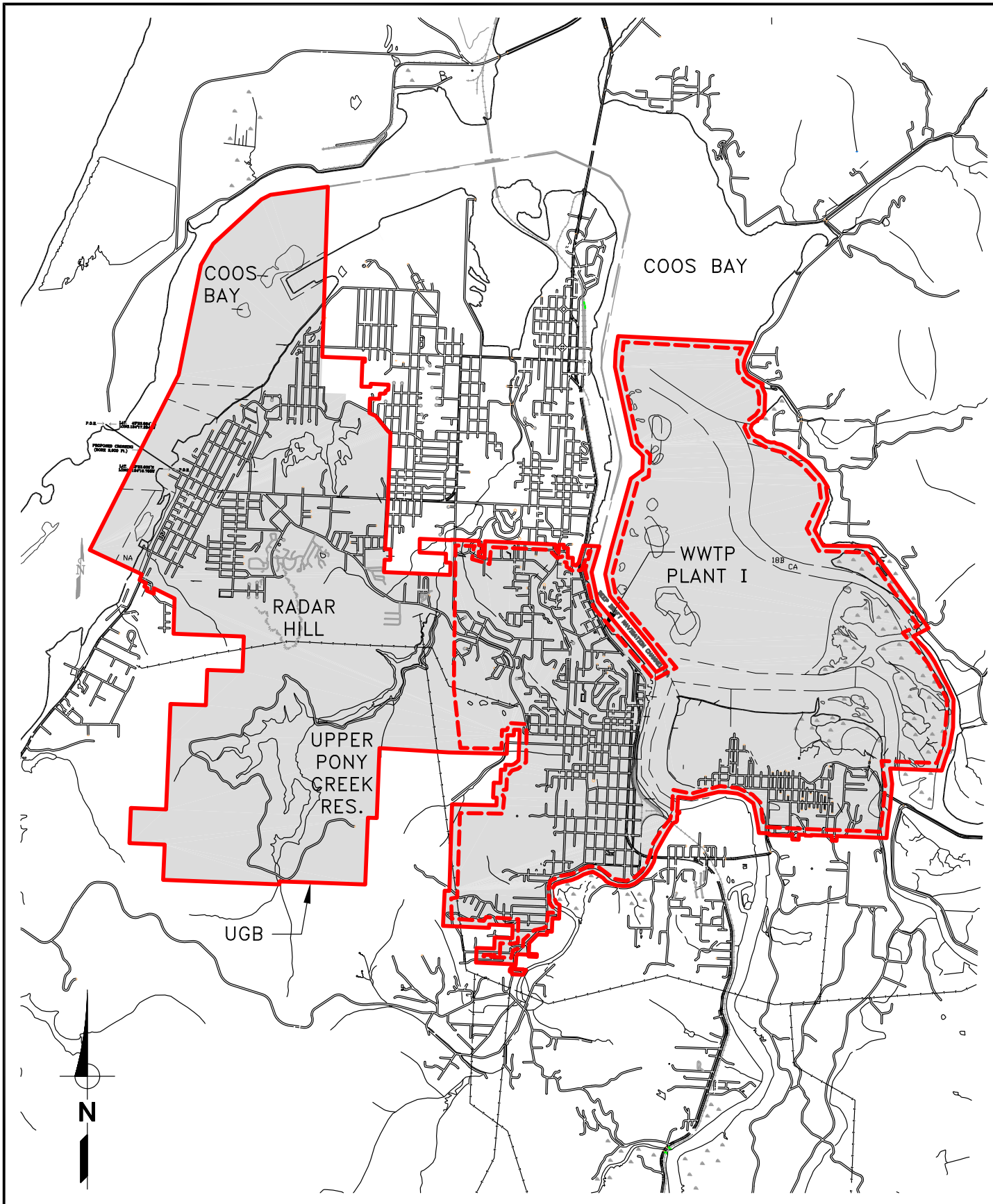


Figure 3-1

City of Coos Bay

PLANT I COLLECTION SYSTEM

WEST YOST & ASSOCIATES

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The Bunker Hill Sanitary District is located south of the treatment plant. It is described in detail in the Bunker Hill Economical Development Plan for Bunker Hill Sanitary District (May, 1997).

Gravity Sewers

The gravity sewers are composed primarily of PVC, concrete, and clay. Most of the system is 8-inch diameter pipe with 4- and 6-inch pipe in the upper reaches of the system and up to 30-inch pipe in the lower elevations.

Pump Stations

Fifteen pump stations convey sewage to Wastewater Treatment Plant No. 1 from the City. Run times for the pumps provide an indication of the ability of the pump stations to meet demand. A review of these run times indicates all pump stations have adequate capacity. Basic design data for the pump stations are shown in Table 3-2. Pump Stations 4 and 5 are being upgraded.

CONDITION ASSESSMENT

Inspection of the City's collection system is done on a routine basis. A review of problem and remote lines are consistently being performed. From this, staff develops an extensive line-cleaning list to be proactive in preventing overflows and blockages. As cleaning continues, every buried manhole is raised to grade level for preventive maintenance and reduction of inflow. In areas where the manhole is not accessible, roads are constructed. Site or land title restrictions preclude construction of an access road, trails have been constructed and maintained for inspection and cleaning purposes. Manholes in these remote locations are visually inspected on a monthly basis. Whenever there is a problem within the collection system, there is a process in place to make sure the problem is documented and is addressed by the collection crew. This process continues for 120 days and consists of periodic inspections, line cleaning, and documentation. After 120 days the sanitary sewer line will be reviewed to determine if the line needs to be placed on the list of a more frequent cleaning schedule.

The City also conducts limited smoke testing. The sewers are cleaned on a rotating basis so that pipes are cleaned approximately every five years.

INFILTRATION AND INFLOW ANALYSIS

Infiltration is groundwater that enters the system from the surrounding soil through defective pipes, joints, or manholes. Inflow is stormwater that directly enters the system from sources such as illicit drainage connections, flooded manhole covers, roof downspouts, and other rain induced flow.

Flows associated with I/I offset some of the available capacity of the collection system. I/I is also an indicator of the condition of the system. High peak flows can signify system deterioration.

Table 3-2. Wastewater Treatment Plant No. 1 Collection System Pump Stations

Item	Pump Station 1	Pump Station 2	Pump Station 3*	Pump Station 4	Pump Station 5	Pump Station 6	Pump Station 9	Pump Station 10	Pump Station 12	Pump Station 13	Pump Station 17	Pump Station 18	Pump Station 19	Pump Station 20	Pump Station 21
Location	Corner of Birch Ave. and North Front St.	Adjacent to Farr's on Hwy 101 near Ingersall Intersection	Treatment Plant No. 1 Site	Adjacent to Blossum Gluch Creek on S. 10th St.	2006 Woodland Dr.	400 Kruse Street	1890 Southwest Blvd.	2599 Woodland Dr.	3000 Ocean Blvd.	2366 SE Ocean Blvd.	699 6th Street	545 Whitty	On site of old treatment facility in Eastside	1465 Old Wireless Lane	Within SOMAR shipbuilding compound in Eastside
Date Constructed / Upgraded	1951/1989	1951/1991	1951/1974/2007	1954/1973	1952/1974	1956/2003	1966/1974	1966/1974 2009	1971/1992	1971/1992	1963/1999	1963/2005	1963/2001	2000	1985
Pumps															
Type	Vertical Solids Handling	Vertical Solids Handling	Submersible Triplex Station	Self Priming Centrifugal Pumps	Vacuum – Prime Centrifugal Pumps	Self Priming Centrifugal Pumps	Close Coupled Centrifugal Wet Pit / Dry Pit	Duplex Submersible	Submersible Solids Handling	Submersible Solids Handling	Submersible Solids Handling	Vacuum – Prime Centrifugal Pumps	submersible	submersible	Vacuum Prime Centrifugal
Number	4	3	3	2	2	3	2	2	2	2	2	2	2	2	2
Capacity, each, gpm	2@2110 2@4190	3@2800	2@ 2100gpm @ 26.6 TDH 1265gpm@ 26.6'	2@325	2@225	3@400	2@200	752 gpm@185' TDH	2@300	2@480	2@700	2@200	2@400	2@40	2@100
Nominal Firm Capacity, gpm	8,140	5,600	2,200	325	225	800	200	750	300	480	700	200	400	40	100
Horsepower, each	2@30 2@60	3@12	3@20 hp	2@10	2@30	3@30	2@7.5	2@70	2@15	2@25	2@8 hp	2@15	2@30	2@1.5	2@5
Overflow point	Bay Isthmus Sl. River Mile 13.85	Bay Isthmus Sl. River Mile 14.6	Bay Isthmus Sl. River Mile 13.85	Bay Isthmus Sl. River Mile 14.4	Pony Creek, River Mile 8.85	Coal Bank Slough, River Mile 14.65	Coal Bank slough River Mile 14.65	Pony Creek, River Mile 8.85	Pony Creek, River Mile 8.85	Pony Creek, River Mile 8.85	Gravity Overflow to Isthmus Slough Mile 13.15	Isthmus Slough, River Mile 15.0	Coos River Mile 15	Coalbank Slough, Mile 14.65	Coos River, River Mile 15.5
Time to Overflow, min	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Summer 2.1 Winter 1.0	Unknown	Unknown	Unknown	Unknown
Level Control	sonic	sonic	Multi-rod transducer	floats	floats	sonic	floats	floats	floats	floats	sonic	sonic	sonic	floats	floats
Forcemain															
Diameter, inches	14" / 24"	18"	12"	6"	6"	12" / 14"	6"'	10"	6"	6"	6"	6"	6"	3"	4"
Length, ft	3490' / 3620'	1370'	205'	390'	1970'	590"	190"	3650'	830'	453'	8,400'	480'	970'	770'	500'
Standby Power	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Discharge Manhole	Plant One Head works	Pump Station 1	Plant One Head works	Pump Station 1	Pump Station 1	Pump Station 2	Pump Station 6	Pump Station 3	Pump Station 13	Pump Station 10	Pump Station 2	Pump Station 2	Pump Station 17	Pump station 9	Pump Station 19
Location	Plant One Head works	35BA-7	Plant One Head works	DD27-15	27BD-9	35BD-6	3AA-15	22BD-10	21DC-10	21DD-10	40' south of PS#2 no manhole	36BB-11	36BA-21	3AC-20	36AA-6
Condition	Fair	Fair	Good	Poor	Poor	Fair	Fair	Good	Fair	Fair	No manhole	Good	Good	Fair	Fair

* Improvements are under construction.

EPA Guidelines for Infiltration and Inflow

EPA guidelines for the screening of I/I flows in a wastewater collections system are based upon per capita flow rates. If the measured per capita flow rate of the collection system exceeds EPA threshold for infiltration during dry weather with corresponding high groundwater (120 gallons per capita per day (gpcd)), then the sources of infiltration in the collection system may warrant active management to correct system deficiencies. The 120 gpcd flow rate includes domestic wastewater flow, infiltration, and nominal industrial and commercial flows. These regulations provide that no further I/I analysis work is necessary if the 120 gpcd guideline is not exceeded and there are no hydraulic overloads in the system.

Infiltration

The EPA guideline for infiltration is based on a high groundwater dry weather flow rate defined as the highest 7-day average flow recorded over a seven to fourteen day period during high groundwater season. In Oregon, this condition occurs during the winter months when there is little or no precipitation for a continuous period of seven to fourteen days. For the population of 10,410 contributing to Wastewater Treatment Plant No. 1, the EPA guideline translates into a total system flow of 1.25 million gallons per day (mgd). The average high groundwater dry weather flow at the treatment plant is 2.53 (243 gpcd) which suggests that there is groundwater infiltration contributing to the wastewater flow. During wintertime dry periods in the past five years, 7-day average flows ranged between 1.77 and 3.62 mgd as summarized in Table 3-3. Because EPA's I/I guidelines are exceeded, an analysis is performed to determine if an I/I reduction program for the City is cost effective.

Table 3-3. High Groundwater Dry Weather Flows

Period	7-Day Average Flow, mgd	7-Day Average Flow, gpcd	Total Rainfall, Inches
4/1/2000 - 4/11/2000	1.77	170	0.00
12/24/2000 - 12/31/2000	2.40	230	0.00
2/24/2002 – 3/4/2002	2.08	200	0.00
3/27/2002 – 4/7/2002	1.96	188	0.00
2/2/2003 – 2/12/2003	3.36	322	0.00
1/14/03 - 1/20/03	3.62	348	0.00
Average	2.53	243	0.00
EPA Guidelines	1.25	120	0.00

Inflow

The EPA guideline for evaluating inflow is based on the highest daily flow recorded during a storm event. The EPA suggests that inflow problems may warrant attention if the measured high daily flow is greater than 275 gpcd. For Wastewater Treatment Plant No. 1, this results in a total system flow of 2.90 mgd. A review of plant records is summarized in Table 3-4 and shows that the highest recorded daily flow was 11.4 mgd (1,094 gpcd) on December 16, 2002. The current peak day wet weather flow is estimated at 10.0 mgd (961 gpcd).

Table 3-4. Wastewater Treatment Plant No. 1
Peak Day Flows

Date	Flow, mgd	Flow, gpcd
12/16/02	11.4	1,094
1/13/00	11.4	1,093
12/13/03	11.0	1,053
12/30/02	10.8	1,034
1/6/02	9.9	950
12/15/02	9.7	931
2/26/00	9.1	874
EPA Guideline	2.9	275

COST EFFECTIVENESS ANALYSIS FOR I/I REMOVAL

The following analysis has been completed in order to meet the stipulations of the NPDES permit (Schedule D, Item 10).

Estimation of I/I Contribution to Plant Flow

Municipal wastewater can be split into three components: sanitary wastewater, base infiltration, and rainfall dependent infiltration and inflow (RDI/I). Sanitary wastewater is the wastewater produced by residents and businesses in the service area. Base infiltration is the groundwater that leaks into the collection system during periods of no rainfall and low groundwater levels. RDI/I is normally defined as the flow associated with direct inflow of rainfall and snowmelt, and infiltration due to rainfall-induced high groundwater.

In order to determine the amount of I/I in the collection system, it is first necessary to estimate sanitary wastewater flows. The City experiences lowest flows during the summer months, when little or no precipitation occurs.

These conditions are most likely to occur during July through September. Table 3-5 lists flows and rainfall for recent summer months. Based on this information, it appears that low summer flows range from 1.10 to 1.51 mgd. This is representative of the base sanitary wastewater and base infiltration flow.

Table 3-5. Summer Dry Weather Wastewater Flows

Month	Average Flow, mgd	Precipitation, inches
Jul-99	1.39	0.24
Aug-99	1.51	0.51
Sep-99	1.38	0.02
Jul-00	1.26	0.43
Aug-00	1.21	0.16
Sep-00	1.20	0.49
Jul-01	1.19	0.24
Aug-01	1.17	0.67
Sep-01	1.10	0.15
Jul-02	1.30	0.02
Aug-02	1.25	9.45
Sep-02	1.12	1.91
Jul-03	1.51	0.00
Aug-03	1.42	0.06
Sep-03	1.40	1.89

Table 3-6 lists winter wastewater flows for November through January when groundwater levels are low. These flows represent base sanitary and RDI/I flows and range from 1.59 to 4.43 mgd.

Table 3-6. Winter Low Groundwater Wastewater Flows

Month	Average Flow, mgd	Rainfall, in/mo
Nov-99	2.87	10.72
Dec-99	2.96	11.57
Jan-00	4.43	11.61
Nov-00	1.59	11.53
Dec-00	2.27	11.55
Jan-01	1.86	9.73
Nov-01	2.16	10.18
Dec-01	3.56	9.85
Jan-02	4.08	10.80
Nov-02	1.73	9.13
Dec-02	4.35	8.72
Jan-03	3.53	8.57

Typical wastewater unit flow rates for a similar size City's service area are 80 to 100 gallons per capita per day (gpcd). However, Table 3-5 equates to measured rates of 105 – 145 gpcd. The higher unit rates are likely related to the leaky collection system. A total dry-weather base flow of 120 gallons/capital/day has been established by EPA as a historical average where infiltration is not excessive (M&E pp.149) Thus, a base infiltration range of 0.5 to 2.9 mgd for the plant can be determined as the difference between the low wintertime flow (rainy season with low groundwater) and sanitary wastewater flow.

For an average annual flow of 2.4 mgd with largely residential sources and a small amount of commercial and industrial flow, the textbook sanitary wastewater peaking factor is 3.5 (Wastewater Engineering, Metcalf and Eddy, 3rd Edition, 1991). Applying this factor to the base sanitary flow range of 1.10 to 1.51 mgd gives a peak sanitary flow range of 3.9 to 5.3 mgd. RDI/I can be estimated as the difference between the peak wet weather flow (PWWF, or peak instantaneous flow) and the sum of the peak sanitary flow plus the base infiltration. The current PWWF is listed in Chapter 5 as 15 mgd; therefore, groundwater infiltration can be estimated between 9.7 and 11.2 mgd. Wastewater flow component ranges are summarized in Table 3-7.

Table 3-7. Wastewater Flow Component Ranges

Item	Low End of Range	High End of Range
Rainy season with low groundwater, mgd	1.6	4.4
Base sanitary flow, mgd	1.1	1.5
Base infiltration, mgd	0.5	2.9
Peak sanitary flow, mgd	2.8	3.8
RDI/I, mgd	8.3	11.8

Cost Effectiveness Analysis

Collection system flow monitoring data is unavailable for the City's system. However, the City has completed a separate collection system master plan (January 2006, by HBH). Bunker Hill Sanitary District identified I/I issues within their system in their 1997 Economical Development Plan. For the purposes of this analysis, a range of peak I/I flows will be considered. The range will be from moderate I/I, double the overall collection system average, or 6,500 gallons per acre per day (gpad) to high I/I, four times the overall collection system average, or 13,500 gpad. Generally, wastewater collection systems will exhibit a range of conditions where the oldest and most degraded parts of the system have a much higher amount of inflow than the newer systems. By using a range of I/I factors, the sensitivity of the analysis can be assessed. Therefore, even though specific information on the location of the worst areas is not available at this time, an assessment can be made whether such areas should ultimately be rehabilitated. For the purposes of this Facility Plan, we defer to the SSMP for collection system upgrade recommendations.

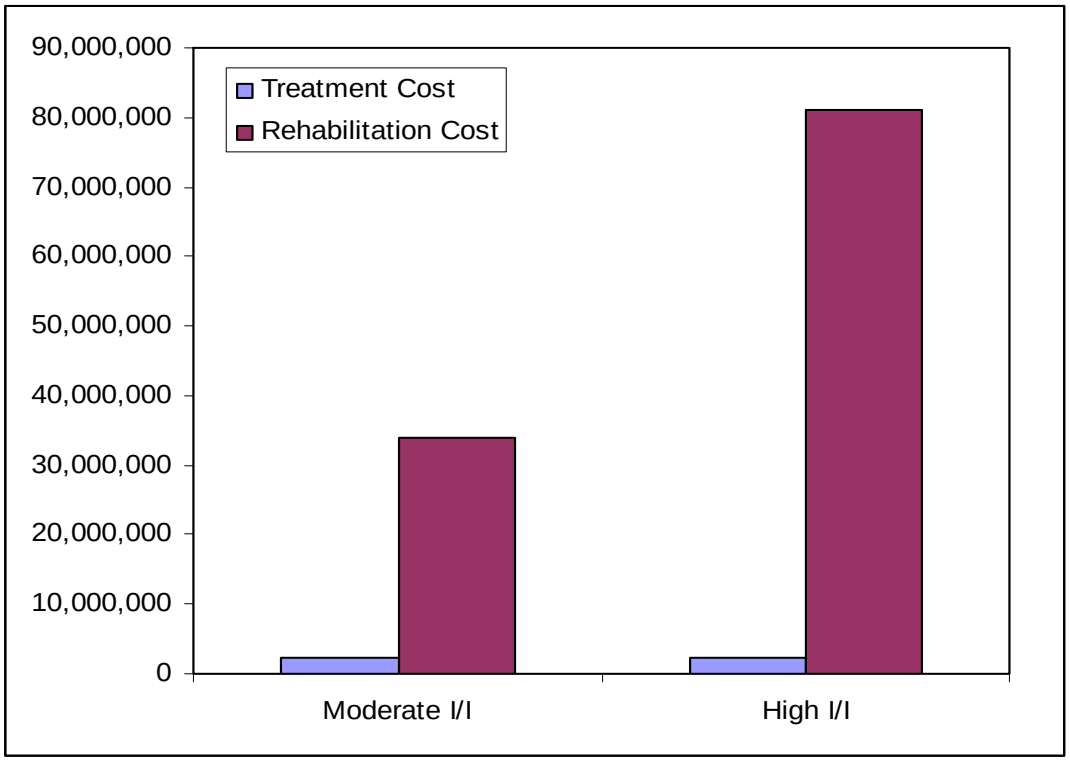
Assuming the collection system were to be completely rehabilitated, including service lateral replacement, the peak I/I could be reduced to that of a well-constructed new system, or 1,500 gpad. For a typical residential area, costs for comprehensive collection system rehabilitation are approximately $45,000 per acre. So, each acre rehabilitated would reduce peak flows by 5,000 to 12,000 gpd and would cost $45,000. The unit cost for peak I/I reduction is therefore $3.75-$9 per gpd removed.

Wastewater treatment facilities impacted by the high peak flows are the screens and grit removal basins, secondary clarification and chlorine contact basin. The estimated cost of the treatment plant improvements strictly associated with increasing treatment plant capacity is $2.4 million including engineering and contingencies. Theoretically, peak I/I can be reduced by the difference between the PWWF and peak sanitary flow, or 9 mgd, through collection system rehabilitation. If this were done, treatment plant expansion costs would be reduced by $2.4 million. Figure 3-2 shows the relative cost of rehabilitation to treating the flow for the range of I/I flow evaluated.

At $3.75 per gpd removed, reducing peak flows by 9 mgd through collection system rehabilitation would cost $34 million. At $9 per gpd, the cost would be $81 million.

While the basis for this approach is approximate, it is apparent that the cost for collection system rehabilitation to reduce peak flows would be much higher than the cost for providing the required treatment capacity.

Figure 3-2. Pipeline Rehabilitation vs. Treatment Cost



CAPACITY ASSURANCE, MANAGEMENT, OPERATION AND MAINTENANCE (CMOM)

Proper operation and maintenance of sanitary sewer systems is vital to protect public health, property, and waterways. The EPA may possibly propose a new rule in the future to support sanitary sewer overflow (SSO) control. The objectives of CMOM are briefly described below:

- Address capacity, management, operation and maintenance requirements for municipal sanitary sewer collection systems
- Minimizes SSOs.
- Establish requirements for reporting, public notification, and record keeping for discharges from municipal sanitary sewer system

Conforming to the above-proposed rules will help the City to upgrade its wastewater collection system and potentially reduce SSOs. The City currently has an Overflow Notification and Response Plan (ONRP) in place. The plan includes procedures on spill notification, location identification, notification contacts, sampling and cleanup procedures, prevention and training. CMOM will further require the City to:

- Establish general performance standards. A CMOM program will ensure that the collection system can collect and transport all base and appropriate peak flows to the City's treatment facility and, develop a procedure for notifying those who could be affected by SSO.
- Implement a management program. A management program should address the program goals; identify administrative and maintenance personnel responsible for implementing the CMOM program; establish legal authority through collection system use ordinances, service agreements, or other legally binding documents to manage flow effectively; identify existing system deficiencies and appropriately design performance requirements; and monitor the progress of the CMOM program.
- System Evaluations and Capacity Assurance Plan (SECAP). SECAP will identify deficient parts of the collection system and prioritize maintenance programs to assure that the collection system has sufficient capacity.
- Submit to periodic audits of the CMOM program. CMOM will require regular, comprehensive audits, done by the City's personnel. These audits will help identify non-compliance of CMOM regulations so problems can be addressed quickly. All findings, proposed corrective actions, and upcoming improvements, should be documented in the audit report.

CONCLUSIONS

While it is clear that a comprehensive program to remove I/I would not be cost effective (versus increasing treatment capacity), the City should nevertheless implement a program of I/I identification and elimination as part of their overall maintenance and CIP program. The following program elements are recommended:

- Limited flow monitoring in areas with suspected high I/I.
- Systematic sewer televising to identify problem areas.
- A user-friendly collection system maintenance management program that provides a comprehensive database of the system; provides locations and descriptions of I/I sources and structural defects; and helps with work orders, customer complaint tracking, and generates system management.
- Repair of structural defects and leaks as part of street reconstruction projects.
- Elimination of other significant I/I sources as funds and staff are available.
- Development of a collection system master plan. (Completed in January 2007).

CHAPTER 4. EXISTING WASTEWATER TREATMENT FACILITIES

A review of the city of Coos Bay's existing wastewater treatment facilities forms the framework for the development of a long-term plant upgrade strategy. Analysis of historical plant operating data can reveal any ongoing performance deficiencies. Identification of the design capacity of each existing unit process can indicate the need to expand facilities when compared to the projections of future flows and loads. In addition, the existing facilities information allows for the determination of how new facilities can be best integrated into the system to achieve long-term upgrade requirements.

TREATMENT PLANT DESCRIPTION

The Coos Bay Wastewater Treatment Plant No. 1 is owned by the City of Coos Bay, and is managed and operated by Operations Management International, Inc. (OMI). Located on the east side of the City on 6th Avenue just off of Highway 101, Wastewater Treatment Plant No. 1 serves the east side of Coos Bay and the Bunker Hill Sanitary District. The plant was originally built in 1954 as a primary treatment plant for combined sanitary sewage and stormwater. Secondary treatment was added in 1973. The plant was extensively upgraded in 1990 to provide Class I mechanical and electrical reliability up to an instantaneous peak hydraulic flow of 15 million gallons per day (mgd) under the National Discharge Elimination system (NPDES) permit. At that time new headworks, primary clarifier and second secondary clarifier were added to the plant. The existing secondary clarifier was converted to a chlorine contact basin and the existing primary clarifier was converted into a sludge thickening tank. Plant treatment processes now include screening, grit removal, primary sedimentation, activated sludge secondary treatment, secondary clarification, disinfection, dechlorination, and anaerobic digestion of sludge.

The existing layout of Wastewater Treatment Plant No. 1 is shown in Figure 4-1. The site is bordered by 6th Street to the east, 8th Street to the west, Ivy Avenue to the south and Coos Bay Boulevard to the north.

Table 4-1 outlines the design data for the existing treatment units and major equipment. Figure 4-2 shows a flow schematic of Wastewater Treatment Plant No. 1 and Figure 4-3 show a plant flow schematic. The functions of the unit processes are described in the following sections.

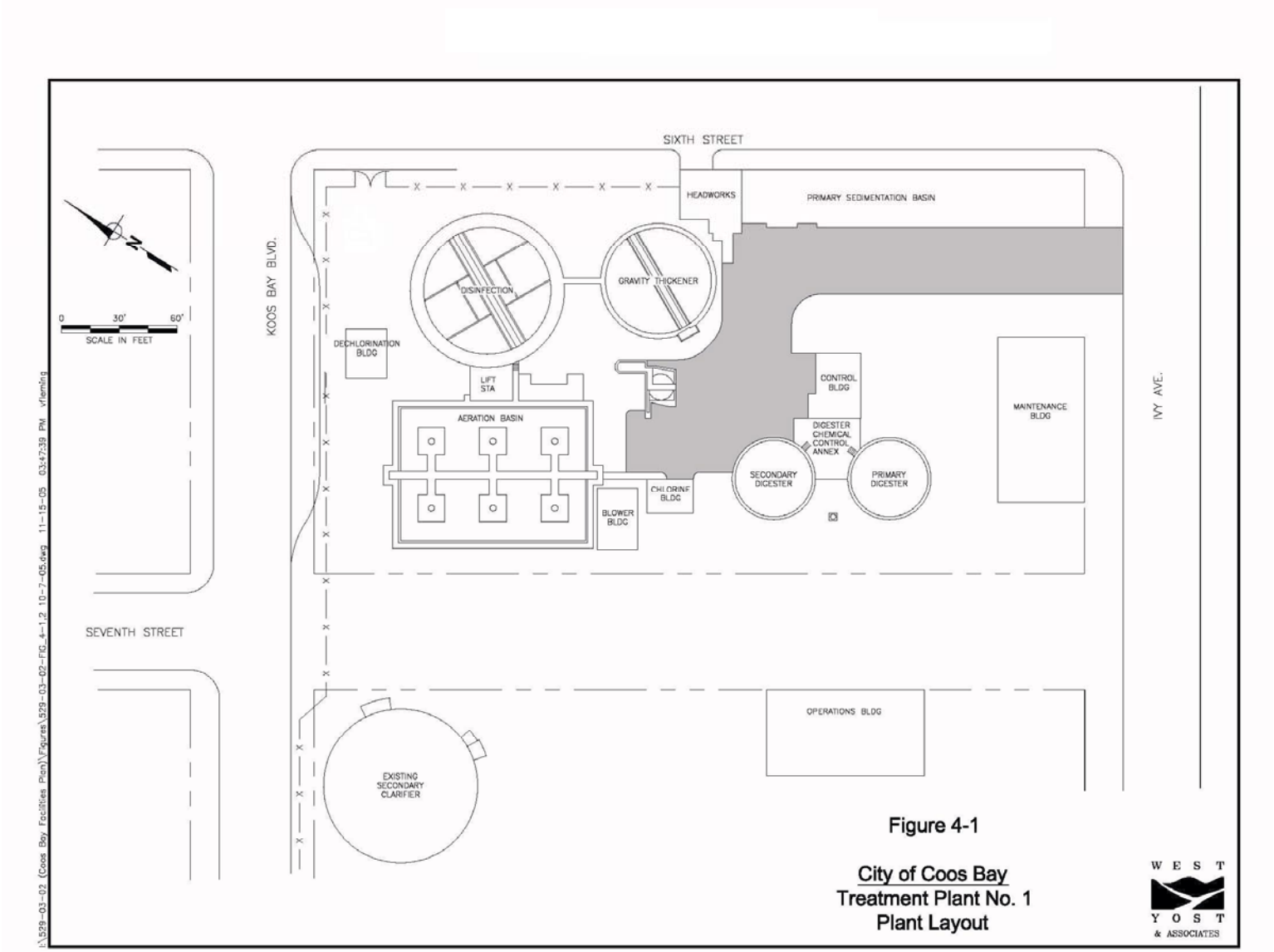


Figure 4-1. Layout of Treatment Plant No. 1

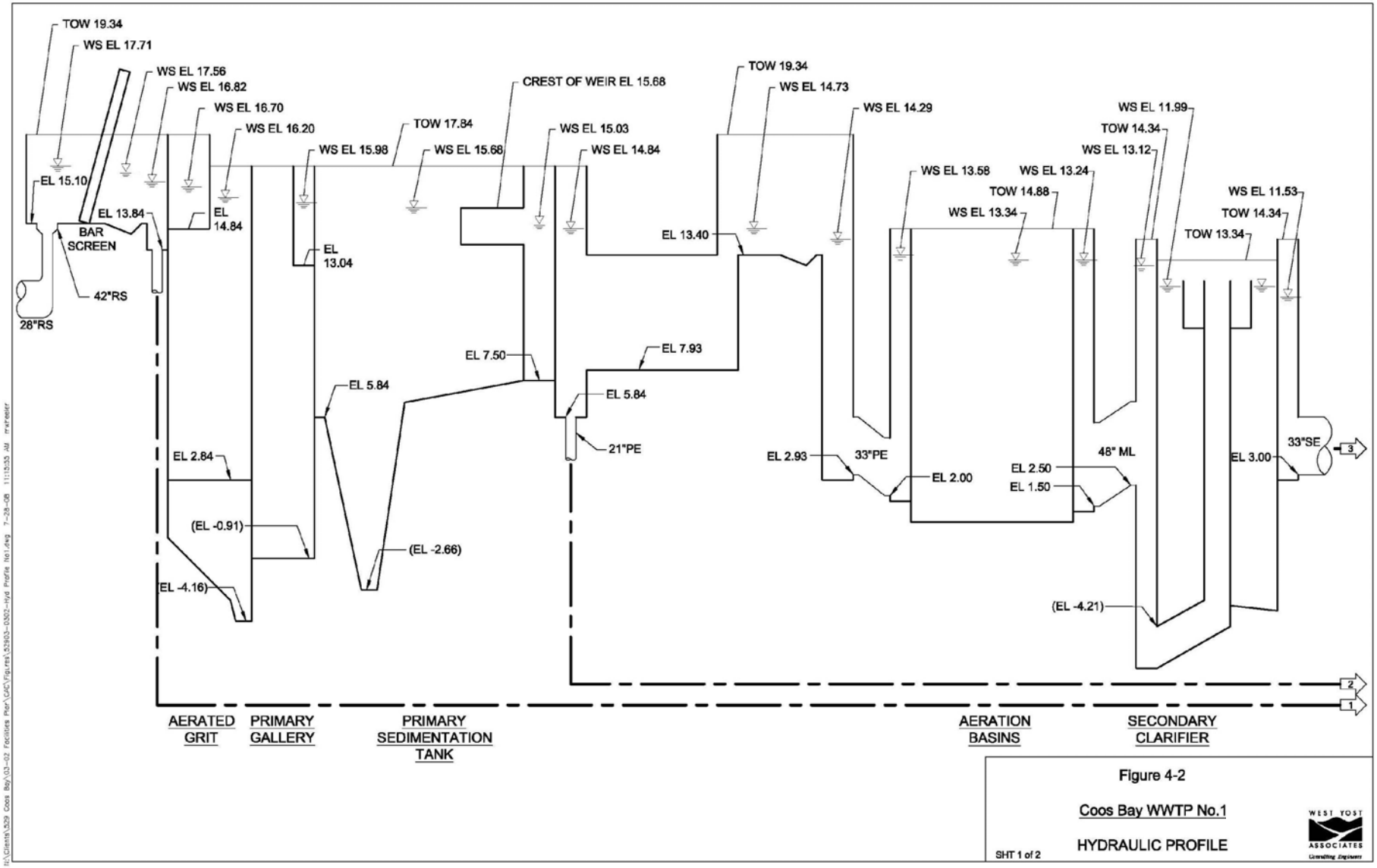


Figure 4-2. Hydraulic Profile

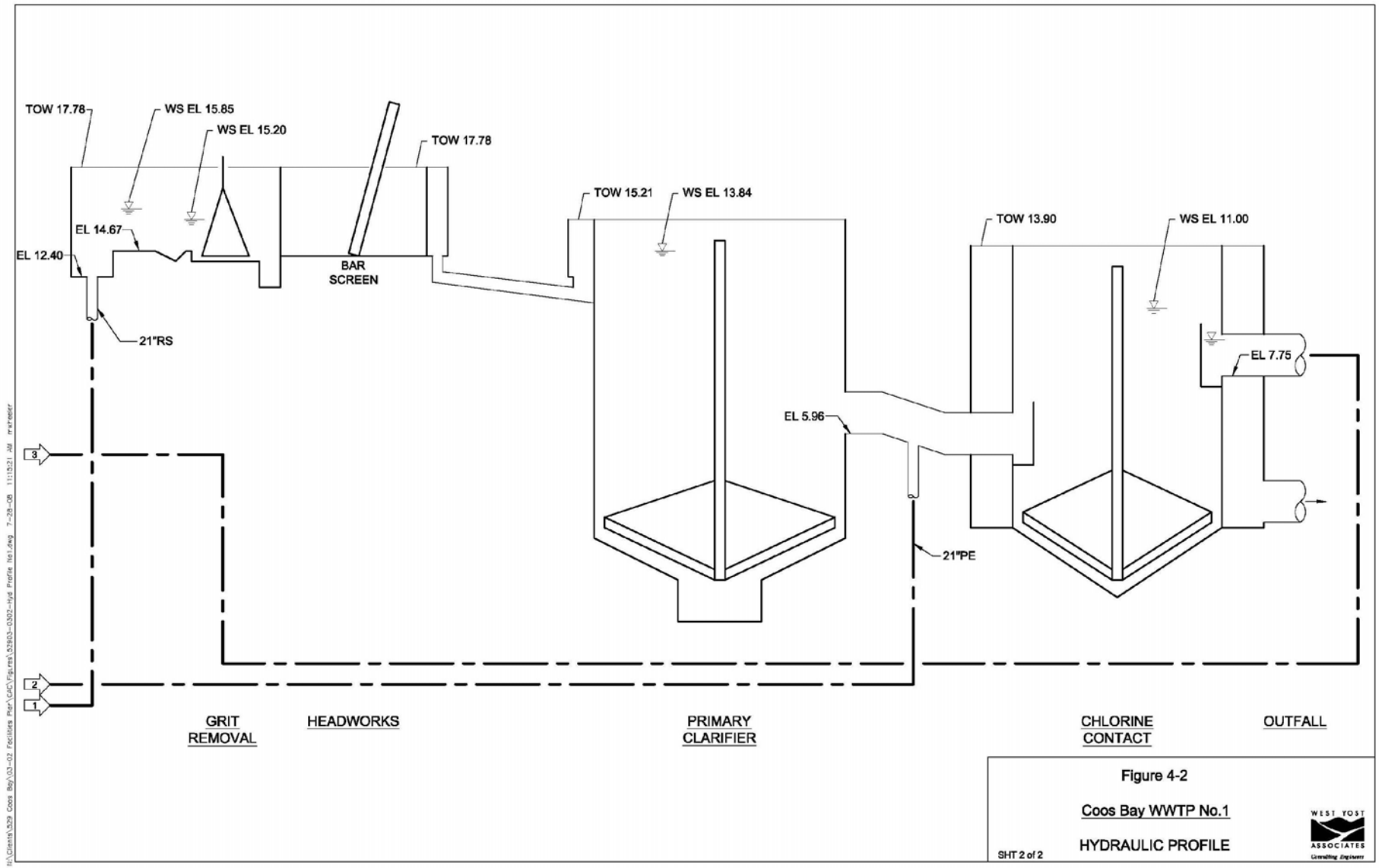


Figure 4-2. Hydraulic Profile, cont'd…

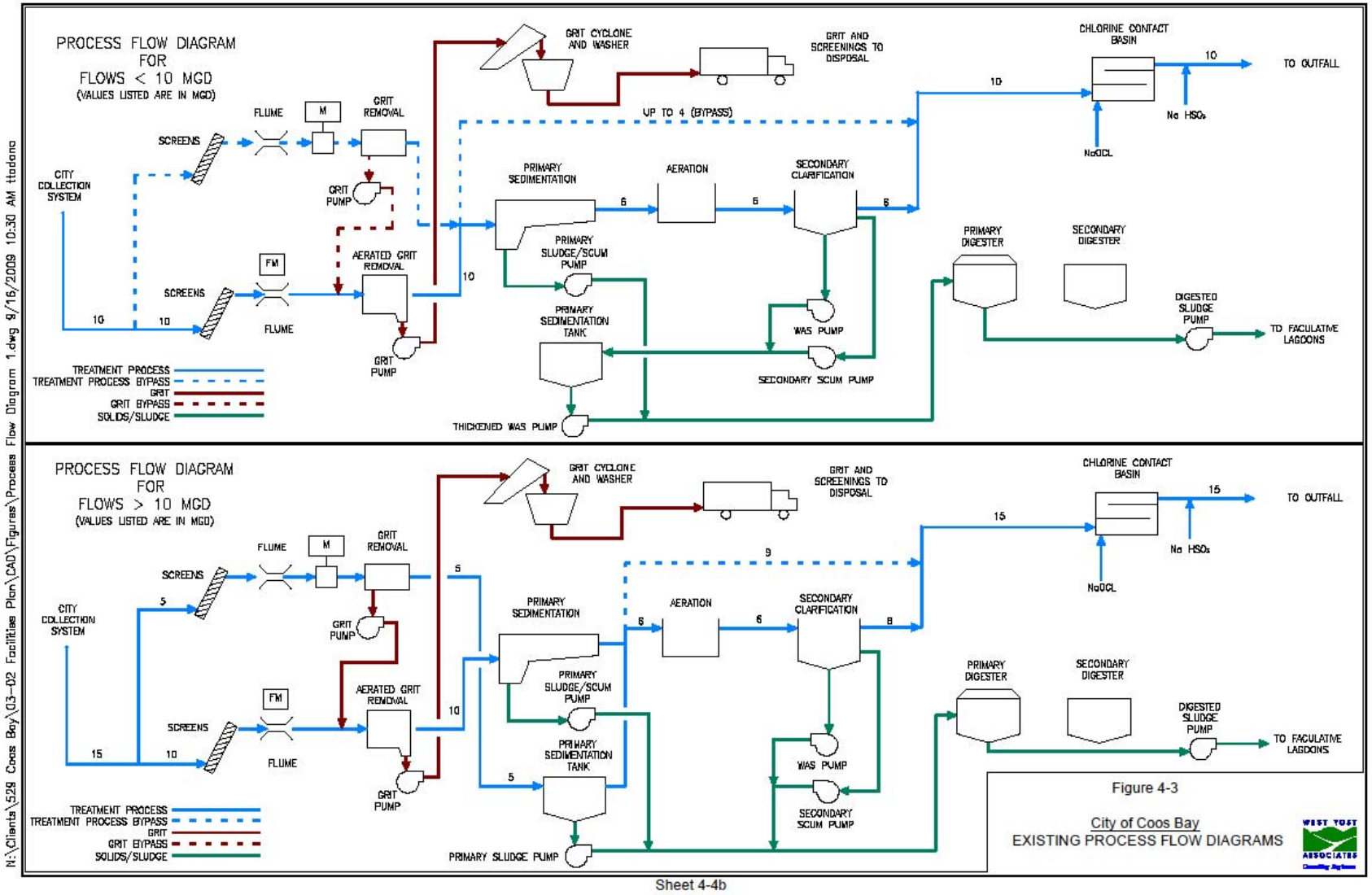


Figure 4-3. Existing Process Flow Diagrams

Table 4-1. Design Data for the Existing Wastewater Treatment Plant No. 1

Description	Value
GENERAL DESIGN CRITERIA	
Design Flows, mgd	
Average Dry Weather (ADWF)	2.9
Maximum Month (MMF)	4.9
Maximum Day (MDF)	9.6
Peak Wet Weather Flow (PWWF)	15.0
Split-stream Treatment, mgd	
Primary Treatment and Disinfection Capacity	15
Secondary Treatment Capacity	6
Design Loadings, lbs/day	
BOD Loading	
Average	2,670
Maximum Month	3,870
Total Suspended Solids Loading	
Average	3,410
Maximum Month	5,170
PRELIMINARY TREATMENT	
Old Headworks (Not in-use)	
Existing Grit Chamber	
Number	1
Capacity, mgd	5
Grit Transfer Pump	
Number	1
Type	Centrifugal
Capacity, gpm	270
Headworks (In-use)	
Mechanical Bar Screen	
Number	1
Type	Front Cleaned Climber
Bar Spacing, in.	0.75
Manual Bar Screen	
Number	1
Bar Spacing, in	1.5
Screenings Compactor	

Description	Value
Number	1
Capacity, cubic feet/hour	34
Upper Screw, HP	1
Lower Screw, HP	3
Aerated Grit Tank	
Number	1
Capacity, mgd	10
Grit Pumps	
Number	2
Capacity, each, gpm	270
Grit Cyclone	
Number	1
Capacity, gpm	270
Grit Washer	
Number	1
Capacity, gpm	30
FLOW MEASUREMENT	
Number	2
Type	Parshall Flume
Size, in.	18
Number of Transmitters	1
PRIMARY TREATMENT	
Primary Sedimentation	
Circular Primary Sedimentation Basin (Used as Secondary MLSS Sludge Thickener)	
Number	1
Diameter, ft	54
Overflow Rate, gpd/sf	
ADWF	700
PWWF	2,180
Rectangular Primary Sedimentation Basin	
Number	1
Width, ft	21.5
Length, ft	145
Overflow rate, gpd/sf	

Description	Value
ADWF	930
PWWF	3,210
Primary Sludge Pumps	
Number	2
Type	Rotary Lobe
Capacity, *each, gpm*	50
Primary Scum Pump	
Number	1
Type	Rotary Lobe
Capacity, gpm	50
Thickened WAS Pump	
Number	1
Type	Piston
Capacity, gpm	60
FLOW MEASUREMENT	
Quantity	1
Type	Parshall Flume
Size, in.	18
INTERSTAGE PUMPING STATION	
Lift Pumps	
Quantity	3
Type	Centrifugal
Capacity, each, mgd	2.7
RAS Pumps	
Quantity	3
Type	Centrifugal
Capacity, each, gpm	625
SECONDARY TREATMENT	
Aeration Basins	
Number	2
Width, each, ft	34
Length, ft	96
Sidewater Depth, ft	15.5
Total Volume, gal	757,000
MLSS concentration, mg/L	2,000

Description	Value
Hydraulic Detention Time, hours	
ADWF	6.3
Maximum Flow	3.0
Diffuser Type	Fine Bubble Tubes
Blowers	
Number	3
Type	Centrifugal
Capacity, each, scfm	1,200
Pressure, psi	8.0
Secondary Clarifier	
Number	1
Diameter, ft	80
Side water depth, ft	16
Overflow rate, gpd/sf	
ADWF	580
Maximum Flow	1,200
RAS Pump	
Number	2
Type	Centrifugal
Capacity each, gpm	1,500
WAS Pump	
Number	1
Type	Centrifugal
Capacity, gpm	360
Secondary Scum and Tank Drain Pump	
Number	2
Capacity, each, gpm	340
CHLORINATION AND DECHLORINATION	
Chlorination Facilities	
Type	Sodium Hypochlorite
Contact Tank	
Number	1
Volume, gal	370,000
Hydraulic detention time, minutes	
ADWF	333

Description	Value
PWWF	36
Sodium Hypochlorite Storage Tanks	
Number	2
Total Storage Volume, gal	3,600
Feed pumps, number	
Number	3
Type	Diaphragm
Capacity, each, gph	20
Dechlorination Facilities	
Type	Sodium Bisulfite
Sodium Bisulfite Storage Tanks	
Number	2
Volume	1,500
Feed pumps	
Number	2
Type	Diaphragm
Capacity, each, gph	12.7
Mixer	
Number	1
Type	Vertical
Motor Size, Hp	5
OUTFALL	
Length, ft	715
Diameter, in	42
Diffuser, number of ports	5
ANAEROBIC DIGESTION	
Primary Digester	
Number	1
Diameter, ft	45
Depth, ft	26
Volume, gal	331,150
Hydraulic detention time, days	17
Digester Mixing	Mechanical
Mixer Size, Hp	15
Secondary Digester	

Description	Value
Number	1
Diameter, ft	40
Depth, ft	26
Total volume, gal	253,660
Hydraulic detention time, days	13
Digester Mixing	
Type	Gas Circulation Compressor
Capacity, cfm	150
Operating pressure, psig	15
Heat Exchanger	
Number	2
Type	Spiral
Recirculation Pump	
Number	2
Type	Recessed Impeller
Capacity, each, gpm	150
Sludge Transfer Pump	
Number	1
Capacity, gpm	450
Waste Gas Burner	
Number	1
Capacity, cfh	5,800
BIOSOLIDS STORAGE	
Facultative Sludge Lagoon	
Surface Area, acres	4
Depth, ft	11
UTILITIES	
Nonpotable Water	
Low Pressure Pump	
Number	1
Type	Centrifugal
Booster Pump	
Number	1
Type	Centrifugal
Plant Water Pumps	

Description	Value
Number	2
Type	Centrifugal
Emergency Generator	
Size, kW	200
Fuel	Diesel

FLOW CONTROL STRATEGY

Wastewater Treatment Plant No. 1 is operated in several modes depending on the influent flow rate as summarized below:

- When the influent flow rate is less than 6 mgd, all flow receives full preliminary, primary and secondary treatment, disinfection and dechlorination. The new headworks and the rectangular primary sedimentation basin are used.
- When the influent flow rate is between 6 and 10 mgd, all flow receives preliminary treatment and primary treatment using the rectangular sedimentation basin. Up to 6 mgd receives secondary treatment. Primary effluent over 6 mgd goes directly to the chlorine contact chamber for disinfection, dechlorination and discharge.
- When the influent flow rate exceeds 10 mgd, 10 mgd receives preliminary treatment in the new headworks and primary treatment in the rectangular primary sedimentation basin. After primary treatment, 6 mgd of flow is directed to secondary treatment and 4 mgd flows directly to the chlorine contact basin. Flow in excess of 10 mgd is treated in the old headworks and the older circular primary sedimentation basin. All flow up to 15 mgd is disinfected in the chlorine contact basin and dechlorinated before discharge.

  Redundancy:

  - When flow rate is less than 2.5 mgd, the old circular primary sedimentation basin and/or old headworks are used during maintenance of similar unit processes.

RELIABILITY/REDUNDANCY CRITERIA

Reliability/redundancy criteria were developed for the major unit processes at the Coos Bay WWTP No. 1. System reliability and redundancy classifications and requirements for wastewater facilities were established by the EPA and are described in the EPA's Technical Bulletin "Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability" EPA (430-99-74-001). These requirements are intended to maintain a minimum level of treatment if there is a process component failure. The Coos Bay WWTP No. 1 is a Class I facility as defined in the EPA criteria because its discharge:

1. Is into public water supply, shellfish, or primary contact recreation waters, or
2. As a result of its volume and/or character, could permanently or unacceptably damage or affect the receiving waters or public health if normal operations were interrupted.

The criteria for reliability/redundancy applicable to the Coos Bay No. 1 WWTP and the design features that address these criteria are summarized in Table 4-2.

TREATMENT PROCESS DESCRIPTION

Headworks

The headworks were expanded in 1990. The old headworks consist of a rectangular grit chamber that is currently used only when the flow rate exceeds 10 mgd. When the level of flow in the new bar screen channel exceeds a preset level, a gate is opened which directs excess wastewater to the old headworks. The signal is interlocked so that when the gate opens, the grit collector in the old grit chamber and the grit transfer pump start. The grit transfer pump sends grit to the aerated grit tank in the new headworks.

Headworks

The new headworks consist of a front cleaned, mechanical bar screen that is 4.5 feet wide with ¾-inch openings. A manual bar screen is located in a bypass channel. The material accumulated on the screens is collected in a screenings compactor and discharged to a dumpster for landfill disposal. The influent flow rate is measured in a Parshall Flume downstream of the screens.

Operators report that there is significant rusting of equipment, covers and conduits in the headworks area. The transducers on the flumes are old and in need of replacement.

Grit Removal

Following screening and measurement, wastewater flows into an aerated grit tank that is 15 feet deep, 17.5 feet long and 11 feet wide and contains two chambers. Grit is pumped alternatively from the chambers about every thirty minutes. The cycle begins with agitation air and non-potable water (NPW) being added for grit suspension. After a pre-set interval, a grit pump conveys the grit slurry into a cyclone separator. Following separation in the cyclone, the grit is dewatered and discharged to a dumpster for disposal.

Grit from Wastewater Treatment Plant No. 2 is trucked to the grit chamber for processing and subsequent hauling to the landfill.

