Environmental Assessment

Coos Bay Wastewater Treatment Plant No. 2 Expansion and Upgrade Project

Prepared for:

City of Coos Bay

Consulting Engineers & Geologists, Inc.

275 Market Avenue
Coos Bay, OR 97420-2219
541/266-9890

December 2015

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LIST OF ACRONYMS

APE	Area of Potential Effects
BMPs	Best Management Practices
BE	Biological Evaluation
BO	Biological Opinion
BOD	biochemical oxygen demand
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CTCLUSI	Confederated Tribes of Coos, Lane Umpqua and Siuslaw Indians
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
CZMA	Coastal Zone Management Act
cy	cubic yards
DEQ	Oregon Department of Environmental Quality
DLC	Oregon Donation Land Claims Act of 1850
DLCD	Oregon Department of Land Conservation and Development
DOGAMI	Oregon Department of Geology and Mineral Industries
DPS	Distinct Population Segment
DSL	Oregon Department of State Lands
DT	detection threshold
EA	Environmental Assessment
EB	Equalization Basin
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESH	Essential Indigenous Anadromous Salmonid Habitat
ESU	Evolutionary Significant Unit
FIRM	Floodplain Insurance Rate Map
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FPA	Facilities Plan Amendment
FPPA	Farmland Protection Policy Act
FWCA	Fish and Wildlife Coordination Act
HAP	hazardous air pollutant
HDPE	high-density polyethylene
H_2S	hydrogen sulfide
IBC	International Building Code
ICEAS	Intermittent Cycle Extended Aeration System
IFA	Infrastructure Finance Authority
IFAS	Integrated Fixed Film Activated Sludge
ITS	Incidental Take Statement
gpm	gallons per minute
L	liter
m	meter

MAO	Mutual Agreement and Order
MBR	membrane bio reactor
MBTA	Migratory Bird Treaty Act
mg	milligrams
mgd	million gallons per day
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NR	National Register
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rules
OC	Oregon Coast
OCMP	Oregon Coastal Management Program
ODA	Oregon Department of Agriculture
OHWM	ordinary high water mark
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Administration
OSWB	Oregon State Weed Board
PBS	PBS Engineering and Environmental, Inc.
PEM	Palustrine emergent (wetland)
PIF	peak instantaneous flows
ppbV	parts per billion by volume
RM	river mile
ROW	Right-of-Way
RUS	Rural Utilities Services
SBR	sequencing batch reactors
SEACOR	Shellfish and Estuarine Assessment of Coastal Oregon
SFHA	Special Flood Hazard Area
SHN	SHN Consulting Engineers & Geologists, Inc.
SHPO	State Historic Preservation Office
SOULA	Southern Oregon University Laboratory of Anthropology
SSO	sanitary sewerage overflows
THPO	Tribal Historic Preservation Officer
TKN	Total Kjeldahl Nitrogen
TSS	total suspended solids
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UV	ultraviolet
VA	value analysis
WAS	waste activated sludge
WQC	water quality certification

WWTP	wastewater treatment plant
µg	microgram

1.0 Purpose and Need for the Project

The City of Coos Bay (City) owns, operates, and maintains two wastewater treatment facilities. Wastewater Treatment Plant (WWTP) No. 1 treats approximately two-thirds of the flows in the City and the entire sanitary sewer flows from Bunker Hill Sanitation District, and is located in the eastern portion of the city near Highway 101 and Koosbay Boulevard. WWTP No. 2 is located in the southwest portion of the City and treats the remaining one-third of the City's wastewater and the entire sanitary sewer flows from the Charleston Sanitary District. The City proposes to expand and upgrade WWTP No. 2 to improve wastewater treatment and system capacity and to meet future wastewater treatment regulations that are required by the Oregon Department of Environmental Quality (DEQ).

The existing treatment plant is operating under a Mutual Agreement and Order (MAO) with the DEQ which describes the actions the City will perform to address identified wastewater treatment deficiencies and stipulates a schedule for the upgrades that must be met for DEQ compliance. Funding for the planning and design of the new WWTP No. 2 is being provided by the Oregon Infrastructure Finance Authority (IFA), with construction funds coming from the Clean Water State Revolving Fund (CWSRF). The DEQ implements the CWSRF under an operating agreement with the U.S. Environmental Protection Agency (EPA).

The purpose of this Environmental Assessment (EA) is to clearly establish the purpose and need for the project, to determine if all reasonable alternatives have been appropriately considered in the selection of the proposed alternative, to evaluate the environmental effects of the project and alternatives considered, to assess the significance of those effects, to specify mitigation measures where necessary to protect the environment, and to determine whether the project will have a significant adverse effect on the human environment.

1.1 Purpose and Need

The purpose of this project is to improve deficiencies identified in the existing wastewater treatment system for WWTP No. 2 and to meet Oregon DEQ compliance requirements. In addition to improving wastewater treatment, the purpose of the project is also to increase the treatment capacity for the west side of the City and the Charleston Sanitary District, and to reduce the environmental footprint of the current wastewater treatment plant located on the shore of Coos Bay.

The City has determined there is a need for upgrades to the existing facility. The aging facility contains several components that have exceeded their useful life and are in need of replacement as early as practicably possible. Improved collection, water quality treatment, and disinfection systems are needed to meet DEQ regulatory and redundancy requirements, as well as to meet current peak flows and future flow conditions for projected population growth. While WWTP No. 2 currently meets DEQ requirements, the existing facilities may not have the capacity to continue to meet flow and discharge requirements if upgrades are not performed. The Proposed Action alternative is the City's request to meet their needs.

1.2 Authority and Jurisdiction

In accordance with the National Environmental Policy Act (NEPA) of 1969, a project that receives federal funding must evaluate the environmental consequences of proposed actions on the natural and human environment before the action can be funded. This includes evaluating alternative means of addressing the purpose and need for the action. The President's Council on Environmental Quality (CEQ) has developed a series of regulations for implementing NEPA. These regulations are included in Title 40 of the Code of Federal Regulations (CFR), Parts 1500–1508. This EA is prepared in accordance with both CEQ and the U.S. Department of Agriculture's Rural Utility Service (RUS) environment policies and procedures for implementing NEPA (7 CFR Part 1794).

This EA is a stand-alone public document to address the environmental issues associated with the construction of the proposed expansion and upgrades for WWTP No. 2. It evaluates environmental issues relevant to the proposed project to assist in understanding the environmental implications or consequences of the proposal. The amount of information and level of analysis provided is commensurate with the magnitude of construction activities and their potential level of impact. After an appropriate public review and comment period, it will be determined whether to prepare a Finding of No Significant Impact (FONSI) on the human environment and authorize the project, or whether a Notice of Intent to prepare an Environmental Impact Statement is needed.

1.3 Location

The City of Coos Bay is located in Coos County on the southern Oregon coast, approximately 200 miles south of the Columbia River (bordering Washington State) and 100 miles north of the state border with California. The existing WWTP No. 2 is located at 100 Fulton Avenue west of Empire Boulevard (also known as Cape Arago Highway) on the Coos Bay shoreline. It is bounded by Fulton Avenue to the south, Coos Bay to the west, and undeveloped estuarine habitat to the north and immediately to the east where First Creek enters the bay. The facility is fenced and protected with riprap on the southern, western, and northern sides. The fenced area is developed and covers approximately 1.2 acres.

The new upgraded WWTP No. 2 would be constructed on approximately two acres of vacant property across the road (Empire Boulevard) from the existing facility. The new site is northeast of the intersection of Empire Boulevard and Fulton Avenue in the Empire District of the City. The new facility would replace the existing facility. The site is located in Township 25 South, Range 13 West; Section 19 of the Willamette Meridian; at approximately Latitude 43.38571° North, Longitude -124.28097° West. The location of the project area is shown on Figure 1 and Figure 2 with a more detailed view of the facility is shown on Figure 4.

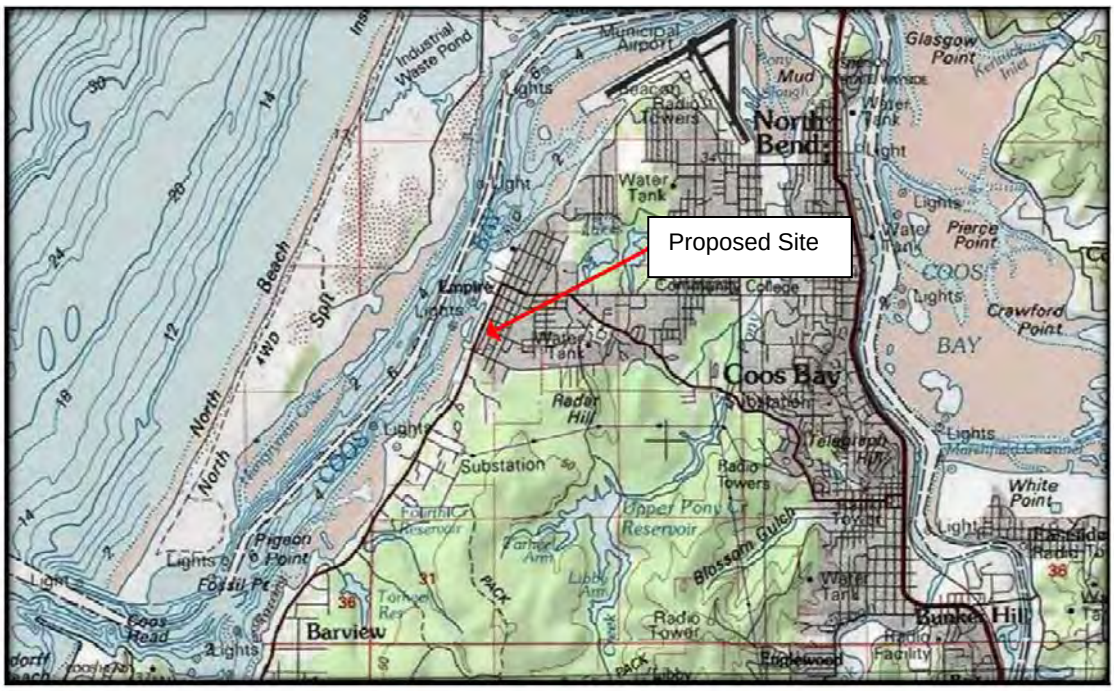


Figure 1. Proposed site for new WWTP No. 2

1.4 Existing Facilities

WWTP No. 2 was first constructed as a primary treatment facility in 1964, with secondary treatment added in 1973. The facility was upgraded in 1990 with a new headworks and additional secondary treatment unit to meet DEQ National Pollutant Discharge Elimination System (NPDES) permit requirements. The existing facility treats primarily domestic wastewater, including sanitary sewer flows, and has a design peak flow of 7 million gallons per day (mgd). The facility consists of influent pumping, headworks with screening and grit separation, primary clarification, activated sludge secondary treatment, secondary clarification, disinfection, dechlorination, and anaerobic digestion for the stabilization of biosolids. Dechlorinated effluent is discharged through a 24-inch diameter gravity outfall to Coos Bay at river mile (RM) 3.8 south of Fulton Avenue that extends .3 mile offshore into Coos Bay.

1.5 Project Description (Proposed Action)

The Proposed Action is to construct a new upgraded WWTP No. 2 in Coos Bay at a site across the road from the existing facility to improve the treatment of wastewater and sanitary sewer flows, and to expand treatment capacity. Included with construction of the new WWTP is demolition of the existing plant. The demolition involves the removal of all facilities at the existing plant site, down to three-feet below grade. The disturbed areas will be restored with gravel backfill, topsoil, and native vegetation. An aerial photograph of the two locations is shown in Figure 2.

Figure 2. Aerial photograph of WWTP No. 2 sites.

The Proposed Action will also construct approximately 22,600 feet of new Waste Activated Sludge (WAS) pipeline from WWTP No. 2 to the City's WWTP No. 1, which has treatment capacity for the current and future volumes of sludge. The new pipeline will consist of a 4-inch diameter HDPE pipeline that is proposed to be installed, using Horizontal Directional Drilling (HDD) and conventional open-cut trench methods, below streets and within the City's road right-of-way. The new WAS pipeline alignment is depicted in Figure 3.

As part of the WAS pipeline route, an Optional HDD Alignment was selected on the far eastern end of the alignment. This Optional route is evaluated as part of the Proposed Project, since it is unknown which alignment segment (open-cut or HDD) will ultimately be designed for this final stretch of pipeline. While the open-cut trench section is conventional, it will have the most surface disruption and potential impacts to traffic and residential uses. The HDD Optional route eliminates many of these concerns, and may be a less costly option. While the ultimate selection of this option will not be made until the construction bidding period, the Proposed Action analyzes the impacts from both routes under the WAS Pipeline Alignment.

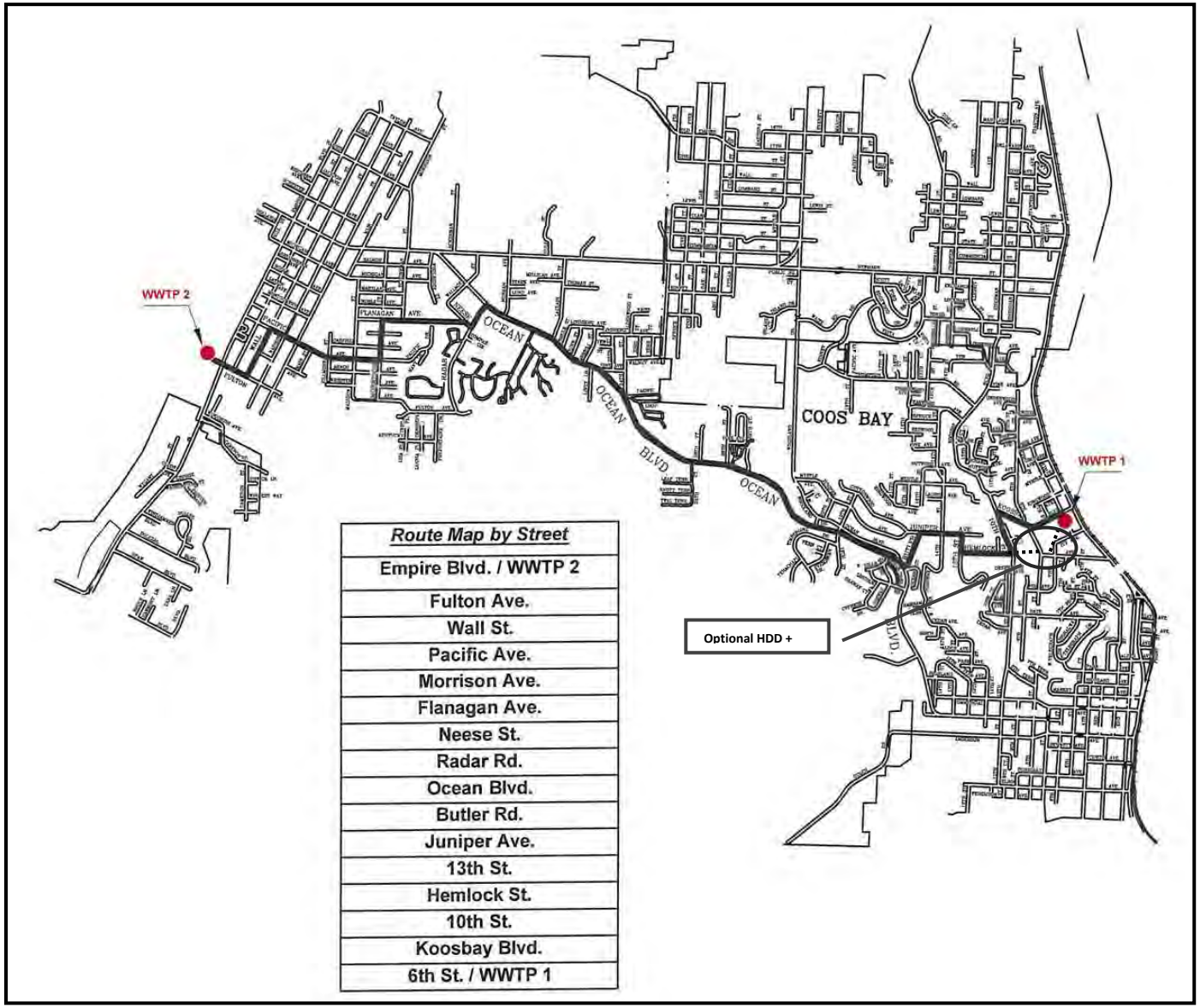


Figure 3. Waste Activated Sludge pipeline alignment.

1.5.1 Overview of Proposed Action

The new WWTP No. 2 will be constructed as "greenfield" construction, with the majority of the work completed independent of interface with the existing plant (the new plant will be built while the other remains on-line). Design of the new facility is based on recommendations developed after analyzing alternatives in the *Wastewater Treatment Plant 2 Facilities Plan Amendment* (FPA) prepared by Civil West Engineering Services, Inc., on November 20, 2012.

The treatment plant design, Coos *Bay Wastewater Treatment Plant #2 Preliminary Design* (SHN, 2013a) was prepared by SHN Consulting Engineers & Geologists, Inc. & CH2MHill and includes 18 technical memoranda that specify the design criteria, overall process, specific unit process of the components, hydraulic summaries, general project sequencing, and cost summaries. In addition, 30 percent design plans have been prepared. This report meets the specifications outlined in the 2012 FPA.

The following unit processes and facilities will be part of the upgraded facility:

- Trench style influent pump station
- Headworks incorporating screening and grit removal
- Sequencing batch reactors (SBR) with effluent flow equalization and waste-activated sludge pumping
- Ultraviolet (UV) disinfection system
- Odor control system
- Control building (offices, lab, lockers, etc.)
- Electrical building and shop
- Site-wide electrical systems
- Site-wide supervisory control and data acquisition systems
- Civil site work and yard piping

The facility will utilize the Xylem/Sanitaire Intermittent Cycle Extended Aeration System (ICEAS) sequencing batch reactor process for secondary activated sludge treatment in conjunction with raw sewage screening, grit removal, and UV disinfection.

The City has evaluated long-term biosolids management options for the Coos Bay area in the *Coos Bay Long-Term Biosolids Management Plan* (Dyer, 2014), prepared by the Dyer Partnership Engineers & Planners. This plan includes a review of a range of biosolids management options at both WWTP's No. 1 and No. 2, as well as the implementation of a new WAS pipeline. As part of this planning evaluation, a Preliminary Trenchless Feasibility report was developed to evaluate the entire proposed WAS pipeline route (Staheli Trenchless Consultants, 2014). The report found the alignment feasible and provided general assumptions and guidelines for its future development.

If construction of the new WAS pipeline is not complete when the new WWTP 2 is commissioned and placed on-line, the City proposes to haul un-thickened WAS from WWTP 2 to WWTP 1 for digestion, thickening, drying, and ultimate disposal using existing container trucks.

The new WWTP No. 2 will utilize the existing outfall, consisting of a 24-inch diameter lined and coated concrete pipe that is equipped with five diffuser ports that are 7.5 feet apart. The outfall is 1,826 feet in length and the end is marked with a timber pylon. It has a capacity of 9 mgd, which is adequate for current and peak flows; there are no proposed modifications to the outfall with this project. Currently, dechlorinated effluent is discharged at the outfall. UV disinfection from the new plant will replace chlorination and will eliminate the need for dechlorination of the effluent. The new facility will be completely constructed and clean water tested prior to connection to the existing sewer system and outfall.

1.5.2 Site Plan for New WWTP No. 2

The new site for the Proposed Action is located at the intersection of Fulton Ave. & Empire Blvd. Effluent discharge piping will run from the new facility, under Empire Boulevard, and connect to the existing discharge pipe. The Empire Blvd. crossing will be open trench construction. An overall site plan is shown below in Figure 4.

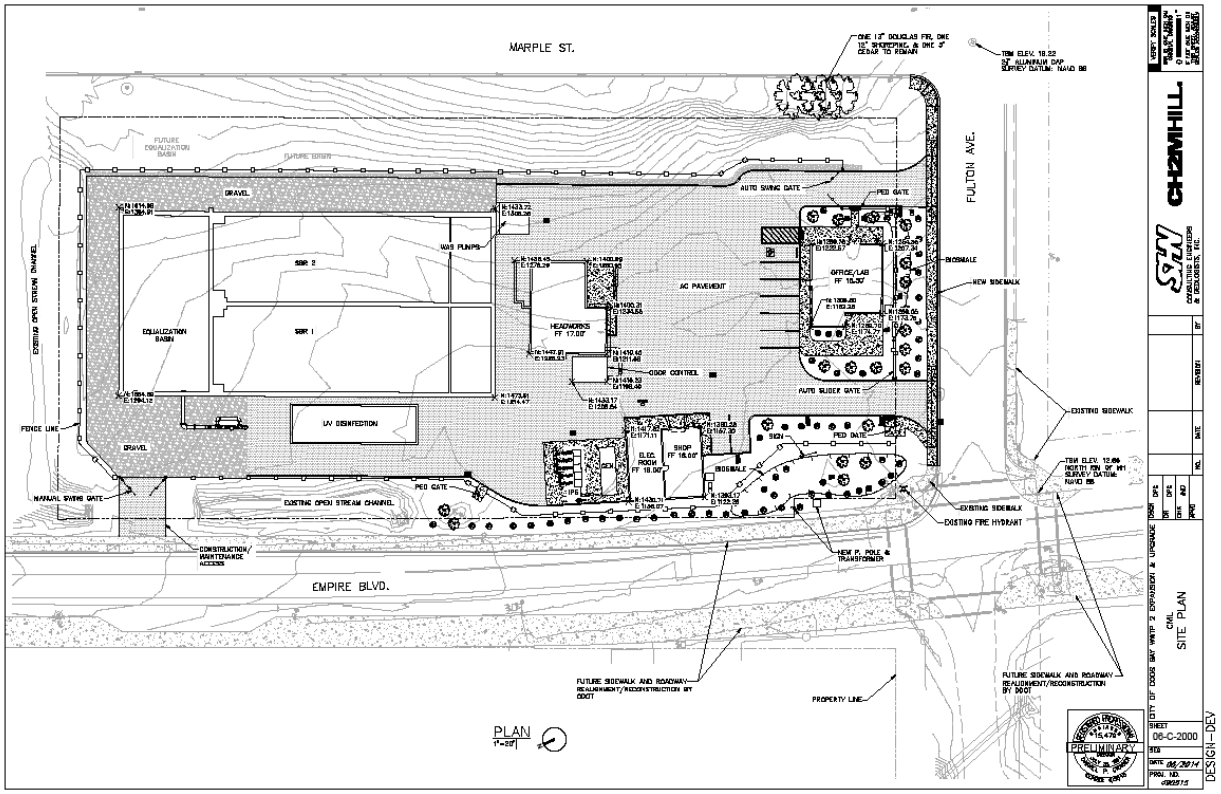


Figure 4. Overall site plan for new WWTP No. 2 (Proposed Action).

The site plan for the new WWTP No. 2 includes the following:

- **Collection system:** The collection system will be modified to convey wastewater flows to the new treatment plant site. In order to lift the wastewater into and through the treatment process, a new influent pump station must be constructed.
- **Influent pump station:** A new trench style influent pump station and wet well will be constructed near the southwest corner of the site. The structure will be founded at a depth of approximately 17 feet below grade on a cast-in-place mat slab foundation. The structure type will be a cast-in-place concrete vault.
- **Headworks:** A new headworks will be constructed near the center of the site and will include the headworks structure, two mechanically cleaned fine screens, one manually cleaned bar screen bypass, transfer and discharge conveyors, influent sampling, one headcell grit removal, two SBR influent flow control weirs, two grit pumps, one teacup grit classifier, one grit snail, and two dumpsters for disposal of dewatered screenings and grit. The structure will be approximately 35 feet high and will be supported with a reinforced concrete slab-on-grade with grade beams at the perimeter, thickened footings at the interior walls, and reinforced concrete construction. The headworks will be capable of treating peak instantaneous flows (PIF) for the planning period of 8.2 mgd, or 5,700 gallons per minute (gpm). It will also be able to treat dry weather flows of approximately .84 mgd, or 585 gpm.
- **Sequencing Batch Reactors (SBRs) and Equalization Basin (EB):** The SBRs and EB will be built on the northern half of the site and will include effluent flow equalization and waste activated sludge pumping. The SBR and EB is an open-top multi-basin reinforced concrete structure. Elevated concrete walkways will be constructed along the tops of the basin walls. The total dimension of the SBR system is approximately 100 feet wide by 144 feet long. The wall heights are approximately 20 feet with a top liquid depth of 18.5 feet. The EB will have a dimension of 36 feet wide by 100 feet long. The wall heights are approximately 15 feet. The basins will be supported by a reinforced concrete mat foundation. Ground improvements will be required due to the presence of up to 6 feet of non-engineered fill material beneath the SBR/EB footprint.
- **Control Building (Office/Lab):** This new building will be located at the south end of the site. Dimensions of the building are approximately 40 feet wide by 60 feet long. The building will be supported by a slab-on-grade foundation with perimeter footings and footings at the interior walls.
- **Electrical/Shop Building:** This new building will be constructed in the area along the western edge of the site. Dimensions of the building are 37 feet wide by 40 feet long. The building will consist of CMU walls and will be supported by a slab-on-grade foundation with perimeter footings and footings at the interior walls.

Primary access to the site will be along Fulton Avenue at the south end, with two paved driveways to provide ingress and egress. An additional paved access point for construction and maintenance will be located along the northwestern end of the site along Empire Boulevard. It will be gated and locked, and will also provide emergency access. Basic utilities (water, electric, natural gas, and telecommunications) will be brought to the site from existing

utility lines located either along Empire Boulevard or Fulton Avenue. The entire new site will be enclosed inside a fence that will be six feet high. Parking areas will be landscaped as required by City's municipal code. A minimum of 10 parking spaces is required to trigger a landscaping requirement. Some additional landscaping will be incorporated in unpaved areas and potentially around the office building.

1.5.3 Influent Flows and Loads

Influent flow and load projections were used to determine the preferred treatment scheme for design flow and load values, as shown in Table 1, below.

Table 1
Design Influent Flows and Loads

Flow Condition	Annual (Jan–Dec)	Wet Weather (Nov–Apr)	Dry Weather (May–Oct)
Flows (mgd)			
Average Daily	1.24	1.50	0.99
Maximum Month	-	2.09	1.51
Peak Week	-	3.57	-
Peak Daily Average	-	6.31	-
Peak Instantaneous	-	8.20	-
Biochemical Oxygen Demand (pounds per day)			
Average Daily		2,334	
Maximum Month		3,314	
Maximum Day		4,567	
Total Suspended Solids (pounds per day)			
Average Daily	2,926	2,929	2,923
Maximum Month		4,648	
Maximum Day		6,792	
Total Kjeldahl Nitrogen (pounds per day)[1]			
Average Daily	324	325	323
Maximum Month		421	
Maximum Day		500	
Ammonia (pounds per day)			
Average Daily	243	244	242
Maximum Month		316	
Maximum Day		375	

1. Total Kjeldahl Nitrogen (TKN) loading data was not provided in the FPA. The ammonia to TKN ratio was assumed to equal 0.75.

The City experiences a wide range of wastewater flow values at the existing WWTP No. 2. The variance in flows is a direct result of the condition of the collection system, and inflow and infiltration has been identified as the primary source of flow variation. The City is committed to an ongoing inflow and infiltration reduction program, including a collection system assessment and rehabilitation projects. Wastewater flows for the planning period through 2037 are summarized in Table 2.

Table 2 Summary of Projected Wastewater Flows	
Parameter	**2037 Flow (mgd)**
Dry Weather Flows	
Average Dry Weather Flow (ADWF)	0.99
Average Daily Flow (ADF)	1.24
Maximum Month Dry Weather Flow (MMDWF)	1.51
Wet Weather Flows	
Average Wet Weather Flow (AWWF)	1.50
Maximum Month Wet Weather Flow (MMWWF)	2.09
Peak Week Flow	3.57
Peak Daily Average Flow (PDAF)	6.31
Peak Instantaneous Flow (PIF)	8.20

1.5.4 Effluent Requirements

Restrictions for the discharge of WWTP effluent in Coos Bay are based on DEQ and NPDES compliance requirements, including expected changes to the enterococcus limit, as shown in Table 3.

Table 3 Wastewater Discharge Limitations Not to be Exceeded					
May 1 – October 31					
Parameter	**Average Effluent Concentrations, mg/L**		**Monthly[1] Average lb/day**	**Weekly[1] Average lb/day**	**Daily[1] Maximum lbs**
	Monthly	**Weekly**			
BOD_5	20	30	340	510	670
TSS	20	30	340	510	670
November 1 – April 30					
BOD_5	20	30	510	760	1000
TSS	20	30	510	760	1000
November 1 – April 30 After submitting OAR 340-041-0120(9) (a) (G) (iv) implementation documentation.					
BOD_5	30	45	700	1100	1400
TSS	30	45	700	1100	1400
Other Parameters (Year-round except as noted)	**Limitations**				
BOD_5 and TSS Removal Efficiency	Shall not be less than 85 percent monthly average concentration for BOD_5 and TSS.				
Fecal Coliform Bacteria	Shall not exceed a monthly median of 14 organisms per 100 ml. No more than 10 percent of the samples collected in a calendar month shall exceed 43 organisms per 100 ml.				

Table 3, Continued	
Other Parameters (Year-round except as noted)	**Limitations**
pH	May not be outside the range of 6.0 to 9.0.
Total Residual Chlorine	May not exceed a monthly average concentration of 0.03 mg/L and a daily maximum concentration of 30 mg/L.
Enterococcus Bacteria	Monthly log mean may not exceed 35 organisms per 100 ml.

1. Average dry weather design flow to the facility equals 2.02 mgd. Summer mass load limits are based on 2.02 mgd. Winter mass load limits are based upon average wet weather design flow to the facility equaling 2.8 mgd. The daily mass load limit is suspended on any day in which the flow to the treatment facility exceeds 4.04 mgd (twice the design average dry weather flow).

Note: When the total residual chlorine limitation is lower than 0.05 mg/L, DEQ will use 0.05 mg/L as the compliance evaluation level. Daily maximum concentrations at or below 0.05 mg/L will be considered in compliance with the limit.

1.5.6 Waste Activated Sludge (WAS) Pipeline

A WAS pipeline alignment has been evaluated as part of the biosolids management plan, and found to be a feasible option for treatment of WAS from Plant No. 2. The pipeline alignment follows existing City right-of-way and under City streets. Implementation of the WAS pipeline would consist of installing a 4-inch diameter HDPE pipeline over an approximately 22,600 foot alignment through both horizontal directional drilling (HDD) and open-cut construction methods. By using HDD for pipeline installation for the majority of the project (approximately 17,810 feet), surface impacts will be minimal and disruption of traffic flows on area streets would be limited to areas around the entry and exit locations of the drill pits. About six small sections of area streets along the alignment do not provide an ideal HDD construction opportunity, and those areas (approximately 4,790 feet) will require open-cut trench construction; these locations are within City streets and there would be some minor disruption to traffic for short periods. Figure 3 shows the pipeline route from WWTP No. 2 to WWTP No. 1.

1.5.7 Plant Reliability Criteria

The EPA requires that wastewater facilities meet the requirements for reliability and redundancy in their treatment components and associated equipment. In addition, the Oregon DEQ has established minimum standards governing the reliability of mechanical, electrical, and fluid systems used in wastewater systems. The standards are intended to protect the environment (particularly receiving waters) against unacceptable degradation resulting from power failure, floods, peak loads, equipment failure, and maintenance shutdowns. The standards are divided into three decreasingly stringent classes of reliability: I, II, and III. WWTP No. 2 will discharge to Coos Bay's shellfish habitat; therefore, the DEQ has determined that reliability Class I is appropriate.

2.0 Alternatives to the Proposed Action

In accordance with federal laws and NEPA regulations, applicants for federal funding are required to explore all reasonable alternatives that could satisfy and are consistent with the purpose and need of a proposal. Over the course of development of the Proposed Action, alternatives considered included optimizing the current facilities, alternative site locations, and comparisons of engineering designs and system capacities to meet DEQ requirements, reasonable growth concerns, and to reduce environmental consequences. Relevant factors in the history and development of alternatives are described below, followed by the alternatives evaluated in the design for an upgraded facility.

The FPA (Civil West, 2012) included engineering design alternatives and evaluation of those alternatives to recommend a facility that would meet DEQ compliance requirements and fulfill the City's purpose and need for an upgraded wastewater facility. This included updated population and wastewater influent characteristics to meet projected population and flow rates until 2037. A *Preliminary Design Report* was finalized by SHN and CH2MHill (SHN, 2013) in August 2013, based on the FPA recommendations for a new WWTP No. 2 facility.

2.1 Alternatives Analyzed But Not Considered in Detail

Prior to development of the Proposed Action to meet the City's purpose and need, feasibility studies were conducted on three sites as possible locations for improved WWTP No. 2 facilities, as summarized below. The sites were evaluated and determined not to be viable alternatives and were eliminated from further consideration.

2.1.1 West Yost Facilities Plan Option

A *Facilities Plan for Wastewater Treatment Plant #2* was prepared by West Yost Associates (West Yost, 2007) that reviewed treatment options and recommended expansion and improvements at the existing WWTP No. 2 site. It included a new influent pump station, new headworks, new control building, new 70-foot diameter secondary clarifier, new secondary pump station, new gravity belt thickener, upgrades to the aeration basins, and conversion of an existing clarifier to a chlorine contact chamber. The new headworks, influent pump station, and control building were to be built on a site adjacent and to the south of the existing WWTP No. 2, which is currently owned by the City. Subsequent investigation of the proposed southern site resulted in identification and delineation of existing wetlands which negatively impacted the proposed location for new facilities. Due to potentially significant impacts to wetlands, this alternative site location was eliminated from further consideration.

2.1.2 North Spit Option

During alternative site investigations in 2010, the City expressed an interest in utilizing the existing lagoon facility located on the North Spit across the bay and northwest of the existing WWTP No. 2. Investigations determined the most feasible design would include an 18" high-density polyethylene (HDPE) forcemain bored beneath the bay from the existing WWTP No. 2 to a point on the North Spit near a retired salmon hatchery. From that point, 18" HDPE would

be installed in an open trench along the North Spit road (Trans Pacific Parkway) to the treatment lagoon.

To transmit the wastewater to the lagoon, a relatively large pump station at or near the existing facility would be required. In addition, new headworks, a new effluent pump station, and disinfection requirements would be needed at the lagoon site. The lagoon has an ocean outfall which would be used to discharge the treated effluent into the Pacific Ocean. Although thought to be serviceable, it would likely require a new diffuser.

Improvements were estimated to cost approximately $18 million (based on cost estimates from 2006 by Civil West), not including any land acquisition or legal costs associated with the project. Concerns regarding the legal aspects of the City operating a plant outside of the City limits and the urban growth boundary were also brought up, along with the lagoon that is permitted for industrial waste disposal and not municipal waste. Based on high costs, relatively high risk, and unknown legal issues, this option was determined not to be a viable and eliminated from further evaluations.

2.1.3 Combined Plant Option

A review of the possibility of pumping wastewater from WWTP No. 2 to WWTP No. 1 was evaluated by the City. Transmitting the full amount of wastewater from WWTP No. 2 would require a combination of a 30" forcemain and sections of 42" gravity main. The total length of the new main line would be nearly six miles. Depending on the selected alignment, three or four pump stations would be required. Costs for transmission of the wastewater alone quickly surpassed $30 million. In addition to the transmission costs, WWTP No. 1 would have to be completely rebuilt to handle the additional flows. This option was found to be expensive and was not considered in detail as a viable alternative.

2.2 No Action Alternative

Under the No Action Alternative, the City would continue the use of the existing wastewater treatment plant for treatment and disposal of municipal wastewater. Wastewater discharge would continue from the wastewater plant under existing authorizations and permits. The City would not be able to meet its schedule to upgrade the facility with the DEQ. This alternative would not address the risk of exceedances of NPDES permit conditions. The City would not realize additional financial revenue from the CWSRF, and this would impede the City's ability to fund needed improvements to their sewer system. This alternative would not meet the project's purpose and need, nor the City's goals and objectives identified.

2.3 WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The FPA prepared in 2012 met the City's need to develop and evaluate viable alternatives for WWTP No. 2. The evaluation of alternatives included unit performance and deficiencies, wastewater flows, design capacity, design and cost estimates, and impacts to water quality. The FPA contains summaries of wastewater influent characteristics such as BOD, TSS, ammonia loading, discharge requirements, and updated population values. It projected flow rates and

population values until 2037, based on current and projected growth, to provide a 20-year planning period for the new upgraded wastewater treatment facility. Flow rates included expected peak flow events throughout the calendar year. The Projects estimated construction cost is approximately $16.7 million.

During the development of the FPA, the City enlisted a third-party team of experts and stakeholders to perform a value analysis (VA) of the plan amendment. The VA team made observations of the existing facility, made recommendations for additional alternatives to be considered, and performed a life cycle analysis on several of the options from the VA process. During the early development of the FPA, the City acquired the proposed new plant site east of Empire Boulevard. The new site made several new treatment alternatives possible that could not be considered in the original facilities plan. The FPA recommended treatment plant upgrades at the new site as a long-term solution to meet DEQ requirements for the projected growth of the city.

The treatment alternatives introduced and evaluated in the FPA are summarized below for major components of the wastewater treatment process. The alternatives were evaluated for cost, noneconomic factors, and technical feasibility, taking into consideration recommendations made by the VA team. The City utilized the FPA analysis to determine the recommended plan for design of the Proposed Action alternative.

2.3.1 Liquid Stream Alternatives

The following liquid stream treatment options were considered:

- Activated sludge, conventional
- Oxidation ditch
- Sequencing Batch Reactors
- Packaged Activated Sludge Process
- Membrane Bio Reactor (MBR)
- MBR + Actiflo® process
- Packaged Fine Bubble Aerated Lagoon
- MBR + Chemically Enhanced Primary Treatment Bypass on Existing Site (VA Option 1)
- Integrated Fixed Film Activated Sludge (IFAS) + Bypass on Existing Site (VA Option 2)

The above listed treatment alternatives were screened for suitability in Coos Bay based on several factors resulting in an in-depth comparison of the following top three alternatives:

1. Activated sludge, conventional
2. Oxidation ditch
3. SBR, including modified processes such as Intermittent Cycle Extended Aeration System (ICEAS)

The in-depth comparison included initial investment capital costs, life cycle costs, operations and maintenance costs, and several non-economic objectives.

2.3.2 Solids Train Alternatives

Alternatives for solids storage, digestion, and disposal were evaluated, including solids being digested aerobically, anaerobically, or thickened and transferred to the City's WWTP No. 1. Solids disposal options analyzed were limited to continuing the current practice of land application on property under contract for disposal of Class B biosolids. As a result, the City determined to include transferring the biosolids through a WAS pipeline to the existing WWTP No. 1 for final treatment and disposal.

Several alternatives for the other components of the treatment plant upgrades and improvements were evaluated in the FPA. The other elements of the treatment process are considered common to all of the liquid treatment alternatives and were evaluated separately. These other components included the following:

- Gravity collection system
- Lab and office building
- Influent pump station
- Headworks – screen
- Headworks – grit removal
- Disinfection
- Discharge

2.3.4 Outfall

Modifications to the existing outfall were considered but ultimately rejected, as there are no compelling reasons to discontinue its use. Two other treatment alternatives involving blended treatment during peak flows were previously considered which would maximize the use of the existing facilities by combining primary effluent with secondary effluent. The effluent discharged from the blended treatment alternatives would not meet the bacteria limits for shellfish growing waters and would require the construction of a new outfall. Because all of Coos Bay may be subject to bacteria limits for shellfish in the future, the blended treatment and new outfall alternatives are not considered a practical option to pursue and were eliminated from further consideration.

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 chemicals and pathogens due to enhanced treatment at the new wastewater facility. It was determined that the existing outfall will be retained regardless of which headworks and treatment alternatives are ultimately selected.

In April 2015, the City performed an underwater inspection of the existing outfall diffuser and determined that it was not properly functioning and needed to be repaired. As a result, the City applied for a US Army Corps of Engineers (USACE) permit to repair the diffuser, with subsequent ESA consultation with the National Marine Fisheries Service (NMFS). Consultation with NMFS on the USACE permit was completed on August 19, 2015 and is therefore considered part of the environmental baseline for this EA as repairs will be undertaken before construction of the WWTP No. 2.

2.3.5 Comparison of Cost and Non-Economic Factors

The City is cognizant of the public residential, private commercial, industrial, and other municipal and public users of the wastewater collection and treatment systems. Cost is a major consideration for the development of a new facility. The cost of the project alternatives evaluated in the FPA are ranked in Table 4, with 1 being the best ranking in terms of cost efficiency, and 4 being the lowest.

