POST POINT WASTEWATER TREATMENT PLANT IMPROVEMENTS

Biological Evaluation

Prepared for

City of Bellingham
Department of Public Works

June 2011

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1.0 INTRODUCTION

The City of Bellingham Public Works Department (City) is proposing improvements at the Post Point Wastewater Treatment Plant (WWTP) (Figure 1). Improvements are intended to expand treatment capacity of the WWTP. The overarching purpose and need for the improvements is to protect water quality within Bellingham Bay while meeting increased capacity needs associated with projected population growth within the WWTP service area. Process upgrades will allow the WWTP to more reliably meet current regulatory requirements and provide flexibility to meet future, more stringent limits.

Project Information

Project Name:	Post Point Wastewater Treatment Plant Improvement Project
State:	Washington
County:	Whatcom
Location:	Township 27 North, Range 02 East, Sections 2 and 11
Proponent:	City of Bellingham Department of Public Works Contact: Rory Routhe
Preparer:	ESA Adolfson 5309 Shilshole Avenue NW, Suite 200 Seattle, Washington 98107
Preparer Contact:	Steve Krueger Phone: (206) 789-9658

1.1 Background

The City of Bellingham established primary treatment at the Post Point WWTP in 1974. At that time, the WWTP treated flows of up to 55 million gallons per day (mgd) and discharged effluent into Bellingham Bay. To comply with a consent decree negotiated between the City and the Environmental Protection Agency (EPA) in 1993, the City upgraded the WWTP to provide secondary treatment. The City currently provides wastewater collection and treatment services within the City of Bellingham and several adjacent districts, operating 324 miles of wastewater collection piping, 27 pump stations, a combined sewer overflow (CSO) structure, and the WWTP.

In recent years, the WWTP has treated up to a maximum of 72 mgd by blending peak flows. During wet weather, the Post Point WWTP can experience periods of flow that exceeds its secondary treatment capacity (37 mgd). To prevent microbial community washout in the secondary treatment process, the City's current NPDES permit allows the WWTP to bypass a portion flow in excess of 37 mgd around the secondary treatment process. Primary effluent is blended with secondary effluent prior to disinfection and discharge.

The Post Point WWTP is currently approaching the limit of its National Pollutant Discharge Elimination System (NPDES) permit requirements. The permit limits the influent pollutant loadings at the WWTP based on its established maximum month design capacity for flow and loading parameters. The permit requires the permittee (City) to submit a plan and schedule to the Washington Department of Ecology (Ecology) for continuing to maintain capacity at the facility when one of two conditions occurs:

1. The measured flow BOD or total suspended solids (TSS) loads has reached 85 percent of rated capacity for three consecutive months; or

2. Projected increases in flow or influent loading to the WWTP would reach design capacity within five years.

The Post Point WWTP meets both conditions. Based on historical records, the Post Point WWTP has exceeded 85 percent of the permitted WWTP BOD waste load capacity (25,530 pounds per day [ppd]) for 16 months between 2006 and 2009 with 4 consecutive months exceeded in 2008. In 2009, the WWTP reached 95 percent of its rated BOD loading capacity during the month of September. The current population growth estimates indicate the Post Point WWTP capacity will be exceeded within five years. These conditions have triggered the process of planning for improvements, which is described in the *Draft City of Bellingham Post Point Wastewater Treatment Plant Facilities Planning Report* (Carollo Engineers, 2011). The report was developed in accordance with WAC 173-240 and the guidance of the State of Washington, *Criteria for Sewage Works Design* (Ecology, 2008a). The report also includes a liquid stream alternatives evaluation and a biosolids and energy evaluation. The recommended improvements will add treatment capacity to the WWTP and will provide increased reliability during periods of maximum flows and loading conditions. The report relies on population growth estimates described in City Resolution 2009-10 and 20-year projections for wastewater flows and loading estimates described in the *Comprehensive Sewer Plan* (Carollo Engineers, 2009).