Table 4-2. Process Reliability/Redundancy Criteria

Process	EPA Requirements[1]	Coos Bay WWTP No. 1 Design
INFLUENT PUMP STATION		
	Parallel pumps with ability to pump maximum day flow with single largest unit out of service, and peak wet weather flow with all units in service.	Parallel pumps with ability to pump maximum day flow with single largest unit out of service, and peak wet weather flow as defined in the plant design criteria with all units in service.
PRELIMINARY TREATMENT		
Screening System	At least two screens must be provided. WWTPs with only two bar screens must have one bar screen designed to permit manual cleaning.	Parallel screens sized to pass peak wet weather flow with all units in service.
Grit Removal System	Where a single grit removal unit is utilized, a bypass must be provided.	One grit basin sized to pass the peak wet weather flow is provided with a bypass channel.
PRIMARY TREATMENT		
Primary Clarifiers	Parallel clarifiers designed for maximum month wet weather flow with all units in service. Redundant clarifier provided for maximum month dry weather flow.	Single clarifier is designed for peak wet weather flow.
Primary Sludge/Scum Pumps	Parallel pumps with ability to pump maximum sludge load with single largest unit out of service.	Parallel pumps with ability to pump maximum sludge load with single largest unit out of service.
SECONDARY TREATMENT		
Aeration Basins	At least two equal volume basins shall be provided.	Two equal volume basins are provided to treat the primary effluent flow.
Aeration Blowers/Mechanical Aerators	There shall be a sufficient number of blowers to enable the design oxygen transfer to be maintained with the largest capacity unit out of service. The backup unit may be uninstalled, provided that the installed unit can be easily removed and replaced. At least two units shall be installed.	Three centrifugal blowers are provided of which two may be run at a time.
Secondary Clarifiers	There must be at least two units designed so that, with the largest capacity unit out of service, the remaining unit(s) can handle at least 75% of the design flow.	Two clarifiers designed to handle peak wet weather flow with all units in service. The small clarifier alone can handle 2.2 mgd at peak overflow rate.

Table 4-2. Process Reliability/Redundancy Criteria, cont'd...

Process	EPA Requirements[1]	Coos Bay WWTP No. 1 Design
DISINFECTION		
Chlorine Contact Basins	The basins shall be sized such that with the largest flow capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow to that unit operation.	One basin with a minimum contact time of 30 minutes during peak wet weather flow conditions is provided. During average conditions, a portion of the basin can be taken out for service for maintenance.
SOLIDS TREATMENT		
Anaerobic Digestion	At least two digestion tanks shall be provided.	Two digesters are provided. One digester is used for storage.
Biosolids Storage	Biosolids Storage	Designed for 6 months wet weather storage

Notes:

1. "Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability" EPA Technical Bulletin No. 430-99-74-001.

Primary Treatment

Rectangular Primary Clarifier

The rectangular primary sedimentation tank is 145 feet long, 21.5 feet wide and has an average side water depth of 9 feet. The rectangular sedimentation tank has a flat bottom and standard scraper assembly for sludge removal.

The older circular primary sedimentation basin is 54 feet in diameter and 10 feet deep. The basin is original to the plant and was converted to a sludge thickener in the 1990 expansion. The circular sedimentation basin has a sloped bottom with circular scraper and sludge collection hopper. It is used as a primary sedimentation basin when flows exceed 10 mgd. When the influent flow rate is between 2.5 and 10 mgd, waste activated sludge (WAS) and primary sludge are thickened in this tank. The sludge is co-thickened to about 2% solids. Primary sludge, scum and WAS are pumped to the digesters on a pre-set timer. The primary sludge pump is a piston pump that is original to the plant.

Activated Sludge

Up to 6 mgd of primary effluent flows through a Parshall Flume to two aeration basins. The basins are equipped with baffles to allow operation in plug-flow or step-feed modes. Each basin is separated into four zones. In the current operating mode, the first two zones act as selectors. RAS is fed into the first two zones and primary effluent is fed into the third zone. Three centrifugal blowers supply air to the basin. Air is fed to the aeration basins through Parkson membrane tube diffusers. The process is operated at an MLSS concentration of 2000 mg/l.

Dewatered Aeration Basin

Secondary Clarification

Secondary Clarifier

The treatment plant's single flat bottom secondary clarifier is 80 feet in diameter and 16 feet deep. The basic clarifier configuration consists of a center-feed well with perimeter overflow V-notch weirs. The clarifier mechanisms draws sludge into a central pit where suction lines draw off the return activated sludge (RAS). The secondary effluent leaves the clarifiers via a 33-inch line and the settled solids are removed by RAS and waste activated sludge (WAS) pumps. The WAS is pumped to the old circular primary sedimentation tank for thickening via modified flexible tubing. Secondary scum is conveyed to the old circular primary clarifier with the old tank drain pump.

Interstage Pumps

The interstage pump station consists of 3 centrifugal pumps, each with capacity of 1,850 gpm. The pumps are operated as drain pumps for the aeration basins.

It should be noted that components such as conduits and electrical boxes are rusting throughout the interstage pump station.

Chlorination/Dechlorination

The chlorine contact basin is a 68-foot diameter retrofitted secondary clarifier equipped with over and under baffles to enhance plug flow conditions. Flow is fed peripherally and exits at V-notch weirs near the center of the tank.

Sodium hypochlorite is used to disinfect secondary effluent. Sodium hypochlorite is diluted with treated effluent and fed into the 33-inch secondary effluent pipe as it enters the chlorine contact basin. The sodium hypochlorite solution is fed through a perforated PVC pipe and there is a coarse bubble diffuser to provide mixing. Contact time in the basin is 36 minutes at peak wet weather flow. Chlorine is paced off of the influent flow meter.

Chlorine Contact Basin

Dechlorination facilities consist of sodium bisulfite metering pumps; storage tanks with spill containment, and feed piping and a mixer. The bisulfite is injected at the chlorine contact basin overflow weir. Plant effluent is sampled for chlorine residual in a manhole in the outfall pipe prior to discharge into the Coos Bay. Dechlorination has compound loop control using the influent flow rate and sulfite residual as inputs.

The existing system does not meet current DEQ design requirements for mixing of the chlorine with the effluent, redundancy nor the configuration to prevent short circuiting. As plant modifications are planned, DEQ will require upgrading of the disinfection system.

Outfall

Treated effluent is discharged into Coos Bay at the eastern end of Coos Bay Boulevard at River Mile 13.2. The outfall consists of a 42-inch lined and coated steel pipe with a 20-foot five-port diffuser. The pipe is approximately 715 feet long and discharges 200 feet from the shore at an approximate depth of 20 feet. The outfall is a combined outfall with 12- and 24-inch storm drains connecting to the treatment plant effluent pipe at a vault at the intersection of Coos Bay Boulevard and 6th Street. Operators have noted that an overflow occurs at this location during high storm events. The overflow is likely due to the heavy storm water flow into the outfall. The condition of the outfall pipe is poor and some of the structural supports are missing. A temporary (emergency) repair of the outfall pipe has been completed due to a pipe separation. A pre-design report for complete replacement of the outfall pipe and diffusers was prepared in May 2006 by The Dyer Partnership Engineers & Planners, Inc. The pre-design collection system flows from WWTP #1 effluent by constructing separate outfall pipes for each flow.

Anaerobic Digestion

The plant has two anaerobic digesters, one 40 feet in diameter and one 45 feet in diameter. The 45-foot diameter tank, the primary digester, is equipped with a floating cover. The smaller tank, the secondary digester, has a fixed cover. The secondary digester is currently neither heated nor mixed and is used for storage prior to the sludge being pumped to lagoon for storage. A boiler and heat exchanger provide heat for the primary digester. Sludge is circulated with two recessed impeller pumps. Gas not used for digester heating is sent to a waste gas burner.

Primary Digester Floating Cover

The floating cover on the primary digester sunk into the tank several years ago and has been temporarily repaired. The handrails around both tanks are rusted. The rail around the secondary digester has broken. Operators report that controls on the boiler are not reliable and the temperature control valves on the hot water line into the heat exchanger do not function correctly. The electrical system in the control building is old and windows are cracked. The waste gas burner is in poor repair and not used consistently.

Biosolids Drying and Disposal

Digested sludge is pumped to the City's facultative sludge lagoon for curing and storage. The bentonite clay- lined lagoon has a surface area of approximately 4 acres, is 11 feet deep, and contains two inlet ports. Supernatant from the lagoon is aerated and pumped to the City sewer system for return to the treatment plant. A floating dredger reaps the sludge which is land applied to approximately 250 acres of DEQ- approved private farmlands and forest sites between June and October each year.

Plant Utilities

The treatment plant has the following utility systems:

- **Non-potable Water (3W) Pumps.** Four pumps provide non-potable water for in-plant uses. One pump provides water for general use. Two booster pumps provide high-pressure flow for wash down and irrigation, and one pump is dedicated to providing dilution water to the hypochlorite feed system.
- **Standby Power.** A 200 kW generator with fuel storage is available for use in the event of a power outage. The generator was installed in 1997 and an automatic transfer switch was installed in 2003. The generator is capable of supplying power to the entire plant.

UNIT PROCESS CAPACITY

The capacities of each unit process was estimated based on calculations and information available in operating manuals and are summarized in Table 4-3.

Table 4-3. Unit Process Capacity Summary

Unit Process	Basis for Capacity	Design Criteria	Total Estimated Capacity
Bar Screen	PWWF	Screen Head loss	15 mgd
Aerated Grit Chamber	PDF	HRT at PDF: 3 minutes	10 mgd
Primary Sedimentation	PWWF	Rectangular: 3500 gpd/sf Circular: 3000 gpd/sf	17 mgd
Aeration Basins	SRT at Max Month Load HRT at Max Month Flow	4 days SRT 4 hours HRT	3475 lb/day BOD[1] 4.5 mgd
Aeration System	BOD loading	1.1 lb O2/lb BOD 20% SOTE	3030 lb/d BOD[1]
Secondary	Peak Flow to Secondary	1200 gpd/sf	6 mgd

Unit Process	Basis for Capacity	Design Criteria	Total Estimated Capacity
Clarification	Treatment		
Chlorine Contact Basin	PWWF	30 minute contact time	17 mgd
Outfall	PWWF	100 year flood elevation of 9.0	15 mgd
RAS Pumping	25% Peak Flow to Secondary Treatment	Firm Capacity	2.2 mgd
Anaerobic Digestion	Hydraulic Detention Time at Max Month Loading	17 days	14,000 gal/d
Lagoon	Average Organic Loading, lbVSS/ksf/day	20 lb VSS/ksf/day	3500 lb VSS/day

(1) Load to secondary treatment. Capacity does not take into account uptake by nitrification.

The following sections provide additional information on the capacity evaluation for each unit process.

Bar Screen

The headworks includes one mechanical bar screen and a manual bar screen. The capacity of the screens is typically calculated based on the mechanical bar screen only with the manual bar screen reserved for back-up service. The manual bar screen has wider bar spacing which allows more debris into downstream processes and is therefore only used for flows above the hydraulic capacity of one mechanical screen when the mechanical bar screen must be bypassed.

The mechanical bar screen is rated at 15 mgd according to design drawings. At 15 mgd, the velocity through the bars, assuming 35% blinding, is calculated to be approximately 5.2 fps and the head loss is approximately 0.5 feet. The recommended velocity range is 1 to 4 feet per second so at peak flow the screen's effectiveness is reduced. However, the influent under these conditions is dilute (combined stormwater & sewage) and the higher velocities are allowable for brief periods under these conditions. The head loss through the screen is such that the flow is well below the operating floor upstream of the screen at peak flow.

Aerated Grit Chamber

The aerated grit chamber capacity is rated at 10 mgd. Flow in excess of 10 mgd is routed to the old grit chamber but the grit is pumped back to the new aerated grit chamber. Also, grit from Treatment Plant No. 2 headworks is added to the aerated grit chamber for processing. A minimum hydraulic detention time at peak flow of 3 minutes is recommended. At 10 mgd, detention time is approximately 3 minutes.

Primary Sedimentation

The primary sedimentation tank capacity is based on the surface overflow rate. Generally, a higher overflow rate can be allowed to a rectangular tank than a circular basin. Using the criteria listed in Table 4-3, the capacity of the rectangular basin slightly exceeds 10 mgd and the capacity of the circular tank is 6.9 mgd for a total primary sedimentation capacity of 17 mgd.

Aeration Basins

Aeration basins that treat municipal wastewater are typically designed based on solids retention time (SRT) and, to a lesser extent, hydraulic retention time (HRT). To maintain an SRT of 4 days at a mixed liquor suspended solids (MLSS) concentration of 2,000 milligrams per liter (mg/l), the influent BOD load to the aeration basins would be approximately 4340 lbs/day at maximum month conditions. Capacity could be increased by increasing the MLSS concentration.

HRT is a secondary design criterion that serves as a check of SRT. In general, a 4-hour HRT at maximum month flow is considered reasonable. However, HRTs of as low as 3 hours are acceptable provided the SRT is maintained within limits. A flow of 4.5 mgd to the aeration basin yields an HRT of 4 hours. At 6 mgd, the peak design flow to the aeration basin, the HRT is 3.0 hours.

Aeration System

The capacity of the aeration equipment is based on its estimated oxygen transfer rate and the oxygen requirements of the wastewater. Based on a 20% standard oxygen transfer efficiency (SOTE) and oxygen requirements of 1.1 lb of oxygen per lb of BOD, the allowable BOD to the aeration basins is 3475 lb/day. The calculation does not take into account some oxygen uptake due to nitrification that is known to occur in the summer months. The uptake by nitrification that currently occurs in summer months reduces the capacity of the system to approximately 2260 lb/day BOD. Current aeration capacity = 3 @ 1,200 scfm (from Table).

Secondary Clarification

The surface overflow rate at the maximum flow condition is typically the criteria considered for secondary clarifier capacity. A typical value for a circular secondary clarifier is 1200 gpd/sf. Above this overflow rate, performance will begin to decline. At 6 mgd, the rated maximum flow to the secondary treatment system, the overflow rate of the secondary clarifier is 1200 gpd/sf.

Chlorine Contact Basin

The capacity evaluation of the chlorine contact basin is based on the proper hydraulic detention time and optimum dimensions to achieve acceptable disinfection. Baffling in the converted secondary clarifier provides an increased length-to-width ratio although the configuration is not ideal for a contact basin. The existing system can achieve adequate disinfection for the current permit requirements but will need improvements should more stringent requirements be implemented.

The disinfection system should be sized based on peak hour flow. The contact chamber should have 15 minutes of contact time at peak hour flow, 20 minutes at peak day flow and 60 minutes at average dry weather flow.

Outfall

The existing outfall serves as an outfall for both the wastewater treatment plant and the stormwater system. The 100-year flood elevation in the area is 9.0 feet above mean sea level (MSL) according to the 1990 design documents. If manhole lids were bolted as shown in the 1990 upgrade plans, the overflow point would be the chlorine contact basin weir at about elevation 11.0.

Currently, operators have reported overflows out of a manhole in the intersection of Coos Bay Blvd & 6th St. due to high stormwater flows combining with effluent at this location.

Return Activated Sludge Pumping

The firm capacity of the RAS pumping system is based on the capacity of the system with the largest pump out of service. Assuming the second pump, which is also used for WAS, could also be used for RAS pumping, the capacity is 1860 gpm. This estimate is based on the reported rated capacity of each pump.

Anaerobic Digestion

The capacity of the anaerobic digestion facilities was evaluated based on solids retention time criteria. To reduce pathogens and vector attraction adequately, the digesters need to provide a mean cell residence time of 15 days at a temperature between 35ºC and 55ºC.. Based on the volume of the primary digester, the digesters are operating at capacity and plant data confirm that the digesters are operating near capacity.

Facultative Lagoon

The lagoon acts as a storage facility for stabilized sludge. The loading rate to the lagoon should be kept below 20 lb volatile solids/1000 square feet (sf) of lagoon surface area per day to avoid odors, although in the summer months, the loading rate can be increased for short periods of time. The lagoon receives digested sludge from both plants. With four acres of surface area, it has the capacity to receive 3500 lb VSS/day. It is currently loaded at an annual average rate of 600 lb VSS/day.

WASTEWATER TREATMENT PLANT PERFORMANCE

A review of recent plant influent and effluent quality data is useful for characterizing the current performance of the wastewater treatment system. As shown in Table 4-4, the treatment plant produced high quality effluent in 2005.

Table 4-4. 2005 Plant Performance Summary

Month	Influent Flow, mgd		Effluent Concentration, mg/l			
			BOD		TSS	
	Average Day	Maximum Day	Average Day	Maximum Day	Average Day	Maximum Day
January	2.89	5.66	8.26	11.90	7.14	8.40
February	1.86	2.19	8.01	9.70	6.35	11.20
March	2.17	5.27	9.49	11.60	8.22	18.80
April	2.60	3.63	6.85	9.40	3.58	4.90
May	2.27	4.88	9.42	12.60	5.71	16.80
June	1.72	2.40	9.77	11.80	4.01	8.50
July	1.40	1.52	10.58	12.10	6.53	12.40
August	1.36	1.43	7.93	10.90	5.96	7.60
September	1.32	1.46	10.30	15.80	4.60	7.40
October	1.42	1.99	8.99	12.00	5.69	7.50
November	2.70	4.02	11.90	30.10	7.96	15.80
December	3.79	10.55	11.03	17.60	9.30	18.90

Table 4-5. Unit Process Capacity Summary

Unit Process	Basis for Capacity	Design Criteria	Firm Capacity	Total Capacity
Screening	PWWF	Headloss across the screens	19 mgd	34 mgd
Grit Basin Capacity	PWWF	Flow, Channel Depth and Channel Velocity of 2 to 3 FPS per manufacturer	5 mgd	15 mgd
Primary Clarifiers	PWWF		5 mgd	15 mgd
Aeration Basin	HRT at MMWWF	2000 mg/L MLSS HRT = 3 hours (min)	12 mgd	24 mgd
	SRT at Maximum Month Load			
Secondary Clarifiers	Hydraulic overflow rate at peak flow	1,200 gpd/sf	—	9 mgd
RAS Pumping	Reported capacity	Firm capacity	1,500 gpm	3,000 gpm
WAS Pumping	Reported capacity	Firm capacity	340 gpm	680 gpm
Chlorine Contact Basins	PWWF	30 minute detention time at PWWF	—	17 mgd
Outfall	PWWF		—	35 mgd
Anaerobic Digestion	Detention Time	24 days	24 days	
Facultative Lagoon	Solids loading rate	20 lb volatile solids/1000 sf /day	3500 lb VSS/day	

CHAPTER 5. WASTEWATER CHARACTERISTICS

The Coos Bay Wastewater Treatment Plant No. 1 (WWTP No. 1) is operated by Operations Management International, Inc. (OMI). OMI personnel monitor important wastewater characteristics for the plant and report these plant conditions to the City of Coos Bay and to the Oregon Department of Environmental Quality (DEQ) on a monthly basis as required by the NPDES permit. This chapter summarizes data from the discharge monitoring reports (DMRs) and analyzes recent data to define the flows and loads that characterize the City's wastewater under current conditions. Current flow and load estimates are used along with the population projections presented in Chapter 2 to develop flow and load projections for future conditions. The flow and load projections serve as the basis for assessing the adequacy of existing treatment systems and sizing new treatment facilities.

CURRENT FLOWS AND LOADS

Analysis of flows and load data forms an important initial step in developing wastewater flow projections. The following assessment of current flow and load conditions for the Coos Bay WWTP No. 1 is based on operational data from the plant. The flow and load analysis presented herein were developed based on the data from 1995 through 2005 so that larger storms that occurred between 1995 and 1999 could be included in the analysis. A review of the data showed that there was no significant difference between the peak flows resulting from data analysis for a period from 1995-1999 and 1999-2005. Therefore, average and maximum month flows and loads were developed based on data from January 1999 through December 2005.

Wastewater Flows

Because wastewater flow rates can be quite variable, a number of different flow conditions are important in sizing and evaluating wastewater treatment plants. This section defines the flows of interest and develops estimates of monthly and peak flows.

Definitions

The flow rates and related parameters discussed in this chapter are defined below:

- The *average annual flow* (AAF) is the average flow for the entire year.
- The *average dry weather flow* (ADWF) is the average daily flow at the plant during the dry weather season, typically May through October.
- The *average wet weather flow* (AWWF) is the average daily flow at the plant during the wet weather season, typically November through April.
- The *maximum month dry weather flow* (MMDWF) is defined as the flow recorded at the plant when total rainfall quantities are at the 1-in-10 year probability level for the month of May (average for month).

- The *maximum month wet weather flow* (MMWWF) is defined as the plant flow when total rainfall quantities are at the 1-in-5 year probability level for the month of January. However, the wet season maximum month for the plant is December. Therefore, based on DEQ's recommendation, December rainfall data was to determine the MMWWF (average for month).
- The *Maximum Week Wet Weather Flow* (MWWWF) is the weeks flow with a recurrence probability of 1.92 percent in a given year (average for week).
- The *peak day flow* (PDF) is the flow rate that corresponds to a 24-hour storm event with a 1-in-5 year recurrence interval that occurs during a period of high groundwater and saturated soils.
- The *peak wet weather flow* (PWWF) is expected to occur during the peak day flow. The PWWF is the highest flow at the plant sustained for one hour. The PWWF dictates the hydraulic capacity of the treatment system. PWWF is also referred to as the peak instantaneous flow, or peak hour flow.
- *Infiltration and inflow* (I/I) refers to water that enters the wastewater collection system due to deterioration or illicit connections. Infiltration is groundwater that enters the system from the surrounding soil through defective pipes, joints, or manholes. Inflow is storm water that directly enters the system from sources such as drainage connections, flooded manhole covers, and sewer defects that respond quickly to saturated ground conditions.

Rainfall Records

Since rainfall has a large effect on wastewater treatment plant flow rates, DEQ flow projection guidelines recommend that rainfall records and statistical analyses be considered when analyzing WWTP flows. Daily rainfall data are collected at WWTP No. 1.

The National Oceanic and Atmospheric Administration (NOAA) prepares statistical summaries of climatologic data for selected meteorological stations. The meteorological station with statistical summaries closest to Coos Bay WWTP No. 1 is located at the North Bend Airport. The most recent climatologic summary for areas of Oregon was issued in 2004 and is based upon data collected from 1971 through 2000. Table 5-1 compares the average monthly total rainfall recorded at WWTP No. 1 and rainfall statistics for the North Bend Airport Meteorological Station obtained from the climatologic summary. The relative similarity in rainfall totals indicates that historical data from the North Bend Airport Meteorological Station provides a reasonable representation of rainfall distribution at the Coos Bay WWTP No. 1.

Table 5-1. Average Monthly Rainfall at Coos Bay WWTP No. 1, 1999-2005 and Statistical Rainfall Summary for the North Bend AP Meteorological Station, 1971-2000

Month	1999-2005 WWTP No. 1 Average Rainfall, inches	1999-2005 OCS Average Rainfall, inches	1971-2000 NOAA Average Rainfall, inches	Greatest Monthly Rainfall, inches (North Bend)	Greatest Daily Rainfall, inches (North Bend)	1-in-5 Year Monthly Rainfall, inches (North Bend)	1-in-10 Year Monthly Rainfall, inches (North Bend)
January	9.48	10.26	9.54	20.96	4.02	13.67	17.07
February	6.66	6.95	8.12	16.26	5.16	11.10	13.36
March	4.19	5.82	7.94	14.13	4.02	10.74	12.83
April	2.77	5.21	5.19	11.13	2.65	7.43	9.25
May	1.89	3.03	3.40	9.30	4.35	5.04	6.50
June	0.87	1.72	1.72	4.80	2.72	2.62	3.46
July	0.13	0.33	0.51	2.79	1.29	0.84	1.23
August	0.35	0.49	0.88	2.72	1.51	1.45	2.16
September	0.44	1.50	1.73	5.70	2.05	2.87	4.46
October	2.51	3.87	4.62	12.46	11.17	7.09	9.47
November	7.72	7.32	10.36	22.69	6.67	14.58	17.94
December	9.01	12.33	10.42	20.76	5.60	14.95	18.70
Wet Season	Total 38.83	Total 47.89	Total 51.57	Max 22.69	Max 6.67	Max 14.95	Max 18.70
Dry Season	Total 6.19	Total 10.94	Total 12.86	Max 12.46	Max 11.17	Max 7.09	Max 9.47

Flow Analysis

Analysis of plant influent flows provides the basis for developing flow projections for the system in the future.

The average dry weather flow (ADWF) is the average flow during the dry weather season months of May through October. Since little rainfall occurs during these months (with the exception of May), rain dependent I/I sources do not significantly affect ADWF. The average wet weather flow (AWWF) is the average flow during the wet weather season months of November through April during a year with average rainfall. Table 5-2 presents a summary of the wet and dry season rainfall and flows for the period 1999 through 2005. Based on the information in the table and a review of rainfall data for those years, the ADWF is estimated to be 1.6 mgd, the highest dry weather average for those years and AWWF is estimated to be 3.1 mgd. The relatively large difference between the ADWF and AWWF indicates that the seasonal variations in wastewater flow caused by rainfall dependent I/I are significant.

Table 5-2. Summary of WWTP No. 1 Wet and Dry Season Rainfall and Influent Flow

Season	Water Year[(a)]	Total Season Rainfall, in	Average Plant Influent Flow, mgd	Calculated Flows (for reference)
Dry Season	1999	8.64	1.57	
	2000	9.69	1.43	
	2001	6.87	1.32	ADWF = 1.6
	2002	2.67	1.28	
	2003	3.10	1.53	MMDWF = 2.9
	2004	14.79	1.59	
	2005	13.08	1.58	
Average Dry Season		8.41	1.47	
Wet Season	1999	31.42	3.50	
	2000	44.85	3.11	
	2001	16.45	2.00	AWWF = 3.2
	2002	41.27	2.90	
	2003	48.52	3.05	MMWWF = 5.6
	2004	33.23	2.79	
	2005	27.30	2.34	
Average Wet Season		34.72	2.81	

(a) Water year runs from the preceding November through October.

The maximum month dry weather flow (MMDWF) is defined by DEQ as the influent plant flow that would be expected to occur when rainfall is at the 1-in-10 year probability level for the wettest month of the dry weather season. For the Coos Bay area October is the wettest dry weather month for the area but the average May rainfall is used for this analysis because groundwater levels are higher in the spring. This is consistent with the data observed at the WWTP No. 1, i.e. the observed average May plant influent flow is greater than the average October plant influent flow although the rainfall is higher in the month of October indicating that infiltration effects are higher than direct inflow.

From Table 5-1, the 1-in-10 year May rainfall at the North Bend Airport Meteorological Station is 6.50 inches. DEQ guidelines for projecting the MMDWF rely on relating the monthly average influent plant flow for January through May against the total rainfall for each respective month. Data from the 2004 and 2005 seasons were used. By approximating a linear relationship, as illustrated in Figure 5-1, the MMDWF is estimated to be approximately 3.1 mgd.

Similarly, the MMWWF is defined by DEQ as the flow expected to occur when rainfall is at the 1-in-5 year probability level for the month of December. The 1-in-5 year December rainfall is approximately 15.0 inches (Table 5-1). As illustrated in Figure 5-1, the MMWWF is estimated at 5.2 mgd. The computed maximum month flows compare well with the observed flows at the treatment plant as shown in Table 5-3.

Figure 5-1. Coos Bay WWTP No. 1 Monthly Influent Flow Versus Rainfall, January 2004 - December 2005

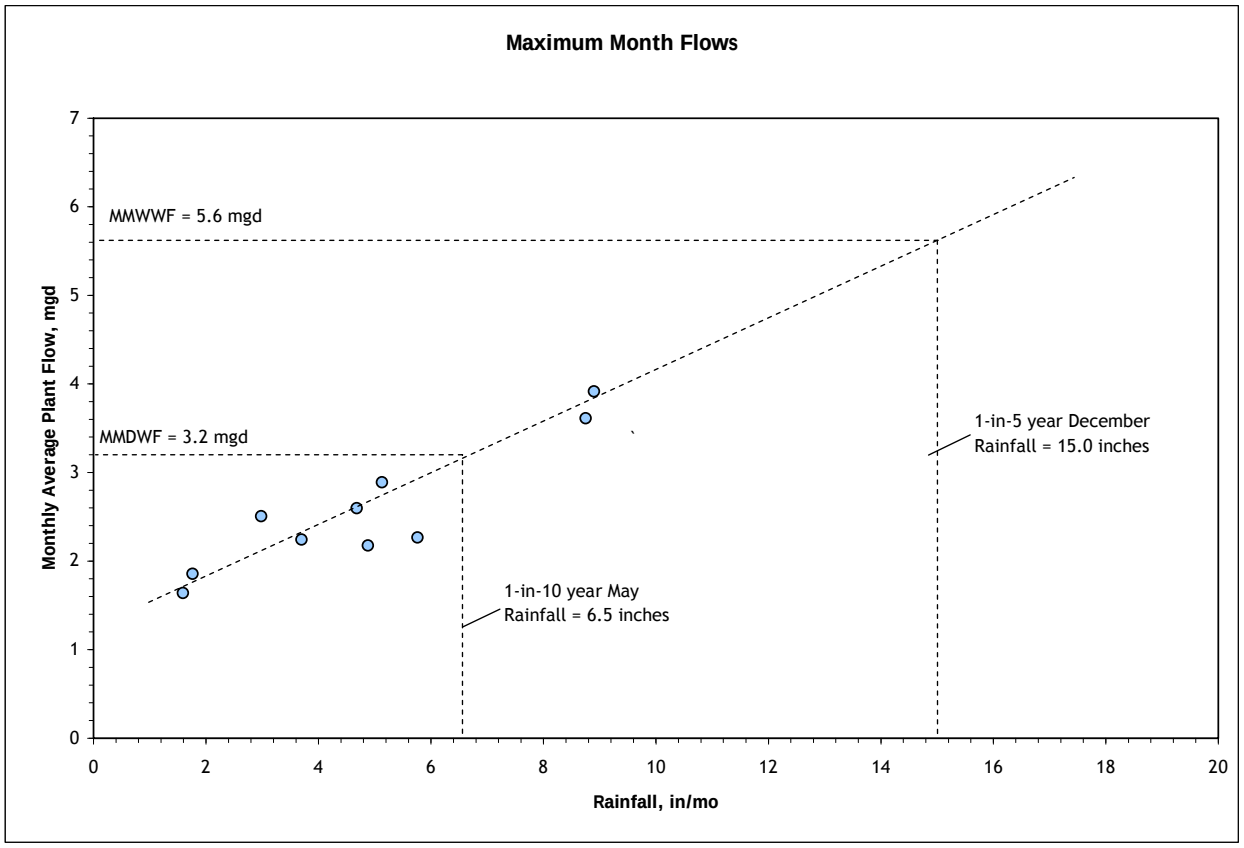


Table 5-3. Maximum Month Flow Comparison between Observed and Computed (2004 and 2005 Data Only)

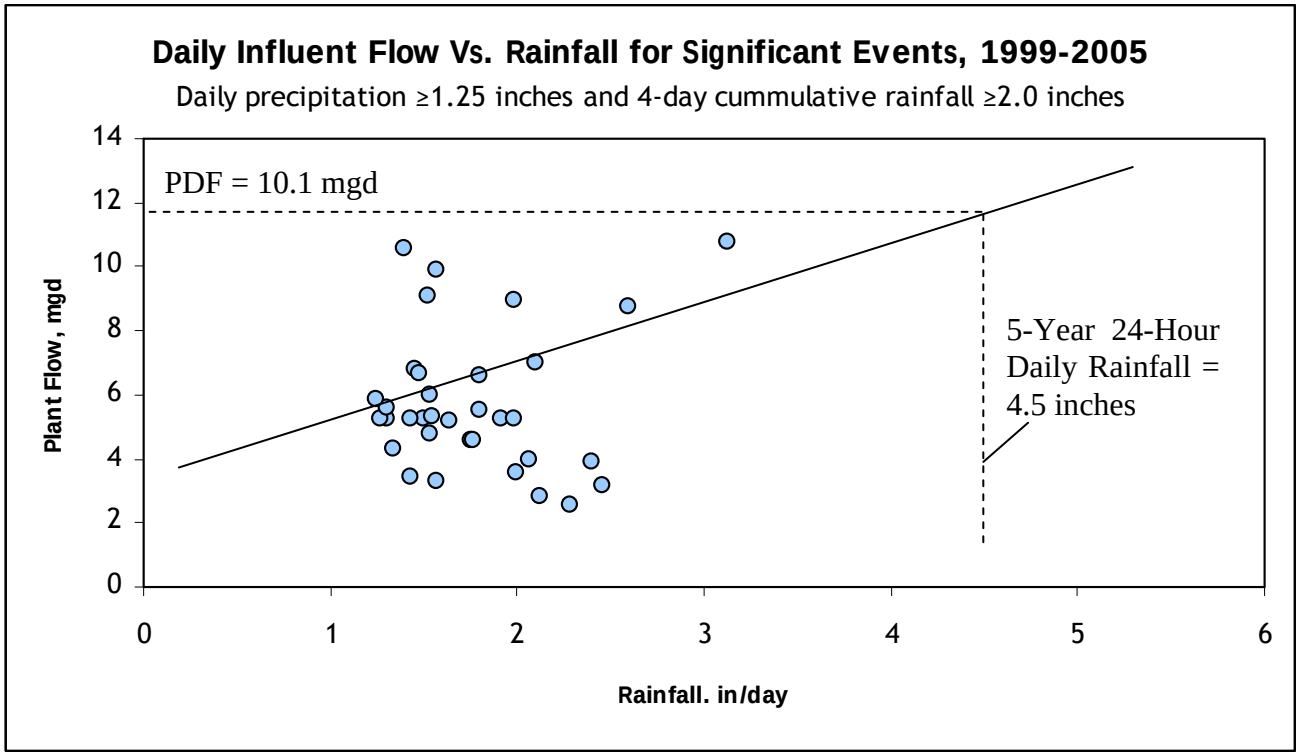
Month	Maximum Month Flow, mgd	
	Observed	Computed
May	3.36	3.2
December	6.81	5.6

The peak day flow (PDF) is defined as the daily average plant flow rate that occurs during the 1-in-5 year, 24-hour storm event. For the Coos Bay area, this is approximately 4.5 inches of rainfall, based on isopluvial map found in the NOAA Atlas 2; Volume X. Figure 5-2 presents flows and corresponding rainfall totals from significant wet season storm events for the period of record. In order to ensure that soils were saturated and infiltration/inflow was significant, this analysis considered only those days with over 1.25 inches of daily recorded rainfall and at least two inches of cumulative rainfall in the previous 4 days. The DEQ methodology for estimating the PDF assumes that there is an approximately linear relationship between influent flow and rainfall, where influent flows steadily increase with larger rainfall events. Based on Figure 5-2,

the PDF is estimated at 10.1 mgd. The correlation coefficient is 0.1 which is indicative of the variability of the data.

Figure 5-2. Daily Influent Flow Versus Rainfall for Significant Events

Label1



Peak wet weather flow (PWWF) and maximum week wet weather flow (MWWWF) were estimated by projecting flow on a log-probability graph using average, maximum month and peak day flows as presented in Figure 5-3. The capacity of the upstream sewage pump stations is 20 mgd.

Figure 5-3. Probability Analysis for PWWF Determination (1999-2005 data)

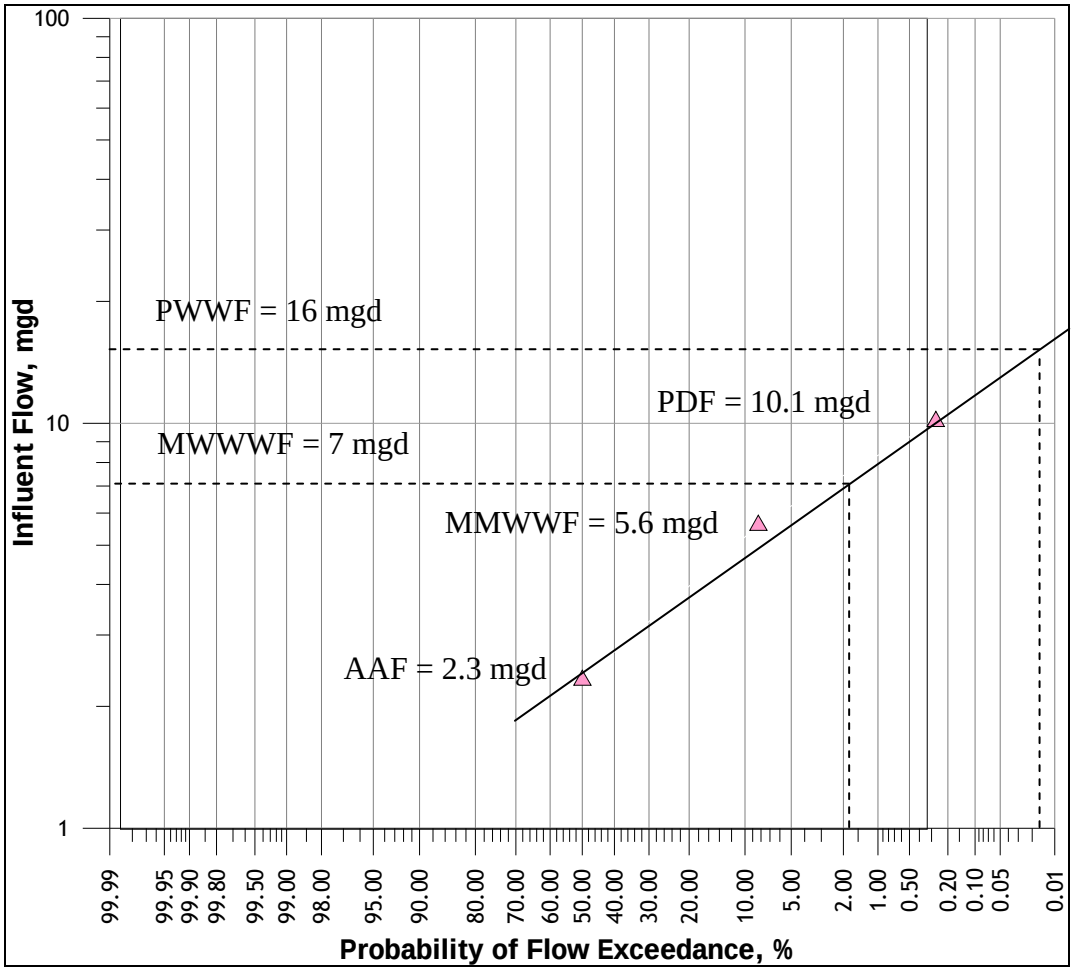


Table 5-4 summarizes the current wastewater flows and peaking factors for Wastewater Treatment Plant No. 1.

Table 5-4. Current Wastewater Flows

Flow Parameter	Flow Rate, mgd	Peaking Factor
Average Dry Weather Flow (ADWF)	1.6	1.0
Average Wet Weather Flow (AWWF)	3.1	1.9
Average Annual Flow (AAF)	2.3	1.4
Maximum Month Dry Weather Flow (MMDWF)	3.2	2.0
Maximum Month Wet Weather Flow (MMWWF)	5.6	3.5
Maximum Week Wet Weather Flow (MWWWF)	7.0	4.4
Peak Day Flow (PDF)	10.1	6.3
Peak Wet Weather Flow (PWWF)	16.0	10.0

Another useful flow analysis parameter is the wet weather I/I rate for the community in terms of gallons per acre per day (gpad). Since the wet weather I/I rate is approximately equal to the difference between the PWWF and the ADWF, the I/I rate for Coos Bay WWTP No. 1 is 14.4 mgd. The difference between PWWF and ADWF for Plant #2 is 4.0 mgd. Adding the difference for Plant #1 and Plant #2 yields 18.8 mgd. Based on an estimated overall developed area of 2,480 acres as reported in Chapter 2 and the combined difference of both treatment plants of 18.8 mgd, the I/I rate for the system is estimated at 7,580 gpad. This I/I rate is very high relative to the 1,500 gpad typically associated with new construction.

BOD and TSS Loads

Biochemical oxygen demand (BOD) and total suspended solids (TSS) are indicators of the organic loading on a wastewater treatment facility. BOD is a measure of the amount of oxygen required to biologically oxidize the organic material in the wastewater over a specific time period. A 5-day BOD test is conventionally used for wastewater testing. As its name suggests, TSS is a measure of the particulate material suspended in the wastewater. The BOD and TSS loading on the WWTP influence the following:

- **Treatment Process Sizing.** The size of biological treatment units, such as aeration basins, is approximately proportional to a plant's organic loading.
- **Aeration System Sizing.** Treating higher BOD loads requires higher capacity aeration equipment. A wastewater treatment facility's aeration system is typically sized to provide oxygen during peak day BOD loading conditions.
- **Sludge Production.** BOD and TSS removed by the plant are converted into inert solids and biomass (sludge). Higher BOD and TSS loads result in increased sludge quantities.

BOD and TSS Records

Daily BOD and TSS concentrations are recorded approximately twice per week. The daily plant loading for BOD and TSS from January 1999 to December 2005 is shown in Figures 5-3 and 5-4 respectively. As illustrated in Figures 5-4 and 5-5, the highest BOD and TSS loads recorded for this period occurred in the late fall. Investigation into the rainfall data revealed that the high concentrations of BOD and TSS correspond to the first major storm event that occurs at the end of a dry season. Thus, the spikes in the BOD and TSS levels are likely due to the flushing of accumulated solids from the sewer system after the extended dry, low flow period.

Figure 5-4. Daily Plant Loading: Biochemical Oxygen Demand (BOD)

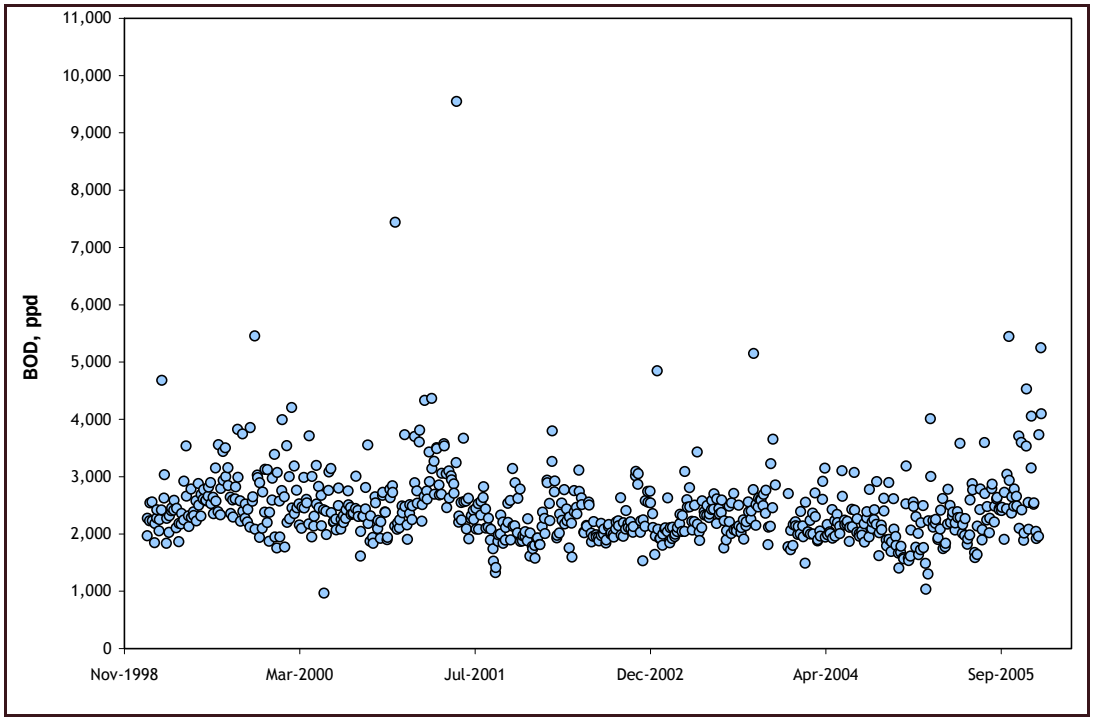
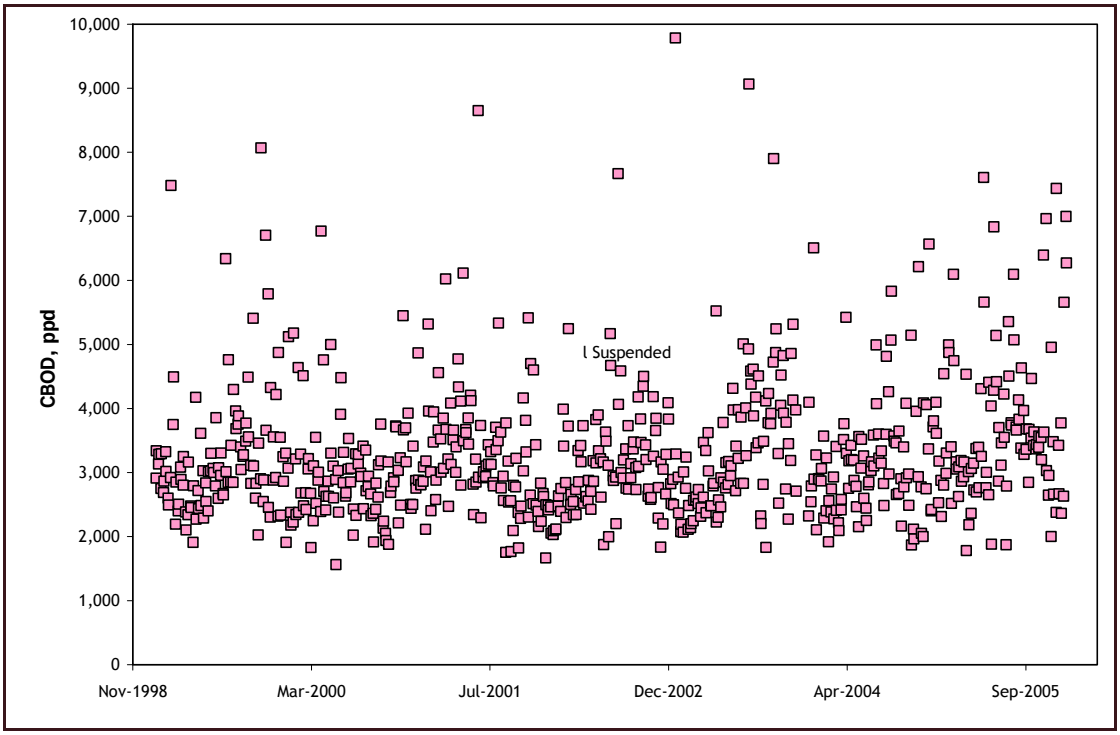


Figure 5-5. Daily Plant Loading: Total Suspended Solids (TSS)



Unit Loading Values

The development of unit loading values provides the basis for future loading projections. Analysis of loading levels and population allows for the calculation of the unit design values for the wastewater loads. The average unit loading value in pounds per capita per day (ppcd) can be applied to the population projections to estimate future sanitary loads. Table 5-5 presents the calculated unit design loads for BOD and TSS for WWTP No. 1 Service Area. These values are consistent with textbook average loading rates for communities with largely residential and commercial developments. Table 5-6 reports the estimated maximum and average BOD and TSS loads for the WWTP No. 1 Service Area.

Table 5-5. Current Unit Design Loads

Period	Population	Average BOD, ppd	Average TSS, ppd	BOD Unit Load, ppcd	TSS Unit Load, ppcd
Wet Weather	10,250	2,400	3,200	0.23	0.31
Dry Weather	10,250	2,400	3,400	0.23	0.33
Average	10,250	2,400	3,300	0.23	0.32

Table 5-6. Current Plant Influent Loading (1999-2005)

Description	BOD, ppd	Peaking Factor	TSS, ppd	Peaking Factor
Dry Weather				
Average	2,400	1.0	3,400	1.0
Max Month	3,500	1.5	4,700	1.4
Peak Day	5,400	2.3	9,100	2.7
Wet Weather				
Average	2,400	1.0	3,200	1.0
Max Month	3,300	1.4	4,200	1.3
Peak Day	7,400	3.1	9,800	3.1
Annual				
Average	2,400	1.0	3,300	1.0
Max Month	3,500	1.5	4,700	1.4
Peak Day	6,400	2.7	9,500	2.9

Nutrients

Nutrients of primary concern at a wastewater treatment facility are nitrogen and phosphorus. Typically, the majority of the nitrogen in raw sewage is in the form of ammonia; concentrations range from 15 to 30 mg/L. Raw sewage phosphorus concentrations are usually between 4 and 8 mg/L, with the majority of the phosphorus in a soluble form, such as phosphate. Influent ammonia and phosphate are not regularly sampled at the Coos Bay WWTP No. 1. However, ammonia is measured at Coos Bay WWTP No. 2 and the values are typical for raw sewage.

FLOW AND LOAD PROJECTIONS

The flow and load projections are based on current flows and loads and anticipated community growth. As identified in Chapter 2, the population of Coos Bay is expected to be 16,030 by the year 2027. For the WWTP No. 1 service area, (comprised of a portion of Coos Bay and Bunker Hill), the future population (2027) is anticipated to be 10,500 persons.

To complete the projection analysis, the current flows, loads, and population were used to create unit design values. For example, the unit ADWF value is approximately 157 gallons per capita per day. This unit flow is high compared to other cities in the Western Oregon and may be due to base infiltration flows. Similarly, based on the current average BOD loading of 2,300 pounds per day, the unit value is 0.22 pounds of BOD per capita per day. The unit design values were used in conjunction with projected future populations to estimate future flows and loads for the City.

Flow Projections

The sanitary flow generated in the WWTP No. 1 service area comes from a wide variety of collection system users. The average wastewater flows from these users are expected to grow at approximately the same rate as the overall population. Therefore, future sanitary flows are projected by applying the anticipated population growth rate to the current sanitary flows. Projection of ADWF, AWWF, MMDWF and MMWWF are made using this unit design value method.

Projection of the future peak wet weather flows requires additional consideration due to the variability of I/I rates among existing and future developments. Peak flows are estimated using current wet weather I/I rates for existing portions of the collection system while using lower rates in areas with new sewers. The current PWWF of 16.0 mgd is greatly influenced by the presence of collection system deficiencies in the older parts of town. Since improved construction materials and techniques in new portions of the collection system should exclude most I/I sources, the projections of future peak wet weather flow must account for lower wet weather I/I rates in new developments. Therefore, for the purposes of the PWWF projections, new developments are assigned a wet weather I/I rate of 3,000 gpad. Future flow rates are summarized in Table 5-7.

Table 5-7. Coos Bay WWTP No. 1 Design Flow Projection

Flow Parameter	Year 2027 Flow, mgd
Average Dry Weather Flow (ADWF)	1.6
Average Wet Weather Flow (AWWF)	3.1
Average Annual Flow (AAF)	2.4
Maximum Month Dry Weather Flow (MMDWF)	3.3
Maximum Month Wet Weather Flow (MMWWF)	5.7
Maximum Week Wet Weather Flow (MWWWF)	7.2
Peak Day Flow (PDF)	12
Peak Wet Weather Flow (PWWF)	20

Load Projections

Future plant loads, summarized in Table 5-8, are estimated by applying unit design factors from Tables 5-5 and 5-6 to the year 2027.

Table 5-8. Projected Plant Influent Loads

Parameter	Year 2027	
	BOD, lbs/day	TSS, lbs/day
Annual Average	2,450	3,370
Maximum Month	3,580	4,800
Peak Day	6,540	9,700

WASTEWATER CHARACTERISTICS SUMMARY

Table 5-9 summarizes the flow and load projections developed in previous sections.

Table 5-9. Wastewater Characteristics Summary

Wastewater Characteristics Factor	2005	2027
Average Dry Weather Flow (ADWF), mgd	1.6	1.6
Average Wet Weather Flow (AWWF), mgd	3.1	3.1
Average Annual Flow (AAF), mgd	2.3	2.4
Maximum Month Dry Weather Flow (MMDWF), mgd	3.2	3.3
Maximum Month Wet Weather Flow (MMWWF), mgd	5.6	5.7
Maximum Week Wet Weather Flow (MWWWF), mgd	7.0	7.2
Peak Day Flow (PDF), mgd	10.1	12
Peak Wet Weather Flow (PWWF), mgd	16.0	20
Loads:		
BOD, ppd		
Average	2,400	2,450
Max month	3,500	3,580
Peak day	6,400	6,450
TSS, ppd		
Average	3,300	3,370
Max month	4,700	4,800
Peak day	9,500	9,700

CHAPTER 6. REGULATORY REQUIREMENTS

The City of Coos Bay recognizes the importance of protecting the water quality of Coos Bay. The estuary provides recreational opportunities for tourists and local residents, serves as wildlife habitat, and is an important fisheries and harbor resource. This chapter discusses the regulatory aspects of protecting water quality, examines the water quality standards for the Bay, and presents the anticipated wastewater treatment requirements.