Table 4
Cost Comparison of Project Treatment Alternatives

Item Description	Total Project Cost	Operations & Maintenance	Rank
Conventional Treatment	$23,307,300	$3,682,050	4
Oxidation Ditch	$22,976,700	$3,735,352	3
Sequencing Batch Reactor	$22,380,025	$3,384,892	2
Intermittent Cycle Extended Aeration System	$21,435,350	$2,948,673	1

Non-economic factors of the project alternatives were also evaluated in the FPA. Several of the non-economic evaluation concepts identified during the VA process with City staff and operations personnel are included in Table 5. The score for each criterion is based on a scale of 1 to 5, with 1 being the lowest score, suggesting the project does not meet the criteria, and 5 being the highest score, meaning that the project meets or exceeds the criteria.

2.3.6 FPA Recommended Plan

The following FPA recommended improvements to meet regulatory and population requirements for WWTP No. 2 were used in determining the design for the Proposed Action. The new plant will be constructed and tested prior to bringing the new facility on-line.

Existing Gravity System Upgrades. Improvements to the existing gravity collection system will include several manholes, including approximately 250 lineal feet of new 30" diameter pipe. Connections will be made to existing manholes and pipe to provide positive slope to the new influent pump station. The existing pipe to the existing pump station will be plugged and abandoned, in place.

Lab and Office Building. A new office building approximately 2,500 square feet in size will be constructed on the new plant site. The building will be equipped with the necessary laboratory facilities and office spaces to accommodate the operations personnel.

Influent Pump Station. A new influent pump station sized to pump PIF will be constructed on the proposed plant site. The pump station will be equipped with five pumps, variable frequency drives, and controllers. The design of the pump station will include a self-cleaning channel design.

Table 5
Non-Economic Comparison of Project Treatment Alternatives

Criteria	Conventional Treatment		Oxidation Ditch		Sequence Batch Reactor		Intermittent Cycle Extended Aeration System	
	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Meets requirements of Mutual Agreement and Order (MAO).	5	The project will comply with the MAO.	5	The project will comply with the MAO.	5	The project will comply with the MAO.	5	The project will comply with the MAO.
Meets redundancy requirements.	5	The project will meet redundancy requirements of EPA and DEQ.	5	The project will meet redundancy requirements of EPA and DEQ.	5	The project will meet redundancy requirements of EPA and DEQ.	5	The project will meet redundancy requirements of EPA and DEQ.
Process will meet expected future regulations.	5	The treatment process will produce quality effluent meeting expected NPDES permit limits.	5	The treatment process will produce quality effluent meeting expected NPDES permit limits.	5	The treatment process will produce quality effluent meeting expected NPDES permit limits.	5	The treatment process will produce quality effluent meeting expected NPDES permit limits.
Reduction of odor emissions	2	This process will result in large open basins, some aerated, some anaerobic.	2	This process will result in large oval open basins, with surface aerators.	4	This process will have a smaller open water surface and no clarifiers.	4	This process will have a smaller open water surface and no clarifiers.
Maintain operation of existing plant during construction.	5	Installation will occur on the new site.	5	Installation will occur on the new site.	5	Installation will occur on the new site.	5	Installation will occur on the new site.
Future expansion.	1	Will require most of new site to accommodate new clarifiers and aeration basins.	2	Loop may be added. Clarifier may not fit on the site.	5	Design will allow for expansion of the reactor basins.	5	Design will allow for expansion of the reactor basins.
Proven technology with installations in Oregon.	5	Several installations throughout Oregon.	5	Several installations throughout Oregon.	5	Several installations throughout Oregon.	5	Several installations throughout Oregon.
Capability to treat varying flows (from average dry-weather to peak day flows).	5	Multiple basins will provide operational flexibility.	4	Limited number of basins for flexibility.	5	Multiple basins will provide operational flexibility.	5	Multiple basins will provide operational flexibility.
Totals	**33**		**33**		**39**		**39**	

Headworks - Screen. A new headworks facility will be located on the new site and include flow measurement and mechanical screening equipment. A bypass channel with manual bar screen will also be included to facilitate flow bypass during service work on the mechanical screen. Several mechanical screens identified will function equally well and are similar enough from a cost perspective that further selection is not necessary at this level of detail. The components of the headworks has been sized and designed for the PIF projected for future conditions.

Headworks - Grit Removal. The new headworks facility on the new site will also include the installation of new vortex-style grit removal equipment. The grit removal equipment will be sized to remove grit and fine particulate from the wastewater stream. The grit chamber has been designed to accommodate the wide range of flows, from average daily flows to PIF.

Treatment Process. A new aerated treatment process will be constructed. The recommended treatment alternative is a SBR, including modified SBR alternatives such as the ICEAS. A minimum of two rectangular basins will be designed to receive and treat the wastewater following the headworks facility in a continuous flow process. The basins are expected to be constructed of concrete. The treatment process will require forced air blown into the basins and dispensed via ceramic disc diffusers.

Disinfection. A new disinfection facility will provide UV treatment for flows ranging from the average dry-weather daily flows to PIF. The UV disinfection system will operate in multiple channels and will have complete redundancy on the lamps, ballasts, and controls; in accordance with DEQ regulations. The design and installation will include bridge and crane equipment to facilitate lamp and ballast maintenance. The disinfection channel will be located at the new site.

Discharge. Based on an inspection of WWTP No. 2, the existing outfall is sufficient to meet the projected needs. Needed repairs to the discharge diffuser identified in the City's April 2015 inspection will be undertaken prior to WWTP No. 2 being constructed and these repairs will retain the outfall in its existing configuration. Minor modifications to the effluent system will include a new 30-inch diameter pipe from the new wastewater treatment plant to the existing treatment plant site, and connection to the existing effluent discharge pipe directly upstream of the existing WWTP No. 2 discharge manhole.

Biosolids Disposal (WAS Thickened and Piped; Anaerobic Digestion). Based on the life cycle analysis described above, the recommended option for storage, handling, and treatment of solids is to transfer the sludge by a forcemain pipeline from the WWTP No. 2 for further processing at the WWTP No. 1. The existing anaerobic digesters at WWTP No. 1 were identified in the existing facilities plan as having sufficient capacity to accept and treat solids from WWTP No. 2. Sludge from WWTP No. 2 will be piped through a forcemain to the anaerobic digesters at WWTP No. 1 for digestion to Class B standards and pumped to the existing solids storage lagoon.

The finance strategy outlined in the existing facilities plan is sufficient to meet the fiscal demands of the recommended project. The City has already started implementation of the recommended financial plan by adopting periodic incremental rate increases over the next several years. It is expected that at the time a new facility is operational, rates will be sufficient to support the operation costs of the new plant.

3.0 Affected Environment and Environmental Consequences

The NEPA compliance process requires federal funding agencies to consider direct and indirect impacts to the environment. For each resource category, the impact analysis follows the same general approach in terms of impact findings. When possible, quantitative information is provided to establish impacts. Qualitatively, these impacts will be measured as outlined in Table 6.

Table 6
Impact Analysis Criteria

Impact Scale	Criteria
None/Negligible	The resource area would not be affected, or changes would be either non-detectable or if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, although the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and could have both localized and regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions are being altered on a short-term basis. Mitigation measures would be necessary and the measures would reduce any potential adverse effects.
Major	Changes would be readily measurable and would have substantial consequences on a local and regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Impacts are disclosed based on the amount of change or loss to the resource from the baseline conditions and may be direct or indirect. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action and occur later in time or are farther removed from the area, but are reasonably foreseeable.

The following subsections discuss the environmental resources evaluated, including the regulatory settings, the affected environment and existing conditions for each resource, the environmental consequences of the alternatives, and mitigation measures for each resource to avoid or minimize adverse environmental impacts.

3.1 Land Use

3.1.1 Affected Environment

Zoning

Land use within the planning area (the existing WWTP No. 2, proposed new location of the WWTP and the WAS pipeline route) is predominantly residential, with smaller areas of commercial and light industrial development. Residential and forested areas surround the core community commercial area. Construction of the proposed new WWTP facility will be located entirely on three City-owned tax lots. During the preparation of this report, the City consolidated these three tax lots. Refer to Figure 5 for a depiction of the tax lots and the description provided below for each:

- Tax Lot 2600 at the south-southwest corner is 100′ x 53.3′ (0.12 acre) at the intersection of Empire Boulevard and Fulton Avenue;
- Tax Lot 2601 at the south-southeast corner is 100′ x 53.3′ (0.12 acre) and accessed by Fulton Avenue;
- Tax Lot 2700 (the largest) is 200′ x 400′ (1.79 acres) and runs lengthwise along Empire Boulevard to the west and Marple Street to the east. It is bounded on the south by tax lots 2600 and 2601 and on the north by Tax Lot 2800.

All tax lots are zoned C-2 General Commercial. Tax Lot 2601 was re-zoned from R-2 Single-Family and Duplex Residential to C-2 General Commercial by the City Council on April 3, 2012, under City Ordinance No. 446. The Empire Urban Renewal Plan, adopted by the City on August 30, 1995, includes C-2 zoning under Chapter 2.9, General Industrial District. Section 1 of Chapter 2.9 states the C-2 district is included in the zoning regulations to achieve the following City objectives:

1. A general commercial district providing a broad range of commercial and other services that are easily accessible to all residential areas will promote the economic stability and future growth of the City, and will permit limited residential and industrial uses.

2. A district allowing uses and services not permitted in the Central Commercial zoning district.

It was determined construction of a WWTP constitutes a use other than those listed as approved under C-2 zoning. A Conditional Use Permit allowing construction of a WWTP on the four tax lots was approved by the City of Coos Bay Planning Commission on March 13, 2012 (No. ZON2012-00010). It became final on March 30, 2012, after giving the public an opportunity to appeal the decision. The approval includes conditions to ensure the project will not result in increased odor, byproducts (emissions, gas, mist, vapor, particulate matter, or other air, water, or land pollution outside of the facility), or noise generated that exceeds permitted levels established by the Oregon DEQ. It also required Tax Lot 2601 to be rezoned as C-2 (since accomplished) and approval of a site plan and architectural review prior to the issuance of building permits.

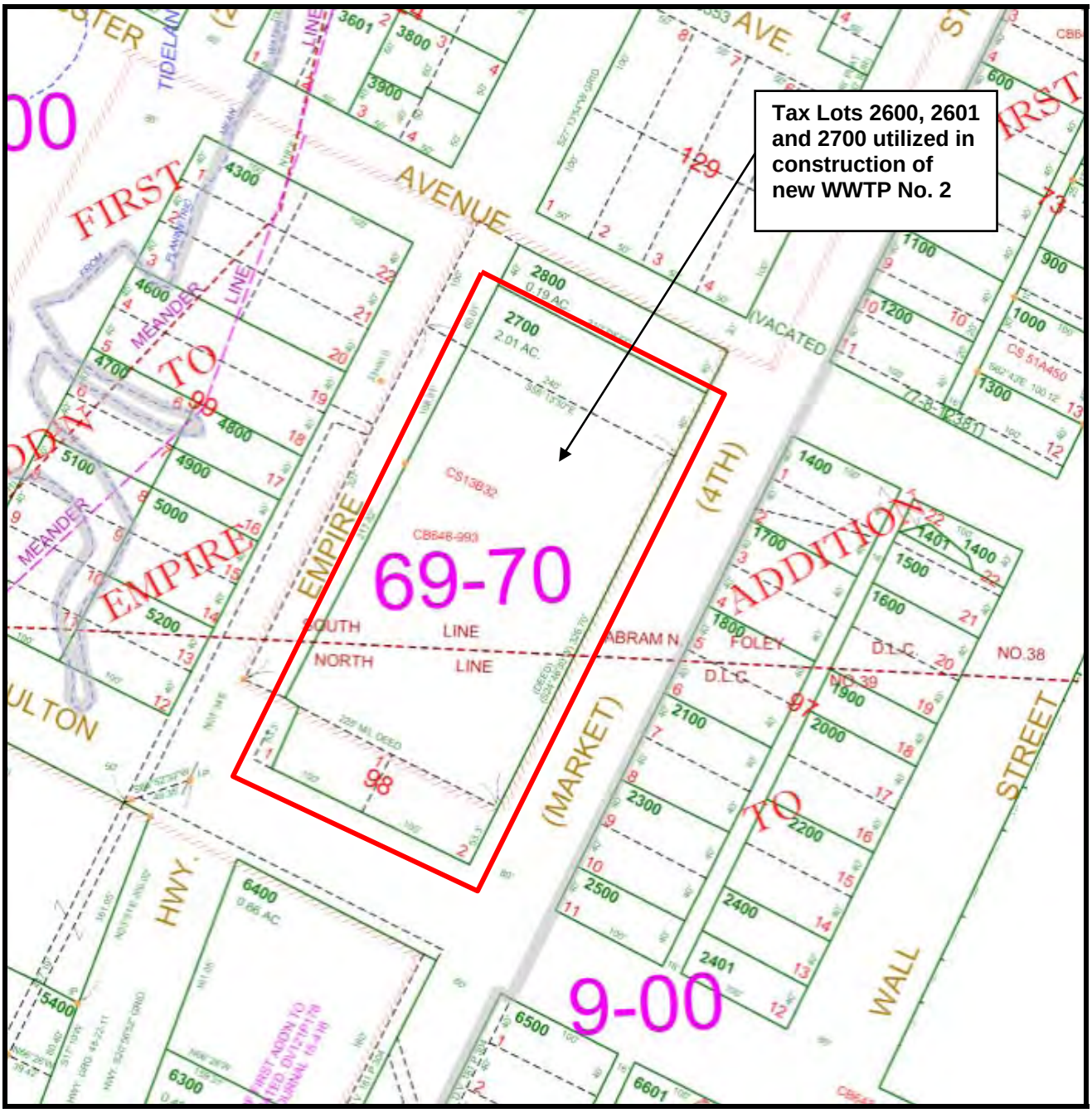


Figure 5. Wastewater Treatment Plant No. 2 Site and Tax Lots

The City administers a building and mechanical inspection program through the Community Development Department. City codes are designed to ensure the safety and structural integrity of buildings and other structures. The site development process includes a review by the City's Planning Commission 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.

As part of the City approval process, the project will be required to comply with the City Comprehensive Plan for zoning of the properties along Empire Boulevard. The site is also located in the Empire Urban Renewal District for the City of Coos Bay.

Tax Lot 2700 has been vacant since before 1939. A dirt walking path used by area residents cuts diagonally across the lot from the northeast corner to the southwest corner, connecting Marple Street to the corner of Empire Boulevard and Fulton Avenue. Tax lots 2600 and 2601 were developed with small houses sometime between 1939 and 1955. A small house was located on Tax Lot 2600, also referred to as 695 Empire Boulevard, which was demolished in 2004 under Demolition Permit No. BLD2004-00001 and the lot remains vacant. A concrete slab-on-grade foundation remains in place at 490 Fulton Avenue (Tax Lot 2601) where another small residence was removed under Demolition Permit No. 187-D13-004, issued February 28, 2013.

Adjoining sites to the north, west, and east were first developed with small houses sometime before 1939, with additional homes constructed to the east between 1939 and 1955. The existing WWTP No. 2 was constructed to the west in 1964. A small grocery store was constructed to the south and a trailer park was constructed to the north in the late 1970s. . Limited development has been ongoing at nearby properties since the 1980s until present day.

The new WAS pipeline traverses under City streets through residential and commercial areas of the city. Construction will be within existing City right-of-way (ROW) as well as in areas previously disturbed by roadway construction.

Traffic

The new WWTP site is located along Empire Boulevard/Cape Arago Highway, a major roadway that connects Coos Bay to the unincorporated community of Charleston, located approximately four miles southwest of the project. In addition, the road provides vehicular access to a variety of ocean beaches before dead-ending at Cape Arago, approximately 10 miles south, and it connects to Seven Devils Road, a back road that connects to U.S. Highway 101 and Bandon to the south. Adjacent City streets around the proposed project consist of portions of Fulton Avenue near its intersection with Empire Blvd, and S. Marple Street near the intersection with Fulton Ave.

The project also proposes to locate a new WAS pipeline under existing City streets within the ROW. Figure 3 shows the pipeline alignment. These streets consist of areas within residential and commercial areas. Residential streets provide access to homes, schools and other residential related facilities and commercial centers. Traffic on these streets is generally light, with peak morning and afternoon uses during school/work commute periods. Ocean Boulevard is a 4-lane arterial east/west route that provides vehicle access to various portions of the City, and is the main access to Empire Blvd. and the community of Charleston. Traffic along this route can be heavy during morning/evening commute periods, as it provides the most direct access to and from downtown Coos Bay along Highway 101.

Noise

Noise within the project vicinity has not been well documented, but it is generally associated with traffic. Sensitive noise receptors are considered to be areas that sustain greater effects from noise sources than other areas, such as industrial areas. Sensitive receptors to noise typically include churches, schools, homes and residential areas, hospitals, and public facilities.

Potential noise receptors in the area of the proposed project are urban residential, with smaller areas of commercial and light industrial development. The overall noise level for the vicinity is moderately loud along Empire Boulevard and the Empire-Coos Bay Highway. The City Council passed unreasonable noise restrictions for the City under Section 2 of Ordinance No. 100, General Offenses, approved by the Mayor on July 13, 1987. Under Section 2, no person shall create, or assist in creating, or permit the continuance of unreasonable noise which annoys, disturbs, injures, or endangers the comfort, repose, health, safety, or peace of others. Acts declared to be unreasonable noises in violation of ordinance, as related to the project, include:

- The sound of any horn or signaling device on any vehicle on any street, public, or private place, except as a necessary warning of danger;
- The blowing of any steam whistle attached to any stationary boiler, except to give notice of the time to begin or stop work, or as a warning of danger, or upon request of property city authorities;
- The use of any mechanical device operated by compressed air, steam or otherwise, unless the noise created is effectively muffled;
- The erection, including excavation, demolition, alteration, or repair of any building in residential districts, other than between the hours of 7 a.m. and 6 p.m. except in case of urgent necessity in the interest of the public welfare and safety, and then only with a permit issued by the city;
- The discharge in the open air of the exhaust of any steam engine, internal combustion engine, motor boat, or motor vehicle except through a muffler or other device which will effectively prevent loud or explosive noises and the emission of annoying smoke; and
- The conducting, operating, or maintaining of any garage within 100 feet of any private residence, apartment, rooming house, or hotel in a manner as to cause loud or offensive noises to be emitted between the hours of 11 p.m. and 7 a.m.

Visual Aesthetics

The existing WWTP No. 2 site is located in an area that is comprised of both residential and commercial uses and is generally screened from view by travelers on S. Empire Boulevard by structures, though the facility can be seen from the roadway. Residences immediately to the east of the existing treatment facility also have views onto the facility site, with some views screened by vegetation. Operations at the existing facility have been on-going since about 1964. The existing facility is also seen from water craft that use the ship channel, as the existing WWTP No. 2 is sited on the waterfront, exposed to the channel.

The new WWTP No. 2 is proposed to be constructed on a vacant lot immediately across S. Empire Blvd. from the existing treatment plant. The proposed site has had historical uses, primarily consisting of residential developments; these have all been removed and the site is currently vacant. The proposed site is zoned Commercial and has other existing commercial activities adjacent to it, including a convenience store and an RV Park (located south and north, respectively). East of the site is residential developments. While the site has been developed in the past, it currently appears as a vacant lot or field.

Streets in the area are illuminated with overhead street lights, located at approximately 500 foot spacing. These lights direct illumination on public streets around the project area and are found on all streets surrounding the proposed treatment plant location.

Existing utilities are located along the proposed WAS pipeline route, with overhead electrical and phone service found on poles generally located on the shoulders of the roads, and underground water and sewer lines within the ROW of existing roads and streets.

Air Quality

Air quality is regulated under the federal Clean Air Act, as amended, and is administered by the EPA. In Oregon, the EPA has delegated its regulatory authority for air quality to the DEQ and to regional clean air agencies. The mission of the Oregon DEQ's Air Quality Program is to preserve and enhance Oregon's air quality to support healthy, clean air for all Oregonians. In addition to the Clean Air Act, it is also responsible for implementing ORS 468a for air quality.

The 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 (NAAQS). Areas of the country that persistently exceed the NAAQS for these pollutants are designated "nonattainment" areas. The EPA also sets standards for 188 hazardous air pollutants, which are known or believed to cause human health effects when they exceed levels specified by the EPA. Hazardous air pollution emissions in excess of certain levels are subject to national emissions standards.

Air pollution within the City of Coos Bay has not been extensively documented; however, motor vehicles and residential wood heating are anticipated to be the primary source of air emissions in the immediate area. Exposed mud and sand at low tide in the project vicinity has also been noted as a potential source of odor. Coos County has been designated by the Oregon DEQ as an attainment area, meaning that air quality standards set by both DEQ and the EPA are maintained countywide. No significant sources of air pollution are designated by the EPA for the project. In addition, sufficient wind present throughout the year assists in dispersing any air pollutants that are released into the atmosphere. The nearest area that exceeds ambient air quality standards is the Eugene-Springfield area, which is approximately 75 air miles to the northeast of Coos Bay.

While the Clean Air Act and state and local regulations set standards for criteria pollutants and hazardous air pollutants, they do not set standards for odors. Existing odor and air pollutant-producing activities at the existing WWTP No. 2 site include primary sedimentation, aeration, and

the digester gasses and odors. Of note, the existing WWTP No. 2 does not have any odor control mechanisms in place, and odor is dispersed by local winds.

Property Values

Construction of the new WWTP No. 2 along Empire Boulevard has not been evaluated to determine if relocating the facility would result in a devaluation of real estate property values in the vicinity. It is anticipated that no loss in value would occur to the surrounding properties. In addition to being located adjacent to the proposed WWTP, the homes are located uphill of the site and have a partial view of Coos Bay that may be obstructed by the facility. Landscaping and security fencing would partially shield views of the new facility. It should be noted, however, that there are no City-imposed height restrictions for this tax lots where the new WWTP is proposed to be located. Without any restrictions, views from homes on the east side of Marple Street could be completely obstructed if a two-story home or high rise commercial building were to be located here in the future. For neighborhoods on the north and northwest corner of the site, the existing riparian vegetation will be retained and will provide a visual buffer for surrounding properties. In addition, the trailer park to the north has a tall hedge at its southern border that provides an additional visual and noise buffer.

The WAS pipeline route is located underground beneath existing City streets within the ROW along with other underground utilities.

Soils

In June 2013, a geotechnical field investigation was conducted by SHN to evaluate soil and groundwater conditions at the new WWTP No. 2 site. Subsurface investigations included three machine borings and eight exploratory test pits. The proposed site is located on a terrace that slopes gently, with the western half of the property being relatively flat with a range in elevation of approximately 14 to 20 feet. The eastern half of the property ascends to an elevation of approximately 30 feet, where it borders Marple Street.

Investigations by SHN determined there are various levels of thickness and a lateral distribution of non-engineered fill material at the proposed site, ranging from 2 to 6 feet. Fill material consists of a mix of unconsolidated and loose poorly graded sand and soft silt with varying amounts of fine rounded gravel. It is assumed to have been derived from previous on-site grading, based on the similarity in texture as compared to the underlying in-place native soils. The degree of compactive effort used during fill placement is unknown; therefore, all fill material currently in place at the site should be considered unsuitable as structural load bearing subgrade.

The SHN geotechnical investigation (SHN, 2013b) of the new WWTP No. 2 site noted published geologic mapping that indicates the site is underlain by Pleistocene age marine terrace deposits composed of weakly consolidated shallow marine sediments, with a structurally complex sequence of bedrock beneath. Based on the field evaluations completed at the site, the thickness of the marine terrace deposit is relatively uniform across the new construction site and varies from approximately 10 to 12 feet, thinning toward the southwest. Bedrock was encountered at 10 feet in the southwest corner of the site, and at approximately 17 feet in the northern portion of the site.

The top of the bedrock surface (i.e., terrace/bedrock contact) occurs at an elevation of approximately 0 feet relative to sea level and is interpreted to be relatively planar and level across the site.

Additional geotechnical investigations of the WAS pipeline route were conducted (SHN, 2014) to understand geological subsurface conditions along the pipeline route. Those investigations found similar conditions to those at the new treatment plant site, including soils. The report provides a series of engineering design recommendations for development of the HDD pipeline.

In addition to site investigations, the Natural Resources Conservation Service (NRCS) online Web Soil Survey program indicates the soil on most of the proposed site is predominantly Bandon sandy loam. The Bandon series consists of deep, well drained soils formed in sandy marine deposits on marine terraces. The existing WWTP No. 2 and a portion of the southwest corner of the new wastewater treatment plant site along Empire Boulevard consists of Heceta fine sand, which is typically deep and poorly drained soil found in deflation basins and depressional areas between dunes.

Geologic Hazards

Potential geologic hazards for the project site area include seismic ground shaking (earthquakes), surface fault rupture, seismically induced ground deformation (liquefaction and lateral spreading), and tsunami inundation.

Additional geotechnical investigations conducted by SHN (SHN, 2014) along the proposed WAS pipeline route determine subsurface conditions and potential geologic hazards. That report found that the pipeline route was feasible, and that there were no significant geologic hazards that would significantly impact development of HDD pipeline along this route. The report provides engineering design guidelines for use in the ultimate HDD design plan as well as for use in development of a hydraulic fracture ("frac-out") analysis that provides engineering design guidance for future construction of pipelines using HDD technology.

Earthquakes

The continental shelf off the coast of Oregon includes the convergence of two crustal plates called the Cascadia Subduction Zone, located approximately 50 miles west of the project. It is a regional-scale thrust fault (megathrust) that forms the plate boundary between the subducting Juan de Fuca Plate and the overriding North America Plate. It extends 750 miles offshore, from northern California to southern British Columbia. Subduction is driven by the westward migration of the North America Plate and eastward migration of the Juan de Fuca Plate (Personius and Nelson, 2005). Geological studies show that great earthquakes (> 8.0 magnitude) have repeatedly occurred in the past 7,000 years. The most recent great earthquake occurred on January 26, 1700, which resulted in much of the subduction zone rupturing during a 9.0 magnitude earthquake.

Surface Faults

The Barview fault is the nearest Pleistocene-Holocene age fault to the project. It is located approximately 1.5 miles to the south, where it projects offshore toward the northwest in Coos Bay. The fault is part of numerous north-striking thrust and reverse faults associated with the South Slough syncline formed during ongoing east-west compression in the forearc of the Cascadia Subduction Zone. Based on field reconnaissance of the project vicinity and a review of available geologic maps, literature, and aerial imagery, there is no geomorphic evidence to suggest that active faults cross the project sites. The late Pleistocene age of the undeformed marine terrace surface in the project vicinity precludes the potential for a Holocene age fault to be present. Therefore, SHN geotechnical engineering staff has determined the potential for a surface fault rupture to occur at the project site is low.

Liquefaction

Liquefaction is described as the sudden loss of soil shear strength due to a rapid increase of soil pore water pressures caused by cyclic loading from a seismic event. In simple terms, a liquefied soil acts more like a fluid than a solid when shaken during an earthquake. The adverse effects of liquefaction include local and regional ground settlement, ground cracking, expulsion of water and sand, the partial or complete loss of bearing and confining forces used to support loads, amplification of seismic shaking, and lateral spreading. In order for liquefaction to occur, the following are typically needed:

- Non-cohesive granular soils (e.g., poorly graded sand, silty sand);
- A shallow groundwater table; and
- Low density granular soils (typically associated with young geologic deposits).

Liquefaction susceptibility for Pleistocene marine terraces is estimated to be very low, as susceptibility generally decreases with increasing geologic age. All portions of the new site have been concluded to be underlain by Pleistocene age marine terrace materials and Eocene age siltstone bedrock. Initial geologic screening conducted by SHN did not identify conditions conducive to liquefaction. The non-cohesive soils encountered below the water table appear to be sufficiently dense and well-consolidated to preclude the hazard of liquefaction. In addition, the geologic age of the site's marine terrace deposits (>80,000 years) suggest that the liquefaction hazard at the site is very low. Therefore, SHN has concluded the risk to the proposed development (new WWTP and WAS pipeline) associated with seismically-induced liquefaction is low.

Lateral Spreading

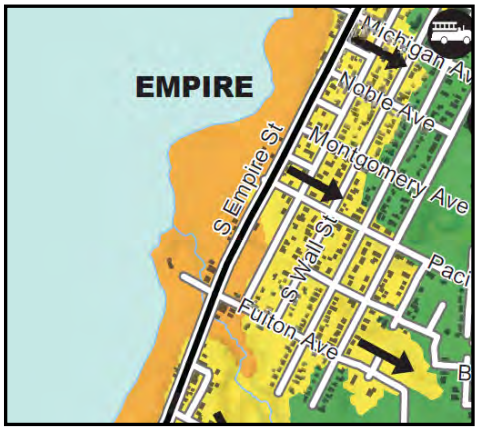
Lateral spreading is defined as lateral earth movement of liquefied soils, or competent strata riding on a liquefied soil layer, downslope toward an unsupported slope face (e.g., a coastal bluff or an inclined slope face). In general, lateral spreading has been observed on low to moderate gradient slopes, but has also been noted on slopes as flat as 1 degree. The distance of the nearest descending slope face to the new WWTP project site is about 300 feet. Based on the low liquefaction hazard and the distance to the edge of Coos Bay from the new site, SHN geotechnical engineers have determined there is a low potential for lateral spreading to occur.

Tsunamis

The coast of Oregon has a tsunami hazard. A tsunami is a series of sea waves triggered by undersea earthquakes or landslide activity and can travel thousands of miles in a matter of hours. As tsunamis enter shallow water near land, they increase in height and can cause great loss of life and property damage. Earthquakes along the boundary, called subduction earthquakes, can be of a magnitude 9 and can cause major tsunamis. A tsunami generated by a Cascadia Subduction Zone earthquake would push ocean water much farther inland than one generated by a larger but faraway earthquake, and could come onshore in 10 to 30 minutes. The only warning may be the earthquake shaking itself.

Avoiding danger means moving to high ground, safely above the possible wave height. To help residents and visitors along the entire Oregon coast prepare for the next Cascadia Subduction Zone earthquake and tsunami, Senate Bill 379 in 1995 instructed the Oregon Department of Geology and Mineral Industries (DOGAMI) to establish the area of expected tsunami inundation based on scientific evidence and tsunami modeling, and to provide inundation zone mapping. DOGAMI maps for the Coos Bay and North Bend area include tsunami evacuation routes developed by local officials and reviewed by the Oregon Office of Emergency Management. DOGAMI notes in the mapping it is based on preliminary data and should not be used for site-specific planning.

The existing WWTP No. 2 is located in the tsunami hazard zone for both local and distant tsunamis. The new WWTP site is located approximately 2/3 in both zones, with the upper northern 1/3 in a local zone only, as shown in Figure 6. The WAS pipeline is generally outside of the tsunami hazard zones with the exception of a portion of the pipeline under Fulton Ave. and a portion of S. Wasson Street.



- **Green:** OUTSIDE HAZARD AREA. Evacuate to this area for all tsunami warnings or if you feel an earthquake.
- **Yellow:** LOCAL CASCADIA EARTHQUAKE AND TSUNAMI. Evacuation zone for a local tsunami from an earthquake at the Oregon coast.
- **Orange:** DISTANT TSUNAMI. Evacuation zone for a distant tsunami from an earthquake far away from the Oregon coast.

Figure 6. Site as mapped by DOGAMI

Structures that are difficult to evacuate should not be placed in the expected tsunami inundation zone. Senate Bill 379 restricts the construction of certain essential facilities, hazardous facilities, major structures, and special occupancy structures in the tsunami inundation zone. Some of these require special evacuation or other mitigation techniques, while others are prohibited. However, the restrictions in Senate Bill 379 do not apply to the proposed expansion of WWTP No. 2, as it does not meet the criteria specified by the bill to warrant restrictions.

Important Farmland

The Farmland Protection Policy Act (FPPA) of 1981 is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that to the extent possible federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. For the purpose of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use.

Projects that receive federal funding and have the potential to convert important farmland to non-farm use are required to consult with the NRCS or U.S. Department of Agriculture to establish a farmland conversion rating score, using land evaluation and site assessment. There is no need for consultation when all work of the project is either on previously disturbed land within the footprint of an existing facility *or* inside the incorporated limits of a city. The existing WWTP No. 2, the new WWTP site, and the WAS pipeline alignment are each within the incorporated limits of the City of Coos Bay. No existing agricultural use occurs at any of the project component site and the project does not have the potential to impact farmland or the local agricultural economy, and no further analysis or documentation is required.

Hazardous Materials

A Phase I Environmental Site Assessment was conducted by PBS Engineering and Environmental, Inc. (PBS, 2011) to evaluate possible hazardous materials and wastes at the new WWTP site. EPA and state environmental databases were reviewed to identify sites that pose a potential environmental concern to the property due to contaminant migration. The site does not appear on any database. Based on a review of the listed sites, none appear to pose a significant environmental concern to the site.

Phase I results for the Proposed Action site indicated a low potential for site chemical contamination from onsite sources, little potential of offsite contamination from onsite sources, and little potential for site impact from offsite contaminant migration in surface or groundwater from adjacent sites within a .5 mile radius. The report noted there is a potential for a historical heating oil tank to be present at Tax Lot 2600 on the southwest corner of the site. Investigations by the City were undertaken that included using a backhoe to pot-hole the site and the use of a metal detector; no tank was discovered. Based on available records, the former house (demolished in 2004) was heated by a wood stove. PBS determined this is a low environmental concern. Based on the findings of their study, it is the opinion of PBS that no additional investigation is warranted.

3.1.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action alternative, the City would continue to use the existing WWTP No. 2 for wastewater treatment. Existing conditions would be maintained for wastewater treatment and effluent disposal, and no new construction activities would occur. The City would not be able to meet the requirements of the MAO and would continue to face ongoing issues at the existing plant to meet the standards intended to protect the environment (particularly receiving waters) against unacceptable degradation resulting from power failure, floods, peak loads, equipment failure, and maintenance shutdowns that would potentially impact physical resources and associated land use. The City would still need to comply with DEQ treatment standards and it is anticipated that affects on air quality, including offensive odors generated at the existing WWTP, would continue to occur.

Under this alternative the proposed new wastewater treatment facility site would remain unchanged from its current condition. The site would appear to be former residential sites with remnant foundations and historical disturbance. Land uses in the area of the project would remain substantially unchanged. No WAS pipeline would be constructed, and biosolids would remain to the existing WWTP No. 2. Area lighting, traffic patterns and noise would remain the same as the current condition under the No Action alternative. Existing street lights will continue to provide night illumination in the area; traffic patterns will remain the same; and noise generated by this traffic and surrounding existing uses would also remain at similar levels.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

Under the Proposed Action, upgrades to WWTP No. 2 would require a building permit and grading permit from the City, including any permits, variances, or authorizations required for land use actions to ensure the project is in accordance with land use plans for the City. Existing topography and soil conditions at the new site support the proposed construction. Implementation of the design requirements found in the geotechnical report for the new WWTP site (SHN, 2013b) will provide appropriate construction methods. All vehicles would use the existing road infrastructure to access the site. Best management practices (BMPs) would be required for sediment and erosion control. Based on the scale of project, the impact intensity from the ground disturbing activities would be minor, with localized impacts within regulatory standards. The proposed wastewater treatment facility is consistent with the City's Comprehensive Plan because it provides sewer treatment for the service district.

Construction of new wastewater treatment services would increase the impervious surface area of the Proposed Action site, with a maximum of 2.03 acres of surface area affected. There would be direct effects to soil productivity and fertility at the site by the construction footprint that would decrease the amount of open soil. Soil stability would increase following construction and infiltration capacity would decrease at the site where buildings, structures, and impervious surfaces are placed.

The traffic associated with employees of a wastewater treatment facility is a small percentage of the existing traffic in the project vicinity, and even smaller than the amount that would be generated if

the overall new site for the Proposed Action was to be developed for single family residential homes. Temporary construction traffic would increase during project construction, but would return to pre-project levels post-construction. Public service disruptions from construction are expected to be brief and infrequent. Detours may be required to allow transport of equipment and construction materials to the new site, or to allow homeowners access to their property east of the new site. No permanent changes to roadways or traffic patterns will occur as a result of implementation of this alternative.

The Operations Division of the City's Public Works Department is responsible for the maintenance of public infrastructure and overseeing project and contract management. As such, it would ensure a traffic control plan would be implemented as needed during construction to ensure temporary traffic control, alternate routes, staging area locations, and optimal working times are planned to minimize traffic disruption. Following construction, the new facility is expected to result in minor increases in existing traffic, resulting primarily from wastewater treatment employees reporting/leaving work at the entrance to the site on Fulton Avenue.

The potential for noise impacts on the surrounding residential community was evaluated and it was determined that prudent design and equipment selection, combined with meeting the City's noise ordinance, would be sufficient to minimize noise impacts. To protect construction workers and plant operators from construction and operational related noise impacts, the construction contractor and City would be required to comply with applicable occupational health and safety regulations and implement appropriate noise control measures, such as wearing hearing protection and limiting exposure times. Provided these measures are implemented during construction and operations, no adverse noise effects on workers are anticipated.

In terms of potential impacts to visual resources, the new WWTP has been designed to minimize the industrial look of the facility and present an aesthetically acceptable view. The concept for the facility is to present an architectural image of quality and good design, to provide architectural exterior treatments that are uniform and complimentary across all structures on site, and to provide visual screening of process equipment from adjacent roadways and residential neighborhoods. To achieve this, the following design criteria will be implemented to minimize the visual impact of the process equipment:

- The headworks building and UV facility will each have a metal roof panel canopy installed that will be fitted with screening panels on at least three sides;
- The maintenance building will have a sloping roof with metal roof panels installed; and
- Various exterior architectural wall treatments for the SBRs and equalizations basins will be considered in an attempt to minimize the visual impacts from their surfaces.

The entire new site will be enclosed inside a six foot tall fence and outdoor lighting will be provided on exterior doors, on roads and parking lots, and where deemed appropriate for visibility. Impacts to the community surrounding the facility due to lighting would be minimized through the use of fixtures that minimize any sky glow effect and trespass of light off the facility. This includes sharp cut-off exterior lights that limit the migration of light. As required by City code, continuous lights will be provided 24 hours a day along egress paths, along with emergency illumination for life safety, property, and equipment protection.

Under the Proposed Action, minor temporary increases in airborne particles would occur during construction from increased engine exhaust pollutants and fugitive dust. These increases are expected to occur intermittently during construction. The Proposed Action would not create exceedances of any federal or state emission standard for the project vicinity and does not violate any NAAQS.

Once construction is completed, WWTP would have improved air quality through reduced odors from the new plant as a result of the installation of specialty odor control equipment. Odors generated by the Proposed Action will consist primarily of hydrogen sulfide (H_2S) odors, although lesser quantities of other organic odor compounds are anticipated to occur in trace amounts, including mercaptans, dimethyl disulfide, and others. The SBR basins are expected to generate more complex odors, but at low concentrations. Odor control systems installed as part of the Proposed Action will be capable of removing both H_2S and general odor. The odor control technology selected was chosen to ensure it is capable of a high degree of odor removal efficiency to prevent odor complaints and improve public relations.

In addition, the headworks of the new wastewater treatment facility is expected to produce significant odors which can create an unpleasant nuisance to the surrounding area if not captured. For the new WWTP No. 2 headworks facility, the screenings channels and equipment will be totally enclosed and the odorous air will be drawn off the channels by the odor control system. The screenings and grit dumpster room, located on the ground floor, will also have the odorous air captured and sent to the odor control system. Odor control will be accomplished by an engineered media packaged biofilter, which was selected as the best technology for the system designed under this alternative.

Odor tests conducted to determine the detection threshold (DT) for system components are able to determine detectable concentrations and when odor may be perceptible regardless of what odor compound(s) is causing the odor. The headworks of a WWTP typically produces significant odors which can create an unpleasant nuisance to the surrounding area if not captured. The selected odor reduction goal, based on past experience at similar applications, is to reduce offsite H_2S concentrations to 15 micrograms (µg)/m3 (10 parts per billion by volume [ppbV]) or below, considered the concentration in air likely to cause odor complaints. These odor goals should be met based on predicted hourly offsite levels, as determined by dispersion modeling, peak inlet odor concentrations, and 100 percent compliance. To comply, odor limits must not be exceeded for any hour of the year. The State of Oregon does not have a regulatory value for H_2S, but does enforce a "nuisance" clause.

To ensure the project meets the offsite odor goal set forth in the project design, a dispersion model was set up for the entire expanded and upgraded facility to verify that the proposed design will meet the offsite odor goal set forth. The American Meteorological Society/EPA Regulatory Model was used to predict offsite odor impacts, utilizing an approach based on criteria consistent with the EPA's *Guidelines on Air Quality Modeling*. The dispersion model predicted dispersion over a land area based on emission rates, local meteorological data, and surface parameters. Model inputs included emission rates from odorous processes and local meteorological and terrain data, and model output predicted variations in odor concentration as a function of distance from the source.

The results of the odor dispersion modeling indicate that predicted offsite impacts will fall below the project specific maximum offsite odor criteria for both H_2S and DT, with odor control equipment utilized.

The influent pump station minimizes odors by capturing air emissions from the wet well and processing the air to remove noxious odors. The only release of air occurs from the blower exhaust at the pump station, which passes through a biofilter before being exhausted. In addition, an odor control system would be implemented to minimize odors. By improving treatment technology, operation of the WWTP could improve air quality slightly after the proposed upgrades are in place. No long-term effects on air quality are anticipated.