The report describes the City's continued implementation of a long-term program of facility expansions and improvements to meet ultimate demand within the service area while meeting all applicable water quality regulations and standards. Three potential phasing options were developed for the recommended improvements outlined in the *Draft City of Bellingham Post Point Wastewater Treatment Plant Facilities Planning Report* (Carollo Engineers, 2011). The City is proceeding with the Intermediate Phase 1 Improvements option, while it is evaluating options for future phases. This document discusses the construction and operation of the full Phase 1 improvements (liquid stream expansion) only.

1.1.1 Outfalls

Three outfalls are defined and permitted in the City's current NPDES permit. Two outfalls (001 and 002) discharge treated effluent from the WWTP and the third outfall (003) discharges combined sewage from the collection system. The outfall information presented herein summarizes a detailed WWTP outfall analysis (CH2M Hill, 1989a), a facility hydraulic analysis (Brown and Caldwell, 2002), a dilution analysis (Hart Crowser, 2006), and a reasonable potential analysis (Carollo, 2011). Because the City has chosen to implement aggressive peak flow management strategies upstream of the WWTP, the facility planning for capacity expansion to accommodate population growth assumes that peak day flow at the WWTP will not increase beyond current permitted levels.

Outfall 001 serves as the primary outfall and is located approximately 2,010 feet offshore at a depth of 76 feet below mean lower low water elevation (MLLW) (Figure 2). Its multi-port diffuser is 425 feet in length with 35, six-inch diameter ports spaced 12 feet apart. The rated hydraulic capacity of Outfall 001 is 55 mgd (Brown and Caldwell, 2002). In accordance with an NPDES permit requirement, an inspection of the submerged portion of Outfall 001 was performed in July 2008 by Diversified Diving, Inc. The resulting inspection report concluded that Outfall 001 is in good condition, with no evidence of failing concrete or voids/chunks missing at joints or pipe lengths.

Outfall 002 originates at Harris Street and serves as the alternate discharge location for occasional flows exceeding Outfall 001's rated discharge, up to the WWTP's peak flow of 72 mgd (Figure 2). In 2008, the City of Bellingham replaced the existing 30 inch diameter Outfall 002 pipe. The new 54-inch diameter, single-port pipe discharges approximately 475 feet offshore at a depth of 41 feet below MLLW. The termini of Outfall 001 and Outfall 002 are separated by more than 1,300 feet, so the regulatory mixing zones for the two outfalls do not overlap (Hart Crowser, 2006).

Outfall 003 is a combined sewer overflow from the C Street CSO Facility that discharges during wet weather events (i.e., when flows to the WWTP exceed 72 mgd). When used, combined sewage discharges to Bellingham Bay.

Dilution factors for municipal WWTP effluent were calculated during the most likely "critical mixing condition" based on the maximum daily flow for acute exposure and maximum month flow for chronic exposure (Ecology, 2008b). The 1989 outfall analysis determined the critical dilution season for Outfall 001 corresponded to the maximum stratification in Bellingham Bay, which occurs during August. The analysis conservatively calculated dilutions during this month at 92:1 and 57:1 for flows of 10.7 mgd and 44.7 mgd, respectively. .

Dilutions during minimum stratification (January) resulted in dilutions of 339:1 and 145:1 for flows of 10.7 mgd and 44.7 mgd, respectively. A previous reasonable potential analysis (RPA) by Ecology during development of the 2007 National Pollutant Discharge Elimination System (NPDES) permit renewal indicated that attainment of acute criteria would not be impacted by the 72 mgd discharge and no NPDES permit limits were established. The acute and chronic dilution factors associated with the Post Point WWTP mixing zone were determined using the EPA Plumes modeling software (Ecology, 2007b) and are listed as 33:1 and 70:1 (Ecology, 2007a). In addition, Ecology's evaluation determined there was no reasonable potential to exceed the water quality criteria was found for various parameters, including metals and other trace pollutants (Ecology, 2007b).