REGULATORY FRAMEWORK

The regulatory environment surrounding water quality protection in Oregon is relatively complex, requiring interaction and cooperation between a number of federal, state, and local agencies. The first step in the process is to assign beneficial uses to the water body. This task is the responsibility of the Oregon Water Resources Department (OWRD). A water body's beneficial uses depend on characteristics such as its size and location. The following are the designated beneficial uses for the South Coast Basin. (Oregon Administrative Rules—OAR 340-041-0300)

- Industrial Water Supply
- Anadromous Fish Passage
- Salmonid Spawning and Rearing[(a)]
- Resident Fish and Aquatic Life
- Wildlife & Hunting
- Fishing
- Boating
- Water Contact Recreation
- Aesthetic Quality
- Commercial Navigation & Transportation

(a) This is a basin-wide use and does not apply to the Bay

It is the responsibility of the Oregon Department of Environmental Quality (DEQ) to establish and enforce water quality and waste treatment standards that ensure the Bay's beneficial uses are preserved. The DEQ's general policy is one of antidegradation of surface water quality. Discharges from wastewater treatment plants (WWTPs) are regulated through the National Pollutant Discharge Elimination System (NPDES). All discharges of treated wastewater to a receiving stream must comply with the conditions of an NPDES permit. The Environmental Protection Agency (EPA) oversees state regulatory agencies, and can intervene if the state agencies do not successfully protect water quality.

Local governments must operate their WWTPs so that they comply with all waste treatment standards and the requirements of the NPDES permit. If a WWTP is regularly out of compliance, the municipality typically enters into an agreement with DEQ to make improvements to the plant and ensure that standards are met. This agreement is known as a Mutual Agreement and Order (MAO).

This section summarizes the regulatory requirements pertinent to wastewater facilities planning for Coos Bay.

Oregon Administrative Rules for Wastewater Treatment

The state surface water quality and waste treatment standards for Coos Bay are detailed in the following sections of the Oregon Administrative Rules (OARs):

- OAR 340-041-0004 lists policies and guidelines applicable to all basins. DEQ's policy of antidegradation of surface waters is set forth in this section.
- OAR 340-041-0007 through 340-041-0036 describes the standards that are applicable to all basins.
- OAR 340-041-0300 through 340-041-0305 contain requirements that are specific to the South Coast basin including the minimum beneficial uses, water quality standards, and design criteria for waste treatment in the South Coast basin.

The surface water quality and waste treatment standards in the OARs are viewed as minimum requirements. Additional, more stringent limits developed though the TMDL process supersedes the basin standards.

Clean Water Act Section 303(d) List

DEQ issued the Section 303(d) list of water quality limited water bodies in January 2003. The list contains over 1,000 stream segments that are water quality limited for one or more parameters. Coos Bay has been designated water quality limited for bacteria in the vicinity of the two treatment plants. Coos Bay, Coalbank Slough, Isthmus Slough and the Coos River are listed on the Department's 2004/2006 303d list as water quality limited for the shellfish growing bacteria standard (14 fecal coliform per 100 ml). Because the receiving waters exceed the criteria, there is no dilution available in the mixing zone. For this reason, the Coos Bay #1 treatment plant will need to meet a fecal coliform effluent limit of 14 organisms per 100 ml at the end of pipe.

Total Maximum Daily Loads

When receiving water is water quality limited, DEQ is required to establish TMDLs for the pollutant(s) that are causing the problem. Since the Coos Bay estuary is listed for bacteria, a bacteria management plan will be developed. For Treatment Plant No. 1, the NPDES permit will be the bacteria management plan and DEQ will likely reopen the permit once the bacteria management plan has been developed.

Groundwater Protection

OAR 340-040 details state standards for protection of groundwater quality. Paragraph 340-040-0030(3)(b) states that for new facilities, the groundwater pollutant concentration limits shall be at background levels for all contaminants. Historically, DEQ's interpretation of this standard has required that all earthen impoundments for wastewater or treated effluent—including sewage treatment lagoons, effluent holding ponds, and constructed wetlands—be lined with impervious material to prevent leakage into the underlying groundwater. This standard also precludes the discharge of treated effluent to groundwater unless all contaminants are first treated to background levels.

All treatment units at the WWTP are concrete or steel structures. Therefore, the potential for groundwater contamination is minimal. The sludge storage lagoon is lined with bentonite (clay).

Reliability Criteria

EPA has established reliability criteria for wastewater treatment plant treatment processes, and OAR Chapter 340 Division 52 also contains reliability requirements. Plant No. 1 discharges to the Bay where recreation takes place including fishing and boating. This plant is required to meet Class II reliability criteria as outlined by EPA in their technical bulletin entitled "Design Criteria for Mechanical, Electrical, and Fluid System and Component Reliability". While some redundancy is required, the criteria are not as stringent as the criteria for Class I.

Effluent Reuse

Requirements for reuse of treated WWTP effluent for irrigation are listed in OAR 340-055. State reuse standards are designed to ensure that groundwater resources are protected. Therefore, reclaimed water must be applied at agronomic rates. This requirement applies to the constituents in the water as well as the application of the water itself. Four reclaimed water treatment levels are defined in the OARs. In general, as the level of treatment is increased, public access is less restrictive, the number of approved uses is expanded, and the required size of buffer areas is reduced. For example, Level I requires only biological treatment and no disinfection. However, public access must be prevented, buffer zones must be established, and the water can only be used to irrigate non-food crops. Conversely, Level IV reclaimed water requires the highest level of treatment, including coagulation and filtration, and can be used essentially without restriction.

Biosolids Treatment and Reuse

OAR 340-050 describes state standards for biosolids treatment and reuse. The state standards are based on the federal sludge regulations, which are contained in Part 503 of Chapter 40 of the Code of Federal Regulations (40 CFR 503). The Part 503 Sludge Regulations were developed by EPA during the early 1990s. Both DEQ and EPA encourage the beneficial reuse of biosolids on agricultural land as a soil amendment; therefore, the Part 503 Regulations focus on treatment and application requirements for reuse. Biosolids must be applied at agronomic rates.

Vector Attraction Reduction. The Part 503 Regulations list two categories of treatment requirements: vector attraction reduction and pathogen reduction. Vector attraction reduction requirements concentrate on reducing the volatile solids content of the sludge. The Part 503 Regulations list 10 options for meeting vector attraction requirements. Sludge must comply with vector attraction reduction requirements before it is applied on agricultural land.

Pathogen Reduction. With respect to pathogen reduction requirements, the Part 503 Regulations recognize two categories of biosolids: Class A and Class B. Class A biosolids has low levels of pathogenic bacteria and is considered safe for public use. In addition to complying with bacteria population limits, Class A biosolids must treated through one of several specific methods, known as Processes to Further Reduce Pathogens (PFRPs). These include high pH treatment, high temperature treatment, composting, heat drying, irradiation, and pasteurization. The treatment requirements for Class B biosolids are less stringent than those for Class A. However, unlike Class A biosolids, Class B biosolids cannot be given directly to the public. In addition, public access to agricultural sites is restricted for at least 30 days after application of Class B biosolids. A number of methods are available for creating a Class B biosolids; these are known as Processes to Significantly Reduce Pathogens (PSRPs).

Producing a Class A biosolids expands a City's reuse options. However, the additional flexibility of a Class A biosolids must be weighed against the added cost. Treatment processes for creating Class A biosolids are more expensive, complex, and labor intensive than processes for Class B biosolids.

Metals. The metals concentration of biosolids applied to agricultural land is also a concern. Two types of metals concentration limits are of interest: Ceiling Concentration Limits and Pollutant Concentration Limits. Ceiling Concentration Limits are the maximum allowable metals concentrations that the biosolids can contain. If these limits are exceeded, the biosolids cannot be land applied.

Pollutant Concentration Limits are lower than Ceiling Concentration Limits. If a plant's biosolids comply with Pollutant Concentration Limits, application can take place without concern over cumulative metals loadings. If the metals content of the biosolids exceeds Pollutant Concentration Limits but complies with Ceiling Concentration Limits, agricultural reuse is allowed, but application of metals must be tracked to ensure that the total metals load does not exceed the cumulative capacity of the site. Generally, unless the wastewater system receives a significant industrial contribution, metals concentrations usually fall within Pollutant Concentration Limits.

Classification of Sludge. Sludge is categorized depending on degree of pathogen reduction and metals content. The four types of sludge in descending level of quality are:

- Exceptional Quality. Exceptional Quality sludge is the highest quality biosolids, meeting both the Class A pathogen reduction requirements and the Pollutant Concentration Limits for metals.
- Pollutant Concentration. Pollutant Concentration sludge complies with the stringent Pollutant Concentration Limits for metals, but is only treated to Class B pathogen reduction standards.

- Annual Pollutant Loading Rate. This sludge is treated to Class A pathogen reduction standards, but does not comply with Pollutant Concentration Limits for metals. It does, however, comply with metals Ceiling Concentration Limits.
- Cumulative Pollutant Loading Rate. The lowest quality sludge that can be applied to agricultural land, Cumulative Pollutant Loading Rate sludge meets Class B pathogen reduction requirements. Metals concentrations fall between Pollutant Concentration Limits and Ceiling Concentration Limits; therefore, site cumulative metals loading must be tracked.

To qualify for any of the sludge categories described above, the biosolids must also comply with vector attraction reduction requirements.

WATER QUALITY

This section discusses water quality issues applicable to Coos Bay.

Temperature

High water temperatures adversely affect salmonid fish, such as trout and salmon, as well as other cold-water aquatic species. Temperatures in the mid-to-high 70 degree F range can be lethal to adult salmonids. Temperatures in the mid 60 degree F to low 70 degree F range cause physiological stress which, when combined with other survival pressures, can increase mortality. Table 6-1 summarizes temperature limits for Spring Chinook and Coho salmon.

Temperature is also important because it controls the solubility of dissolved oxygen (DO) in water. As temperature increases, the DO saturation concentration decreases and it becomes more difficult to maintain adequate DO levels.

Table 6-1. Temperature Preference for Spring Chinook and Coho Salmon

Life-stage	Spring Chinook	Coho
Egg incubation	42.1°F to 55.0°F	39.9°F to 55.9°F
Juvenile rearing	50.0°F to 58.6°F	53.2°F to 58.3°F
Adult migration	37.9°F to 55.9°F	45.0°F to 60.1°F
Spawning	42.1°F to 55.0°F	39.9°F to 48.9°F
Upper lethal limit	71.6°F	77.0°F

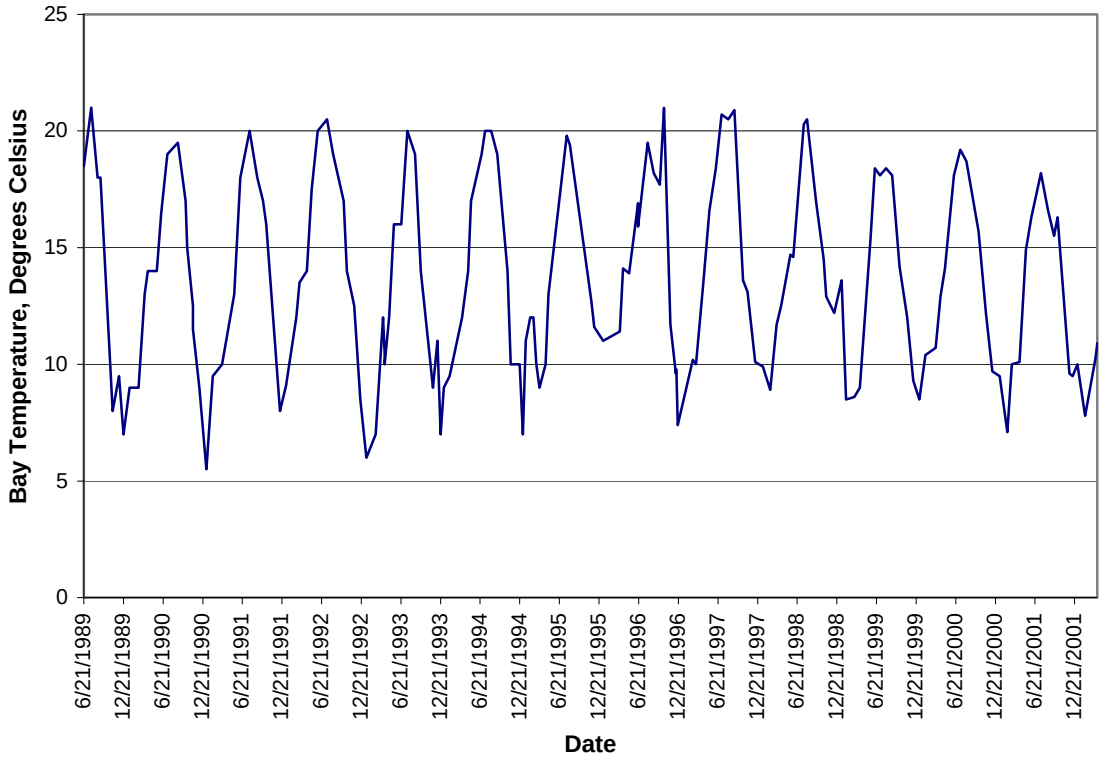
Source: DEQ, 1995

OAR 340-041-0028 establishes the temperature standards that apply to Coos Bay:

> *(7) Oceans and Bays: Except for the Columbia River above mile 7, ocean and bay waters many not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the ambient condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life.*

Temperatures in the Bay near the Plant No. 1 outfall are shown in Figure 6-1. Temperatures range in value between a minimum of 6 degrees Celsius (42.8 degrees F) and a maximum of 21 degrees Celsius (69.8 degrees F). At Plant No. 1, the available mixing at the edge of the Regulatory Mixing Zone (RMZ) is 60:1. Winter effluent temperatures are about 14 degrees Celsius (57.2 degrees F), which results in a temperature impact at the edge of the mixing zone that is well within the standard. Summer temperature differentials between the effluent and the Bay are similar and will not cause the standard to be exceeded.

Figure 6-1. Coos Bay Water Temperature at the Coast Guard Dock



Dissolved Oxygen

DO is necessary to support aquatic life. Salmonid fish are very sensitive to low DO levels, particularly during the early stages of development. The numeric DO standards consider two factors: whether salmonid fish are present and, if present, whether the fish are in the critical spawning, egg development, and fry emergence stages. The DO standard for the estuary stipulates that the concentration shall not be below 6.5 milligrams per liter (mg/L).

pH

The pH standard for the Coos Bay estuary states that pH must be maintained between 6.5 and 8.5 (OAR 340-041-0305 (1)(a). The permitted discharge pH ranges between 6.0 and 9.0. With the available mixing, no pH excursions will occur as a result of the Plant No. 1 discharge.

Bacteria

The Bay at the Plant No. 1 discharge area is not a designated as shellfish growing waters and the following bacteria standard is applicable for the Bay:

> *(A) A 30-day log mean of 126 E. coli organisms per 100 milliliters, based on a minimum of five samples:*
>
> *(B) No single sample may exceed 406 E. coli organisms per 100 milliliters.*

Since the Bay is listed for exceeding the fecal coliform requirements for the shellfish growing areas, DEQ established a fecal limit in the permit with the stipulation that the permit will be re-opened once the bacteria allocations have been completed as part of the TMDL process.

Toxic Substances

OAR 340-041-0033 regulates the discharge of toxic substances to Coos Bay. DEQ has adopted the toxicity limits set forth in EPA's *Quality Criteria for Water* (1986). This document lists toxicity limits for over 120 substances. *Quality Criteria for Water* lists standards for both acute toxicity and chronic toxicity. Acute toxicity limits are the values that cannot be exceeded for more than 1 hour every 3 years. Chronic toxicity limits represent the maximum 4-day-average value that cannot be exceeded more than once every 3 years.

OAR 340-041-0053 allows DEQ to designate an RMZ to allow for dilution of WWTP effluent with the Bay. The area within the RMZ must comply with all acute toxicity limits; however, chronic toxicity standards may be exceeded. The area outside of the RMZ must comply with chronic toxicity standards. DEQ may also designate a zone of immediate dilution (ZID) within which acute toxicity limits may be exceeded. If assigned, ZIDs are typically 10 percent of the size of the RMZ. DEQ has established an RMZ based on a 100-foot radius around the discharge and a ZID with a 10-foot radius. The respective mixing for these zones is 60:1 and 5:1.

DEQ conducted a reasonable potential analysis for heavy metals as part of the permit renewal process. No metals show a reasonable potential for exceeding water quality criteria.

Chlorine Toxicity. For marine discharges, the chronic and acute toxicity limits are 0.0075 mg/L and 0.013 mg/L respectively. Since adequate disinfection cannot be accomplished with these levels of chlorine residual, DEQ has required dechlorination equipment to be installed at the plant to ensure compliance with these limits.

Ammonia Toxicity. Ammonia toxicity is affected by the temperature and pH of the water. DEQ completed a reasonable potential analysis for ammonia and determined that no reasonable potential exists for exceeding the ammonia standard in the Bay for Plant No. 1.

Other Parameters

A number of other water quality standards which are not considered to be problematic in the Coos Bay Estuary are detailed in OAR 340-041-0007. However, these parameters must be considered to ensure continued compliance:

- Turbidity. The maximum allowable cumulative increase in turbidity is 10 percent.
- Liberation of dissolved gases. The liberation of dissolved gases which cause objectionable odors or are harmful to aquatic life or recreational opportunities is not allowed.
- Objectionable tastes and odors. The creation of objectionable tastes and odors which adversely affect the potability of drinking water or the palatability of fish is not allowed.
- Bottom deposits. The formation of appreciable bottom deposits is not permitted.
- Objectionable water surface conditions. The creation of objectionable discoloration, a scum layer, floating material, or an oily sleek is not allowed.
- Aesthetic conditions. The creation of objectionable aesthetic conditions is not allowed.
- Radioisotopes. Radioisotope concentrations shall not exceed maximum acceptable values.
- Dissolved gas concentrations. The concentration of dissolved gases shall not exceed 110 percent of saturation level.

TREATMENT REQUIREMENTS

DEQ has the responsibility to establish wastewater treatment requirements which ensure the protection of the Bay's beneficial uses and compliance with all in-stream water quality standards. This section discusses the Plant No. 1 discharge requirements.

Current Discharge Permit

Plant No. 1's NPDES permit was issued on August 21, 2003, and was modified on December 15, 2004. The permit is provided as Appendix A and discharge limits are summarized in Table 6-2.

Table 6-2. Existing Discharge Permit

Parameter	Average Effluent Concentrations		Monthly	Weekly	Daily
	Monthly, mg/L	Weekly, mg/L	average, ppd	average, ppd	maximum, ppd
May 1 - October 31:					
BOD - 5	20	30	480	730	970
TSS	20	30	480	730	970
November 1 - April 30:					
BOD - 5	30	45	730	1,100	1,500
TSS	30	45	730	1,100	1,500
Other parameters:					
Fecal Coliform Bacteria	Shall not exceed a monthly mean of 126 organisms per 100 mL. No single sample shall exceed 406 organisms per 100 mL.				
pH	6.0 – 9.0				
BOD and TSS Removal Efficiency	Shall not be less than 85%				
Total Residual Chlorine	0.03 mg/l monthly 0.06 mg/l daily				
Excess Thermal Load (May 1 – October 31)	57 Million kcals/day as a weekly average				

The loads shown are based on an average dry weather flow of 2.9 mgd. Once the City of Coos Bay has acquired and accepted legal authority to implement the provisions of OAR 340-041-0120(9)(a)(G)(iv), the mass limits during the wet season will be increased for both BOD-5 and TSS. The wet weather monthly, weekly, and daily limits will be 900, 1400, and 1800 pounds per day respectively. These are based on an average wet weather design flow of 3.6 mgd. Daily mass load limits will be suspended when the flows to the plant exceed 5.8 mgd.

Upon approval of an engineering study that demonstrates that flows are not excessive, the removal efficiency will be modified. Once modified, the following removal efficiencies will be required when monthly average flows are 4.26 mgd or more:

(a) 71-percent monthly average for BOD-5

(b) 76-percent monthly average for TSS

Anticipated Discharge Permit

Because the NPDES permit has recently been revised to reflect current water quality issues, no major changes in discharge requirements are anticipated. The projected flow for the plant is within the current design capacity so no restrictions related to dry weather mass loads are anticipated.

The only pending TMDL for the Bay is for bacteria. Once the load allocations are completed for the Bay, it is anticipated that the DEQ will establish a bacteria load for Plant No. 1 that will not likely be more restrictive than the existing permit. The existing permit reportedly includes higher mass loads which are conditional on the City obtaining operational control over all of the collection system and implementing an inflow elimination program.

DEQ has initiated studies in anticipation of a modified turbidity standard. While the final promulgation of the standard is not expected for several years, it is believed that the new standard will be less restrictive than the current standard. It is not anticipated that additional treatment will be mandated to meet the new turbidity standard. Most of the current work has focused on streams and the impact on estuaries is not well defined at this time.

Note: The Reasonable Potential Analysis (RPA) performed by the DEQ during the last permit renewal does not meet current requirements under the RPA Internal Management Directive (IMD). That RPA was performed using only 6 samples, incorrectly applied the fresh water criteria and did not evaluate the potential to exceed human health criteria. Additionally, a receiving stream hardness of 4000 was used, which gave a very high criteria for those metals that are hardness dependent. It is likely that the hardness was less than 4000, but inadequate information was available at the time.

CHAPTER 7. LIQUID STREAM TREATMENT ALTERNATIVES

The liquid stream treatment facilities at Coos Bay Wastewater Treatment Plant (WWTP) No. 1 are generally able to satisfy the requirements set forth in its National Pollutant Discharge Elimination System (NPDES) permit. However, upgrades are necessary to provide facilities that can reliably treat increased flows and loads from Coos Bay's future growth. The planning and implementation of these improvements will ensure that Coos Bay WWTP No. 1 will continue to satisfy its permit requirements in the years to come.

The wastewater characteristics analysis presented in Chapter 5 provides the flow and load projections used during the development of the following liquid stream treatment alternatives. Based on the flow and load projections and the capacity of the facilities, the plant capacity needs to be expanded to treat the projected peak wet weather flow. While the existing facilities have adequate capacity for the peak day flow, there are short term periods when the incoming flows exceed the treatment capacity of the plant.

CATEGORIES OF IMPROVEMENTS

Three factors were used to guide the planning for the upgrade of the liquid stream treatment processes:

- Improve plant reliability by providing multiple process units where applicable.
- Optimize utilization of existing facilities to the extent possible to reduce costs.
- Optimize utilization of available space.

The following sections analyze alternatives for potential improvements by grouping facilities into one of two categories:

- Headworks: Headworks consist of screening and grit removal.
- Treatment: Treatment consists of primary sedimentation, biological treatment, secondary clarification and disinfection.

ANALYSIS OF LIQUID STREAM IMPROVEMENTS

Improvements to liquid stream treatment processes are examined in this section.

Improvements Common to All Alternatives

The following recommendations are common to all liquid stream alternatives:

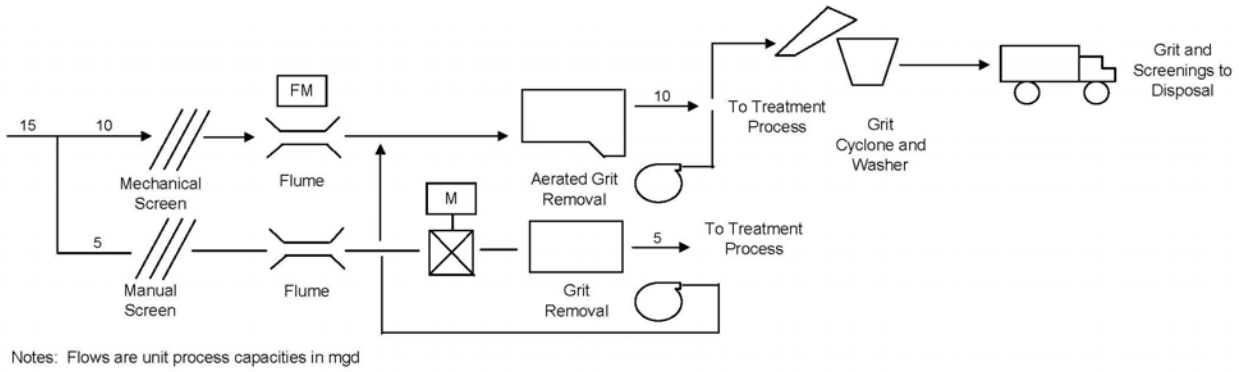
- New transducers on influent flumes.
- Replace existing mechanical bar screen.

- Remove existing manual bar screen and install new mechanical screen.
- Site piping improvements.
- Electrical and SCADA/process control improvements. The power distribution system would be upgraded as required to serve new equipment. Control system improvements would focus on reducing labor and energy costs.

Headworks and Grit Removal

The existing headworks are shown schematically in Figure 7-1.

Figure 7-1. Existing Plant No. 1 Headworks



The existing mechanical screen and manual bar rack are not sized to accommodate the design year peak flow of 20 mgd. The operators report severe rusting on the mechanical bar screen. Due to inadequate capacity and poor performance, this unit should be replaced. The manual bar screen should be replaced with a mechanical bar screen to provide at least 20 mgd screening capacity. New screens should have no more than a 3/8-inch bar spacing to improve performance.

The transducer on the main flume is in need of repair. The transducer on the bypass flume is not functional. Both transducers should be replaced.

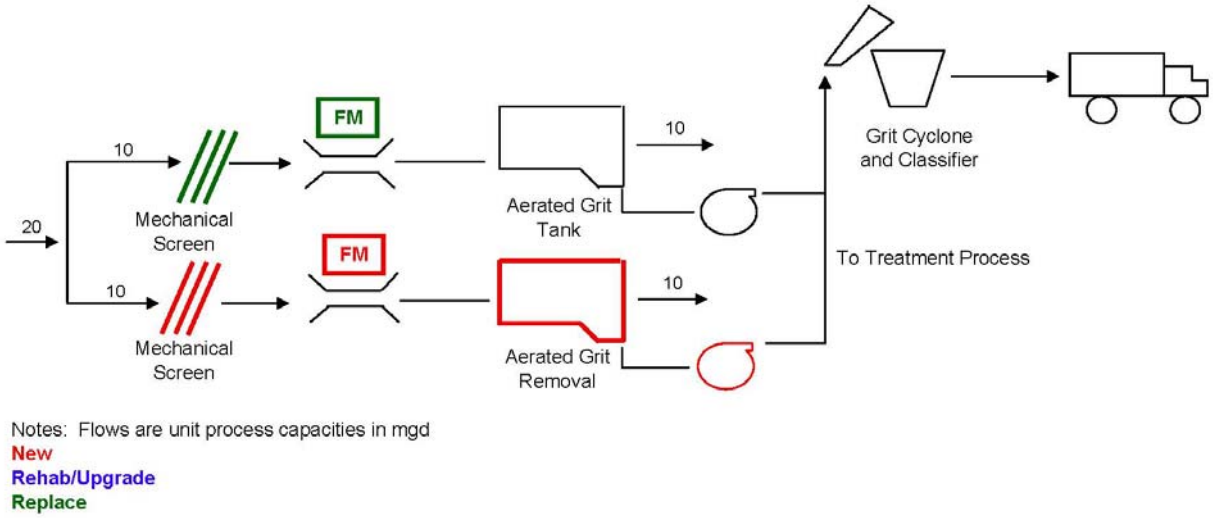
The existing aerated grit chamber has a design capacity of 10 mgd. The original grit removal basin downstream from the manual screen performs poorly and is only used for peak flows. In fact, grit from the original chamber is recycled to the aerated grit chamber for subsequent removal. Due to the sand content of the influent flow, grit removal should be provided for all flow into the plant. Two alternatives were evaluated:

Grit Removal Alternative G1. Construct a second aerated grit chamber.

Grit Removal Alternative G2. Continue with one aerated grit chamber for 10 mgd flow and treat remainder of flow by degritting primary sludge.

Grit Removal Alternative G1. Alternative G1 consists of continuing to use the existing aerated grit chamber to its 10 mgd capacity and adding a second aerated grit chamber with a capacity of 10 mgd. The second chamber would be built adjacent to the existing grit chamber. A new grit pump is recommended so the operators can run the grit pumps continuously during the first storm flushes when the grit load is heavy. The air requirement for the additional grit chamber is small and the existing blowers have adequate capacity to supply air to the second tank.

Figure 7-2. Grit Removal Alternative G1



Notes: Flows are unit process capacities in mgd
New
Rehab/Upgrade
Replace

Table 7-1 shows exiting and future design data for grit removal facilities for Alternative G1.

Table 7-1. Alternative G1 Design Data

Description	Existing Value	New Value
INFLUENT FLOW MEASUREMENT		
Parshall Flume		
Number	2	2
Size, inches	18	18
Number of Flow Transmitters	1	2
Old Headworks		
Existing Grit Chamber		
Number	1	-
Capacity, mgd	5	-
Grit Transfer Pump		
Number	1	-
Type	Centrifugal	-
Capacity, gpm	270	-
1990 Headworks		
Mechanical Bar Screen		
Number	1	2
Type	Front Cleaned Climber	TBD
Bar Spacing, in.	0.75	3/8
Manual Bar Screen		
Number	1	-
Bar Spacing, in	1.5	-
Screenings Compactor		
Number	1	1
Capacity, cubic feet/hour	34	34
Upper Screw, HP	1	3
Lower Screw, HP	3	1
Aerated Grit Tank		
Number	1	2
Capacity, each, mgd	10	10
Grit Pumps		
Number	2	4

Table 7-1. Alternative G1 Design Data, cont'd…

Description	Existing Value	New Value
Capacity, each, gpm	270	270
Grit Cyclone		
Number	1	2
Capacity, each, gpm	270	270
Grit Washer		
Number	1	1
Capacity, gpm	30	30

Grit Removal Alternative G2. Alternative G2 consists of continuing to use the existing aerated grit chamber for flow up to 10 mgd. When influent flow exceeds 10 mgd, the aerated grit chamber would continue to operate to its capacity. The remaining flow would pass directly to the rectangular primary sedimentation basin. Dilute primary sludge will be pumped from the sedimentation basin and degritted in a cyclone/classifier. A new cyclone and classifier will be provided for the sludge degritting. A pump is included to transfer degritted sludge to thickening.

This alternative includes construction of a new channel to bypass flow around the aerated grit chamber directly to the rectangular sedimentation basin and installation of a gate in the existing channel between the aerated grit basin and the primary sedimentation basin. A schematic of this alternative is shown in Figure 7-3.

Figure 7-3. Grit Removal Alternative G2

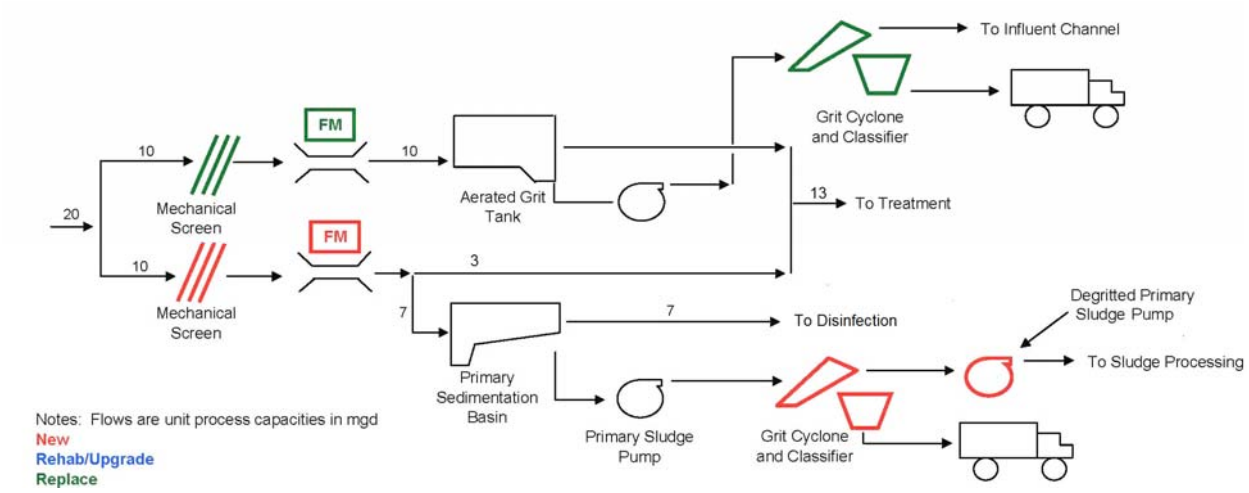


Table 7-2 shows existing and future design data for grit removal facilities for Alternative G2.

Table 7-2. Alternative G2 Design Data

Description	Existing Value	New Value
INFLUENT FLOW MEASUREMENT		
Parshall Flume		
Number	2	2
Size, inches	18	18
Number of Flow Transmitters	1	2
PRELIMINARY TREATMENT		
Old Headworks		
Existing Grit Chamber		
Number	1	-
Capacity, mgd	5	-
Grit Transfer Pump		
Number	1	-
Type	Centrifugal	-
Capacity, gpm	270	-
New Headworks		
Mechanical Bar Screen		
Number	1	2
Type	Front Cleaned Climber	TBD
Bar Spacing, in.	0.75	3/8
Manual Bar Screen		
Number	1	-
Bar Spacing, in	1.5	-
Screenings Compactor		
Number	1	1
Capacity, cubic feet/hour	34	34
Upper Screw, HP	1	1
Lower Screw, HP	3	1
Aerated Grit Tank		
Number	1	1
Capacity, each, mgd	10	10
Grit Pumps		

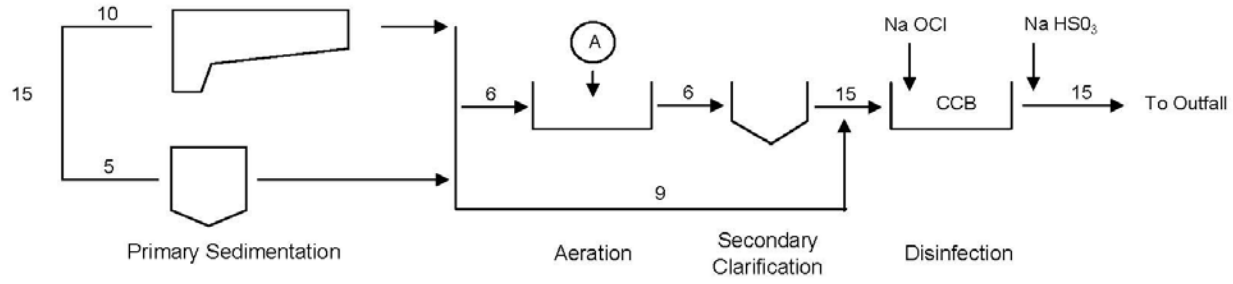
Table 7-2. Alternative G2 Design Data, cont'd…

Description	Existing Value	New Value
Number	2	2
Capacity, each, gpm	270	270
Degritted Primary Sludge Pump		
Number	-	1
Capacity, each gpm	-	270
Grit Cyclone		
Number	1	2
Capacity, gpm	270	270
Grit Washer		
Number	1	2
Capacity, gpm	30	30

Treatment

The existing treatment process is shown schematically in Figure 7-4.

Figure 7-4. Existing WWTP No. 1 Treatment Process



Notes: Flows are unit process capacities in mgd

Primary Sedimentation

Under the current operational scenario, flow up to 2.5 mgd is treated in the older circular primary sedimentation basin. When flow is between 2.5 and 10 mgd, the rectangular sedimentation basin is used and when flow exceeds 10 mgd, 10 mgd is treated in the rectangular basin and the circular basin treats 5 mgd. The primary effluent from the circular basin flows via gravity to secondary treatment. Primary sludge is thickened in the sedimentation basins.

While the design criteria for the plant indicates treatment capacities of 10 mgd for the rectangular basin, plant data shows that the performance of the basin is considerably below that mark as shown in Figures 7-5 and 7-6.

Figure 7-5. Primary Sedimentation Basin BOD Removal Performance

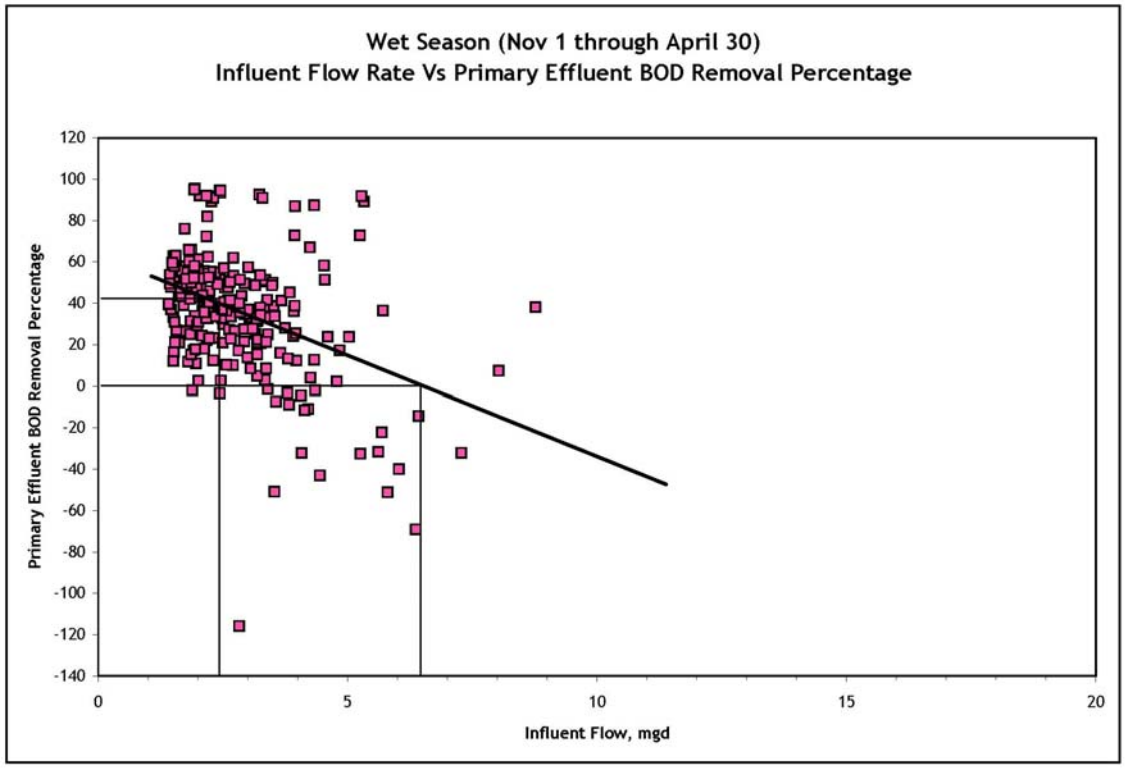
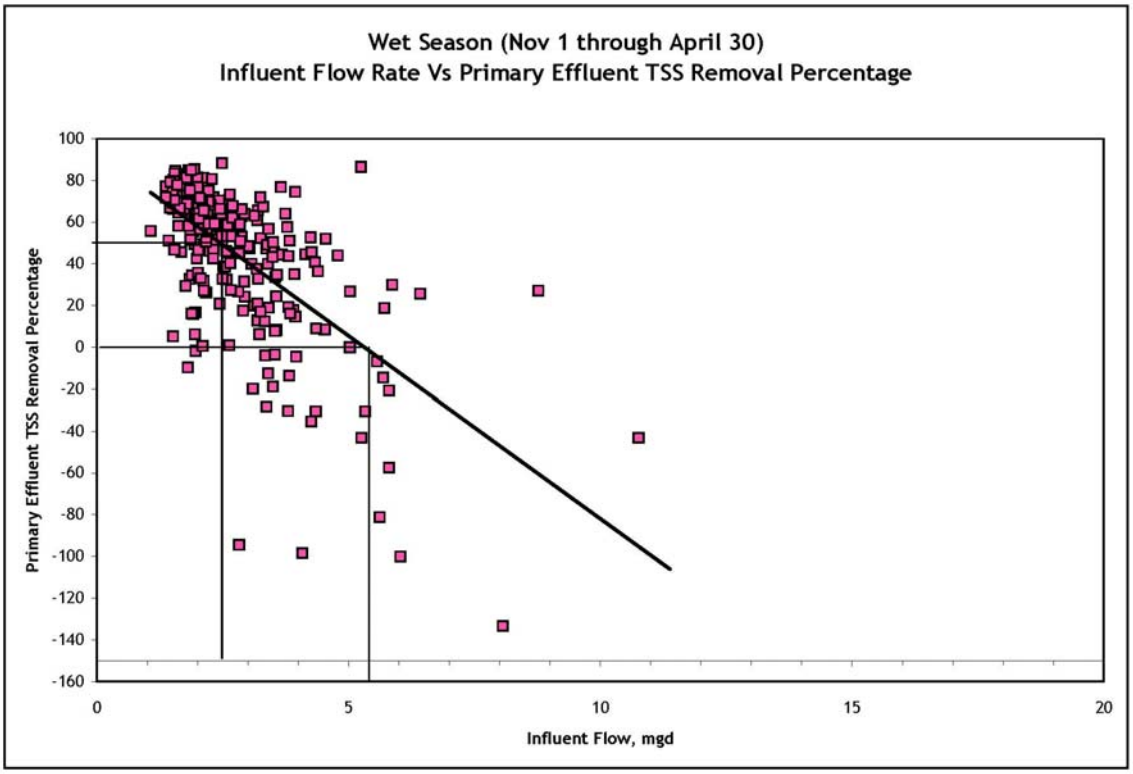


Figure 7-6. Primary Sedimentation Basin TSS Removal Performance



The basin essentially provides no removal beyond 6 mgd. This flow corresponds to an overflow rate of 1920 gpd/sf, well below the basin design overflow rate of 3200 gpd/sf. The basin has adequate influent flow baffling but is shallow with a depth of only 8 feet at its shallowest point. To improve basin performance, it is recommended that dilute primary sludge be removed from the basin and thickened outside. This will lower the sludge blanket and improve performance. For the treatment process alternatives, it is assumed that primary sludge will be thickened in the existing circular primary sedimentation basin.

Two treatment process alternatives were evaluated:

Treatment Process Alternative T1. Blended Treatment

Treatment Process Alternative T2. Full primary and secondary treatment for all flow.

Treatment Process Alternative T1. Treatment Alternative T1 is shown in Figure 7-7. This treatment alternative does not increase the primary sedimentation capacity. A secondary clarifier is added for redundancy and expanded secondary treatment capacity. Process flows will be treated via primary and/or secondary treatment unit processes according to the following flow scenarios:

- All flow scenarios up to 7 mgd will receive full primary and secondary treatment.
- When flow exceeds 7 but is less than 13 mgd, 7 mgd will receive full primary and secondary treatment. Flow in excess of 7 mgd will bypass primary treatment and receive secondary treatment.
- When flow exceeds 13 mgd, 7 mgd will receive primary treatment. Flow in excess of the 7 mgd (which receives primary treatment) will bypass primary treatment and receive secondary treatment. Up to 13 mgd (including a portion of the 7 mgd from primary treatment) will receive secondary treatment.
- When flow reaches 20 mgd, 7 mgd will receive primary treatment only, and 13 mgd will receive secondary treatment only.

All flows will receive disinfection (chlorination) and dechlorination prior to discharge into the outfall. Table 7-2.5 includes a list of influent flow scenarios and treatment processes for Treatment Process Alternative T1.

Table 7-2.5 Treatment Process Alternative T1 – Blended Treatment

Influent Flow, mgd	Amount of flow which receives treatment process		
	Primary Clarification	Secondary Treatment Aeration Basin & Secondary Clarification	Disinfection Chlorination & Dechlorination
Up to 7	ALL	ALL	ALL
7 to 13	7 mgd (bypass excess)	ALL	ALL
13 to 20	7 mgd	Up to 7 mgd (bypass excess)	ALL
	6 to 13 mgd (bypass)	13 mgd	
20	7 mgd	7 mgd (bypass)	ALL
	13 mgd (bypass)	13 mgd	

Figure 7-7. Alternative T-1 Process Flow Diagrams

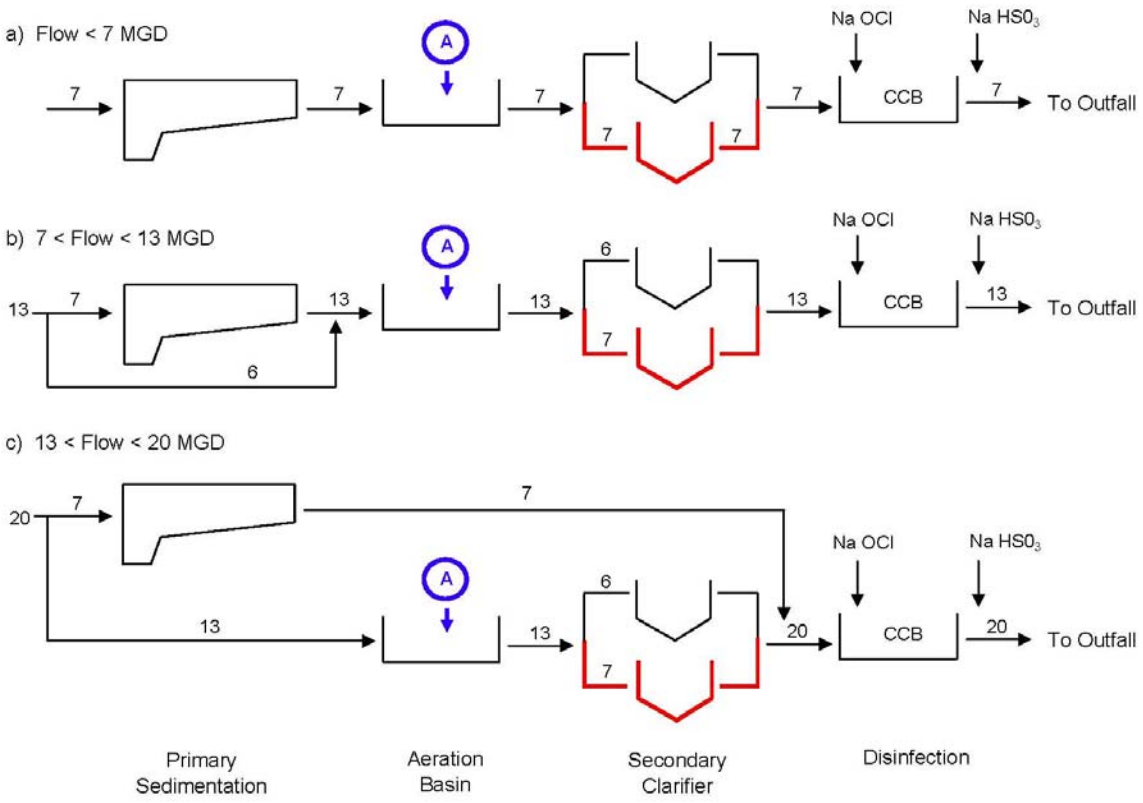


Table 7-3 shows existing and future design data for treatment facilities for Alternative T1.

Table 7-3. Alternative T1 Design Data

Description	Existing Value	New Value
PRIMARY TREATMENT		
Primary Sedimentation		
Circular Primary Sedimentation Basin		
Number	1	-
Diameter, ft	54	-
Overflow rate, PWWF, gpd/sf		
PWWF	2,180	-
Rectangular Primary Sedimentation Basin		
Number	1	1
Width, ft	21.5	21.5
Length, ft	145	145
Overflow rate, gpd/sf		
PWWF	3,200	2,200[(a)]
SECONDARY TREATMENT		
Aeration Basins		
Number	2	2
Width, ft	34	34
Length, ft	96	96
Sidewater Depth, ft	15.5	15.5
Total Volume, gal	756,000	756,000
MLSS, mg/l	2,000	2,000
Hydraulic Detention Time, hours		
ADWF	11.3	10.7
MMWWF	3.3	3.1
Diffuser Type	Fine Bubble Tubes	Fine Bubble Tubes
Blowers		
Number	3	4
Type	Centrifugal	Centrifugal
Capacity, each, scfm	1,200	1,200
Pressure, psi	8.0	8.0

Table 7-3. Alternative T1 Design Data, cont'd…

Description	Existing Value	New Value
Secondary Clarifiers		
Existing Clarifier		
Diameter, ft	80	80
Sidewater Depth, ft	16	16
Overflow Rate, gpd/sf		
Peak Flow to Secondary Treatment	1200	1200
New Clarifier		
Diameter, ft	-	90
Sidewater Depth, ft	-	18
Overflow Rate, gpd/sf		
Peak Flow to Secondary Treatment	-	1200
RAS pumps		
Number	2	3
Type	Centrifugal	Centrifugal
Capacity, each, gpm	1,500	1,500
WAS Pump		
Number	1	2
Type	Centrifugal	Centrifugal
Capacity, each, gpm	360	360
Secondary Scum and Tank Drain Pump		
Number	1	1
Capacity, each, gpm	340	340

(a). At peak flow to process, 7 mgd.

Treatment Process Alternative T2. Treatment Alternative T2 would provide full primary and secondary treatment for the design peak flow of 20 mgd. As shown in Figure 7-8, screened, degritted raw sewage would flow to primary sedimentation. A second primary sedimentation basin would be constructed. Aeration basin volume would not be increased; however a blower would be added. A new secondary clarifier would be constructed.

Figure 7-8. Treatment Process Alternative T2

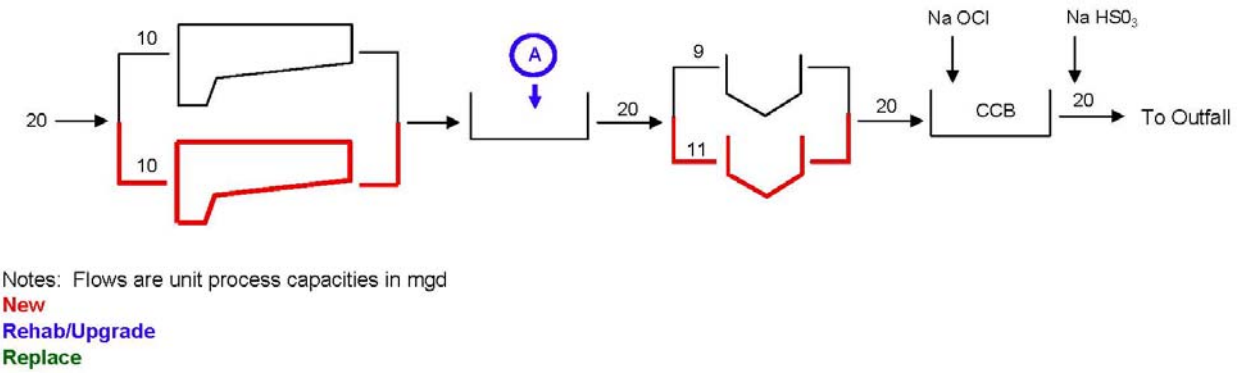


Table 7-4 shows existing and future design data for treatment facilities for Alternative T2.