In terms of geologic hazards, geotechnical investigations have determined there is a low potential for surface faults ruptures, liquefaction, or lateral spreading to impact the new WWTP site. If tsunami waves are generated locally from a distant earthquake in the Pacific region, the existing WWTP No. 2 would be the most vulnerable. The impact intensity would be dependent on the wave height in relation to the facility. From DOGAMI mapping, close to 2/3 of the new site may also be vulnerable to waves generated by a distant tsunami. If a great earthquake occurs along the Cascadia Subduction Zone, it would generate long duration, very strong ground shaking, followed by a series of tsunami waves, which would likely affect the existing and new sites. Given the uncertainty in tsunami wave run-up heights, the low-lying elevation of the new site (14 feet to 30 feet), and the proximity to Coos Bay and the bay entrance, tsunami inundation should be expected to occur at both sites as a result of a great subduction earthquake along the Cascadia Subduction Zone.

The most common hazardous materials that enter municipal wastewater systems are grease and typical household cleaning products. The effects of an inadvertent disposal of hazardous wastes into wastewater effluent is more likely to affect smaller plants than larger plants because the materials are usually more diluted in the larger plants. However, the frequency of these incidents at a smaller facility should be correspondingly lower, so there would likely be no net increase in potential concern. Established treatments and disinfection processes in the facility design ensure that when treated effluent is discharged, potential chemical contamination and biological pathogens have already been diluted, volatized, or absorbed by nearby sediments and would not present a potential hazard.

Chemicals at the proposed new facility would either be generated on-site from non-hazardous materials or delivered via truck and stored on-site, inside chemical tanks with secondary containment structures. No gas phase chemicals are proposed for use at the facility. Based on this, the potential for hazardous chemical impacts are minimal.

Overall, impacts to land use by the development of a new WWTP are expected to be measurable but minor in their intensity, with small and localized changes that would be mitigated to reduce any potential adverse effects. Providing upgraded wastewater treatment is essential to effectively treat existing wastewater flows.

Construction of the new WAS pipeline will occur within City street ROW and be underground, and will have minimal impacts on land uses. Traffic along the construction route is expected to be

slightly impacted by the locations of the entry and exit sites for the HDD drilling equipment. At these locations, portions of the roadway will need to be temporarily closed to traffic for the construction. Since HDD installs hundreds of feet of pipe underground from one location, the entry and exit locations of the pipe are limited. Additionally, areas where open cut trenches of pipeline are required are also limited. These areas will require lane closures and traffic control or detours to provide safety to the public. While there will be lane closures and traffic controls that will inconvenience drivers, the impacts are short-term and temporary; once construction is completed the roadways will be fully reopened with no long-term restrictions.

Noise from the WAS pipeline construction will occur from construction equipment at the drilling sites and along the routes where open cut trenches will be constructed. HDD drilling sites (entry and exit sites) and open cut trench construction will occur in residential and commercial areas. Noise from these construction activities will be in accordance with the City's municipal code. Use of construction equipment during this period will have a minor impact on area residents and businesses in the immediate vicinity of the construction work, but is not considered significant.

There will be no long-term impacts to the visual resources from the WAS pipeline, as the entire pipeline will be underground. Short-term visual impacts will be the construction equipment during project development, but this impact is limited in scope and scale and once construction is completed for a segment of the pipeline, the construction equipment will be gone and the visual impact will be eliminated. Impacts from pipeline construction to air quality include minor emissions from construction related equipment; dust emissions are anticipated to be minor and not a significant issue. There will be no impact to property values from the pipeline, as once constructed it will be no different than other underground public utilities.

Geotechnical investigations for the pipeline alignment found that the alignment is suitable for HDD construction and that there are no significant issues related to geology or geotechnical conditions that would eliminate the use of this technology. Additionally, the geotechnical report outlines a series of engineering design recommendations that will be incorporated into the HDD design to reduce the potential for frac-out and provide contractors with sufficient information to minimize risk in developing the project.

In all, the development of the WAS pipeline will have minimal, if any impacts to land uses along its alignment.

3.1.3 Mitigation

No construction would occur under the No Action alternative and no mitigation would be required.

The following mitigation measures recommended for the Proposed Action would ensure that constructing a wastewater treatment facility at the new site is compliant with local, state, and federal land use requirements:

1. The City shall comply with the Coos Bay Comprehensive Plan requirements and will ensure that these requirements are included in the design and construction documents for the

project. The City will document of compliance, including any conditional use permits or variances, should be retained in the administrative record for the project.

2. The City shall ensure that appropriate BMPs to control erosion and sediment, reduce spills and pollution are selected and implemented in construction contracts. The City shall provide monitoring to ensure construction contractor compliance.

3. The City shall implement a traffic control plan during construction to ensure traffic control measures, alternate routes, staging area locations, and optimal working times are planned to minimize traffic disruption.

4. Standard construction BMPs, including decreasing vehicle idle times and watering down construction areas, should be implemented during construction to reduce temporary effects to air quality. Debris created by construction should not be burned, but transported to a disposal area to avoid further air pollution.

5. Noise from the construction activities will be in compliance with the City of Coos Bay Municipal Code regarding the nuisance ordinance for noise.

6. Structures should be designed and constructed to withstand seismic shaking as required by the International Building Code (IBC) for Site Class C, consisting of "very dense soil and soft rock" (IBC Table 1613.5.2, 2012).

7. Surface drainage will be designed to prevent ponding and enable water to drain toward suitable collection or discharge facilities from foundations, slabs-on-grade, edges of pavement, and tops of slopes. Concentrated water should not be discharged onto bare ground or slopes, but should be carried in pipes or lined channels to suitable disposal points.

8. Should any hazardous materials and/or toxic waste be found at construction sites during project development, the City will ensure that these materials are collected and disposed of in accordance with federal and Oregon Department of Health and DEQ regulations.

3.2 Floodplains

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program and reviews and approves changes to Flood Insurance Rate Maps (FIRM). The State of Oregon administers floodplain regulations through its review of local government regulations in compliance with statewide planning goals. Specifically, floodplain regulation is accomplished through State Goal 7, Areas Subject to Natural Disaster and Hazards. All local jurisdictions must adopt regulations that comply with Goal 7 and its policies, including having their regulations acknowledged by the Oregon Department of Land Conservation and Development (DLCD).

The community of Coos Bay participates in the National Flood Insurance Program (NFIP) and is mapped for floodplains. To ensure compliance with the NFIP, the City has a floodplain management ordinance (Coos Bay Municipal Code Chapter 17.195) to reduce future flood risks to

new construction in Special Flood Hazard Areas (SFHA). A SFHA is a high-risk area defined as any land that would be inundated by a flood having a 1 percent chance of occurring in a given year. It is also referred to as a 100-year flood and as Zone A in flood zone mapping by FEMA. All flood zone designations are delineated on FIRMs for NFIP communities by FEMA.

In addition to local and state floodplain management, Executive Order (EO) 11988 for Floodplain Management requires federal funding agencies to take action to minimize the occupancy and modification of floodplains and to avoid adverse effects and incompatible development in the floodplain. Provisions for floodplain development permits are reviewed to ensure any proposed development within a floodplain will be reasonably safe from flooding or resistant to flood damage.

3.2.1 Affected Environment

The existing WWTP No. 2 and the southwest portion of the site proposed for the new WWTP are shown as Zone X on FIRM Community Panel No. 41011C0168E, dated March 17m 2014. The remainder of the proposed new WWTP No. 2 site is also shown as Zone X on FIRM Community Panel No. 41011C0169E, dated March 17, 2014. Zone X is an area of minimal flood hazard and is usually depicted on FIRMs as above the 500-year flood level. The existing outfall that will be utilized for the new WWTP No. 2 is located just south of Fulton Avenue (adjacent to the existing WWTP No. 2 site) and is shown on FIRM Community Panel No. 41011C0168E as being in Zone AE, a SFHA, or the 100-year flood zone. FIRM maps are located in Appendix A.

3.2.2 Environmental Consequences

Alternative 1 – No Action

With the implementation of the No Action alternative, no construction would occur; therefore there would be no impacts within the 100-year floodplain from construction related impacts. The existing WWTP No. 2 is not located in the floodplain and continued operations of the facility under the No Action alternative would also have no impact on floodplains. The existing wastewater outfall is located within the 100-year floodplain (Zone AE) and would continue to be utilized by the existing facility. The No Action alternative would maintain existing conditions and no improvements to the facility would be undertaken towards meeting the MAO requirements. Lack of facility improvements could lead to exceedance of NPDES discharge limits. Continued use of the existing WWTP No. 2 and the outfall would not change any pre-existing floodplain conditions and would have no long-term adverse impacts to floodplains.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The Proposed Action does not propose any construction in the 100-year floodplain. The new WWTP No. 2 facility is located outside of the floodplain, as is the new WAS forcemain pipeline. The existing outfall for WWTP No. 2, at its current site, is located within the 100-year zone, and is proposed to be utilized for the Proposed Action.

The project design and permitting provisions include appropriate mitigation measures to minimize potential adverse affects to water quality in Coos Bay and its associated floodplain. The Proposed Action would result in higher quality effluent being released with increased reliability to meet NPDES limits. Use of the existing outfall structure would not cause any change to pre-existing floodplain values and will have no long-term adverse effects to the floodplain.

3.2.3 Mitigation

The City has concluded the alternatives would not have an impact on a 100-year or 500-year floodplain. No additional mitigation is required, as compliance with local, state, and federal permitting and authorization requirements, including BMPs for the project, will ensure any potential adverse effects are minimized.

3.3 Wetlands

Wetlands are formally defined by the U.S. Army Corps of Engineers (USACE) and the EPA 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. The three essential characteristics of wetlands are: 1) hydrophytic vegetation (i.e., a plant that grows either partly or totally submerged in water, or a plant growing in waterlogged soil); 2) hydric soils, characterized by an abundance of moisture; and 3) wetland hydrology, including the distribution or circulation of water on and below the earth's surface.

Projects that have the potential to affect waters of the United States must comply with USACE permit requirements under Section 404 of the Clean Water Act (CWA) of 1972. This includes any project that involves the excavation or the placement of fill material into waters of the United States, particularly when work will be conducted below the ordinary high water mark (OHWM) of a water body or in a wetland. USACE regulations also require that any fill material used is obtained from a permitted borrow location or approved upland source, unless otherwise authorized by the USACE. In addition, EO 11990 for the Protection of Wetlands requires projects that receive federal funding follow avoidance, mitigation, and preservation procedures with public input before implementing construction that has the potential to affect wetlands.

At the state level, DEQ Water Quality Certification (WQC) must also be received if the project will impact state waters. WQC is triggered by the USACE permit process whenever state waters have the potential to be impacted. In addition, Oregon's Removal-Fill Law (ORS 196.795-990), enacted in 1967, requires people who plan to remove or fill material in waters of the state to obtain a permit from the Department of State Lands (DSL). "Waters of the state" are defined as "natural waterways including all tidal and nontidal bays, intermittent streams, constantly flowing streams, lakes, wetlands, and other bodies of water in this state, navigable and nonnavigable, including that portion of the Pacific Ocean that is in the boundaries of this state." The law applies to all landowners, whether private individuals or public agencies.

Although the City does not have its own wetland ordinance, it coordinates with the DSL and USACE regarding proposed fill and removal in wetlands.

3.3.1 Affected Environment

The affected environment includes the existing WWTP No. 2 site, the new WWTP site on the east side of Empire Boulevard, as well as the WAS pipeline alignment. The existing WWTP No. 2 site is built on historic fill and is protected by riprap on all sides except where accessed by Fulton Avenue. No wetlands are mapped or have been observed on the existing site.

At the new WWTP site, several alterations related to wetlands and water resources have occurred in the last ten years to prepare the land for development. In 2004, the Oregon DSL concurred with the wetlands/waters delineation for Tax Lot 2700 (Determination No. 04-0081). At that time, three wetlands and a waterway described as "a ditched drainage, possibly a modified natural stream" (stream) were mapped. Subsequently, the DSL issued Removal-Fill Permit No. 31703 and the USACE issued Nationwide Permit (NWP) No. 2003-733 for Tax Lot 2700. The DSL permit was renewed on May 4, 2006, to fill all the wetlands on Tax Lot 2700 (the lot is 1.79 acres).

Work done to grade the site as part of the stream realignment was allegedly incomplete and inadequate to properly drain the site of storm water. As a result, there is an area on the original property and adjacent properties (tax lots 2600 and 2601) which retained water and which continues to meet the DSL criteria for wetlands and is considered "waters of the state." The USACE, however, does not consider the wetlands jurisdictional at the federal level, as they are isolated and lack connectivity to "waters of the U.S."

The most recent wetland delineation for the new site was conducted by PBS in 2011, with a report dated November 16, 2011. The study area included the entirety of tax lots 2600, 2601, and 2700, and the southern edge of Tax Lot 2800, up to the edges of the modified unnamed stream on the northern and northwestern perimeter of the site. In addition to the stream, the study area identified one Palustrine emergent (PEM) wetland totaling approximately 4,132 square feet (0.095 acres) in the south central portion of the site in portions of tax lots 2700, 2600, and 2601.

The wetland supports some native vegetation and approximately 40 percent of the relative cover in the herbaceous layer is natives. Dominant herbaceous vegetation in the wetland included small-fruited bulrush (*Scirpus microcarpus*), Bolander's rush (*Juncus bolanderi*), soft rush (*Juncus effusus*), jointed rush (*Juncus articulatus*), colonial bentgrass (*Agrostis tenuis*), hairy cat's ear (*Hypochaeris radicata*), Watson's willow herb (*Epilobium ciliatum*), and creeping buttercup (*Ranunculus repens*). Dominant species in the shrub/sapling layer were typically saplings of Hooker's willow (*Salix hookeriana*) and red alder (*Alnus rubra*). The wetland does not extend beyond the site.

The highest elevation portion of the wetland starts as a narrow, low gradient drainage along the toe of the eastern hill that likely receives both surface runoff and subsurface lateral flow from the hill slope. The wetland slopes gently to the south where it widens into a more or less flat to slightly concave area that appears to pond for short periods of time after precipitation, and has been classified as ephemeral. It then narrows again into a narrow and shallow incision in topsoil layers (a rill) that terminates in a nearly square, excavated depression.

The Oregon DSL concurred with the 2011 wetland delineation in a letter dating March 28, 2012, and stated that it would be subject to permit requirements under the state Removal-Fill Law. Of note, a portion of the wetland is part of a previously delineated wetland which had been permitted to be filled under DSL Permit No. 31703 and USACE Permit No. 2003-773 for Tax Lot 2700. The DSL determination is valid for five years from the date of the letter. The City has obtained a Removal-Fill permit for this site.

The WAS pipeline route is entirely underground and has no impact on wetlands. The HDD construction sites will be within City streets, as will the areas of open cut trenches where new pipe will be constructed. None of these areas have wetlands present.

3.3.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action alternative, no construction activities would occur that would disturb the earth surface and potentially impact wetlands. However, with continued use of the existing WWTP No. 2, water quality may be impacted by runoff during future flooding events. This may create minor short-term impacts on the water quality of Coos Bay and adjacent wetlands, including wetlands identified south of the existing WWTP No. 2. In addition, the sewer pipe across First Creek south of the existing WWTP is in poor condition and could potentially leak into the stream and adjacent wetlands. It is proposed to be replaced when a separate project to construct road improvements to Empire Boulevard, tentatively planned for 2014, is implemented.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The small, isolated wetland delineated by PBS is proposed to be eliminated and filled to accommodate development of the new WWTP site. Although the wetland has been determined to be nonjurisdictional by the USACE (and hence no USACE permit is required), the Oregon DSL has determined the wetland is subject to the permit requirements of the state Removal-Fill Law. Previous calculated values for wetland functions were all quite low, as it is a small, degraded wetland in a region that contains higher functioning wetlands. A number of factors contributed to the analysis, including there is no surface water connection to other waters, the wetland is in a low position in the watershed, there are better functioning systems and habitat in the area, and it lacks rare species or habitat components.

The WAS pipeline route has been evaluated for wetlands and none exist. Construction will occur within previously constructed streets, or drilling will place pipe below ground level and underneath any area that might have a wetland. Open cut trenches are located in existing streets that have been paved. There will be no impact to wetlands.

3.3.3 Mitigation

Measures to avoid wetland impacts are incorporated into the construction methods, including avoiding clearing and grading near or on the banks of the small stream channel on Tax Lot 2800;

Tax Lot 2800 is not a part of the project site, though it is located immediately adjacent to the project. In addition to standard BMPs that will be required for the project, the following mitigation measures specific to wetlands would ensure potential effects to wetlands will be minimal and compensated for:

1. Access roads and work areas must use existing access ways whenever possible to prevent impacts to mitigation wetlands/channel on the north and west site of the new WWTP site. BMPs such as silt fencing and reseeding using native species are required, as needed, to eliminate the potential for runoff and erosion to adjacent areas.

2. No construction material or debris shall be staged or disposed of in a wetland, even temporarily. Excess and unsuitable excavated material shall not be side cast into or placed upslope of wetlands environments and shall be disposed of at an authorized disposal location.

3. The City is required to directly coordinate with the Oregon DEQ, DSL, and USACE, regarding permits and authorizations required to comply with state and federal laws for the protection of wetlands. The City shall obtain and comply with all requirements prior to and during project implementation

3.4 Historic Properties

The National Historic Preservation Act (NHPA) requires that federally-funded actions take into account cultural resources in and around a project site, in cooperation with the state, tribes, and local governments. Section 106 of the NHPA and its implementing regulations (36 CFR 800) outline the procedures to be followed in the documentation, evaluation, and mitigation of impacts to cultural resources. This includes coordination with the State Historic Preservation Office (SHPO) and appropriate tribes. In addition, the Archeological (sic) and Historic Preservation Act (AHPA) of 1974, as amended, includes provisions for construction and requires coordination with the Department of Interior if historic properties are discovered after a project has begun and potential adverse effects may occur.

The SHPO is responsible for administering state-level programs. Cultural resources include resources of historical and/or archaeological significance. For purposes of this analysis, the term "archaeological resources" is used to refer to prehistoric or historic subsurface sites or objects, and the term "historic resources" is used to refer to above-ground historic structures and sites. Archaeological sites, objects, and human remains are protected under Oregon Revised Statutes (ORS) 358.905 and ORS 97.740.

3.4.1 Affected Environment

Prehistoric Context

Archaeological research in southwest Oregon suggests that people have lived in the region for over 10,000 years (Winthrop, 1993; Connolly, 1991). As a result of geomorphological processes, very few well-stratified sites have been found or adequately reported. Furthermore, local soil conditions

hamper the preservation of perishable organic material, often making it difficult to reliably radiocarbon date many archaeological deposits. Nonetheless, analyses of archaeological sites suggest that southwest Oregon was occupied by a society characterized by high residential mobility that took advantage of the seasonal and spatial patchiness of the local environment.

Archaeological research conducted since 1940 emphasizes the complexity of the settlement patterns of southwest Oregon coastal people. Seasonal household mobility was required to access and harvest a variety of resources, including not only salmon and sea mammals, but also upland resources such as berries, camas, acorns, elk, and deer, as well as estuarine species such as shellfish, flatfish, herring, and smelt. Surveys have identified at least 35 wood stake fish weirs previously used to impound fish with the outgoing tide on the intertidal mudflats of the Coos and Coquille estuaries. Elsewhere on the Oregon coast, fish weirs have been dated to as old as 3,000 Before Present (Byram, 2002). Despite the social transformations of the last 2,000 years, activities in seasonal camps remained important for household subsistence and social experience.

The general area where the project is located has been the historical home to the *Hanis* and *Miluk* people. The Miluk villages were centered on the South Slough, located near the mouth of Coos Bay to the south and extending along the southwest shores of Coos Bay. The Hanis villages extended from the current city of Empire and out to the north and east (Byram and Purdy, 2008). They lived in semi-permanent villages that were located along estuaries, main stems of the region's larger rivers, or outer-coast headlands ideally situated for the purposes of fishing, gathering, and hunting. The area associated with the project area lies within the neighborhood of the Hanis village *Hanisitch*, which is recalled in Coos oral tradition as one of the principle villages on Coos Bay and one that was visited by many earlier European explorers.

Historic Context

In addition to the tribal history, the first EuroAmericans to pass through the Coos Bay area were parties of fur trappers in the 1820s, including Hudson's Bay Company trader Alexander McLeod during his explorations from 1826 to 1827 of the southern Oregon coast (Tveskov, 2000).
In addition, a party led by Jedediah Smith traveled from California through Coos Bay in 1828. Smith traveled with more than 20 men and 300 horses and mules through country that had never been traveled by horseback before, with the objective of selling the horses once they made it to the Rocky Mountains. Parties during this era entered an area in which there were no maps, written records, eyewitness accounts, or other information they could use to guide their way.

American immigration to the area gradually increased as businessmen and their families, miners, and farmers were attracted to the region by free land offered by the U.S. government. After Congress passed the Oregon Donation Land Claims (DLC) Act in 1850, surveyed public lands became available to white U.S. citizens over the age of 18 throughout the Oregon Territory. From December 2, 1850, until 1855, a man and wife could claim 320 acres and a single person (men and widows older than 18) 160 acres. The lands were free to those who claimed them and then stayed to live upon them. During the five-year period the law was in effect, nearly 9,000 persons filed claim to approximately 2.5 million acres of Oregon, mostly within the Willamette and Umpqua valleys. The law created severe problems throughout the Pacific Northwest between white settlers

and Indian residents, who were watching their ancestral homelands being systematically occupied by strangers without explanation or compensation.

It was not until 1852, when a shipwreck landed at Coos Bay, that the end was marked by the "uncontested tenure of the Coos Indians on the estuary" and the beginning of a "long and enduring" presence of EuroAmericans in the area (Beckham, 2000). The *Captain Lincoln* sent to resupply the army post at Fort Orford ran adrift on the North Spit where the sailors spent four months awaiting rescue. The castaways survived in makeshift tents and subsisted on supplies intended for Fort Orford, supplemented by fresh foods provided by Indian people from the village of Hanisitch, adjacent to the current project area. Some of the castaways were said to have later returned to settle permanently in the area (Walsh, 2009).

Shortly after the *Captain Lincoln* survivors were taken back to Fort Orford, groups of settlers from other Oregon outposts ventured through Coos Bay. DLC claims made in the Coos Bay area included settlements by businessmen in present-day Empire and coal mine developers near present-day Libby in 1853 and 1854. In 1853, Coos County was created from parts of Jackson and Umpqua counties and Empire City became the first permanent EuroAmerican unincorporated city in the area, established by a Jacksonville group called the Coos Bay Commercial Company. Empire City, the "future metropolis of the golden west," was named the county seat in 1854 (Beckham, 1973).

Men who came as part of the Coos Bay Commercial Company were lured by Perry B. Marple, an "eccentric promoter and former preacher" who was mining outside of Jacksonville and extolling the beauty and excellent harbor known as Coos Bay to other miners. Other claims were scattered along the Pacific Coast and along the mainstem Coquille during the same years for a variety of reasons, including agriculture, townsite development, and mining. Later settlers prospered and formed business foundations in coal mining, logging, milling, and dairy farming in Coos Bay and Coos County. By the 1870s, growing industry in the nearby cities of Marshfield (now Coos Bay) and North Bend soon eclipsed Empire City, as a new sawmill and shipyard drew workers to the area. In 1896, the Coos County Seat was moved south to Coquille.

After a failed attempt at the unification of Marshfield, North Bend, and Empire into a single city, the town of Marshfield alone was renamed Coos Bay in 1944. A 1909 magazine describes the Coos Bay area as having "an abundance of coal, fine agricultural, dairy and fruit land, navigable river, healthful and mild climate, and good citizens" (Coos County Chamber of Commerce, 1909). The area was largely cut off from automobile traffic well into the 20th century, and residents were connected to the outside world by ocean and river going ships, along with limited train travel.

After World War I ended in 1918, improvements were made to barely passable wagon roads and official plans were made in 1921 to construct the Roosevelt Highway (now U.S. Highway 101) to connect communities along the Oregon Coast. Initially small streams en route were bridged. Larger spans, like Coos Bay, continued to require ferry passage until the completion of the McCullough Bridge in 1936.

Historic Properties

New Wastewater Treatment Plant No. 2 Site
The project is located within the bounds of the original 1853 Empire townsite. Empire is now incorporated into the City of Coos Bay, but was originally the first EuroAmerican town established in Coos County. Consequently, it is possible that mid- to late- 19th century or early 20th century residential or business sites, rich in highly visible ferrous metal, ceramic, or glass artifacts, could be present. All of these site types will typically yield an abundance of artifacts and ecofacts that would be identified through pedestrian or shovel test pit surveys.

Within the project Area of Potential Effects (APE), previously recorded cultural resource surveys include a survey conducted in 2012 by PBS. The work consisted of a pedestrian survey and the excavation of three shovel test probes along the western edge of the project area. No cultural resources were encountered during this survey (Thomas, 2012).

Southern Oregon University Laboratory of Anthropology (SOULA) archaeologist Dr. Mark Tveskov along with Southern Oregon University students conducted a cultural resources survey including pedestrian and subsurface surveys of the project APE on April 27, 2013 (SOULA Report No. 13.06). The SOULA report also summarizes other surveys conducted in the general area of the project vicinity. Prior to conducting the cultural resources survey, SOULA conducted a records search of the SHPO archaeological database for the project's APE and determined no cultural resources have been previously identified within the APE for the project. In addition to conducting a pedestrian survey of the entire site, eight 30 cm x 30 cm shovel test probes (STPs) were excavated on a 20-meter grid to determine if the landform was intact and if cultural material was present.

The project area lies on an elevated Pleistocene beach terrace overlooking Coos Bay, which is itself overlain by a relatively shallow deposit more recent soil. Such locations on the southern Oregon coast frequently contain archaeological sites, and, except in exceptional locations, are rarely deep or stratified into the underlying terrace and are thus visible via pedestrian survey (where ground visibility is high) or through the use of STPs.

During the pedestrian survey, four distinct areas were noted, including a section along the southeastern portion of the project area that consisted of a recently demolished structure and gravel fill, and an area northwest of this that also consisted of gravel fill. No cultural material was observed within this area and the landform did not appear to be intact. Along the southern portion of the project area and within the northwestern corner of the APE, two areas were noted that had dense low vegetation and appeared to represent disturbed wetland areas. Previous development of the site included channelizing this drainage into a culvert that runs beneath the surface along the northwestern edge of the project area. Within the central portion of the project area and along the eastern edge, two areas of good surface visibility were encountered. Both of these appeared to have had a large amount of disturbance associated with them from historic construction and no cultural material was noted in these areas. The remaining portion of the project APE was a level grass covered field with low surface visibility that appeared to be a relatively intact landform.

During the subsurface survey, the soils consisted of reddish brown dune sand mottled with darker brown soils. Within the STPs excavated, a mixture of modern and mid-twentieth century cultural

material was recovered. The modern deposits indicated that the soils within this vicinity are disturbed up to at least 60 cm below the surface. SOULA concluded the presence of the temporally mixed deposits indicated that the soils in the APE are largely disturbed.

An 1857 General Land Office map of the project area indicates a coal mine was located within the northeastern corner of the project APE. SOULA determined this would suggest that a large amount of disturbance had occurred to the site during this era of use. While two artifacts of a historic nature were recovered from the site during the STPs conducted in April 2013, they were within disturbed soils and associated with modern material. Due to the disturbed nature of the project area, the material is not believed to represent an intact deposit.

WAS Pipeline Alignment

The WAS pipeline route was evaluated by Byram Archaeological Consulting (BAC) in June, 2014 (BAC, 2014) to determine if any high probability areas might exist within the City of Coos Bay right-of-way where potential impacts to unknown and buried cultural resources might occur. The APE consists of the entire pipeline alignment from the existing WWTP No. 2 to WWTP No. 1. The BAC report found the alignment heavily developed with areas of residential and commercial uses, and significant portions of the project covered in pavement.

Investigations evaluated areas where excavations were likely to occur to facilitate pipeline installation. Of those sites, approximately six locations were identified as having potential for containing buried archaeological resources, and upon further evaluation only two sites were recommended for further probing, should it be required by SHPO.

3.4.2 Environmental Consequences

Alternative 1 – No Action

The No Action Alternative would maintain existing conditions. No construction activities would occur that would potentially affect historic properties and cultural resources and no further review or evaluation is required.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

Based on the absence of reported cultural resources within the APE (both the new WWTP No. 2 site and the WAS pipeline alignment) of the Proposed Action and the previously disturbed location of the sites, both SOULA and BAC concluded the project would have little potential to encounter archaeological resources, and SOULA concluded that no further archaeological work is recommended for the new WWTP project area.

A letter was sent to Dr. Dennis Griffin, SHPO State Archaeologist, on September 20, 2013, requesting concurrence that no historic properties will be affected by the new WWTP No. 2 project. Letters were also sent on the same date to the Coquille Indian Tribe (Coquille Tribe), Confederated Tribes of Coos Lower Umpqua and Siuslaw Indians (CTCLUSI), and the Confederated Tribes of the Siletz (Siletz Tribe) requesting review of the project to identify any sites of traditional cultural and

religious importance. Copies of correspondence detailing coordination with the SHPO and tribes can be found in Appendix B.

The SHPO concurred on November 12, 2013, that the proposed construction will have no effect on any known cultural resources and no further archaeological research is needed for the project under SHPO Case No. 13-1465. Dr. Griffin advised, however, to be aware that if during development activities any cultural material (i.e., historic or prehistoric) is encountered, all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery.

Of the tribes contacted, the Coquille or Siletz tribe did not respond with any comments or concerns regarding the project. Stacy Scott, Cultural Resources Protection Specialist and Tribal Historic Preservation Office for CTCLUSI, responded with a site visit request and met Barbara Gimlin, SHN environmental planner, at the site on November 5, 2013. The SOULA and geotechnical report were provided upon request following the site visit to provide additional information on the site. Ms. Scott presented questions regarding the survey protocol implemented, which were in turn satisfied by further communications with Dr. Mark Tveskov of SOULA.

In a letter dated November 15, 2013, Ms. Scott stated CTCLUSI has no objections to the proposed work based on adverse effects to known cultural resources. She requested the tribe be contacted immediately if any known or suspected cultural resources are encountered during the work and that all construction personnel be given training on cultural resource protection (i.e., laws and basic identification) prior to the start of the project. This training should be reiterated at weekly safety meetings so that they will be better prepared to know when to stop work and await proper identification from a trained professional. CTCLUSI further requested that they be given at least 72 hours notice prior to any ground disturbing work so that a staff person or designated tribal member can have the opportunity to be present for some or all of the proposed work. The CTCLUSI requests will be required as a condition of project approval.

For the WAS pipeline, BAC also concluded that due to the nature of the project it is unlikely that ground disturbance will encounter cultural resources. However, of the six locations identified as having any potential for containing buried archaeological resources, two sites were recommended for limited probing to determine if buried archaeological resources may be present, should SHPO determine that additional research is necessary.

An archaeological survey of the proposed WAS pipeline was sent to Dr. Dennis Griffin, SHPO State Archaeologist, in July 2014 requesting concurrence that the WAS pipeline portion of the WWTP No. 2 would have no effect to any cultural resources. The archaeological survey outlined sites where further subsurface probing may occur, if deemed necessary by SHPO. Copies of the report were also sent by BAC to affected tribes.

The SHPO concurred on August 27, 2014 that the proposed construction of the WAS pipeline will have no effect on any significant archaeological objects or sites and no further archaeological research is needed for the project under SHPO Case No. 26603. SHPO advised, however, to be aware that if during development activities any cultural material (i.e., historic or prehistoric) is

encountered, all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. A copy of the concurrence letter is found in Appendix B.

On November 3, 2015 the SHPO contacted the City requesting additional information about the anticipated depths of excavations of the project. A copy of the SHPO letter is found in Appendix B. SHPO wanted additional information in an effort to protect any buried archaeological resources and/or human remains that may exist in the project area. The City has provided information to the SHPO.

Subject to any later unanticipated discoveries, the City has made a determination of *no historic properties affected* for the Proposed Action, as outlined in 36 CFR § 800.4(d)(1). An inadvertent discovery clause required as a condition of project approval further mitigates the potential for adverse effects to cultural resources.

The impact intensity to cultural resources is expected to be negligible. However, in the event an unanticipated discovery of a potential historic property occurs during construction, this would elevate the level of impact. The intensity would be determined by the nature of the discovery. All construction would be halted until the City has completed consultation with the SHPO and tribes to determine appropriate measures that may need to be taken to ensure the project is in compliance with the NHPA.

3.4.3 Mitigation

The following conditions are required for project implementation to ensure historic and cultural resources are protected:

1. In the event historically or archaeologically significant materials or sites (or evidence thereof) are discovered during the implementation of the project, the project shall be halted and all reasonable measures taken to avoid or minimize harm to property until such time as the City, in consultation with the SHPO and tribes, determines appropriate measures have been taken to ensure that the project is in compliance with the NHPA. Under Oregon state law (ORS 358.905-995) it is a class B misdemeanor to impact an archaeological site on public or private land, and under state law (ORS 97.740-760) impacts to Native American graves and cultural items are a Class C felony.

2. CTCLUSI will be contacted immediately if any known or suspected cultural resources are encountered during the work. All construction personnel shall be given training on cultural resource protection (i.e., laws and basic identification) prior to the start of the project and the training will be reiterated at weekly safety meetings. In addition, CTCLUSI will be given at least 72 hours notice prior to any ground disturbing work so that a staff person or designated tribal member can have the opportunity to be present for some or all of the proposed work.

3.5 Biological Resources

3.5.1 Affected Environment

Vegetation

The existing facility for WWTP No. 2 is located at an industrial site with limited vegetation beyond landscaping in the vicinity. The little amount of vegetation at the site includes mowed grass, weedy herbaceous plants, and one or two shore pines (*Pinus contorta*) near the operations building. Vegetation on the outside of the fenced facility is also mowed grass and weedy herbaceous plants. Salt marsh habitat is located just north of the site and includes such species as the western marsh-rosemary (*Limonium californicum*), fleshy jaumea (*Jaumea carnosa*), pickleweed (*Salicornia virginica*), and saltgrass (*Distichlis spicata*). Further north of the site, Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*), listed as a federal species of concern and state-listed as endangered, is known to occur. Point Reyes bird's-beak is further addressed under threatened and endangered species.

Several alterations related to vegetation have occurred at the proposed location of the new WWTP in the last eight or nine years to prepare the land for development. An aerial photograph from April 2004 shows Tax Lot 2700 covered with trees and shrubs. An aerial from June 2005 shows the same tax lot completely cleared of woody vegetation. Current vegetation at the site is primarily herbaceous with scattered shrubs and saplings, with a small group of trees at the southeast corner of the site and riparian vegetation along the stream channel. The site consists of a variety of native and non-native grasses and low lying brush. Wetland and riparian species have been covered in Section 3.3.

Species at the new site include reed canarygrass (*Phalaris arundinacea*), sweet vernalgrass (*Anthoxanthum odoratum*), fescue (*Festuca* spp.), red clover (*Trifolium pratense*), hairy cat's ear (*Hypochoeris radicata*), bentgrass (*Agrostis* spp.), common velvetgrass (*Holcus lanatus*), common horsetail (*Equisetum arvense*), scattered rushes (*Juncus* spp.), Queen Anne's lace (*Daucus carota*), dandelions (*Taraxacum* spp.), trailing and Himalayan blackberries (*Rubus* spp.), Scotch broom (*Cytisus scoparius*), butterfly bush (*Buddleja davidii*) and saplings of red alder. In addition to grasses, vegetation at the site is dominated by Scotch broom, common horsetail, and blackberries.

Invasive Species

EO 13112, Invasive Species, was created to prevent the introduction of invasive species and to provide for their control. Noxious weeds are non-native, aggressive, and invasive plants. Species such as Scotch broom and Himalayan blackberry are replacing native vegetation and opportunistically becoming established on sites otherwise unoccupied by grass or shrub species, which is true at the new site for this project. The spread of noxious weeds is altering habitats and interfering with natural succession. Resource and vegetation management is necessary to maintain natural communities, successional processes, biodiversity, and ecosystem health.

Noxious weeds are classified by the Oregon State Weed Board (OSWB) as any plant that is injurious to public health, agriculture, recreation, wildlife, or any public or private property. They have

become so thoroughly established and are spreading so rapidly on private, state, county, and federally owned lands in Oregon that they have been declared by ORS 569-350 to be a menace to public welfare.

Noxious weeds have the potential to be eradicated or controlled in the state; however, steps leading to eradication and intensive control are necessary. Eradication and intensive control rests not only on private landowners and operators, but on the county, state, and federal government. To assist in control, the Oregon Department of Agriculture (ODA) Noxious Weed Control Program and the OSWB maintain the state noxious weed list, which covers all lands within the state.

The Noxious Weed Policy and Classification System (ODA, 2013) establishes three categories for weeds within or having potential habitat in Oregon. Noxious weeds are listed as either A or B, and may be added to the T list, as directed by the OSWB, to receive priority in implementing noxious weed control projects. These classifications are defined below.

- Class "A" weeds—a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent.
- Class "B" weeds—a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.
- Class "T" weeds—a priority noxious weed designated by the OSWB as a target on which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

The Coos County Weed Board utilizes ODA's classification system; however, it distinguishes "A" weeds as those not known to occur in Coos County but its presence in neighboring counties make future occurrence in Coos County seem imminent. "T" weeds are listed as designated priority noxious weeds for the county. Although not on the "T" list for the state or county, Scotch broom, butterfly bush and Himilayan blackberry were encountered during field surveys conducted. All three species are on the "B" list and considered invasive species needing control.

Coos Bay Estuary (including Shellfish)

The Coos Bay estuary is the second largest estuary in Oregon and covers approximately 54 square miles of open channels and periodically inundated tidal flats. It ranges from a half mile to a mile and a half wide by 15 miles long and has approximately 30 tributaries. The major tributary flowing into Coos Bay is the Coos River. As Oregon's second largest estuary, Coos Bay provides habitat and rearing value for clams, crabs, and burrowing shrimp, which are of significant economic importance to the area, including Oregon's economically productive Dungeness crab fishery. The distribution varies along the route from the Coos Bay harbor entrance, with principle subtidal clam beds and crab species found in the lower bay. Variations in substrate, attachment sites, sediments, salinities, temperatures, dissolved oxygen, and other physical factors affect shellfish distribution.

Much of the shoreline and subtidal habitat of Coos Bay consists of unvegetated mud and sand, mixed with areas of various algae species, where clams and shrimp are found with varied abundance and diversity. A Shellfish and Estuarine Assessment of Coastal Oregon: Coos Bay

(SEACOR) in 2008 conducted extensive mapping of clam and crab distributions. SEACOR interactive maps can be found on the ODFW website and provide valuable distribution information for recreational harvesters, as well as assisting biologists and resource agencies in estuarine management.

Salinity and other water quality characteristics vary with proximity to the estuary mouth and with the volume of freshwater entering sloughs. In general, the lower bay (below RM 9.0) is dominated by higher salinity from ocean water while the upper bay water is affected by freshwater influx that varies seasonally. Tidal flux constantly changes the salinity of the water in the channel. South Slough, at RM 1.3, is relatively saline whereas Catching Slough at approximate RM 15.5 is brackish with a much lower salinity. The abundance of fish in the lower bay increases in the summer due to higher salinity.

Dungeness crab (*Cancer magister*) occurs in the main channel areas of Coos Bay, largely from the mouth of the bay to the BLM boat ramp on the North Spit (northwest of the Project). Juvenile Dungeness crab feed on a variety of small invertebrates and usually avoid habitat overlap with adult crab, since they are known to cannibalize. Crabs remain juveniles for their first two years and they prefer shallow estuarine areas with protective structure such as pilings, woody debris, and eelgrass. Adult Dungeness crab can be found throughout sandy and muddy areas in the shallowest parts of the lower bay, where they forage on a number of fish and invertebrate species, yet they can be found to depths of 2,000 feet offshore. They are frequently associated with eelgrass beds.

Red rock crabs (*Cancer productus*) are also found in the bay and are native to Oregon. They prefer rocky substrates, as the name implies, although they are also called "Japanese Crab"; a misnomer that may cause worry among recreational crabbers. Red rock crabs are found in the fossil record as well as in Native American middens. They are an important component of Oregon estuaries and nearshore areas, and even function as a steward to the estuary by predating on invasive species such as green crab (*Carcinus maenas*). However, when present in considerable abundance, the red rock crab is a serious predator on both oysters and clams. Despite being less meaty than the Dungeness, red rock crab meat is also very tasty.

Along the eastern side of the lower bay from the Empire area south, and along the western lower bay of the North Spit, sand and mud flats support several large and productive clam beds. Clam species common to the lower bay include gapers (Empire, horse, horseneck, blue; *Tresus capax*), butter (beefsteak, Martha Washington, quahog; *Saxidomus giganteus*), littleneck (steamer, native littleneck; *Protothaca staminea*), and cockles (*Clinocardium nuttallii*). Butter and gaper clams are considered the most numerous in Coos Bay and studies conducted from the 1970s to 2009 have shown increased populations. Cockles and littlenecks are less common and studies show their populations have been dropping since the 1970s. Softshell clams (*Mya arenaria*) are non-native and are typically found further inland along the bay.