The capacity improvements at the Post Point WWTP will not change the peak flow capacity above the current capacity of 72 mgd. Although there is no change in peak flow, the previous RPA was updated based upon historic Post Point WWTP effluent samples and Puget Sound background toxics concentration characterization undertaken by Ecology in 2009 and 2010 (Carollo Engineers 2011). The updated RPA, as detailed in Appendix E, confirmed Ecology's 2007 RPA that Post Point WWTP effluent has no reasonable potential to cause exceedances of acute toxics criteria.

Maximum month flows will increase from 20 mgd to 34.3 mgd and the potential impact of this additional flow on meeting chronic water quality criteria is considered within this evaluation.

The RPA for chronic conditions was developed around the worst case, maximum month conditions. It used revised maximum month flow, revised mixing within the mixing zone, and updated effluent and background water quality data. Based upon the analysis, the updated RPA demonstrates that there is no reasonable potential for the Post Point WWTP effluent discharge to cause exceedances of chronic toxics criteria (Carollo Engineers, 2011).

1.1.2 NPDES Permit Limitations

The Post Point WWTP operates under a National Pollutant Discharge Elimination System (NPDES) permit, which places limits on various water quality parameters, flow rates, and waste loadings. The current NPDES permit (Permit No. WA-002082-6) was issued in 2007 by the Washington Department of Ecology (Ecology) and expires in 2012 (Ecology 2007a). In addition to limiting effluent parameters such as the Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), fecal coliform; and pH, the NPDES permit also requires the discharged effluent to meet the microconstituent surface water quality standards as defined in the Washington Administrative Code (WAC Chapter 172-201A). Discharge limits for water quality per the current NPDES permit for the WWTP are listed in Table 1-1 and 1-2. The full NPDES is included in Appendix A.

Table 1-1. Post Point WWTP Summer Effluent Limitations for Outfall 001

Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demanda (5-day)	30mg/L, 3830 lb/day; 85% removal of influent BOD	45 mg/L, 5745 lb/day
Total Suspended Solids	30 mg/L, 5004 lb/day; 85% removal of influent TSS	45 mg/L, 7506 lb/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pHb	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[c]**
Total Residual Chlorine	198 µg/L, 33 lb/day	429 µg/L, 72 lb/day
Quarterly		
Whole Effluent Toxicity	Acute Limit = 3%	
a The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
b Indicates the range of permitted values. The instantaneous maximum and minimum pH shall be reported monthly. The pH shall not be averaged.		
c The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.		

Table 1-2. Post Point WWTP Winter Effluent Limitations for Outfall 001.

Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demanda (5-day)	30 mg/L, 5004 lb/day; 80% removal of influent BOD	45 mg/L, 7506 lb/day
Total Suspended Solids	30 mg/L, 5004 lb/day; 80% removal of influent TSS	45 mg/L, 7506 lb/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pHb	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[c]**
Total Residual Chlorine	198 µg/L, 33 lb/day	429 µg/L, 72 lb/day
Quarterly		
Whole Effluent Toxicity	Acute Limit = 3%	
a The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
b Indicates the range of permitted values. When pH is continuously monitored, excursions between 5.0 and 6.0, or 9.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 are violations. The instantaneous maximum and minimum pH shall be reported monthly..		
c The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.		

In addition, Special Condition S12 of the permit stipulates: "A CSO related bypass of the secondary treatment portion of the Post Point WWTP is authorized when the flow rate to the facility exceeds 37 mgd as a result of a precipitation event" (Ecology, 2007a). During such an event, the City must minimize the discharge of pollutants to the environment as well as continue to meet the final effluent limits presented in Table 2-4. All CSO related bypass flows must at a minimum receive primary clarification, solids and floatables removal, and disinfection prior to discharge.