Table 7-4. Alternative T2 Design Data

Description	Existing Value	New Value
PRIMARY TREATMENT		
Primary Sedimentation		
Circular Primary Sedimentation Basin		
Number	1	-
Diameter, ft	54	-
Overflow rate, PWWF, gpd/sf		
PWWF	2,180	-
Rectangular Primary Sedimentation Basin		
Number	1	2
Width, ft	21.5	21.5
Length, ft	145	145
Overflow rate, gpd/sf		
PWWF	3,200	3,200
SECONDARY TREATMENT		
Aeration Basins		
Number	2	2
Width, ft	34	34
Length, ft	96	96
Sidewater Depth, ft	15.5	15.5
Total Volume, gal	756,000	756,000
MLSS, mg/l	2,000	2,000
Hydraulic Detention Time, hours		
ADWF	11.3	10.7
MMWWF	3.3	3.1
Diffuser Type	Fine Bubble Tubes	Fine Bubble Tubes
Blowers		
Number	3	4
Type	Centrifugal	Centrifugal
Capacity, each, scfm	1,200	1,200
Pressure, psi	8.0	8.0

Table 7-4. Alternative T2 Design Data, cont'd…

Description	Existing Value	New Value
Secondary Clarifier		
Existing Clarifier		
Diameter, ft	80	80
Sidewater Depth, ft	16	16
Overflow Rate, gpd/sf		
PDF	1200	1200
PWWF	1800	1800
New Clarifier		
Diameter, ft	-	90
Sidewater Depth, ft	-	18
Overflow Rate, gpd/sf		
PDF	-	1200
PWWF	-	1800
RAS Pumps		
Number	2	3
Type	Centrifugal	Centrifugal
Capacity, each, gpm	1,500	1,500
WAS Pump		
Number	1	2
Type	Centrifugal	Centrifugal
Capacity, each, gpm	360	360
Secondary Scum and Tank Drain Pump		
Number	1	1
Capacity, each, gpm	340	340

DISINFECTION

The chlorine contact basin will provide nearly 27 minutes of detention at future peak wet weather flow. Under the current bacterial standard, this detention time is adequate. The chlorine contact chamber is fed by gravity. Addition of a flash mixer where secondary effluent enters the chlorine contact chamber, and baffle modifications to increase the length-to-width ratio of the channels in the basin will improve performance.

Table 7-5. Chlorination and Dechlorination Basic Design Data

Description	Existing Value	New Value
CHLORINATION AND DECHLORINATION		
Chlorination Facilities		
Type	Sodium Hypochlorite	Sodium Hypochlorite
Contact Tank		
Number	1	1
Total volume, gal	370,000	370,000
Hydraulic detention time, minutes		
ADWF	333	313
PWWF	36	27
Sodium Hypochlorite Storage Tanks		
Number	2	2
Total Storage Volume, gal	3,600	3,600
Feed pumps		
Number	3	3
Type	Diaphragm	Diaphragm
Capacity, each, gph	20	20
Dechlorination Facilities		
Type	Sodium bisulfite	Sodium bisulfite
Sodium Bisulfite Storage Tanks		
Number	2	2
Total Storage Volume, gal	3,000	3,000
Feed Pumps		
Number	2	2
Type	Diaphragm	Diaphragm
Capacity, each gph	12.7	12.7
Mixer		
Number	1	1
Type	Vertical	Vertical
Motor, hp	5	5

OUTFALL

The existing 42-inch outfall is currently being replaced due to its deteriorating condition. The cost for replacement of the outfall with a 48-inch pipe slightly north of its current location is included in Table 7-7.

COMPARISON OF ALTERNATIVES

Tables 7-6 and 7-7 present the capital costs for Alternatives G1 and G2, and T1 and T2, respectively. A complete present worth comparison between alternatives will be presented in Chapter 10, Recommended Plan. Non-economic comparisons of alternatives are provided in Tables 7-8 and 7-9.

Table 7-6. Grit Removal Alternatives Capital Cost Comparisons, $1,000

	Alt. G1, dollars	Alt. G2, dollars
Contractor Profit and Overhead, 15%	103	93
Mobilization, 5%	34	31
New level elements on influent flumes	11	11
Demolish manual bar screen	11	11
New mechanical bar screen	145	145
Replace existing mechanical bar screen	145	145
Demolish existing stairs	9	9
New grit chamber, channel, gates, appurtenances and pumps	246	0
New grit chamber bypass channel and gate	0	50
New grit cyclone and classifier	109	218
Degritted primary sludge pump	0	20
Site piping	11	11
Electrical/SCADA, 20%	138	124
Subtotal	964	868
Contingencies, 25%	241	217
Engineering, 20%	193	174
Total	1,397	1,259

Some components may reach the end of their service life before the end of the 20-year planning horizon. These components will likely require replacement at the expiration of the anticipated service life. The present worth (PW) of the additional costs of components which may require replacement within the planning horizon are listed in Table 7-6.5 and Table 7-7.5 below.

Table 7-6.5. Grit Removal Alts. Service Life & Present Worth Comparisons, $1,000*

Items which will require replacement within planning horizon	Service Life, years	Alt. G1 – PW of Replacement Cost	Alt. G2 – PW of Replacement Cost
New mechanical bar screen	15	83	83
Replace existing mechanical bar screen	15	83	83
New grit cyclone and classifier	15	63	63
Total PW of Replacement Items, dollars		229	229

*Based on a 20 year planning period and a return rate of 5.875% as recommended by the Natural Resources Conservation Service, and a 2.0% inflation rate on Capital Replacement Items.

Table 7-7. Treatment Alternatives Capital Cost Comparisons, $1,000

	Alt. T1, dollars	Alt. T2, dollars
Contractor Profit and Overhead, 15%	215	517
Mobilization, 5%	72	172
New Primary Sedimentation Basin	0	2,017
New Blower	27	27
Mixed Liquor Splitter Box	90	90
New Secondary Clarifier	969	969
New RAS Pump	27	27
New WAS Pump	20	20
Site Piping Improvements	56	56
Chlorine Contact Basin Improvements	24	24
Outfall	219	219
Electrical/SCADA, 20%	286	690
Subtotal	2,004	4,827
Contingencies, 25%	501	1,207
Engineering, 20%	401	965
Total	2,906	6,999

Table 7-7.5. Treatment Alts. Service Life & Present Worth Comparisons, $1,000*

Items which will require replacement within planning horizon	Service Life, years	Alt. T1 – PW of Replacement Cost	Alt. T2 – PW of Replacement Cost
New Blower	15	16	16
New RAS Pump	15	16	16
New WAS Pump	15	12	12
Total PW of Replacement Items, dollars		44	44

*Based on a 20 year planning period and a return rate of 5.875% as recommended by the Natural Resources Conservation Service, and a 2.0% inflation rate on Capital Replacement Items.

Based on this analysis, the recommended plan for Plant No. 1 is based on the development of Alternatives G2 and T1. These are further developed in Chapter 9.

Table 7-8. Non-Economic Comparison of Grit Removal Alternatives

Evaluation Criteria	Grit Removal Alternative G1	Grit Removal Alternative G2
Capacity – design year for this plan is 2027	Influent pump station and headworks facilities would be sized for design year peak flows.	Influent pump station and headworks facilities would be sized for design year peak flows.
Performance – requirements are guided by DEQ NPDES permit	Screening and grit removal deficiencies would be corrected through proper equipment selection.	Screening and grit removal deficiencies would be corrected through proper equipment selection.
Implementation – feasibility of construction staging to maintain operations of the plant	New aerated grit chamber would be constructed adjacent to existing facilities during the summer season so that existing grit chamber could process influent flow.	The new channel would be constructed first so that flow could be bypassed around the existing aerated grit chamber when the gate in the primary influent channel is installed.
Constructability – outlines any construction concerns or issues	Relatively few uncertainties likely during construction.	Relatively few uncertainties likely during construction.
Reliability – adequate redundancy provided for critical equipment	Complies with Class I reliability requirements	Complies with Class I reliability requirements
Future Capacity Expansion – space available and ease of expansion of new and existing facilities	Future expansion will be considered in the design and placement of new facilities.	Future expansion will be considered in the design and placement of new facilities.
Operational Issues – operational and maintenance ease and flexibility.	Operation will be similar to existing operation. The new aerated grit tank would manually be put on line when flows exceed the capacity of the existing chamber.	Flow in excess of 10 mgd would bypass the aerated grit chamber and primary sludge would be degritted.

Table 7-9. Non-Economic Comparison of Treatment Alternatives

Evaluation Criteria	Treatment Alternative T1	Treatment Alternative T2
Capacity – design year for this plan is 2027	Some raw sewage flows from the headworks directly to the aeration basins during high flows.	All treatment steps have adequate capacity for design year peak flows.
Performance – requirements are guided by DEQ NPDES permit	New facilities will be able to meet the proposed bacteria standards in the new permit.	New facilities will be able to meet the proposed bacteria standards in the new permit.
Implementation – feasibility of construction staging to maintain operations of the plant	Construction staging is possible to keep all facilities in service.	Construction staging is possible to keep all facilities in service.
Constructability – outlines any construction concerns or issues	Few uncertainties are likely during construction.	Few uncertainties are likely during construction.
Regulatory Issues – ease of permit compliance	Permit compliance responsibilities are similar to current situation.	Permit compliance responsibilities are similar to current situation.
Reliability – adequate redundancy provided for critical equipment	Only one primary tank is included in this alternative. Maintenance on that tank would occur during periods of low loading.	All processes have backup facilities.
Future Capacity Expansion – space available and ease of expansion of new and existing facilities	A new secondary clarifier is constructed on currently unoccupied land planned for an additional tank. Area planned for future tanks has been left clear for future expansion.	A new secondary clarifier is constructed on currently unoccupied land planned for an additional tank. Area planned for future tanks has been left clear for future expansion.
Operational Issues – operational and maintenance ease and flexibility.	Pumping of flow from the circular primary basin to the aeration basin is eliminated.	Pumping of flow from the circular primary basin is eliminated.

CHAPTER 8. SOLIDS MANAGEMENT ALTERNATIVES

Solids that are produced as part of the wastewater treatment process must be treated and reused or disposed of in an environmentally acceptable and economically feasible manner. Solids treatment includes reduction of the water content, stabilization of volatile compounds, reduction of pathogens, and storage during wet weather. Following these steps, the biosolids are disposed of in a landfill, or are applied on agricultural land at an agronomic rate. Alternatives for solids management are evaluated in this chapter.

The Department of Environmental Quality (DEQ) encourages the beneficial reuse of biosolids through land application. While incineration has been used at other facilities, air quality concerns and cost have eliminated most of these facilities. Some communities dispose of their dewatered solids in landfills, but the beneficial attributes of the solids as a soil amendment are lost with this approach. In addition, landfill disposal is subject to the discretion of the landfill operator. Some successful solids management programs utilize landfill disposal as a wet-weather or emergency disposal strategy. The City of Coos Bay currently applies solids from Plant Nos. 1 and 2 to private agricultural and forest lands in a manner consistent with regulatory requirements for beneficial reuse.

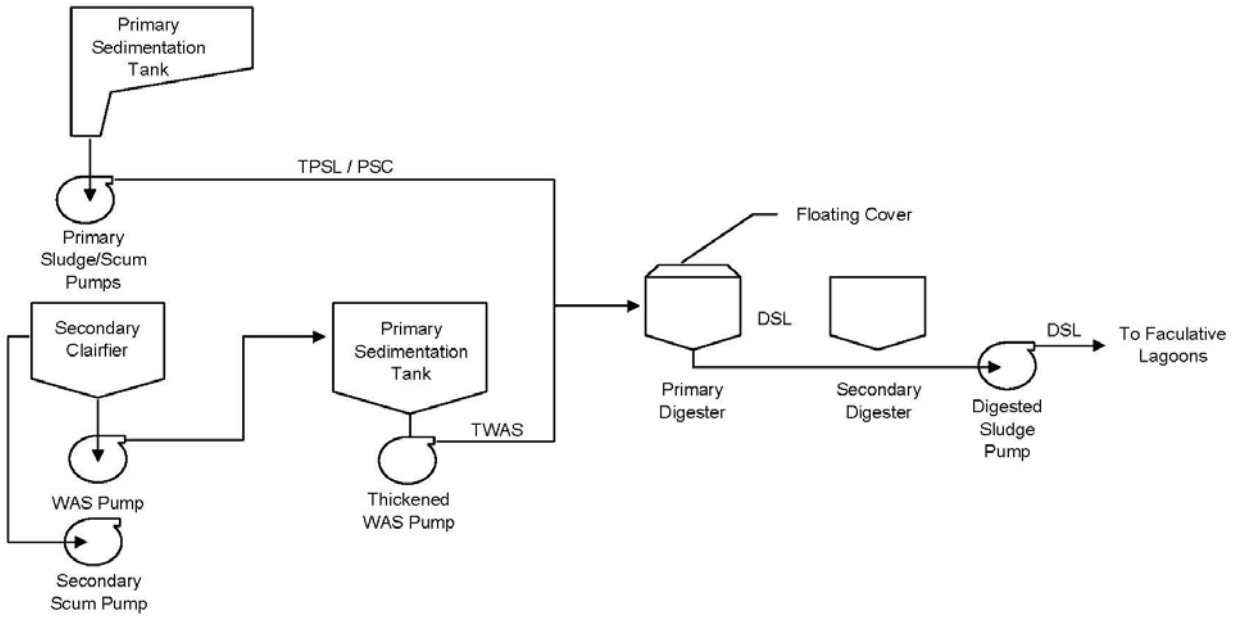
The primary objectives of the solids management program include:

- Ensure adequate capacity is available to process current and projected sludge quantities.
- Comply with applicable state and federal (Code of Federal Regulations, Chapter 40, Part 503) regulations.
- Ensure that biosolids are reused in an environmentally sound and publicly acceptable manner.
- Prevent the creation of nuisance conditions, such as vectors or objectionable odors.
- Minimize costs by using existing facilities to the extent possible.

EXISTING SYSTEM

Solids collected at wastewater treatment plant (WWTP) No. 1 consist of waste activated sludge (WAS), primary sludge, primary scum, and secondary scum. Depending on flow conditions, primary sludge and WAS are either co-thickened in the circular primary sedimentation basin or primary sludge is thickened in the rectangular primary sedimentation basin and WAS is thickened in the circular primary sedimentation basin prior to anaerobic digestion. Digested solids are pumped to the facultative sludge lagoon on the east side of town and combined with digested sludge from WWTP No. 2. The lagoon provides wet weather storage and additional volatile solids reduction. Biosolids are removed from the lagoon and land applied between June and October each year. Figure 8-1 shows the existing sludge processing facilities at WWTP No. 1.

Figure 8-1. Existing Solids Processing Facilities at WWTP No. 1



Solids production rates are estimated to evaluate process options. Under current average loading conditions, the plant generates approximately 3,700 pounds of dry solids per day. Solids production projections are summarized in Table 8-1.

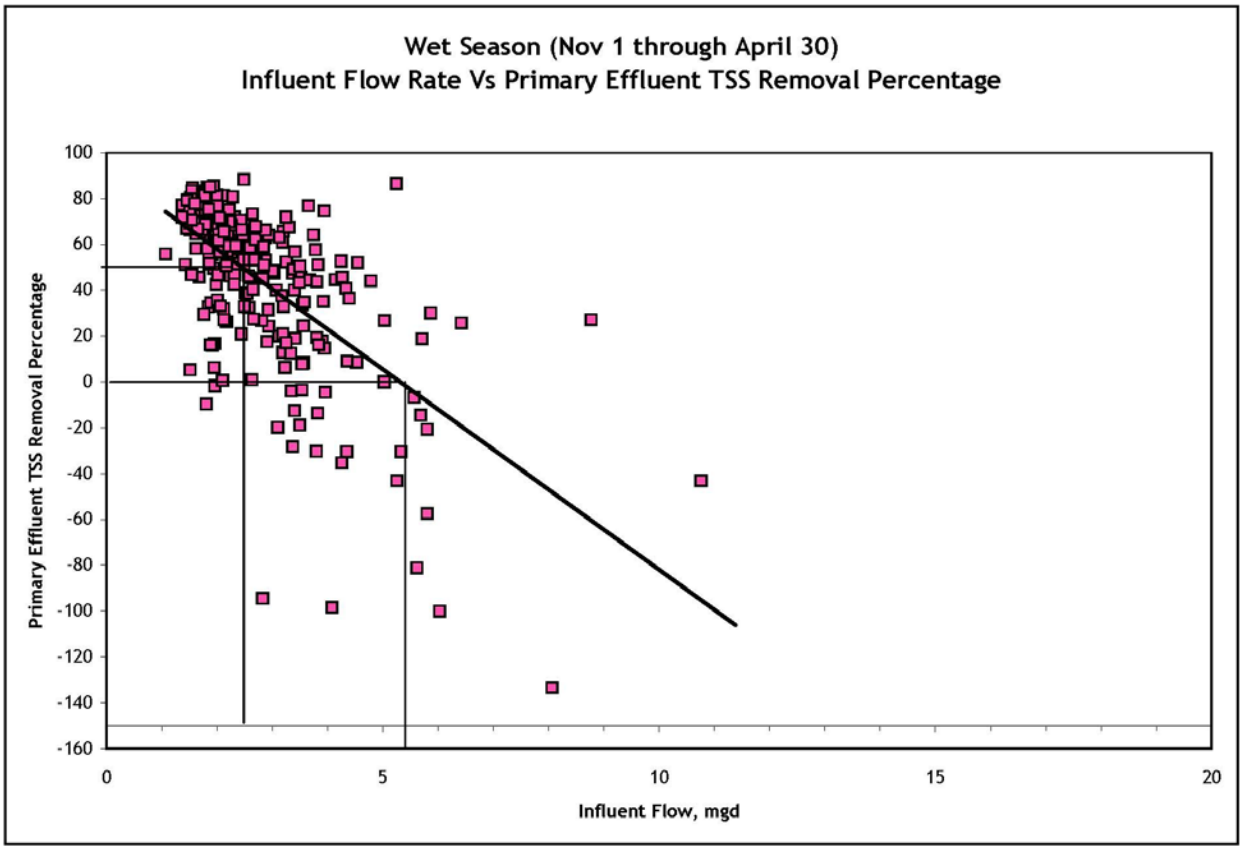
Table 8-1. WWTP No. 1 Average Sludge Production Projections

Year	Sludge Production, lbs/day	Sludge Production, gal/day
2003 Primary Solids	1,980	10,300[(a)]
WAS Solids	850	7,800[(b)]
Total Solids	**2,830**	**18,100**
2027 Primary Solids (unthickened)	2,100	11,000[(a)]
WAS Solids	900	8,300[(b)]
Total Solids	**3,000**	**19,300**
2027 Primary Solids (thickened)	2,100	6,300[(c)]
WAS Solids	900	2,700[(c)]
Total Solids	**3,000**	**9,000**

(a) Based on average thickened sludge pumped to digester at 2 – 2.5 percent solids.
(b) Based on average thickened sludge pumped to digester at 1 – 1.5 percent solids.
(c) Based on average thickened sludge pumped to digester at 4 percent solids.

Primary Sludge. Operations personnel currently maintain a sludge blanket in the rectangular primary sedimentation basin in an effort to thicken primary sludge prior to digestion. While this technique is effective at reducing the volume of sludge produced, the solids are susceptible to wash out during periods of high flow due to hydraulic currents in the primary sedimentation basin. Consequently, the effective capacity of the primary sedimentation basin is reduced compared to an operational approach that does not include in-tank thickening. Figure 8-2 shows the relationship between primary clarifier solids removal efficiency and plant flow. There is a general trend of decreasing efficiency with increased plant flow. As operated, the rectangular primary sedimentation process does not meet its design capacity of 10 mgd.

Figure 8-2. Plant Flow vs. Primary Effluent TSS Removal Percentage



Waste Activated Sludge. WAS solids concentration leaving the circular primary sedimentation basin where it is thickened, currently averages approximately 1 to 1.5 percent. Reducing WAS volume through an alternate thickening method would produce a thicker sludge, increase the capacity of the digesters, and reduce overall solids handling costs.

Anaerobic Digestion. Recommendations in the WWTP #2 Facilities Plan propose that thickened sludge from WWTP #2 plant be hauled to WWTP #1 for digestion. Table 8-2 summarizes combined sludge quantities from WWTP #1 and #2.

Table 8-2. Combined WWTP No. 1 and 2 Average Sludge Quantities for Digester Loading

Year	Sludge Production, lbs/day	Sludge Production, gal/day
2003 WWTP No. 1 Solids	2,800	18,100[a]
WWTP No. 2 Solids	2,000	16,300
Total Solids	**4,800**	**34,400**
2027 WWTP No.1 Solids (unthickened)	3,000	19,300[a]
WWTP No. 2 Solids	2,300	6,900
Total Solids	**5,300**	**26,200**
2027 WWTP No. 1 Solids (thickened)	3,000	9,000[c]
WWTP No. 2 Solids	2,300	6,900
Total Solids	**5,300**	**15,900**

(a) Based on average thickened primary sludge pumped to digester at 2 – 2.5 percent solids and thickened WAS pumped to digester at 1 – 1.5 percent solids.
(b) Based on average thickened sludge pumped to digester at 4 percent solids.

Currently, there are two digesters at the WWTP No. 1 site. Digester No. 1 is heated and mixed. Digester No. 2 provides gas storage. Considering only the volume of Digester No. 1, existing capacity is not adequate for current sludge quantities. The primary digester has a volume of 331,150 gallons which provides less than ten days of detention time for the total current sludge production. Alternatives will be evaluated for stabilizing the sludge quantities listed in Table 8-2.

Digested Sludge Pumping. Digested sludge is pumped to the facultative lagoon using a single 450 gpm sludge transfer pump. Operators report the pump is in good condition. Should the pump need repair, there is sludge storage at WWTP No. 2 in the existing digesters which will be converted to storage tanks so that the solids from WWTP No. 2 could be held. Solids from WWTP No. 1 could be held for a short time in the clarifiers. This storage adds a sufficient level of reliability to the system so that a second pump will not be required. Note: Digested sludge can be hauled from the digesters directly to the sludge lagoon if necessary.

Facultative Lagoon. The City's lagoon has adequate capacity to store current and future loads from WWTP No. 1 and No. 2. The current loading of the lagoon is approximately 600 pound per day of volatile suspended solids while it could treat up to 3,500 pounds per day. The lagoon has a storage capacity in excess of one year. Improvement to the lagoon is not needed.

BIOSOLIDS QUALITY

Biosolids produced in the City of Coos Bay meet the Environmental Protection Agency's (EPA) requirements for land application. Volatile solids reduction of the sludge exceed vector attraction reduction criteria. Table 8-3 shows the general biosolids characteristics, while Table 8-4 summarizes the concentration of heavy metals detected in the biosolids for the year 2004. As shown, the biosolids meet the requirements for exceptional quality biosolids.

Table 8-3. Biosolids Characteristics

Parameter	Average, mg/kg
Total Solids	40,550
Volatile Solids	20,165
VS% / TS%	0.497
Ammonia Nitrogen	12,700
Nitrate Nitrogen	100
Total Kj. Nitrogen	42,150
Phosphorus	31,050
Potassium	2,000

Table 8-4. Biosolids Quality – Metals

Parameter	Measured Average Concentration, mg/kg	Standard, mg/kg	
		Limit	Exceptional Quality
Arsenic	8.9	75	41
Cadmium	2.6	85	39
Chromium	34.2	3,000	1,200
Copper	401.0	4,300	1,500
Lead	105.6	840	300
Mercury	3.6	57	17
Molybdenum	11.4	75	18
Nickel	29.2	420	420
Selenium	5.0	100	36
Zinc	954.5	7,500	2,800

TREATMENT LEVEL

Land application of biosolids is subject to Federal Part 503 regulations. These regulations list two categories of treatment requirements: vector attraction (rodents, birds, and insects) and pathogen reduction. Vector attraction reduction requirements concentrate on reducing the volatile solids content of the sludge. With respect to pathogen reduction requirements, the Regulations recognize two categories of biosolids: Class A and Class B. Class A biosolids have low levels of pathogenic bacteria and are considered safe for public use. Class B biosolids have higher levels of pathogenic bacteria and are not considered appropriate for public use.

The processes required for the production of Class A biosolids have both a significant initial capital cost and ongoing operation and maintenance costs. For this reason, the vast majority of Oregon communities produce Class B biosolids. The sludge management alternatives presented herein assume the City will continue to produce Class B biosolids. A mean cell residence time of 15 days is required at a temperature of 35º C.

The presence of metals in the sludge is also regulated for land application. Table 8-4 lists the Pollutant Concentration Limits in metals of concern the 503 regulations. The City's biosolids easily meet the Pollutant Concentration Limits for exceptional quality biosolids.

SOLIDS MANAGEMENT ALTERNATIVES

There are numerous processes available for solids management that (when properly combined) are capable of providing effective solids treatment prior to disposal. Figure 8-3 illustrates a wide range of alternatives that utilize anaerobic or aerobic digestion. In addition to digestion, lime stabilization, pasteurization or thermal drying options could be used to meet the regulatory requirements for pathogen and vector attraction reduction; however, storage options would be reduced if lime stabilization is used.

Prior to analyzing these various options, the three elements of a successful solids management program should be reviewed. A short description of each element as related to the Coos Bay WWTP No. 1 solids management program is presented below.

Disposal. Disposal consists of the final application of the treated solids product. The City currently uses all of their biosolids in a beneficial manner on agricultural and forest lands during the summer months. This method is consistent with DEQ's promotion of beneficial use and is a program that should have no significant obstacles or limitations in the planning horizon. Other options, as listed in Figure 8-3, either add cost or uncertainty.

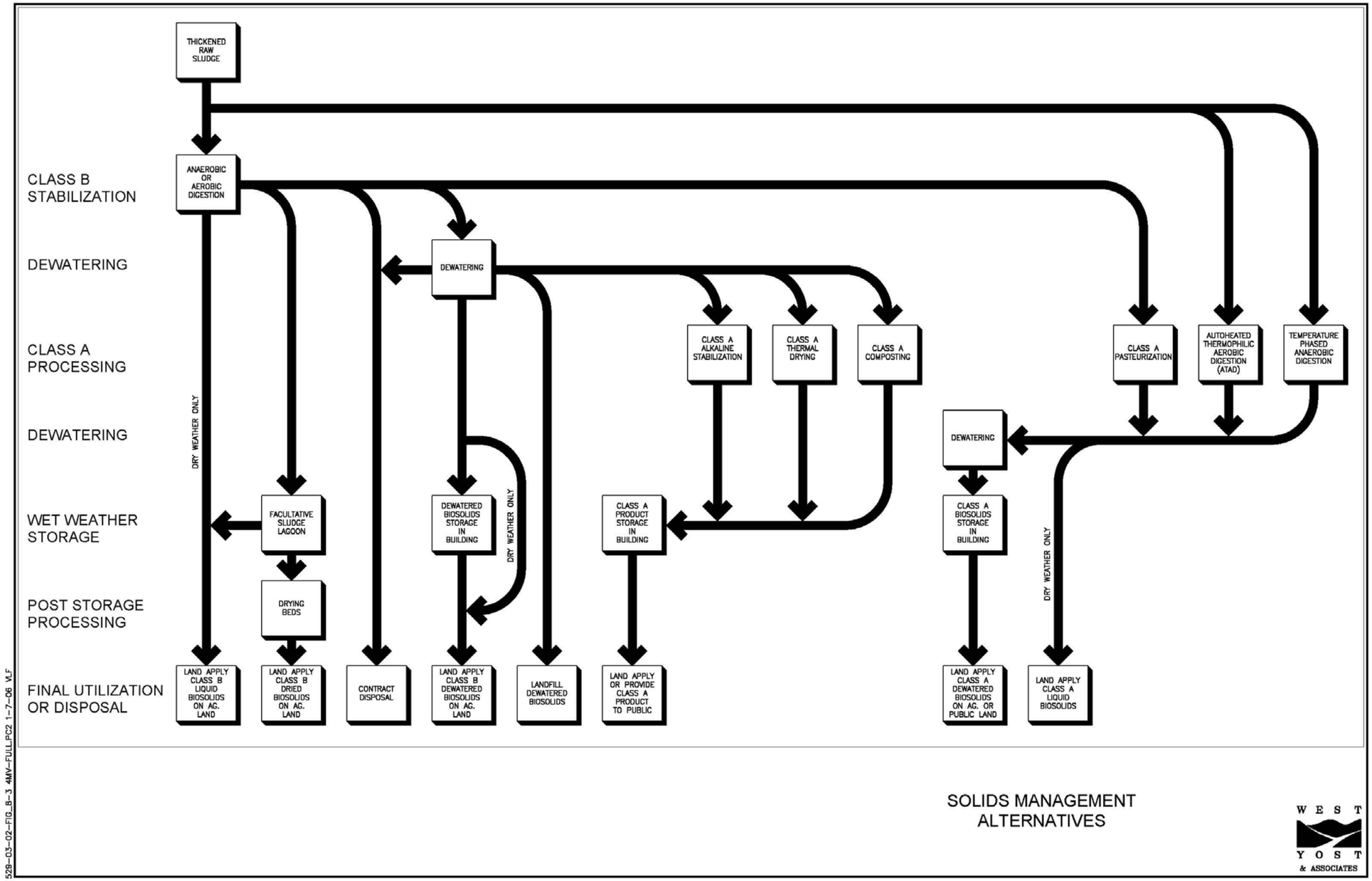
Storage. Most successful solids management programs include some type of wet weather storage of biosolids, because land application is generally achievable only during the summer months when runoff is unlikely and groundwater is generally deeper. The City's facultative lagoon provides this storage. The lagoon has adequate capacity to accommodate the current and future (projected) sludge quantities from both plants. Therefore, in the interest of maximizing the use of existing facilities, alternative storage methods need not be evaluated.

Treatment. Numerous sludge treatment technologies are available, designed to produce either Class A or Class B biosolids. The primary advantage to Class A biosolids is that they can be distributed with few restrictions due to a higher level of pathogen reduction. However, production of Class A biosolids has significantly higher capital and operation and maintenance (O&M) costs compared to Class B processes. If disposal methods that are compatible with Class B biosolids are available and there is no other compelling reason to convert to a Class A program, the additional expense to achieve a Class A product is not justified.

The City's anaerobic digestion process currently produces Class B biosolids, which is acceptable for application on agricultural and forest land. If additional thickening facilities are included, the existing digesters have enough capacity to accommodate projected future sludge quantities.

Lime stabilization is another common sludge thickening process, but it is not generally compatible with lagoon storage. Converting to Class B lime stabilization would require an alternate approach to storage, and would only be cost-effective if the existing lagoon was inadequate for the design year sludge quantities. A Class B lime stabilization program would require construction of new dewatering and (dewatered biosolids) storage facilities. Aerobic digestion is another acceptable Class B process. While simpler to operate than anaerobic digestion, aerobic digesters require a significant amount of energy and space—additional tank volume would be necessary. In addition, there have been reported cases of odor problems where aerobic digesters are used in combination with facultative sludge lagoons for storage.

Figure 8-3. Solids Management Alternatives



Elements Common to All Alternatives

The following elements are common to all solids management alternatives:

- Digesting thickened sludge from WWTP No. 2 as recommended in the WWTP No. 2 Draft Facilities Plan (February 2005).
- New in-line primary sludge grinder
- New pump for thickened sludge from the circular primary sedimentation basin.
- New boiler, heat exchangers, gas and hot water piping and appurtenances.
- Replacing mixing and recirculating equipment for Digester No. 1. Mechanical mixers are assumed for the purposes of this report.
- Automatic sludge transfer between the primary and secondary digesters should be provided.
- New handrails around both digester roofs.
- Replace floating cover on Digester No. 1.
- Improve the cover of Digester No. 2 as required
- General repair on digester control building including replacing broken windows.
- New waste gas burner.
- Replace electrical and install SCADA/process control systems. Control system improvements will focus on reducing labor and energy costs.

Solids Management Alternative S1

As shown schematically in Figure 8-4 this alternative includes continuing to thicken primary sludge in the rectangular primary sedimentation basin and thickening WAS in the circular primary clarifier under all flow conditions. The digesters would process WWTP No. 1 sludge along with thickened sludge from WWTP No. 2 until capacity of the digesters is reached at which time Digester No. 1 at WWTP No. 2 will need to be rehabilitated and used to its capacity. A portion of the sludge will be digested at WWTP No. 2 and a portion will be digested at WWTP No. 1. It is recommended that the Digester No. 2 cover be repaired and it be used as the primary digester and Digester No. 1 be equipped with a new floating cover and it be used as a secondary digester.

Recommendations for Facility Plan #2 are to turn digesters into holding tanks. Therefore, S1 not recommended.

Major components of Alternative S1 include:

- Upgrading Digester No. 1 at WWTP No. 2 which will be used in the early years as storage tank.
- Resuming hauling of sludge digested at WWTP No. 2 to the lagoon in the later years when sludge is digested at WWTP No. 2.

Figure 8-4. Alternative S1 Process Flow Diagram

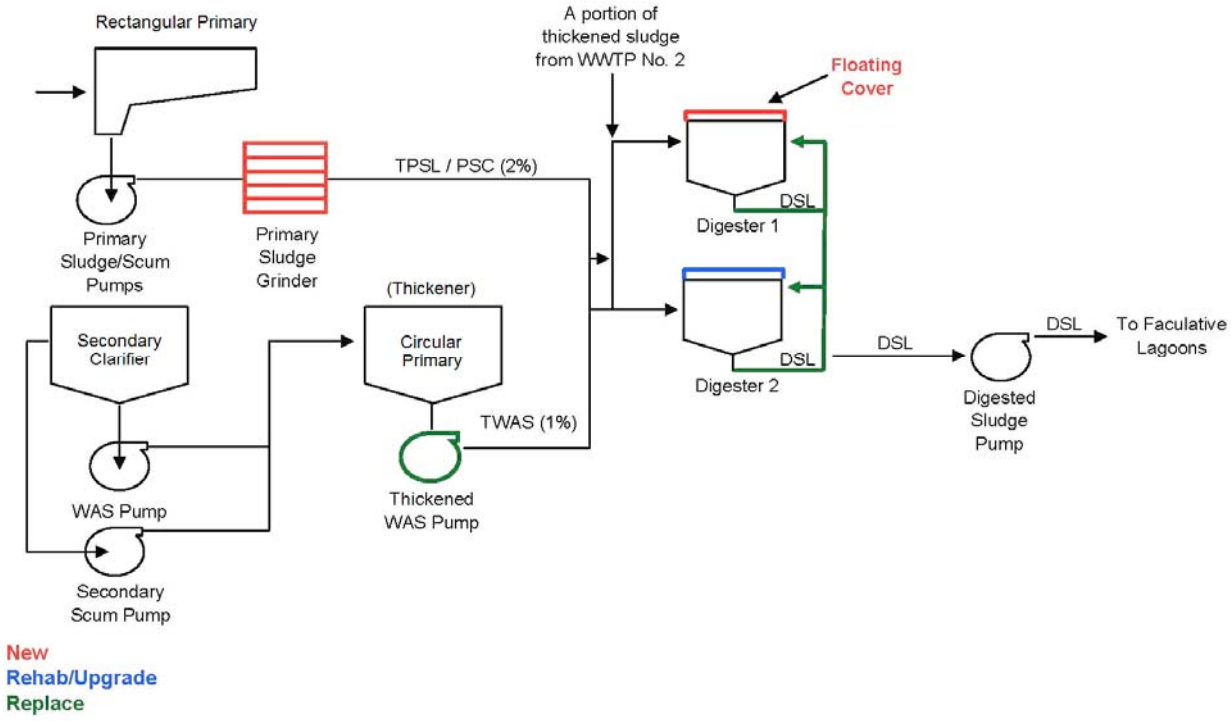


Table 8-5 shows existing and future design data for Alternative S1.

Table 8-5. Solids Management Alternative S1 Design Data

Description	Existing Value	New Value
Primary Sludge		
Primary Sludge Grinder		
Number		1
Type		In-line
Waste Activated Sludge		
Thickened WAS Pump		
Number	1	1
Type	Piston	Rotary Lobe
Capacity, gpm	60	60
Anaerobic Digestion		
Digester No. 1		
Diameter, ft	45	45
Depth, ft	26	26
Volume, gallons	331,150	331,150

Description	Existing Value	New Value
Cover Type	Floating	Floating
Mixer		
Type	Mechanical	Mechanical
Size, Hp	15	15
Digester No. 2		
Diameter, ft	40	40
Depth, ft	26	26
Volume, gallons	253,660	253,660
Cover Type	Fixed	Fixed
Mixer		
Type	Gas Circulation Compressor	Mechanical
Number	1	1
Capacity, cfm	150	
Size, Hp		10
Hydraulic Detention Time, days		
Average	29	27[a]
Maximum Month	21	16[a]
Heat Exchangers		
Number	2	2
Type	Spiral	Spiral
Sludge Recirculation Pumps		
Number	2	2
Type	Recessed Impeller	Recessed Impeller
Capacity, gpm	150	150
Boiler		
Number	1	1
Capacity, Mbtu/h	822	1,000
Waste Gas Burner		
Number	1	1
Capacity, cfh	5,800	5,800
Sludge Transfer Pump		
Number	1	1
Size, gpm	450	450

(a) Includes thickened sludge from WWTP No. 2 exceeding the capacity of Digester No. 1 at WWTP No. 2.

Solids Management Alternative S2

As shown schematically in Figure 8-5 this alternative consists of thickening primary sludge in the existing circular primary clarifier under all flow conditions and thickening WAS with a gravity belt thickener, on-site anaerobic digestion with thickened sludge from WWTP No. 2, pumping Class B biosolids to the City's facultative lagoon, and land application. It is recommended that the Digester No. 2 cover be repaired and it be used as the primary digester and Digester No. 1 be equipped with a new floating cover and it be used as a secondary digester.

Major improvements include:

- Converting the existing circular primary sedimentation basin to a gravity thickener and related appurtenances for primary sludge thickening including a new sludge pump.
- Installing a new gravity belt thickener for WAS thickening, a polymer system, a thickened WAS pump and a building to house the equipment.

Figure 8-5. Alternative S2 Process Flow Diagram

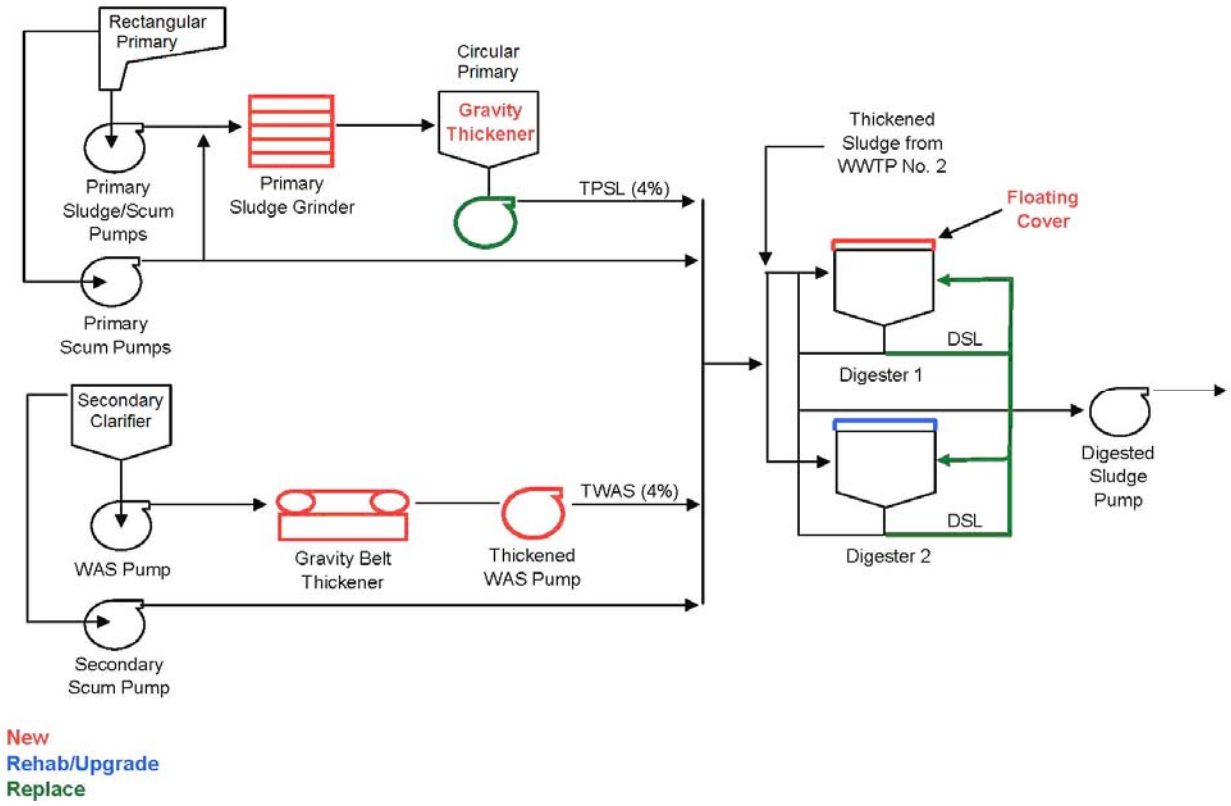


Table 8-6 shows existing and future design data for Alternative S2.

Table 8-6. Solids Management Alternative S2 Design Data

Description	Existing Value	New Value
Primary Sludge		
Thickened Primary Sludge Pump		
Number		1
Type		Rotary Lobe
Capacity, gpm		100
Drive		Constant Speed
Primary Sludge Grinder		
Number		1
Type		In-line
Waste Activated Sludge		
WAS Gravity Belt Thickener		
Number		1
Belt Width, meters		1
Loading Rate, lb/hr-m		500
Thickened WAS Pumps		
Number	1	1
Type	Piston	Rotary Lobe
Capacity, gpm		50
Drive		Constant Speed
Polymer Feed System		
Number		1
Type		Liquid
Anaerobic Digestion		
Digester No. 1		
Diameter, ft	45	45
Depth, ft	26	26
Volume, gallons	331,150	331,150
Cover Type	Floating	Floating
Mixer		
Type	Mechanical	Mechanical
Size, Hp	15	15

Description	Existing Value	New Value
Digester No. 2		
Diameter, ft	40	40
Depth, ft	26	26
Volume, gallons	253,660	253,660
Cover Type	Fixed	Fixed
Mixer		
Type	Gas Circulation Compressor	Mechanical
Number	1	
Capacity, cfm	150	
Size, Hp	15	
Hydraulic Detention Time, days		
Average	29	33[a]
Maximum Month	21	23[a]
Heat Exchangers		
Number	2	2
Type	Spiral	Spiral
Sludge Recirculation Pumps		
Number	2	2
Type	Recessed Impeller	Recessed Impeller
Capacity, gpm	150	150
Boiler		
Number	1	1
Capacity, Mbtu/h	822	1000
Waste Gas Burner		
Number	1	1
Capacity, cfh	5,800	5,800
Sludge Transfer Pump		
Number	1	1
Size, gpm	450	450

(a) Includes thickened sludge from WWTP No. 1 and WWTP No. 2

COMPARISON OF ALTERNATIVES

Table 8-7 presents the capital costs for Alternatives S1 and S2. A complete present worth comparison between alternatives will be presented in Chapter 10. A non-economic comparison of the solids management alternatives is provided in Table 8-8.

Recommendations for WWTP #2 (In Plant #2 Facility Plan) are to convert digesters into sludge holding tanks, and haul sludge from Plant #2 to Plant #1 for digestion. Therefore, Alternative S1 is not recommended.

Alternative S2 has a higher capital cost, but if implemented in conjunction with recommended liquid treatment alternatives – will result in a higher level of treatment and operational reliability at the City of Coos Bay's WWTPs.

Alternative S2 is the recommended option for sludge management. A full evaluation of the combined liquid and solids alternatives is provided in Chapter 9.

Table 8-7. Solids Management Alternatives Capital Cost Comparisons, $1,000

	Alt. S1, dollars	Alt. S2, dollars
Contractor Profit and Overhead, 15%	272	289
Mobilization, 5%	91	96
Primary sludge grinder	86	86
Replace piston pump	90	90
New boiler, heat exchangers, gas and hot water piping	265	265
Mixers and recirculation pumps for digesters	180	180
New handrails on digesters	36	36
Demo cover on Digester No. 1	26	26
New fixed cover on Digester No. 1	191	191
Digester building repair	96	96
Improve Digester No. 2 cover	144	144
New waste gas burner	41	41
Yard piping	11	38
Upgrade Digester No. 1 at WWTP No. 2	534	0
New Sludge Truck for WWTP No. 2	112	0
WAS Gravity Belt Thickener	0	529

Table 8-7. Solids Management Alternatives Capital Cost Comparisons, $1,000, cont'd…

	Alt. S1, dollars	Alt. S2, dollars
Thickened WAS Pumping	0	107
Thickening Building	0	96
Electrical/SCADA, 20%	363	385
Subtotal	2,538	2,698
Contingencies, 25%	634	674
Engineering, 20%	508	540
Total	3,680	3,912

Some components may reach the end of their service life before the end of the 20-year planning horizon. These components will likely require replacement at the expiration of the anticipated service life. The present worth (PW) of the additional costs of components which may require replacement within the planning horizon are listed in Table 7-6.5 and Table 7-7.5 below.

Table 8-7.5. Solids Mgmt Alternatives Service Life & Present Worth Comparisons, $1,000*

Items which will require replacement within planning horizon	Service Life, years	Alt. S1 – PW of Replacement Cost	Alt. S2 – PW of Replacement Cost
Primary sludge grinder	15	50	50
Replace piston pump	15	52	52
New waste gas burner	15	24	24
New Sludge Truck for WWTP No. 2	10	131	0
Total PW, dollars		257	126

*Based on a 20 year planning period and a return rate of 5.875% as recommended by the Natural Resources Conservation Service, and a 2.0% inflation rate on Capital Replacement Items.

Table 8-8. Non-Economic Comparison of Solids Management Alternatives

Evaluation Criteria	Alternative S1	Alternative S2
Capacity – design year for this plan is 2027	Adequate capacity for design year sludge production. Higher ultimate capacity as all three digesters (two at WWTP No. 1 and one at WWTP No. 2) would be used.	Adequate capacity for design year sludge production. Lower ultimate capacity as only the two digesters at WWTP No. 1 would be used. Digesters at WWTP #2 would only be used to store solids. Ultimately, solids from WWTP #2 will be transferred to WWTP #1 for Digestion.
Performance – requirements are guided by DEQ NPDES permit and Part 503 regulations	Properly designed and operated anaerobic digesters consistently comply with Class B stabilization requirements.	Properly designed and operated anaerobic digesters consistently comply with Class B stabilization requirements.
Implementation – feasibility of construction staging to maintain operations of the plant	Construction staging is possible to keep all facilities in service.	Construction staging is possible to keep all facilities in service.
Constructability – outlines any construction concerns or issues	Few uncertainties are likely during construction.	Few uncertainties are likely during construction.
Regulatory Issues – ease of permit compliance	Complies with Class B biosolids requirements	Complies with Class B biosolids requirements
Reliability – adequate redundancy provided for critical equipment	All digesters at WWPT #1 will be used to their full capacity toward the end of the planning horizon.	The primary sludge gravity thickener could serve as back-up for the gravity belt thickener. The sludge storage capacity at WWTP No. 2 could provide some relief to digesters at WWTP No. 1.
Future Capacity Expansion – space available and ease of expansion of new and existing facilities	Digester capacity could be increased in the future by adding heating and mixing to Digester No. 1 at WWTP No. 2.	Gravity belt thickener would be constructed on previously unoccupied land.
Operational Issues – operational and maintenance ease and flexibility.	No new processes are added at WWTP No. 1. Primary sedimentation performance will remain poor with sludge thickening remaining the rectangular basin. Thickened WAS concentration will remain low.	Having nearly 30 days of sludge storage at WWPT No. 2 would provide operational flexibility. Thickening facilities will add operations and maintenance activities to WWTP No. 1. Eliminating sludge treatment at WWTP No. 2 consolidates process O&M functions.

The non-economic evaluation criteria listed above are as follows:

- Capacity
- Performance
- Construction Feasibility
- Regulatory Compliance
- Reliability
- Future Expansion
- Operational Flexibility

Both alternatives adequately address all the criteria listed. Alternative S2 provides less sludge digestion capacity than S1. However, Alternative S2 consolidates process O&M functions for sludge digestion at WWTP #1. Also, S2 provides almost 30 days (average) sludge storage at WWTP #2, which will provide operational flexibility for solids management.

Alternative S2 also increases treatment performance of the primary sedimentation basin by providing primary sludge thickening outside the rectangular primary sedimentation basin.

While S2 is the higher cost option, we recommend Alternative S2 based on the non-economic comparison analysis.

CHAPTER 9. RECOMMENDED PLAN

This chapter presents the recommended plan for upgrading Coos Bay Wastewater Treatment Plant No. 1. Liquid treatment alternatives are described in Chapter 7 and solids alternatives are described in Chapter 8.

RECOMMENDED PROCESS IMPROVEMENTS

The recommended improvements are summarized in Table 9-1.

Table 9-1. Summary of Recommended Alternatives

Alternative	Description
G2	New mechanical bar screen, flow meter, grit cyclone and classifier to match existing. Replace existing equipment with new. Each train will treat 10 mgd.
T1	Treat up to 7 mgd with full primary and secondary treatment. A new secondary clarifier will be constructed to provide secondary treatment to all flow up to 13 mgd. One new blower will be added to provide air to the existing aeration basins.
S2	The existing circular primary sedimentation basin will become a gravity thickener for primary sludge. WAS will be thickened with a gravity belt thickener. All equipment and piping for the digesters will be replaced including mixers, heat exchangers and recirculation pumps. Digester No. 1 will get a new floating cover.

PRESENT WORTH ANALYSIS

As noted in Chapters 7 and 8, the grit removal, treatment process and solids management alternatives cannot be compared independently, as some cost savings may be achieved with certain combinations of alternatives. This fact is addressed in the cost summary presented in Table 9-2 which combines the three analyzed processes into complete treatment alternatives. It should be noted that certain combinations were left off this table as they do not provide full treatment if combined. Table 9-2 also compares and ranks the present worth of each alternative. In a present worth analysis, the ongoing operation and maintenance (O&M) costs are converted to an equivalent current value and added to an alternative's capital cost. In this way, alternatives with relatively low capital costs and high O&M costs can be compared to alternatives with high capital and low O&M costs. O&M costs include labor, power and chemicals.

Table 9-2. Present Worth (PW) Cost Comparison of Alternatives, $1000*

Item	G1-T1-S1, dollars	G1-T2-S1, dollars	G2-T1-S2, dollars	G2-T2-S2, dollars
Capital	7,983	12,076	8,077	12,170
PW of Capital Replacement w/in Planning Horizon	530	530	399	399
Annual O&M	169	169	170	170
PW of O&M	1,960	1,960	1,967	1,967
Total PW	10,473	14,566	10,443	14,536
Rank	2	4	1	3

*Based on a 20 year planning period and a return rate of 5.875% as recommended by the Natural Resources Conservation Service, and a 2.0% inflation rate on Capital Replacement Items.

Backup data for the Capital and O&M Costs is provided in Appendix E.

RECOMMENDED PLAN ELEMENTS

The recommended plan elements include the following:

Liquid Train

Headworks. Headworks improvements include installing new transducers on the influent flumes for reliable influent flow data and replacing the mechanical bar screen and installing a mechanical screen in the bypass channel to meet future flow requirements. The aerated grit basin will remain to treat up to 10 mgd. Flow above 10 mgd will go directly to the rectangular primary sedimentation basin. Non-thickened primary sludge will be pumped to a new cyclone separator and screw classifier.

Primary Treatment. The existing rectangular primary sedimentation basin will treat flows up to 7 mgd. Flow in excess of 7 mgd will go directly to secondary treatment. The circular primary sedimentation basin will be converted to a gravity thickener for primary sludge. The existing primary sludge pump at the circular tank will be replaced and a sludge grinder will be added.

Aeration Basins. The existing aeration basins have adequate volume to provide secondary treatment to up to 13 mgd of screened raw wastewater. A blower will be added to better meet process oxygen requirements.