There are two species of oysters in Coos Bay: the native or Olympia oyster (*Ostrea lurida*) and the commercially grown Pacific oyster (*Crassostrea gigas*). The Olympia oyster is the only oyster native to Oregon and Coos Bay is one of only a few bays where they exist in Oregon. Neither species is legal for recreational harvest. Native oyster populations are protected to encourage their recovery, and Pacific oysters are only commercially grown and considered private property. Oyster beds in

Coos Bay are not found for several miles either direction from the project vicinity and are not anticipated to be affected by the project.

Fish (including Essential Fish Habitat)

Coos Bay and its connecting waterways provide foraging, migratory, spawning, and juvenile nursery habitat to numerous species of fish, and is a major migration corridor for salmon and steelhead that spawn and rear in the Coos River systems. The Coos Bay system provides habitat for the following evolutionary significant units (ESUs) of Pacific salmonids: Oregon Coast (OC) coastal cutthroat trout (*O. clarki clarki*); OC Chinook salmon (*Oncorhynchus tshawytscha*), state sensitive-critical; Pacific Coast chum salmon (*O. keta*), state sensitive-critical; OC steelhead (*O. mykiss*) winter run, state sensitive-vulnerable, which is also a federal species of concern; and OC coho salmon (*O. kisutch*), federally-listed as threatened under the Endangered Species Act in February 2008.

The fish community consists of species that are adapted to salinity fluctuations characteristic of the Coos Bay estuary, with the number of species increasing down river through the estuary towards the ocean. Some estuarine fish such as kelp greenling and starry flounder spend their entire lives within the estuary, whereas other species are seasonal. Anadromous fish species occurring in the project area include Chinook salmon, coho salmon, chum salmon, steelhead, and coastal cutthroat trout. Anadromous salmon are generally transitory, passing through the bay in the fall as adults to Coos River, while juveniles primarily outmigrate in the spring and summer. Other seasonal inhabitants include white and green sturgeon, American shad, Pacific lamprey, surfperch, lingcod, rock greenling, sculpin, surf smelt, Pacific herring, English sole, eulachon, longfin smelt, Pacific tomcod, sand sole, and topsmelt.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976, as amended, was enacted, along with other goals, to promote the protection of Essential Fish Habitat (EFH) in the review of projects conducted under federal permits, licenses, or other authorizations that affect or have the potential to affect EFH. The MSA requires all federal agencies to protect fisheries habitat from being lost due to disturbance and degradation and to consult with the National Marine Fisheries Service (NMFS) when an action has the potential to adversely affect EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" [16 USC § 1801(10)].

The MSA established regional Fishery Management Councils and mandated that Fishery Management Plans (FMPs) be developed to identify and describe the EFH habitat areas of particular concern. When Congress reauthorized this act in 1996 as the Sustainable Fisheries Act, several reforms and changes were made. One change was to charge the NMFS with designating and conserving EFH for species managed under existing FMPs. This was intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions to encourage the conservation and enhancement of such habitat.

In estuarine and marine areas, EFH for Pacific salmon extends from the nearshore and tidal submerged environments within state waters out to the full extent of the Exclusive Economic Zone (200 nautical miles) off the coast. In Coos Bay, EFH species include Chinook and coho salmon,

northern anchovy, Pacific sardine, and a variety of rock and groundfish. All habitats accessible to these managed species in the Coos Bay system are considered EFH.

Estuarine and marine habitat for EFH prey species in Coos Bay is essentially the same as that required by managed EFH species. Many species of EFH groundfish and salmonids occupy inshore areas of the lower bay during juvenile stages (e.g., Chinook salmon, coho salmon, English sole, eulachon) where they feed on estuarine dependent prey, including shrimp, small fishes, and crabs. As they mature and move offshore, their diets in many cases change to include fish, although estuarine species (e.g., shrimp, crabs) can still constitute an important dietary component.

The Oregon DSL, in consultation with the ODFW, designates Essential Indigenous Anadromous Salmonid Habitat (ESH) areas based on field surveys and/or the professional judgment of ODFW´s district biologists [ORS 196.810(1)(b)]. ESH is defined as the habitat necessary to prevent the depletion of native salmon species (chum, sockeye, Chinook, and Coho salmon; and steelhead and cutthroat trout) during their life history stages of spawning and rearing. The designation applies only to those species that have been listed as sensitive, threatened, or endangered by a state or federal authority, and designations are periodically reviewed and updated.

Threatened and Endangered Species

Federal agencies are required by Section 7 of the Endangered Species Act (ESA) of 1973, as amended, to ensure that any actions authorized, funded, or carried out by a federal agency does not jeopardize the continued existence of a federally-listed threatened, endangered, or proposed species, or result in the destruction or adverse modification of designated Critical Habitat of a federally-listed species. In addition, Oregon has its own ESA that requires state agencies to protect and promote the recovery of state-listed threatened and endangered species.

Steps have been taken to identify species that may occur in the project vicinity that are listed as threatened, endangered, or proposed for listing under the ESA and to determine the project's potential effects on those species or Critical Habitat. The "action area" is defined as all areas that may be directly or indirectly affected by the action and can often extend well beyond the physical project boundaries (e.g., downstream water quality). In addition to obtaining both a NMFS and USFWS ESA species list online for Coos County, a data system search for rare, threatened, and endangered plants and animals within two miles of the project was conducted by the Oregon Biodiversity Information Center (ORBIC) on July 5, 2013. The ORBIC database is continually updated and the data received must be updated every six months for compliance with the ESA.

For the project, the City is required to consult with the USFWS and NMFS for federally-listed threatened and endangered species (or proposed for listing) and Critical Habitat found in the vicinity of the project and to determine the project's potential effects on those species or Critical Habitat. Federal candidate species and species of concern do not require federal ESA consultation. One USFWS and five NMFS federally listed species are known to occur within two miles of the project and are discussed below. However, a lack of federally-listed species or critical habitat for a given area does not necessarily indicate there are no significant elements present, only that there is no information recorded for the site. To ensure there are no listed species present that may be affected by the project, habitat at the site was evaluated to determine whether any additional

USFWS listed species have the potential to occur in the project vicinity. As a result, two additional species were identified and evaluated, including: 1) the western lily, federally listed as endangered on August 17, 1994; and 2) the streaked horned lark (*Eremophilia alpestris strigata*), proposed for listing as threatened on October 11, 2012.

At the state level, consultation is conducted with the ODA for state-listed plant species and the ODFW for fish and wildlife species. State regulations pertaining to the protection of botanical resources are limited to ORS 564 and Oregon Administrative Rules, Chapter 603, Division 73. State threatened and endangered plant species that could be present within the project's vicinity are protected on all non-Federal public lands (state, county, city, etc.), including all lands below the highest measured tides which are considered waters of the state. State-listed threatened and endangered species that may potentially occur in the project vicinity include the following: western lily (*Lilium occidentale*), Point Reyes bird's-beak, bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis*), and western snowy plover (*Charadrius nivosus nivosus)*.

All state and federal threatened and endangered (or proposed for listing) species are discussed below.

Plants

Western Lily (*Federal Endangered, State Endangered)*
The western lily is considered a bog plant and grows in areas with perched water tables which are associated with one or two soil types. Occurrences within the Coos Bay area are reported to occur in Blacklock soils, which are deep, poorly drained soils high in organic content; however, it also grows in soils that are well drained that have a significant layer of organic soil. In all known occurrences of the western lily, the soils are high quality native soils, exhibiting good structure and very low bulk density (USFWS, 2009). In contrast, the soil types for the majority of the project are identified as Bandon sandy loam, with one small portion along the southern boundary mapped as Bullards sandy loam, and a small area in the southwestern portion, adjacent to Empire Boulevard, mapped as Heceta fine sand.

The combination of various activities (logging, residential use, filling wetlands, and re-alignment of a ditch) at the proposed site of the new wastewater facility in the past eight or nine years has resulted in disturbed soil in several portions of the site. A significant portion of the site is bare or sparsely vegetated and gravel fill at the surface or several inches below is common at the site. In addition to the lack of soil types preferred by the western lily, the site lacks plant species typically associated with western lily. Dominant herbaceous species at the site include sweet vernalgrass, red clover, hairy cat's ear, colonial bentgrass, Queen Anne's lace, and common velvetgrass herbaceous species, with the shrub layer dominated by Scotch broom, butterfly bush, Himalayan blackberry, and saplings of red alder.

Site evaluations in 2013 determined that due to the lack of suitable habitat and associated species at the site, western lilies are not expected to occur within the projects footprint and the project is anticipated to have no effect on the species. Since evaluations were conducted after the recommended blooming period (beginning in late June/July for the Coos Bay area) for this species, additional site investigations were conducted in 2014. Two separate surveys

of the proposed new wastewater treatment plant site were undertaken (6/17/14 and 7/29/14) to determine if the western lily was present and could be detected from either flowers or vegetative characteristics. The 2014 surveys failed to locate the western lily at the project site, and it was determined that through lack of suitable habitat and absence of individual plants, this species is not located at the project.

Point Reyes bird's-beak (Federal Species of Concern, State Endangered)
The Point Reyes bird's-beak is known to occur in substantial numbers with up to 25,000 or more flowering plants detected during the blooming season within ½ mile north of the existing WWTP No. 2 site on low lands and salt marshes with sandy soil. Species present are sufficiently buffered and protected from any ground disturbing activities, and the site is located over one mile from the outfall mixing zone. No plants of this species are located at any of the proposed action sites; therefore there are no impacts to the species from the project.

Birds

Bald Eagle (Federal De-listed, State Threatened)
The bald eagle is a widespread breeder in Oregon, with confirmed nesting in all but four counties. When the bald eagle was federally de-listed on July 9, 2007, legal protections provided to the bald eagle switched to the Bald and Golden Eagle Protection Act and new guidelines were developed. The most substantive change in the guidelines was a reduction in the distance between activities and occupied nests from 0.5 mile to 660 feet when the activity is visible from the nest (line-of-sight).

Bald eagles are usually associated with large water bodies, including lakes, rivers, and coastal nearshore habitat. Home ranges are usually about two to three square miles. Bald eagle numbers peak in late winter and early spring when breeders, transients, and winter residents are all present. They nest on large, prominent trees and snags, usually within a mile of water, and nests are almost always reused. While foraging habitat occurs in and along the bay, no suitable nesting habitat exists in the immediate area of the existing and proposed WWTP sites or along the WAS pipeline alignment. A nest site in the ORBIC database is listed on a ridge above Glasgow, roughly five miles inland from the project site, but it has not been active since 2003. No nests are known to occur in or near the project vicinity. No inadvertent disturbance is anticipated, and the project is not expected to affect this species.

Brown Pelican (Federal De-listed, State Endangered)
The brown pelican, sometimes referred to as the California brown pelican, is found in nearshore ocean waters, in large bays and river mouths, and on beaches and spits. These birds are rarely seen inland or more than 40 miles from shore and they feed mostly in shallow estuarine waters. In Coos Bay, they are known to occur from RM 6 to the open ocean and are considered a common to abundant post-breeding migrant on the North Spit (BLM, 2005). Pelicans make extensive use of sand spits, offshore sand bars, and islets for nocturnal roosting and daily loafing, especially by nonbreeders and during the non-nesting season (USFWS, 2005). It arrives from the south along the Oregon coast in April and

becomes abundant by August and September. Although most brown pelicans have withdrawn to the south by December, small numbers now winter most years in the Coos Bay area.

Coos Bay is considered foraging (feeding) and roosting habitat for the brown pelican, with roosting occurring on the north side of the bay on the sunken jetty close to the bay mouth, on the sand spit on the North Spit, and on dredge spoil islands around RM 3 to 4. Onshore fish cleaning stations, often associated with boat ramps, have also been mentioned as possibly attracting brown pelicans to possibly feed on offal. Nesting sites within the Coos Bay estuary have not been documented and the species is not believed to breed in or near the project vicinity. In addition, brown pelicans appear unaffected by industrial activity already taking place in and around the bay. While the closest designated fish cleaning station is located at the Empire boat ramp approximately one mile north of the project, the foraging route of pelicans would be over the bay, not inland. Brown pelicans are most notably impacted by human disturbances at nesting colonies and roosting habitats, neither of which occur near the project. No effect to this species is anticipated from the development of the project.

Streaked Horned Lark (Federal Threatened, State Sensitive Critical)
The streaked horned lark is a rare subspecies of the horned lark. It migrates between Oregon and Washington with breeding populations found in the Puget Sound lowlands, Columbia River/coastal Washington, and the Willamette Valley in Oregon from late March to early August. It was listed as a federal Threatened species in October 2013. In addition to being listed as threatened, critical habitat has been designated in both Oregon and Washington, but no critical habitat has been designated in Coos County. The closest county with critical habitat is Lane County which is inland and to the north.

Some individuals winter in California and occur along the Oregon coast on migration, while a few winter on the coast. The species occurs in bare and sparsely vegetated habitats such as coastal dunes, beaches, gravel roads, airport runways, grazed pastures, and dry mudflats; however, they do not occur on rolling or steep areas at these sites. Where deflation plains occur, streaked horned larks are often behind the foredune (Pearson, personal communication, 2013). Larks also occur where dredge spoils have been deposited or in areas where there is accretion (deposition) of sand causing beach areas to become wider, provided the sites are sparsely vegetated and are immediately adjacent to water. For sites not immediately adjacent to water, the area of expanse has to be quite large, likely 300 acres or greater, although further studies are needed (Pearson, personal communication, 2013).

It has been determined that suitable habitat does not exist in or near the project site due to the lack of proximity to open water where sparsely vegetated lark habitat potentially exists. In addition, encroachment by Scotch broom, Himalayan blackberries, and other noxious weed species increasingly makes potential habitat unlikely to be used by the larks, especially given the vast amounts of potential habitat on the North Spit and along that coast that remains relatively undisturbed by human influence. While an occasional individual may show up on the mudflats in the vicinity of the existing WWTP No. 2 to forage, streaked

horned larks are not expected in the project site and the project is not anticipated to affect the species.

Western Snowy Plover (Federal Threatened, State Threatened)
The western snowy plover was listed as threatened under the ESA on March 5, 1993. Critical habitat was later designated for the Pacific Coast population in 1999, and a recovery plan for the species was developed by the USFWS. The southwestern portion of the North Spit is designated as critical habitat for the plover, from the ocean beach at Horsfall to the Coos Bay north jetty and includes all federal lands at the south end. Population evaluations have been conducted by the USFWS (USFWS, 2012) to document this species nesting locations along the Oregon Coast. The project site is greater than one mile from the closest portion of the designated critical habitat on the North Spit.

On the coast, the western snowy plover is almost exclusively a bird of open sand beaches, and its typical coastal nesting habitat is at the upper edge of the beach below the foredunes. It also nests on bare spits at small estuary mouths and, on the North Spit, is most prevalent on restored sand habitat east of the foredune. This habitat does not occur in or near the project vicinity, which is located across the bay from the North Spit. It is unlikely that this species would nest in the project vicinity due to the lack of primary habitat for the species and the urbanization of the area. While an occasional individual may use the mudflats adjacent the existing WWTP No. 2 for foraging, breeding is unlikely. Western snowy plovers are not expected to occur at the existing WWTP No. 2, near the new treatment facility site, or along the WAS pipeline alignment, and the project is not anticipated to affect the species.

Fish

Three federally-listed anadromous fish species spend a portion of their life cycle within the estuarine environment of Coos Bay. Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch)*, southern distinct population segment (DPS) green sturgeon (*Acipenser medirostris*), and southern DPS Pacific eulachon (*Thaleichthys pacificus*), were each federally-listed (2008, 2006 & 2010, respectively) as threatened under the ESA. These three species have not warranted listing as threatened or endangered by the State of Oregon. Use of the Coos Bay system by eulachon and green sturgeon is sporadic at best (based on various ODFW seining surveys and personal communications) and there is very little habitat available for coho salmon adjacent to the existing WWTP No. 2. No habitat exists for fish at the new WWTP site or along the WAS pipeline route, which is within existing roadways.

For analysis under the ESA for fish species, the action area includes all areas to be affected directly or indirectly by the project due to potential impacts from effluent at the existing outfall site and storm water discharge, turbidity, contaminant dispersion, and habitat loss.

OC Coho Salmon (Federal Threatened, Federal Critical Habitat, State Sensitive Critical)
Oregon Coast coho salmon are one of several anadromous salmonid species that utilize Coos Bay for migration and rearing habitat for adult and juveniles on their way to and from the ocean between marine and freshwater environments. On February 4, 2008, NMFS listed

the naturally spawning populations within the ESU of OC coho salmon as a federal threatened species under the ESA. Coos Bay was included as Critical Habitat as part of the Coos Bay watershed.

Essential physical and biological features for estuaries include whether an area is free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between freshwater and saltwater, natural cover, and forage. The effluent outfall site for the project contains one or more biological features within the acceptable range of values required to support the biological processes for which coho salmon use the habitat. Coho salmon adults and smolts would migrate through this area and use the area to make the physiological transition between marine and freshwater environments.

Actual distribution of juvenile coho salmon within the project action area is unknown. However, juvenile salmonid studies in the lower Columbia River observed that juvenile coho salmon were in greater abundance away from the shoreline areas, often in deep water during their outmigration. Carson et al. (2001) found that in the lower Columbia River less than 20 percent of all fish were found along the shore and were about evenly split between the channel and channel margins. Based on studies in the Columbia River, there is no reason to suggest that outfall mixing zone would have any higher abundance of juvenile salmonids than the rest of the bay area. Coho salmon migrating to the ocean would likely be more closely associated with the main channels than the nearshore area, reducing their chance of encountering the outfall. In addition, OC coho salmon outmigrating in Coos Bay are typically larger than sub-yearling juvenile Chinook salmon and are much less susceptible to potential adverse effects.

The outfall and associated diffusers located at RM 3.8 do not require water intake, and no entrainment or impingement would occur. The mixing zone for the outfall would be affected by the effluent released; however, screening and disinfection of the effluent prior to release is anticipated to significantly reduce the level of degradation to water quality. Depending on their reaction to water quality and activity within the mixing zone, coho salmon may have migration delays, may move into less protected habitat, or they may become more susceptible to predation due to potential effects from even trace amount of toxins released such as copper and zinc.

Pacific Eulachon (Federal Threatened-Southern DPS, No State Listing)
Eulachon (commonly called smelt, candlefish, or hooligan) is a small, anadromous fish from the eastern Pacific Ocean. In North America they range from northern California into the southeastern Bering Sea. On March 18, 2010, NMFS listed the southern DPS of eulachon as threatened under the ESA, followed by designating Critical Habitat for the southern DPS on October 20, 2011. The southern DPS ranges from Nass River, British Columbia, to Mad River, California, and includes Coos Bay and its upper reaches. However, Critical Habitat was not designated for the Coos Bay system. Prior to being listed as threatened under the ESA in 2010, the commercial catch of eulachon from the Columbia River from 1938 to 1992 averaged approximately 2 million pounds per year. Since the mid-1990s, however,

eulachon populations have decreased dramatically. Between the years of 1993 to 1996, the average annual catch dropped to approximately 43,000 pounds (a nearly 98 percent decline).

Eulachon are plankton-feeders, chiefly eating crustaceans such as copepods and euphausiids. They typically spend three to five years in saltwater before returning to freshwater to spawn. Many sources note that runs tend to be erratic, appearing in some years but not others (NMFS, 2006). They do not feed in freshwater and remain there only a few weeks to spawn.

There is currently little information available about eulachon presence in Coos Bay. Monaco et al. (1990) described eulachon as rare in Coos Bay. While eulachon were mentioned as occurring in other studies conducted in the bay in 1971, Wagoner et al. (1990) stated that they had apparently not been abundant enough in recent years to attract an active dipnet fishery. More recently, Miller and Shanks (2005) surveyed the distribution of 28 identified larval and juvenile fish species in Coos Bay for more than three years between 1998 and 2001, but did not encounter eulachon.

Adults begin moving through the bay as early as December and spawning typically occurs from January to mid-May, with the peak in February to mid-March. When present, eulachon may utilize both shallow and deep water habitats within the estuary as they migrate to spawning grounds. They will only spawn in lower reaches of rivers and major tributaries (i.e., the Coos River), as they need moving water and large substrate to spawn. Eggs are fertilized in the water column, sink, and adhere to the river bottom typically in areas of gravel and coarse sand. Eulachon eggs hatch in 20 to 40 days, with incubation time dependent on water temperature. Shortly after hatching, the larvae are carried downstream and dispersed by estuarine and ocean currents. When the larvae reach juvenile size, they disperse to the ocean as soon as able. Juveniles may migrate out as early as February to as late as almost mid-summer (Chuck Wheeler, NMFS, personal communication, 2013). Adult eulachon do not always die after spawning so they could return to the ocean.

The potential for eulachon to be affected by the project would occur during seasonal migrations by adults to inland rivers to spawn and the outmigration of larvae and juveniles after hatching. Eulachon do not feed in freshwater and their presence in Coos Bay would be limited. Given the deep and shallow water habitats available along the bay transit route, there is a low likelihood that there would be a significant impact on spawning runs of eulachon in Coos Bay.

The likelihood of effects to larval and juvenile stages of eulachon as they outmigrate through the Coos Bay estuary is anticipated to be minimal. As the larvae are carried by currents and tides, it would seem highly likely that they would be carried past the outfall and would not be in the mixing zone for any substantial length of time. Once the larvae have grown to juvenile size, they naturally disperse to the ocean as soon as they are able. Any juveniles occurring near the mixing zone would be migratory in nature. The low number of all stages of eulachon that are likely to be in Coos Bay further reduces the potential for the species to be affected by the Project.

Green Sturgeon (Federal Threatened-Southern DPS, No State Listing)
Green sturgeon are long-lived, slow-growing fish, and are the most marine-oriented of the sturgeon species. Although they are members of the class of bony fishes, the skeleton of sturgeons is composed mostly of cartilage. They are believed to spend the majority of their lives foraging in nearshore oceanic waters, bays, and estuaries, ranging from nearshore waters in Baja California to those in Canada. They utilize both freshwater and saltwater habitat and spawn in deep pools or holes in large, turbulent, freshwater river mainstems (Moyle et al., 1992).

There are two distinct population segments defined for green sturgeon—a northern DPS with spawning populations in the Klamath and Rogue rivers and a southern DPS that spawns in the Sacramento River (NMFS, 2008). The southern DPS includes all spawning populations of green sturgeon south of the Eel River in California. The southern DPS of the North American green sturgeon was federally listed as threatened on April 7, 2006, under the ESA. The species has not warranted protective listing status by the State of Oregon. Studies have confirmed the migratory nature of green sturgeon between northern and southern DPS units. As such, NMFS took an inclusive approach when determining the geographical area occupied by the southern DPS and designated Critical Habitat from the Bering Sea, Alaska, to the U.S. California and Mexico border.

Southern green sturgeon are known to occupy Coos bay during the summer months. They spawn in the Sacramento River basin in California, where they typically migrate into freshwater beginning in late February and spawn from March to July, with peak activity from April to June. Although juveniles are not present in Coos Bay, adults and subadults use estuarine areas for foraging and growth. Data from Washington studies indicate that green sturgeon will only be present in estuaries from June until October (Moser and Lindley, 2007). While in Coos Bay, they likely seek out the deepest habitats to rest during low tides and feed on invertebrates in shallow water during high tides.

The principal factor in the decline of the southern DPS is the reduction of their spawning area in California. If a green sturgeon spawns in Oregon, it is not part of the southern DPS and not considered threatened under the ESA. Both southern and northern DPS green sturgeon may occur in Coos Bay, in addition to white sturgeon (Mike Gray, ODFW, personal communication, 2013). Green sturgeon spend more time in the ocean, as they have less tolerance for freshwater than white sturgeon, but they do come in and out of the bay. No adverse effects to green sturgeon are anticipated from the project.

Marine Mammals

Two federally-listed marine mammals with a potential to occur near the project site are discussed below.

Steller Sea Lion (Federal Endangered, No State Listing)
The Steller sea lion, also called northern sea lion, ranges along the eastern North Pacific coast from Alaska to southern California. It breeds on rocky beaches, often on islands, and at other times is frequently seen hauled out on select coastal rocks, jetties, marinas, and

navigation buoys. It forages at sea for fish and invertebrates, sometimes to several hundred miles from land. The Oregon population was estimated at over 5,000 in 2002 and productivity appears to be increasing (NMFS website). The nearest rookery to Coos Bay, one of Oregon's two primary rookeries, is at Orford Reef in Curry County to the south. There is a haul-out site offshore at Cape Arago, roughly eight miles south of the project, and another smaller site on the northeast spit of Clam Island (created by dredge spoils).

Potential adverse effects to Steller sea lion populations will be negligible because sea lions do not often occur as far into Coos Bay as the project, and even if they were to occur in the vicinity of the outfall no effects are anticipated. Sea lions tend to stay closer to the harbor entrance and are known to frequent the Charleston boat harbor and to travel further up the bay seasonally with salmon runs. There are no suitable haul-out sites near the existing WTTP No. 2 and the project will not affect the species.

Southern-Resident Killer Whale (Federal Endangered, No State Listing)
The killer whale (*Orcinus orca*) is a wide-ranging predator of the open ocean that has a worldwide distribution but is most common in subarctic, temperate, and subantarctic waters. The southern resident killer whale was proposed for delisting in 2012 and is currently under review. Along the North Pacific coast, resident killer whales occur from Oregon and Washington to the Bering Sea. Their distribution is correlated to food supplies, and they feed primarily on fish and marine mammals. Killer whales could be encountered in Oregon during the fall, winter, and spring, with occasional sightings throughout the year. They occasionally enter bays in pursuit of salmon and pinnipeds, and have on occasion been observed inside Coos Bay. The project is will not affect the species.

Wildlife

The existing WWTP No. 2 site is developed and provides limited wildlife habitat. Gulls and crows commonly congregate at the facility and their dung is considered a nuisance by facility operators who hose off the equipment on a daily basis (Adolfson, 2005a). Wildlife species anticipated to occur adjacent to the site include assorted birds, squirrel, and small rodents. Habitat near the Proposed Action site offers limited nesting, brood rearing, foraging, and staging habitat for bird species. Similar to those occurring adjacent to the existing site, species anticipated to occur near the overall project location include birds, squirrel, small rodents, raccoons, and other small mammals, with occasional deer. No reptiles or amphibians are known to occur in the immediate project action area. Due to the existing site being fenced and urbanization adjacent to the new site, minimal wildlife is expected to wander through the area.

The Fish and Wildlife Coordination Act (FWCA) was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. No impacts to wildlife are anticipated by either project alternative related to streams or the bay. Potential impacts to fish will be adequately addressed under federal and state ESA compliance required, and the project is anticipated to comply with the FWCA.

Migratory Birds

The project is located in the statewide Pacific Flyway path for migratory birds. The Southern Oregon coast provides wintering and migratory habitat for birds, and Coos Bay is one of a number of important areas for shorebirds between San Francisco Bay and British Columbia. Key areas for migrating shorebirds include the bay and shoreline, along with wetlands and deflation plains found throughout the county. The Coos Bay estuary hosts thousands of waterfowl during winter and migration periods, and thousands of shorebirds of many species during spring and fall migration.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, provides federal protection for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions. The MBTA protects nearly all native species of birds. The only exceptions are introduced species, including English (house) sparrows, starlings, and rock dove (commonly known as park pigeons). There is no federal protection for upland game species (chuckar, pheasant, quail, and grouse), but most states protect these species. USFWS permits are required to take, capture, relocate, or possess any of the protected species of birds or their parts, nests, or eggs. The MBTA includes a 'no take' provision. Consultation with the USFWS is required if an action may cause a potential take of migratory birds, and to determine measures to minimize or avoid these impacts.

Birds and nests are protected under MBTA, but habitat is not. Habitat is only protected when there is an active nest (i.e., nest with chicks or eggs being tended by an adult). Empty/abandoned nests and nonviable eggs are not protected, but cannot be taken into possession without a permit during the nesting season. Outside of the nesting season, permits are not required to remove an empty or abandoned nest, or to remove or alter the structure the nest is built in or on. The MBTA policy excludes eagle nests and nest trees, which are protected under the Bald and Golden Eagle Protection Act, and threatened or endangered species, which are protected under the ESA.

The USFWS advises that clearing of trees, shrubs, and brush be conducted prior to March 1 or after August 31 to ensure most nesting birds have fledged. If construction activities occur during the nesting season, trees and brush should be surveyed for the presence of any active nests. If there are none in the immediate area, and there are no active nests close enough for the activity to disturb nesting birds, clearing may be conducted without permits. If there should be a nest, the nesting site should be marked and activity limited around that area until the birds fledge (perhaps leaving that area for the last of the project).

Unless nests are in a location to pose a risk to human safety or the birds, there is no permit the USFWS can issue. Examples of health safety issues are permits issued to airports to protect air traffic and nests built on active power equipment which poses a fire hazard. There are no 'incidental take' permits under the MBTA. Any activity that involves habitat destruction during nesting season should proceed with caution.

3.5.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action Alternative, no construction would occur and biological resources wouldn't be impacted from ground disturbing activities. Existing conditions would be maintained including operations of the existing WWTP No. 2 and effluent discharges to the outfall. Although, overflows may potentially occur at times that include the discharge of effluent that may exceed the bacterial limit required in the NPDES permit for shellfish growing waters. Partially treated waste from overflows can impair the health of fish and other aquatic organisms and reduce economic and recreational opportunities in Coos Bay.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

Vegetation

For the Proposed action, minor vegetation loss would result to accommodate construction of the new WWTP facility during clearing, grading, and fill activities. The majority of the site has previously been disturbed by past development. Any replanting would be seeded with native vegetation. Measures slated for post-construction along with continued maintenance at the site would ensure the project is in compliance with EO 13112 for invasive species. The implementation of BMPs and compliance with permitting requirements would ensure sensitive habitat would not be affected by the construction activities, with the exception of the wetlands that would be impacted (see Section 3.3).

No vegetation is anticipated to be disturbed along the WAS pipeline route as the construction sites are within existing ROW and streets.

Fish and Wildlife

The project is within the city limits and there is substantial habitat available in the surrounding area for wildlife, particularly once outside the city limits. The effect would be negligible to short or long-term natural processes sustaining wildlife populations. No impacts to fish through habitat modification are anticipated. Vegetation removal at the new WWTP site would have minimal, if any, effects to available food sources, shelter, or population density to terrestrial species currently utilizing the marginal habitat at the site, and those effects would be long-term to natural processes sustaining these populations at the site. However, there is plenty of habitat available in surrounding areas to minimize any potential effects. Vegetation impacted by construction will be replanted with native vegetation and all invasive species will be removed from the site which will both have long-term benefits to both the vegetation community and area wildlife. There are no anticipated impacts to fish or wildlife from the pipeline construction route within existing streets.

Long-term impacts to fish and wildlife resources are expected to be minor, with measurable changes found at the new wastewater treatment plant site that will convert previously disturbed, but currently vacant land, to a public facility. This impact is small (about 2 acres) and localized.

Threatened and Endangered Species

From the analysis conducted for individual species, the expansion and upgrade of WWTP No. 2 is anticipated to have *no effect* on several state or federal listed species. This includes no effect to federal species listed as threatened, endangered, or proposed, including the western lily, bald eagle, brown pelican, streaked horned lark, western snowy plover, Steller sea lions, or killer whales.

Due to increased concerns by NMFS regarding storm water released into Coos Bay, further consultation to comply with the ESA is required to address potential adverse effects to coho salmon, green sturgeon, and eulachon. This is largely based on the increase in impervious surfaces at the Proposed Action site that may result in increased storm water discharged into Coos Bay. Storm water may deliver a wide variety of pollutants to the ecosystem, including nutrients, metals, petroleum-related compounds, and sediment washed off paved surfaces. These pollutants may potentially adversely affect coho salmon, even at ambient levels.

Storm water is a complex mixture of many contaminants originating on roads, landscaping and other surfaces. Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow. These contaminants also accumulate in the prey and tissues of juvenile salmon where, depending on the level of exposure, they cause a variety of lethal and sublethal effects on salmon, including disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities.

Additional concerns were also identified by NMFS regarding treated effluent discharged to Coos Bay from the wastewater treatment process and potential impacts to aquatic species in the mixing zone around the wastewater effluent discharge point in the bay. Due to these concerns by NMFS regarding the potential adverse effects, further consultation is required to determine whether the project has the potential to adversely affect fish species as related to Section 7(a)(1) of the ESA and Section 305(b) of the MSA.

A Biological Evaluation (BE) was prepared to address these potential effects of the project to federally listed ESA species and their critical habitats. The BE was prepared by CH2MHill on behalf of the City (CH2MHill, 2014) in November 2014 and submitted to the EPA who initiated consultation with the NMFS in January 2015. Review of the BE was completed by NMFS, which made a determination and resulted in NMFS issuing a Biological Opinion (BO) and incidental take statement (ITS) for the project on November 23, 2015. A copy of the BO and ITS is provided in Appendix C.

As stated in the BO, the NMFS has determined that the project will have the following effects on the listed species identified below, and provides both "Reasonable and Prudent Measures" and "Terms and Conditions" which are non-discretionary and must be implemented by the EPA and the City for this project. These conditions are hereby included into the EA as mitigation measures.

Species Effects Determinations
The NMFS BO concludes that "After reviewing and analyzing the current status of the listed species and critical habitats, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of OC coho salmon, green sturgeon, or eulachon, or destroy or adversely modify OC coho salmon or green sturgeon designated critical habitat."(underline emphasis added) (*Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Replacement of the City of Coos Bay Wastewater Treatment Plant No. 2*, November 23, 2015, page 44).

Incidental Take Statement
As defined in the BO, in part, "Incidental take is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to a prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS" (NMFS, 2015, page 45). As part of the ITS, the NMFS outlines both 'reasonable and prudent measures' and 'terms and conditions' for the implementation of the WWTP No. 2 project.

Reasonable and Prudent Measures
The NMFS has outlined reasonable and prudent measures that are "nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02)." (NMFS, 2015). These measures are:

1. Minimize incidental take from exposure to contaminants being discharged by Plant #2 and new impervious surfaces.
2. Monitor contaminant concentrations to document the effects of the action on ESA-listed species in the action area, and provide annual monitoring reports to NMFS.

Terms and Conditions
In order to implement the reasonable and prudent measures, the NMFS has outlined terms and conditions that are "non-discretionary, and the EPA and their applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14)." (NMFS, 2015). The terms and conditions identified by the NMFS are provided below, and are hereby incorporated into this EA as mitigation measures that must be implemented for this project.

1. To implement reasonable and prudent measure #1 (contaminant discharge), the City of Coos Bay shall:
    a. Ensure effluent from the new Plant #2 meets EPA-approved DEQ aquatic life criteria, including:
        i. Do not exceed dissolved copper concentrations of 3.1 µg/L at the edge of the RMZ.
        ii. Do not exceed dissolved zinc concentrations of 81 µg/L at the edge of the RMZ.

iii. Report any sampled exceedances of EPA-approved DEQ aquatic life criteria concentrations to NMFS within 30 days, including a description of the remedy.

b. Maintain proper functioning condition of the rain garden stormwater filter as follows:
   i. Conduct maintenance (e.g., debris removal, soil amendment, vegetation removal and replanting, mowing, sediment removal, tilling, etc.) throughout the year to ensure that stormwater treatment facilities function as appropriate to remove stormwater pollutants. Record the dates and types of maintenance done.
   ii. The rain garden shall drain within 48 hours after any major rainfall event (i.e., greater than 1.5 inches of rain over a 24-hour period at weather station OR-CS-14). If water continues to pond after 48 hours, sources of possible clogging shall be identified and corrected within 7 days. Record the dates and details of any such events.
   iii. Report any failure to drain within 48 hours to NMFS within 30 days, including a description of the remedy.

2. To Implement reasonable and prudent measure #2 (monitoring), the City of Coos Bay shall:
   a. Monitor to determine if wastewater discharges are within the extent of take specified in the ITS, including:
      i. Semi-annual measurements of contaminant concentrations from wastewater discharges. At a minimum the measurements shall include copper and zinc.
      ii. Sample discharge at the edge of the RMZ or in the effluent pipeline prior to discharge, as described below:
         1. If the samples are taken on the edge of the RMZ, they must be taken on the downstream side during an outgoing tide and include a measurement of background concentrations from upstream of the diffuser during the outgoing tide.
         2. If the samples are taken in the effluent pipeline prior to discharge, a dilution ratio may be used. Unless a new mixing study is completed adhering to DEQ requirements, the City of Coos Bay shall use a ratio no greater than 4:1. The City can apply dilution rates from a new mixing zone study once completed and approved by DEQ.
   b. Monitor to determine if stormwater discharges are within the extent of take as specified in the ITS as described below:
      i. Record dates of all major rainfall events (i.e., greater than 1.5 inches of rain over a 24-hour period as measured at weather station OR-CS-14).
      ii. Record dates and times of all instances where water remains within the biofiltration planting boxes for 48 hours or more after the end of a major rainfall event, and the remedy taken to restore function of the system.
   c. Submit an annual monitoring report to NMFS by January 30 of each year that includes the following information for the prior calendar year:

i. Project identification.
    1. Project name and location.
    2. Contact name, address, and phone number.
ii. Wastewater monitoring data as described in 2.a. above.
iii. Monitoring data for the stormwater facility as described in 2.b. above.
iv. Submit all reports to:
    ARA, Oregon/Washington Coastal Area Office
    NOAA Fisheries, West Coast Region
    Attn: **WCR-2015-2030**
    1201 Lloyd Blvd Suite 1100
    Portland, Oregon 97323-1274

MSA Essential Fish Habitat Consultation

As part of the consultation process, the NMFS also consulted with EPA regarding the potential impacts that the project may have on essential fish habitat (EFH). As noted in the BO (NMFS, 2015) "The MSA (section 3) defines EFH as 'those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity'". The NMFS evaluated the potential impacts to approximately 27 fish species that comprise Groundfish, Coastal Pelagic Species and Pacific Salmon Species. A listing of the species is found in the BO which is located in Appendix C.

After evaluation, the NMFS developed EFH conservation recommendations that are subsets of the Terms and Conditions outlined in the BO Incidental Take Statement previously outlined in this section. Specific recommendations are provided below and are found in the MSA consultation section of the BO.

EFH Conservation Recommendations

The following conservation measures are necessary to avoid, mitigate, or offset the impact of the project on EFH.

1. Contaminant Discharge. Minimize adverse effects on water quality and forage/food resources by managing wastewater effluent and maintaining stormwater systems, as stated in the term and condition #1 of the BO.
2. Monitoring. Ensure completion of a monitoring and reporting program to confirm the proposed action is meeting the objective of limiting adverse effects, as stated in term and condition #2 of the BO.

Migratory Birds

There is limited nesting habitat for migratory birds in or near the project sites. At the existing WWTP No. 2 site, vegetation available for migratory bird nesting is located outside of the fenced site. The types of actions proposed would not alter or disturb existing breeding or non-breeding habitat that may be used by migratory birds. Demolition activities at the existing site could affect nesting birds on the far eastern edge of the project (where birds are nesting off-site but near the plant) should work occur along the fence line during bird nesting periods. Mitigation for demolition timing will need to be implemented to prevent unanticipated impacts to potential nesting birds.

At the new site, in addition to clearing of herbaceous and shrub vegetation, three to four isolated trees may require removal at the southeast corner of the site. Clearing of the site is planned for periods after and before migratory bird nesting periods and no impacts are anticipated. However, if the clearing is planned to be conducted during the migratory bird nesting season, mitigations for protection of potential bird nest sites will need to be implemented.

The proposed WAS pipeline is planned for construction within existing city streets and ROW, with entry and exit locations of the HDD pipeline in areas that are free of vegetation, or have been significantly disturbed by residential development. Areas where open cut trenches for new pipeline segments are planned are also within city streets, and these areas will not impact any habitat for migratory birds.

3.5.3 Mitigation

Measures to minimize impacts to biological resources have been incorporated into the design of the Proposed Action alternative, include improving the existing facility, locating the new facility on previously disturbed land and construction of the new pipeline within existing streets. The project design is also in compliance with the NPDES permit that incorporates water quality standards that will minimize adverse impacts to shellfish and fish in Coos Bay. The following mitigation measures are required to ensure compliance with NEPA for biological resources:

1. The City will implement the Reasonable and Prudent Measures and Terms and Conditions from the NMFS consultation for this project as outlined in the Biological Opinion (NMFS, 2015). Additionally, the City will implement the Conservation Recommendations outlined by the NMFS in their MSA Essential Fish Habitat Consultation, as part of the BO.