1.1.2.1 Potential Future Permitting Considerations

The design for the WWTP improvements considered the potential for future permitting considerations such as nutrient removal, flow blending, and future trace organic compound (TOrC) removal (Appendix B). Completion of Phase 1 WWTP improvements will allow the WWTP, through future phased improvements, to meet more stringent water quality standards as they are promulgated and applicable to the WWTP. These future phased improvements are most efficiently implemented through completion of the construction and operation of the Phase 1 improvements discussed throughout this document.

1.1.3 Historic and Existing Flows

The historic and existing sewer flows for the Post Point WWTP between 1998 and 2006 were originally analyzed in the Comprehensive Sewer Plan (Carollo Engineers, 2009). The data has been updated to also include flows from 2007 through 2009 (Carollo Engineers, 2011).

The peaking factors for the WWTP flow was estimated based on an analysis of the effluent flow records between 1998 and 2009. The average dry weather flow (ADWF) is defined as the low flow least affected by inflow and infiltration (I/I). The ADWF was calculated as the average flow during the three driest months of the year (July through September). The average annual flow (AAF) was defined as the average of the average daily effluent flows for each year. The maximum month flows (MMF) were determined by calculating the maximum of the 30 day running averages of the daily effluent flows. The peak day and peak hour flows were determined based on the maximum of the hourly recorded effluent flows for each year.

Table 1-3 summarizes the ADWF, AAF, MMF, peak day flow (PDF), and peak hour flow (PHF) values in mgd from 1999 through 2009.

Table 1-3. Post Point WWTP Historic Effluent Flow Summary

Flow (mgd)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ADWF(1)	9.2	9.8	9.7	9.7	9.6	10.8	9.7	9.7	9.4	9.6	8.9
AAF(1)	12.8	11.3	11.7	11.3	12.0	12.5	11.8	12.5	12.0	11.4	12.9
MMF	20.2	17.4	19.6	17.5	18.1	19.8	17.9	21.0	19.0	14.3	25.1
PDF (2)	42.4	31.3	37.4	40.2	49.8	55.3	40.5	38.2	33.2	36.1	70.0(3)
PHF (4)	-	-	-	-	-	72.2	62.7	66.6	68.9	52.4	72.6

Notes

(1) Water use efficiency programs and conservation efforts have resulted in a steady base flow (CH2M Hill, 2009).

(2) The maximum sustained flowrate pumped to the WWTP over a single calendar day (24 hours).

(3) In January 7-8, 2009, the City of Bellingham sustained a record rainfall event, which resulted in the WWTP handling its peak hydraulic capacity.

(4) The maximum recorded flowrate pumped to the WWTP.

1.1.4 Historic and Existing Wastewater Loads

Wastewater loading data are important for sizing critical treatment processes in order to meet the discharge permit. The wastewater loading components of principal interest for the Post Point WWTP are BOD and TSS. Post Point WWTP operations staff measures influent TSS daily and influent BOD an average of six times per week. The current NPDES permit only places limitations on BOD and TSS because (to date) no one has demonstrated that nutrient discharge is creating a water quality impact in Bellingham Bay.

1.1.4.1 Biological Oxygen Demand (BOD)

The historical annual average, maximum monthly and peak day influent BOD loads in pounds per day (ppd) are presented in Table 1-4. Over the past ten years, the annual and maximum month averages have increased in response to growth within the service area. Conversely, improvements to operational strategies at the WWTP have likely resulted in the recent decrease of peak day loading.

Table 1-4. Post Point WWTP Historic Influent BOD Loading

Load (ppd)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AA	17,200	17,400	19,200	18,500	19,300	20,200	19,500	20,800	20,900	21,400	21,000
MM	19,300	20,000	21,400	20,000	21,500	23,100	22,000	24,100	23,400	23,500	25,300
PD	35,100	30,200	48,500	34,700	33,300	37,000	50,300	46,500	40,200	33,800	32,900

AA=Annual Average; MM = Maximum Month; PD = Peak Day

1.1.4.2 Total Suspended Solids (TSS)

The historical annual average, maximum monthly and peak day influent TSS loads in ppd are presented in Table 1-5.