Secondary Clarifiers and RAS/WAS Pumping. A new 90-foot diameter clarifier will be added to increase secondary clarification capacity and provide better reliability. RAS and WAS pumping will be added for the new clarifier. A mixed liquor split box will split flow from the aeration basins to the two clarifiers.

Disinfection. Additional baffles will be added in the existing chlorine contact basin to provide improved performance up to 20 mgd.

Solids Train

Primary Sludge and WAS Thickening. Primary sludge will be gravity thickened in the existing circular primary sedimentation basin. Ultimately, WAS will be thickened with a gravity belt thickener.

Anaerobic Digestion. The digesters will stabilize thickened sludge from both WWTPs 1 and 2. Both digesters and the digester control building at WWTP will need to be upgraded to provide adequate digestion capacity. Handrails will be replaced. Equipment including mixers, heat exchangers, recirculation pumps and a boiler will be replaced. Existing Digester No. 2 (with a fixed cover) will be used as the primary digester. The existing floating cover on Digester No. 1 will be replaced and Digester No. 1 will be used as a secondary digester. Sludge can be directly withdrawn from Digester No. 1 for beneficial reuse. During wet-weather months (and any excess solids not used on Agricultural Lands) digested sludge will be pumped to facultative lagoon for storage. The waste gas burner will be replaced so that methane produced in the digesters can be burned.

Biosolids Disposal. Digested sludge will be pumped from the digesters to the City's existing facultative lagoons and ultimately land applied.

Other Improvements

Other improvements needed at the site include the following:

- Site piping improvements.
- Electrical and SCADA/process control improvements. The power distribution system would be upgraded as required to serve new equipment. Control system improvements would focus on improving labor and energy efficiency.
- The recommended plan elements are summarized in Table 9-3. A process flow diagram of the recommended plan is shown in Figure 9-1.

Table 9-3. Recommended Plan Basic Data

Description	New Value
PRELIMINARY TREATMENT	
Flow Measurements	
Parshall Flume	
Number	2
Size, inches	18
Number of Flow Transmitters	2
Flow Range	0.33 to 15.9 mgd
Headworks	
Mechanical Bar Screen	

Description	New Value
Number	2
Type	TBD
Bar Spacing, in.	3/8
Screenings Compactor	
Number	1
Capacity, cubic feet/hour	34
Upper Screw, HP	1
Lower Screw, HP	1
Aerated Grit Tank	
Number	1
Capacity, each, mgd	10
Grit Pumps	
Number	2
Capacity, each, gpm	270
Degritted Primary Sludge Pump	
Number	1
Capacity, each gpm	270
PRIMARY TREATMENT	
Primary Sedimentation	
Rectangular Primary Sedimentation Basin	
Number	1
Width, ft	21.5
Length, ft	145
Overflow rate, gpd/sf	
PWWF	2,200[a]
SECONDARY TREATMENT	
Aeration Basins	
Number	2
Width, ft	34
Length, ft	96
Sidewater Depth, ft	15.5
Total Volume, gal	756,000

Description	New Value
MLSS, mg/l	2,000
Hydraulic Detention Time, hours	
ADWF	10.7
MMWWF	3.1
Diffuser Type	Fine Bubble Tubes
Blowers	
Number	4
Type	Centrifugal
Capacity, each, scfm	1,200
Pressure, psi	8.0
Secondary Clarifiers	
Existing Clarifier	
Diameter, ft	80
Sidewater Depth, ft	16
Overflow Rate, gpd/sf	
Peak Flow to Secondary Treatment	1200 (6 mgd)
New Clarifier	
Diameter, ft	90
Sidewater Depth, ft	18
Overflow Rate, gpd/sf	
Peak Flow to Secondary Treatment	1200 (7 mgd)
RAS pumps	
Number	3
Type	Centrifugal
Capacity, each, gpm	1,500
WAS Pump	
Number	2
Type	Centrifugal
Capacity, each, gpm	360

Description	New Value
Secondary Scum and Tank Drain Pump	
Number	1
Capacity, each, gpm	340
CHLORINATION AND DECHLORINATION	
Chlorination Facilities	
Type	Sodium Hypochlorite
Contact Tank	
Number	1
Total volume, gal	370,000
Hydraulic detention time, minutes	
ADWF (current ~ 1.7 mgd)	313
PWWF (projected ~ 20 mgd)	27
Sodium Hypochlorite Storage Tanks	
Number	2
Total Storage Volume, gal	3,600
Feed pumps	
Number	3
Type	Diaphragm
Capacity, each, gph	20
Dechlorination Facilities	
Type	Sodium bisulfite
Sodium Bisulfite Storage Tanks	
Number	2
Total Storage Volume, gal	3,000
Feed Pumps	
Number	2
Type	Diaphragm
Capacity, each gph	12.7
Mixer	
Number	1
Type	Vertical
Motor, hp	5

Description	New Value
OUTFALL	
Length, ft	715
Diameter, in	48
Diffuser, number of ports	5
SLUDGE PROCESSING	
Primary Sludge	
Thickened Primary Sludge Pump	
Number	1
Type	Rotary Lobe
Capacity, gpm	100
Drive	Constant Speed
Primary Sludge Grinder	
Number	1
Type	In-line
Waste Activated Sludge	
WAS Gravity Belt Thickener	
Number	1
Belt Width, meters	1
Loading Rate, lb/hr-m	500
Thickened WAS Pumps	
Number	1
Type	Rotary Lobe
Capacity, gpm	50
Drive	Constant Speed

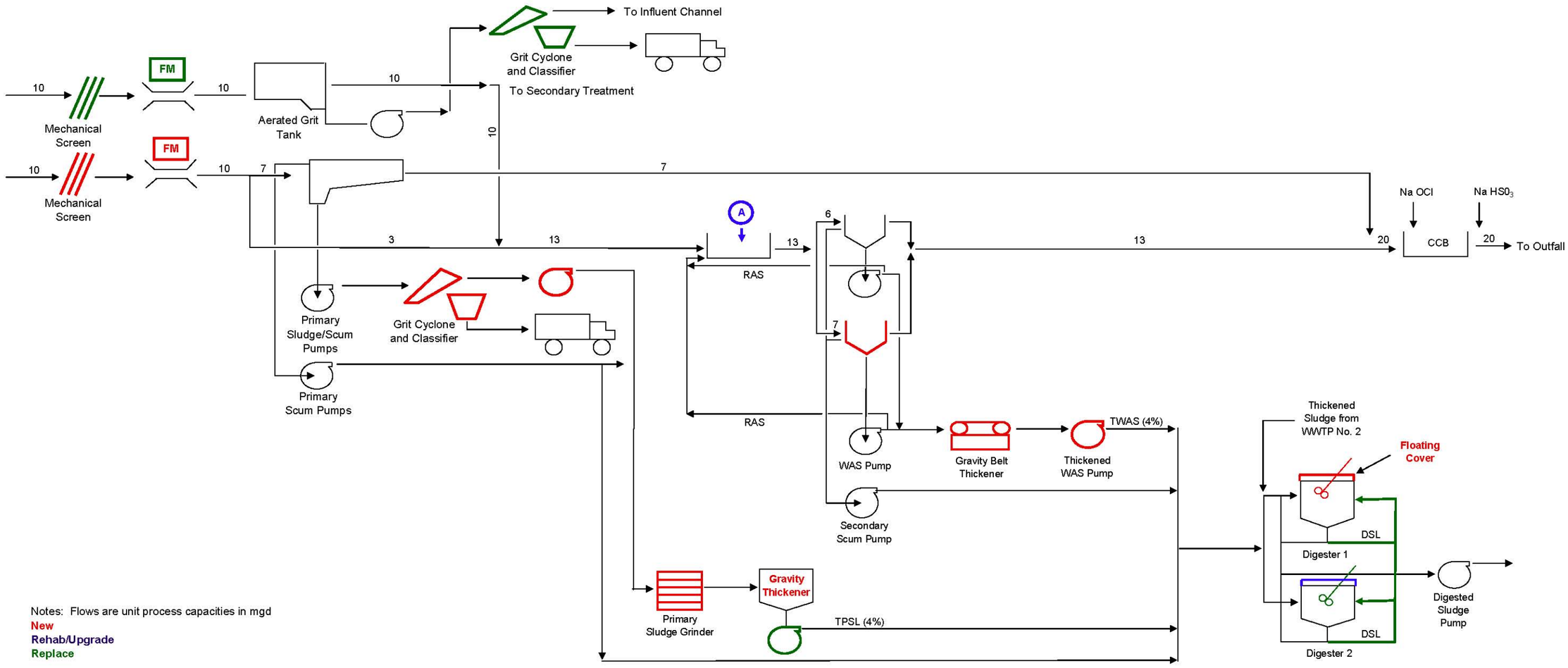
Description	New Value
Polymer Feed System	
Number	1
Type	Liquid
Anaerobic Digestion	
Digester No. 1	
Diameter, ft	45
Depth, ft	26
Volume, gallons	331,150
Cover Type	Floating
Mixer	
Type	Mechanical
Size, Hp	15
Digester No. 2	
Diameter, ft	40
Depth, ft	26
Volume, gallons	253,660
Cover Type	Fixed
Mixer	
Type	Mechanical
Number	1
Size, Hp	15
Hydraulic Detention Time, days	
Average (17,700 gpd)	33[b]
Maximum Month (25,400 gpd)	23[b]
Heat Exchangers	
Number	2
Type	Spiral
Sludge Recirculation Pumps	
Number	2
Type	Recessed Impeller
Capacity, gpm	150

Description	New Value
Boiler	
Number	1
Capacity, Mbtu/h	1000
Waste Gas Burner	
Number	1
Capacity, cfh	5,800
Sludge Transfer Pump	
Number	1
Size, gpm	450

(a) At peak flow to process, 7 mgd.

(b) Includes thickened sludge from WWTP No. 2.

Figure 9-1. Recommended Plan Process Flow Diagram



IMPLEMENTATION

Improvements will be phased in at the plant over the course of the planning period. These facility improvements are necessary to maintain acceptable performance and reliability at the treatment plant over the next twenty years. The site plan is given in Figure 9-2 and shows the anticipated phasing of improvements.

Phase 1 Facilities

Phase 1 facilities are required to improve reliability, performance and address safety issues. Phase 1 facilities include the following:

- Replace sludge transfer piston pump (completed in August 2007).
- New level elements on influent flumes.
- Replace floating cover on Digester 1.
- Improve fixed cover on Digester 2.
- Construct new waste gas burner.
- Outfall improvements
- New handrails on digesters.

Phase 2 Facilities

Phase 2 facilities will be implemented to address capacity and reliability issues. Phase 2 facilities include the following:

- New blower.
- Mixed liquor split box.
- New secondary clarifier.
- New RAS pump.
- New WAS pump.
- Site piping.

Phase 3 Facilities

Phase 3 facilities will be needed to accommodate sludge hauled from WWTP No. 2 for digestion at WWTP No. 1. Phase 3 facilities include the following:

- New boiler, heat exchangers, gas and hot water piping.
- Mixing, heating and recirculation pumping for Digester 1.
- Mixing, heating and recirculation pumping for Digester 2.
- Digester building repair.

Phase 4 Facilities

Phase 4 facilities extend digester capacity by thickening sludge. The headworks improvements and grit systems are related and will be constructed simultaneously. Phase 4 Facilities include the following:

- Demolish manual bar screen.
- New mechanical bar screen.
- Replace existing mechanical bar screen.
- Demolish existing stairs.
- New grit chamber bypass channel and gate.
- New grit cyclone and classifier.
- Degritted primary sludge pump.
- Site piping.
- Inline primary sludge grinder.
- WAS Gravity Belt Thickener.
- Thickened WAS pump.
- Thickening Building. (Chemical storage controls)
- Yard piping.

CAPITAL IMPROVEMENT PLAN

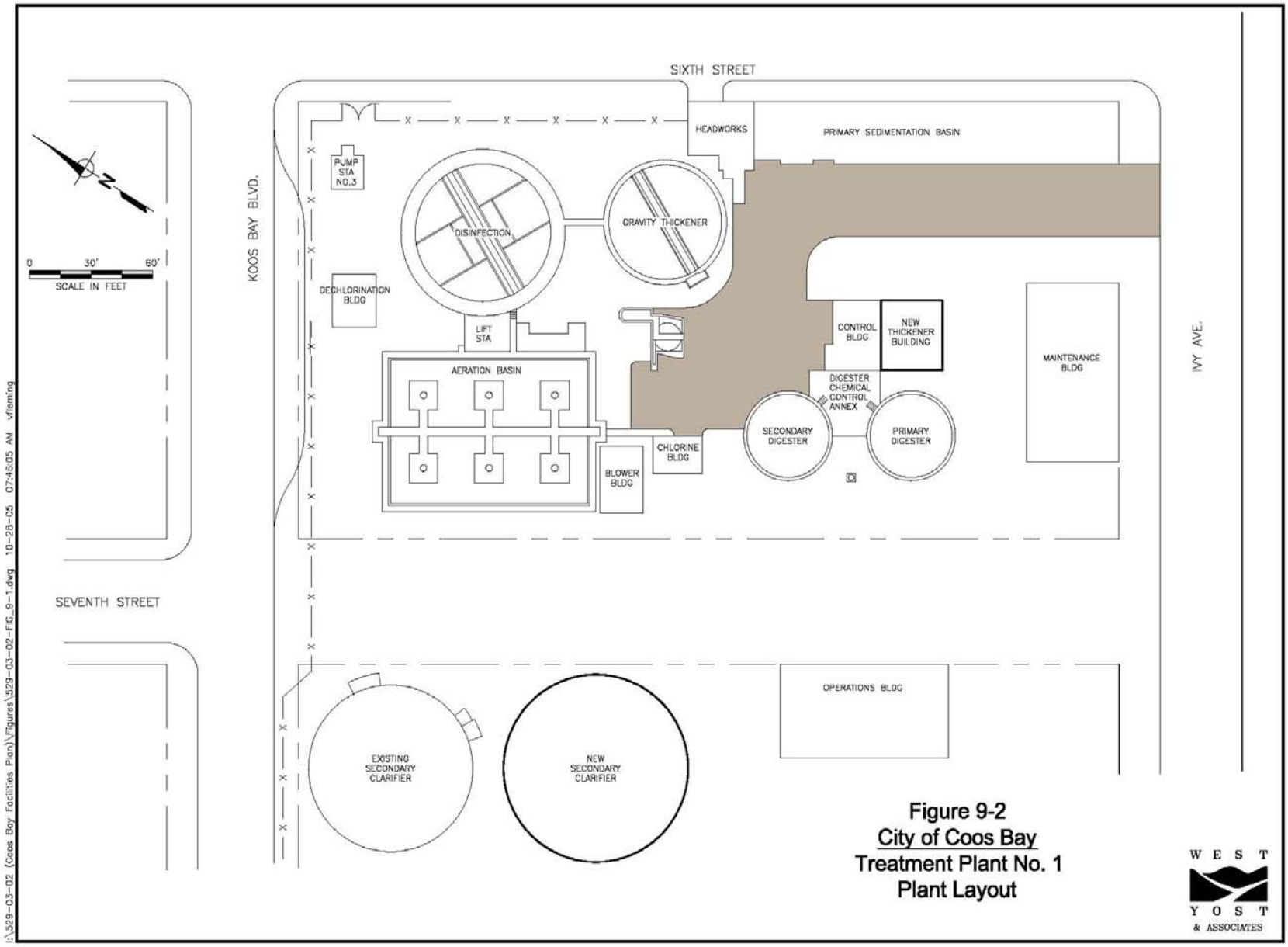
The Capital Improvement Plan (CIP) provides a road map for the City that identifies the location, timing and estimated cost of the recommended improvement projects that are necessary to maintain reliable operation of the wastewater treatment plant. The CIP is based on the recommended plan. The following sections summarize the details of the recommended CIP.

Basis for Cost Estimates

The cost estimates presented in this report are planning level estimates. Such estimates are approximate and made without detailed engineering design data. Construction and operating costs for the recommended plan are based on preliminary layouts. Estimates were prepared using the construction costs of similar plants when possible. When these costs were not available, construction costs were obtained from available cost cures and EPA process design manuals. Since these cost estimates are based on conceptual design data, they may change as more detailed design information is developed.

Costs can be expected to undergo long-term changes in keeping with corresponding changes in the national economy. One of the best available barometers of these changes is the Engineering News-Record (ENR) construction cost index. It is computed from the prices for structural steel, Portland cement, lumber and common labor.

Figure 9-2. Recommended Plan Site Plan



The costs developed in this report are based on the ENR 20-city index of 7314, which was the index in October 2004. The costs presented here may be related to those at any time in the past or future by applying the ratio of the then-prevailing cost index to ENR CCI 7314.

Because of the limitations of cost estimates based on planning information, cost estimates must allow for unanticipated improvements, variation in final quantities, adverse construction conditions, and other unforeseeable difficulties that will increase the final construction cost. Therefore, the total construction cost includes a contingency allowance of 25 percent.

The cost of engineering services for major projects typically includes special investigations, a predesign report, surveying, foundation exploration, preparation of contract drawings and specifications, construction management, start-up services and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 12 to 20 percent of the construction cost. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small, complicated projects and to projects that involve extensive remodeling of existing facilities. For Coos Bay WWTP No. 1, where new projects will involve both rehabilitation and expansion of the existing plant, it is assumed that total engineering costs will average 15 percent of the construction cost.

For the cost analysis estates in this report, the City of Coos Bay has internal administrative costs associated with any major construction project. These include internal planning and budgeting, the administration of engineering and construction contracts, legal services, and liaison with regulatory and funding agencies. For a typical project similar in size to the work described in this report, the city's administrative costs are estimated at five percent of the construction cost.

The combination of engineering and administrative cost is assumed to be 20 percent and is applied to the total construction cost.

Capital Cost Summary

Estimated costs for the recommended improvements are summarized in Table 9-4. These costs are all shown in 2004 dollars and need to be adjusted when planning for projects that will be implemented in the future. Projects are organized according to the previously outlined phasing plan.

Table 9-4. Recommended Plan Cost Summary
(2004 Dollars at ENR CCI 7314)

Description	Cost			
	Construction	Contingency 25%	E&A 20%	Total
Phase 1 Improvement Projects				
Disinfection				See Note 1
Replace piston pump completed (Aug. 2007)	80,000	—	—	80,000
New level elements on influent flumes	22,630	5,658	4,526	32,814
Demo Cover on Digester 1	37,649	9,412	7,530	54,592
Replace floating cover on Digester 1	274,896	68,724	54,979	398,599
Improve cover on Digester 2	39,888	9,972	7,978	57,837
Construct new waste gas burner	60,031	15,008	12,006	87,045
Outfall	1,678,630	419,658	335,726	2,434,014
New handrails on digesters	51,078	12,770	10,216	74,064
Standby power	167,863	41,966	33,573	243,401
Total Phase 1 Cost				**3,462,365**
Phase 2 Improvements (2010 to 2014)				
New blower	134,290	33,573	26,858	194,721
Mixed liquor split box	123,100	30,775	24,620	178,494
New secondary clarifier	1,075,442	268,861	215,088	1,559,391
New RAS pump	134,290	33,573	26,858	194,721
New WAS pump	127,576	31,894	25,515	184,985
Chlorine Contact Basin Improvements	59,312	14,828	11,862	86,002
Site piping	90,646	22,662	18,129	131,437
Total Phase 2 Cost				**2,529,751**
Phase 3 Improvements (2018-2022)				
New boiler, heat exchangers, gas and hot water piping	381,396	95,349	76,279	553,024
Mixing heating and recirc for Digester 1	201,436	50,359	40,287	292,082
Mixing heating and recirc for Digester 2	201,436	50,539	40,287	292,082
Digester building repair	138,367	34,592	27,673	200,632
Total Phase 3 Cost				**1,337,820**

Description	Cost			
	Construction	Contingency 25%	E&A 20%	Total
Phase 4 Improvements (2023-2026)				
Demolish manual bar screen	22,382	5,595	4,476	32,454
New mechanical bar screen	187,695	46,924	37,539	272,158
Replace mechanical bar screen	187,695	46,924	37,539	272,158
Demolish existing stairs	20,392	5,098	4,078	29,568
New grit chamber bypass channel and gate	61,798	15,450	12,360	89,607
New grit cyclone and classifier	150,766	37,691	30,153	218,610
Degritted primary sludge pump	62,358	15,589	12,472	90,419
Site piping	22,630	5,658	4,526	32,814
Inline primary sludge grinder	124,006	31,001	24,801	179,809
WAS Gravity Belt Thickener	761,885	190,471	152,377	1,104,734
Thickened WAS pump	154,221	38,555	30,844	223,621
Thickening Building	138,367	34,592	27,673	200,632
Yard piping	54,436	13,609	10,887	78,932
Total Phase 4 Cost				**2,825,516**
Total Cost				**10,155,453**

Note 1: Changes in the water quality requirements associated with the designation of the discharge area as supporting shell fish will require upgrading of the disinfection system. This was not evaluated during the preparation of the plan since DEQ changed the designation after the plan was completed.

APPENDIX A

Environmental Assessment

City of Coos Bay
Wastewater Treatment
Plant No. 1

Environmental
Assessment

august 2005

Prepared For:

West Yost & Associates
Consulting Engineers
1800 Blankenship Road, Suite 425
West Linn, OR 97068

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EXHIBITS

1.0 PURPOSE AND NEED FOR THE PROJECT

The City of Coos Bay (City) proposes to upgrade Wastewater Treatment Plant (WWTP) No. 1 that was originally constructed in 1954. The purpose of this project is to improve wastewater treatment and to increase treatment capacity for the City and the Bunker Hill Sanitary District. The WWTP currently services a population of about 15,650. Wastewater facility improvements are needed to accommodate planned growth in the service area. The facility's National Pollutant Discharge Elimination System (NPDES) waste discharge permit was renewed in 1995, modified in 2003, and expires December 31, 2007. A Mutual Agreement and Order (MAO) dated August 21, 2003 between the City and DEQ outlines measured steps necessary for WWTP No. 1 to be in compliance with the chlorine discharge limits established in the NPDES permit. To date, the WWTP No. 1 is compliant with the chlorine discharge limits.

1.1 Project Location and Site Description

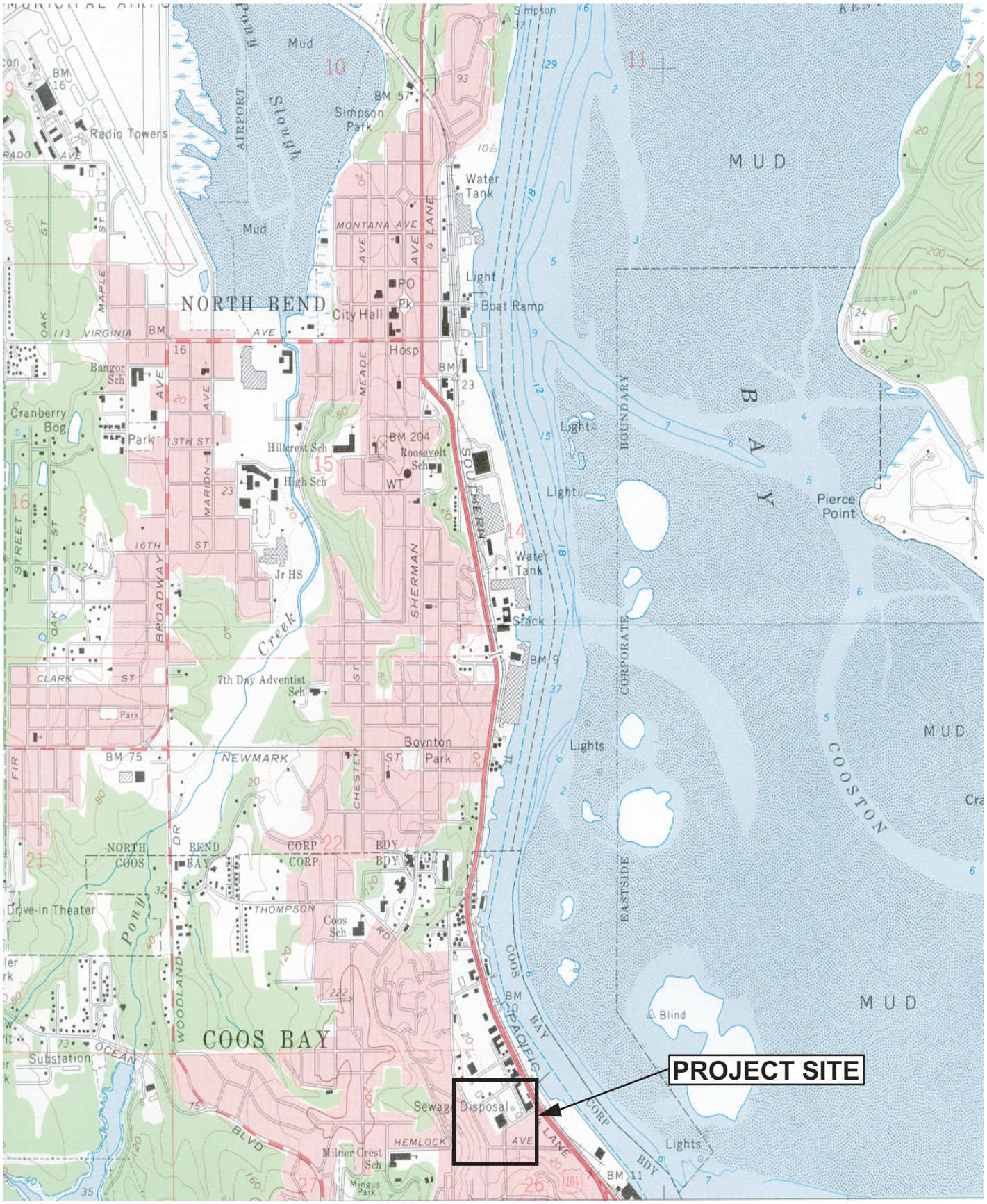
WWTP No. 1 is located in the City of Coos Bay in the NW ¼ of Section 26, Township 25 South, Range 13 West, Willamette Meridian (Figures 1 and 2). The project site is bounded by Koosbay Boulevard to the north, Ivy Avenue to the south, single-family residences to the east (Photo 1), and North Sixth Street to the west (Figure 3). The surrounding area is a mixture of residential, commercial, and industrial uses. A majority of the existing WWTP is developed except the southwest portion of the site that is used for equipment storage and stockpiling (Photo 2). The facility is landscaped with turf grass and a few trees (Photo 3).

1.2 Proposed Action

1.2.1 Description of Existing Conditions

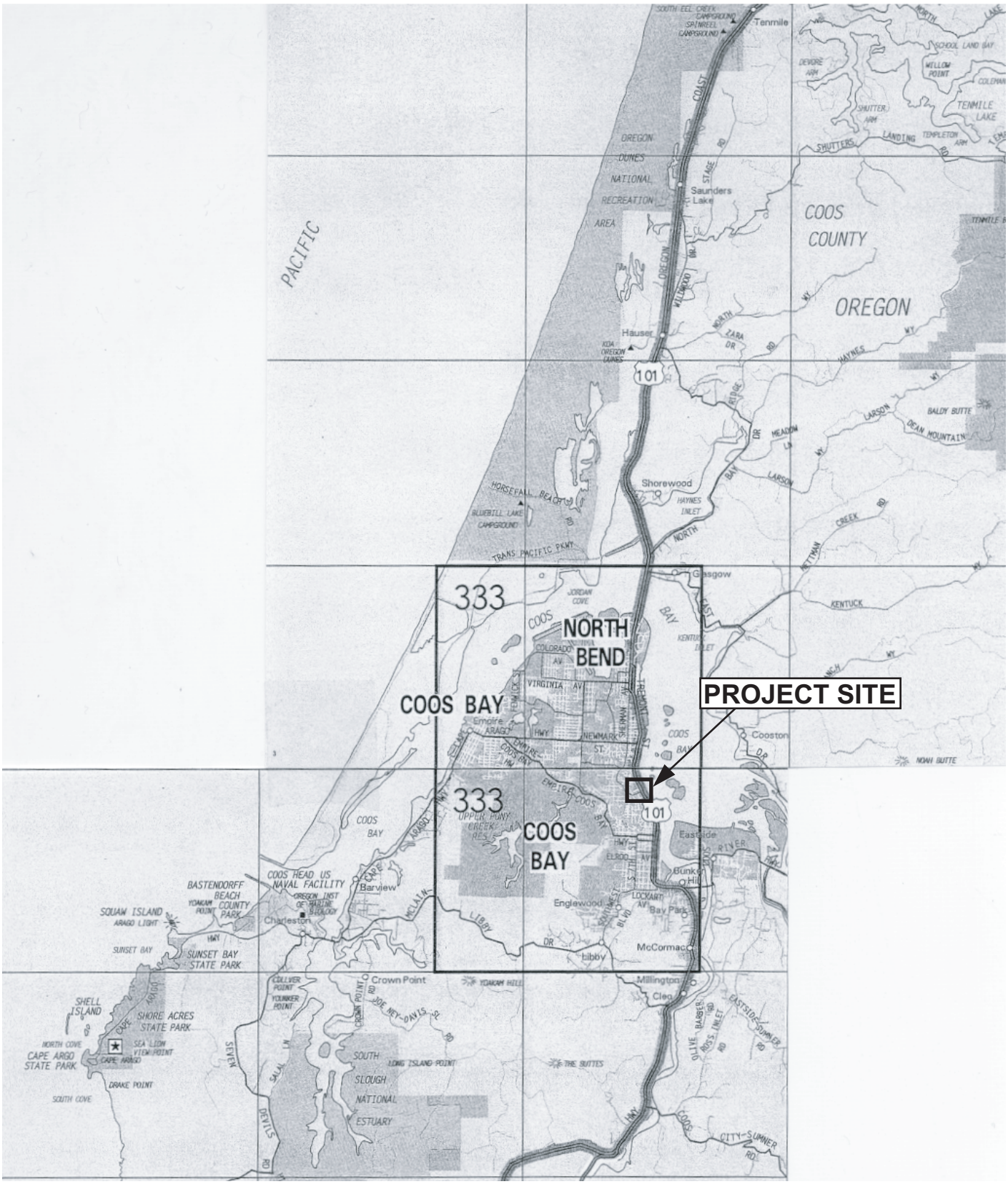
1.2.1.1 Background and Existing Facilities

WWTP No. 1 is owned by the City of Coos Bay and managed and operated by Operations Management International, Inc. (OMI). A primary treatment plant was first constructed on the project site in 1954, and secondary treatment was added in 1973. In 1990, the facility was upgraded with new headworks and a new primary clarifier to meet Class I reliability requirements. The existing facility treats municipal wastewater from residential and commercial sources using an activated sludge process with effluent dechlorination and anaerobic digestion of biosolids. Specifically, the facility consists of influent pumping, screening and grit removal, primary sedimentation, activated biosolids secondary treatment, secondary clarification,



ADOLFSON	NORTH 1" = 2286'	Edits by: ML Date: 6/6/05
	Source: USGS North Bend 7.5-minute quadrangle, 1971	

FIGURE 1
Site Map
Coos Bay WWTP No.1 Improvement Project
Coos Bay, Oregon



ADOLFSON

NORTH
1" = 2.5 mi.

Edits by: ML
Date: 6/6/05

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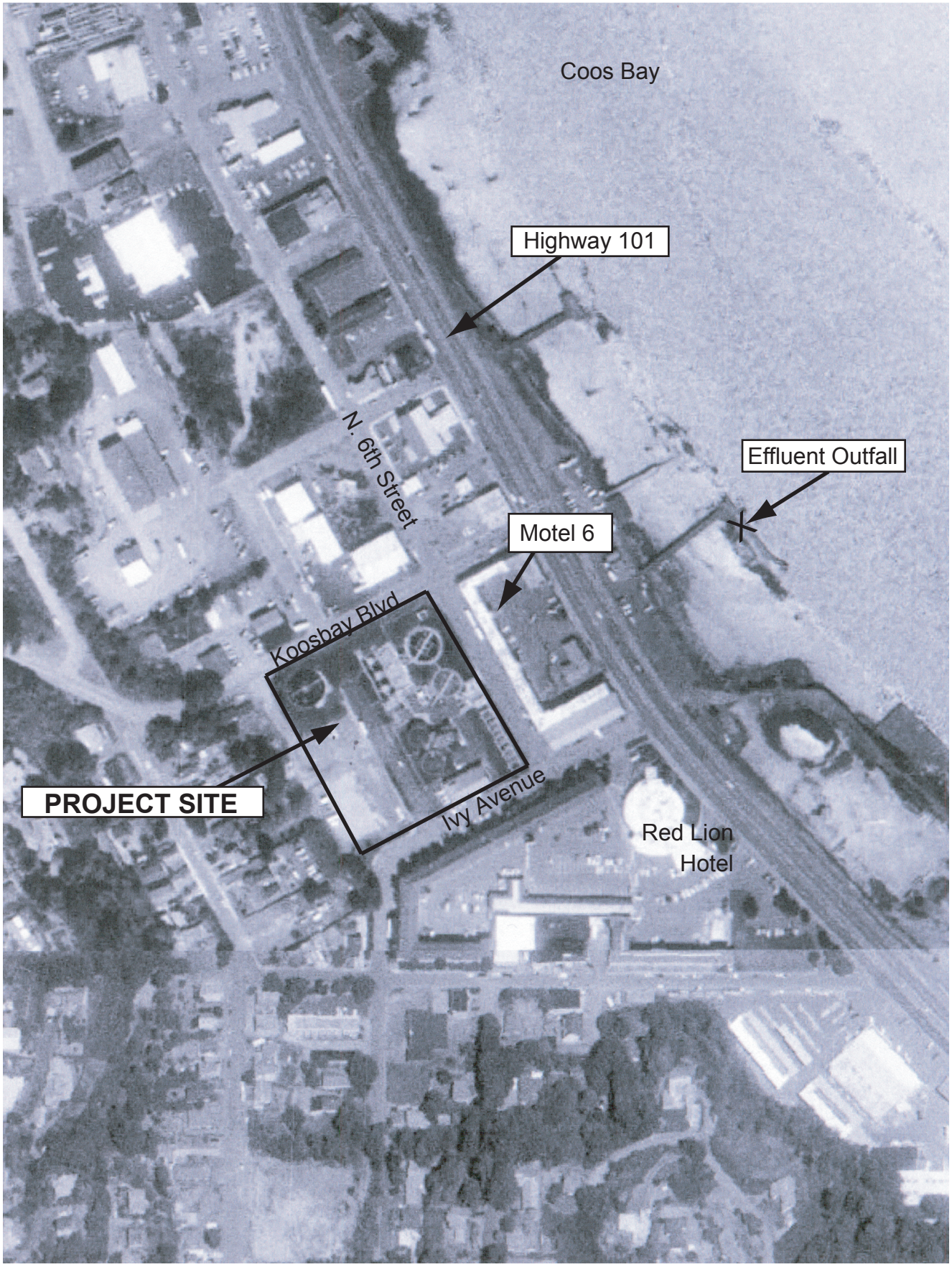
FIGURE 2
Vicinity Map
Coos Bay WWTP No. 1 Improvement Project
Coos Bay, Oregon



ADOLFSON

NORTH
1" = 320'

Edits by: ML
Date: 6/6/05

Source:
U.S. Geological Survey, 1994

FIGURE 3
Aerial Map
Coos Bay WWTP No. 1 Improvement Project
Coos Bay, Oregon

dechlorination (disinfection), and anaerobic digestion of biosolids (Figure 4). Dechlorinated effluent is discharged through a 42-inch-diameter gravity outfall to Coos Bay at river mile (RM) 13.2. The outfall pipe, approximately 715 feet long, is lined and coated steel and discharges effluent 200 feet away from shore in water approximately 20 feet deep. The end of the outfall contains 5 port diffusers on a 20-foot length of pipe.

The current facility is designed to accommodate average dry weather flows (ADWF) of 1.6 million gallons per day (mgd) and peak flows of 15 mgd. The existing aerated grit chamber has a design capacity of 10 mgd. The original grit removal basin performs poorly and is only used for peak flows. Grit removal is recommended for all flow into the plant due to the high sand content of the influent flow (*Draft Facilities Plan*, 2005)

The volume of flow dictates the type of treatment process. Flow up to 2.5 mgd is treated in the older circular primary sedimentation basin. When flow is between 2.5 and 10 mgd, the rectangular sedimentation basin is used and when flow exceeds 10 mgd, 10 mgd is treated in the rectangular basin and the circular basin treats 5 mgd. Due to the lower elevation of the circular tank, primary effluent from the circular basin needs to be pumped to secondary treatment. Primary sludge is thickened in the sedimentation basins. The minimum treatment for flows exceeding 10 mgd and up to 15 mgd consists of clarification and chlorination before discharge.

The rectangular basin has a design peak capacity of 10 mgd, however plant data indicates that the basin does not provide primary treatment for flows above 6 mgd. The *Draft Facilities Plan* recommends removing dilute primary sludge from the rectangular basin and thickening it the circular primary sedimentation basin to lower the sludge blanket and improve performance.

Primary biosolids are thickened in the new rectangular primary clarifier (constructed in 1990) and waste activated sludge (WAS) is thickened in the old primary clarifier (circular tank). Biosolids settle in the primary clarifier and are pumped to the anaerobic digesters. Treated biosolids are then pumped under the bay to a 4-acre facultative sludge lagoon located in Eastside (approximately 1 mile southeast of WWTP No 1). The lagoon is approximately 11 feet deep and lined with bentonite clay. Biosolids are annually removed from the lagoon with a floating dredge and applied to 250 acres of private farmlands and forests between June and October. The anaerobic digestion process produces Class B biosolids, which is acceptable for application onto agricultural and forest land.

1.2.2 Proposed Action

Minor facility upgrades are proposed to improve the treatment process and to provide increased capacity for future peak flows. All improvements would occur at the existing facility. Proposed upgrades would not require work below the Ordinary High Water Line (OHWL) of Coos Bay or any other waterbody and would not require demolition of existing structures. The following objectives were considered during development of the plant improvement alternatives: (1) Improve plant reliability by providing multiple process units where applicable; (2) optimize utilization of existing facilities to the extent possible to reduce costs; and (3) optimize space at the existing facility.

Plant improvements are designed to accommodate projected future flows and loads. The population of the City of Coos Bay is expected to grow 0.4 percent per year from 18,000 in 2003

to 17,220 by the year 2027 (West Yost & Associates, 2005). Refer to the *Draft Facilities Plan* for more details on current and projected loads.

Proposed facility upgrades are described according to three categories: (1) headworks facilities, (2) liquid treatment, and (3) solids treatment. Headworks include the influent sewers and force mains, influent pumping, screening, and grit removal. Liquid treatment includes primary sedimentation (primary clarifier), biological treatment, secondary clarification, and disinfection. Solids treatment includes thickening WAS, anaerobic digestion, and removing biosolids from the site.

1.2.2.1 Headworks / Grit Removal

The proposed headworks / grit removal process is a split flow grit treatment for flows up to 20 mgd (Alternative G2 in the 2005 *Draft Facilities Plan*). This alternative would involve continuing to use the existing aerated grit chamber for 10 mgd flow and treating remainder of flow by degritting primary sludge. Specific improvements would include:

- Install a new cyclone and classifier for degritting sludge.
- Add a pump to transfer degritted sludge to thickening.
- Construct a new channel to bypass flow around the aerated grit chamber.

When influent flow exceeds 10 mgd, the aerated grit chamber would continue to operate to its capacity. The remaining flow would pass directly to the rectangular primary sedimentation basin. Dilute primary sludge would be pumped from the sedimentation basin and degritted in a cyclone/classifier. A channel would be constructed to bypass flow around the aerated grit chamber directly to the rectangular sedimentation basin. This alternative also includes the installation of a gate in the existing channel between the aerated grit basin and the primary sedimentation basin.

1.2.2.2 Liquid Stream Treatment

Under the proposed action, wastewater would be treated with a split flow treatment process. Proposed wastewater treatment upgrades would provide full primary and secondary treatment for all flow up to 6 mgd (Alternative T1 in the 2005 *Draft Facilities Plan*). When flow exceeds 6 but is less than 13 mgd, 6 mgd will receive full primary and secondary treatment and disinfection. Flow in excess of 6 mgd will bypass primary treatment and all flow will receive secondary treatment. When flow exceeds 13 mgd, 7mgd will receive primary treatment; 13 mdg will receive secondary treatment and all flow will be disinfected. Specific upgrades would include the following:

- Construct an additional secondary clarifier for redundancy.
- Add a blower.

A proposed additional secondary clarifier would be constructed adjacent to the existing clarifier. This new clarifier would be approximately 90 feet in diameter, with a sidewater depth of 18 feet.

Within an additional two feet diameter for the foundation, the total footprint of the new clarifier would be approximately 6,940 square feet or 0.16 acres.

1.2.2.3 Solids Treatment

This alternative would involve using the existing circular primary clarifier to thicken primary sludge adding a gravity belt thickener for WAS thickening and using the existing digesters to stabilize solids (Alternative S2 in the *Draft Facilities Plan*). Proposed improvements would specifically include:

- Construct a gravity belt thickener facility for WAS thickening and related appurtenances for primary sludge thickening.
- Replace the floating cover on Digester No. 1 with a fixed cover.
- Replace and install digester heating and mixing equipment.

1.2.2.4 General Improvements

Improvements common to all alternatives would include the following:

- Install new transducers on influent flumes.
- Replace existing mechanical bar screen.
- Remove existing manual bar screen and install new mechanical screen.
- Replace primary sludge pump.
- Improve site piping.
- Improve electrical and SCADA/process controls. The power distribution system would be upgraded as required to serve new equipment. Control system improvements would focus on reducing labor and energy costs.

1.2.2.5 Construction Methods

Construction at the existing treatment plant would occur over the planning period and phases would likely each be completed within one year. The facility would continue to operate during construction and all staging would occur on-site. No road closures would be required. Construction equipment would include front-end loaders, excavators, and cranes. Proposed structures and equipment would be placed on piles, therefore pile-driving would be required to implement some of the proposed upgrades. Pile-driving would likely occur for one to two weeks during the construction period and would involve the use of a diesel hammer.

2.0 ALTERNATIVES TO THE PROPOSED ACTION

This section describes alternative headworks and treatment technologies considered in the 2005 *Draft Facilities Plan*.

2.1 No Build Alternative

For the purpose of this assessment, the No Build Alternative would maintain the existing WWTP No. 2 as it is and no upgrades would be implemented. Under this alternative, the existing facility would not be able to accommodate future peak flows.

2.2 Project Alternative

2.2.1 Grit Removal

This alternative consists of continuing to use the existing aerated grit chamber to its 10 mgd capacity and adding a second aerated grit chamber with a capacity of 10 mgd. Specific upgrades include:

- Installing a second grit chamber adjacent to the existing one.
- Installing a second cyclone separator and washer.

The second grit chamber would eliminate the need for split flow treatment. The chamber would be built adjacent to the existing grit chamber. Since the quantity of grit is not expected to change dramatically and the plant has flexibility in its ability to cycle grit pumps, new pumps are not required but would cycle through both grit tanks when both are in use. The air requirement for the additional grit chamber is small and the existing blowers have adequate capacity to supply air to the second tank.

2.2.2 Liquid Stream Treatment

Liquid stream treatment upgrades proposed under the Project Alternative (T2 in the 2005 *Draft Facilities Plan*) would provide primary and secondary treatment for all flows (up to 20 mgd) and would consist of the following:

- Constructing an additional primary sedimentation basin.
- Adding a blower.
- Constructing a new secondary clarifier (same as proposed action).

Under this alternative, screened, degritted raw sewage would flow to primary sedimentation. The proposed primary sedimentary basin would be rectangular and would be installed adjacent to the existing basin (Photo 5), as planned in a previous facilities plan. The new primary sedimentation basin would be 145 feet long by 21.5 feet wide and have a total footprint

(including foundation) of 3,800 sf or 0.09 acres. Aeration basin volume would remain the same, but an additional blower would be added to the existing blower building. The additional secondary clarifier would be constructed next to the existing secondary clarifier and would be the same size (90 feet in diameter or a total footprint of 6,940 square feet or 0.16 acres).

2.2.3 Solids Treatment

Solids treatment under the Project Alternative would consist of continuing to thicken primary sludge in the rectangular primary tank and thicken WAS in the circular primary tank (Alternative S1 in the *Draft Facilities Plan*). Specific improvements would include:

- Upgrading the digesters at WWTP No. 2 when digester capacity at WWTP No. 1 is exceeded.

2.3 Alternatives Considered but Eliminated

Due to the relatively minor upgrades required to accommodate future flows, no other alternatives were considered.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following sections describe the affected environment and potential impacts from the project alternatives on the environmental factors listed below.

- Earth resources
- Land use
- Floodplains
- Wetlands
- Cultural and historical resources
- Threatened and endangered species
- Fish, wildlife and vegetation
- Water resources
- Coastal resources
- Socio-economic/environmental justice issues
- Noise
- Air quality
- Transportation
- Aesthetics

3.1 Earth Resources

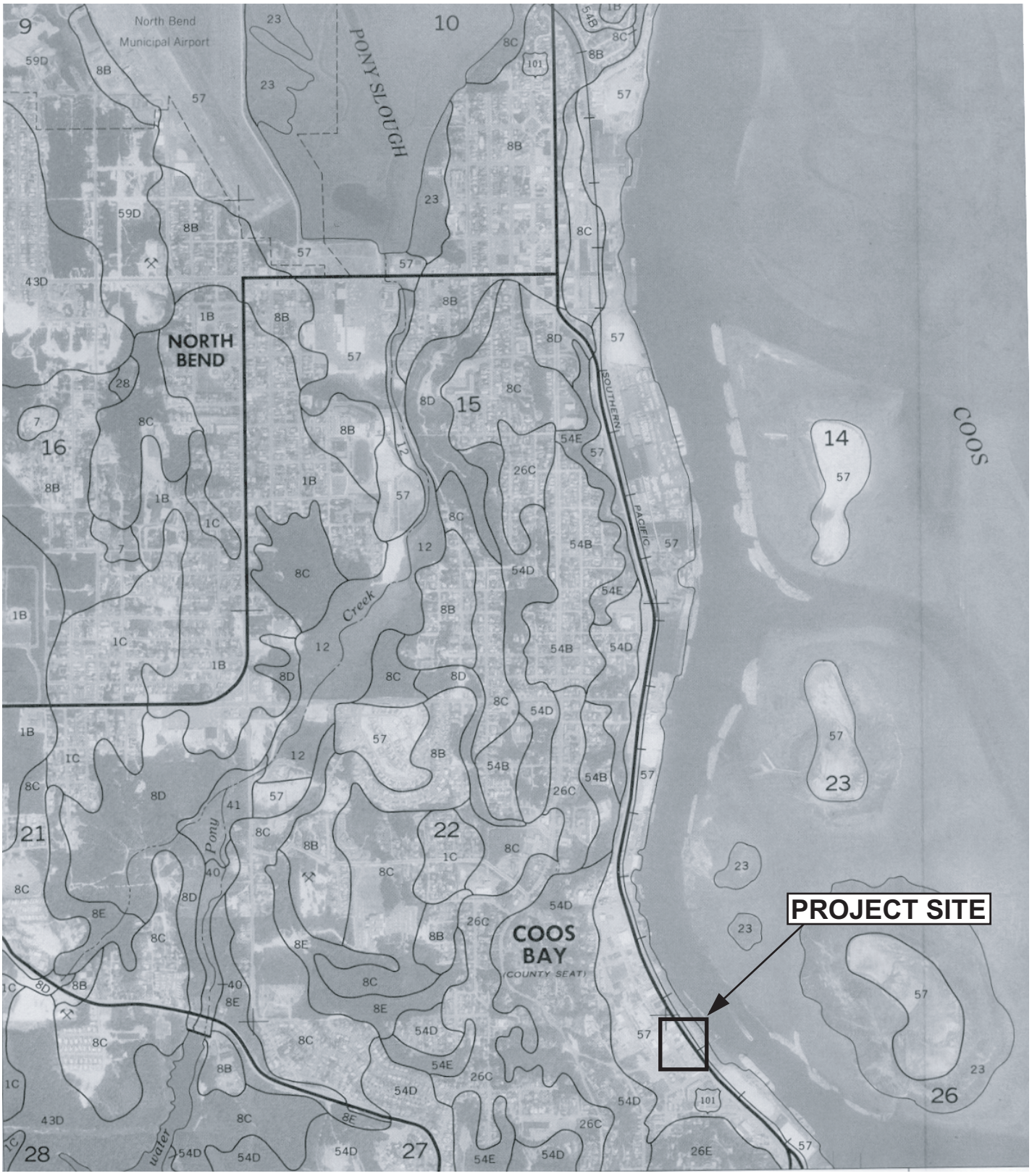
This section addresses potential impacts related to slope, erosion, and soil suitability. This section also discusses general construction impacts and proposed mitigation.

3.1.1 Affected Environment

The project site is flat and is surrounded by city streets on three sides. Soils on-site and in the project vicinity are mapped as Udorthents, 0 to 1 percent slopes (Figure 5). This map unit consists of areas along rivers, marshes, and estuaries that have been filled for commercial and industrial uses. Fill material along marshes and tidal flats includes dredge spoils, dune sand, and wood chips. Permeability and drainage varies within this mapped soil unit (Haagen, 1989). Geotechnical information has not been collected for the site.

3.1.2 Regulatory Environment

Projects affecting slopes, erosion, and soils are regulated at the local level. Development proposals are reviewed and approved by the City.



Soil Map Unit: 57 - Udorthents, level, 0-1 percent slopes, unranked on hydric soils list

ADOLFSON

NORTH
No Scale

Edits by: ML
Date: 6/6/05

Source:
Soil Survey of Coos County, Oregon 1989

FIGURE 4
Soils Map
Coos Bay WWTP No. 1 Improvement Project
Coos Bay, Oregon

3.1.3 Environmental Consequences

3.1.3.1 No Build Alternative

Under the No Build Alternative, earthwork would not be conducted and no potential impacts related to soils and erosion would occur. Consequently, no mitigation would be required.

3.1.3.2 Proposed Action

Construction methods for the Proposed Action would include minor grading, excavating, and backfilling. Earthwork from the Proposed Action is estimated to affect 6,940 square feet or 0.16 acres. Ground-disturbing activities have the potential to result in sedimentation of adjacent waterbodies from wind and water erosion. Approximately 5,000 cubic yards (cy) would be excavated for the installation of the new secondary clarifier and gravity belt thickener facility. The new secondary clarifier would be constructed adjacent to the existing secondary clarifier on unoccupied land. Excavated material would be stockpiled on-site and covered as needed to prevent wind erosion. Approximately 2,800 cy of material would be backfilled. Excess soil and gravel would be hauled off-site to an approved upland location.

3.1.3.3 Project Alternative

The project alternative would require similar construction methods to install new structures and equipment. Earthwork from the Project Alternative is anticipated to affect a total of 10,740 square feet or 0.25 acres to construct a new secondary clarifier, a new primary sedimentation basin (adjacent to the existing rectangular basin), and a new grit chamber. New structures would be located on unoccupied land covered with lawn. An additional blower would be housed in the existing blower building. Approximately 7,700 cy would be excavated for the installation of the new equipment. Excavated material would be stockpiled on-site and covered as needed to prevent wind erosion. Approximately 4,000 cy of material would be backfilled.

3.1.4 Mitigation

The following mitigation measures would apply to all alternatives that involve ground-disturbing activities. To avoid and/or minimize adverse impacts to the environment during construction, a number of conservation and mitigation measures would be in place. Mitigation would include developing comprehensive erosion prevention and sediment control plans prior to construction for each phase of construction. The plans would include elements for site documentation, pre-construction meetings, timing, staging, clearing, excavation, grading, and minimization. Additionally, site stabilization, sediment retention, wet-weather measures, and emergency supplies would be included.