2. Construction activities that are located adjacent to, or within, migratory nesting bird habitat, or will remove or affect migratory bird nesting habitat, will occur prior to or after nesting season, appropriate to the site but generally will be done prior to March 1st or after August 31st each year. Should construction activities occur during the nesting bird season then one of the following will occur:

    a. Conduct vegetation removal and other ground-disturbance activities associated with construction from September 1 to February 28, when birds are not nesting; **or**

    b. Conduct pre-construction surveys for nesting birds if vegetation-removal or ground-disturbing activities adjacent to nesting habitat are to take place during the nesting season (March 1 to August 31 for most birds). These surveys shall be conducted 7 days prior to vegetation removal or construction activities initiated during the nesting season. If an active nest is located during the pre-construction surveys, ODFW and/or USFWS shall be notified, as appropriate to the species and its status. If an active nest is found adjacent to construction operations, construction at that location shall be prohibited within an adequate setback, as approved by a qualified biologist in consultation. Work within the setback would have to be delayed until after the young have fledged, as determined during surveys by a qualified biologist.

3.6 Water Quality

The Oregon DEQ is responsible for protecting and enhancing Oregon water quality. DEQ requires and issues NPDES permits to regulate the type and amount of wastewater discharge produced at a regulated facility such as WWTP No. 2. Domestic sewage may expose the public to diseases if it is not properly collected, treated, and disposed of.

The NPDES permit for WWTP No. 2 authorizes the City to construct, install, modify, or operate a wastewater treatment collection, control, and disposal system, and to discharge treated wastewater at the outfall located at RM 3.8 of Coos Bay. The permit establishes more stringent discharge limits for bacteria, chlorine, and ammonia due to shellfish growing areas in the vicinity of the effluent outfall, and a new permit is pending. WWTP No. 2 is operating under a Mutual Agreement and Order (MAO) with the DEQ, entered into by the City on August 21, 2003. The MAO establishes interim water quality limits, including fecal coliform, residual chlorine, and ammonia limits, until necessary plant upgrades can be completed to meet more stringent NPDES permit requirements.

The MAO describes the actions the City will perform to address identified wastewater treatment deficiencies and stipulates a schedule for the upgrades that must be met for DEQ compliance. The MAO has been modified and amended since 2003, including most recently on March 2, 2012, to allow the City time to conduct investigative work on how to address and upgrade the various components of the treatment facility in its planning and pre-design process.

WWTP No. 2 was last inspected by DEQ on August 26, 2009, and was found to be operating in compliance with its permit and MAO. In addition, the DEQ conducted an antidegradation review to determine whether they could issue a permit for discharge to waters of the state in 2013. All evaluations showed that the discharge at WWTP No. 2 meets the requirements and/or exceptions of the applicable regulations.

Renewal of the City's NPDES Permit No. 100711 (EPA Reference No. OR002358-2) is currently under review by the DEQ and the DEQ anticipates renewal of the permit in 2015.

3.6.1 Affected Environment

The affected environment includes the existing WWTP No. 2 site, the proposed new WWTP site at the northeast corner of Empire Boulevard and Fulton Avenue, and the WAS pipeline route. The western portion of Coos Bay is protected by the 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.

There is a stream crossing for an unnamed creek that flows through a culvert under Empire Blvd. from the new WWTP site to the tidal wetlands of Coos Bay, and another that allows First Creek to flow under Fulton Ave. and into the tidal wetlands near the existing WWTP No. 2. The WAS pipeline follows existing road improvements and generally does not have any underwater or under channel river/stream crossings. The only exceptions are the unnamed creek that flows under South Wasson Street through a culvert, and at Pony Creek. At the South Wasson Street crossing the WAS

pipeline is proposed to cross well under the culvert within the street ROW. Similarly, the pipeline crossing of Pony Creek is anticipated to be above the Pony Creek culvert within the roadway. Both locations have the creeks contained within existing culverts.

Groundwater

Nearby property well logs indicate the shallowest occurrence of groundwater is approximately two feet below the ground surface at the new WWTP site. Based on topography, the direction of shallow, unconfined groundwater flow is expected to be towards the west, with the properties to the east considered to be up gradient. During SHN's geotechnical investigations conducted at the site in June 2013, wet soils were initially encountered in samples collected between three and five feet of the ground surface. Below five feet, samples from the entire section of marine sands were wet, and free water was observed flowing past the test pit walls. Groundwater levels during the field exploration were expected to be at or near their seasonal high, with a seasonal variation of at least several feet in the groundwater elevation expected to occur at the site. Groundwater elevation is also likely to be tidally influenced due to the site proximity to Coos Bay.

At the new WWTP site, the City intends to grade the area to direct all runoff back to the influent pump station, where it will be treated with the process wastewater. There are no flows contributing to the subject drainage other than what is generated at the site during storm events. The soils in the area are predominantly sandy loams which are well drained, although they have slow permeability. This explains why water is ponding in the low area where the one isolated wetland occurs.

The Safe Drinking Water Act of 1974 directs projects with a federal nexus to determine if a sole source aquifer would be affected. The project is not located within the vicinity of a sole source aquifer, and no further evaluation is required.

Streams

On-Site

For the new WWTP site the nearest body of water is a small channelized unnamed waterway at the north end of the site which was realigned as part of the mitigation for the wetland delineation and fill at the site. The waterway is a stream channel that provides flow to Coos Bay.

The stream had historically flowed through the center of Tax Lot 2700 before turning west to flow under Empire Boulevard. Under USACE Permit No. 200300733 and Oregon DSL Permit No. 31703, the stream was realigned in 2004. For the realignment, the stream now is confined to the northern portion of Tax Lot 2800 (Tax Lot 2800 is not a part of the project and is off-site) from east to west, turning south before it reaches Empire Boulevard and entering a 48" diameter culvert that is approximately 60 feet long; this culvert provides surface access to the site from Empire Blvd. South of the culvert, the stream continues to flow along the western edge of Tax Lot 2700 for approximately 100 feet before turning west

to flow under Empire Boulevard and into Coos Bay, located approximately 400 feet to the west.

Riparian mitigation for the stream realignment was required and has been completed. It included armoring the stream channel with riprap on the steep banks, and planting native woody vegetation along the narrow strips at the top of the bank in 2005. The mitigation was monitored by Stuntzner Engineering and Forestry, LLC, and monitoring reports were submitted to regulatory agencies, as required. For the Proposed Action, no work will occur at or below the OHWM of the stream. Paved emergency ingress/egress along Empire Boulevard is planned for the western boundary of the site at the existing access point where the culvert is located. No in-stream work or channel modifications are proposed.

Tyler Krug, USACE Project Manager, conducted a preliminary review of the Proposed Action alternative WWTP No. 2 site and determined the previous USACE consultation completed by PBS in 2011 delineated just to the top of the OHWM of the stream. It is likely that the stream is tidally influenced, and would be jurisdictional for the USACE under Section 10 of the Rivers and Harbor Act (Section 10). Any structure (including pavement, an underground cable, etc.) going over or under Section 10 waters requires consultation to determine if a USACE permit is required. The existing crossing is expected to have minimal impacts due to the existing culvert and fill prism being in-place and no proposal to modify them is planned. Proposed work would be minimal and would be mitigated by BMPs. Based on the proposed project, which leaves intact the existing crossing that accesses the site, the project is unlikely to be required to have a Section 10 permit. However, the USACE may take jurisdiction over any work at the existing access point and might require a Nationwide Permit (NWP) 14 for crossings. The applicable permit, if required, would be determined once a permit application is turned in by the City to the USACE after the NEPA process is completed.

The Oregon DSL provided a letter on March 28, 2012, stating the agency concurred with the PBS wetland and waterway boundaries as mapped in the November 2011 wetland delineation, and that each would be subject to permit requirements under the state Removal-Fill Law. . The City has acquired a DSL Removal-Fill permit for this project.

WAS Pipeline Alignment

The WAS pipeline crosses the location of three existing streams, all of which have been confined to culverts and placed under existing roads. The first crossing is the unnamed stream located at the new WWTP No. 2 site, as described above in 'On-Site'. The second crossing is another unnamed stream (#1242402433884 as identified in StreamNet) along Ocean Boulevard near the intersection with 28th Street. It appears that this stream is associated with the Pony Creek stream system. The last crossing is Pony Creek at Ocean Boulevard, just downstream from the Lake Merritt dam site. Refer to Figure 7 for crossing locations.

Off-Site

First Creek is the stream to the south of the project vicinity. It is a perennial tributary stream of Coos Bay that originates in the hills of the North Bend and the Coos Bay peninsula. It flows northwest and through a culvert under Empire Boulevard and then under Fulton Avenue before draining into a salt marsh just northeast of the existing WWTP No. 2 site. The existing influent sewer pipe crosses First Creek just south of Fulton Avenue.

Wild and Scenic Rivers

The National Wild and Scenic Rivers Act of 1968, as amended, was established to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection. The project is not located geographically near a designated wild and scenic river basin and no further consultation is required.

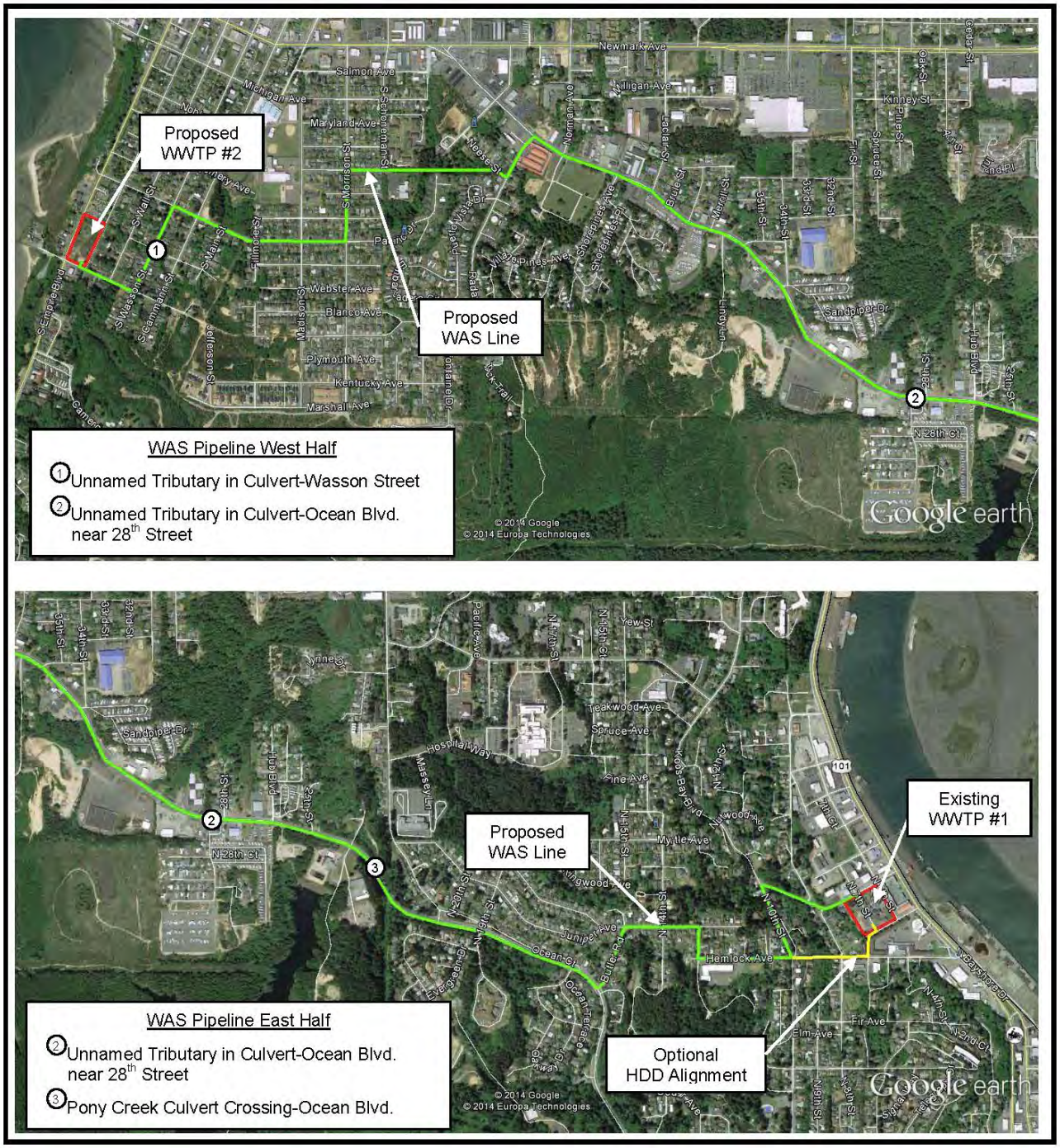


Figure 7. Was Pipeline Crossings

Sanitary Sewer Overflows

DEQ guidelines were used to estimate projected sewage flow rates using a statistical method based on rainfall (DEQ Flow Project Guidelines, April 1996). In Oregon, wastewater treatment facilities must have both the hydraulic and treatment capacity to handle the peak day average flow associated with a five-year storm for the amount of sewage that can move through the system without overflowing and the amount of sewage that can be treated to meet effluent limits.

Oregon Administrative Rules have established an upper threshold for sanitary sewerage overflows (SSO). During the summer months, these overflows are prohibited unless they are the result of a storm event which exceeds the one-in-ten year 24-hour storm. During the winter months, SSOs are prohibited unless it is due to a storm event which exceeds the one-in-five-year 24-hour storm magnitude. Therefore, treatment plants in Oregon must be capable of treating all wastewater up to these flows.

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 storm water pollution and to control erosion. Section 401 Water Quality Certification is required to ensure that federally permitted activities resulting in discharge to a water of the state meets water quality standards. NPDES permit parameters included biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform bacteria, enterococcus bacteria, pH, and total residual chlorine. Both Sections 402 and 401 are administered by the Oregon DEQ.

Mixing Zones

A mixing zone is an area where wastewater discharged from a permitted facility enters and mixes with a water body. A mixing zone is an established area where water quality standards may be exceeded as long as acutely toxic conditions are prevented and all beneficial uses, such as drinking water, fish habitat, recreation, and other uses are protected. Mixing zones are required to protect the beneficial uses.

The EPA allows states to adopt their own mixing zone regulations as part of the state's water quality standards (40 CFR 131.13). These state regulations are subject to review and approval by EPA; Oregon's mixing zone rule has been approved by the EPA and can be found at OAR 340-041-0053. The Oregon 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 size of the area or zone varies based on how concentrated the wastewater discharge is, water quality standards, location of the discharge in relation to critical habitat or drinking water intakes, and size or flow of the waterbody. Not all permitted facilities have mixing zones. Most mixing zones in Oregon vary in size from 5 to 300 feet from the point of discharge.

Water Quality Standards

The Oregon DEQ administers and monitors water quality standards for Oregon rivers and streams per Section 303(d) of the federal CWA. In 2011, the DEQ revised the state's water quality standards regulation to address the human health criteria for toxic pollutants. DEQ also finalized new and revised water quality standards rules addressing the implementation of water quality standards through various water quality control programs, including NPDES permits and nonpoint source pollution programs. On Oct. 17, 2011, the EPA approved revisions to Oregon's water quality standards designed to reduce or prevent toxic pollutants in Oregon waterways. EPA's approval makes the revised state standards, including new NPDES permitting implementation policies, effective for state and federal CWA programs. The water quality standards for the South Coast Basin (OAR 340-041-0300) apply to the project area and are used as a basis for the standards set in the NPDES permit for WWTP No. 2.

3.6.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action alternative, corrective actions specified in the MAO and NPDES permit renewal between the City and DEQ would not be realized, because needed treatment plant upgrades to meet the new water quality rules would not be implemented. WWTP No. 2 would continue to operate under interim effluent limitations specified in the MAO that do not meet current DEQ state standards for the release of wastewater effluent in the shellfish growing waters of Coos Bay. The schedule agreed upon in the MAO to construct new or modified facilities to adequately treat wastewater would not be met and WWTP No. 2 would likely violate the fecal coliform, total residual chlorine, and ammonia effluent limitations at times.

Nutrient pollution and fecal contamination of nearshore waters due to overflowing during storm events may occur. The impact intensity would be determined by the extent of the overflows that occur, with localized impacts expected. If overflows repeatedly exceed regulatory standards for water quality, substantial consequences to local resources would occur that may result in long-term consequences. Available data does not conclusively link instances of infection or health problems to groundwater or offshore contamination caused by current WWTP practices. However, the presence of enteric microbes in nearshore marine waters can pose a health risk through ingestion, inhalation of contaminated water spray, or eating contaminated seafood.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The Proposed Action site provides some storage of storm water runoff in the small depression at the south end of the new WWTP site where the isolated wetland occurs. Grading and filling of the site for construction would result in ground disturbance which has the potential to result in surface water runoff during construction. The isolated wetland is proposed for elimination, therefore the impacts would be final. Project design and BMPs required during construction would ensure that no release of sediments would occur into the stream at the site and the effects from construction storm water runoff would be negligible.

Based on SHN geotechnical investigations, the groundwater elevation lies more than 15 feet above the base of the excavation for the foundation of the influent pump station. It also lies at or slightly above the elevation of the base of the thickest section of fill material. All fill material will be required to be excavated and replaced with engineered fill. Therefore, it should be expected that shallow groundwater conditions will be encountered during site excavation, grading, and construction of the influent pump station. Construction methods and BMPs will ensure that groundwater will be protected during construction; there will be negligible impact to groundwater quality.

The most critical element of protecting the receiving water quality in Coos Bay is adherence to the MAO and NPDES permit. The Proposed Action would include upgrading the existing system to accommodate projected future wastewater loads and flows and to meet more restrictive NPDES water quality standards while balancing the cost of improvements. These improvements will have a positive effect to the existing mixing zone at the discharge point through the use of Ultra Violet (UV) filters rather than the conventional chlorination of wastewater effluent. Current PIF is estimated at 4.5 mgd and the projected peak flow for 2037 is 8.2 mgd. While the volume of effluent discharged into Coos Bay will increase as the population grows, the concentrations of toxic chemicals and pathogens will decrease with implementation of the Proposed Action which employs superior wastewater treatment technologies than those currently present at the existing WWTP No. 2.

The new wastewater system would have the capacity to reduce sanitary sewer overflows and ensure that nutrient pollution and fecal contamination of nearshore waters due to overflows during storm events would be negligible. Provided DEQ compliance is achieved, no adverse effects are anticipated to water quality. The impact intensity to water quality from the Proposed Action would be well below regulatory standards, with improved effluent water quality having beneficial effects to Coos Bay. The service district would benefit from the reduction of sewage discharges that would result from the implementation of improved wastewater treatment facilities.

The Proposed Action also proposes the construction of a new WAS pipeline to transfer sludge to the existing WWTP No. 1. Implementation of this alternative will have negligible effect, if any, on water quality. Construction practices utilize HDD technologies for installation of the new pipeline which eliminate most of the open cut trenches. HDD isolates surface impacts to small areas of drilling which will be managed through storm water controls implemented as BMP's. The open cut trench sections are limited and will have similar BMP's to manage the excavation activities, including excavation stockpile storm water and erosion controls. No significant impacts to storm water runoff or water quality is anticipated from this portion of the project.

For the WAS pipeline route, the Proposed Action has been developed to install the pipeline at all stream crossings by HDD, where the new WAS pipeline will be placed above or below the existing culverts. No channel modifications are proposed by open-cut trenches or HDD pits.

Additionally, the HDD pipeline route has had a frac-out analysis completed that evaluated the potential for drilling fluids to fracture the local bedrock and be pushed onto the surface. The frac-out analysis determined that the potential for a frac-out is low and has provided specific

information for use in the HDD bore plan to control drilling fluids and reduce the potential of frac-out to negligible levels.

3.6.3 Mitigation

1. Disturbed areas that will be left exposed following construction shall be stabilized with a seed mixture capable of surviving in site soils, using native species. If any non-native species are required for specific problem areas, species will be selected that will not become nuisance species to the surrounding areas.

2. No work will be conducted or impact the area below the ordinary high water mark of the stream located on the northern and northwestern perimeter of the new WWTP site. If the project should require that work be done inside the stream channel, further consultation with regulatory agencies will be required prior to project implementation.

3. The City shall implement the Reasonable and Prudent Measures, Terms and Conditions, and EFH Recommendations from the NMFS biological opinion (Appendix C) which will provide additional protection of water quality in Coos Bay.

3.7 Coastal Resources

3.7.1 Affected Environment

The project is located within the coastal zone management area of Oregon, which extends from the crest of the coastal mountain range seaward to the extent of state jurisdiction located three nautical miles offshore.

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 Coastal Management Program (OCMP). Federal financial assistance to state and local governments trigger the consistency provisions of the CZMA. The lead agency responsible for applying the standards of the OCMP is the Oregon DLCD. The City is responsible for confirming with the DLCD whether this project would require a consistency determination under the CZMA. A project must be shown to be consistent with the various applicable components of the OCMP, with 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. Under the management plan, the existing WWTP No. 2 site is within Shoreland Segment 55, with a management classification of Urban Development. The management objective for Shoreland Segment 55 states:

> *This segment shall be managed to allow continuation of the existing mix of residential and commercial uses to the west of Cape Arago Highway (Empire Boulevard), since this segment is not especially suited to commercial and industrial water-dependent/related uses. This segment also*

contains designated mitigation Site M-1b (medium priority) which must be protected from pre-emptive uses, consistent with Policy #22.

The existing and ongoing WWTP use is allowed within this Shoreland Segment, and the project complies with general and special conditions and policies to meet statewide planning goals. If the project qualifies for a NWP by the USACE, the DLCD has provided conditional advance concurrence through the NWP program. Otherwise, concurrence from the DLCD that the project is consistent with the OCMP is required prior to project implementation.

3.7.2 Environmental Consequences

Alternative 1 – No Action

The existing WWTP No. 2 is consistent with base zoning and the *Coos Bay Estuary Management Plan*. A federal consistency determination is not required for no action, and no mitigation would be required to maintain existing conditions under the OCMP.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The Proposed Action would consist of development of a new wastewater facility that is located in Shoreline Segment 55 of the *Coos Bay Estuary Management Plan,* as is work at the existing WWTP No. 2. The existing WWTP is a permitted use within the Shoreland Segment as are the improvements at the new WWTP, and these facilities are consistent with the OCMP.

The new WAS pipeline is partially located in the Shoreland Segment, and is consistent with uses permitted here.

3.7.3 Mitigation

No mitigations are required as the development of the project is consistent with the OCMP.

3.8 Socioeconomic Resources and Environmental Justice

EO 12898, Environmental Justice, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations in the United States resulting from federal programs, policies, and activities. It also requires federal agencies to ensure that public notifications regarding environmental issues are concise, understandable, and easily accessible. Accordingly, socioeconomic and demographic conditions in the service area were analyzed to determine if a disproportionate number (defined as greater than 50 percent) of minority or low income persons have the potential to be affected by the alternatives considered.

3.8.1 Affected Environment

Low income populations were identified using data from the 2010 U.S. Census. The percentage of disadvantaged people in the potentially affected area was compared to demographics in Coos

County and the state to determine if an environmental justice impact could occur. Minority and low income population totals and percentages are presented in Table 7.

Table 7
Minority and Low Income Population Totals
Coos County, Oregon
2010 U.S. Census

Area	Population 2010	Percentage Minority 2012	Number of Households 2007-2011	Average Median Household Income 2007-2011	Income Below Poverty Level (Percent) 2007-2011
City of Coos Bay	15,967	12.9	6,804	36,751	16.9
Coos County	63,043	8.7	27,077	37,789	16.0
State of Oregon	3,831,074	11.7	1,509,554	49,850	14.8

For the purpose of evaluating Environmental Justice effects, the affected environment is defined as the affected population of the City of Coos Bay and the Charleston Sanitary District. The 2010 U.S. Census reported there were 15,976 people in the City of Coos Bay, with 87.1 percent white, 7.6 percent Hispanic or Latino, 2.6 percent Native American, 1.4 percent Asian, 0.6 percent black, and the remaining 5.5 percent of local residents had multi-racial backgrounds. The U.S. Census determined that 16.9 percent of the city population had incomes below the poverty level, compared to 16.0 percent for the county, and 14.8 for the state of Oregon.

Although no service area-specific statistics have been compiled other than the City of Coos Bay as a whole, based on the above statistics and for project planning purposes, it is estimated that approximately 16.9 percent of residents served by WWTP No. 2 may be considered low income. This is well below the 50 percent threshold for environmental justice. Further investigation into properties within the immediate vicinity of the new site revealed that in addition to a mobile home park immediately north of the site, existing homes had lower values in the Empire District when compared to other neighborhoods in the City. The presence of lower income households does not necessarily indicate the existence of a disadvantaged population. Given the overall beneficial nature of the project, no disproportionate impacts are expected to minority of low income populations from the project.

In 2008, the City performed a Wastewater Rate and Cost of Service Study to fund future improvements for the wastewater treatment and collection system, as established by the City's Master Plan, facility plans and the MAO. The City Council approved the study's recommended annual rate increase of 6.5% in April 2009. Since the initial annual rate increase, the City Council has approved the 6.5% rate increase each year.

3.8.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action Alternative, no construction activities would take place. Minority and low income persons would not be directly affected; however, not having upgrades to, or a replacement for, their aging facility would continue to affect residents of the community as a whole (including low income and minority populations), as the potential to exceed DEQ thresholds affects both the natural and human environments they live in. It is likely that nearshore water quality conditions in Coos Bay would continue to be affected and the City would continue to face ongoing issues at the existing plant to meet the standards intended to protect the environment (particularly receiving waters) against unacceptable degradation resulting from power failure, floods, peak loads, equipment failure, and maintenance shutdowns that would potentially impact physical resources and associated land use.

Available data does not conclusively link instances of infection of health problems to potential contamination caused by current sewage treatment practices at WWTP No. 2. However, the presence of contamination in nearshore estuarine waters can pose a health risk through ingestion (e.g., swimming), inhalation of contaminated water spray (e.g., while boating), or eating contaminated seafood. Therefore, it may be reasonably assumed that potential public health risks related to the presence of enteric microbes (possible pathogens in fecal pollution) exist and would continue to exist under this alternative.

The direct and indirect impacts to socioeconomic resources would be determined by the level of health risks posed by not improving the treatment and disinfection of wastewater for the service district. If overflows occur, potential impacts would likely increase. The intensity of impacts would be variable and based on the extent of effluent released into receiving waters that exceeds water quality standards.

Scheduled wastewater increases (currently estimated at 6.5% annually) have been approved in past years and it is likely that the increases will continue into the near future to provide funds for wastewater improvements. Selection of the No Action alternative would have no effect on these rates, as they have been independently set prior to this evaluation.

Alternative 2 – WWTP No. 2 Expansion and Upgrade Project (Proposed Action)

The Proposed Action would upgrade the existing WWTP No. 2 through construction of a new facility and development of a WAS pipeline to transfer sludge to the existing WWTP No. 1. The direct result would be a social and economic beneficial impact to the community as a whole, including public health and safety through improved water quality and reduced pollution to the waters of Coos Bay. Minority and low income residents in the service district (as well as the entire population of the area) would benefit from the risk reduction of potentially contaminated sewage discharges by construction of an improved wastewater treatment facility.

The installation of wastewater systems that meet Oregon DEQ statutory treatment standards would improve water quality in shallow aquifers, nearshore waters, and, to a lesser extent, offshore

marine waters. The resulting reduced threat of fecal contamination and nutrient pollution would reduce potential adverse effects on public health. Low income and minority populations are expected to benefit from the wastewater management improvements proposed; this would be a beneficial long-term social and economic impact to the community as a whole, including these populations.

From a financial standpoint, the implementation of the Proposed Action will not have an impact on the existing scheduled annual rate increases (estimated at 6.5%), as these increases were previously enacted to build up reserves for city-wide wastewater improvements. While the annual increase may have an effect on low and very low income persons, implementation of the Proposed Action will not provide additional increases to wastewater fees currently collected.

3.8.3 Mitigation

The Proposed Action alternative would not result in disproportionately high or adverse effects to minority or low income populations and no mitigation would be required.

3.9 Miscellaneous Issues

3.9.1 Cumulative Effects

Cumulative effects are those that result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes an action. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Under the No Action Alternative, degradation to the environment has an increased likelihood to occur if regulatory and population requirements are not met for wastewater collection, treatment, and disinfection. This would result in minor to moderate direct effects to biological and water resources in the Coos Bay estuary marine zone and public health impacts, depending on the intensity of any overflows or releases of contaminants into the environment.

The Proposed Action would meet DEQ requirements and as such, all resources would benefit. Implementation of the project is expected to have few, if any, adverse cumulative impacts to physical resources, water resources, biological resources, cultural resources, or socioeconomic resources, as the majority of the project impacts are anticipated to be beneficial. Construction would create temporary disturbance to soil, create short-term impacts from construction related noise, and have temporary and short-term impacts on local traffic in isolated areas around construction sites.

The areas of disturbed soil would be properly treated to eliminate future settling and revegetated to reduce surface erosion from the site. Construction related noise will also be temporary and limited to the construction sites; once construction is completed the noise levels will return to pre-construction levels. Traffic related impacts are also very limited in both time and location; roadways where open cut trenches for new pipelines and HDD sites will likely require traffic control that could increase congestion in some locations for short periods during the construction.

However, once completed the roadways will immediately return to pre-construction traffic congestion levels.

Storm water that is accepted into the wastewater treatment plant would be treated prior to release and reduce the levels of contaminants, to the best extent practicable. BMPs, permitting conditions, and project mitigation measures would further reduce the potential for runoff and erosion to adversely affect adjacent areas and resources. There would be long-term gains to area residents and the environment by having an improved WWTP. Cumulative effects are anticipated to be negligible or minor to the environment and beneficial to the population the facility services.

3.9.2 Plain Writing

The Plain Writing Act of 2010 requires the federal government to write all new publications, forms, and publicly distributed documents in a "clear, concise, well-organized" manner. In his January 21, 2009, Memorandum of Transparency and Open Government, President Obama emphasized the importance of establishing "a system of transparency, public participation, and collaboration." Plain writing is indispensable to achieving these goals. This EA complies with federal regulations regarding plain writing and was written as clearly and uncomplicated as possible to make it easier for the public to understand the proposed project and how it may affect the human environment they live in.

3.9.3 Agency Coordination and Public Involvement

This EA evaluated environmental and historic resources that could be affected by the project to expand and improve the existing WWTP No. 2 for the City of Coos Bay. Several state and federal agencies, in addition to three tribes, were consulted throughout the NEPA process to gather valuable input and to meet regulatory requirements. The evaluation did not identify any significant adverse impacts associated with land use, floodplains, wetlands, historic properties, biological resources, water quality, coastal resources, socioeconomic resources, or environmental justice. Implementing the Proposed Action, along with any conditions associated with permits or approvals, is expected to avoid or minimize adverse effects associated with the action.

The EA will be released and a public notice will be posted in the community of Coos Bay and Charleston for a 30-day public review and comment period. The EA and public notice will be posted for viewing at City Hall, the Coos Bay Public Library, Coos Bay U.S. Post Office, Empire U.S. Post Office, Charleston U.S. Post Office, Charleston Sanitary District office, and on the City's website. Following the public involvement comment period, Oregon DEQ, delegated as the lead for NEPA compliance by CWSRF funding, will determine whether to issue a FONSI for the Proposed Action, or whether a Notice of Intent to prepare an Environmental Impact Statement is needed due to potential significant effects; the City does not anticipate the need to prepare an Environmental Impact Statement.

The initial public notice will also serve as the final public notice for this project. Unless significant substantive public comments are received, no further public involvement will be conducted for this EA.

4.0 Summary of Mitigation

This section provides a summary of the mitigation measures that are required to be implemented to reduce the potential impacts from development of the Proposed Action to levels that are less than significant.

The City is also required to obtain and comply with all local, state, and federal permits and authorizations prior to implementing the Proposed Action. These requirements are considered to be a required project element for implementation to avoid, minimize and reduce the potential adverse impacts from the project, or to comply with federal and state laws and regulations. As such, these are not considered mitigation measures, and are not necessarily included in the mitigation summary.

Development in the Proposed Action project area shall comply with the scope of work in the final design plans. The mitigation measures proposed in the various sections of this EA have been summarized in Table 8.

Table 8 Mitigation Measures Required For Project Implementation	
Resource Element	**Mitigation Measure**
Land Use	**Mitigation Measure 1** The City shall ensure that appropriate BMPs to control erosion and sediment, reduce spills and pollution are selected and implemented in construction contracts. The City shall provide monitoring to ensure construction contractor compliance.
	Mitigation Measure 2 The City shall comply with the Coos Bay Comprehensive Plan requirements and will ensure that these requirements are included in the design and construction documents for the project. The City will document of compliance, including any conditional use permits or variances, should be retained in the administrative record for the project.
	Mitigation Measure 3 The City shall implement a traffic control plan during construction to ensure traffic control measures, alternate routes, staging area locations, and optimal working times are planned to minimize traffic disruption.
	Mitigation Measure 4 Standard construction BMPs, including decreasing vehicle idle times and watering down construction areas, should be implemented during construction to reduce temporary effects to air quality. Debris created by construction should not be burned, but transported to a disposal area to avoid further air pollution.
	Mitigation Measure 5 Noise from the construction activities will be in compliance with the City of Coos Bay Municipal Code regarding the nuisance ordinance for noise.
Land Use	**Mitigation Measure 6** Structures should be designed and constructed to withstand seismic shaking as required by the International Building Code (IBC) for Site Class C, consisting of "very dense soil and soft rock" (IBC Table 1613.5.2, 2012).
	Mitigation Measure 7 Surface drainage will be designed to prevent ponding and enable water to drain toward suitable collection or discharge facilities from foundations, slabs-on-grade, edges of pavement, and tops of slopes. Concentrated water should not be discharged onto bare ground or slopes, but should be carried in pipes or lined channels to suitable disposal points.

Table 8, Continued	
Resource Element	**Mitigation Measure**
Land Use, Continued	**Mitigation Measure 8** Should any hazardous materials and/or toxic waste be found at construction sites during project development, the City will ensure that these materials are collected and disposed of in accordance with federal and Oregon Department of Health and DEQ regulations?
Wetlands	**Mitigation Measure 9** Access roads and work areas must use existing access ways whenever possible to prevent impacts to mitigation wetlands/channel on the north and west site of the new WWTP site. BMPs such as silt fencing and reseeding using native species are required, as needed, to eliminate the potential for runoff and erosion to adjacent areas.
	Mitigation Measure 10 No construction material or debris shall be staged or disposed of in a wetland, even temporarily. Excess and unsuitable excavated material shall not be side cast into or placed upslope of wetlands environments and shall be disposed of at an authorized disposal location.
	Mitigation Measure 11 The City is required to directly coordinate with the Oregon DEQ, DSL, and USACE, regarding permits and authorizations required to comply with state and federal laws for the protection of wetlands. The City shall obtain and comply with all requirements prior to and during project implementation
Historic Properties	**Mitigation Measure 12** In the event historically or archaeologically significant materials or sites (or evidence thereof) are discovered during the implementation of the project, the project shall be halted and all reasonable measures taken to avoid or minimize harm to property until such time as the City, in consultation with the State Historic Preservation Officer (SHPO) and tribes, determines appropriate measures have been taken to ensure that the project is in compliance with the National Historic Preservation Act (NHPA).
	Mitigation Measure 13 CTCLUSI will be contacted immediately if any known or suspected cultural resources are encountered during the work. All construction personnel shall be given training on cultural resource protection (i.e., laws and basic identification) prior to the start of the project and the training will be reiterated at weekly safety meetings. In addition, CTCLUSI will be given at least 72 hours notice prior to any ground disturbing work so that a staff person or designated tribal member can have the opportunity to be present for some or all of the proposed work.

Table 8, Continued	
Resource Element	**Mitigation Measure**
Biological Resources	**Mitigation Measure 14** The City will implement the Reasonable and Prudent Measures, Terms and Conditions and EFH Conservation Recommendations from the NMFS consultation for this project as outlined in the Biological Opinion (NMFS, 2015).
	Mitigation Measure 15 Construction activities that are located adjacent to, or within, migratory nesting bird habitat, or will remove or affect migratory bird nesting habitat, will occur prior to or after nesting season, appropriate to the site but generally will be done prior to March 1st or after August 31st each year. Should construction activities occur during the nesting bird season then one of the following will occur: a. Conduct vegetation removal and other ground-disturbance activities associated with construction from September 1 to February 28, when birds are not nesting; **or** **b.** Conduct pre-construction surveys for nesting birds if vegetation-removal or ground-disturbing activities adjacent to nesting habitat are to take place during the nesting season (March 1 to August 31 for most birds). These surveys shall be conducted 7 days prior to vegetation removal or construction activities initiated during the nesting season. If an active nest is located during the pre-construction surveys, ODFW and/or USFWS shall be notified, as appropriate to the species and its status. If an active nest is found adjacent to construction operations, construction at that location shall be prohibited within an adequate setback, as approved by a qualified biologist in consultation. Work within the setback would have to be delayed until after the young have fledged, as determined during surveys by a qualified biologist.
Water Quality	**Mitigation Measure 16** Disturbed areas that will be left exposed following construction shall be stabilized with a seed mixture capable of surviving in site soils, using native species. If any non-native species are required for specific problem areas, species will be selected that will not become nuisance species to the surrounding areas.
	Mitigation Measure 17 No work will be conducted or impact the area below the ordinary high water mark of the stream located on the northern and northwestern perimeter of the new WWTP site. If the project should require that work be done inside the stream channel, further consultation with regulatory agencies will be required prior to project implementation.

5.0 List of Preparers

SHN Consulting Engineers & Geologists, Inc.