Mitigation would also include installing and maintaining all appropriate erosion prevention and sediment control best management practices (BMPs), including but not limited to:

- Establish access and staging areas with a stabilized ground surface to reduce tracking of soils onto roadways; wash vehicle wheels; and collect washwater for proper disposal.

- Maintain vegetative growth and provide adequate surface water runoff treatment and control systems.
- Minimize the area that is to be cleared and graded at one time; mark the area clearly; and schedule construction soon after clearing.
- Apply sediment control measures such as straw-bale and brush barriers, straw wattles, vegetated strips, and/or silt fences to control and filter sheet-flow and shallow runoff.
- Revegetate disturbed areas as soon as possible after completion of construction.
- Stabilize soil stockpiles with seed, sod, mulch, plastic covers, erosion control blankets, mats, and chemical binders. Between October 1 and April 30, implement wet-weather measures and stabilize exposed soils that have not been worked for more than two days. Between May 1 and September 30, stabilize exposed soils that have not been worked on for more than seven days.
- Suppress windborne movement of soils off-site by spraying the soils with water or using other dust control materials.
- Sweep the streets or use other means to remove vehicle-tracked soil near the entrances to major construction sites. Schedule project activities to minimize erosion potential; inspect and maintain structural BMPs; monitor weather and install extra measures in anticipation of severe storms; monitor compliance with the site erosion prevention and sediment control plan and local regulatory requirements; and remove gear and restore the site.

The Proposed Action and Project Alternative would comply with conditions of all required permits including the NPDES permit issued by DEQ as well as grading and building permits from the City of Coos Bay.

3.2 Land Use

3.2.1 Affected Environment

The affected environment includes the existing wastewater treatment plant, which is developed except for the southwest corner. The WWTP No. 1 site and areas to the north and south are zoned Industrial – Commercial (I-C), which allows for commercial and light industrial uses which are compatible with adjacent residential and commercial uses. Adjacent land to the west (within 400 feet of WWTP No. 1) is zoned Residential (R-2).

3.2.2 Regulatory Environment

The City of Coos Bay administers the building and mechanical inspection program. City codes are designed to ensure the safety and structural integrity of buildings and other structures. The building permit process includes a review by the planning division to ensure consistency with zoning requirements, a review by city code officials, and a review by the engineering division to ensure that adequate storm drainage and sewer service is provided. The treatment plant is an allowed use within the Industrial – Commercial zone.

3.2.3 Environmental Consequences

3.2.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions. No land use actions would be required to maintain existing conditions.

3.2.3.2 Proposed Action

Under the Proposed Action, upgrades to the wastewater system would require a building permit and grading permit from the City of Coos Bay, but would not require any significant land use actions. No land conversion or zoning changes would be required to upgrade the wastewater system.

3.2.3.3 Project Alternative

Similar to the Proposed Action, proposed structures under the Project Alternative would require a building permit and a grading permit from the City of Coos Bay, but would not require any significant land use actions. No land conversion or zoning changes would be required to upgrade the wastewater system.

3.2.4 Mitigation

None of the alternatives (including the No Build Alternative) would adversely affect existing land use. Therefore, no mitigation would be required.

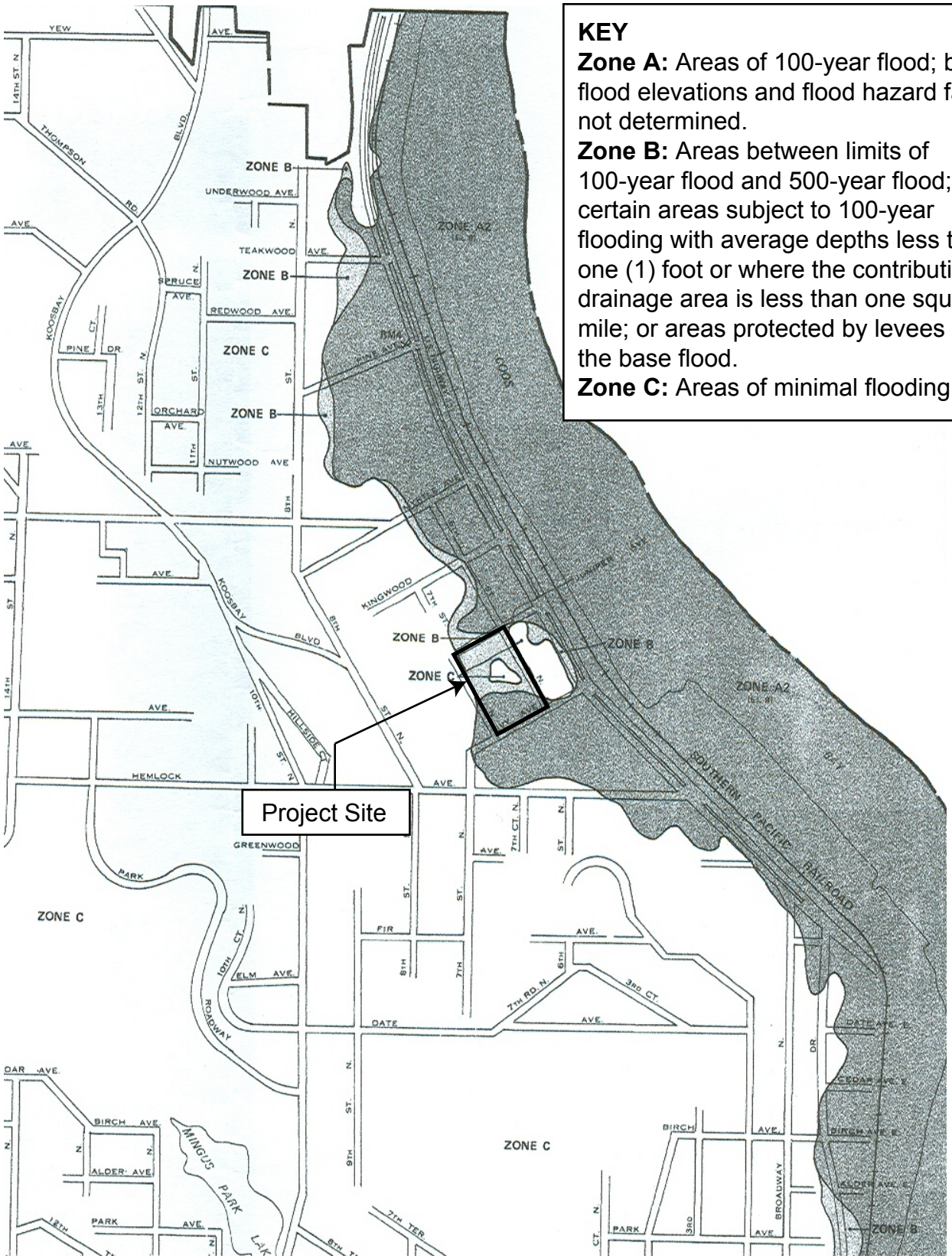
3.3 Floodplains

3.3.1 Affected Environment

The WWTP No. 1 site contains three different zones mapped by the Federal Emergency Management Agency (Figure 5) (FEMA, 1984). Zone A2, the 100-year floodplain of Coos Bay, is mapped for the southern third of the site. Zone B, or an area between the limits of the 100-year floodplain and the 500-year floodplain of Coos Bay, is mapped for the central and northern portions of the site. Zone B may be subject to 100-year flooding with average depths less than one foot. Zone B also includes areas protected by levees from the base flood and areas where the contributing drainage area is less than one square mile (FEMA, 1984). Lastly, Zone C, an area of minimal flooding, is mapped as a polygon within Zone B in the center of the site. The existing outfall is within the 100-year floodplain of Coos Bay (FEMA, 1984).

3.3.2 Regulatory Environment

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program and reviews and approves changes to Flood Rate maps. The State of Oregon administers floodplain regulations through its review of local government regulations in compliance with the Statewide Planning Goals. Specifically, floodplain regulation is accomplished through State Goal 7, Areas Subject to Natural Disaster and Hazards. All local



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1" = approx. 700 feet

Map data are the property of the sources listed below.
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FIGURE 5
Floodplain Map
Coos Bay WWTP No. 1 Improvement Project
Coos Bay, Oregon

jurisdictions must adopt regulations that comply with Goal 7 and its policies and have their regulations acknowledged by the State Land Conservation and Development Commission.

The City of Coos Bay has a Flood Damage Prevention ordinance (Chapter 3.14) that applies to any development in the 100-year floodplain of Coos Bay. Grading, paving, excavation, and construction of structures in the 100-year floodplain of Coos Bay would be required to comply with the development standards of Chapter 3.14.

3.3.3 Environmental Consequences

3.3.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions.

3.3.3.2 Proposed Action

New structures would be constructed on piles and concrete pads and would be evaluated for consistency with the City's Flood Damage Chapter. The gravity thickener building may be within the 100-year floodplain and would be constructed in accordance with applicable regulations.

3.3.3.3 Project Alternative

The environmental consequences for constructing new structures under this alternative are the same as described for the Proposed Action. The new primary sedimentation basin would be in the 100-year floodplain and would be constructed in accordance with applicable regulations.

3.3.4 Mitigation

Proposed equipment constructed in areas of special flood hazard (100-year floodplain of Coos Bay) would be required to comply with the development standards of the City's Flood Damage Prevention Chapter. Development standards require that non-residential structures:

- Be floodproofed so that below the base flood level, the structure is watertight with walls substantially impermeable to the passage of water;
- Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
- Have a registered engineer or architect certify that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based upon their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the City as set forth in Section 1(2)B of this Chapter; and
- If elevated and not floodproofed, meet the same standards for space below the lowest floor as described in Section 7((2)(A)(2)).

The development standards also require that applicants floodproofing non-residential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the floodproofed level, i.e., a building constructed to the base flood level will be rated as one foot below that level.

3.4 Wetlands

3.4.1 Affected Environment

Wetlands are formally defined by the U.S. Army Corps of Engineers (the Corps) (Federal Register, 1982) and the Environmental Protection Agency (Federal Register, 1988) as " … those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and similar areas (Federal Register, 1982). The three essential characteristics of wetlands are (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology (Environmental Laboratory, 1987).

The affected environment includes the existing WWTP No. 1 site. According to the National Wetlands Inventory (NWI), no wetlands are mapped for the project site or immediate vicinity (USFWS, 1989). The nearest mapped wetlands are intertidal mudflats located approximately 0.25 miles to the east in Coos Bay (Figure 6). The existing WWTP is built on historic fill and did not contain any wetland vegetation, soils, or hydrology during a January 2005 visit.

3.4.2 Regulatory Environment

In general, proposed activities within jurisdictional wetlands typically require permits from the Oregon Division of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps). The Corps and DSL regulate wetlands and other waters in different ways. Under Oregon's Removal-Fill Law (ORS 196.795-990), removal or fill of more than 50 cubic yards in a wetland or other Water of the State requires a permit. Any amount of fill or removal in Essential Salmon Habitat (ESH) requires a permit from DSL. The City of Coos Bay does not have its own wetland ordinance, but the City coordinates with DSL regarding proposed fill and removal in wetlands.

Key of common wetland categories mapped in project vicinity:
E2EMP = Estuarine, intertidal, emergent, irregularly flooded
E2USN = Estuarine, intertidal, unconsolidated shore, regularly flooded
PSSC = Palustrine, scrub-shrub, seasonally flooded

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NORTH
No Scale

Edits by: ML
Date: 6/6/05

Source:
U.S. Department of the Interior, Fish and Wildlife Service 1989
North Bend quadrangle

FIGURE 6
National Wetlands Inventory Map
Coos Bay WWTP No. 1 Improvement Project
Coos Bay, Oregon

3.4.3 Environmental Consequences

3.4.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions.

3.4.3.2 Proposed Action

Proposed construction would occur at the existing WWTP No. 1 which does not contain wetlands, consequently, the Proposed Action would not affect wetland resources.

3.4.3.3 Project Alternative

Proposed construction for the Project Alternative would occur at the existing WWTP No. 1 which does not contain wetlands, consequently, this alternative would not affect wetland resources.

3.4.4 Mitigation

No adverse impacts to wetlands are anticipated from facility upgrades and no mitigation would be required.

3.5 Cultural and Historical Resources

3.5.1 Affected Environment

Cultural resources are defined as recorded archaeological sites, traditional use areas, and areas with a high probability for containing archaeological resources. Historical resources include structures designated or eligible for listing on the National Register of Historic Places (National Register). Structures that may qualify for designation as a historical resource are typically older than 50 years. The possible presence of cultural and historical resources was assessed through coordination with the State Historic Preservation Office (SHPO), a review of the National Register, and a review of existing reports related to on-site structures.

According to SHPO, the project site has a high probability for possessing archaeological sites and/or buried human remains (Exhibit B). This is most likely due to the location of the site near the shoreline of Coos Bay. Specific cultural resources have not been identified because cultural resource surveys have not been previously conducted for the project site or the vicinity.

Based on a review of the National Register, no historical resources are listed for the project site or immediate vicinity (National Park Service, 2005). Additionally, no structures at the WWTP No. 1 site are proposed for demolition.

3.5.2 Regulatory Environment

Federal laws, regulations, agency-specific directives, and Executive Orders require a consideration of cultural resources in federal undertakings. Section 106 of the National Historic Preservation Act (NHPA) of 1966, its subsequent amendments, and Executive Order 11593 require that federal agencies consider the effects of a federal undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. Section 106 requires federal agency coordination with the SHPO and appropriate tribes. Archaeological sites, objects, and human remains are protected under Oregon Revised Statutes (ORS) 358.905 and ORS 97.740.

3.5.3 Environmental Consequences

3.5.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions. No ground-disturbing construction would likely occur under this alternative.

3.5.3.2 Proposed Action

The Proposed Action would involve constructing a new secondary clarifier adjacent to the existing one on unoccupied land. Although the existing project site has been disturbed from past grading and site preparation, ground disturbance has the potential to impact below-ground cultural resources. No structures would be demolished and no adverse impacts to above-ground cultural resources are anticipated. Mitigation measures are described below.

3.5.3.3 Project Alternative

In addition to a new secondary clarifier, the Project Alternative would involve constructing a primary sedimentation basin. Similar to the consequences described under the Proposed Action, new ground disturbance has the potential to impact below-ground cultural resources.

3.5.4 Mitigation

No adverse impacts to historical resources are expected and no mitigation is proposed. Mitigation related to below-ground cultural resources would be the same for the Proposed Action and the Project Alternative. SHPO recommends extreme caution during ground-disturbing activities at the existing WWTP site and immediate vicinity (Exhibit B). If archaeological material were found during construction, all work would cease immediately until a professional archaeologist could assess the discovery. A data recovery plan would be developed by a professional archaeologist, with input from applicable Tribes regarding treatment of archaeological deposits.

3.6 Threatened and Endangered Species

3.6.1 Affected Environment

The presence of threatened, endangered, and candidate species in the study area was assessed from correspondence with the U.S. Fish and Wildlife Service (USFWS) (Exhibit C), a review of the National Marine Fisheries Service (NOAA Fisheries) website, a review of the Oregon Natural Heritage Information Center database (ONHIC, 2005), and a site visit on January 26, 2005. Threatened, endangered, and candidate species that may occur in the project vicinity are listed in Table 1. The distribution, habitat requirements, and likely presence in the project area of each of these species are described below.

Table 1. Threatened and Candidate Species that May Occur in the Project Vicinity

Common Name	Scientific Name	Federal Status	Agency with Jurisdiction
FISH			
Coho salmon (Oregon Coast ESU)	*Oncorhynchus kisutch*	Threatened	NOAA Fisheries
Steelhead (Oregon Coast)	*O. mykiss*	Candidate	NOAA Fisheries
WILDLIFE			
Brown pelican	*Pelecanus occidentalis*	Endangered	USFWS
Bald eagle	*Haliaeetus leucocephalus*	Threatened	USFWS
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	USFWS
Northern spotted owl	*Strix occidentalis caurina*	Threatened	USFWS
Pacific fisher	*Martes pennanti pacifica*	Candidate	USFWS
PLANTS			
Western lily	*Lilium occidentale*	Endangered	USFWS

Notes: ESU = Evolutionarily Significant Unit; USFWS = U.S. Fish and Wildlife Service; NOAA Fisheries = National Marine Fisheries Service

3.6.1.1 Salmonids

Coos Bay provides migration and rearing habitat for coho salmon and steelhead (ONHIC, 2005). Coho salmon (Oregon Coast ESU) is federally listed as threatened and considered a state sensitive-critical species. Critical habitat has not been designated for Oregon Coast coho salmon. Steelhead (Oregon Coast) is a candidate for listing on the Endangered Species Act (ESA) and is considered a state sensitive-vulnerable species.

Coho spawning and rearing habitat typically consists of small, low gradient tributary streams (Nickelson, 2001). Oregon coast adult coho are typically two years old when they return to their

natal streams in the fall to spawn and die. Coho require clean gravel and cool temperatures for spawning and rearing (preferably 50 to 57° F). Juvenile coho typically spend one summer and one winter in freshwater, then migrate to the ocean. Although little is known about the residence time of juveniles in estuaries during out-migration, recent research indicates that juveniles may rear for extended periods in the upper ends of tidal reaches (Nickelson, 2001). During the summer, coho are found in pools in small streams. During the winter, juvenile coho may be found in off-channel alcoves (Nickelson, 2001).

Oregon coast steelhead has the most complex life history of the Pacific salmonids (Busby et al., 1996). Spawning and rearing habitat requirements of steelhead are similar to those described above for Oregon coast coho. Oregon coast steelhead are typically four years old when they return to their natal streams. Adult migration ranges from December to April with peak spawning in January and February (Busby et al., 1996).

3.6.1.2 Brown Pelican

The brown pelican was listed as endangered throughout its range on October 13, 1970 (35 FR 16047). Critical habitat is not designated for this species. Brown pelicans breed from November to March on small islands off the coast of California. During the non-breeding season, brown pelicans forage along the coast of Oregon and Washington. Typical foraging habitat includes near-shore waters and shallow estuaries. Pelicans plunge bill first into the water to catch surface-schooling fish. Brown pelican foraging habitat occurs on the north side of Coos Bay near a sunken jetty, on North Spit, and south of the WWTP No. 2 at RM 3.4 (OHNIC, 2005). Foraging habitat may be present on the east side of Coos Bay, however ODFW personnel have suggested that pelicans prefer deeper water (Steve Love, ODFW Biologist, personal communication, 2005).

3.6.1.3 Bald Eagle

On February 14, 1978, the bald eagle was federally listed as endangered in the conterminous United States, except for Oregon, Washington, Michigan, Minnesota, and Wisconsin, where it was listed as threatened. The bald eagle was proposed for delisting on July 6, 1999, but remains listed while the decision to delist the bald eagle is pending (64 FR 36453). Critical habitat has not been designated or proposed for bald eagles.

Bald eagles generally perch, roost, and build nests in mature trees near water bodies and available prey, usually away from intense human activity. They typically forage on open bodies of water and prey on a variety of foods, including fish, birds, mammals, carrion, and invertebrates (Stinson et al., 2001). Bald eagle winter foraging areas are usually located near open water on rivers, lakes, reservoirs, and bays with abundant fish and waterfowl (ODFW, 2003).

No bald eagle nest sites are known to occur within one mile of the project site (Stuart Love, personal communication, 2005). No bald eagles or their nests were observed during the January 26, 2005, site visit to the existing WWTP No. 1 facility. The shoreline in the project vicinity is developed and did not contain suitable roosting and perching habitat for bald eagles. The proposed activities would take place on the existing WWTP site, where human activity is

common. The proposed construction would be limited in duration and occur within a small area; therefore, it would not likely have any affect on bald eagle foraging behavior.

3.6.1.4 Marbled Murrelet

The marbled murrelet was listed as threatened on October 1, 1992. Critical habitat was designated for this species on June 24, 1996 and typically consists of mature forests on state or federally owned lands (61 FR 26256). The marbled murrelet is a small seabird that breeds in large blocks of late successional or old growth coniferous forests (61 FR 26256). Marbled murrelets forage on small fish and invertebrates in near-shore marine environments, including estuaries. No marbled murrelet nests are recorded for the project vicinity (ONHIC, 2005), and no potential marbled murrelet habitat occurs on-site or in the vicinity due to a lack of mature forest habitat.

3.6.1.5 Northern Spotted Owl

The northern spotted owl was listed as threatened on June 26, 1990, due to widespread habitat loss. Critical habitat was designated for this species on February 14, 1992. The northern spotted owl requires large tracts of mature coniferous or coniferous/mixed-hardwood forests (57 FR 1796). No spotted owl nests are recorded for the project vicinity (ONHIC, 2005) and no potential spotted owl habitat occurs on the project site or immediate vicinity. The project vicinity lacks large blocks of mature forest and does not provide suitable perching or nesting habitat for the northern spotted owl.

3.6.1.6 Pacific Fisher

The Pacific fisher is a nocturnal carnivore that dens in hollow trees and rocky crevices. This shy mammal is associated with large, undisturbed tracts of forest (Ingles, 1965). As of 2001, only six fisher sightings have been confirmed in Oregon (Pacific Biodiversity Network, 2001). The project site and vicinity lack undisturbed forests and do not provide suitable habitat for the Pacific fisher.

3.6.1.7 Western Lily

The western lily is an endangered, herbaceous plant with an extremely limited distribution. Critical habitat is not designated for the western lily. This species is known to occur at 31 sites within about two miles of the coast between Hauser in Coos County, Oregon; and Loleta in Humboldt County, California (USFWS, 1994). The western lily may reach up to 5 feet in height and have red or sometimes orange flowers that are in bloom from late June through July (Eastman, 1990). This perennial bulb occurs on the margins of sphagnum bogs and in forest or thicket openings along the periphery of seasonal ponds and small channels. The western lily also may be found in coastal prairie and scrub near the ocean where fog is common. The WWTP No. 1 has been disturbed from past development and does not contain any aquatic habitat or native herbaceous plant species. No suitable habitat for the western lily occurs on the project site.

3.6.2 Regulatory Environment

Threatened and endangered species are protected under the federal ESA of 1970 (16 USC 1531). The ESA prohibits the "take" of listed species without a special permit. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any of these actions. Consultation with the USFWS or NOAA Fisheries is required for proposed actions with a federal nexus that may affect threatened or endangered species or their habitats.

Fish habitat is protected under the Magnuson-Stevens Act (16 USC 1801). The purpose of this federal law is to promote protection, conservation, and enhancement of EFH. EFH includes those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. The MSA requires all federal agencies to consult with NOAA Fisheries on all actions or proposed actions that are permitted, funded, or undertaken by the federal agency that may adversely affect designated EFH.

3.6.3 Environmental Consequences

3.6.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions that include the discharge of treated effluent to waters containing threatened and proposed for listing fish species.

3.6.3.2 Proposed Action

The Proposed Action would consist of upgrading the existing WWTP site to accommodate future flows of 20 mgd. Construction would occur at a site that is currently developed and no vegetation is proposed for removal. No changes are proposed to the existing outfall in Coos Bay except for higher volumes of effluent (during projected future peak flows) and lower concentrations of toxic chemicals and pathogens.

The Proposed Action is not expected to adversely affect the northern spotted owl or the pacific fisher, due to a lack of suitable habitat for these species on the project site and immediate vicinity. No large tracts of forest or upper beach habitat would be impacted by the proposed upgrades. The project would improve effluent quality and therefore may indirectly benefit species that forage on aquatic organisms in Coos Bay including the marbled murrelet, bald eagle, and brown pelican. No direct impacts to the marbled murrelet, bald eagle, and brown pelican are anticipated.

The NPDES water quality standards are designed to protect beneficial uses of Coos Bay that include shellfish production and salmonid habitat. Effluent discharge limits for fecal coliform, ammonia, chlorine, and temperature were developed with consideration of salmonid habitat requirements. Consequently, the Proposed Action is not anticipated to adversely impact coho salmon and steelhead migration or rearing habitat.

3.6.3.3 Project Alternative

The Project Alternative would result in similar environmental consequences as described for the Proposed Action.

3.6.4 Mitigation

Measures to minimize impacts to threatened and endangered species have been incorporated into the design of both alternatives: improving an existing facility, locating new equipment on previously disturbed land. Compliance with the NPDES permit will minimize adverse impacts to listed and proposed for listing fish species in Coos Bay.

3.7 Fish, Wildlife and Vegetation

3.7.1 Affected Environment

The presence of fish, wildlife, and vegetation in the study area was determined from a review of the Oregon Natural Heritage Information Center database (ONHIC, 2005), and a site visit on January 26, 2005. The affected environment includes the existing WWTP site and Coos Bay near the existing outfall. The existing WWTP site is developed and provides limited wildlife habitat. Common birds observed at the facility in January 2005 were the yellow-rumped warbler, common crow, and various gull species. Other common wildlife species anticipated to occur adjacent to the WWTP in residential areas include the American robins, black-capped chickadee, wrens, woodpeckers, squirrels, raccoons, opossums, and small rodents. The little amount of vegetation present on the WWTP No. 1 site includes mowed grass and a few landscaped trees (Photos 1-3).

The effluent outfall is located in Coos Bay. In general, estuaries are highly productive systems that provide habitat for a multitude of resident and migratory species, including fish, marine mammals, terrestrial mammals, and birds (Johnson and O'Neil, 2001). No shellfish beds are located within the mixing zone of the WWTP No. 1 outfall on the east side of Coos Bay. Fish and aquatic species present in Coos Bay include: rock fish, Dungeness crab, Pacific lamprey, sturgeon, anchovy, herring, chum salmon, coho salmon, steelhead, surf perch, and lingcod (Alan Ritchey, personal communication, 2005).

3.7.2 Regulatory Environment

Fish and wildlife species that are not listed under the federal ESA are protected in a few different ways. The federal Fish and Wildlife Coordination Act (16 USC 661) requires consultation with the USFWS for water-resource development projects that may result in the loss of or damage to wildlife resources. Water-resource development projects include actions where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license.

The Migratory Bird Treaty Act (16 USC 703) prohibits the unauthorized "take" of all birds, including their nests, eggs, and young, with the exception of the European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), and domestic pigeon (*Columba* ssp.) (non-native species).

At the state level, ODFW provides guidance to federal permitting agencies regarding the potential for projects to adversely impact fish and wildlife resources. Through the application of statewide planning goals and policies, the state also requires local governments to plan for and protect natural resources. Fish, wildlife, and vegetation resources are addressed as part of State Planning Goal 5. All local jurisdictions must adopt regulations that comply with Goal 5 and its Policies and have their regulations acknowledged by the State Land Conservation and Development Commission.

3.7.3 Environmental Consequences

3.7.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions and would not include upgrading the existing facility to accommodate future flows.

3.7.3.2 Proposed Action

Proposed upgrades would occur on previously disturbed or developed ground and is not anticipated to negatively affect fish and wildlife species or vegetation. No mature trees or native vegetation would require removal. Aquatic habitat in Coos Bay may be positively affected by the proposed upgrades that are designed to treat anticipated future flows.

3.7.3.3 Project Alternative

The Project Alternative would have similar consequences to fish, wildlife, and vegetation as described for the Proposed Action.

3.7.4 Mitigation

Measures to minimize impacts to fish, wildlife, and vegetation have been incorporated into the design of both alternatives and include the following: improving an existing facility and locating new equipment on previously disturbed land. Compliance with the NPDES permit will minimize adverse impacts to aquatic species in Coos Bay.

3.8 Water Resources

3.8.1 Affected Environment

The affected environment includes the WWTP site and the effluent outfall located 700 feet to the east in Coos Bay.

The Coos Bay estuary, a sub-basin of the South Coast Watershed, covers approximately 13,348 acres and is fed by a number of creeks and rivers including Coos River, Coquille River, Willanch Creek, Kentuck Creek, Larson Creek, and Palouse Creek. The town of North Bend and the City of Coos Bay are situated on a peninsula that roughly divides Coos Bay into a western and an eastern portion. The western portion of Coos Bay is protected by North Spit - a narrow landmass with sand dunes. The tidally influenced mud flats along the shores of Coos Bay are ideal for shellfish production. Land use surrounding the bay includes agriculture, private and public timberlands, the Oregon Dunes National Recreation Area, wildlife reserves, urban centers (North Bend and the City of Coos Bay).

The DEQ administers and monitors water quality standards for Oregon rivers and streams per Section 303(d) of the federal Clean Water Act. Coos Bay from RM 7.8 to 12.3 exceeds water quality standards for fecal coliform (DEQ, 2002). Coos Bay is not listed for any other water quality parameters.

3.8.2 Regulatory Environment

In general, proposed activities affecting Waters of the United States are regulated under Sections 404, 401, and 402 of the federal Clean Water Act (CWA). Section 404 applies to the discharge of dredged or fill material into navigable waters of the United States, including jurisdictional wetlands.

The NPDES permit (Section 402 of the CWA) is a joint state and federal permit for wastewater discharges to surface waters. The NPDES program requires a plan to prevent stormwater pollution and to control erosion. Section 401 Water Quality Certification is required to ensure that a federally permitted activity resulting in discharge to a water of the State meets water quality standards. NPDES permit parameters include biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, pH, chlorine, ammonia, and thermal loading (Table 2). Both Sections 402 and 401 are administered by the DEQ.

DEQ establishes mixing zone requirements for the discharge of effluent into receiving waters as part of the NPDES permit. Two types of mixing zones are regulated – the acute mixing zone and the chronic mixing zone. The acute mixing zone is designed to prevent lethal impacts to aquatic organisms that are in the zone of initial contact and the chronic mixing zone is designed to protect the integrity of the entire receiving waterbody. The NPDES permit writer uses best professional judgment in establishing mixing zone requirements. The NPDES permit for WWTP No. 1 is based on an acute mixing zone of 10 feet and a chronic mixing zone of 100 feet.

The water quality standards for the South Coast Basin (OAR 340-041-0325) apply to the project area. The state fresh water bacteria standard is: *A 30-day log mean of 126 E.coli organisms per 100 milliliters, based on a minimum of five (5) samples; no single sample may exceed 406 E. coli organisms per 100 milliliters.* Under the temperature standards for Coos Bay, no measurable increase outside the mixing zone is allowed in stream segments containing federally listed threatened and endangered species if the increase would impair the biological integrity of the population. A measurable increase is defined as greater than a 0.25° F increase at the edge of the mixing zone (OAR 340-041-0006(55)). A temperature evaluation conducted for the NPDES permit renewal concluded that discharge to Coos Bay would not result in a measurable increase in temperature at the edge of the mixing zone (DEQ, 2003).

Table 2: Wastewater Discharge Limitations Not to be Exceeded

May 1 – October 31:					
Parameter	Average Effluent Concentrations		Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
	Monthly	Weekly			
BOD_5	20 mg/L	30 mg/L	480	730	970
TSS	20 mg/L	30 mg/L	480	730	970
November 1 – April 30:					
BOD_5	30 mg/L	45 mg/L	900	1400	1800
TSS	30 mg/L	45 mg/L	900	1400	1800

Other parameters (year-round except as noted)	Limitations
Fecal Coliform Bacteria	Shall not exceed 126 organisms per 100ml monthly geometric mean. No single sample shall exceed 406 organisms per 100ml. (See Note 2 and 3)
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 for BOD_5 and TSS. (See Note 5)
Total Residual Chlorine	Shall not exceed a monthly average concentration of 0.03mg/L and a daily maximum concentration of 0.06mg/L.
Excess Thermal Load (May 1 – October 31)	Shall not exceed 57 Million kcals/day as a weekly average. (See Note 1)

*Average dry weather design flow to the facility equals 2.9 MGD. Summer mass load limits based upon average dry weather design flow to the facility. Winter mass load limits based upon average wet weather design flow to the facility equaling 3.6 MGD. The daily mass load limit is suspended on any day in which the flow to the treatment facility exceeds 5.8 MGD (twice the design average dry weather flow).

Note 1. The thermal load limit was calculated using the average dry weather design flow and an estimated maximum weekly effluent temperature. This permit may be reopened, and the maximum allowable thermal load modified (up or down), when more accurate effluent temperature data becomes available. In addition, if the Total Maximum Daily Load (TMDL) for temperature for this sub-basin assigns a Waste Load Allocation (WLA) to this source, this permit may be re-opened to establish new thermal load limits and/or new temperature conditions or requirements.

Note 2. This permit may be reopened and modified as necessary to incorporate any Waste Load Allocation (WLA) or Best Management Practice established by the TMDL for bacteria for this sub-basin.

Note 3. If a single sample exceeds 406 organisms per 100ml, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 ml, a violation shall not be triggered.

Note 4. Upon Department approval of the engineering study demonstrating that flows to the treatment facility are not the result of excessive infiltration and inflow (Schedule D, Condition 10), the following BOD_5 and TSS Removal Efficiency limits shall automatically become effective:

Note 5. BOD_5 and TSS Removal Efficiency shall not be less than: (a) 85% monthly average for BOD_5 and TSS when monthly average daily plant flows are 4.25 MGD or less; and, (b) 71% monthly average for BOD_5 and 76% monthly for TSS when monthly average daily flows are 4.26 MGD or more.

3.8.3 Environmental Consequences

3.8.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions that would not accommodate future flows of 20 mgd.

3.8.3.2 Proposed Action

The Proposed Action would include upgrading the existing system to accommodate projected future loads and flows and to meet NPDES water quality standards while balancing the cost of improvements. The projected peak flow for 2027 is 20 mgd. While the volume of effluent discharged into Coos Bay will increase as the population grows, the treatment will meet NPDES standards that have been designed to protect the beneficial uses of Coos Bay.

3.8.3.3 Project Alternative

The environmental consequences to water resources from the Project Alternative are the same as described for the Proposed Action.

3.8.4 Mitigation

Both the Proposed Action and Project Alternative would satisfy DEQ's effluent disposal and biosolids treatment requirements. Compliance with DEQ's NPDES permit is recommended to minimize adverse water quality impacts. No adverse impacts to water quality are anticipated as long as compliance with DEQ's NPDES permit is achieved.

3.9 Coastal Management Zone

3.9.1 Affected Environment

The project area is within the Coastal Zone Management area of Oregon that extends from the Washington border to the California border, seaward to the extent of state jurisdiction (3 nautical miles offshore), and inland to the crest of the coastal mountain range.

3.9.2 Regulatory Environment

The federal consistency provisions of the Coastal Zone Management Act (CZMA) require that any federal action occurring in or outside of Oregon's coastal zone that affects coastal land or water uses or natural resources must be consistent with the Oregon Ocean-Coastal Management Program (OCMP). Federal consistency potentially applies to any project having effects on land and water uses or natural resources of the Oregon coastal zone. Federal financial assistance to state and local governments or related public entities, such as Rural Economic & Community

Development, Housing and Urban Development, and U.S. Forest Service grants will trigger the consistency provisions of the CZMA.

The Department of Land Conservation and Development (DLCD) is the state of Oregon's designated coastal management agency and is responsible for reviewing projects for consistency with the OCMP and issuing coastal management decisions. A project must be shown to be consistent with the various applicable components of the OCMP, with the statewide planning goals, and with coastal city and county comprehensive plans and land use regulations. The City of Coos Bay and Coos County adopted the *Coos Bay Estuary Management Plan* to provide implementation of the OCMP and statewide planning goals. The WWTP No. 1 site is not located within any shoreland segment that is regulated under the Under the *Coos Bay Estuary Management Plan*.

3.9.3 Environmental Consequences

3.9.3.1 No Build Alternative

The existing WWTP is consistent with the base zoning. No mitigation would be required to maintain existing conditions.

3.9.3.2 Proposed Action

The Proposed Action would not affect shoreland segments or parcels under the *Coos Bay Estuary Management Plan*.

3.9.3.3 Project Alternative

The Project Alternative would not affect shoreland segments or parcels under the *Coos Bay Estuary Management Plan*.

3.9.4 Mitigation

No adverse impacts to the Coastal Management Zone are anticipated from either the Proposed Action or the Project Alternative and no mitigation is proposed.

3.10 Socio-Economic / Environmental Justice Issues

3.10.1 Affected Environment

The WWTP No. 1 is within approximately 500 feet of the shoreline on the east side of the City of Coos Bay. The facility is situated within an industrial / commercial area off of State Highway 101. Residences are located to the west on a hillside overlooking East Coos Bay. Construction of proposed improvements at the facility may potentially affect the residential area to the west.

The median family income for the City of Coos Bay residents in the year 1999 was $38,721 (Census 2000 Summary File 3, Series P-77, Median Family Income, U.S. Census Bureau, 2003). Approximately 90 percent of the residents of the City of Coos Bay are white, with 5 percent a

mix of two or more races and the rest of the ethnic groups in the population representing 2 percent or less. In comparison, Coos County residents are 92 percent white, 4 percent a mix of other races, 3 percent American Indian, and the remaining ethnic groups in the population representing 1 percent or less (Census 2000 Summary File 3, Series P-6 Race, U.S. Census Bureau, 2003).

Low-income populations were identified using statistical poverty thresholds from the Census 2000 Summary File 3, Series P-87 Poverty Status in 1999 by Age (U.S. Census Bureau, 2003). These thresholds were derived from information collected in the Census 2000. Poverty status is defined by a set of income thresholds that vary by family size and composition. Families or individuals with income below their appropriate poverty thresholds are classified as poor. In 1999, 17 percent of City of Coos Bay residents were at or below poverty level standards compared to 15 percent of Coos County residents (Table 3). The percentage of residents at or below poverty level at the national and state level is approximately 12 percent. No readily identifiable groups of low-income persons living in geographic proximity to the project area were identified from the income data.

Table 3. Population Comparison for the City of Coos Bay and Coos County

	United States	Oregon	Coos County	Coos Bay
Total population	273,882,232	3,347,667	61,534	15,026
Income in 1999 below poverty level	33,899,812	388,740	9,257	2,483
Percentage below poverty level	12%	12%	15%	17%

3.10.2 Regulatory Environment

In February 1994, President Clinton issued Executive Order 12898, which requires each federal agency to "...make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States..." (Executive Order 12898).

3.10.3 Environmental Consequences

3.10.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions. Sewer rates would periodically increase to account for inflation.

3.10.3.2 Proposed Action

Under the Proposed Action, wastewater treatment upgrades would occur at an existing facility and would equally affect all the residents of Coos Bay. The project would not result in disproportionately high or adverse effects to minority or low-income populations. Information on sewer rate increases from this alternative is not available.

3.10.3.3 Project Alternative

Similar to the Proposed Action, the Project Alternative would affect all the residents of Coos Bay in a similar manner, regardless of race or income, and would not result in adverse impacts to socioeconomic resources. Information on sewer rate increases from this alternative is not available.

3.10.4 Mitigation

Neither the Proposed Action nor the Project Alternative would result in disproportionately high or adverse effects to minority or low-income populations and no mitigation would be required.

3.11 Noise

3.11.1 Affected Environment

The affected environment includes the existing WWTP site and immediate vicinity. Residences occur west of the WWTP No. 1 site with the closest residences located between 75 and 150 feet away (Photo 1). Sensitive receptors also include patrons at the Best Western and Red Lion hotels located one block away. Adolfson staff noted during the January 2005 field visit that the operating equipment at the existing facility was audible from western perimeter, but blended in with traffic noise from Highway 101.

The human ear responds to a wide range of sound intensities. The decibel scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 decibels (dBA). Hence, a 70 dBA sound level will sound twice as loud as a 60 dBA sound level. People generally cannot detect differences of 1 dBA, but a 5 dBA change would likely be perceived under normal conditions.

Table 4 presents representative noise sources and corresponding noise levels produced in decibels. Factors affecting the impact that a given noise will have on a person include the frequency and duration of the noise, the absorbency of the ground and surroundings, and the distance of the receptor from the noise source. The receptor and the usual background noise levels also determine the degree of impact.

Table 4. Sound Levels Produced by Common Noise Sources

Thresholds/Noise Sources	Sound Level (dBA)	Subjective Evaluations	Possible Effects on Humans
Carrier jet takeoff (50 ft)	140	Deafening	Continuous exposure can cause hearing damage
Siren (100 ft) Loud rock band	130		
Jet takeoff (200 ft) Auto horn (3 ft)	120		
Chain saw Noisy snowmobile	110		
Lawn mower (3 ft) Noisy motorcycle (50 ft)	100	Very Loud	
Heavy truck (50 ft); bulldozer or backhoe (100 ft)	90		
Pneumatic drill (50 ft); loader (100 ft) Busy urban street, daytime	80	Loud	
Normal automobile at 50 mph; Vacuum cleaner (3 ft)	70		Speech Interference
Large air conditioning unit (20 ft) Conversation (3 ft)	60	Moderate	
Quiet residential area; Light auto traffic (100 ft)	50		Sleep Interference
Library; Quiet home	40	Faint	
Soft whisper (15 ft)	30		Minimal Effects
Slight Rustling of Leaves	20	Very Faint	
Broadcasting Studio	10		
Threshold of Human Hearing	0		

Source: U.S. Environmental Protection Agency, 1971.

Modeling of noise levels projected for project construction and operation of the upgraded facility has not been conducted for the project area. Local governments have primary responsibility for controlling noise sources and regulating outdoor noise levels in the environment.

3.11.2 Regulatory Environment

Local governments have primary responsibility for controlling noise sources and regulating outdoor noise levels in the environment. The City of Coos Bay regulates "unreasonable noise" under Ordinance No. 100. Restrictions on construction noise apply only to residential districts.

The State of Oregon establishes noise standards for existing industrial and commercial facilities (OAR 340-035-0035) and exemptions for construction noise (OAR 340-035-035(5)(g)). These standards are administered by the Oregon DEQ but are no longer enforced by DEQ due to elimination of the noise program (Rachel Sakarta, personal communication, 2004). Nevertheless, Commercial Noise Source Standards (OAR 340-35-035) are as follows:

- 7am-10pm: L_{50} = 55 dBA, L_{10} = 60 dBA, L_1 = 75 dBA

- 10pm-7am: L_{50} = 50 dBA, L_{10} = 55 dBA, L_1 = 60 dBA.

The L_{50} represents the allowable mean noise level that may occur in one hour. The L_{10} and L_1 represent the allowable noise level for 10% and 1% of one hour, respectively.

3.11.3 Environmental Consequences

3.11.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions. No noise complaints have been made regarding operation of the existing wastewater system.

3.11.3.2 Proposed Action

Proposed wastewater facility upgrades would occur at an already developed site that is approximately 75 to 150 feet away from nearby residences. According to Table 4, noise from heavy trucks, bulldozers or backhoes would generate noise up to 90 dB at 100 feet and would therefore be audible to the nearest residences. In comparison, a busy urban street in the daytime generates noise levels up to 80 dB (Table 4). A diesel hammer would be used to drive approximately 100 piles for the new secondary clarifier and would generate noise levels ranging from 130 to 140 dB. Pile-driving would likely be completed within 7 to 14 days. Construction would occur in an area with existing background noise from the Highway 101, a major thoroughfare, and existing commercial and industrial uses. Construction noise would likely be limited to daylight hours (7 a.m. to 6 p.m. Monday through Friday). Operation of the upgraded WWTP would result in similar noise levels to the current conditions.

3.11.3.3 Project Alternative

In addition to a new secondary clarifier, the Project Alternative would also involve constructing an additional primary sedimentation basin, and an additional blower. Similar to the Proposed Action, new equipment would be constructed on piles, therefore pile-driving would occur during construction. Construction for the additional facilities would result in similar noise impacts to those described for the Proposed Action, but may occur for a longer period of time. In addition to the 100 piles for the secondary clarifier, approximately 84 piles would be hammered for the new primary sedimentation basin. Pile-driving for this alternative would likely be completed within 14 to 21 days. The blowers would be housed in a small building and would not result in a significant noise increase. Operation of the upgraded WWTP would result in similar noise levels to the current conditions.

3.11.4 Mitigation

Pile-driving would produce excessive noise levels (130-140 dB) for a short duration for both the Project Action and Project Alternative. Other construction noise from both alternatives would result in very loud noise levels, similar to noise generated from an urban street during the daytime. Potential mitigation measures to reduce impacts from pile-driving include: 1) using various dampening and shielding methods to reduce noise levels, 2) consider vibration or hydraulical insertion, or 3) consider drilled holes for cast in place piles to reduce noise. These

potential mitigation measures would not likely be required by the City because construction noise is not regulated in I-C zones. Other mitigation measures include restricting construction to daylight hours (generally between 7 a.m. and 6 p.m.) Monday through Friday. No adverse noise impacts are anticipated from operation of the upgraded WWTP, and no additional mitigation would be required.

3.12 Air Quality

3.12.1 Affected Environment

The affected environment includes the existing WWTP and immediate vicinity. The climate of Coos Bay is characterized by mild summers and wet, cool winters. Temperatures range from 46 to 67° F between May and October and 39 to 57° F from November to April. The average annual precipitation is 62 inches with most of the rainfall occurring October to April (National Weather Services, 2003).

The average wind velocity for the project vicinity is approximately 8 miles per hour with gusting up to 29 and 38 mph (National Weather Service, 2005). Wind direction is variable. Sufficient wind is present in the project area the year to disperse air pollutants released into the atmosphere.

Existing odor and air pollutant-producing activities on the site include the primary sedimentation, aeration, and the digester. The digesters are in need of repair, including the floating cover on Digester No. 1. Nearby sources of odor include exhaust from vehicles on Highway 101 and exposed mud and sand at low tide.

No significant sources of air pollution are designated by the Environmental Protection Agency (EPA) for the project site or vicinity (EPA, 2004). The nearest area that exceeds ambient air quality standards is the Eugene-Springfield area (EPA, 2004).

3.12.2 Regulatory Environment

Air quality is regulated under the federal Clean Air Act (CAA) and its amendments. At the federal level, the CAA is administered by the EPA. In Oregon, EPA has delegated its regulatory authority for air quality to the DEQ and to regional clean air agencies.

Several different types of air pollutants are subject to regulation. Under the CAA, EPA has set air quality standards for six principal pollutants: carbon monoxide, sulfur dioxide, lead, ozone, and two categories of particulate matter. The standards for these "criteria" pollutants are known as the National Ambient Air Quality Standards, or NAAQS. Areas of the country that persistently exceed the national ambient air quality standards for these pollutants are designated "nonattainment" areas.

EPA also has set standards for 188 hazardous air pollutants (HAPs), which are known or believed to cause human health effects when they exceed levels specified by EPA. HAP emissions in excess of certain levels are subject to National Emissions Standards for Hazardous Air Pollutants (NESHAPS). While the CAA and state and local regulations set standards for criteria pollutants and HAPs, they do not set standards for odors.

3.12.3 Environmental Consequences

3.12.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions. Offensive odors are occasionally detected at nearby residences due to inadequate treatment facilities.

3.12.3.2 Proposed Action

Approximately 0.09 acres of earthwork (excavating and grading) would be required to implement the proposed upgrades at WWTP No. 1. Construction might result in periodic, short-term increases of airborne particles on-site and in the vicinity of the project. Dust and engine exhaust generated by construction equipment (such as front-end loaders or excavators) at the existing WWTP site would be the main source of impacts to air quality. These impacts are expected to occur intermittently during construction between 7 a.m. and 6 p.m. at the existing WWTP site.

Implementation of the Proposed Action would improve the efficiency of the existing anaerobic digesters, therefore operation of the facility could result in slight improvements to air quality.

3.12.3.3 Project Alternative

The footprint of impact is larger (0.25 acres versus 0.09 acres) for this alternative because of an additional proposed structure - a new primary sedimentation basin. Consequently, this alternative has the potential to generate more fugitive dust during construction than the Proposed Action.

The existing anaerobic digesters would also be repaired under this alternative and would result in slight improvements to air quality from operation of the facility.

3.12.4 Mitigation

To minimize adverse air quality impacts during construction of either the Proposed Action or Project Alternative, water would be applied to adjacent streets and at the WWTP No. 1 facility to reduce the potential for creating dust. No other adverse air quality impacts are anticipated from construction or operation of either the Proposed Action or the Project Alternative, and no additional mitigation is required or proposed.

3.13 Traffic and Safety

3.13.1 Affected Environment

The affected environment includes the existing WWTP No. 1 site located on Ivy Avenue, one block west of Highway 101. Existing traffic activity at the site includes five to six employee trips per day and approximately five truck trips per week.

Ivy Avenue is a short six-block-long local residential street that extends from Highway 101 to 9th Street. No residences are accessed from Ivy Avenue between Highway 101 and the WWTP No. 1 site. Highway 101 is a principal arterial or state route. During a traffic count conducted between 4 p.m. and 6 p.m. on Wednesday, August 4, 2002, 4,531 vehicles including 200 trucks were counted on Highway 101 near WWTP No. 1 (City of Coos Bay, 2002).

3.13.2 Regulatory Environment

Construction traffic is required to comply with the standards of the Oregon Department of Transportation (ODOT). The contractor would be required to submit a traffic control plan to ODOT as part of the proposed project.

3.13.3 Environmental Consequences

3.13.3.1 No Build Alternative

The No Build Alternative would maintain existing traffic conditions. No traffic or safety impacts would occur from this alternative.

3.13.3.2 Proposed Action

Construction of the Proposed Action would result in a temporary increase of truck traffic at the project site. No residences are accessed off of Ivy Avenue between Highway 101 and the WWTP No. 1 site, thereby minimizing adverse impacts to transportation and safety. Construction traffic would access the site via Highway 101 that currently receives high traffic volumes. Operation of the WWTP site under the Proposed Action would result in the same number of employee and truck trips. Construction or operation of the Proposed Action is not anticipated to result in adverse traffic or safety impacts.

3.13.3.3 Project Alternative

Construction of the Project Alternative would result in more truck traffic at the project site due to the fact that more facilities would be constructed. Operation of the WWTP site under the Proposed Action would result in the same number of employee and truck trips. Construction or operation of the Project Alternative is not anticipated to result in adverse traffic or safety impacts.

3.13.4 Mitigation

Mitigation for construction-related traffic and safety impacts are the same for the Proposed Action and the Project Alternative. To mitigate for potential traffic impacts during construction, the contractor will be required to submit a traffic control plan to ODOT. Signage will be required near the construction site to alert passenger vehicles about lowered speed limits and merging trucks. With mitigation measures in place, the additional truck trips per week are not expected to result in adverse traffic impacts. No adverse impacts to traffic or safety are anticipated from operation of the Proposed Action or the Project Alternative and no mitigation is proposed.

3.14 Environmental Design (Aesthetics)

This section describes the aesthetics of the project alternatives, including environmental design techniques and compatible use.

3.14.1 Affected Environment

The existing WWTP No. 1 site is located off of Ivy Avenue in a commercial – industrial section of town. The existing facility is visible from residences on a hill to the west that overlooks the east side of Coos Bay, but is not visible from Highway 101.

3.14.2 Regulatory Environment

In general, environmental design is regulated at the local level. Proposed improvements at the WWTP No. 1 site within the City of Coos Bay are subject to standards of the building permit.

3.14.3 Environmental Consequences

3.14.3.1 No Build Alternative

The No Build Alternative would maintain existing conditions.

3.14.3.2 Proposed Action

The proposed action would involve constructing a new secondary clarifier (a circular tank) adjacent to the existing secondary clarifier. The proposed clarifier would be 90 feet in diameter (or a total footprint of 6,940 square feet or 0.16 acres) and constructed of the same material as the existing one.

3.14.3.3 Project Alternative

The Project Alternative would also involve constructing a new secondary clarifier as well as a new rectangular primary sedimentation basin (same as the existing one).

3.14.4 Mitigation

Features incorporated into the Proposed Action to reduce potential impacts to the surrounding environment include improving a site that is currently developed. The project vicinity is currently developed with commercial and industrial structures, therefore proposed equipment is not anticipated to adversely impact aesthetics. Due to the minimal impacts expected during construction, the City would not likely require mitigation and none is proposed.

4.0 SUMMARY OF MITIGATION

Table 5 summarizes the proposed mitigation measures. Mitigation would be the same for both the Proposed Action and the Project Alternative.