- Barbara Gimlin, Environmental Planner
- Mark Chaney, Principal Environmental Scientist
- Greg O'Connell, Project Botanist
- Mark Denning, Project Engineer
- Steve Donovan, Project Manager/Principal Engineer

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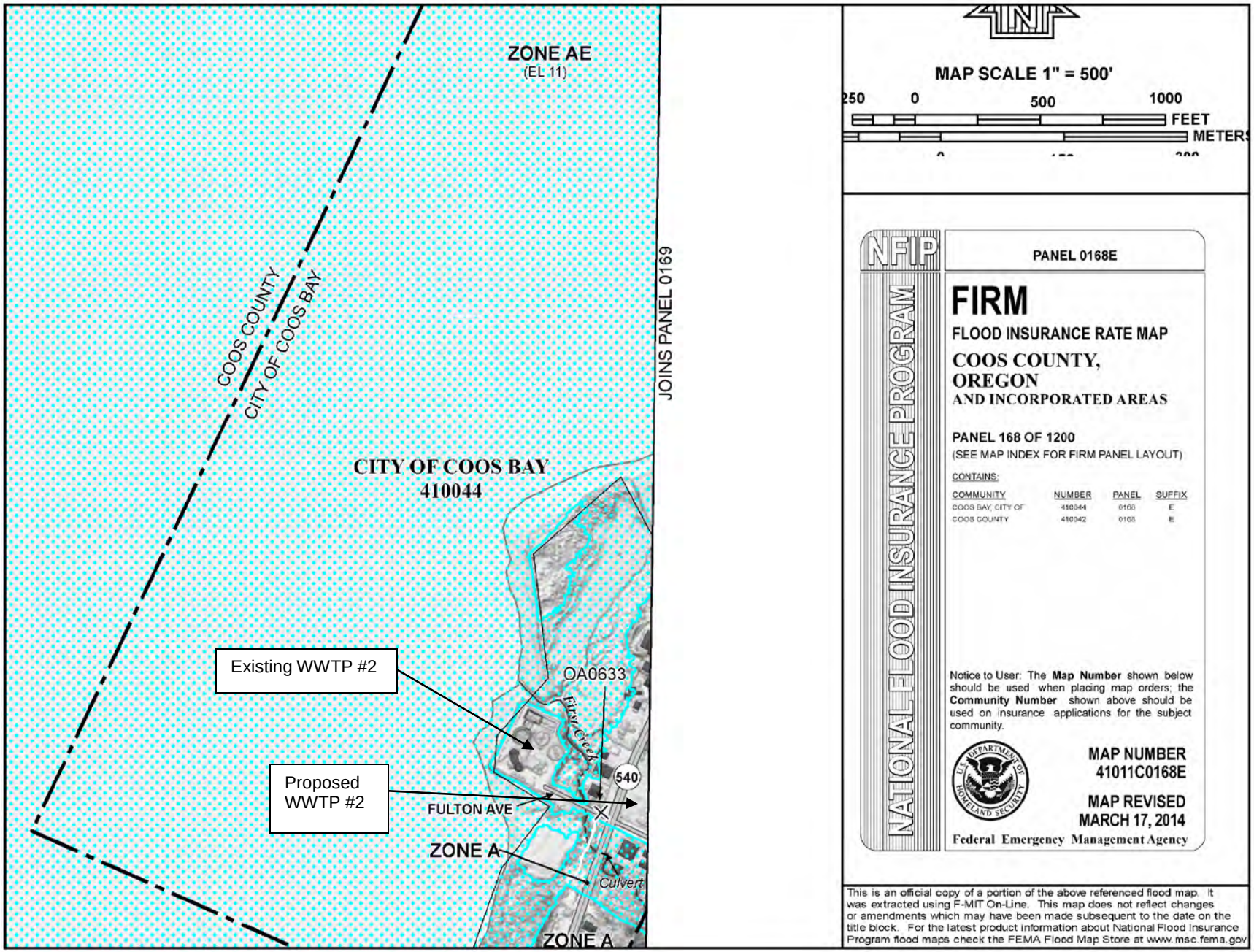
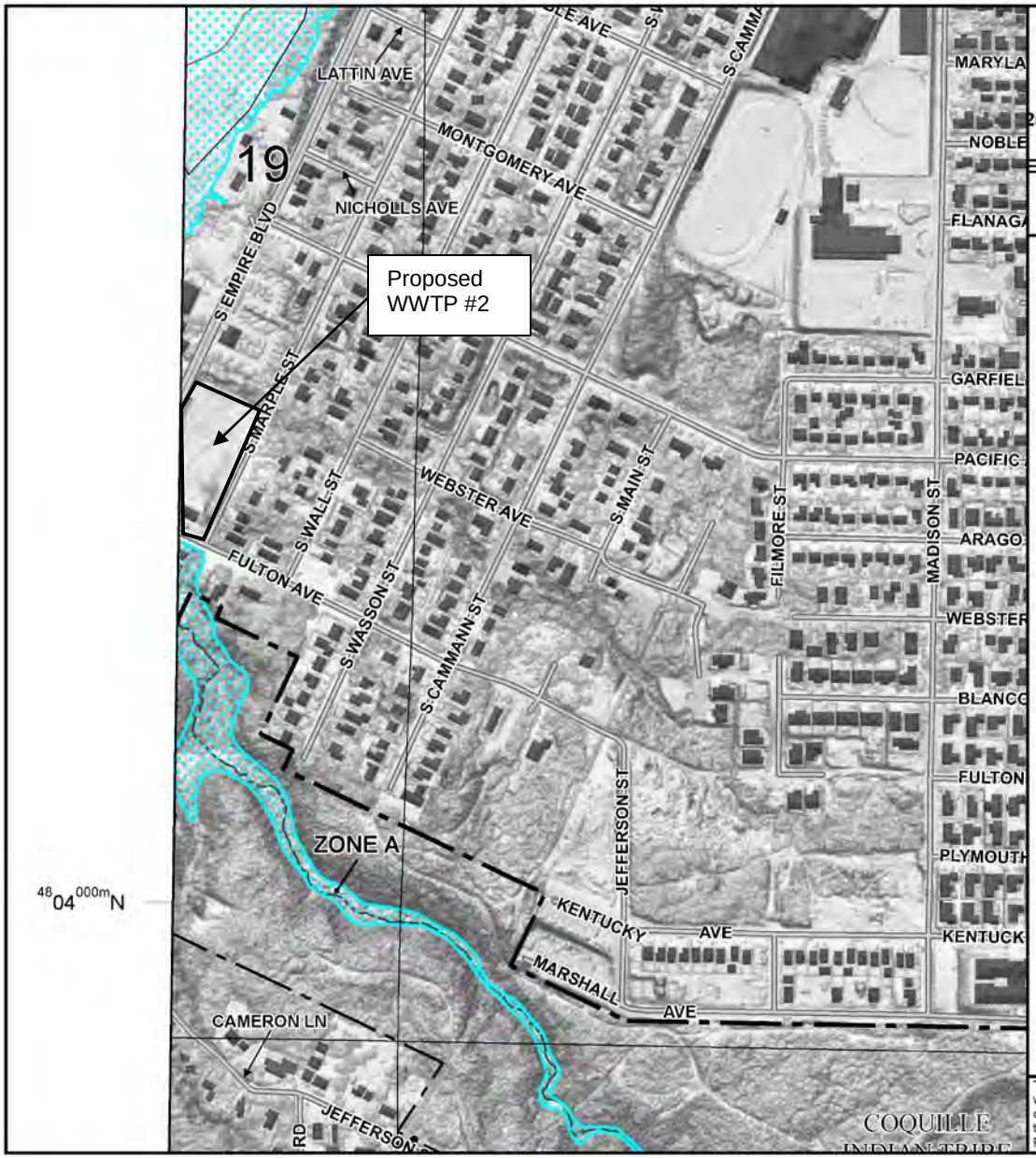
Appendix A

FEMA Flood Insurance Rate Map


ZONE AE
(EL 11)
COOS COUNTY
CITY OF COOS BAY
JOINS PANEL 0169
CITY OF COOS BAY
410044
Existing WWTP #2
Proposed
WWTP #2
OA0633
Flint Creek
540
FULTON AVE
ZONE A
Culvert
ZONE A
MAP SCALE 1" = 500'
250 0 500 1000
FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0168E
FIRM
FLOOD INSURANCE RATE MAP
COOS COUNTY,
OREGON
AND INCORPORATED AREAS
PANEL 168 OF 1200
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
COOS BAY, CITY OF 410044 0168 E
COOS COUNTY 410042 0168 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
41011C0168E
MAP REVISED
MARCH 17, 2014
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METERS

NFIP

PANEL 0169E

FIRM

FLOOD INSURANCE RATE MAP

COOS COUNTY, OREGON AND INCORPORATED AREAS

PANEL 169 OF 1200

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COOS BAY, CITY OF	410044	0169	E
COOS COUNTY	410042	0169	E
NORTH BEND, CITY OF	410048	0169	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
41011C0169E

MAP REVISED
MARCH 17, 2014

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix B

Cultural Resource Correspondence

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0671
Fax (503) 986-0793
www.oregonheritage.org

February 15, 2012

Mr. Paul Slater
PBS Engineering & Enviro
271 N Baxter
Coquille, OR 97423

RE: SHPO Case No. 12-0129
Coos Bay Waste Water Treatment Plan #2 East Site Proj (NWP-2003-7333 & DSL APP0031703)
CRS
PBS Engineering/City of Coos Bay/NWP/DSL
25S 13W 19, Coos Bay, Coos County

Dear Mr. Slater:

Our office recently received your report about the project referenced above. I have reviewed your report (SHPO# 24928) and agree that the project will have no effect on any known cultural resources. No further archaeological research is needed with this project.

Please be aware, however, that if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. Under state law (ORS 358.905-955) it is a Class B misdemeanor to impact an archaeological site on public or private land in Oregon. Impacts to Native American graves and cultural items are considered a Class C felony (ORS 97.740-760). If you have any questions regarding any future discovery or my letter, feel free to contact our office at your convenience.

Sincerely,

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

November 12, 2013

Ms. Jennifer Wirsing
City of Coos Bay Public Works Department
500 Central Ave
Coos Bay, OR 97420

RE: SHPO Case No. 13-1465
Coos Bay Wastewater Treatment Plant No. 2 Expansion & Upgrade Proj
FOE/CRS/expand & upgrade existing facility
Coos Bay Public Works/SN Consulting/ODEQ/EPA/SOU
2S 13W 19, Coos Bay, Coos County

Dear Ms. Wirsing:

Our office recently received your report about the project referenced above. I have reviewed your report (SHPO# 26007) and agree that the project will have no effect on any known cultural resources. No further archaeological research is needed with this project.

Please be aware, however, that if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. Under state law (ORS 358.905-955) it is a Class B misdemeanor to impact an archaeological site on public or private land in Oregon. Impacts to Native American graves and cultural items are considered a Class C felony (ORS 97.740-760). If you have any questions regarding any future discovery or my letter, feel free to contact our office at your convenience.

Sincerely,

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us

CONFEDERATED TRIBES OF
COOS, LOWER UMPQUA & SIUSLAW INDIANS
1245 Fulton Ave. Coos Bay, OR 97420
Phone (541) 888-9577 or 1-888-280-0726
Fax (541) 888-2853

15 November 2013

Barbara Gimlin
Biologist and Environmental Planner
SHN Consulting Engineers & Geologists, Inc.
275 Market Avenue
Coos Bay, OR 97420

Re: Proposed Wastewater Treatment Plant No. 2, Coos Bay

Dear Barbara Gimlin,

The Ancestral Territory of the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians extends from the mouth of Tenmile Creek (Lane County) in the north, south to Fivemile Point halfway between the mouths of Whiskey Run Creek and Cut Creek (coinciding with the border between Sections 30 and 31, Township 27 South, Range 14 West, Coos County), thence east to the crest of the Coast Range (to Weatherly Creek on the Umpqua River.) As such, the proposed work is within the Ancestral Territory of the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians. The Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians have no objections to the proposed work based on adverse effects to known cultural resources.

Please be aware that the proposed work area is in proximity to known cultural resource sites and so may contain as yet unlocated cultural resources. We request that we be contacted immediately if any known or suspected cultural resources are encountered during the work. **We would like to request that all construction personnel be given some training on cultural resource protection (i.e. laws and perhaps basic identification) prior to the start of the project and reiterated at weekly safety meetings so that they will be better prepared to know when to stop work and await proper identification from a trained professional. We further request that we be given at least 72 hours' notice prior to any ground disturbing work, so that a staff person or designated member of the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians can have the opportunity to be present for some or all of the proposed work.**

Please also be aware that federal and state laws prohibit intentional excavation of known or suspected cultural resources without an archaeological permit and require that we be notified immediately if

resources are discovered, uncovered, or disturbed. 43 CFR 10 applies on tribal and federal lands, federal projects, federal agencies, as well as to federal actions and federally funded (directly or indirectly) projects. ORS 97.745 prohibits the willful removal, mutilation, defacing, injury, or destruction of any cairn, burial, human remains, funerary objects, or objects of cultural patrimony of any native Indian. ORS 358.920 prohibits excavation injury, destruction, or alteration of an archaeological site or object or removal of an archaeological object from public or private lands.

Please feel free to contact me if I may be of any further assistance.

Sincerely,

Stacy Scott

Stacy Scott
Cultural Resources Protection Specialist/THPO

CC: Contact
Files

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

August 27, 2014

Mr. Darby Shindruk
Byram Archaeological Consulting, LLC
87016 Green Ridge Drive
Veneta, OR 97487

RE: SHPO Case No. 14-1300
City of Coos Bay Waste Activated Sludge Line (WAS) Project
CRS
BAC/City of Coos Bay
25S 13W 19, 20, 21, 269, 27, 28, Coos Bay, Coos County

Dear Mr. Shindruk:

Our office recently received a report of archaeological investigations for the project referenced above. The report has been assigned SHPO Report# 26603 and added to the SHPO Library. We have reviewed the report and concur that a good faith effort has been implemented and the project will likely have no effect on any significant archaeological objects or sites. Based on the information provided, additional archaeological research is not anticipated for this project.

In the unlikely event an archaeological object or site (i.e., historic or prehistoric) is encountered during project implementation, all ground disturbance at the location should cease immediately until a professional archaeologist can be contacted to evaluate the discovery. Under state law (ORS 358.905-955 & ORS 97.740) archaeological sites, objects and human remains are protected on both public and private land in Oregon. If you have not already done so, be sure to consult with all appropriate Indian tribes regarding your proposed project. If you have any questions regarding any future discovery or this letter, feel free to contact me at your convenience.

Sincerely,

Matt Diederich, MAIS
SHPO Archaeologist
(503) 986-0577
Matthew.Diederich@oregon.gov

Oregon
Kate Brown, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

November 3, 2015

Mr. Stephen Donovan
SHN Engineers & Geologists
275 Market Avenue
Coos Bay, OR 97420-2228

RE: SHPO Case No. 12-0129
Coos Bay Waste Water Treatment Plan #2 East Site Proj (NWP-2003-7333 & DSL APP0031703)
CRS
25S 13W 19, Coos Bay, Coos County

Dear Mr. Donovan:

We have recently had an opportunity to review the 2014 Environmental Assessment for the above project that was authored by your agency. In it you state that the 2013 geotechnical field investigations established that the entire project area is covered in fill ranging from 2 to 6 feet. As such, our office is reconsidering the value of the recommendations of the previous archaeological survey results completed in 2012 for the project. In the earlier archaeological survey report (Thomas 2012), the author states that "the background research identified the APE within a high probability area for significant archaeological deposits, as it is located on the estuary waterfront, approximately 0.65 miles south of the ethnographic village site complex and the village of Hanisitch, which became the site of Empire City, the first historic era Coos Bay settlement." "The proposed APE location is considered to be a high probability area for buried precontact and historic archaeological resources." Given the depth of fill placed on top of the natural landform, the degree of testing conducted by Ms. Thomas is now seen as inadequate in clearing the project of archaeological concerns.

Our office is requesting additional information from you regarding the level of proposed disturbance across the project as to depth of proposed excavation for the installation of all related facilities. We are aware that the existing treatment facility will be graded down to three feet below current grade, which is itself, twice as deep as the archaeological testing occurred. Where and to what depth are the proposed pipelines to be located? Where will an open trench be excavated as opposed to HDD alignment? What depth will either of these options be placed? Aside from the need for an inadvertent discovery plan (IDP) for the project, some area of proposed development may need to have a professional archaeologist on site to monitor the excavation of intact soils due to the high probability of buried intact cultural-bearing sediments existing in the area. Our office has been informed that the project area has a very high potential for disturbing buried significant cultural sediments and we want to be sure that if such disturbance does occur, all activities can cease quickly until the discovery can be assessed by a professional. Any information you could share with our office regarding the current project design would greatly be appreciated.

Our letter is being sent in an effort to protect any buried archaeological resources and/or human remains that may exist within the proposed project area. Federal and state laws protect archaeological sites on both public and private land in Oregon. If you have any questions about my letter or the information we are seeking, feel free to contact me at your convenience. In order to help us track your project accurately, please be sure to reference the SHPO case number above in all correspondence.

Sincerely,

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@oregon.gov

Appendix C

ESA Section 7(a)(2) Biological Opinion

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232

Refer to NMFS No.:
WCR-2015-2030

November 23, 2015

Martha Turvey
TMDL Coordinator
U.S. Environmental Protection Agency
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Replacement of the City of Coos Bay Wastewater Treatment Plant No. 2

Dear Ms. Turvey:

Thank you for your letter of January 26, 2015, requesting initiation of consultation with National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for funding the replacement of City of Coos Bay's wastewater treatment plant #2 in Coos Bay, Oregon. In this biological opinion (opinion), we conclude that the proposed action is not likely to jeopardize the continued existence of Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*), southern distinct population segment Pacific eulachon (eulachon) (*Thaleichthys pacificus*), or southern distinct population segment North American green sturgeon (green sturgeon) (*Acipenser medirostris*). We also conclude the proposed action will not result in the destruction or adverse modification of designated critical habitat for OC coho salmon or green sturgeon. The effects of this action would occur outside the geographic range of designated critical habitat for eulachon.

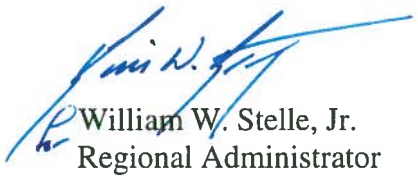
As required by section 7 of the ESA, we are providing an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures we consider necessary or appropriate to minimize the impact of incidental take associated with this action. The ITS sets forth nondiscretionary terms and conditions, including reporting requirements, and the U.S. Environmental Protection Agency (EPA) and your applicants must comply with them to implement the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species. Exceeding the specified level of take in the ITS would trigger reinitiation of this consultation.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Both of these conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to us within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the EPA must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, we established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please contact Chuck Wheeler, fisheries biologist in the Oregon Coast Branch, at 541.957.3379 if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,



William W. Stelle, Jr.
Regional Administrator

cc: John Palmer, EPA
David Belyea, ODEQ
Craig Massie, CH2M Hill
Jennifer Wirsing, City of Coos Bay

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

for the

Replacement of the City of Coos Bay Wastewater Treatment Plant No. 2

NMFS Consultation Number: WCR-2015-2030

Action Agency: U.S. Environmental Protection Agency

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?*	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Oregon Coast coho salmon	Threatened	Yes	No	No
Southern distinct population segment North American green sturgeon	Threatened	Yes	No	No
Southern distinct population segment Pacific eulachon	Threatened	Yes	No	N/A

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Coastal Pelagic Species	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

William W. Stelle, Jr.
Regional Administrator

Date: November 23, 2015

TABLE OF CONTENTS

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the Oregon Coast Branch.

1.2 Consultation History

On January 26, 2015, we received a biological assessment (BA) from the U.S. Environmental Protection Agency (EPA) along with a letter requesting formal consultation on the potential effects of funding the replacement of the City of Coos Bay (City) wastewater treatment plant (Plant) #2. We also relied upon multiple email and telephone conversations with the City, EPA, Oregon Department of Environmental Quality (DEQ), and their consultants in January and February, 2015. The EPA determined the action may affect and is likely to adversely affect Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*), southern distinct population segment (DPS) North American green sturgeon (*Acipenser medirostris*) (hereafter referred to as 'green sturgeon'), southern DPS Pacific eulachon (*Thaleichthys pacificus*) (hereafter referred to as 'eulachon'), and designated critical habitat for each of these species. Formal consultation was initiated on January 26, 2015.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The EPA is proposing to fund the City through the Clean Water state revolving fund to construct a new plant to replace the existing Plant #2. The new Plant #2 will be located just east of the existing plant, across South Empire Boulevard on an empty city block (Figure 1; new Plant #2 will be located north of Fulton Avenue and east of South Empire Boulevard). The peak day hydraulic capacity will be lower in the new plant (6.31 million gallons per day) than the existing plant (6.6 million gallons per day), which is partly due to the future population estimate being revised lower. The new Plant #2 will

upgrade wastewater treatment by implementing a UV disinfection system instead of the existing chlorination process currently used. The discharge outlet from the new plant will tie into the existing outfall pipe and diffuser located in Coos Bay.

The City will need to construct several new buildings and other impervious surfaces with a total footprint of approximately 1.5 acres. Paved impervious surfaces will include a parking area with eight spaces, maintenance roads, and three access points. The DEQ will require that any runoff with potential to come into contact with wastewater be collected and run through Plant #2. Other rooftops and hard surface areas will be treated by a landscaped rain garden, with overflow to a road storm drainage system that eventually discharges to First Creek. Runoff from part of the driveway cannot be captured and treated and will run untreated into the same road storm drainage system that delivers to First Creek.

The existing Plant #2 will be demolished once the new Plant #2 comes online, with virtually all of the structures and pavement being removed. There is no in-water work associated with the proposed action; therefore, the City may construct the proposed action at any time of year.

The City also will construct a pipeline to convey biosolids to the City's Plant #1, located to the east across the Coos Bay peninsula near the shoreline of the eastern channel of the bay near the terminus of Ivy Street. The pipeline will transfer biosolids from the new plant to Plant #1 where the biosolids will then be anaerobically digested and stored in an existing sludge lagoon as part of the existing biosolids treatment and disposal at Plant #1. The pipeline route is approximately 22,600 feet in length and follows existing streets. This pipeline will cross under Pony Creek and two unnamed streams. All streams at their crossing locations are in culverts, and the City will install the pipeline under these culverts using a horizontal directional drill.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interrelated or interdependent activities associated with this proposed action. In other circumstances, future growth in the service area enabled by the upgrade of a utility is an interdependent activity with indirect effects. However, in the case of the City's Plant #2 replacement, the new plant has a smaller treatment capacity than the existing plant.[1] Thus, future development will not be enabled by the replacement of Plant #2. For this consultation, any impacts on listed species and critical habitat resulting from the discharge of wastewater contaminants would be considered effects of the action because the EPA's proposed action to fund construction of a new plant will result in contaminants being discharged from that plant.

[1] Email from Craig Massie, CH2MHill, to Chuck Wheeler, NMFS, February 10, 2015 (Explaining the reduction of treatment capacity with the replacement of Plant #2)

Figure 1. Vicinity map of the City of Coos Bay Wastewater Treatment Plant #2 replacement.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For this action, the action area is defined as the footprints of the existing plant, new plant, staging area, effluent outfall located at river mile 3.8, and biosolids pipeline. The action area also includes Coos Bay beginning at the confluence with the Pacific Ocean upstream to river mile 9. Because of tidal ebb and flow, this 9-mile reach of Coos Bay may be affected by contaminants discharged by the new plant. River mile 9 is the transition point between the lower bay subsystem and upper bay subsystem (ODFW 1979). The lower bay subsystem is a confined channel with high velocities likely to carry contaminants far distances. The upper bay subsystem is an unconfined channel approximately 3 times wider than the lower. Velocities during flood tides within the upper bay subsystem are significantly lower and less likely to transport contaminants than those in the lower subsystem. Because of the lower flood velocities in the upper bay subsystem and distance from the effluent outfall, contaminants from the plant are not reasonably certain to distribute above river mile 9. The action area also includes the lower 800 feet of First Creek, where stormwater contaminants from impervious surfaces will be discharged. The action area occurs in sixth-field hydrologic unit code (HUC) watershed #171003040306.

The action area provides habitat for adult and juvenile migration, and juvenile rearing habitat for the OC coho salmon evolutionarily significant unit (ESU). We listed OC coho salmon as threatened under the ESA on June 20, 2011 (76 FR 35755). We designated OC coho salmon critical habitat and issued protective regulations on February 11, 2008 (73 FR 7816). Two other species listed under the ESA occur in the action area. We listed eulachon as threatened under the ESA on March 18, 2010 (75 FR 13012). We have not issued protective regulations for eulachon, but did designate critical habitat for eulachon on October 20, 2011 (76 FR 65324). We listed green sturgeon as threatened under the ESA on April 7, 2006 (71 FR 17757), designated critical habitat on November 9, 2009 (74 FR 52300), and issued protective regulations on June 2, 2010 (75 FR 30714). The action area is not within the geographic range of designated critical habitat for eulachon.

The action area is also designated as EFH for various life stages of groundfish (PFMC 2005), coastal pelagics (PFMC 1998), and Pacific salmon (PFMC 1999) and may adversely affect EFH for those species.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with us and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental

take is expected, section 7(b)(4) requires us to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

The effects of this action would all occur outside the geographic range of designated critical habitat for eulachon. Therefore, eulachon critical habitat will not be discussed further.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[2]

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and

[2] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the rangewide status of OC coho salmon, green sturgeon, eulachon, and aquatic habitat at large is climate change. Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early-spring will be less affected. Low-elevation areas are likely to be more affected.

During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas. Warming is likely to continue during the next century as average temperatures increase another 3°F to 10°F. Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007; USGCRP 2009). These changes to precipitation occurrence will likely result in higher winter stream flows. Where snow occurs, a warmer climate will cause earlier runoff so stream flows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007; USGCRP 2009).

Higher winter stream flows will increase the amount of gravel entering the action area, but may also increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs. Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al*. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and

Williams 2005; Zabel *et al*. 2006; USGCRP 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al*. 2006).

2.2.1 Status of Listed Species

For Pacific salmon, steelhead, and other relevant species we commonly use four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany *et al*. 2000). These "viable salmonid population" (VSP) criteria therefore encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout a species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation at single genes to complex life history traits (McElhany *et al*. 2000).

"Abundance" generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle; i.e., the number of naturally-spawning adults produced per parent. When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al*. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany *et al*. 2000).

The following summary describes the status of the ESA-listed species, and their designated critical habitat considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register.

Status of OC Coho Salmon

We proposed a recovery plan for this species on October 13, 2015 (80 FR 61379). Among other things, the proposed recovery plan contains objective, measurable delisting criteria, site-specific management actions necessary to achieve the plan's goals, and estimates of the time and costs required to implement recovery actions. We are soliciting review and comment from the public and all interested parties on the proposed plan.

Spatial Structure and Diversity. This species includes populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco. The Cow Creek Hatchery Program (South Umpqua population) is included as part of the OC coho salmon ESU because the original brood stock was founded from the local, natural origin population and natural origin coho salmon have been incorporated into the brood stock on a regular basis. The OC-technical recovery team (TRT) identified 56 populations, including 21 independent and 35 dependent populations in five biogeographic strata (Table 1) (Lawson *et al.* 2007). Independent populations are populations that historically would have had a high likelihood of persisting in isolation from neighboring populations for 100 years and are rated as functionally independent or potentially independent. Dependent populations (D) are populations that historically would not have had a high likelihood of persisting in isolation for 100 years. These populations relied upon periodic immigration from other populations to maintain their abundance (McElhany *et al.* 2000; Lawson *et al.* 2007).

A 2010 biological recovery team noted significant improvements in hatchery and harvest practices have been made (Stout *et al.* 2012). However, harvest and hatchery reductions have changed the population dynamics of the ESU. Current concerns for spatial structure focus on the Umpqua River. Current status of diversity shows improvement through the waning effects of hatchery fish on populations of OC coho salmon. In addition, recent efforts in several coastal estuaries to restore lost wetlands should be beneficial. However, diversity is lower than it was historically because of the loss of both freshwater and tidal habitat loss coupled with the restriction of diversity from very low returns over the past 20 years.

Table 1. OC coho salmon populations. Population types included functionally independent (FI), potentially independent (PI) and dependent populations (D) (McElhany *et al.* 2000; Lawson *et al.* 2007).

Stratum	Population	Type	Stratum	Population	Type
North Coast	Necanicum River	PI	Mid-Coast (cont.)	Alsea River	FI
	Ecola Creek	D		Big Creek (Alsea)	D
	Arch Cape Creek	D		Vingie Creek	D
	Short Sands Creek	D		Yachats River	D
	Nehalem River	FI		Cummins Creek	D
	Spring Creek	D		Bob Creek	D
	Watseco Creek	D		Tenmile Creek	D
	Tillamook Bay	FI		Rock Creek	D
	Netarts Bay	D		Big Creek (Siuslaw)	D
	Rover Creek	D		China Creek	D
	Sand Creek	D		Cape Creek	D
	Nestucca River	FI		Berry Creek	D
	Neskowin Creek	D		Siuslaw River	FI
Mid-Coast	Salmon River	PI	Lakes	Siltcoos Lake	PI
	Devils Lake	D		Sutton Creek	D
	Siletz River	FI		Tahkenitch Lake	PI
	Schoolhouse Creek	D		Tenmile Lakes	PI
	Fogarty Creek	D	Umpqua	Lower Umpqua River	FI
	Depoe Bay	D		Middle Umpqua River	FI
	Rocky Creek	D		North Umpqua River	FI
	Spencer Creek	D		South Umpqua River	FI
	Wade Creek	D	Mid-South Coast	Threemile Creek	D
	Coal Creek	D		Coos River	FI
	Moolack Creek	D		Coquille River	FI
	Big Creek (Yaquina)	D		Johnson Creek	D
	Yaquina River	FI		Twomile Creek	D
	Theil Creek	D		Floras Creek	PI
	Beaver Creek	PI		Sixes River	PI

Abundance and Productivity. It has not been demonstrated that productivity during periods of poor marine survival is now adequate to sustain the ESU. Recent increases in adult escapement do not provide strong evidence that the century-long downward trend has changed. The ability of the OC coho salmon ESU to survive another prolonged period of poor marine survival remains in question. Wainwright (2008) determined that the weakest strata of OC coho salmon were in the North Coast and Mid-Coast of Oregon, which had only "low" certainty of being persistent. The strongest strata were the Lakes and Mid-South Coast, which had "high" certainty of being persistent. To increase certainty that the ESU as a whole is persistent, they recommended that restoration work should focus on those populations with low persistence, particularly those in the North Coast, Mid-Coast, and Umpqua strata.

Limiting Factors. Information about limiting factors at the species scale can be gleaned from the discussion of factors for decline and threats in Stout *et al.* (2012). Also, the state of Oregon provided "population bottlenecks" (*i.e.*, limiting factors at the population scale) in its coastal

coho assessment (State of Oregon 2005). Based on these two sources, limiting factors for this species include:

- degraded stream complexity
- reduced recruitment of wood to streams
- increased fine substrate sediment
- loss of beaver dams
- increased water temperature
- reduced stream flow
- human disturbance of the landscape
- loss of wetlands and estuarine habitat
- fish passage barriers
- effects of global climate change
- periodic reduction in marine productivity
- hatchery effects
- effects from exotic fish species

Coos River population. OC coho salmon occurring in the action area are part of the Coos River population identified as functionally-independent. An independent population is one that historically would have had a high likelihood of persisting in isolation from neighboring populations for 100 years (Lawson *et al.* 2007). The Coos River population is part of the Mid-South Coast biogeographic strata defined within the OC coho salmon ESU (Lawson *et al.* 2007).

Annual spawning surveys document the Coos River population's annual abundance varies considerably from year to year (Table 2).[3] The recent trend in this population's abundance is consistent with ESU level abundance trends. The Coos River population has been highly variable with a recent downward trend. The Coos River population has a high probability to sustain itself (score 0.74, Stout *et al*. 2012). The average spawner return over the last 10 years is 7.3% of the potential historical adult abundance (206,000 spawners, Lawson *et al.* 2007).

[3] http://oregonstate.edu/dept/ODFW/spawn/pdf%20files/coho/AnnualEstESU2004-2013.pdf

Table 2. Annual estimates of OC coho salmon natural spawner abundance in the Coos River system based on monitoring data collected by the Oregon Department of Fish and Wildlife (ODFW) (includes Big Creek for 1990-2013).

Year	Coos River Basin
1990	2,273
1991	3,813
1992	16,545
1993	15,284
1994	14,685
1995	10,351
1996	12,128
1997	1,127
1998	3,167
1999	4,945
2000	5,386
2001	43,301
2002	35,429
2003	29,559
2004	24,116
2005	17,048
2006	11,266
2007	1,329
2008	14,881
2009	26,979
2010	27,658
2011	10,999
2012	9,414
2013	6,884
Average	**15,524**
2004-2013 Avg.	**15,057**

The primary factor limiting the Coos River population is reduced stream complexity (ODFW 2007). Stream complexity refers to structural elements within a stream channel such as large wood, boulders, and overhanging vegetation, as well as varied hydraulic elements such as pools and riffles. This limiting factor affects rearing juvenile OC coho salmon in freshwater streams and does not apply within the action area (estuary).

Status of Eulachon

On June 21, 2013, NMFS announced a Federal recovery plan outline, which is to serve as interim guidance for recovery efforts (USDC 2013). A draft recovery plan is targeted for completion by September 2015. The major threats to eulachon are impacts of climate change on oceanic and freshwater habitats (species-wide), fishery by-catch (species-wide), dams and water diversions (Klamath and Columbia subpopulations) and predation (Fraser River and British Columbia sub-populations) (NMFS 2013). Preliminary key recovery actions in the recovery outline include maintaining conservative harvest, reducing by-catch, restoring more natural flows and water quality in the Columbia River, maintaining dredging best management practices,

removing Klamath River dams, and completing research on life history and genetics, climate effects, and habitat effects (NMFS 2013).

Spatial Structure and Diversity. ESA-listed eulachon occur in three salmon recovery domains in Oregon: the Willamette and Lower Columbia, Oregon Coast, and Southern Oregon/Northern California Coast. The ESA-listed DPS of eulachon includes all naturally-spawned populations that originate in rivers south of the Nass River in British Columbia to the Mad River in California. Core populations for this species include the Fraser River, Columbia River and (historically) the Klamath River. Eulachon leave saltwater to spawn in their natal streams late winter through early summer, and typically spawn at night in the lower reaches of larger rivers fed by snowmelt. After hatching, larvae are carried downstream and widely dispersed by estuarine and ocean currents. Eulachon movements in the ocean are poorly known, although the amount of eulachon bycatch in the pink shrimp fishery seems to indicate that the distribution of these organisms overlap in the ocean.

Abundance and Productivity. In the early 1990s, there was an abrupt decline in the abundance of eulachon returning to the Columbia River with no evidence of returning to their former population levels since then (Drake *et al.* 2008). Persistent low returns and landings of eulachon in the Columbia River from 1993-2000 prompted the states of Oregon and Washington to adopt a Joint State Eulachon Management Plan in 2001 that provides for restricted harvest management when parental run strength, juvenile production, and ocean productivity forecast a poor return (WDFW and ODFW 2001). Despite a brief period of improved returns in 2001-2003, the returns and associated commercial landings have again declined to the very low levels observed in the mid-1990s (Joint Columbia River Management Staff 2009). Starting in 2005, the fishery has operated at the most conservative level allowed in the management plan (Joint Columbia River Management Staff 2009). Large commercial and recreational fisheries have occurred in the Sandy River in the past. The most recent commercial harvest in the Sandy River was in 2003. No commercial harvest has been recorded for the Grays River from 1990 to the present, but larval sampling has confirmed successful spawning in recent years (USDC 2011).

Limiting Factors. Limiting factors for this species include (Gustafson *et al.* 2010; Gustafson *et al.* 2011; NOAA Fisheries 2011):

- changes in ocean conditions due to change, particularly in the southern portion of the species' range where ocean warming trends may be the most pronounced and may alter prey, spawning, and rearing success
- climate-induced change to freshwater habitats
- bycatch of eulachon in commercial fisheries
- adverse effects related to dams and water diversions
- artificial fish passage barriers
- increased water temperatures
- insufficient streamflow
- altered sediment balances
- water pollution
- over harvest
- predation

Status of Southern DPS Green Sturgeon

We have released a recovery outline for this species (NMFS 2010). This preliminary document identifies important threats to abate, including exposure to contaminants, loss of estuarine and delta function, and other activities that impact spawning, rearing and feeding habitats. Key recovery needs are restoring access to suitable habitat, improving potential habitat, and establishing additional spawning populations.

Spatial Structure and Diversity. Two DPSs have been defined for green sturgeon, a northern DPS (spawning populations in the Klamath and Rogue rivers) and a southern DPS (spawners in the Sacramento River). Southern green sturgeon includes all naturally-spawned populations of green sturgeon that occur south of the Eel River in Humboldt County, California. When not spawning, this anadromous species is broadly distributed in nearshore marine areas from Mexico to the Bering Sea. Although it is commonly observed in bays, estuaries, and sometimes the deep riverine mainstem in lower elevation reaches of non-natal rivers along the west coast of North America, the distribution and timing of estuarine use are poorly understood.

Limiting Factors. The principal factor for the decline of southern green sturgeon is the reduction of its spawning area to a single known population limited to a small portion of the Sacramento River. It is currently at risk of extinction primarily because of human-induced ''takes'' involving elimination of freshwater spawning habitat, degradation of freshwater and estuarine habitat quality, water diversions, fishing, and other causes (USDC 2010). Adequate water flow and temperature are issues of concern. Water diversions pose an unknown but potentially serious threat within the Sacramento and Feather Rivers and the Sacramento River Delta. Poaching also poses an unknown but potentially serious threat because of high demand for sturgeon caviar. The effects of contaminants and nonnative species are also unknown but potentially serious. As mentioned above, retention of green sturgeon in both recreational and commercial fisheries is now prohibited within the western states, but the effect of capture/release in these fisheries is unknown. There is evidence of fish being retained illegally, although the magnitude of this activity likely is small (NOAA Fisheries 2011).

2.2.2 Status of the Critical Habitats

This section examines the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated areas. These features are essential to the conservation of the listed species because they support one or more of the species' life stages (*e.g.*, sites with conditions that support spawning, rearing, migration and foraging).

Salmon and Steelhead. For salmon and steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the 5th field hydrologic unit code (HUC_5) in terms of the conservation value they provide to each listed species they support.[4] The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species

[4] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

viability, NMFS' critical habitat analytical review teams (CHARTs) evaluated the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area (NOAA Fisheries 2005). Thus, even a location that has poor quality of habitat could be ranked with a high conservation value if it were essential due to factors such as limited availability (*e.g.*, one of a very few spawning areas), a unique contribution of the population it served (*e.g.*, a population at the extreme end of geographic distribution), or if it serves another important role (*e.g.*, obligate area for migration to upstream spawning areas).

The physical or biological features of freshwater spawning and incubation sites, include water flow, quality and temperature conditions and suitable substrate for spawning and incubation, as well as migratory access for adults and juveniles (Table 3). These features are essential to conservation because without them the species cannot successfully spawn and produce offspring. The physical or biological features of freshwater migration corridors associated with spawning and incubation sites include water flow, quality and temperature conditions supporting larval and adult mobility, abundant prey items supporting larval feeding after yolk sac depletion, and free passage (no obstructions) for adults and juveniles. These features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas and they allow larval fish to proceed downstream and reach the ocean.

Table 3. Physical or biological features of critical habitats designated for ESA-listed salmon and steelhead species (except Snake River spring/summer-run Chinook salmon, Snake River fall-run Chinook salmon, Snake River sockeye salmon, and SONCC coho salmon), and corresponding species life history events.

Physical or Biological Features		**Species Life History Event**
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and "reverse smoltification" Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing

CHART Salmon and Steelhead Critical Habitat Assessments

The CHART for each recovery domain assessed biological information pertaining to areas occupied by listed salmon and steelhead, determine whether those areas contained physical or biological features essential for the conservation of those species and whether unoccupied areas existed within the historical range of the listed salmon and steelhead that are also essential for conservation. The CHARTs assigned a 0 to 3 point score for the physical or biological features in each HUC_5 watershed for:

Factor 1. Quantity
Factor 2. Quality – Current Condition
Factor 3. Quality – Potential Condition
Factor 4. Support of Rarity Importance
Factor 5. Support of Abundant Populations
Factor 6. Support of Spawning/Rearing

Thus, the quality of habitat in a given watershed was characterized by the scores for Factor 2 (quality – current condition), which considers the existing condition of the quality of physical or biological features in the HUC_5 watershed; and Factor 3 (quality – potential condition), which considers the likelihood of achieving potential in the HUC_5 watershed, either naturally or through active conservation/restoration, given known limiting factors, likely biophysical responses, and feasibility.

Oregon Coast coho salmon

The historical disturbance regime in the central Oregon Coast Range was dominated by a mixture of high and low-severity fires, with a natural rotation of approximately 271 years. Old-growth forest coverage in the Oregon Coast Range varied from 25% to 75% during the past 3,000 years, with a mean of 47%, and never fell below 5% (Wimberly *et al.* 2000). Currently, the Coast Range has approximately 5% old-growth, almost all of it on Federal lands. The dominant disturbance now is logging on a cycle of approximately 30 to 100 years, with fires suppressed.

Oregon's assessment of OC coho salmon (Nicholas *et al.* 2005) mapped how streams with high intrinsic potential for rearing are distributed by land ownership categories. Agricultural lands and private industrial forests have by far the highest percentage of land ownership in high intrinsic potential areas and along all coho salmon stream miles. Federal lands have only about 20% of coho salmon stream miles and 10% of high intrinsic potential stream reaches. Because of this distribution, activities in lowland agricultural areas are particularly important to the conservation of OC coho salmon.

The OC coho salmon assessment concluded that at the scale of the entire domain, pools are generally abundant, although slow-water and off-channel habitat (which are important refugia for coho salmon during high winter flows) are limited in the majority of streams when compared to reference streams in minimally-disturbed areas. The amount of large wood in streams is low in all four ODFW monitoring areas and land-use types relative to reference conditions. Amounts of fine sediment are high in three of the four monitoring areas, and were comparable to reference conditions only on public lands. Approximately 62% to 91% of tidal wetland acres (depending on estimation procedures) have been lost for functionally and potentially independent populations of coho salmon.

As part of the coastal coho salmon assessment, DEQ analyzed the status and trends of water quality in the range of OC coho salmon using the Oregon water quality index, which is based on a combination of temperature, dissolved oxygen, biological oxygen demand, pH, total solids, nitrogen, total phosphates, and bacteria. Using the index at the species scale, 42% of monitored sites had excellent to good water quality, and 29% show poor to very poor water quality (ODEQ 2005). Within the four monitoring areas, the North Coast had the best overall conditions (six sites in excellent or good condition out of nine sites), and the Mid-South coast had the poorest conditions (no excellent condition sites, and only two out of eight sites in good condition). For the 10-year period monitored between 1992 and 2002, no sites showed a declining trend in water quality. The area with the most improving trends was the North Coast, where 66% of the sites (six out of nine) had a significant improvement in index scores. The Umpqua River basin, with

one out of nine sites (11%) showing an improving trend, had the lowest number of improving sites.

The specific unit of OC coho salmon critical habitat that will be affected by the proposed action is the Coos Bay Frontal 5th field HUC (1710030403). The action area comprises only a portion of the 5th field HUC. This portion only contains physical or biological features necessary for rearing and migration (Table 3). The CHART identified agriculture, forestry, grazing, road building/maintenance, and urbanization as key management activities affecting the physical or biological features within this watershed. More specifically, the landscape changes are largely from: a loss of large woody debris and forested land cover, dredging and urbanization of lower estuary, and diking and draining of wetlands (mostly for urban development, agriculture and grazing). The CHART considered this watershed and the associated Coos River mainstem as having high conservation value.

Green Sturgeon

A team similar to the CHARTs, referred to as a critical habitat review team (CHRT), identified and analyzed the conservation value of particular areas occupied by southern green sturgeon, and unoccupied areas they felt are necessary to ensure the conservation of the species (USDC 2009). The CHRT did not identify those particular areas using HUC nomenclature, but did provide geographic place names for those areas, including the names of freshwater rivers, the bypasses, the Sacramento-San Joaquin Delta, coastal bays and estuaries, and coastal marine areas (within 110 meters depth) extending from the California/Mexico border north to Monterey Bay, California, and from the Alaska/Canada border northwest to the Bering Strait; and certain coastal bays and estuaries in California, Oregon, and Washington.