Table 5. Summary of Mitigation

Environmental Factor	Mitigation (For the Proposed Action and Project Alternative)
Land use	• No mitigation recommended or required.
Floodplains	• New structures constructed within the 100-year floodplain of Coos Bay should comply with the development standards of the City's Flood Damage Prevention Chapter.
Wetlands	• No impacts and no mitigation required.
Cultural and Historical Resources	• If cultural resources are found during construction, work would stop in the immediate vicinity and the appropriate agencies would be contacted. A data recovery plan would be developed by the professional archaeologist, with input from applicable Tribes regarding treatment of archaeological deposits.
Threatened and Endangered Species	• Comply with the water quality standards of the NPDES permit.
Fish, Wildlife, and Vegetation	• Comply with the water quality standards of the NPDES permit.
Water Quality	• Comply with the NPDES permit requirements issued by DEQ
Socio-Economic/Environmental Justice Issues	• No mitigation recommended or required.
Noise	• Consider dampening or shielding methods to reduce noise levels from pile-driving or consider less noisy techniques. • Restrict construction to daylight hours (generally 7 a.m. to 6 p.m.) Monday through Friday.
Air Quality	• Dampen the WWTP site and adjacent streets to reduce the potential for fugitive dust to arise.
Traffic and Safety	• Contractor will be required to submit a traffic control plan to ODOT. • Signage will be required near the construction site to alert passenger vehicles about lowered speed limits and merging trucks.
Aesthetics	• No mitigation recommended or required.

Notes: DEQ = Department of Environmental Quality

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EXHIBITS

EXHIBIT A – PHOTOGRAPHS

Photo 1 – Looking west at North Seventh Street and residences from the northwest corner of the facility.

Photo 2 – The southwest portion of the site, used for storage, contains gravel and patches of grass.

Photo 3 – Looking east at the aeration basin in the background and mowed lawn in the foreground.

Photo 4 – New primary treatment process installed in 1990.

Photo 5: Future location for additional primary treatment (under Project Alternative).

EXHIBIT B – LETTER FROM STATE HISTORIC PRESERVATION OFFICE

Oregon
Theodore R. Kulongoski, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St. NE, Suite C
Salem, OR 97301-1271
(503) 986-0707
FAX (503) 986-0793
www.hcd.state.or.us

RECEIVED
JAN 2 7 2005
BY:

January 24, 2005

Ms. Sarah Hartung
Adolfson Associates, Inc.
333 SW Fifth Avenue, Suite 600
Portland, OR 97204-1743

RE: SHPO Case No. 05-0105
City of Coos Bay Wastewater Treatment Facilities Project
25S 13W 19, 26, Coos Bay, Coos County

Dear Ms. Hartung:

Thank you for your submission for the project referenced above. Unfortunately, the information you provided was not complete enough for us to comment on the above-ground portion of this review. Under NEPA and Section 106 of the National Historic Preservation Act it is the responsibility of the City of Coos Bay, or its chosen delegate, to perform any environmental review to determine if above-ground cultural resources may be affected by the proposed undertaking. It is the duty of the lead agency, or its chosen delegate, to locate National Register properties, survey the area of potential effect for properties that may be eligible for the National Register, make initial determinations of eligibility on such properties, and determine what effects the undertaking may have on these properties. The State Historic Preservation Office then responds to these agency findings within 30 days.

State Archaeologist Dennis Griffin has checked the statewide cultural resource database, and found that there have been no previous archaeological surveys completed anywhere near your proposed project area. However, your project area lies within an area generally perceived to have a high probability for possessing archaeological sites and/or buried human remains. While not having sufficient knowledge to predict the likelihood of archaeological resources within your project area, extreme caution is recommended during future ground disturbing activities. ORS 358.905 and ORS 97.740 protect archaeological sites and objects and human remains on State public and private lands in Oregon. If any archaeological material is discovered during construction activities, all work should cease immediately until a professional archaeologist can assess the discovery.

Our response here is to assist you with your responsibilities under NEPA and Section 106 of the National Historic Preservation Act (per 36 CFR Part 800). It does not satisfy the above-ground "SHPO consultation" requirement of the Section 106 process, nor does it imply concurrence on any above-ground portion of your project. We look forward to receiving the items specified above so we can complete our review and comment in a timely manner.

To further assist you, we have placed the Section 106 forms and guidelines on our website at http://www.oregon.gov/OPRD/HCD/SHPO/preservation_106.shtml. Please feel free to contact Dennis Griffin or me if you have further questions, comments or need additional assistance.

Sincerely,

Sarah Jalving

Sarah Jalving
Historic Compliance Specialist
(503) 986-0679 or Sarah.Jalving@state.or.us

Sarah Hartung

-----Original Message-----
From: JALVING Sarah [mailto:Sarah.Jalving@state.or.us]
Sent: Wednesday, February 02, 2005 2:28 PM
To: Sarah Hartung
Subject: Coos Bay wastewater treatment plant projects

Sarah,
There is no need to complete above-ground Section 106 documentation forms for a structure that is not at least 50 years of age. So unless archaeological resources are uncovered, it seems that your Section 106 responsibilities are taken care of. Thanks and good luck.

Sarah Jalving
Review & Compliance
Oregon State Historic Preservation Office
Heritage Conservation Division
725 Summer St. NE, Suite C
Salem, Oregon 97301
phone: 503-986-0679
fax: 503-986-0793

>>> shartung@adolfson.com 01/27/05 04:41PM >>>
Hello Sarah: Thank you for your response on the Coos Bay wastewater treatment plant projects. I looked on the National Register of historic places and found 20 listings for the City of Coos Bay, but none are located on or adjacent to the existing wastewater treatment plants. Wastewater treatment plant No. 1 (WWTP 1) is located in the NW Section 26, Township 25 South, Range 13 West. Wastewater treatment plant No. 2 (WWTP 2) is located in the SE of Section 19, Township 25 South, Range 13 West.

No buildings or structures are proposed to be demolished at WWTP 1. At WWTP 2, the existing headworks is proposed to be demolished and completely rebuilt on the existing site or just outside the site boundaries. The headworks, constructed in 1990, screen raw sewage and remove grit before primary treatment.

I'm wondering if it's necessary to submit a Section 106 form regarding demolition of the headworks structure?
Thanks for your advisement.

Regards,
Sarah Hartung
Project Ecologist
Adolfson Associates, Inc.
333 SW Fifth Avenue, Suite 600
Portland, OR 97204-1743
Ph: 503-788-5270
Fx: 971-544-0450

EXHIBIT C – USFWS SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.SP01(05)
File Name: Sp0160.wpd
TS Number: 05-0977

Sarah Hartung
Adolfson Associates, Inc.
333 SW Fifth Avenue, Suite 600
Portland, Oregon 97204

JAN 2 8 2005

Subject: Wastewater Treatment Facility No. 1 Project
USFWS Reference # 1-7-05-SP-0160

Dear Ms. Hartung:

This is in response to your letter, dated January 11, 2005, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Wastewater Treatment Facility No. 1 Project in Coos County. The Fish and Wildlife Service (Service) received your correspondence on January 11, 2005.

We have attached a list (Enclosure A) of threatened and endangered species that may occur within the area of the Wastewater Treatment Facility No. 1 Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Oregon Department of Environmental Quality (ODEQ) requirements under the Act are outlined in Enclosure B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, ODEQ is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Enclosure B, as well as 50 CFR 402.12.

If ODEQ determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, ODEQ is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Enclosure A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published May 4, 2004, in the Federal Register (Vol. 69, No. 86, 24876) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, ODEQ is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, ODEQ may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages ODEQ to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Kevin Maurice or Corissa Larvik at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact NOAA Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

KJ Maurice

for Kemper M. McMaster
State Supervisor

Enclosures
1-7-05-SP-0160

cc electronic:
Nongame, Oregon Department of Fish and Wildlife, Salem, Oregon.

Enclosure A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE WASTEWATER TREATMENT FACILITY NO. 1 PROJECT 1-7-05-SP-0160

LISTED SPECIES[1/]

Birds		
Marbled murrelet[2/]	*Brachyramphus marmoratus*	CH T
Bald eagle[4/]	*Haliaeetus leucocephalus*	T
Brown pelican	*Pelecanus occidentalis*	E
Northern spotted owl[5/]	*Strix occidentalis caurina*	CH T
Fish		
Coho salmon (Oregon Coast)[6/]	*Oncorhynchus kisutch*	**T
Plants		
Western lily	*Lilium occidentale*	E

PROPOSED SPECIES

None

CANDIDATE SPECIES

Mammals		
Fisher[7/]	*Martes pennanti*	
Fish		
Steelhead (Oregon Coast)[8/]	*Oncorhynchus mykiss*	**CF

SPECIES OF CONCERN

Mammals	
White-footed vole	*Arborimus albipes*
Red tree vole	*Arborimus longicaudus*
Pacific western big-eared bat	*Corynorhinus townsendii townsendii*
Silver-haired bat	*Lasionycteris noctivagans*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis (bat)	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
Birds	
Band-tailed pigeon	*Columba fasciata*
Olive-sided flycatcher	*Contopus cooperi borealis*
Yellow-breasted chat	*Icteria virens*
Mountain quail	*Oreortyx pictus*
Oregon vesper sparrow	*Pooecetes gramineus affinis*
Purple martin	*Progne subis*

Amphibians and Reptiles	
Tailed frog	*Ascaphus truei*
Northwestern pond turtle	*Emys marmorata marmorata*
Northern red-legged frog	*Rana aurora aurora*
Southern torrent salamander	*Rhyacotriton variegatus*
Fish	
Green sturgeon	*Acipenser medirostris*
River lamprey	*Lampetra ayresi*
Pacific lamprey	*Lampetra tridentata*
Coastal cutthroat trout (Oregon Coast)	*Oncorhynchus clarki clarki*
Invertebrates	
Newcomb's littorine snail	*Algamorda newcombiana*
California floater (mussel)	*Anodonta californiensis*
Plants	
Pt. Reyes bird's-beak	*Cordylanthus maritimus ssp. palustris*
Moss	*Limbella fryei*

(E) - Listed Endangered *(T) - Listed Threatened* *(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered *(PT) - Proposed Threatened* *(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected *(D) - Documented*

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

(CF) - Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.

** *Consultation with National Marine Fisheries Service may be required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12*

2/ *Federal Register Vol. 57, No. 45328, October 01, 1992, Final Rule - Marbled Murrelet*

3/ *Federal Register Vol. 64, No. 234, December 7, 1999, Final Rule-Critical Habitat for the Western Snowy Plover*

4/ *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*

5/ *Federal Register Vol. 57, No. 10, January 15, 1992, Final Rule-Critical Habitat for the Northern Spotted Owl*

6/ *Federal Register Vol. 63, No. 153, August 10, 1998, Final Rule-Oregon Coast Coho Salmon*

7/ *Federal Register Vol. 69, No.68, April 8, 2004, 12-Month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher*

8/ *Federal Register Vol. 63, No. 53, March 19, 1998, Final Rule-West Coast Steelhead*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

---

[1] A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other that construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

APPENDIX B

Discharge Permit

Expiration Date: 12/31/2007
Permit Number: 100699
File Number: 19802
Page 1 of 26 Pages

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:

Coos Bay, City of
500 Central Avenue
Coos Bay, OR 97420

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 13.2
Emergency Overflows:		
Pump Station #1, 690 Front Street	002	Isthmus Slough, R.M. 13.85
P.S. #2, 834 1st Street	003	Isthmus Slough, R.M. 14.6
P.S. #3, 1499 6th Street	004	Isthmus Slough, R.M. 13.15
P.S. #4, 299 S. 10th Street	005	Isthmus Slough, R.M. 14.4
P.S. #5, 2006 Woodland. Drive	006	Pony Creek, R.M. 8.85
P.S. #6, 400 Kruse Street	007	Coalbank Slough, R.M. 14.65
P.S. #9, 1890 SW Blvd.	008	Coalbank Slough, R.M. 14.65
P.S. #10, 2599 Woodland Drive	009	Pony Creek, R.M. 8.85
P.S. #12, 3000 Ocean Blvd.	010	Pony Creek, R.M. 8.85
P.S. #13, 2366 SE Ocean Blvd.	011	Pony Creek, R.M. 8.85
P.S. #17, 699 6th Street	012	Isthmus Slough, R.M. 13.15
P.S. #18, 545 Whitty Street	013	Isthmus Slough, R.M. 15.0
P.S. #19, 321 9th Ave.	014	Sewage Lagoon
P.S. #20, 1465 Old Wireless Lane	015	Coos River, R.M. 15
P.S. #21, 1742 Coos River	016	Coos River, R.M. 15.5

FACILITY TYPE AND LOCATION:

Activated Sludge
Coos Bay STP #1
Ivy Street at Sixth Avenue
Coos Bay

Treatment System Class: Level IV
Collection System Class: Level III

RECEIVING STREAM INFORMATION:

Basin: South Coast
Sub-Basin: Coos
Receiving Stream: Coos Bay
Hydro Code: 14A*COOS 13.2 D
LLID: 1243397433543-12.2-D
County: Coos

EPA REFERENCE NO: OR-002357-4

Issued in response to Application No. 994909 received February 15, 1995.

This permit is issued based on the land use findings in the permit record.

Michael H. Kortenhof, Water Quality Manager
Western Region

August 21, 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.

Expiration Date: 12/31/2007
Permit Number: 100699
File Number: 19802

MODIFICATION
This Modification Shall Be Attached To and Made A Part Of Permit #100699

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:

Coos Bay, City of
500 Central Avenue
Coos Bay, OR 97420

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 13.2
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P.S. #2, 834 1st Street	003	Isthmus Slough, R.M. 14.6
P.S. #3, 1499 6th Street	004	Isthmus Slough, R.M. 13.15
P.S. #4, 299 S. 10th Street	005	Isthmus Slough, R.M. 14.4
P.S. #5, 2006 Woodland. Drive	006	Pony Creek, R.M. 8.85
P.S. #6, 400 Kruse Street	007	Coalbank Slough, R.M. 14.65
P.S. #9, 1890 SW Blvd.	008	Coalbank Slough, R.M. 14.65
P.S. #10, 2599 Woodland Drive	009	Pony Creek, R.M. 8.85
P.S. #12, 3000 Ocean Blvd.	010	Pony Creek, R.M. 8.85
P.S. #13, 2366 SE Ocean Blvd.	011	Pony Creek, R.M. 8.85
P.S. #17, 699 6th Street	012	Isthmus Slough, R.M. 13.15
P.S. #18, 545 Whitty Street	013	Isthmus Slough, R.M. 15.0
P.S. #19, 321 9th Ave.	014	Sewage Lagoon
P.S. #20, 1465 Old Wireless Lane	015	Coos River, R.M. 15
P.S. #21, 1742 Coos River	016	Coos River, R.M. 15.5

FACILITY TYPE AND LOCATION:

Activated Sludge
Coos Bay STP #1
Ivy Street at Sixth Avenue
Coos Bay

Treatment System Class: Level IV
Collection System Class: Level III

RECEIVING STREAM INFORMATION:

Basin: South Coast
Sub-Basin: Coos
Receiving Stream: Coos Bay
Hydro Code: 14A*COOS 13.2 D
LLID: 1243397433543-12.2-D
County: Coos

EPA REFERENCE NO: OR002357-4

This permit was originally issued on August 21, 2003 in response to Application No. 994909 received February 15, 1995. This is a Department initiated modification in accordance with OAR 340-045-0055, Application No. 982771. This permit was issued based on the land use findings in the permit record.

Michael H. Kortenhof, Western Region Water Quality Manager — December 15, 2004 Date

ADDENDUM NO. 1

Modification #1 – Permit No. 100699, Schedule A, Condition 3.a (1) is modified to add Note 6 to the Total Residual Chlorine limit. Note 6 shall read as follows:

6. When the total residual chlorine limitation is lower than 0.10 mg/L, the Department will use 0.10 mg/L as the compliance evaluation level (i.e. daily maximum concentrations below 0.10 mg/L will be considered in compliance with the limitation).

Modification #2 – Permit No. 100699, Schedule B, Condition 1.a. (Influent Monitoring Requirements) is modified to delete the requirement to monitor metals and cyanide semi-annually. The Condition shall read as follows:

a. Influent

The facility influent grab samples and measurements are taken just before the bar screen. The facility influent composite samples are taken just before the Parshall flume.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Semi-Annual	Verification
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab

Modification #3 – Permit No. 100699, Schedule B, Condition 1.b. (Effluent Monitoring Requirements) is modified to delete the requirement to monitor metals and cyanide semi-annually. In addition, Schedule B, Condition 1.b. is modified to require Whole Effluent Toxicity monitoring annually for the remainder of the permit cycle and to perform at least three "priority pollutant" scans during the remainder of the permit cycle. The Condition shall read as follows:

b. Treated Effluent Outfall 001 MODIFIED 4-7-08 - See letter

The facility effluent grab samples and measurements and all composite samples are taken from the effluent channel just before the final gate. All bacteria samples and all samples for toxics are taken in the same location. Total chlorine residual samples are taken from the first manhole on the outfall pipeline.

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab
Fecal Coliform	2/Week	Grab
Quantity Chlorine Used	Daily	Measurement
Chlorine Residual	Daily	Grab
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
Average Percent Removed (BOD_5 and TSS)	Monthly	Calculation
Toxics:		
Whole Effluent Toxicity (See Note 3)	Annually	Acute & chronic
Priority Pollutants	(See Note 9)	24-hour Composite
Temperature:		
Effluent Temperature, Daily Max (See Note 7)	Daily	Continuous
Effluent Temperature, Average of Daily Maximums (See Note 7)	Weekly	Calculation
Excess Thermal Load	Weekly (May 1 – October 31)	Calculation (See Note 7)

Modification #4 – Permit No. 100699, Schedule B Notes are modified to delete Notes 1, 2 and 8.

Modification #5 – Permit No. 100699, Schedule B, Note 3 is modified to read as follows:

3. Beginning in calendar year 2005, the permittee shall conduct Whole Effluent Toxicity testing for a period of three (3) years in accordance with the frequency specified above. If the Whole Effluent Toxicity tests show that the effluent samples are not toxic at the dilutions determined to occur at the Zone of Immediate Dilution and the Mixing Zone, no further Whole Effluent Toxicity testing will be required during this permit cycle. Note that at least four Whole Effluent Toxicity test results will be required along with the next NPDES permit renewal application.

Modification #6 – Permit No. 100699, Schedule B, Note 9 is added and shall read as follows:

9. The permittee shall perform all testing required in Part D of EPA Form 2A. The testing includes all metals (total recoverable), cyanide, phenols, hardness and the 85 pollutants included under volatile

organic, acid extractable and base-neutral compounds. Three scans are required during the 4 ½ years after permit issuance. Two of the three scans must be performed no fewer than four months and no more than eight months apart. The effluent samples shall be 24-hour daily composites, except where sampling volatile compounds. In this case, six discrete samples (not less than 40 mL) collected over the operating day are acceptable. The permittee shall take special precautions in compositing the individual grab samples for the volatile organics to insure sample integrity (i.e. no exposure to the outside air). Alternately, the discrete samples collected for volatiles may be analyzed separately and averaged.

Modification #7 – Permit No. 100699, Schedule D, Condition 5 (Priority Pollutant Scan procedures) is deleted.

Modification #8 – Permit No. 100699, Schedule E is deleted.

SCHEDULE A

1. **Waste Discharge Limitations not to be exceeded after permit issuance (see Note 4).**

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	20 mg/L	30 mg/L	480	730	970
TSS	20 mg/L	30 mg/L	480	730	970

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/L	45 mg/L	730	1100	1500
TSS	30 mg/L	45 mg/L	730	1100	1500

* Average dry weather design flow to the facility equals 2.9 MGD. All mass load limits based upon average dry weather design flow to the facility.

Waste Discharge Limitations not to be exceeded after submitting documentation that the authority to implement OAR 340-041-0120(9)(a)(G)(iv) in tributary collection systems has been obtained (See Note 4).

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	20 mg/L	30 mg/L	480	730	970
TSS	20 mg/L	30 mg/L	480	730	970

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/L	45 mg/L	900	1400	1800
TSS	30 mg/L	45 mg/L	900	1400	1800

* Average dry weather design flow to the facility equals 2.9 MGD. Summer mass load limits based upon average dry weather design flow to the facility. Winter mass load limits based upon average wet weather design flow to the facility equaling 3.6 MGD. The daily mass load limit is suspended on any day in which the flow to the treatment facility exceeds 5.8 MGD (twice the design average dry weather flow).

3. **Other waste Discharge Limitations not to be exceeded after permit issuance.**

a. Treated Effluent Outfall 001

(1)

Other parameters (year-round except as noted)	Limitations
Fecal Coliform Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Notes 2 and 3)
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 for BOD_5 and TSS (See Note 5)
Total Residual Chlorine see Modification #1 (NOTE6)	Shall not exceed a monthly average concentration of 0.03 mg/L and a daily maximum concentration of 0.06 mg/L.
Excess Thermal Load (May 1 – October 31)	Shall not exceed 57 Million kcals/day as a weekly average. (See Note 1)

(2) 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 340-41-0325 except in the following defined mixing zone:

The allowable mixing zone is that portion of Coos Bay contained within a radius of one hundred (100) feet from the outfall. The Zone of Immediate Dilution (ZID) shall be defined as that portion of the allowable mixing zone that is within ten (10) feet of the point of discharge.

b. Emergency Overflow Outfalls 002 through 016

(1) No wastes shall be discharged from these outfalls and no activities shall be conducted which violate water quality standards as adopted in OAR 340-041-0325, unless the cause of the discharge is due to storm events as allowed under OAR 340-41-120 (13) or (14).

(2) Raw sewage discharges are prohibited to waters of the State from November 1 through May 21, except during a storm event greater than the one-in-five-year, 24-hour duration storm, and from May 22 through October 31, except during a storm event greater than the one-in-ten-year, 24-hour duration storm.

If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

c. No activities shall be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals shall be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

NOTES:

1. The thermal load limit was calculated using the average dry weather design flow and an estimated maximum weekly effluent temperature. This permit may be reopened, and the maximum allowable thermal load modified (up or down), when more accurate effluent temperature data becomes available. In

addition, if the Total Maximum Daily Load (TMDL) for temperature for this sub-basin assigns a Waste Load Allocation (WLA) to this source, this permit may be re-opened to establish new thermal load limits and/or new temperature conditions or requirements.

2. This permit may be reopened and modified as necessary to incorporate any Waste Load Allocation (WLA) or Best Management Practice established by the TMDL for bacteria for this sub-basin.

3. If a single sample exceeds 406 organisms per 100 ml, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 ml, a violation shall not be triggered.

4. The waste discharge limits in Schedule A, Condition 2 shall automatically become effective upon submittal of documentation to the Department that the City of Coos Bay has acquired and has accepted the necessary legal authority to implement the provisions of OAR 340-041-0120(9)(a)(G)(iv).

5. Upon Department approval of the engineering study demonstrating that flows to the treatment facility are not the result of excessive infiltration and inflow (Schedule D, Condition 10), the following BOD5 and TSS Removal Efficiency limits shall automatically become effective:

   BOD_5 and TSS Removal Efficiency Shall not be less than: (a) 85% monthly average for BOD_5 and TSS when monthly average daily plant flows are 4.25 MGD or less; and, (b) 71% monthly average for BOD_5 and 76% monthly for TSS when monthly average daily flows are 4.26 MGD or more.

6

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 grab samples and measurements and samples for cyanide are taken just before the bar screen. Composite samples are taken just before the Parshall flume. All samples for toxics (except cyanide) are taken in the same location.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Semi-Annual	Verification
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab
Toxics:		
Metals (Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn) & Cyanide, measured as total is mg/L (See Note 1)	Semi-annually using 3 consecutive days between Monday and Friday, inclusive	24-hour daily composite (See Note 2)

delete see addition #2

b. Treated Effluent Outfall 001

The facility effluent sampling locations are the following:

All effluent grab samples and measurements and all composite samples are taken from the effluent channel just before the final gate. All bacteria samples, final chlorine residual samples and all samples for toxics are taken in the same location.

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab
Fecal Coliform	2/Week	Grab
Quantity Chlorine Used	Daily	Measurement
Chlorine Residual	Daily	Grab
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
Average Percent Removed (BOD_5 and TSS)	Monthly	Calculation
Toxics:		
Metals (Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn) & Cyanide, measured as total in mg/L (See Note 1)	Semi-annually using 3 consecutive days between Monday and Friday, inclusive	24-hour daily composite (See Note 2)
Whole Effluent Toxicity (See Note 3)	Semi-annually	Acute & chronic

delete see addition #3

b. Treated Effluent Outfall 001 (Continued)

Item or Parameter	Minimum Frequency	Type of Sample
Temperature:		
Effluent Temperature, Daily Max (See Note 7)	Daily	Continuous
Effluent Temperature, Average of Daily Maximums (See Note 7)	Weekly	Calculation
Excess Thermal Load	Weekly (May 1 – October 31)	Calculation (See Note 7)

c. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Biosolids analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units)	Annually	Composite sample to be representative of the product to be land applied from the storage lagoon (See Note 4)
Biosolids metals content for: Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Semi-Annually	Composite sample to be representative of the product to be land applied from the storage lagoon (See Note 4)
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	Monthly	Calculation (See Note 5)
Record of digestion days (mean cell residence time)	Monthly	Calculation (See Note 6)
Daily Minimum Sludge Temperature	Daily	Record

d. Emergency Overflow Outfalls 002 through 016

Item or Parameter	Minimum Frequency	Type of Sample
Flow	Daily (during each occurrence)	Estimate duration and volume

e. Receiving Stream (within 500 feet of the Outfall 001 but outside the effluent plume)

Item or Parameter	Minimum Frequency	Type of Sample
Toxics:		
Metals (Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn) & Cyanide, measured as total in mg/L (See Note 8)	Semi-annually (one day of the 3 consecutive days of influent and effluent testing)	Grab

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 Biosolids and 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 June 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 19 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. For influent and effluent cyanide samples, at least six (6) discrete grab samples shall be collected over the operating day. Each aliquot shall not be less than 100 mL and shall be collected and composited into a larger container which has been preserved with sodium hydroxide for cyanide samples to insure sample integrity. Monitoring for mercury during the first year after permit issuance shall be conducted in accordance with EPA Method 1631. Monitoring for silver during the first year after permit issuance shall be conducted using a test method with a detection limit of 0.1 µg/L or less. After the first year, mercury and silver monitoring of the effluent may be conducted according to any test procedures approved by 40 CFR Part 136, unless otherwise notified in writing by the Department. For all tests, the method detection limit shall be reported along with the sample result.

2. Daily 24-hour composite samples shall be analyzed and reported separately. Toxic monitoring results and toxics removal efficiency calculations shall be tabulated and submitted with the Pretreatment Program Annual Report as required in Schedule E. Submittal of toxic monitoring results with the monthly Discharge Monitoring Report is not required.

3. Beginning no later than December 31, 2003, the permittee shall conduct Whole Effluent Toxicity testing for a period of one (1) year in accordance with the frequency specified above. If the Whole Effluent Toxicity tests show that the effluent samples are not toxic at the dilutions determined to occur at the Zone of Immediate Dilution and the Mixing Zone, no further Whole Effluent Toxicity testing will be required during this permit cycle. Note that Whole Effluent Toxicity test results will be required along with the next NPDES permit renewal application.

4. Composite samples from the storage lagoon or pond shall be taken from reference areas in the storage lagoon or pond pursuant to the approved Biosolids Management Plan. 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.

5. 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 and a representative composite sample of solids exiting each digester withdrawal line (as defined in the approved Biosolids Management Plan).

6. The days of digestion shall be calculated by dividing the effective digester volume by the average daily volume of Biosolids production.

7. Temperature monitoring and reporting shall begin no later than sixty (60) days after permit issuance. Excess Thermal Load shall be calculated as follows:
(Weekly average of daily maximum effluent temperatures in °F - applicable summer stream temperature standard, 64°F) X (Weekly average of daily flow in MGD) X 2.10 conversion factor = Excess Thermal Load, in Million kcals/day.

8. For receiving stream samples, at least six (6) discrete grab samples shall be collected over the operating day. Each aliquot shall not be less than 100 mL and shall be collected and composited into a larger container which has been preserved with sodium hydroxide for cyanide samples to insure sample integrity. Monitoring for mercury shall be conducted in accordance with EPA Method 1631. Monitoring for silver shall be conducted using a test method with a detection limit of 0.1 µg/L or less. Monitoring of toxics in Coos Bay shall be conducted during the first year after permit issuance. After the first year, monitoring of Coos Bay may be eliminated unless otherwise notified in writing by the Department. For all tests, the method detection limit shall be reported along with the sample result.

delete toc TOD #4

9 See Modification #6

SCHEDULE C

Compliance Schedules and Conditions

1. Within 180 days after the limits in Schedule A, Condition 2 become effective, the permittee shall submit to the Department for review and approval a proposed program and time schedule for identifying and reducing inflow. Within 60 days of receiving written Department comments, the permittee shall submit a final approvable program and time schedule. The program shall consist of the following:

   a. Identification of all overflow points and verification that sewer system overflows are not occurring up to a 24-hour, 5-year storm event or equivalent;

   b. Monitoring of all pump station overflow points;

   c. A program for identifying and removing all inflow sources into the permittee's sewer system over which the permittee has legal control; and

   d. If the permittee does not have the necessary legal authority for all portions of the sewer system or treatment facility, a program and schedule for gaining legal authority to require inflow reduction and a program and schedule for removing inflow sources.

2. By no later than November 19, 2003, the permittee shall submit to the Department a report which either identifies known sewage overflow locations and a plan for estimating the frequency, duration and quantity of sewage overflowing, or confirms that there are no overflow points. The report shall also provide a schedule to eliminate the overflow(s), if any.

3. By no later than August 21, 2005, the permittee shall provide standby power capabilities through installed generator to Pump Station #18.

4. The permittee is expected to meet the compliance dates which have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director may revise a schedule of compliance if he determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. Prior to increasing thermal load (flow or temperature) beyond the current permit limitations, the Permittee shall notify the Department and apply for and be issued a permit modification allowing the increase.

2. All biosolids shall be managed in accordance with the current, DEQ approved biosolids management plan, and the site authorization letters issued by the DEQ. Any changes in solids management activities that significantly differ from operations specified under the approved plan require the prior written approval of the DEQ.

   All new biosolids application sites shall meet the site selection criteria set forth in OAR 340-50-0070 and must be located within Coos County. All currently approved sites are located in Coos County. No new public notice is required for the continued use of these currently approved sites. Property owners adjacent to any newly approved application sites shall be notified, in writing or by any method approved by DEQ, of the proposed activity prior to the start of application. For proposed new application sites that are deemed by the DEQ to be sensitive with respect to residential housing, runoff potential or threat to groundwater, an opportunity for public comment shall be provided in accordance with OAR 340-50-0030.

3. This permit may be modified to incorporate any applicable standard for biosolids use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for biosolids use or disposal is more stringent than any requirements for biosolids use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

4) **Whole Effluent Toxicity Testing**

   a. The permittee shall conduct whole effluent toxicity tests as specified in Schedule B of this permit.

   b. Whole Effluent Toxicity tests may be dual end-point tests, only for the fish tests, in which both acute and chronic end-points can be determined from the results of a single chronic test (the acute end-point shall be based upon a 48-hour time period).

   c. Acute Toxicity Testing - Organisms and Protocols

      (1) The permittee shall conduct 48-hour static renewal tests with the *Ceriodaphnia dubia* (water flea) and the *Pimephales promelas* (fathead minnow).

      (2) The presence of acute toxicity will be determined as specified in **Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, Fourth Edition, EPA/600/4-90/027F, August 1993.

      (3) An acute Whole Effluent Toxicity test shall be considered to show toxicity if there is a statistically significant difference in survival between the control and 100 percent effluent, unless the permit specifically provides for a Zone of Immediate Dilution (ZID) for biotoxicity. If the permit specifies such a ZID, acute toxicity shall be indicated when a statistically significant difference in survival occurs at dilutions greater than that which is found to occur at the edge of the ZID.

   d. Chronic Toxicity Testing - Organisms and Protocols

      (1) The permittee shall conduct tests with: the fish species *Atherinops affinis* (topsmelt) invertebrate species. The invertebrate species must be one of the following: *Hol*

costata (mysid); *Crassostrea gigas* (Pacific Oyster); *Mytilus edulis, M. californianus, M. galloprovincialis, or M. trossulus* (mussels).

(2) The presence of chronic toxicity shall be estimated as specified in **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms**, First Edition, EPA/600/R-95/136, August 1995.

(3) A chronic Whole Effluent Toxicity test shall be considered to show toxicity if a statistically significant difference in survival, growth, or reproduction occurs at dilutions greater than that which is known to occur at the edge of the mixing zone. If there is no dilution data for the edge of the mixing zone, any chronic Whole Effluent Toxicity test that shows a statistically significant effect in 100 percent effluent as compared to the control shall be considered to show toxicity.

e. Quality Assurance

(1) Quality assurance criteria, statistical analyses and data reporting for the Whole Effluent Toxicity tests shall be in accordance with the EPA documents stated in this condition and the Department's **Whole Effluent Toxicity Testing Guidance Document**, January 1993.

f. Evaluation of Causes and Exceedances

(1) If toxicity is shown, as defined in sections c.(3) or d.(3) of this permit condition, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department. If the second test also indicates toxicity, the permittee shall follow the procedure described in section f.(2) of this permit condition.

(2) If two consecutive Whole Effluent Toxicity test results indicate acute and/or chronic toxicity, as defined in sections c.(3) or d.(3) of this permit condition, the permittee shall evaluate the source of the toxicity and submit a plan and time schedule for demonstrating compliance with water quality standards. Upon approval by the Department, the permittee shall implement the plan until compliance has been achieved. Evaluations shall be completed and plans submitted to the Department within 6 months unless otherwise approved in writing by the Department.

g. Reporting

(1) Along with the test results, the permittee shall include: 1. the dates of sample collection and initiation of each toxicity test; 2. the type of production; and 3. the flow rate at the time of sample collection. Effluent at the time of sampling for Whole Effluent Toxicity testing should include samples of required parameters stated under Schedule B, condition 1. of this permit.

(2) The permittee shall make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the Whole Effluent Toxicity tests, are using for all toxicity tests required by the Department.

h. Reopener

(1) If Whole Effluent Toxicity testing indicates acute and/or chronic toxicity, the Department may reopen and modify this permit to include new limitations and/or conditions as determined by the Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45.

Delete - See Modification #7 Also Schedule B Note 9

5. A priority pollutant scan shall be performed at least once during the term of this permit and must be submitted to the Department as part of the Permittee's NPDES permit renewal application. The permittee shall perform chemical analysis of its influent, effluent and biosolids to be beneficially used for the specific toxic pollutants listed in Tables II and III of Appendix D of 40 CFR Part 122. The influent and effluent samples shall be 24-hour daily composites, except where sampling volatile compounds. In this case, six (6) discrete samples (not less than 100 mL) collected over the operating day are acceptable. The permittee shall take special precautions in compositing the individual grab samples for the volatile organics to insure sample integrity (i.e. no exposure to the outside air). Alternately, the discrete samples collected for volatiles may be analyzed separately and averaged. For biosolids analyses, a composite of weekly grab samples for the final product shall be used.

6. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and/or treatment) of the system to be supervised as specified on page one of this permit.

Note: **A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.**

b. The permittee's wastewater system may not be without supervision (as required by Special Condition 6.a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified at no less than one grade lower then the system classification.

c. If the wastewater system has more than one daily shift, the permittee shall have the shift supervisor, if any, certified at no less than one grade lower than the system classification.

d. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

e. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program, 811 SW 6th Ave, Portland, OR 97204. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

f. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 6.b. above.

7. The permittee shall notify the appropriate DEQ Office in accordance with the response times noted in General Conditions of this permit, of any malfunction so that corrective action can be coordinated between permittee and the Department.

8. Unless otherwise approved in writing from the Department, the wastewater treatment facility shall not be allowed to accept for treatment the following types of waste: Domestic Septic Tank waste from single family dwellings and Domestic Septage from septic tanks, holding tanks, chemical toilets, marine Type III privies, and vault toilets.

9. The permittee shall not be required to perform a hydrogeologic characterization or groundwater monitoring during the term of this permit provided:

   a. The facilities are operated in accordance with the permit conditions, and;

   b. There are no adverse groundwater quality impacts (complaints or other indirect evidence) resulting from the facility's operation.

   If warranted, at permit renewal the Department may evaluate the need for a full assessment of the facilities impact on groundwater quality.

10. The permittee may qualify for a lower percentage removal efficiency of BOD and TSS than shown in Schedule A of this permit, pursuant to 40 CFR 133.103(d). The permittee must conduct an engineering study to demonstrate that flows to the treatment facility are not the result of excessive infiltration and inflow. Upon approval of the study by the Department, the alternate removal efficiency limits in Schedule A, Note 5 shall be applied.

SCHEDULE E

Pretreatment Activities

The permittee shall implement the following pretreatment activities:

1. The permittee shall conduct and enforce its Pretreatment Program, as approved by the Department, and comply with the General Pretreatment Regulations (40 CFR Part 403). The permittee shall secure and maintain sufficient resources and qualified personnel to carry out the program implementation procedures described in this permit.

2. The permittee shall adopt all legal authority necessary to fully implement its approved pretreatment program and to comply with all applicable State and Federal pretreatment regulations. The permittee must also establish, where necessary, contracts or agreements with contributing jurisdictions to ensure compliance with pretreatment requirements by industrial users within these jurisdictions. These contracts or agreements shall identify the agency responsible for all implementation and enforcement activities to be performed in the contributing jurisdictions. Regardless of jurisdictional situation, the permittee is responsible for ensuring that all aspects of the pretreatment program are fully implemented and enforced.

3. The permittee shall update its inventory of industrial users at a frequency and diligence adequate to ensure proper identification of industrial users subject to pretreatment standards, but no less than once per year. The permittee shall notify these industrial users of applicable pretreatment standards in accordance with 40 CFR § 403.8(f)(2)(iii).

4. The permittee shall enforce categorical pretreatment standards promulgated pursuant to Section 307(b) and (c) of the Act, prohibited discharge standards as set forth in 40 CFR § 403.5(a) and (b), or local limitations developed by the permittee in accordance with 40 CFR § 403.5(c), whichever are more stringent, or are applicable to nondomestic users discharging wastewater to the collection system. Locally derived discharge limitations shall be defined as pretreatment standards under Section 307(d) of the Act.

   A technical evaluation of the need to revise local limits shall be performed at least once during the term of this permit and must be submitted to the Department as part of the permittee's NPDES permit application, unless the Department requires in writing that it be submitted sooner. Limits development will be in accordance with the procedures established by the Department.

5. The permittee shall issue individual discharge permits to all Significant Industrial Users in a timely manner. The permittee shall also reissue and/or modify permits, where necessary, in a timely manner. Discharge permits must contain, at a minimum, the conditions identified in 40 CFR § 403.8(f)(1)(iii). Unless a more stringent definition has been adopted by the permittee, the definition of Significant Industrial User shall be as stated in 40 CFR § 403.3(t).

6. The permittee shall randomly sample and analyze industrial user effluents at a frequency commensurate with the character, consistency, and volume of the discharge. At a minimum, the permittee shall sample all Significant Industrial Users for all regulated pollutants twice per year. Alternatively, at a minimum, the permittee shall sample all Significant Industrial Users for all regulated pollutants once per year, if the permittee has pretreatment program criteria in its approved procedures for determining appropriate sampling levels for industrial users, and provided the sampling criteria indicate once per year sampling is adequate. At a minimum, the permittee shall conduct a complete facility inspection once per year. Additionally, at least once every two years the permittee shall evaluate the need for each Significant Industrial User to develop a slug control plan. Where a plan is deemed necessary, it shall conform to the requirements of 40 CFR § 403.8(f)(2)(v).

   Where the permittee elects to conduct all industrial user monitoring in lieu of requiring self-monitoring by the user, the permittee shall gather all information which would otherwise have been submitted by the user. The

permittee shall also perform the sampling and analyses in accordance with the protocols established for the user.

Sample collection and analysis, and the gathering of other compliance data, shall be performed with sufficient care to produce evidence admissible in enforcement proceedings or in judicial actions. Unless specified otherwise by the Director in writing, all sampling and analyses shall be performed in accordance with 40 CFR Part 136.

7. The permittee shall review reports submitted by industrial users and identify all violations of the user's permit or the permittee's local ordinance.

8. The permittee shall investigate all instances of industrial user noncompliance and shall take all necessary steps to return users to compliance. The permittee's enforcement actions shall track its approved Enforcement Response Plan, developed in accordance with 40 CFR § 403.8(f)(5). If the permittee has not developed an approved Enforcement Response Plan, it shall develop and submit a draft to the Department for review within 90 days of the issuance of this permit.

9. The permittee shall publish, at least annually in the largest daily newspaper published in the permittee's service area, a list of all industrial users which, at any time in the previous 12 months, were in Significant Noncompliance with applicable pretreatment requirements. For the purposes of this requirement, an industrial user is in Significant Noncompliance if it meets one or more of the criteria listed in 40 CFR 403.8(f)(2)(vii).

10. The permittee must develop and maintain a data management system designed to track the status of the industrial user inventory, discharge characteristics, and compliance. In accordance with 40 CFR § 403.12(o), the permittee shall retain all records relating to pretreatment program activities for a minimum of three years, and shall make such records available to the Department and USEPA upon request. The permittee shall also provide public access to information considered effluent data under 40 CFR Part 2.

11. The permittee shall submit by March 1 of each year, a report that describes the permittee's pretreatment program during the previous calendar year. The content and format of this report shall be as established by the Department.

12. The permittee shall submit in writing to the Department a statement of the basis for any proposed modification of its approved program and a description of the proposed modification in accordance with 40 CFR § 403.18. No substantial program modifications may be implemented by the permittee prior to receiving written authorization from the Department.

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

substantial and permanent loss of natural resources which 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 unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) 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 judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. 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 B.4.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 shall 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 D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

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

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include 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 event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(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.

APPENDIX C

Inter-District Sewer Services

Inter-District Sewer Services

Sewer Treated	Address	Sewer Rates Charged
Coos Bay sewer treated in North Bend	1420 Thompson	CB
	2635 N 15th	CB
	2665 N 15th	CB
	2699 N 15th	CB
	2745 N 15th	CB
	2785 N 15th	CB
	2775 N 15th Ct	CB
	2650 N 15th	CB
	2680 N 15th	CB
	2730 N 15th	CB
	2780 N 15th	CB
	2795 N 15th	CB
	2780 N 15th Ct	CB
	1330 Yew	CB
	1460 Yew	CB
	1440 Yew	CB
	1440 Thompson	CB
	885 25th, NB/**1290 Lindberg, CB**	CB
	1467 25th, NB/1467 Lindberg, CB	NB
	1450 Lindberg - Septic	CB
	1430 Thompson	CB
	2110 Newmark	NB
	2140 Newmark	NB
North Bend sewer treated in Coos Bay	3709 Fir	NB
	3733 Fir	NB
	3755 Fir	NB
	3777 Fir	NB
	3793 Fir	NB
	3781 Pacific	NB
	3779 Pacific	NB
	3767 Pacific	NB
	3755 Pacific	NB
	3743 Pacific	NB
	3723 Pacific	NB
	3717 Pacific - Septic	NB
	3709 Pacific - Septic connect 6/06	NB
	3710 Pacific	NB
	3714 Pacific	NB
	3766 Pacific	NB
	3784 Pacific	NB
Coos Bay sewer treated in Charleston	1040 Jefferson Street, CB	Charleston
	1030 Jefferson Street, CB	Charleston

$9.25 base		
$3.32 per 100 cu		
0 - 100	$	12.57
101 - 200	$	15.89
201 - 300	$	19.21
301 - 400	$	22.53
401 - 500	$	25.85
501 - 600	$	29.17
601 - 700	$	32.49
701 - 800	$	35.81
801 - 900	$	39.13
901 - 1000	$	42.45
1001 -1100	$	45.77
1101 - 1200	$	49.09
1201 - 1300	$	52.41
1301 - 1400	$	55.73
1401 - 1500	$	59.05
1501 - 1600	$	62.37

Inter-District Sewer Services
Change sewer rates in the July 2006 billing cycle

Sewer Treated	Address	Current Sewer Rates Charged
Coos Bay residents sewer treated in North Bend and needs to be charged North Bend residential user rates		
	1420 Thompson	CB
	2635 N 15th	CB
	2665 N 15th	CB
	2699 N 15th	CB
	2745 N 15th	CB
	2785 N 15th	CB
	2775 N 15th Ct	CB
	2650 N 15th	CB
	2680 N 15th	CB
	2730 N 15th	CB
	2780 N 15th	CB
	2795 N 15th	CB
	2780 N 15th Ct	CB
	1330 Yew	CB
	1460 Yew	CB
	1440 Yew	CB
	1440 Thompson	CB
Has a different address than it's physical location	885 25th, NB/**1290 Lindberg, CB**	CB
Has a different address than it's physical location	**1467 25th, NB**/1467 Lindberg, CB	NB
	1450 Lindberg - Septic	CB
	1430 Thompson	CB
	2110 Newmark	NB
	2140 Newmark	NB
North Bend residents sewer treated in Coos Bay and needs to be charged Coos Bay residential user rates		
	3709 Fir	NB
	3733 Fir	NB
	3755 Fir	NB
	3777 Fir	NB
	3793 Fir	NB
	3781 Pacific	NB
	3779 Pacific	NB
	3767 Pacific	NB
	3755 Pacific	NB
	3743 Pacific	NB
	3723 Pacific	NB
No charge - on septic	3717 Pacific - Septic	NB
	3709 Pacific - Septic connect 6/06	NB
	3710 Pacific	NB
	3714 Pacific	NB
	3766 Pacific	NB
	3784 Pacific	NB

APPENDIX D

Biosolids Management Plan

Coos Bay Biosolids Management Plan for
Coos Bay Wastewater Treatment Plants 1 & 2
(Reviewed & Revised 12/06)

Date:
Contact: Steve Simpson, Project Manager
Address: 680 Ivy Ave.
Coos Bay, OR 97420
Phone Number: (541) 267-3966
Fax Number: (541) 269-9268

File Number: Plant 1 #19802
Plant 2 #19821

NPDES Number: Plant 1 #100699
Plant 2 #100771

Introduction

The City of Coos Bay owns and operates a municipal sewage collection and Class I treatment system (Plant #1 was built in 1954 and Plant #2 was built in 1973, both were upgraded in 1991) under National Discharge Elimination system (NPDES) permit numbers (Plant #1 100699 and Plant #2 100771). The City of Coos Bay Wastewater Treatment Plants 1 & 2 receive primarily domestic wastewater from a population of approximately 18,000 people. Septage is not accepted at these wastewater treatment facilities. Treated effluent from the treatment plants is discharged to Coos Bay. Coos Bay is an estuary and mouth to the tributaries of the Coos River, in Coos County, Oregon.

OMI, Inc. (Operation Management International) operates a municipal sewage collection system and two activated sludge wastewater treatment plants for the City of Coos Bay. Plant #1, which is located at 680 Ivy Avenue, has a design (dry weather) flow of 2.9 million gallons per day (MGD) and can handle peak instantaneous flows of 15 MGD. Plant #2, which is located at 100 Fulton Avenue, has a design dry weather flow of 2.02 MGD and a peak daily flow of 4.84 MGD. No septage is received at either plant and there are no significant industrial users. Plant #1 serves the East Side District of Coos Bay and the Bunker Hill Sanitary District, while Plant #2 serves the West Side of Coos Bay and the Charleston Sanitary District. Both plants underwent a major upgrade in 1991 to meet Class I treatment parameters.

The program is conducted in accordance with a DEQ approved Biosolids Management Plan, National Pollutant Discharge Elimination System, Waste Discharge Permit requirements, 40 CFR Part 503 (Standards for the Use or Disposal of Biosolids), and the Oregon Administrative Rules (Chapter 340, Division 50) concerning land application and disposal of

sewage treatment plant sludge. The Coos Bay's Sludge Management Plan received DEQ approval in 1989.

Section I treatment Facility

Plant #1, Liquid Flow-stream

Influent entering the treatment plant head works will go through a mechanically cleaned bar screen, aerated grit removal tank and then into the 10 MGD primary clarifier. Waste activated sludge and solids from the raw influent co-settle in the primary clarifier. From there it is pumped by two rotary lobe positive displacement pumps to the anaerobic digester. After primary clarification, the flow goes to one or two of the aeration basins, with a capacity of 0.378 million gallons (m-gal) each. These are supplied with fine bubble diffusers for aeration, with the compressed air coming from one of three Hoffman centrifugal blowers. Each blower has a capacity of 1200 standard cubic feet per minute (SCFM) at 8 pounds per square inch (psi). After aeration the mixed liquor goes to the 6-mgd secondary clarifier for settling. The clarified effluent is chlorinated and held in the chlorine contact chamber to allow disinfection time before discharge to Coos Bay.

Plant #2, Liquid Flow-stream

Influent enters a wet well at the plant and is pumped up to the head works by three variable speed centrifugal pumps. There it flows through a mechanical bar screen and then through an 80-inch gravity vortex grit remover. From there it flows to a 0.125 m-gal primary clarifier. After primary clarification it flows to one or two 0.202 m-gal aeration basins. In these basins low speed mechanical surface mixers supply air and mixing. These mixers are governed by variable speed drives that are tied to a dissolved oxygen analyzer to maintain a selected oxygen level. After aeration the mixed liquor goes to an intermediate lift station where three pumps pull the liquor up into the secondary clarifiers. There is a 52-foot and a 56-foot diameter secondary clarifier with capacities of 0.18 and 0.25 m-gal respectively. One or both of these clarifiers can be used at any time. Return activated sludge (RAS) cascades by head pressure and gravity back to the aeration basins. The clarified effluent is chlorinated and held in the chlorine contact chamber, capacity 0.116 m-gal, to allow disinfection time before discharge to Coos Bay.

Solids Processing

Plant#1

Return activated sludge (RAS) is sent back to the aeration basins by one or two 1500-gallons per minute (gpm) RAS pumps, which are controlled by variable frequency drives (VFD's) tied into the plant flow meters to provide proportional flow. Plant #1 is supplied with two anaerobic digesters, although at the present time only one is actually in use.

Plant #2

Waste activated sludge and solids from the raw influent co-settle in the primary clarifier. The solids are pumped by a piston pump to the anaerobic digester. There is a primary digester with a capacity of 0.102 MG and a secondary digester with a capacity of 0.087 MG. The primary digester is supplied with a draft tube type mixer and a hot water jacket sludge heater. A small boiler, fired by either methane gas or propane, supplies hot water.

Solids Storage Structure:
The City of Coos Bay operates a bentonite lined sludge storage lagoon. The lagoon has a 4-acre surface area. The lagoon storage capacity is 258,800 gal. (440 feet long, 440 feet wide and 10 feet deep). All biosolids are stored in the sludge storage lagoon until harvested for land disposal. During the dry weather hauling season, the biosolids are harvested using a hydraulic dredge and pipe system to transfer the sludge to a storage tank. From the storage tank they are loaded into a 2800 or a 4500 gallon tank truck for transportation to the fields. Depending on field conditions and topography, the biosolids are applied directly from the trucks using a splash plate or by using a pump and irrigation cannon setup. Once the number of loads applied matches the agronomic loading rate, the disposal is moved to another field. Both the emptying time of the truck and the area covered per load are measured to ensure proper loading rates are maintained.

Septage Receiving Facility
No septage (0 gallons per year) received at these facilities.

Pretreatment Program:
At the present time there are no significant industrial users connected to the Coos Bay system. Because of this the City requested that the pretreatment requirements be removed from their permit when it was re-issued. A modification of the NPDES permits was issued in December 2004. Part of this modification was the deletion of Schedule E, Pretreatment Activities.

Section II: Solids Storage Structure:

Anaerobically digested sludge is transferred to the lagoon for additional stabilization and storage. The chief benefit of the sludge lagoons is to provide winter storage of sludge from October through May. Land application takes place during the dry months the following year from June through September.

Section III: Solid Treatment Processes

The EPA's 40 CFR parts 503 and the DEQ, Oregon Administrative Rules (OAR) 340-50 allows permit tee to use EPA approved alternatives to satisfy Class A and B biosolids pathogen alternatives or vector attraction reduction option criteria. The permittee must notify the Department in writing and get approval prior to any process change that would utilize pathogen reduction or vector attraction reduction alternatives other than primary reduction alternative/options or others not contained in this biosolids management plan. The permittee must also certify that the alternatives and options used are EPA approved and that sampling and monitoring conforms to the 40 CFR Part 503 and OAR 340-050 regulations.

Class A or B Biosolids determination is not required for biosolids that are taken to DEQ permitted landfills.

Plant #1
Plant #1 digester has a capacity of 330,000 gallons and is supplied with a mechanical mixer and gas collection facilities. It is heated by a low-pressure steam boiler, fired by either methane or diesel, which supplies hot water to a spiral heat exchanger. Average daily sludge pumping from the primary clarifier averages 10,000 gallons, which gives around 30 days of detention time in the digester. The temperature is maintained at 36+ 1-degree C. The volatile solids reduction averages 50% (using the formula In - Out/ In – (In x Out)). The detention time, temperature and volatile solids reduction meet or exceed the requirements of 40 CFR part 503 for pathogen and vector attractions reduction for a class "B" biosolids. After digestion the sludge is transferred via an under the bay pipeline to a 4 acre facultative sludge lagoon located near the old Eastside wastewater treatment facility. It is stored in this lagoon, where it undergoes further thickening and breakdown, until it is harvested for beneficial use as fertilizer on hay crops.

Plant #2
The temperature is maintained at 36+ 1-degree C in the primary (capacity of 0.102 m-gals) and secondary (capacity of 0.087 m-gals) digesters. At average flows, there is approximately 16 days of detention time in the primary digester. Sludge is hauled as needed to the facultative sludge lagoon. It is stored in this lagoon, where it undergoes further thickening and breakdown, until it is harvested for beneficial use as fertilizer on hay crops. The detention time, temperature and volatile solids reduction meet or exceed the requirements of 40 CFR part 503 for pathogen and vector attraction reduction for a class "B" biosolids.

All waste sludge and biosolids are stored in the facultative lagoon until harvested for land disposal. The sludge storage lagoon has a 258,000-gallon capacity. Biosolids are removed with a floating dredge. Sludge from Coos Bay plant #1 and #2 undergo a year or more of detention prior to being removed and beneficially land applied on nearby farm and forestland. Supernatant from the lagoon system is pumped into the Eastside collection system of Coos Bay #1 plant.

For the past 5 years the average volatile solids reduction criteria for Class B biosolids has been achieved by Coos Bay wastewater treatment facility.

Biosolids Production:
Biosolids samples are collected using the method specified in NPDES permit numbers 100699 and 100771, Schedule B, Item 1 (c). This specifies that the City of Coos Bay shall collect a composite sample to be representative of the product land applied from the facultative sludge lagoon.

Amount of sewage sludge per (365 day period)	Frequency
Greater than zero but less than 290	Once per year.
Equal to or greater than 290 but less than 1,500.	Once per quarter (four times per year)
Equal to or greater than 1,500 but less than 15,000.	Once per 60 days (six times per year)
Equal to or greater than 15,000	Once per month (12 times per year)

*If biosolids are removed only once per year, the facility is still required to take the minimum number of samples required by the 40 CFR part 503 Frequency of Monitoring Section (503.16a). At least 2 samples are submitted during each biosolids-hauling season.

All biosolids analysis performed to comply with 40 CFR part 503 are conducted using methods Specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods as specified in 40 CFR 503.8. The following is a list of the analysis performed and the methods used for each analysis.

Monitoring of the City of Coos Bay's biosolids quality ensures compliance with both the State of Oregon OAR 340-50-080 and Federal 40 CFR 503 requirements. The monitoring is completed at least on a semi-annual basis for the regulated inorganic pollutants (i.e. metals). In addition to the metal analysis, and because all biosolids are land applied, percent solids, phosphorus, potassium and nitrogen concentrations are monitored at least semi-annually. If a site has been used for two consecutive years, a soil sample is analyzed for Ammonia and Nitrate content before a third year of application is begun.

The results of sampling and analysis indicate that the yearly concentration of those parameters regulated in 40 CFR 503.13 (b) (3) (Table 3) are below the pollutant concentrations. Therefore those additional management practices listed in 40 CFR 503 for facilities that cannot meet that requirement are not applicable to these facilities.

Sampling:
Pathogen reduction is accomplished at the treatment plant through providing appropriate anaerobic digestion and sludge storage lagoon stabilization. Pathogen testing is conducted for biosolids that are land applied to compare with Class A or Class B pathogen requirements and restrictions.

Composite sampling from the anaerobic digesters and/or sludge storage lagoon is accomplished according to NPDES permit requirements and currently consists of blending equal volume random grab samples taken from the center of nine (9) or more like-sized units resulting from an imaginary grid of each digester or lagoon. The grab samples include the entire depth of sludge to be removed in the area sampled. The frequency of sampling is prior to removal of biosolids from the digester and/or lagoon on a quarterly or when the biosolids is removed, whichever is less*. Pathogen reduction sampling is accomplished at the time the biosolids are land applied.

1.) Anaerobic Digesters
Sample location: Sample port on discharge line of anaerobic digester recirculation pump.

Number and type of sample taken per day: Composite of discrete samples collected throughout the sampling period.

Sample storage and transport: Samples are stored at 4 degrees C in an ice chest or refrigerator. Samples are transported in an ice chest to maintain temperature during delivery to the laboratory. Pathogen samples are delivered to lab within 1 hour of sample collection.

Sample analysis method: EPA 9045; EPA 160.3; EPA 160.4; SM 4500-NH3B; EPA 353.2; EPA 365.3; EPA 351.3; SW-846 7060; SW-846 6010; SW-846; SW-846 7481; SW-847 7471; SW-846 7740; SM 18th, 9221.E.1; SM 18:9260D.1; ASTM D 4994-89; EPA 600/1-87/014; EPA 8240; EPA 1613; EPA 8270; EPA 1613B; EPA 1668 (may include one or more of the referenced methods).

(For a list of current biosolids analysis methodologies see Appendix F).

Lagoons (Coos Bay has 1 lagoon this is approximately 4 acres)
Sample location: Center of 9 quadrants from each lagoon and/or the Discharge weir of the lagoon.

Number and type of sample taken per event: Grab from sampling points in each lagoon. Sample includes the entire sludge column.

Sample storage and transport: Composite sample is stored at 4 degrees C in ice chest or refrigerator. Samples are transported in ice chest to maintain temperature during delivery to laboratory.

Sample analysis method: EPA 9045; EPA 160.3; EPA 160.4; SM 4500-NH3B; EPA 353.2; EPA 365.3; EPA 351.3; SW-846 7060; SW-846 6010; SW-846; SW-846 7481; SW-847 7471; SW-846 7740; SM 18th, 9221.E.1; SM 18:9260D.1; ASTM D 4994-89; EPA 600/1-87/014; EPA 8240; EPA 1613; EPA 8270; EPA 1613B; EPA 1668;

Pathogen Reduction:
To meet the 503 part regulatory requirements pathogen reduction must be met before vector attraction reduction or at the same time vector attraction reduction is achieved.

Class A Biosolids:
With all a Class A alternatives microbial monitoring for fecal coliform or Salmonella sp. is required. This management plan lists the primary alternatives employed by the permittee to meet class A and B biosolids criteria. Typically Class A biosolids can be met by using one of 6 EPA approved alternatives; the primary alternative used by this facility is Alt. 4) Monitor sewage sludge for fecal coliform or Salmonella sp. and densities of enteric viruses and viable helminth ova 503.32 (a) (6).

A) Monitoring for Fecal Coliform or Salmonella sp.
Monitoring for Fecal Coliform or Salmonella sp. is required to detect growth of bacterial pathogens. Because Class A biosolids may be used without site restrictions, all Class A material must be tested to show that the microbial requirements are met at the time when it is ready to be used or disposed. In addition to meeting process requirements, Class A biosolids must meet one of the following requirements:

- Either the density of the fecal coliform in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight)
- Or the density of Salmonella sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).

Unlike Class B biosolids, Class A requirements are not based on an average value. Sampling for Class A biosolids consists of at least 7 discrete samples taken over a 2-week period. Test results are required before Class A material can be released for use or disposal. The Class A biosolids microbial requirement must be met at either:

- The time of use or disposal, or
- At the time the biosolids are prepared for sale or given away in a bag or other container for land application, or
- At the time the biosolids or material derived from biosolids is prepared to meet the requirements in 503.10 (b), 503.10 (c), 503.10 (e) or 503.10 (f).

Class A Pathogen Reduction Alternatives:
Class A determination consists of sampling and analysis of representative quantities of the final biosolids product. Normally sampling would be conducted at three (3) locations; digester biosolids, the lagoon biosolids and stock piled biosolids. Coos Bay's biosolids are digested and the consistency of the biosolids does not change over a two-week period. For Class A biosolids determination at least 7 discrete samples are taken from biosolids treatment location at the time of use.

Alt. 3) Sewage Sludge treated in Other Processes 503.32 (a) (5)
This requirement relies on comprehensive monitoring of bacteria, enteric viruses and viable helminth ova to demonstrate adequate reduction of pathogens.

(i) Either the density of fecal coliform in the sewage sludge was determined to be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of salmonella sp. Bacteria in the sewage sludge was determined to be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge was used or disposed of; at the time the sewage sludge is prepared for sale or giveaway in a bag or other container for land application; or at the time the sewage or material derived from sewage sludge is prepared to meet the requirements in 503.10 (b), (c), (e) or (f).
(ii) (A) The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains enteric viruses.
The density of enteric viruses in the sewage sludge was determined to be less than one Plaque-forming Unit per four grams of total solids (dry weight basis); the sewage sludge is Class A with respect to enteric viruses until the next monitoring episode for the sewage sludge.
(B) When the analysis prior to pathogen treatment shows the density of enteric viruses in the sewage sludge was determine to be equal or more than one Plaque-forming unit per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to enteric viruses when the density of enteric viruses in the sewage sludge after pathogen treatment is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) and when the values or ranges for the operating parameters for the pathogen treatment process produces the sewage sludge that meets the enteric virus density requirement are documented.
(D) After the enteric virus reduction in paragraph (a) (5) (ii) (C) is demonstrated for the pathogen process, then the sewage sludge continues to be Class A with respect to enteric viruses when the values for the pathogen treatment proves operating parameters are consistent with values or ranges of values documented in paragraph (a) (5) (ii) (C).
(iii) (A) The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains helminth ova.

(B) The density of helminth ova in the sewage sludge was determined to be less than one per four grams of total solids (dry weight basis); the sewage sludge is Class A with respect to helminth ova until the next monitoring episode for the sewage sludge.
(C) When the analysis prior to pathogen treatment shows the density of helminth ova in the sewage sludge was determined to be equal or more than one per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to helminth ova when the density of helminth ova in the sewage sludge after pathogen treatment is less than one per four grams of total solids (dry weight basis) and when the values or ranges for the operating parameters for the pathogen treatment process produces the sewage sludge that meets the helminth ova density requirement are documented.
(D) After the helminth ova reduction in paragraph (a) (5) (ii) (C) is demonstrated for the pathogen process, then the sewage sludge continues to be Class A with respect to helminth ova when the values for the pathogen treatment proves operating parameters are consistent with values or ranges of values documented in paragraph (a) (5) (ii) (C).

Alt. 4) Sewage Sludge Treated in Unknown Processes 503.32 (a) (6)
This requirement relies on comprehensive monitoring of bacteria, enteric viruses and viable helminth ova to demonstrate adequate reduction of pathogens:

- Either the density of the fecal coliform in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), or the density of Salmonella sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).
- The density of enteric viruses in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids (dry weight basis).
- The density of viable helminth ova in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids (dry weight basis). (Alt. 4 is for an unknown process and must be approved by the EPA prior to its implementation. This should not be an alternative we use in Oregon).

Alt. 5) Use of Processes to Further Reduce Pathogens (PFRP) 503.32 (a) (7)
This requirement relies on the process to demonstrate adequate reduction of pathogens to meet Class A biosolids criteria:

- Sludge has been treated in one of the PFRPs listed in Appendix B of the 503 regulation, and
- Either the density of the fecal coliform in the sewage sludge is less than 1,000 MPN per gram total solids (dry gram weight), or the density of Salmonella sp. Bacteria in the sewage is less than 3 MPN per 4 grams of total solids (dry weight basis).

Class B Biosolids Pathogen Reduction:
Class B biosolids can be met by using one of the three alternatives, the two primary alternatives used by this facility are Alt. 1) Monitor sewage sludge for fecal coliform 503.32 (b) (2), and Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32 (b) (3).

Alt. 1) Monitor sewage sludge for fecal coliform 503.32 (b) (2) requires that seven samples of treated sewage sludge (biosolids) be collected and that the geometric mean fecal coliform density of these samples be less than 2 million MPN per dry gram biosolids (dry weight basis).

Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32 (b) (3) considers sludge treated in one of the PSRPs listed in Appendix B of the 40 CFR part 503 to meet Class B biosolids criteria for pathogen reduction. For this facility the following PSRPs could be used:

#3 Anaerobic digestion, sludge is treated in the absence of air for a specified residence time at a specified temperature. Values of the mean cell residence time and temperature shall be between 15 days at 35C to 55 degrees Celsius (131C) and 60 days at 20 Celsius (68F), and

#5 Lime stabilization-sufficient lime is added to the sewage to raise the pH of the sludge to 12 for two hours active mix.

Vector Attraction:

This facility primarily satisfies the 503.33 Vector Attraction Reduction criteria by generating a Class B liquid biosolids (>38% volatile solids reduction in anaerobic and sludge storage lagoon treatment processes).

This facility can also use the following as back up vector attraction reduction options:

Opt. 1) The % volatile solid reduction calculation to use for anaerobic digester that is decanted and that does not have appreciable grit accumulation would be the Van Kleeck or Approximate Mass Balance (AMB) equation depending upon the percent solids in the decant ante (Attachment B). To meet the biosolids vector attraction reduction requirements an anaerobic digester must provide a 15-day detention time at 35C in a completely mixed high rate digester in order to achieve a volatile solids reduction of 38% or more. There are alternative volatile solid reduction methods that are deemed equivalent to the 38% volatile solid reduction criteria under the EPA's and the DEQ's regulations.

Opt. 2) Less than 17% additional volatile solid loss during bench-scale anaerobic batch digestion of the sewage sludge for 40 additional days at 30C to 37C (86F to 99F).

Opt. 6) The pH of sewage sludge shall be raised to 12 or higher by alkali addition and without the addition of more alkali shall remain at 12 for two hours (batch is active mix for 2 hours), and the batch must remain at a pH of 11.5 or higher for an additional 22 hours without the addition of more alkali agent). This option requires written approval from the Department prior to land application each year.

Vector attraction determination is not required for biosolids that are land filled.

For the past five (5) years the average volatile solids reduction criteria has been achieved by Coos Bay's wastewater treatment facility.

SECTION IV: BIOSOLIDS ANALYSIS

As reported in the City's 2006 Annual Biosolids Reports, the existing Coos Bay treatment plants have produced about 290 dry tons of biosolids.

Coos Bay's treatment works utilizes the activated sludge process prior to anaerobic digestion. Annually, Coos Bay generates under 290 dry tons per year of biosolids.

Biosolids Analysis:
In 2006 Coos Bay has generated approximately 491,805 lb. or 223.03 dry metric tons of biosolids.

Biosolids Chemical Analysis:
The following table presents the chemical analyses of the City's biosolids for the year 2006. The metals data shows the "clean" nature of the City's biosolids as indicated by their comparison to the Part 503, table 3 "Exceptional Quality Standard" criteria.

City of Coos Bay-Biosolids Chemical Characteristics

	Part 503 Table 3, Criteria			
Constituent		**2006 sample #1**	**2006 sample #2**	**Ave.**
As, mg/kg	41	6.7	5.7	6.2
Cd, mg/kg	39	2.9	2.2	2.6
Cr, mg/kg	1200	30.9	33.4	32.2
Cu, mg/kg	1500	383	320	352
Pb, mg/kg	300	85.5	101	93
Hg, mg/kg	17	2.1	3.0	2.6
Mo, mg/kg	18	8.8	9.8	9.3
Ni, mg/kg	420	26.3	25.4	25.9
Se, mg/kg	100*	ND@5.0	ND@5.0	ND@5.0
Zn, mg/kg	2800	1,071	866	969

*From 40CFR Part 503.13 Tables 1. Ceiling Concentration for metals.
ND = none detected

2006 Biosolids Analysis (The last season the City land applied substantial amounts of biosolids to farmland).

Pounds	**(#) Metal**	**#/yr.**	**#ac/yr.**	**Site life (cumulative)**
lb.	Arsenic (As)	3.05	0.07	529
lb.	Cadmium (Cd)	1.25	0.03	1167
lb.	Chromium (Cr)	15.81	0.35	7649
lb.	Copper (Cu)	173	3.81	351
lb.	Lead (Pb)	45.86	1.01	265
lb.	Mercury (Hg)	1.25	0.03	500
lb.	Molybdenum (Mo)	4.57	0.10	160
lb.	Nickel (Ni)	12.71	0.28	1339
lb.	Selenium (Se)	2.46	0.05	1780
lb.	Zinc (Zn)	476.3	10.51	238

The site life would be limited to 160 years based on the Molybdenum (Mo) cumulative loading from the 2006 biosolids analysis (**Attachment C)**. The City of Coos Bay needs

approximately 75 acres of pasture/grass land to apply on to handle their annual biosolids production.

Biosolids analysis results are entered into an Excel spreadsheet and used to calculate the amount that can be applied to a particular field. Daily lab results and application amounts are entered into this program, which calculates the number of loads remaining on a site as well as the pounds of metals and nutrients applied. This information is kept in the computer and on backup disks and is submitted before February 19 in each year's annual biosolids report. All information for a particular year is kept on record along with the report for that year.

SECTION VI: LAND APPLICATION OF BIOSOLIDS
BENEFICIAL REUSE PROGRAM

Coos Bay plans to continue the options of land application on locally DEQ approved sites. This BMP will also address the marketing/distribution of the Class A product as a soil conditioner. This facility could produce a Class A product suitable for distribution. If in the future the City so desires it would need to develop a distribution and marketing program targeted to landscaping, nursery, and agricultural operations that use soil amendment, fertilizer, liming agent, and similar products. For instance, the City's own Parks Department is a potential user of this material thus avoiding the cost of purchasing similar products. Although it is difficult to market the product before it is produced, the City would need to begin the public education process during construction of the proposed distribution network by identifying and contacting potential users.

Transportation and Land Application:
Biosolids are loaded into a city owned truck or contract haulers truck at the lagoon site. The biosolids loading area has drains that drain back into the lagoon. During the summer months one available option is to land apply biosolids on DEQ authorized sites (approximately 250 acres total).

In the event liquid biosolids are spilled between the treatment facility and the land application site, Coos Bay's sewage treatment works shall contain the spill, lime, absorb (via sand, sawdust, etc.) and remove spilled sludge solids with a front end loader or shovels and dispose of the spillage at a DEQ authorized application or disposal site. All spills into waters of the state or 42 gallons or more on the ground surface shall be reported immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and the Department of Environmental Quality. All spills outside Coos Bay wastewater treatment facilities shall be reported to the regional biosolids coordinator at (541)440-3338.

Application Rates
The proposed application rate for the biosolids on the City's approved land application site is about 4.26 dry/tons per acre per year period. This corresponds to between 100 &120 pounds of available nitrogen per acre per year. The Oregon State Fertilizer Guide recommends a 120 - 140 lb. total Nitrogen loading per year for pasture grass in this region.

Site Approval

The biosolid land application sites are capable of assimilating Coos Bay's annual total nitrogen production of about 16,000 lbs. total available N/yr. 2006 this facility generated about 492,000 lbs or 223 metric tons biosolids for the year. The amount of nitrogen in this biosolids was equivalent to 0.0129 lb. N/lb. biosolids; or 28 lb. N/ton biosolids (see Attachment C, Biosolid Analysis 2006).

At the present time, Coos Bay is using two main biosolids disposal sites, the McCarthy site located up Coos River and the Frank Williams site near Coos Bay. The McCarthy site contains 250 usable acres and the Williams site contains 36 usable acres of agricultural land planted in perennial rye grass. The hay is harvested and cattle grazed on the remainder in a rotating cycle of solids application, harvest and grazing. During the months of June through September (depending on groundwater, precipitation, etc.) solids are harvested from the facultative lagoon with a floating dredge and trucked to the disposal site. There they are surface applied using a spreader bar off of the back of the truck. All requirements for setbacks from waters of the state and grazing restrictions are met. Piezometers have been installed at several locations to monitor the groundwater level. Records are kept of the solids TS and VS and the gallons applied per field. A spreadsheet program calculates the loads to be applied per field and calculates the pounds of solids and nutrients applied. During the harvest season a minimum of two samples are collected and sent off for laboratory analysis of metals and nutrients. This data is used to calculate the annual and cumulative loading of the site. Reports are submitted annually detailing amounts hauled, field application rates, current laboratory data, site lives, etc.

The biosolids land application sites are capable of assimilating Coos Bay's annual total nitrogen production. The biosolids land application rate for pastures and grass is 120 lb. available N per acre/yr.

Biosolids Site Management Information:

Site Name or Site Number	Site Use Crop	Total Available N Loading (lb./ac./yr.)	Net Acres	Plant Available Nitrogen Application lb. N/ac.-yr.
McCarthy Site #1 & #2	Pasture Perennial Rye Grass	120-140 lb. N/acre	14.8	1776
McCarthy Site #3	Pasture Perennial Rye Grass	120-140 lb. N/acre	10.3	1236
McCarthy Site #4	Pasture Perennial Rye Grass	120-140 lb. N/acre	21.6	2592
McCarthy Site #5	Pasture Perennial Rye Grass	120-140 lb. N/acre	13.3	1596
McCarthy Site #6	Pasture Perennial Rye Grass	120-140 lb. N/acre	17.2	2064
McCarthy Site #7	Pasture Perennial Rye Grass	120-140 lb. N/acre	13.3	1596
McCarthy Site #8	Pasture Perennial Rye Grass	120-140 lb. N/acre	23	2760
McCarthy Site #9	Pasture Perennial	120-140 lb. N/acre	12.1	1452

	Rye Grass			
McCarthy Site #10	Pasture Perennial Rye Grass	120-140 lb. N/acre	12.9	1548
McCarthy Site #11	Pasture Perennial Rye Grass	120-140 lb. N/acre	11.2	1344
McCarthy Site #12	Pasture Perennial Rye Grass	120-140 lb. N/acre	8.5	1020
Frank Williams Site #1	Pasture Perennial Rye Grass	120-140 lb. N/acre	12	1440
Frank Williams Site #2	Pasture Perennial Rye Grass	120-140 lb. N/acre	3.2	384
Frank Williams Site #3	Pasture Perennial Rye Grass	120-140 lb. N/acre	5.3	636
Frank Williams Site #4	Pasture Perennial Rye Grass	120-140 lb. N/acre	4.3	516
Frank Williams Site #5	Pasture Perennial Rye Grass	120-140 lb. N/acre	2.8	336
Total*			185.8	22296*

*Plant Available Nitrogen Application lb. N/ac.-yr. loading calculations were done using 120 lb. N/acre.

Long term biosolids application rates and site restrictions are contained in the biosolids site authorization letter. References to the OAR 34-50, The EPA 40 CFR Part 503, site setbacks, site agronomic loading rates, land application restrictions and site restrictions are also detailed out in the site authorization letter.

Distribution and Marketing

The amount of the Class A product distributed to the various users will be recorded and provided in the annual report. Proper identification of the material and its chemical analysis and suggested application rates will be provided to users.

SECTION VII: MONITORING AND REPORTING

Daily Reporting and Record Keeping:

Each year prior to land application of biosolids it is recommended the source operators check to see if contiguous property owners have changed. The operators should keep a record of contact (date, and/or written log of phone call w/name and number, and/or Xerox of postcards w/name and address, etc.) of contiguous property owners, showing they have been notified that the City land applies biosolids at these authorized sites.

Daily Site Logs shall be kept for all biosolids land application sites. Log must have a scaled map showing the site and the land application location that coincides with the daily site loading method (truck spreader, etc.). Daily records should clearly show the date, quantity, and location of biosolids land applied.

A copy of the site authorization, a current biosolids analysis, and a signed certification statement shall accompany all Class B biosolids that are to be land applied beneficially on forest, farm, or pasture lands.

Annual Report shall have a signed copy of the certification statements for pathogen reduction, vector attraction reduction and biosolids has been land applied at approved agronomic loading. Person signing statements should be the operator of record at the treatment plant. The operator shall show how the vector attraction reduction was met. i.e., volatile solids reduction was achieved by time and temperature, the Van Kleeck equation filled out with digester records (MCRT), bench scale test, sour test or any other EPA approved alternative method appropriated for biosolids generated at your facility.

Certification of pathogen reduction is required and is satisfied by submittal of test results in the Annual Biosolids Report. All the previous year's biosolids sampling and analysis that is required by the permit shall be included in City of Coos Bay's Annual Biosolids Report (in each year's annual report appendix).

Monitoring:
Composite samples are taken from the lagoon in accordance with the requirements contained in the treatment plants NPDES permit and this Biosolids Management Plan, and analyzed for pathogens, volatile solids reduction, percent solids, metals, and nutrient levels. The sample results are evaluated and compared with pollutant loading restrictions contained in both the Oregon Administrative Rules and in the Federal Biosolids Regulations. Analyses are also conducted regarding pathogen and vector attraction reduction criteria to compare with Class A or B pathogen and vector attraction reduction requirements. In addition, routine analyses are performed on the treatment plant influent and the anaerobic digester sludge.

Biosolids monitoring, record keeping and reporting are accomplished in accordance with requirements contained in the treatment plant's NPDES Permit, Oregon Administrative Rules, Chapter 340 Division 50, and the approved Biosolids Management Plan. The requirements include providing biosolids analyses and maintaining a log indicting the quantity, quality, and location of applied biosolids. Monthly reporting of all biosolids monitoring and disposal is included in the treatment plant's monthly NPDES Discharge Monitoring Report that is submitted to the DEQ. An annual report is also sent to the EPA and the DEQ at the end of the application season. The report contains specific details regarding biosolids activities and includes a program summary; NPDES permit required monitoring results, CFR 503 monitoring results, certifications, and site application rates and information.

SECTION VIII: CONTINGENCY OPTIONS

In the event of a digester breakdown, the digester contents would be gradually fed to the FSL at a rate calculated not to exceed its daily loading rate. The problem would be corrected and the digester put back in service as soon as possible. If a digester upset occurred, all steps necessary to correct the problem would b taken (i.e., changes in loading rates, chemical additions, etc.). If all of these measures failed to correct the problem, the digester contents would be transferred to the lagoon and the digester restarted.

In case of an on site sludge spill, the spilled contents would be hosed down the storm drains in the area, which have been plumbed back into the plant influent flow.

Spill During Transport:
In the event biosolids are spilled between the treatment facility and the land application site, Coos Bay's sewage treatment works shall contain the spill, absorb (via sand, sawdust, etc.) and remove spilled biosolids. Class B biosolids spilt must be removed with a front-end loader or shovels and land apply the spillage at a DEQ authorized application or disposal site. The spill would be roped off to prevent public access, dammed if necessary to prevent entry into any waterway, cleaned up with another truck or necessary equipment, and the site disinfected.

All spills into waters of the state or spills on the ground surface that are likely to enter waters of the state shall be reported immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and your regional biosolids coordinator at (541)440-3338. All spills of 40 gallons or more on the ground surface shall be reported to the regional biosolids coordinator at (541)440-3338.

SECTION IX: CERTIFICATION STATEMENT

City of Coos Bay's facility is capable of meeting their primary alternatives for achieving Class or B biosolids pathogen and vector attraction reduction criteria. Signed Class A and/or B biosolids and vector attraction statements shall accompany all biosolids that are land applied **(Attachment D)**. For Class A or B biosolids, annual biosolids analysis must be provided upon request. Certification statements must also show conformance with nutrient and land application loading rates where applicable.

Attachment B:

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 the solids exiting each digester withdrawal line. Composite samples of the influent shall consist of at least four samples, each collected at approximately even intervals over an eight-hour period.

Typically in the past we've used the Van Kleeck equation for digesters, the assumption being that there is no grit accumulation in the digester. This volatile solids equation assumes the fixed solids input equals the fixed solids output. The Van Kleeck equation is appropriate if the digester decant is low in total solids. The Van Kleeck equation can be used to calculate the volatile solids reduction for a digester that decants provided VSb equals VSd.

FVSR: Fractional Volatile Solids Reduction

$$FVSR = 1 - VSb * (1-VSf) / VSf (1-VSb)$$

VSf Feed Sludge fractional volatile solids, (kg/kg)
VSb Digested sludge (digester bottom) fractional volatile solids, (kg/kg)
VSd Decantate fractional volatile solids

For this equation to be valid VSb must equal VSd.

For digesters with decant withdrawal (decant high in solids) and no grit accumulation, where the volatile and fixed concentrations are known for all streams as well as the volumetric flow rates for the decant and digester sludge then the Appropriate Mass Balance equation should be used.

FVSR: Fractional Volatile Solids Reduction

$$FVSR = Fyb – Byb – Dyd / Fyb$$

Fyb (F) Feed sludge volumetric flow rate (m^3/d)
(yb) Feed sludge volatile solids concentration (kg/m^3)

Byb (B) Digester sludge (bottom) volumetric flow rate (m^3/d)
(yb) Digester sludge (bottom) volatile solids concentration (kg/m^3)

Dyd (D) Decantate volumetric flow rate (m^3/d)
(yd) Decantate volumetric solids concentration (kg/m^3)

Because the anaerobic digester is cleaned on a regular basis the assumption is there is no grit accumulation in the digestive process.

CITY OF COOS BAY VOLATILE SOLIDS CALCULATION

Currently Coos Bay uses the following volatile solids calculation: % volatile solids, primary sludge (primary sludge average flow – 47,600 GPD) 86% volatile solids, thickened waste activated sludge (thickened sludge flow – 22,600 GPD) 83% volatile solids, dried biosolids (final product) 55.1%.

CALCULATION

A. % Volatile Solids In

$$\frac{VS\,(ps)\,Q\,(ps) + VS(TWAS)\,Q\,(TWAS)}{Q\,(ps) + Q\,(TWAS)}$$

$$\frac{86\,(47.6) + 83\,(22.6)}{47.6 + 22.6}$$

$$= 85.0\%$$

B. % REDUCTION OF VOLATILE SOLIDS

$$\frac{In - Out}{In - (In \times Out)} \times 100$$

$$\frac{0.85 - 0.551}{0.85 - (0.85 \times 0.551} \times 100$$

$$= 78.3\%$$

Attachment D:

"I certify, under penalty of law, that the pathogen requirements in 503.32 (b), the management practices in 503.14, and the vector attraction reduction requirements in 503.33 (b) (1) have been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the pathogen requirements and vector attraction reduction requirements have been met. I also certify that all biosolids were land applied at the approved agronomic loading rate noted in the respective Department site authorization letter. I am aware that there are significant penalties for false certification including the possibility of fines and imprisonment.

_____ _____

Steve Simpson
Project Manager – OMI

Date

Attachment E
Biosolids Test Methods

Biosolids Physical Analysis

Parameter	EPA Method	Standard Methods
Total Solids		SM 2540 G
Volatile Solids		SM 2540 G
pH	EPA 150.1 / EPA 9040	

Biosolids Metal Analysis

Pollutant	EPA Method
Arsenic (Total)	EPA 7062
Cadmium (Total)	EPA 213.2 / EPA 7131
Chromium (Total)	EPA 218.2 / EPA 7191
Copper (Total)	EPA 220.1 / EPA 7210
Lead (Total)	EPA 239.2 / EPA 7421
Mercury (Total)	EPA 245.1 / EPA 7470
Molybdenum (Total)	EPA 246.2 / EPA 7481
Nickel (Total)	EPA 249.2 / EPA 7521
Selenium (Total)	EPA 270.2 / EPA 7740
Zinc (Total)	EPA 289.1 / EPA 7950

Biosolids Nutrient Analysis

Parameter	EPA Method
Total Nitrogen (TKN as N)	EPA 351.3
Ammonia Nitrogen	EPA 350.2
Nitrate Nitrogen	EPA 353.3
Phosphorus (Total)	EPA 365.3
Potassium (Total)	EPA 258.1 / EPA 7610

APPENDIX E

Capital and O&M Costs Backup Data

Coos Bay Plant 1 Cost Estimate					
Coos Bay/Silverton ENR Markup (Jan 2005/Oct 1998) (7300/5986)	1.22			Updated 9-09-2009 by MJW	
Equipment Installation	35%				
Item	**Number**	**Unit**	**Unit Cost**	**Cost**	**Subtotal**
Alternative G1					
New transducers on influent flumes	2	EA	$ 5,500	$ 11,000	
Demo manual bar screen	1	LS	$ 11,000	$ 11,000	
New mechanical bar screen (4.5 FT CHANNEL)	1	EA	$ 145,000	$ 145,000	
Replace existing mechanical bar screen (4.5 FT CHANNEL)	1	EA	$ 145,000	$ 145,000	
Demo existing stairs	1	LS	$ 9,000	$ 9,000	
New grit chamber concrete including stairs	115	CY	$ 820	$ 94,300	
New gates	2	EA	$ 12,000	$ 24,000	
New grit pumps	2	EA	$ 22,250	$ 44,500	
Misc equipment,valves and piping	1	LS	$ 32,000	$ 32,000	
Piles	8	EA	$ 3,900	$ 31,200	
Other	1	LS	$ 20,000	$ 20,000	246,000
New grit cyclone and classifier	1	EA	$ 109,000	$ 109,000	
Site piping	1	LS	$ 11,000	$ 11,000	
Subtotal				**$ 687,000**	
Contractor OHP	0.15			$ 104,000	
Mobilization	0.05			$ 35,000	
Electrical Scada	0.2			$ 138,000	
Subtotal				**$ 964,000**	
Contingencies	0.25			$ 241,000	
Engineering	0.20			$ 193,000	
Total				**$ 1,398,000**	
Alternative G2					
New transducers on influent flumes	2	EA	$ 5,500	$ 11,000	
Demo manual bar screen	1	LS	$ 11,000	$ 11,000	
New mechanical bar screen (4.5 FT CHANNEL)	1	EA	$ 145,000	$ 145,000	
Replace existing mechanical bar screen (4.5 FT CHANNEL)	1	EA	$ 145,000	$ 145,000	
Demo existing stairs	1	LS	$ 9,000	$ 9,000	
New gate	1	EA	$ 12,000	$ 12,000	
New grit chamber bypass channel including new stairs	35	CY	$ 640	$ 22,400	
Piles	4	EA	$ 3,900	$ 15,600	$ 50,000
New grit cyclone and classifier (270 gpm)	2	EA	$ 109,000	$ 218,000	
Degritted primary sludge pump (270 gpm)	1	LS	$ 20,000	$ 20,000	
Site piping	1	LS	$ 11,000	$ 11,000	
Subtotal				**$ 620,000**	
Contractor OHP	0.15			$ 93,000	
Mobilization	0.05			$ 31,000	
Electrical Scada	0.2			$ 124,000	
Subtotal				**$ 868,000**	
Contingencies	0.25			$ 217,000	
Engineering	0.20			$ 174,000	
Total				**$ 1,259,000**	

Coos Bay Plant 1 Cost Estimate					
Coos Bay/Silverton ENR Markup (Jan 2005/Oct 1998) (7300/5986)	1.22			Updated 9-09-2009 by MJW	
Equipment Installation	35%				
Item	**Number**	**Unit**	**Unit Cost**	**Cost**	**Subtotal**
Alternative T1					
New blower (1200 scfm)	1	EA	$ 27,000	$ 27,000	
Mixed liquor split box	1	EA	$ 75,000	$ 75,000	
Piling (say 4 piles)	4	EA	$ 3,750	$ 15,000	$ 90,000
New secondary clarifier (90 FT DIA)	1	EA	$ 600,000	$ 600,000	
Piling (166 timber piles for existing secondary clarifier, use fewer steel piles)	100	EA	$ 3,690	$ 369,000	$ 969,000
New RAS pump (1500 gpm)	1	EA	$ 27,000	$ 27,000	
New WAS pump (360 gpm)	1	EA	$ 20,000	$ 20,000	
Site piping (RAS, WAS, SI, SE)	1	LS	$ 56,000	$ 56,000	
Chlorine Contact Basin Improvements (CMU walls)	3084	SF	$ 8	$ 23,901	
Outfall	1	LS	$ 219,000	$ 219,000	
Subtotal				**$ 1,432,000**	
Contractor OHP	0.15			$ 215,000	
Mobilization	0.05			$ 72,000	
Electrical Scada	0.2			$ 287,000	
Subtotal				**$ 2,006,000**	
Contingencies	0.25			$ 502,000	
Engineering	0.20			$ 402,000	
Total				**$ 2,910,000**	
Alternative T2					
New Primary Sedimentation Basin	1	EA	$ 1,700,000	$ 1,700,000	
Piles for PSB (138 timber piles use fewer steel piles)	84	EA	$ 3,750	$ 315,000	$ 2,015,000
New blower (1200 scfm)	1	EA	$ 27,000	$ 27,000	
Mixed liquor split box	1	EA	$ 75,000	$ 75,000	
Piling (say 4 piles)	4	EA	$ 3,750	$ 15,000	$ 90,000
New secondary clarifier (90 FT DIA)	1	EA	$ 600,000	$ 600,000	
Piling (166 timber piles for existing secondary clarifier, use fewer steel piles)	100	EA	$ 3,690	$ 369,000	$ 969,000
New RAS pump (1500 gpm)	1	EA	$ 27,000	$ 27,000	
New WAS pump (360 gpm)	1	EA	$ 20,000	$ 20,000	
Site piping (RAS, WAS, SI, SE)	1	LS	$ 56,000	$ 56,000	
Chlorine Contact Basin Improvements	3084	EA	$ 7.75	$ 23,901	
Outfall	1	LS	$ 219,000	$ 219,000	
Subtotal				**$ 3,447,000**	
Contractor OHP	0.15			$ 518,000	
Mobilization	0.05			$ 173,000	
Electrical Scada	0.2			$ 690,000	
Subtotal				**$ 4,828,000**	
Contingencies	0.25			$ 1,207,000	
Engineering	0.20			$ 966,000	
Total				**$ 7,001,000**	

Coos Bay Plant 1 Cost Estimate					
Coos Bay/Silverton ENR Markup (Jan 2005/Oct 1998) (7	1.22		Updated 9-09-2009 by MJW		
Equipment Installation	35%				
Item	**Number**	**Unit**	**Unit Cost**	**Cost**	**Subtotal**
Alternative S1					
Primary sludge grinder (assume 8in)	1	EA	$ 86,000	$ 86,000	
New TWAS/TPSL pump to replace piston pump	1	EA	$ 90,000	$ 90,000	
New boiler, heat exchangers, gas and hw piping, etc	1	EA	$ 265,000	$ 265,000	
Mixer and recirc pumps for Digesters 1and 2	2	EA	$ 90,000	$ 180,000	
New handrails on digesters	270	LF	$ 133	$ 35,910	
Demo for fixed cover (Digester 1)	1	LS	$ 26,000	$ 26,000	
New fixed cover on Digester 1	1	LS	$ 191,000	$ 191,000	
General Digester Building repair	1	LS	$ 96,000	$ 96,000	
Improve Digester 2 cover	1	LS	$ 144,000	$ 144,000	
New waste gas burner	1	EA	$ 41,000	$ 41,000	
Yard piping	1	LS	$ 11,000	$ 11,000	
Upgrading Digester No. 1 at WWTP No. 2	1	LS	$ 534,000	$ 534,000	
New Sludge Truck for WWTP No. 2	1	EA	$ 112,000	$ 112,000	
Subtotal				**$ 1,812,000**	
Contractor OHP	0.15			$ 272,000	
Mobilization	0.05			$ 91,000	
Electrical Scada	0.2			$ 363,000	
Subtotal				**$ 2,538,000**	
Contingencies	0.25			$ 635,000	
Engineering	0.20			$ 508,000	
Total				**$ 3,681,000**	
Alternative S2					
Primary sludge grinder (assume 8in)	1	EA	$ 86,000	$ 86,000	
New TWAS/TPSL pump to replace piston pump	1	EA	$ 90,000	$ 90,000	
New boiler, heat exchangers, gas and hw piping, etc	1	EA	$ 265,000	$ 265,000	
Mixer and recirc pumps for Digesters 1and 2	2	EA	$ 90,000	$ 180,000	
New handrails on digesters	270	LF	$ 133	$ 35,910	
Demo for fixed cover (Digester 1)	1	LS	$ 26,000	$ 26,000	
New fixed cover on Digester 1	1	LS	$ 191,000	$ 191,000	
Improve Digester 2 cover	1	CY	$ 96,000	$ 96,000	
General Digester Building repair	1	LS	$ 144,000	$ 144,000	
New waste gas burner	1	EA	$ 41,000	$ 41,000	
Yard Piping	1	EA	$ 38,000	$ 38,000	
WAS Gravity Belt Thickener	1	EA	$ 529,000	$ 529,000	
Thickened WAS Pumping	1	EA	$ 107,000	$ 107,000	
Thickening Building	1	EA	$ 96,000	$ 96,000	
Subtotal				**$ 1,925,000**	
Contractor OHP	0.15			$ 289,000	
Mobilization	0.05			$ 97,000	
Electrical Scada	0.2			$ 385,000	
Subtotal				**$ 2,696,000**	
Contingencies	0.25			$ 674,000	
Engineering	0.20			$ 540,000	
Total				**$ 3,910,000**	

City of Coos Bay
WWTP #1 Facilities Plan

Present Worth of Replacement Values

Inflation Rate, % = 2.0%
Return Rate, % = 5.875%

			Captial Replacement Cost in [year]			PW	
Grit Removal Alternatives							
Item	Service Life, years	Current Captial Cost	10	15	20		
New mechanical bar screen	15	$ 145,000.00		$ 195,150.91		$ 83,000.00	
Replace existing mechanical bar screen	15	$ 145,000.00		$ 195,150.91		$ 83,000.00	
New grit cyclone and classifier	15	$ 109,000.00		$ 146,699.65		$ 63,000.00	
						$ 229,000.00 total	
Treatment Alternatives							
Item	Service Life, years	Current Captial Cost					
New Blower	15	$ 27,000.00		$ 36,338.45		$ 16,000.00	
New RAS Pump	15	$ 27,000.00		$ 36,338.45		$ 16,000.00	
New WAS Pump	15	$ 20,000.00		$ 26,917.37		$ 12,000.00	
						$ 44,000.00 total	
Solids Handling Alternatives							
Item	Service Life, years	Current Captial Cost					
Primary sludge grinder	15	$ 86,000.00		$ 115,744.68		$ 50,000.00	
Replace piston pump	15	$ 90,000.00		$ 121,128.15		$ 52,000.00	
New waste gas burner	15	$ 41,000.00		$ 55,180.60		$ 24,000.00	$ 126,000.00
New Sludge Truck for WWTP No. 2	10	$ 112,000.00	$ 136,527.38		$ 166,426.11	$ 131,000.00	
						$ 257,000.00 total	
						$ 530,000.00	$ 399,000.00

City of Coos Bay
WWTP #1 Facilities Plan

Chemical Costs

Chlorination

Sodium Hypochlorite Use
Assumes 12 1/2% hypochlorite solution, containing 1 lb chlorine/gallon.
Storage tank size, gal ea 1800
No. storage tanks 2

4

Flow condition	Flow, mgd	Dose 4 mg/L Hypocl., gpd	Use, gal per year	Storage days/tank	Storage, days total
Year 2003 ADWF	1.600	53.4	19482	34	67

Dechlorination

Sodium Bisulfite Use
Assumes sodium bisulfite solution at 38% concentration
Storage tank size, gal ea 750
No. storage tanks 2
lbs bisulfite/gal solution 3.5
lbs bisulfite/lb Cl2 1.46

2

Flow condition	Flow, mgd	Use at 2 mg/L Cl2 residual, gpd	Use, gal per year	Storage days/tank	Storage, days total
Year 2003 ADWF	1.600	11.1	4063	67	135

City of Coos Bay
WWTP #1 Facilities Plan

Unit O&M Costs

Power 0.045 $/kwh 62.4
Average Flow, 2003 1.6 mgd

Equipment	Motor hp	% hp Utilization	P (hp)	Efficiency	P req'd (hp)	E (kwh/yr)	Operation Time (%)	Cost ($/yr)
Grit								
Mechanical Bar Screens	2	75%	1.5	75%	2.0	13,070	50%	$ 294.07
Screenings Compactor	15	75%	11.25	75%	15.0	98,024	30%	$ 1,323.33
Grit Pumps	10	75%	7.5	75%	10.0	65,350	20%	$ 588.15
Grit Cyclone	0		0	75%	0.0	0	20%	$ -
Grit Washer	1	75%	0.75	75%	1.0	6,535	20%	$ 58.81
Degritted Primary Sludge Pump	5	75%	3.75	75%	5.0	32,675	15%	$ 220.55
			0					
Treatment			0					
Primary Clarifier Mechanism	1	50%	0.5	50%	1.0	6,535	100%	$ 294.07
Secondary Clarifier Mechanism	1	50%	0.5	50%	1.0	6,535	100%	$ 294.07
WAS pump	3	50%	1.5	50%	3.0	19,605	10%	$ 88.22
RAS pump	15	50%	7.5	50%	15.0	98,024	10%	$ 441.11
Secondary Scum and Tank Drain Pump	5	75%	3.75	75%	5.0	32,675	10%	$ 147.04
Blower	50	80%	40	90%	44.4	290,443	100%	$ 13,069.92
Chlorination Feed Pumps	0.5	30%	0.15	30%	0.5	3,267	100%	$ 147.04
Dechlorination Feed Pumps	0.5	30%	0.15	30%	0.5	3,267	10%	$ 14.70
			0					
Solids			0					
Primary sludge grinder	3	75%	2.25	75%	3.0	19,605	50%	$ 441.11
TWAS/TPSL pump	5	60%	3	60%	5.0	32,675	25%	$ 367.59
Boiler	3	75%	2.25	75%	3.0	19,605	100%	$ 882.22
Digester Mixer	15	80%	12	80%	15.0	98,024	100%	$ 4,411.10
Recirculation Pumps	10	75%	7.5	75%	10.0	65,350	100%	$ 2,940.73
Sludge Transfer Pump	5	75%	3.75	75%	5.0	32,675	100%	$ 1,470.37
Gravity Belt Thickner	25	75%	18.75	75%	25.0	163,374	50%	$ 3,675.92

City of Coos Bay
WWTP #1 Facilities Plan

Grit Removal Alternatives

Alternative G1	Number		Cost, $
Mechanical Bar Screens	2	$	588
Screenings Compactor	1	$	1,323
Grit Pumps	4	$	2,353
Grit Cyclone	2	$	-
Grit Washer	1	$	59
Degritted Primary Sludge Pump	-	$	-
Power Total		**$**	**4,323**

Alternative G2	Number		Cost, $
Mechanical Bar Screens	2	$	588
Screenings Compactor	1	$	1,323
Grit Pumps	2	$	1,176
Grit Cyclone	2	$	-
Grit Washer	2	$	118
Degritted Primary Sludge Pump	1	$	221
Power Total		**$**	**3,426**

City of Coos Bay
WWTP #1 Facilities Plan

Treatment Alternatives

Alternative T1	Number		Cost, $
Primary Clarifier Mechanism	2	$	588.15
Secondary Clarifier Mechanism	2	$	588.15
WAS pump	2	$	176.44
RAS pump	3	$	1,323.33
Secondary Scum and Tank Drain Pump	1	$	147.04
Blower	4	$	52,279.68
Chlorination Feed Pumps	2	$	294.07
Dechlorination Feed Pumps	2	$	29.41
Chlorination Chemicals		$	38,964.48
Dechlorination Chemicals		$	10,158.60
Total Treatment Cost		**$**	**104,549.34**

Alternative T2	Number		Cost, $
Primary Clarifier Mechanism	2	$	588.15
Secondary Clarifier Mechanism	2	$	588.15
WAS pump	2	$	176.44
RAS pump	3	$	1,323.33
Secondary Scum and Tank Drain Pump	1	$	147.04
Blower	4	$	52,279.68
Chlorination Feed Pumps	2	$	294.07
Dechlorination Feed Pumps	2	$	29.41
Chlorination Chemicals		$	38,964.48
Dechlorination Chemicals		$	10,158.60
Total Treatment Cost		**$**	**104,549.34**

City of Coos Bay
WWTP #1 Facilities Plan

Solid Treatment Alternatives

Alternative S1	Number		Cost, $
Primary sludge grinder	1	$	441.11
TWAS/TPSL pump	1	$	367.59
Digester Mixer	2	$	1,764.44
Recirculation Pumps	2	$	8,822.20
Sludge Transfer Pump	1	$	2,940.73
Gravity Belt Thickner	-		
Total Power		**$**	**14,336.07**

Alternative S2	Number		Cost, $
Primary sludge grinder	1	$	441.11
TWAS/TPSL pump	1	$	367.59
Digester Mixer	2	$	1,764.44
Recirculation Pumps	2	$	8,822.20
Sludge Transfer Pump	1	$	2,940.73
Gravity Belt Thickner	1	$	1,470.37
Total Power		**$**	**15,806.43**

City of Coos Bay
WWTP #1 Facilities Plan

Operational and Maintenance Costs

Future to Present Ratio	1.1
n	20
i	5.88%

Decription	G1[a]	G2[a]		T1[b]	T2[b]		S1[c]	S2[c]
O&M Cost								
Power costs, $/yr	$4,323	$3,426		$55,426	$55,426		$14,336	$15,806
Labor costs, $/yr	$0	$0		$12,500	$12,500		$0	$0
Maintenance/Repair costs, $/yr	$0	$0		$8,193	$8,193		$0	$0
Chemical Costs, $/yr	$0	$0		$49,123	$49,123		$0	$0
Total O&M costs, $/year	*$4,323*	*$3,426*		*$125,243*	*$125,243*		*$14,336*	*$15,806*
Present Worth								
Capital cost, $1,000	$1,329	$990		$2,762	$6,655		$3,860	$4,079
Current Total O&M costs, $1,000/year	$4.3	$3.4		$125.2	$125.2		$14.3	$15.8
Future O&M costs, $1,000/year	$4.8	$3.8		$137.8	$137.8		$15.8	$17.4
Average O&M costs, $1,000/year	$4.5	$3.6		$131.5	$131.5		$15.1	$16.6
Present worth of O&M costs[d], $1000	$53	$42		$1,524	$1,524		$174	$192
Total present worth, $1,000	**$1,382**	**$1,032**		**$4,285**	**$8,178**		**$4,034**	**$4,271**

[a]G1 and G2: No additional labor or maintenance required.

[b]T1 and T2: Labor includes 0.5 day per week ($60 per hour) for additional equipment maintenance. Maintenance increase is approx. 7% total plant operational costs

[c]S1 and S2: No additional labor or maintenance required.

[d]Based on 20-year period and discount rate of 5.875% as suggested by the National Resources Conservation Service.