For freshwater rivers north of and including the Eel River, the areas upstream of the head of the tide were not considered part of the geographical area occupied by the southern DPS. However, the critical habitat designation recognizes not only the importance of natal habitats, but of habitats throughout their range. Critical habitat has been designated in coastal U.S. marine waters within 110 meters depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; the lower Columbia River estuary; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) (USDC 2009). Table 4 lists the physical and biological features of critical habitat designated for southern green sturgeon and corresponding species life history events.

Table 4. Physical or biological features of critical habitat designated for green sturgeon and corresponding species life history events.

Physical or Biological Features		Species Life History Event
Site Type	**Site Attribute**	
Freshwater riverine system	Food resources Migratory corridor Sediment quality Substrate type or size Water depth Water flow Water quality	Adult spawning Embryo incubation, growth and development Larval emergence, growth and development Juvenile metamorphosis, growth and development
Estuarine areas	Food resources Migratory corridor Sediment quality Water flow Water depth Water quality	Juvenile growth, development, seaward migration Subadult growth, development, seasonal holding, and movement between estuarine and marine areas Adult growth, development, seasonal holding, movements between estuarine and marine areas, upstream spawning movement, and seaward post-spawning movement
Coastal marine areas	Food resources Migratory corridor Water quality	Subadult growth and development, movement between estuarine and marine areas, and migration between marine areas Adult sexual maturation, growth and development, movements between estuarine and marine areas, migration between marine areas, and spawning migration

The CHRT identified several activities that threaten the physical or biological features in coastal bays and estuaries and necessitate the need for special management considerations or protection. The application of pesticides is likely to adversely affect prey resources and water quality within the bays and estuaries, as well as the growth and reproductive health of green sturgeon through bioaccumulation. Other activities of concern include those that disturb bottom substrates, adversely affect prey resources, or degrade water quality through re-suspension of contaminated sediments. Of particular concern are activities that affect prey resources. Prey resources are affected by: commercial shipping and activities generating point source pollution and non-point source pollution that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon; disposal of dredged materials that bury prey resources; and bottom trawl fisheries that disturb the bottom (but result in beneficial or adverse effects on prey resources for green sturgeon). In addition, petroleum spills from commercial shipping and proposed hydrokinetic energy projects are likely to affect water quality or hinder the migration of green sturgeon along the coast (USDC 2009).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The action area is located within the Coos Bay estuary, the second largest estuary in Oregon. Coos Bay is approximately 13,300 acres, averaging nearly 0.62 miles wide by 15 miles long (Cortright *et al*. 1987). The Coos Bay estuary is classified as a drowned river mouth-type estuary, where winter flows discharge high volumes of sediment through the estuary. In summer, when discharge is lower, seawater inflow dominates the estuary. The bay has nearly 30 tributaries, the largest being the Coos River. Extensive filling and diking of Coos Bay and its sloughs, estuaries, and tributaries have changed the form and function of the estuary, reducing an estimated 90% of Coos Bay marshes (Proctor *et al.* 1980). Intense development in and around the estuary has impacted the shoreline and intertidal zone by removing vegetation and habitats.

The action area is located near Empire at approximate river mile 3.8. The land use around the project site is primarily residential and industrial on the east bank and undeveloped with some industrial on the west bank. The bay is maintained as a deepwater port by the U.S. Army Corps of Engineers (Corps). The center of the channel through this section is frequently dredged to facilitate shipping traffic associated with industrial complexes located upstream. Availability of shallow-water habitat (less than 10 feet deep) is constrained, but some exists near shorelines, particularly around the airport.

Within the action area, Coos Bay is listed on the DEQ 303(d) list for water quality limited streams for fecal coliform (ODEQ 2014). The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) maintain a water quality monitoring station near the location of the existing plant. Parameters monitored in this program are temperature, dissolved oxygen, turbidity, pH, E. coli, phosphorus, and nitrogen (CTCLUSI 2014). CTCLUSI compared the monitoring results to DEQ water quality standards and recommendations from the Oregon Watershed Enhancement Board. Criteria exceedance occurred in all parameters except E. coli, but CTCLUSI (2014) explained that most of these exceedances were single values and did not indicate consistent impairment.

The action area also includes the lower 800 feet of First Creek. Historically, this entire reach was tidally influenced. A tidegate now exists approximately 500 feet from the mouth. Moving upstream from the mouth, the lower portion of the creek runs through a functional tidal marsh until it gets close to the tidegate. Just downstream from the tidegate, the stream is channelized and encroached upon by buildings next to Cape Arago Highway. Upstream of the tidegate the channel is highly degraded. Approximately half of the stream length is contained within culverts under Fulton Avenue and Cape Arago Highway. The other half is confined and overgrown with exotic vegetation. The substrate is mud and fine silts from the historical tidal influence and effects of the tidegate.

An April 16, 2015 underwater inspection found the existing diffuser not properly functioning. The pipe was disconnected 24 feet from the end and two of the ports were sanded in. The City of Coos Bay applied for a Corps permit to fix the diffuser and on August 19, 2015, we completed ESA consultation on the Corps action. The repaired diffuser will have five ports over a distance of 30 feet. Because we have completed ESA consultation on the diffuser repair, it is part of the environmental baseline. Therefore, we will complete this current consultation for replacing Plant #2 assuming the City has repaired the diffuser or will repair the diffuser prior to the construction of the new wastewater plant.

2.4 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. We identified no interrelated or interdependent actions during consultation.

The City will install the biosolids pipeline under existing city streets. It will cross under three streams, but the streams are in culverts (under the road) and the City will install the pipeline under these culverts using a horizontal directional drill. Because there is no in-water work associated with installation of the pipeline and the streams are isolated from potential drilling-related effects by being inside culverts, we did not identify any effects from this construction. Therefore, installation of the biosolids pipeline will not be discussed further.

2.4.1 Effects on Critical Habitats

The proposed construction will occur adjacent to Coos Bay. The proposed action will affect the lower portion of Coos Bay 5th field watershed (HUC# 1710030403), which is designated OC coho salmon and green sturgeon critical habitat. The physical or biological features essential for OC coho salmon present in the action area are forage, free of artificial obstruction, natural cover, salinity, water quality, and water quantity. The physical and biological features for green sturgeon present in the action area are food resources, migratory corridor, sediment quality, water flow, water depth, and water quality.

Plant effluent

The City's effluent discharge is regulated under EPA's National Pollution Discharge Elimination System (NPDES, permit# 100771). The City's NPDES permit allows for two mixing zones: the acute mixing zone, also known as the "zone of initial dilution" (ZID), and the chronic mixing zone, referred to as the "regulatory mixing zone" (RMZ). The ZID is a small area where acute criteria can be exceeded as long as it does not cause acute toxicity to organisms passing through it. The RMZ is an area where acute criteria must be met but chronic water quality criteria can be exceeded, and it must be designed to protect the integrity of the entire water body. The RMZ for the Plant #2 outfall is defined as that portion of Coos Bay contained within a radius of 50 feet from the outfall's diffuser. The ZID is defined as that portion of the allowable mixing zone that is within 5 feet from the diffuser.

In general, discharge of municipal wastewater effluent adversely affects water quality in a receiving water body. The severity and extent of adverse effects are directly related to the level of treatment and the baseline water quality. Effluent contains trace amounts of many chemicals found in a variety of products that are disposed of via municipal sewer systems and through industrial discharges. Municipal effluents have been identified as sources of endocrine disrupting chemicals, pharmaceuticals and personal care products (PPCPs), persistent, bioaccumulative and toxic chemicals, and other compounds of anthropogenic origin in surface waters of the United

States, and Europe (Lee *et al*. 2000; Molnar *et al*. 2000; Huang *et al*. 2001; Kolpin *et al*. 2002; Lazorchak and Smith 2004).

In addressing the effects of releasing these pollutants at the diffuser, we need to understand the relationship between the mixing zone, tidal ebb and flow, water exchange, and flushing rates. Contaminants will be dispersed upstream during the incoming tide (flow) and downstream towards the ocean during the outgoing tide (ebb). Because of changes in channel confinement and velocities and the distance from the diffuser, contaminant dispersion upstream is unlikely past river mile 9.

The diffuser is 1,800 feet west of the existing plant at a depth of 11 feet below mean lower low water (MLLW). The mixing zone extends 50 feet around the diffuser. Outside of the mixing zone, released contaminants do not disappear, but their concentrations are much lower. Coos Bay has approximately 4,569 acres of tidelands (lands submerged at high tide but exposed at low tide), with an average tidal range of 6.7 feet between high and low tide (ODEQ 2004). This equates to an exchange of 10 billion gallons of water every tidal exchange (averaging 12 hours and 25 minutes).

When we consider the volume of effluent (peak discharge of 8.2 million gallons per day), volume of tidal exchange (10 billion gallons every 12.5 hours), and the other factors mentioned above, we find the concentrations of contaminants analyzed in more detail below may be acute in the ZID and chronic in the RMZ, but only at trace levels from the RMZ downstream to the ocean and upstream to river mile 9.

The new plant will use UV disinfection instead of the chlorinated system of the existing plant. The existing plant discharged some chlorine into Coos Bay because the dechlorination process was not 100% effective. The reduction in discharged chlorine constitutes a benefit to water quality in Coos Bay as chlorine is highly toxic in the environment. Furthermore, the new plant will be more effective at treating wastewater due to improved technology and treatment systems in the processing. Thus, the new Plant #2 will lower concentrations of toxic chemicals and pollutants in the effluent. This also constitutes a benefit to species and critical habitats in Coos Bay.

Contaminants regulated by NPDES permit

The NPDES permit the City is currently operating under regulates biological oxygen demand (BOD), total suspended solids (TSS), fecal coliform, chlorine, pH, ammonia, and temperature. Fecal coliform are bacteria originating in the intestines of warm-blooded animals. We searched current literature and found no connection between fecal coliform from warm-blooded animals and effects on the cold-blooded species or their critical habitats analyzed in this opinion. Because Plant #2 is replacing the chlorinated system with a UV system, chlorine is not a concern to address for effects on habitat or fish. Fecal coliform and chlorine will not cause any effects to listed species or critical habitat addressed in this opinion.

Temperature. Monitoring from CTCLUSI (2014) shows the mean water temperature a half mile from Plant #2 is 13.21 degrees Celsius. This is likely indicative of the water temperature at the

diffuser year-round since it is at a depth where variations in temperature are greatly muted. Plant #2's NPDES permit limits effluent temperature to 15 degrees Celsius instantaneous maximum. Given the relative volume of effluent and minimal difference in temperature, the limited discharge of thermal load from Plant #2 may slightly increase water temperatures within the RMZ, but is unlikely to measurably change temperatures outside of that area.

Ammonia. The NPDES permit limits ammonia for this plant to a monthly average concentration of 20 milligrams per liter (mg/L) and a daily maximum concentration of 30 mg/L. The City monitors effluent from the plant each month. The samples are taken in the effluent pipe prior to release through the diffuser. Concentration of contaminants in the ZID and RMZ will be lower due to dilution with bay water. For the month of February 2015 the average concentration of ammonia in the effluent was 12.2 mg/L, with a maximum reading of 17.6 mg/L (City of Coos Bay 2015). Ammonia dissolves in water and may directly exert a toxic effect on aquatic organisms. Ammonia ionization is regulated by water temperature and pH, where the toxic form (un-ionized) increases with increasing pH and temperature.

Biological Oxygen Demand. Organic materials released to the environment from wastewater effluent and other sources are not toxic in the aquatic environment, but if enough organic material is released they can reduce oxygen concentrations in the water. These materials undergo oxidative metabolism by bacteria. This oxidative capacity is estimated crudely as BOD. The NPDES permit limits average weekly BOD to 30 mg/L during the dry season (May through October) and 45 mg/L during the wet season (November to April). In the February, 2015 monitoring report the weekly average BOD was between 7.6 mg/L and 7.8 mg/L (City of Coos Bay 2015).

Total Suspended Solids. TSS is a measure of the amount of particles suspended in solution. The NPDES permit limits Plant #2 to an average weekly TSS of 30 mg/L during the dry season (May through October) and 45 mg/L during the wet season (November to April). In the month of February, 2015 the weekly average TSS was between 3.3 mg/L and 6.8 mg/L (City of Coos Bay 2015).

pH. pH is the measure of alkalinity/acidity of water. The NPDES permit requires Plant #2 to maintain discharge pH between 6.0 and 9.0. In the month of February, 2015 the pH of the effluent was between 6.7 and 7.2 (City of Coos Bay 2015). Monitoring from CTCLUSI (2014) shows the mean water pH near the shoreline of the existing plant is 7.89 in the wet season and slightly higher during the dry season (8.2).

Contaminants not regulated by NPDES permit

In 2010, the City conducted monitoring of over 500 contaminants not regulated under their NPDES permit (Rockwell 2011). Two samples were taken, one on August 9 and one on November 1. The samples were taken in the effluent pipe prior to reaching the diffuser. Concentration of contaminants in the ZID and RMZ will be lower due to dilution with bay water, but the results demonstrate many contaminants will be discharged.

For our analysis, we considered all contaminants regularly found in municipal wastewater, including those detected in the 2010 monitoring of the existing Plant #2. However, we chose only the following to report in detail because they demonstrate the full suite of effects on our species and have the most information for us to analyze. For purposes of our analysis, we assume the effects from contaminants not listed here (e.g. herbicides, insecticides, polychlorinated biphenyls) are similar to those that we report below, including any sublethal and synergistic effects. While not specifically mentioned, we still consider the contaminants not listed here in our conclusion.

Metals. The City's NPDES permit implicitly allows for the discharge of persistent toxic chemicals, such as copper and mercury, because permit limits or treatment requirements are not specified in the permit. Potentially toxic constituents that typically sorb to suspended solids can settle out of the water column in, and beyond, the permitted mixing zone. In the absence of source controls or sufficient treatment, toxicant accumulation can occur in the outfall mixing zone sediments and vicinity, and these toxic contaminants remain perennially available to organisms for uptake and potential bioaccumulation. The 2010 monitoring detected concentrations of several metals in the effluent, including dissolved copper at 4.5 and 5.7 micrograms per liter (µg/L) and dissolved zinc at 31.0 and 27.1 µg/L (Rockwell 2011).

Polybrominated Diphenyl Ethers. Polybrominated diphenyl ethers (PBDEs) are members of a broad class of brominated chemicals commonly used as flame retardants. The family of PBDEs consists of 209 possible substances, which are called congeners. They have been added to plastics, upholstery fabrics and foams in common products like computers, TVs, furniture and carpet pads. There are three main types of PBDEs used in consumer products, and each is made up of a mixture of brominated diphenyl ether (BDE) congeners including penta-BDE, octa-BDE and deca-BDE. Oregon passed legislation to restrict penta-BDEs and octa-BDEs (in 2006) and deca-BDEs (in 2009). However, their widespread use prior to these laws has resulted in a legacy of availability as the products that contain PBDEs break down through normal wear and tear and are discarded. Of the 37 PBDE substances sampled in 2010, most occurred below the level of detection (Rockwell 2011). The highest readings were for PBDE-47 (12.8 and 12.2 nanograms per liter, ng/L), PBDE-99 (9.69 and 10.8 ng/L), and PBDE-209 (51 ng/L and below detection).

Once in the environment, PBDEs can last a long time depending on surrounding conditions such as the availability of water, organic compounds or sunlight. PBDEs, especially those with higher numbers of bromines such as deca-PBDE, can break down into lower brominated PBDEs, which are more bioaccumulative (Siddiqi et al. 2003). Recognized sources of PBDEs include wastewater discharges, surface runoff, atmospheric deposition, oil spills, and sewage overflows (Hart Crowser *et al*. 2007). PBDEs are found throughout the natural environment (air, soil and sediments), and are building up in animals throughout the food chain (Alaee *et al*. 2003). PBDEs have been introduced into the marine environment by various processes, such as discharge of domestic sewage and industrial wastewater, agricultural inputs, runoff from nonpoint sources and atmospheric deposition (Alaee *et al*. 2003).

Pharmaceuticals and Personal Care Products. Any products used by individuals for personal, health or cosmetic reasons are considered PPCPs. They include medications, antibiotics, steroids, hormones, musk fragrances, perfumes, lotions and cosmetics. There are thousands of chemicals

used in PPCPs. Pharmaceuticals and personal care products are an emerging environmental and human health issue and have been identified as constituents discharged into receiving waterbodies by municipal wastewater treatment plants (Ramirez *et al*. 2009, Lubliner *et al.* 2010, Reiner and Kannan 2010, Chase *et al*. 2012). There are no current regulatory requirements for testing these emerging chemicals, nor are water quality standards or other recognized benchmarks available.

PPCP presence in the environment depends upon their individual chemical structure and the frequency of their use. They are present at low concentrations in surface water, groundwater, soils, sediments, marine waters, and drinking water (Tien-Hsi *et al*. 2012. Researchers monitoring the environment find PPCPs virtually everywhere domestic wastewater is discharged (Ternes *et al*. 1999). PPCPs enter the environment as they pass through the human body or when unwanted PPCPs are disposed in the trash or down the drain. Other significant sources include livestock, aquaculture, pets, and agriculture.

Conventional wastewater treatment systems do not do a good job of removing or destroying PPCPs (Barbara *et al*. 2009). The current treatment process at Plant #2 does not completely remove all PPCPs (Rockwell 2011). The PPCPs with highest concentrations in the 2010 monitoring were sulfamethoxazole (2,360 and 5,280 ng/L) and diphenhydramine (2,320 and 1,140 ng/L). The 2010 monitoring tested for musk fragrances, but most results were not reliable for reporting (Rockwell 2011). The lone exception was for galaxolide, which was under the detection level of 10 μg/L.

Stormwater discharge

Stormwater contaminants. Currently there are no stormwater contaminant treatment facilities in the construction area of the new Plant #2 facility (2.22 acres). This site is sparsely vegetated with remnants of houses and a parking area. A total of 0.11 acres of this site are impervious surfaces, none of which have stormwater treatment. The new Plant #2 will have 2.14 acres of impervious surfaces. Runoff from all of the building rooftops and almost all of the paved surfaces will be routed into the new treatment facility. Runoff from approximately 0.1 acres of pavement will be routed through a bioswale rain garden, but runoff from 0.03 acres of driveway next to Fulton Avenue cannot be captured due to topography and will drain untreated to a storm drain on Fulton Avenue. To offset the untreated runoff from 0.03 acres, the City will remove or treat all of the runoff from the 0.11 acres that is currently untreated. The rain garden will treat and fully infiltrate stormwater up to the 100-year storm event. Water generated during storms larger than that will overflow into the same storm drain on Fulton Avenue that the untreated water from the driveway enters. The City will continue to collect and treat stormwater from the site of the existing Plant #2.

The new Plant #2 will treat most of the impervious surfaces primarily because DEQ requires that any runoff with potential to come into contact with wastewater must be collected and run through the treatment facility. CH2MHILL (2014) compared the treatment efficiency of wastewater plants and common stormwater facilities (bioretention, bioswale, etc.) and found the plant will remove a similar or higher level of copper. It is likely that Plant #2 will also remove

other metals and contaminants from impervious surfaces as well or better than standard stormwater facilities.

The proposed action will result in less untreated impervious surface and less stormwater contaminants than are delivered to Coos Bay currently. However, the treatment is not 100% effective and stormwater contaminants will still be delivered to Coos Bay. Some of the contaminants will deliver through Plant #2 to the diffuser, and some will deliver to First Creek from the storm drain on Fulton Avenue.

Summary of effects on critical habitat.

Critical habitat in the action area supports OC coho salmon rearing and migration and green sturgeon growth, development, seasonal holding, and movement between estuarine and marine areas. The physical or biological features essential for OC coho salmon present in the action area are forage, passage free of artificial obstruction, natural cover, salinity, water quality, and water quantity. The physical and biological features for green sturgeon present in the action area are food resources, migratory corridor, sediment quality, water flow, water depth, and water quality.

The proposed action will benefit water quality by decreasing the amount of contaminants delivered as wastewater effluent and stormwater. Wastewater will be improved by not using chlorine and by a more efficient plant. Stormwater contaminants will be reduced by reducing the amount of untreated impervious areas delivering to Coos Bay. However, Plant #2 and the impervious surfaces will still contribute some contaminants. The concentration of contaminants near the diffuser is likely to be acute in the ZID and chronic in the RMZ, but only at trace levels from the RMZ downstream to the ocean and upstream to river mile 9. Stormwater contaminants will also enter First Creek 800 feet upstream from its mouth.

The proposed action will also affect the forage and food resources physical and biological features because some of the contaminants (e.g. metals, PPCPs, and PBDEs) will be taken in by forage species and passed to OC coho salmon and green sturgeon when eaten. The proposed action will not affect any other OC coho salmon or green sturgeon essential physical and biological features.

The effects on critical habitat are likely to be significant within 50 feet of the diffuser (RMZ) and the lower 800 feet of First Creek. Outside of those areas the effects, while adverse, are minor. The OC coho salmon critical habitat unit covers 132,060 acres, of which approximately 3,967 acres (3%) are within the action area, and only 0.25 acres (0.00019%) will have more than minor adverse effects. The green sturgeon critical habitat area (Coos Bay) covers 13,300 acres, of which approximately 30% are within the action area, and only 0.0019% will have more than minor adverse effects. The proposed action will reduce the amount of contaminants discharged to Coos Bay once operations switch from the old Plant #2 to the new one. Overall, the adverse effects will be minor or affect a small portion of the critical habitat, so that the proposed action will not degrade physical or biological features essential for OC coho salmon or green sturgeon at the designated critical habitat unit scale.

2.4.2 Effects on Species

Exposure

In our analysis of the effects of the action on critical habitat, we found adverse effects on water quality and forage/food resources. To understand how listed species present in the action area respond to these effects, we must first understand how these species will be exposed to the effects. Individuals of these species do not reside in the Coos Bay portion of the action area year round or the lower 500 feet of First Creek (below the tidegate). OC coho salmon may be present in First Creek year round, but eulachon and green sturgeon will never be present.

OC coho salmon. Historically, researchers believed juvenile coho salmon rear in freshwater streams for a year, migrating out to sea in the spring at age 1. More recently, the flexibility of pre-smolt coho salmon life histories, including estuary rearing during all parts of the year, has been documented (Bennett *et al*. 2014). Miller and Sadro (2003) observed pre-smolt OC coho salmon entering the estuary in the South Slough of Coos Bay during spring and remaining up to 8 months, when they moved back upstream to overwinter. They also found pre-smolts moving into the estuary in the fall and winter with individuals having a mean residence time of 48 to 64 days per year.

However, these results were from the stream-estuary ecotone portion of the estuary where salinities are low (maximum 10 parts per thousand). Waters in the Coos Bay portion of the action area and the lower 500 feet of First Creek will have much higher salinities, approaching full strength sea water (around 35 parts per thousand) during the summer months. Salinity in the action area all year around is likely higher than the incipient lethal threshold (22 parts per thousand) for pre-smolt coho salmon (Otto 1971). Therefore, pre-smolt juvenile OC coho salmon may be in these portions of the action area throughout the year, but any one individual is unlikely to remain in it for more than a few days. When they are present, pre-smolts will be seeking habitats for refuge and feeding. Areas providing these services include tidal wetlands, low intertidal and subtidal eelgrass, macro-algal beds, and epibenthic algae (Bottom et al. 2005). In Coos Bay, these habitats only occur near the shorelines. With the diffuser located 1,800 feet west of the existing plant at a depth of 11 feet below MLLW, it is unlikely pre-smolts will enter the RMZ or ZID. Any present individual pre-smolts will expose themselves to low concentration contaminants from the effluent outside the RMZ and to stormwater for a few days each.

The juvenile pre-smolts begin their physiological change to smolts the spring after they are born. From February through June, the smolts migrate through the action area on the way to the ocean. Miller and Sadro (2003) found the mean residence time in the lower estuary of South Slough was 5.2 days. Those smolts could have moved through within 24 hours, but choose to remain, likely as the final physiological preparation for ocean salinities (Miller and Sadro 2003). This time period is applicable to residence times for OC coho salmon smolts in the action area, as the physical features are the same. As with pre-smolts, smolts will likely favor the shorelines where the habitat types occur that provide feeding and sheltering. Therefore, smolts are unlikely to enter the RMZ or ZID. Every smolt from the Coos River basin will be exposed to low concentration contaminants from the effluent for an average of 5.2 days each. Any smolts migrating out of First Creek also will expose themselves to the contaminants from the

stormwater outfall. This exposures will likely not be more than a couple of days because the habitat is so poor in the freshwater portion of the action area.

From September to December, adult OC coho salmon return from the ocean and pass through the action area. These returning adults are highly mobile, use the tide to their advantage, and are unlikely to require more than a day to traverse through the action area. Adults are not seeking food or shelter, and therefore are much more likely to swim through the RMZ or ZID. The diffuser is oriented perpendicular to the channel of Coos Bay, with a distance between the first and last ports of approximately 30 feet. The RMZ extends 50 feet from the diffuser, the ZID extends 5 feet from the diffuser. This means the length of the RMZ is 130 feet and the length of the ZID is 40 feet. The Coos Bay channel is approximately 4,500 feet in width at the diffuser. So, the RMZ covers 2.9% of the channel and the ZID covers 0.9% of the channel. Assuming random distribution across the channel, 2.9% of the adult population will be exposed to the RMZ and 0.9% to the ZID. If the distribution is not random, there is no reason why fish would be preferentially attracted to the RMZ or ZID, and no reason to expect that more than 10% of adults would be exposed to the RMZ or 5% to the ZID. To give benefit of doubt to the species, we will analyze these higher percentages. The distance a fish will travel through the RMZ is 100 feet, the ZID is 10 feet. Adult coho salmon swimming through these zones are unlikely to be within the ZID for more than a few seconds or be within the RMZ more than a few minutes. Every adult returning to the Coos basin also will be exposed to low concentration contaminants from effluent discharges outside of the RMZ for about a day.

Eulachon. Eulachon have been observed in the Coos River (Gustafson *et al.* 2010), but likely occur on an infrequent basis and in small numbers (Monaco *et al*. 1990; Emmett *et al*. 1991; Hutchinson 1979 as cited in Gustafson *et al.* 2010). Very recently, March 3, 2015, a pre-spawn female was collected in a screw trap being operated in Winchester Creek, a tributary of South Slough within Coos Bay.[5] Eulachon spawners have returned in the Columbia River as early as mid-December to as late as mid-February, with an average of mid-January (Gustafson *et al.* 2010). First appearance of eulachon spawners in the Coos River has not been studied, but based on the available information for eulachon run-timing, small numbers of spawners, and frequency of occurrence, adult eulachon will probably migrate through the action area from mid-January through May. Any individual adult will only expose itself to contaminants in the action area for a day or two as they swim upstream to spawning habitat. Similar to OC coho salmon adults, at most 10% of adults will be exposed to the RMZ and 5% to the ZID, with exposure times of a few seconds in the ZID and a few minutes in the RMZ. All returning adult eulachon will be exposed to low concentrations of contaminants from effluent discharges, likely for a day or two.

Eggs hatch in 20 to 40 days and larval eulachon, which are feeble swimmers, are carried downstream within hours or days. Thus, larval eulachon could be present in the action area from February through June. Some studies found larval eulachon may be retained for weeks or months in inlets or fjords of estuaries on the British Columbia mainland coast (McCarter and Hay 2003), but no such habitat features exist in the action area. The action area is a constriction between the ocean and the large upper Coos Bay. Therefore, individual larval eulachon will likely only be present a day or two in the action area as they are carried out to sea. These individuals are

[5] Email from Gary Vonderohe, ODFW, to Ken Phippen, NMFS, March 5, 2015, (notifying NMFS of the collection of a eulachon in Coos Bay)

unlikely to be feeding while in the action area as larval nutrition is provided by the yolk sac prior to first feeding (WDFW and ODFW 2001). It is unlikely that more than 10% of larval eulachon will be exposed to the RMZ and 5% to the ZID. But because they are not actively swimming, those that are exposed may be in the ZID and RMZ longer than adult eulachon (up to a minute in the ZID and 10 minutes in the RMZ). Eulachon larvae exposures will occur between February and early July, based on a maximum egg incubation period of 40 days as reported by Gustafson *et al.* (2010)

Green sturgeon. Green sturgeon use the Coos River estuary for subadult and adult growth, development, and migration. Green sturgeon congregate in coastal waters and estuaries, including non-natal estuaries. Beamis and Kynard (1997) suggested that green sturgeon move into estuaries of non-natal rivers to feed. Data from Washington studies indicate that green sturgeon will only be present in estuaries from June until October (Moser and Lindley 2007). Recent fieldwork indicates that green sturgeon generally inhabit specific areas of coastal estuaries near or within deep channels or holes, moving into the upper reaches of the estuary, but rarely into freshwater (WDFW and ODFW 2012). Green sturgeon in these estuaries may move into tidal flats areas, particularly at night, to feed (Dumbauld *et al*. 2008).

When they are not feeding in the shallows, green sturgeon likely will be holding in the deepest habitat available (WDFW and ODFW 2012). In Coos Bay, the navigational channel is maintained at 37 feet below MLLW and runs the entire length of the action area. When they are resting, it is unlikely green sturgeon will be within the ZID or RMZ since the diffuser is located at a water depth of 11 feet below MLLW. While feeding, it is also unlikely green sturgeon will be within the ZID or RMZ because their invertebrate food sources are more prevalent in the shallower intertidal areas. It is likely that a few green sturgeon will swim through the ZID or RMZ on their way to or from feeding, though it is unlikely they will remain in either for more than a few minutes. All green sturgeon in the action area will be exposed to low concentrations of contaminants from project-related discharges.

Plant effluent

Contaminants regulated by NPDES permit

Temperature. Temperatures of the receiving water (13.0°C) and effluent (15.0°C maximum) are within a range that will not have adverse effects for coho salmon or green sturgeon. However, water temperatures suitable for coho salmon can be lethal to adult eulachon. For eulachon from the Cowlitz River that were acclimated to 5°C, an increase to 11°C (constant) for 6 days resulted in 50% mortality; by 8 days, all the test fish were dead (Blahm and McConnell 1971). For eulachon acclimated to 10°C, a 1-hour exposure to water at 18°C (designed to simulate a thermal plume large enough to cause a river to reverse flow) killed at least half of the fish within 50 hours (Blahm and McConnell 1971). All fish exposed to temperatures that were 3 to 22°C (constant) above the control (10°C) retained their gametes until death or conclusion of the test, but most fish in the control group deposited sperm and eggs in their tank as if spawning (Blahm and McConnell 1971, Snyder and Blahm 1971). Because adult eulachon are not expected to remain in the RMZ longer than a few minutes and the change in temperature in the RMZ due to

Plant #2 effluent is much smaller than any of the cited literature, any effect on adult eulachon is unlikely.

We found no information about thermal tolerance of larval eulachon. We did find two studies about related species in the same family as eulachon (osmeridae). Rainbow smelt (*Osmerus mordax*) is a species with a circumpolar distribution that shares an anadromous life history with eulachon. Rainbow smelt larvae held in freshwater at 13°C were exposed to temperature increases of 11.3 to 19.4°C for exposure lasting 5, 30 and 60 minutes. The larvae survived a temperature change of up to 13.6°C (i.e., a temperature of 26.6°C) for up to 60 minutes (Barker et al. 1981).

Capelin (*Mallotus villosus*) is a circumpolar marine smelt that lives in high latitudes in the Atlantic and Arctic oceans. Most capelin spawn below the intertidal zone in the Barents Sea, but one population spawns in a long fjord in northern Norway in the intertidal zone. Davenport and Stene (1986) studied thermal tolerance of larval capelin from this population in laboratory experiments. They exposed groups of capelin eggs and larvae for 24 hours to seawater at temperatures ranging from 5 to 30°C. They also kept 24 larvae in sea water at 18°C for a longer period to assess longer-term survival. Finally, they exposed groups of capelin larvae to sea water that was gradually warmed from 5 to 30°C to assess short-term high temperature tolerance.

From 5 to 20°C, survival of capelin eggs and larvae exposed for 24 hours varied from 85% to 100%. At 22°C and higher, survival of both eggs and larvae declined dramatically. The authors concluded that temperature above 20°C is lethal to capelin for exposures of this duration. Fish held at 18°C survived at a rate of 92% for the first 2 days, and then survival began to decline until all fish were dead on day 7. Fish in water that was gradually warmed survived up to 28°C, although they became motionless at temperatures above 25°C (Davenport and Stene 1986).

The research done on larval rainbow smelt by Barker et al. (1981) and on capelin by Davenport and Stene (1986) suggests that eulachon larvae may be able to tolerate exposures up to 20°C for exposures lasting somewhere between 1 and 24 hours, which are higher and longer than we would expect from effluent of Plant #2. Based on the limited information available for these two allied species, effluent from Plant #2 is unlikely to adversely affect larval eulachon.

Ammonia. The chemical form of ammonia in water consists of two species, a larger component which is the ammonium ion (NH_4^+) and a smaller component which is the non-dissociated or un-ionized ammonia (NH_3) molecule. The sum of the two forms is usually expressed as total ammonia-nitrogen. The ratio of un-ionized ammonia to ammonium ion, dependent upon both pH and temperature, generally increases 10-fold for each rise of a single pH unit, and approximately 2-fold for each 10°C rise in temperature over the 0 to 30°C range (Erickson 1985 as cited in EPA 2008). Ammonia is more toxic as the hydrogen ion concentration [H^+] increases (pH decreases), at least below a pH of 7.3 (Armstrong *et al.* 1978; Tomasso *et al.* 1980 as cited in EPA 2008).

Acute effects of ammonia exposure likely are primarily neurological, resulting from severe metabolic alterations of the central nervous system (Smart 1978, Randall and Tsui 2002). The toxic symptoms observed in fish acutely exposed to ammonia include hyper-excitability, coma, convulsions and hyperventilation. Damage to the central nervous system of coho salmon from

acute ammonia intoxication can result in convulsions and death (Randall and Tsui 2002). Reported mortality thresholds for ammonia range from 0.03 mg/L with a 2-day exposure (Herbert 1956) to 5 mg/L with a 3-day exposure (Holland *et al.* 1960).

Sublethal adverse effects from ammonia exposure include reduced food uptake and growth inhibition, diuresis and ion imbalance, inflammation and degeneration of the gills and other tissues, changes in the oxygen-carrying capacity of the blood, and increased susceptibility to disease (Russo 1985 as cited in EPA 2008). Other sublethal adverse effects on salmon from exposure to ammonia include changes in energy metabolism (Arillo et al. 1981) and ionic balance (Soderberg and Meade 1992), as well as damage to other body cells (Wicks et al. 2002). Physiological effects on salmonid fishes have occurred at concentrations as low as 0.005 mg/L (42-day exposure) (Burrows 1964). The physiological harm recorded in Burrows' study (1964) was gill hyperplasia, a condition that may result in bacterial gill disease. Gill hyperplasia is a response by epithelial cells and lamellae in the gills of fishes to irritations that may include uncontrolled cell growth, thinning, and fusion of lamellae (Burrows 1964, Post 1971, Dauba *et al.* 1992).

Reductions in growth of rainbow trout may occur as low as 0.0023 mg/L (120-day exposure) (Soderberg *et al.* 1983) or as high as 1.3 mg/L (365-day exposure) (Smith 1972). The NMFS assumes that growth reductions occurred throughout the exposure during the Soderberg *et al.* (1983) study and that gill hyperplasia occurred throughout the exposure in the study by Burrows (1964).

Several studies have documented negative changes in behavior that occur at sub-lethal concentrations of un-ionized ammonia, beginning at 0.05 mg/L (Woltering *et al*. 1978). Changes in gill permeability occurred at concentrations of non-ionized ammonia as low as 0.09 mg/L (Lloyd and Orr 1969). Because salt and water regulation in estuarine fish occurs at the gill surface, changes in the gill permeability can reduce the ability of fish to survive. These sub-lethal concentrations of ammonia caused malformation of trout embryos and histopathological changes (i.e., tissue changes characteristic of disease) in gills, kidneys, and livers of fish (Flis 1968; Smith and Piper 1975; Thurston *et al.* 1978; Soderberg 1985; EPA 1986; Soderberg 1995). Salmonids that are exposed to these concentrations of ammonia reduce their feeding and thereby reduce their growth and survival (Soderberg 1995).

The February 2015 monitoring report measured un-ionized ammonia in the effluent at an average concentration of 12.2 mg/L. Once it leaves the diffuser ports, un-ionized ammonia concentrations will quickly decrease, but still be sufficient in the RMZ and ZID to possibly adversely affect green sturgeon, eulachon, and OC coho salmon. However, only one of the life stages of any of the species will be within the ZID or RMZ long enough for the exposure to result in injury. Larval eulachon will be in the ZID and RMZ longer than all others, and they are likely the most susceptible life stage. We are reasonably certain that over the course of the next several decades, at least some larval eulachon will experience gill damage from ammonia. Outside of the RMZ, the concentration of ammonia and fish exposure duration are likely to be less than the lowest thresholds of adverse effect documented above (0.005 mg/L for a 42-day exposure or 0.03 mg/L for a 2-day exposure) for any life stage of all species.

Biological Oxygen Demand. If enough organic material is released, oxygen concentrations in the water can decrease to levels that cause respiratory distress, lack of feeding and growth, and death in salmon (Davis 1975; Kramer 1987). Carter (2005) concluded that juvenile salmonids begin to avoid areas with dissolved oxygen lower than 6 mg/L and they consistently avoid areas with concentrations of 5 mg/L and lower. Davis (1975) listed a threshold of 6.43 mg/L dissolved oxygen for symptoms of oxygen distress in anadromous salmonids. Swimming performance of juvenile coho salmon declined markedly and almost linearly as the logarithm of dissolved oxygen concentrations declined from 7-8 mg/L to 2 mg/L (Dahlberg et al. 1968). Concentrations as low as 3 mg/L result in mortality of salmonids (EPA 1986). Monitoring near the shoreline close to the existing plant found a mean dissolved oxygen recording of 9.49 mg/L during the wet season and 7.22 mg/L during the dry season (CTCLUSI 2014). The minimum single value was 2.59 mg/L. That reading likely occurred at night when dissolved oxygen can be depleted in shallower, more productive, water like where the monitoring station is. Fluctuations that great are unlikely where the diffuser is located in deeper water with greater mixing. At 7.22 mg/L, a slight decrease in swimming performance of listed species is possible. However, the depth and mixing of water near the diffuser will constrain large variations in dissolved oxygen as seen near the shore. Therefore, BOD discharged at the diffuser is likely to affect dissolved oxygen levels in the action area, but is unlikely to cause them to decrease to a point affecting the listed species addressed in this opinion.

Total Suspended Solids. Increases in TSS concentrations as low as 17 mg/L can increase inflammation of the gills and lead to respiratory stress, when juvenile coho salmon are exposed for periods as short as 4 hours (Berg and Northcote 1985). Increases in TSS as low as 30 mg/L can result in behavioral responses (e.g., changes in territorial behavior) of juvenile coho salmon exposed to suspended sediment pulses for periods as short as four hours (Berg and Northcote 1985). Increases in TSS at a concentration of 53.5 mg/L for a 12-hour period caused physiological stress and changes in behavior in coho salmon (Berg 1983). Suspended sediment concentrations at 1200 mg/L for a 96-hour period killed juvenile coho salmon (Noggle 1978). While adequate information exists to analyze the effect of TSS on coho salmon, little exists for green sturgeon or eulachon. In the absence of information we assume the thresholds for effects on green sturgeon and eulachon are similar to those for coho salmon.

Monitoring reports from Plant #2 (City of Coos Bay 2015) indicate discharged concentrations of TSS (between 3.3 mg/L and 6.8 mg/L) well below the threshold of effects described above (17 mg/L for 4 hours). Therefore, TSS from the proposed action is not likely to harm coho salmon, green sturgeon, or eulachon.

pH. Under laboratory conditions, coho salmon tolerated a pH range of 6.1 to 8.2 (Dahlberg *et al.* 1968). Lethal levels for pH occur below 5 or above 9 (European Inland Fisheries Advisory Commission 1969). Plant #2 will maintain pH of the discharge between 6.0 and 9.0. The February, 2015 monitoring report documented a minimum pH of 6.7 and a maximum of 7.2 within the effluent prior to discharge. Therefore, effluent pH is unlikely to be outside the range required for the lowest threshold of effect documented above (6.1-8.2).

Contaminants not regulated by NPDES permit

Metals. Metals have a number of similar toxic effects on fish because of their similar properties. Most metals tend to accumulate in the gill tissue, where the metals form precipitates with the mucus. This leads to decreased ventilation, coughing responses, decreased oxygen and carbon dioxide exchange, and a depletion of energy reserves. The depletion of energy reserves causes decreased swimming ability and a slower response to predators (LaLiberte and Ewing 2006).

Metals tend to accumulate within the body of the fish by binding to phosphate and sulfide groups of various proteins. When the sulfhydryl groups of enzymes are bound, the enzyme activity can be inhibited, potentially causing major disruption of physiological functions and a general decline in fish health (Leland and Kuwabara 1985; Kime 1998). At high enough concentrations, osmoregulatory and hormonal systems can cease to function (LaLiberte and Ewing 2006). Some metals also interfere with olfaction in salmonids (Klaprat *et al*. 1992). Salmon use olfaction as the major sensory input describing the environment around them. Olfaction has been shown to play important roles in predator avoidance (Brown and Smith 1997; Hiroven *et al*. 2000; Scholz *et al*. 2000), recognition of kin (Quinn and and Busack 1985; Olsen 1992), homing of adults to natal streams (Wisby and Hasler 1954; Hasler and Scholz 1983; Stabell 1992), and spawning rituals of adults (Sorensen 1992; Olsen and Liley 1993; Moore and Waring 1996).

Heavy metals also interfere with the workings of the immune system in salmonids (Anderson 1989) but the mechanism of interference is not clear (Kime 1998). Metals may affect the immune system directly or the response could result from a stress reaction that elevates cortisol, which subsequently results in immunosuppression (Schreck 1996). Suppression of the immune system increases susceptibility of salmonids to infection by bacteria, fungi, viruses, and parasites. Such infections decrease the vitality of the fish and increase the chances of mortalities due to osmotic imbalance, inability to feed, or predation (LaLiberte and Ewing 2006).

Two of the most studied metals are copper and zinc. Baldwin *et al.* (2003) exposed juvenile coho salmon to various concentrations of dissolved copper and found reduced olfactory sensory responsiveness. More recent research found reductions in the survival of individuals (Hecht *et al.* 2007, McIntyre et al. 2012). McIntyre et al. (2012) also determined that relatively brief (3 hours) exposures to dissolved copper eliminated the behavioral alarm response in coho salmon, leading to reduced evasion and reduced survival during predation trials. A review of dissolved zinc toxicity studies reveals effects including reduced growth, behavioral alteration (avoidance), reproduction impairment, increased respiration, decreased swimming ability, increased jaw and bronchial abnormalities, hyperactivity, and hyperglycemia. Juvenile fish are more sensitive. Avoidance of dissolved zinc in juvenile rainbow trout, brown trout, and cutthroat trout has been documented (Sprague 1968 and Birge and Black 1980 as cited in EPA 1987c, Woodward et al. 1995). Lethal and sublethal endpoint of dissolved zinc toxicity have been tested on juvenile rainbow trout (Hansen *et al*. 2002; EPA 2007).

However, all of the above studies were conducted in freshwater. Toxicity of dissolved copper and dissolved zinc is reduced in saltwater due to several physiochemical parameters (EPA 2007). Therefore, while the types of effects in the above studies still apply, the threshold concentrations do not. To understand the effects of metals in the effluent on listed species, we will look at

EPA's current recommended saltwater aquatic life criteria (Table 5) which were informed by research from the EPA's database of toxicity studies (ECOTOX) and compare those criteria to the City's 2010 monitoring report. EPA's recommended aquatic life criteria consists of separate criteria for acute and chronic effects. DEQ set water quality standards consistent with EPA's recommended aquatic life criteria and passed administrative rules which EPA approved on April 11, 2014.

The acute criterion is based on toxicity tests that kill 50% of the subjects in a given time (LC_{50}). The ECOTOX database has only one saltwater LC_{50} study for dissolved copper pertaining to listed species considered in this opinion. It found concentrations as low as 329 µg/L killed 50% (LC_{50}) of coho salmon smolts in 96 hours. For dissolved zinc, the only research on species close to those covered in this opinion was on 2-year old Atlantic salmon (*Salmo salar*). It found LC_{50} concentrations as low as 2,000 µg/L in 48-hour tests. The chronic criterion is typically based on "no observable effect concentration" (NOEC) toxicity tests. We found no saltwater NOEC tests in the ECOTOX database for listed species considered in this opinion, or even other salmonids.

Not only is it risky to base criteria concentrations on studies of other species, laboratory-derived toxicity tests have inherent shortcomings and implications in their use understanding ecological consequences for field-exposed fishes. LC_{50} data does not indicate the concentration at which acute toxic effects begin to kill fish, only the concentration that kills half the fish. Nor do LC_{50} tests consider latent mortality, which can range between 15 and 35 percent greater than the LC_{50} predictions (Zhao and Newman 2004). NOEC tests are summary statistics and not actual data (Crane and Newman 2000). Crane and Newman (2000) found the magnitude of effect that can go undetected with in a NOEC statistic (95 percent confidence interval) can be greater than 30 percent on average. These factors create uncertainty that meeting the EPA-approved DEQ aquatic life criteria for metals will fully protect the listed species in this opinion from acute effects in the ZID and chronic effects in the RMZ. Therefore, we assume concentrations of metals meeting the aquatic life criteria are still sufficient to adversely affect our listed resources when individuals reside in the mixing zones for durations similar to those in the toxicity tests above (48 to 96 hours).

The 2010 monitoring reports indicate most dissolved metals in the effluent are below the level of detection, but both dissolved copper and dissolved zinc were detected (Table 5). The dissolved copper concentration on August 9, 2010, was 4.5 µg/L and on November 1, 2010, was 5.7 µg/L. The dissolved zinc concentrations were 31.0 µg/L and 27.1 µg/L for August and November, respectively. These concentrations were taken in the effluent pipe and represent the effluent at the diffuser prior to dilution. Thus, concentrations in the ZID and RMZ will be diluted and likely meet EPA-approved DEQ aquatic life criteria. Furthermore, no life stage of any species will spend time in these zones comparable to the durations used in the toxicity studies mentioned above. Because of the short duration of their residency near the diffuser, we are reasonably certain that the concentrations of metals in the ZID and RMZ are not sufficient to adversely affect any present coho salmon, eulachon and green sturgeon.

Table 5. Comparison of EPA-approved DEQ saltwater aquatic life criteria and Coos Bay Plant #2 2010 monitoring data (Rockwell 2011).

	DEQ Saltwater Criteria		2010 Monitoring Results (Pre-dilution)	
	Acute	Chronic	August	November
Copper (µg/L)	4.8	3.1	4.5	5.7
Zinc (µg/L)	90	81	31	27.1

However, metals from Plant #2 are likely to be at trace levels throughout the action area. Metals typically sorb to suspended solids and can settle out of the water column in, and beyond, the permitted mixing zone. Accumulation of metals is likely to occur in sediments within the outfall mixing zone and the nearby vicinity. These contaminants likely will be consumed by invertebrate forage organisms residing in these areas, thereby entering the food chains of coho salmon and green sturgeon. Thus, we are reasonably certain that metals discharged from Plant #2 will occur throughout the action area and become incorporated into the food chain at levels that will adversely affect OC coho salmon (juveniles and smolts) and green sturgeon (subadults and adults). Adverse effects on these organisms are reasonably certain to include a variety of sublethal and behavioral effects that will reduce growth, fitness, and survival.

Polybrominated Diphenyl Ethers. PBDEs are poorly soluble in water and must be delivered to the fish either through very low water concentrations, through sediments, or indirectly through the food supply (Spacie and Hamelink 1985). Studying medaka (*Oryzias latipes*) and fathead minnow (*Pimephales promelas*) feeding, Muirhead *et al.* (2006) found that PBDE-47 is well absorbed from the fish gastrointestinal tract. A relatively slow decline in the medaka PBDE-47 body levels and correspondingly long biological half-life are indicative of the limited capacity of fish to excrete PBDE-47. Combined, these properties (efficient uptake and slow elimination) explain the tendency of PBDE-47 to bioaccumulate to significant levels in fish (WDOE and WDOH 2006).

Lema *et al*. (2007) found developmental disorders such as reduced growth, abnormal morphology, irregular cardiac function, and altered cerebrospinal fluid flow in zebrafish (D*anio rerio*) upon exposure to high concentrations of PBDEs (100-5000 µg/L). Brief exposure to PBDE-47 causes morphological abnormalities during development and growth of embryos in zebrafish (Lema *et al*. 2007). Chronic exposure to PBDE-47 can disrupt thyroid hormones and affect various key enzymes regulating the production of steroids and receptors in fish gonads (Muirhead *et al.* 2006). This alters the levels of hormones that stimulate the growth and activity of the gonads, which impairs fish reproduction (Muirhead *et al.* 2006). Exposure to 2.4 µg/L of PBDE-47 in the diet of fathead minnows for 21 days caused disruption of thyroid hormone in the brain (Lema *et al*. 2008).

The 2010 monitoring reports indicate most PBDEs in the effluent are below the level of detection. However, some PBDEs were detected, including PBDE-47 which has the most research on its effects on fish. The concentration of PBDE-47 in August was 12.8 ng/L and in November it was 12.2 ng/L. The highest concentration of PDBE was 51 ng/L for PBDE-209 in the November sample. All of the measured concentrations are well below levels tested in the

cited literature. But, because of their persistence in the environment and ability to become entrained into the food web, we are still reasonably certain that PBDEs discharged from Plant #2 into the action area will cause sublethal effects (such as reduced growth on individual green sturgeon and juvenile/smolt coho salmon feeding in the action area.

Pharmaceuticals and Personal Care Products. There is considerable evidence that fishes can be adversely affected by PPCPs. These adverse effects typically interfere with reproduction or alter physiological characteristics (Mottaleb *et al.* 2015). Specific effects documented include male feminization, gill damage, liver damage, kidney damage, heart abnormalities, decreased territorial aggression, decreased ability to catch prey, reduced fecundity, and reduced growth (Corcoran *et al*. 2010). The 2010 monitoring documented the presence of many PPCPs in Plant #2 effluent.

Unfortunately, research is limited on these emerging contaminants and what research there is typically in a laboratory environment with contaminant concentrations higher than what is found in the natural environment (Corcoran *et al*. 2010). None of this research is on coho salmon. This makes predicting the effects of the proposed action difficult. The most reliable information for effects on fish is for 17 alpha-ethenylestradiol (EE2), which also is likely the most potent (Corcoran *et al*. 2010). Because information is lacking on other PPCPs, we will use EE2 as an indicator of effects for all these chemicals. Even though EE2 is likely the most potent, this assumption seems valid because concentrations of some of these other contaminants are likely to have additive effects with each other. Furthermore, several other PPCPs are lipophilic and therefore may bioacculmulate (Corcoran *et al*. 2010, Reiner and Kannan 2010).

Synthetic estrogen is used in birth control pills (EE2), is one of the more potent estrogens, and has been linked to the feminization of male fishes in waters receiving municipal wastewater (Thorpe *et al.* 2003). Male fish downstream of some effluent outfalls have been found to produce messenger ribonucleic acid (which carries information from DNA in the nucleus to the ribosome sites of protein synthesis in the cell) for vitellogenin (an egg-yolk precursor protein), protein associated with oocyte (an immature ovum or egg cell) maturation in females, and early-stage eggs in their testes (Jobling *et al.* 1998). This feminization has been linked to the presence of estrogenic substances such as natural estrogen (17 beta-estradiol, [E2]) and EE2. These substances are usually found in the aquatic environment at low parts per trillion concentrations, typically less than 5 ng/L (Zhou *et al.* 2007). Laboratory studies have shown decreased reproductive success of fish exposed to less than 5 ng/L of EE2 (Parrott and Blunt 2005).

Kidd *et al.* (2007) showed that chronic exposure of fathead minnows to low concentration (5-6 ng/L) of EE2 led to feminization of males through the production of vitellogenin mRNA and protein, and impacts on gonadal development as evidenced by intersex in males and altered oogenesis (egg cell production) in females. This exposure ultimately caused a near extinction of this fish species from the lake where they were being studied. Parrot and Blunt (2005) observed an increase in the ovipositor index (a female secondary sex characteristic) as the most sensitive early response 60 days post hatch when fish were exposed to EE2 concentrations greater than or equal to 3.5 ng/L in a laboratory setting. However, no significant changes were seen in fish exposed up to day 30. Kidd *et al*. (2007) observed elevated vitellogenin 7 weeks after the first estrogen additions to the experimental lake began in 2001.

In the 2010 monitoring (Rockwell 2011), concentrations of EE2 in Plant #2 effluent were below detectable levels, but the detectable level was 100 ng/L. Therefore, it is possible the EE2 level in the effluent was higher than the lowest effects threshold identified above (3.5 ng/L). We also do not know the background concentration of EE2 to which to add Plant #2 effluent. With at least two other wastewater plants upstream, it is reasonable to expect some EE2 in Coos Bay water prior to the additions from Plant #2. Without better monitoring data, we have no choice but to give benefit of the doubt to the listed species by assuming the level of EE2 in the action area with the addition from Plant #2 will exceed 3.5 ng/L (the lowest identified threshold of effect). Based on this analysis of EE2, we also expect that concentrations of other PPCPs will also exceed a threshold of effect within the action area.

While the studies conducted by Kidd *et al*. (2007) and Parrott and Blunt (2005) used longer exposure periods than what OC coho salmon and eulachon use the action area for, we cannot predict how much the concentrations of PPCPs from Plant #2 exceed the effect threshold in those studies. Because we do not have adequate monitoring information to predict the concentrations of PPCPs in Plant #2 effluent, to give benefit of the doubt to the species, we assume the concentrations are high enough for a duration that will cause sublethal effects to OC coho salmon and eulachon. Individual green sturgeon will be within the action area for durations greater than those used in the studies above (30 days continuous exposure) and are certain to incur sublethal adverse effects, such as reduced reproductive success when they eventually spawn (outside the action area).

Stormwater discharge

Stormwater contaminants. Stormwater runoff from impervious surfaces delivers a wide variety of pollutants to aquatic ecosystems, such as metals (*e.g.,* copper and zinc), petroleum-related compounds (e.g., polynuclear aromatic hydrocarbons), and sediment washed off the road surface (Driscoll *et al.* 1990; Buckler and Granato 1999; Colman *et al.* 2001; Kayhanian *et al.* 2003). Stormwater pollutants are a source of potent adverse effects on coho salmon, even at ambient levels (Loge *et al*. 2006, Hecht *et al*. 2007; Johnson *et al*. 2007; Sandahl *et al*. 2007; Spromberg and Meador 2006). These pollutants also accumulate in the prey and tissues of juvenile salmon where, depending on the level of exposure, they cause a variety of lethal and sublethal effects including disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities (Fresh *et al*. 2005; Hecht *et al.* 2007; LCREP 2007). Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow (Anderson *et al*. 1996; Alpers *et al.* 2000a, 2000b).

Copper and zinc are two of the most common and most toxic components of stormwater. Research on their effects was discussed above. The concentrations tested in those studies are lower than common concentrations in stormwater outfalls, and thus indicate toxicity even after stormwater has been moderately diluted. The measured exposure times are also shorter than typical stormwater outfall discharge times.

Runoff from all but 0.13 acres of the 2.14 acres of impervious surface will be treated through Plant #2 and discharged through the diffuser. A rain garden will treat runoff from 0.1 acres of the remaining 0.13 acres by fully infiltrating water up to the 100-year storm; runoff from the other 0.03 acres will remain untreated. A total of 0.11 acres of existing untreated impervious will be removed and/or have its runoff treated. Because runoff from some of the new impervious surface will be untreated and treatment on the rest will not be 100% effective, stormwater contaminants will discharge to the bay. The effects from stormwater discharged through the diffuser were included with the analysis of other effluent discharges above. For the stormwater delivered to the drain on Fulton Avenue, because of the small amount of contributing impervious and the infiltration of the rain garden, the area likely affected by concentrations of stormwater contaminants above the thresholds of effect detailed above (in the metals section) is limited to First Creek.

Adult OC coho salmon migrating into First Creek may be delayed for a short period passing the tidegate, but are also unlikely to spend much time in the action area. Overall, adult OC coho salmon exposure to stormwater contaminant concentrations high enough for a duration long enough to cause injury or death is unlikely. Juvenile OC coho salmon in the lower 800 feet of First Creek likely will be adversely affected by stormwater contaminants, reducing growth, fitness, and survival. Green sturgeon and larval eulachon are unlikely to occur in First Creek and therefore, will not likely be exposed in this area.

Summary of effects on species.

The proposed action will reduce the amount of contaminants delivered to Coos Bay by reducing the amount of untreated impervious surfaces and increasing the efficiency of Plant #2. But the new plant will still deliver enough contaminants to adversely affect OC coho salmon, eulachon and green sturgeon, as summarized below.

Juvenile OC coho salmon will experience decreased growth rates and other sublethal effects from unregulated contaminants discharged by Plant #2 and stormwater discharged in First Creek. Larval eulachon will be injured by ammonia in the ZID and RMZ and will have other sublethal effects from unregulated contaminants discharged by Plant #2. Green sturgeon will experience sublethal effects from unregulated contaminants discharge by Plant #2, including reduced reproductive success from PPCPs.

The effects on OC coho salmon and eulachon are likely to be minor because the life stages do not spend much time in the action area. Adult OC coho salmon are likely to transit the action area within a day, larval and adult eulachon are likely to do so within a couple of days. OC coho salmon juveniles will be present longer, but only a couple of days as pre-smolts and an average of 5.2 days as smolts.

When we put the probability and duration of exposure together with the severity of the effects, we find that every individual in the action area will be subject to some minor, sublethal effects, and a few individuals from each species will likely be injured or killed. On a population scale, the effects of the proposed action will not be measurable because too few individuals will be injured or killed for these species will be adversely affected.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Multiple point source and non-point source discharges enter Coos Bay and the streams that enter into it. Non-point discharges include runoff from agricultural fields, industrial areas, and other developments. Non-point discharges from these types of sources typically carry elevated nutrient loads, petroleum-based chemicals, pesticides, metals, and other constituents. Major point sources in the Coos River basin include stormwater outfalls and two other wastewater treatment plants (the City of Coos Bay has a second plant [Plant #1] and the City of North Bend has a plant). These other treatment plants have NPDES permit requirements similar to Plant #2. Similar to Plant #2, these plants deliver ammonia, BOD, TSS, pH, and other unregulated constituents, and likely have similar effects on species and critical habitats. Stormwater outfalls in the Coos River basin are not inventoried and are likely numerous, particularly in municipalities. Their effects are related to the amount of impervious surface each drains and the uses of those impervious surfaces.

The State of Oregon projects the population of Coos County to grow slowly over the next 20 years (0.15%).[6] The generated amounts of human waste, PPCPs, petroleum-based chemicals, metals, and other byproducts of human existence are likely to increase at the same slow pace. However, technological advances (e.g., cleaner burning engines, more efficient wastewater treatment, treating currently untreated stormwater) and societal shifts (e.g., improved methods of disposing of unused pharmaceuticals, recycling, water conservation) likely will increase the efficiency of removing the contaminants from the environment. In particular, the City is in the early stages of designing upgrades to Plant #1. Also, DEQ is working with the City to develop a stormwater management plan.

Because the population growth rate is so low, the advances in keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on OC coho salmon, OC coho salmon critical habitat, green sturgeon, green sturgeon critical habitat, and eulachon.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), taking into account the status of the species and critical habitat

[6] Data from: http://www.oregon.gov/DAS/oea/Pages/demographic.aspx#Long_Term_County_Forecast. Accessed April 14, 2015.

(Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

2.6.1 Critical Habitat

OC coho salmon

The CHART identified agriculture, forestry, grazing, road building/maintenance, and urbanization as key management activities affecting the physical or biological features within this critical habitat unit. More specifically, the landscape changes are largely from a loss of large woody debris and forested land cover, dredging and urbanization of lower estuary, and diking and draining of wetlands (mostly for urban development, agriculture and grazing). The CHART considered this watershed and the associated Coos River mainstem as having high conservation value.

Climate change is likely to adversely affect the overall conservation value of designated critical habitat, though it may have beneficial effects in certain circumstances. The adverse effects are likely to include, but are not limited to, depletion of cold-water habitat and other variations in quality and quantity of tributary spawning, rearing and migration habitats.

The action area contains physical or biological features necessary for rearing and migration (Table 3). The environmental baseline is degraded from human caused impacts, particularly urban and residential development, industrial development, and agriculture. Developments in and around the estuary, including dredging a navigational channel, have altered habitat value throughout the estuary. Water quality in Coos Bay is likely impaired by several contaminants, but is only listed on the DEQ 303(d) list for fecal coliform.

The proposed action will reduce the amount of contaminants discharged to Coos Bay by increasing the efficiency of Plant #2 and reducing the amount of untreated impervious surfaces. However, Plant #2 will still deliver some contaminants because the wastewater and stormwater treatments will not be 100% effective. The concentration of contaminants near the diffuser is likely to be acute in the ZID and chronic in the RMZ, but only at trace levels from the RMZ downstream to the ocean and upstream to river mile 9. Stormwater contaminants will be at chronic concentrations in First Creek.

Cumulative effects on critical habitat will come mostly from other wastewater plants and stormwater outflows. Because the population growth rate is so low, the advances keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on OC coho salmon critical habitat.

Based on our analysis of effects above, we are confident that the adverse effects of effluent discharge from the new Plant #2 will be minor or affect a small portion of the critical habitat unit

(0.00019%), and therefore will not appreciably diminish the value of critical habitat for the conservation of the species at the watershed level. Consequently, since the proposed action will not appreciably diminish the value of critical habitat for the conservation of the species at the watershed level, the proposed action will not diminish the value of the critical habitat at the designation level. Based on the above analysis, when considered in light of the status of the critical habitat, the effects of the proposed action, when added to the effects of the environmental baseline, and anticipated cumulative effects and climate change, critical habitat will remain functional, or retain the current ability for the PCEs to become functionally established, to serve the intended conservation role for the species.

Green sturgeon

The CHRT identified management activities that applied pesticides, disturbed bottom substrates, adversely affected prey resources, or degraded water quality as key, because they affect the physical or biological features of green sturgeon critical habitat. Of particular concern are activities that affect prey resources. Prey resources are affected by commercial shipping and activities generating point source pollution and non-point source pollution that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon. All of these are concerns in Coos Bay.

Climate change is likely to adversely affect the overall conservation value of designated critical habitat, though it may have beneficial effects in certain circumstances. The adverse effects are likely to include, but are not limited to, reductions in water quality and loss of water quantity in spawning tributaries (spawning tributaries are located outside of the action area in California).

The action area contains physical or biological features necessary for subadult and adult growth, development, seasonal holding, and migration (Table 4). The environmental baseline is degraded from human caused impacts, particularly urban and residential development, industrial development, and agriculture. Developments in and around the estuary, including dredging a navigational channel, have altered forage and habitat value throughout. Water quality is likely impaired by several contaminants, but is only listed on the DEQ 303(d) list for fecal coliform.

The proposed action will reduce the amount of contaminants discharged to Coos Bay by increasing the efficiency of Plant #2 and reducing the amount of untreated impervious surfaces. However, Plant #2 will still deliver some contaminants because the wastewater and stormwater treatments will not be 100% effective. The concentration of contaminants near the diffuser is likely to be acute in the ZID and chronic in the RMZ, but only at trace levels from the RMZ downstream to the ocean and upstream to river mile 9.

Cumulative effects on critical habitat will come mostly from other wastewater plants and stormwater outflows. Because the population growth rate is so low, the advances keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on green sturgeon critical habitat.

Based on our analysis above, we are confident that the adverse effects of effluent discharge from the new Plant #2 will be minor or affect a small portion of the critical habitat area (0.0019%). Therefore, the proposed action will not appreciably diminish the value of critical habitat for the conservation of the species. Consequently, since the proposed action will not appreciably diminish the value of critical habitat for the conservation of the species in the action area, the proposed action will not diminish the value of the critical habitat at the designation level. Based on the above analysis, when considered in light of the status of the critical habitat, the effects of the proposed action, when added to the effects of the environmental baseline, and anticipated cumulative effects and climate change, critical habitat will remain functional, or retain the current ability for the PCEs to become functionally established, to serve the intended conservation role for the species.

2.6.2 Listed Species

OC coho salmon

OC coho salmon occurring in the action area are part of the Coos River population identified as functionally-independent. The Coos River population's annual abundance varies considerably from year to year, with an average spawner return over the last 10 years of 7.3% of the potential historical adult abundance. This population has a high probability of sustaining itself. The primary factor limiting the Coos River population is reduced stream complexity, which will not be affected by the proposed action.

Climate change is likely to adversely affect the survival and recovery of OC coho salmon, though it may have beneficial effects in certain circumstances. The adverse effects are likely to include, but are not limited to, depletion of cold-water habitat and other variations in quality and quantity of tributary spawning, rearing and migration habitats.

The action area supports juvenile rearing and adult and juvenile migration. The environmental baseline is degraded from human caused impacts, particularly urban and residential development, industrial development, and agriculture. Developments in and around the estuary, including dredging a navigational channel, have altered habitat value throughout. Water quality is likely impaired by several contaminants, but is only listed on the DEQ 303(d) list for fecal coliform.

The proposed action will reduce the amount of contaminants discharged to Coos Bay by increasing the efficiency of Plant #2 and reducing the amount of untreated impervious surfaces. Though, Plant #2 will still deliver some contaminants because the wastewater and stormwater treatments will not be 100% effective. A few pre-smolt juveniles each year are likely to spend a day or two in the action area. All smolts will spend an average of 5.2 days in the action area as they acclimate to saltwater conditions. All adults will spend a day in the action area migrating back to freshwater.

OC coho salmon will not be exposed to project-related contaminants for a duration long enough for injuries or death. But, juveniles and smolts will experience sublethal effects from contaminants discharged by Plant #2 and stormwater discharged to First Creek and by

accumulating contaminants from forage. They will likely experience less growth and fitness than would otherwise occur.

Cumulative effects will come mostly from other wastewater plants and stormwater outflows. Because the population growth rate is so low, the advances keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on OC coho salmon.

Sublethal effects on OC coho salmon will occur from contaminants discharged from Plant #2, even though the new plant will result in less contaminants discharged to Coos Bay. Cumulative effects of other treatment plants and stormwater systems may reduce the total amount of contaminants in Coos Bay but degraded water quality will continue into the future and still contribute to adverse effects on OC coho salmon. When we add the effects of the proposed action to the current population status, environmental baseline, and consider cumulative effects and climate change, we find the proposed action will not appreciably reduce the likelihood of the survival or recovery of OC coho salmon at the population scale. Given our conclusion that the population will not be impeded in recovery as a result of the proposed action, the proposed action will also not appreciably reduce the likelihood of the survival or recovery of OC coho salmon at the ESU level.

Green sturgeon

Green sturgeon occurring in the action area are spawned south of the Eel River in California. When not spawning, green sturgeon are broadly distributed in nearshore marine areas from Mexico to the Bering Sea, including Coos Bay. The principal factor for the decline of green sturgeon is the reduction of its spawning area to a single known population limited to a small portion of the highly degraded Sacramento River. This limiting factor does not apply in the action area.

Climate change is likely to adversely affect the survival and recovery of green sturgeon. The adverse effects are likely to include, but are not limited to, loss of quality and quantity of spawning habitat in the Sacramento River. It may also result in changing ocean conditions.

The action area supports subadult and adult growth, development, and migration. The environmental baseline is degraded from human caused impacts, particularly urban and residential development, industrial development, and agriculture. Developments in and around the estuary, including dredging a navigational channel, have altered habitat value throughout. Water quality is likely impaired by several contaminants, but is only listed on the DEQ 303(d) list for fecal coliform.

The proposed action will reduce the amount of contaminants discharged to Coos Bay by increasing the efficiency of Plant #2 and reducing the amount of untreated impervious surfaces. Though, Plant #2 will still deliver some contaminants because the wastewater and stormwater treatments will not be 100% effective. It is likely that a few green sturgeon will swim through the

ZID or RMZ on their way to or from feeding. Though, it is unlikely they will remain in either more than a few minutes. All green sturgeon in the action area will be exposed to low concentrations of contaminants from effluent discharges.

Green sturgeon will not be exposed to high enough concentrations of project-related contaminants for a duration long enough for injuries or death. However, they will experience sublethal effects from contaminants discharged by Plant #2 and by accumulating contaminants from forage. They will likely experience less growth and fitness than would otherwise occur, including reduced reproductive success from PPCPs (when they spawn outside of the action area). However, for the reasons discussed in our effects analysis, these impacts are expected to be minor.

Cumulative effects will come mostly from other wastewater plants and stormwater outflows. Because the population growth rate is so low, the advances keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on green sturgeon.

Sublethal effects on green sturgeon will occur from contaminants discharged from Plant #2, even though the new plant will result in less contaminants discharged to Coos Bay. Cumulative effects of other treatment plants and stormwater systems may reduce the total amount of contaminants in Coos Bay but degraded water quality will continue into the future and still contribute to adverse effects on green sturgeon. When we add the effects of the proposed action to the current population status, environmental baseline and consider cumulative effects and climate change, we find the proposed action will not appreciably reduce the likelihood of the survival or recovery of green sturgeon using the action area. Given this conclusion, the proposed action will also not appreciably reduce the likelihood of the survival or recovery of green sturgeon at the DPS level.

Eulachon

Eulachon in the action area migrate through the action area on their way to or from spawning grounds in the lower reaches of tributaries to Coos Bay. Eulachon have been observed in Coos Bay, but are thought to occur on an infrequent basis and in small numbers. The major species-wide threats to eulachon are impacts of climate change on oceanic and freshwater habitats, and fishery by-catch.

Climate change is likely to adversely affect the survival and recovery of eulachon. The adverse effects are likely to include, but are not limited to, changes in water quality and quantity of spawning tributaries. It may also result in changing ocean conditions.

The action area supports larval and adult migration. The environmental baseline is degraded from human caused impacts, particularly urban and residential development, industrial development, and agriculture. Developments in and around the estuary, including dredging a navigational channel, have altered habitat value throughout. Water quality is likely impaired by several contaminants, but is only listed on the DEQ 303(d) list for fecal coliform.

The proposed action will reduce the amount of contaminants discharged to Coos Bay by increasing the efficiency of Plant #2 and reducing the amount of untreated impervious surfaces. Though, Plant #2 will still deliver some contaminants because the wastewater and stormwater treatments will not be 100% effective. Individual Coos Bay eulachon will be exposed to project-related contaminants for a day or two as larvae and another day or two as an adult. Larval eulachon will be injured by ammonia discharges in the ZID and RMZ. Larvae and adults will have other sublethal effects from unregulated contaminants discharged by Plant #2, but they will be minor because the life stages do not spend much time in the action area and do not feed while present.

Cumulative effects will come mostly from other wastewater plants and stormwater outflows. Because the population growth rate is so low, the advances keeping contaminants out of the environment are likely to outpace increased generation and overall reduce the amounts of contaminants released to Coos Bay. While the total amount of contaminants in Coos Bay will be lower, degraded water quality will continue into the future and still contribute to adverse effects on eulachon.

Some adverse effects on eulachon will occur from contaminants discharged from Plant #2, even though the new plant will result in less contaminants discharged to Coos Bay. Cumulative effects of other treatment plants and stormwater systems may reduce the total amount of contaminants in Coos Bay but degraded water quality will continue into the future and still contribute to adverse effects on eulachon. When we add the effects of the proposed action to the current population status, environmental baseline and consider cumulative effects and climate change, we find the proposed action will not appreciably reduce the likelihood of the survival or recovery of eulachon at the population scale. Given our conclusion that the population will not be impeded in recovery as a result of the proposed action, the proposed action will also not appreciably reduce the likelihood of the survival or recovery of eulachon at the ESU level.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitats, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of OC coho salmon, green sturgeon, or eulachon, or destroy or adversely modify OC coho salmon or green sturgeon designated critical habitat.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings

that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

The NMFS has not yet promulgated an ESA section 4(d) rule prohibiting take of threatened eulachon. Anticipating that such a rule may be issued in the future, we have included a prospective incidental take exemption for eulachon. The elements of this ITS for eulachon would become effective on the date on which any future 4(d) rule prohibiting take of eulachon becomes effective. Nevertheless, the amount and extent of eulachon incidental take, as specified in this statement, will serve as one of the criteria for reinitiation of consultation pursuant to 50 C.F.R. § 402.16(a), if exceeded.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows: Larval eulachon will be injured from exposure to ammonia in the ZID and RMZ. All species will be harmed (including decreased growth, fitness, survival rates and reproductive success) from being exposed to contaminant discharges. Green sturgeon and juvenile OC coho salmon will also be harmed (including decreased growth, fitness, and survival rates and reduced reproductive success) as a result of feeding on contaminated forage organisms.

Accurately quantifying the number of fish taken by these pathways is not possible. Much of the action area is too deep and velocities are too great to allow observation of injured or killed fish. Observation would also add significant additional stress and risk of injury to these fish. Most of the take will occur as sublethal effects that will not be observable without sampling the individuals. Furthermore, there are no methods available to monitor this death and injury because it will occur throughout the year over a large area. In such cases, we use a take surrogate or take indicator that rationally reflects the incidental take caused by the proposed action.

For wastewater effluent, we will use as a surrogate for the extent of take the concentrations of the contaminants with the best available information for monitoring and biological effects on fish; dissolved zinc and dissolved copper. The extent of take indicators for take associated with wastewater effluent are dissolved copper concentrations of 3.1 µg/L at the edge of the RMZ and dissolved zinc concentrations of 81 µg/L at the edge of the RMZ. Concentrations of these constituents are good indicators of the take associated with wastewater effluent because the constituents are representative wastewater pollutants. In addition to being the most practical and feasible indicators to measure, their concentrations are proportional to the adverse effects of the proposed action. Also, there is already a monitoring program in place, which could measure metal concentrations. If either of these indicators of the extent of take are exceeded, reinitiation will be warranted.

For stormwater discharges, the best available indicator for the extent of take is an indicator that demonstrates that the rain garden treatment filters are properly functioning. For this action, the stormwater treatment in the rain garden is an integral means of minimizing potential take, so the

system must function in accordance with its specifications. Inspection within 48 hours following storm events will provide a precise indicator of proper system function (City of Portland 2014). Data from the last 5 years for the weather station closest to Plant #2 (OR-CS-14) indicate storms with more than 1.5 inches of rain over a 24-hour period occur an average of 5.6 times per year. Therefore, the extent of take for stormwater is ponding of water in the system 48 hours after a storm with more than 1.5 inches of rain over 24-hours. Water ponding longer than 48 hours implies that untreated stormwater will overflow the rain garden and pass untreated into the storm drain on Fulton Avenue. This indicator is appropriate for this proposed action because it has a rational connection to the release of stormwater pollutants that will take ESA-listed species. If water continues to pond after 48 hours and sources of possible clogging are not identified and corrected within 7 days, the extent of take will be exceeded and the reinitiation provisions of this opinion will be triggered.

2.8.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1) Minimize incidental take from exposure to contaminants being discharged by Plant #2 and new impervious surfaces.
2) Monitor contaminant concentrations to document the effects of the action on ESA-listed species in the action area, and provide annual monitoring reports to NMFS.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the EPA and their applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The EPA and their applicant have a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. To implement reasonable and prudent measure #1 (contaminant discharge), the City of Coos Bay shall:
    a. Ensure effluent from the new Plant #2 meets EPA-approved DEQ aquatic life criteria, including:
        i. Do not exceed dissolved copper concentrations of 3.1 μg/L at the edge of the RMZ.
        ii. Do not exceed dissolved zinc concentrations of 81 μg/L at the edge of the RMZ.

iii. Report any sampled exceedance of EPA-approved DEQ aquatic life criteria concentrations to NMFS within 30 days, including a description of the remedy.

b. Maintain proper functioning condition of the rain garden stormwater filter as follows:
   i. Conduct maintenance (*e.g.*, debris removal, soil amendment, vegetation removal and replanting, mowing, sediment removal, tilling, etc.) throughout the year to ensure that stormwater treatment facilities function as appropriate to remove stormwater pollutants. Record the dates and types of maintenance done.
   ii. The rain garden shall drain within 48 hours after any major rainfall event (*i.e.*, greater than 1.5 inches of rain over a 24-hour period at weather station OR_CS-14). If water continues to pond after 48 hours, sources of possible clogging shall be identified and corrected within 7 days. Record the dates and details of any such events.
   iii. Report any failure to drain within 48 hours to NMFS within 30 days, including a description of the remedy.

2. To implement reasonable and prudent measure #2 (monitoring), the City of Coos Bay shall:
   a. Monitor to determine if wastewater discharges are within the extent of take specified in the ITS, including:
      i. Semi-annual measurements of contaminant concentrations from wastewater discharges. At a minimum the measurements shall include copper and zinc.
      ii. Sample discharge at the edge of the RMZ or in the effluent pipeline prior to discharge, as described below:
         1. If the samples are taken on the edge of the RMZ, they must be taken on the downstream side during an outgoing tide and include a measurement of background concentrations from upstream of the diffuser during that outgoing tide.
         2. If the samples are taken in the effluent pipeline prior to discharge, a dilution ratio may be used. Unless a new mixing study is completed adhering to DEQ requirements, the City of Coos Bay shall use a ratio no greater than 4:1.[7] The City can apply dilution rates from a new mixing zone study once completed and approved by DEQ.
   b. Monitor to determine if stormwater discharges are within the extent of take specified in the ITS as described below:
      i. Record dates of all major rainfall events (i.e., greater than 1.5 inches of rain over a 24-hour period as measured at weather station OR-CS-14).

[7]The City last completed a mixing zone study for Plant #2 in 1991, it found a 4:1 dilution at the edge of the ZID and 41:1 at the edge of the RMZ. In June of 2014, the City completed modeling that estimated dilution ratios of as little as 7:1 at the edge of the RMZ. Because the age of the full mixing zone study and the discrepancy with the modeling, our confidence in the data is low. We will conservatively apply the measured dilution ratio of the ZID (4:1) to the edge of the RMZ until the City completes a new mixing zone study.

ii. Record dates and times of all instances where water remains within the biofiltration planting boxes for 48 hours or more after the end of a major rainfall event, and the remedy taken to restore function of the system.

c. Submit an annual monitoring report to NMFS by January 30 of each year that includes the following information for the prior calendar year:
   i. Project identification.
      1. Project name and location.
      2. Contact name, address, and phone number.
   ii. Wastewater monitoring data as described in 2.a. above.
   iii. Monitoring data for the stormwater facility as described in 2.b. above.
   iv. Submit all reports to:

ARA, Oregon/Washington Coastal Area Office
NOAA Fisheries, West Coast Region
Attn: **WCR-2015-2030**
1201 Lloyd Blvd Suite 1100
Portland, Oregon 97232-1274

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the Federal action agency:

1. The EPA should investigate treatment methods for municipal wastewater that more efficiently reduce concentrations of metals, PBDEs, PPCPs, and other contaminants to below effects thresholds for aquatic organisms.
2. The EPA should support the investigation of the re-use of treated municipal wastewater for appropriate municipal and agricultural needs such as irrigation. Such actions would not only alleviate effects on listed fish within Coos Bay by decreasing contaminant discharge, but would also decrease the demand for clean freshwater in the municipality.
3. The EPA should complete the development of water quality criteria values for PBDEs, PPCPs and other contaminants that are adequate to protect ESA-listed aquatic species and ensure the State of Oregon applies them to NPDES permits.
4. The EPA should ensure the State of Oregon applies their water quality criteria for metals to NPDES permits and updates those permits if new criteria are promulgated.

2.10 Reinitiation of Consultation

This concludes formal consultation for the replacement of the City of Coos Bay wastewater treatment plant No. 2.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the EPA and descriptions of EFH for Pacific coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and the action area for this consultation are described in the Introduction to this document (Sections 1.3 and 1.4). The action area includes areas designated as EFH for coastal pelagic species, Pacific Coast groundfish, and Pacific salmon (Table 6). The action area is an estuarine area; estuaries are designated by the PFMC as habitat areas of particular concern (HAPC) for groundfish species.

Table 6. Species with designated EFH in the action area.

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes melanops*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhynchus tshawytscha*
Coho Salmon	*Oncorhynchus kisutch*

3.2 Adverse Effects on Essential Fish Habitat

The ESA portion of this document (Section 2.4.1) describes the adverse effects of this proposed action on OC coho salmon, eulachon, and green sturgeon habitat. This ESA analysis of effects is relevant to EFH. However, some of the EFH species may spend more time in the action area and at younger life stages than the ESA species. Effects on these species may be greater than analyzed above. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, we conclude that the proposed action will

adversely affect designated EFH due to release of contaminants (see Section 2.4.1 for detailed discussion).

3.3 Essential Fish Habitat Conservation Recommendations

The following two conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. Both of these conservation recommendations are a subset of the ESA terms and conditions.

1. Contaminant Discharge. Minimize adverse effects on water quality and forage/food resources by managing wastewater effluent and maintaining stormwater systems, as stated in term and condition #1 in the accompanying opinion.
2. Monitoring. Ensure completion of a monitoring and reporting program to confirm the proposed action is meeting the objective of limiting adverse effects, as stated in term and condition #2 in the accompanying opinion.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, approximately 3,967 acres of designated EFH for Pacific coast salmon, Pacific coast groundfish, and coastal pelagic species.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the EPA must provide a detailed response in writing to NMFS within 30 days after receiving an EFH conservation recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH conservation recommendations unless we and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with us over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, we established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The EPA must reinitiate EFH consultation with us if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are EPA. Other interested users could include DEQ and the City. Individual copies of this opinion were provided to the EPA, DEQ, and the City. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by us in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including our ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by our staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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