Table 1-5. Post Point WWTP Historic Influent TSS Loading

Load (ppd)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AA	20,600	21,000	20,700	21,300	22,200	22,700	20,400	21,200	21,600	21,900	24,000
MM	24,600	24,200	23,600	24,600	25,400	26,200	23,800	26,100	26,200	24,000	28,300
PD	54,400	52,600	71,000	59,800	52,300	59,100	67,100	62,500	74,100	51,100	64,700

1.2 Project Objectives

The *Draft City of Bellingham Post Point Wastewater Treatment Plant Facilities Planning Report* (Carollo Engineers, 2011) provides a prioritized implementation and construction sequence that addresses 1) current and future needs of the WWTP to reliably meet permit, 2) cost effective alternatives to prepare for growth throughout the 20 year planning period, and 3) the ability to meet more stringent regulatory targets related to nutrient removal, flow blending, and TOrC removal in the future. The purpose of the proposed project is to construct the recommended improvements contained in the 2011 *Draft Facilities Planning Report*.

The Proposed Phase I Improvements are designed to meet the following primary objectives:

- Provide adequate and reliable treatment capacity to meet the demands of planned growth in the service area and anticipated permit limits through the 20 year planning period, thus protecting water quality in Bellingham Bay;
- Provide flexibility for future upgrades that may be driven by growth, replacement of existing facilities, and future regulatory requirements; and

- Provide an architectural appearance to allow the new facilities to blend in with the surrounding area and existing structures.

1.1.4.3 Water Quality Objectives

The Post Point WWTP as designed will allow for an incremental increase in WWTP flows and result in a commensurate increase in TSS and BOD loading through design year 2034 while meeting all applicable current regulatory requirements. It should be noted that the proposed improvements to the Post Point WWTP are the first step towards a cost effective approach to provide additional and higher levels of treatment in the future, which may be required as future NPDES permit limitations are put into effect. While higher levels of treatment are not required at this time to meet existing NPDES permit limitations, completing the proposed actions provide flexibility for future systems to be implemented to meet anticipated regulatory requirements.

In addition to proposed and potential future process upgrades, the proposed action is also a key component of the overall combined sewer system (CSO) reduction plan for the City. Approximately twenty-percent of the City of Bellingham's collection system operates as a CSO which means that average flow increases substantially during the wet weather season (Carollo Engineers, 2009). During peak wet weather events, up to 72 mgd is delivered to the Post Point WWTP for treatment. As allowed by the NPDES permit, all primary effluent in excess of 37 mgd is currently routed around the secondary treatment process and blended with secondary effluent prior to disinfection. These events are referred to as CSO-related bypass events. During the past five years, the City has experienced an average of nine CSO-related bypass events per year as summarized in Table 1-6.

Table 1-6. Historical Occurrence of CSO Related Bypass Events at the WWTP

Year	Number of Events	Estimated Secondary Bypass Volume (million gallons)
2006	15	21
2007	11	41
2008	2	1.2
2009	10	57
2010	5	12.6
Average	**9**	**27**

The City of Bellingham has implemented multiple programs to reduce CSO-related bypass events in the collection system and at the WWTP, including: reducing base flows through water conservation, reducing peak flows through stormwater separation and infiltration/inflow (I/I) reduction, and by increasing WWTP capacity.

The recommended WWTP improvements are an essential element in the City's approach to controlling CSO-related bypasses at the facility. As documented in the Post Point Wastewater Treatment Improvements Facilities Planning Report (2011), the full recommended improvements are designed to handle a peak flow of 72 mgd through the secondary system. This will eliminate CSO-related bypass at the WWTP altogether. The City is considering a phased approach to

constructing the recommended improvements. The initial phase of the improvements will increase secondary capacity to approximately 55 mgd by 2014. This will reduce the number of CSO-related bypasses approximately 78 percent below current levels.

In recent years, the City has also strongly supported a number of water use efficiency and conservation efforts as documented in the City's Water System Plan (2009). The success of these programs has resulted in per capita flow reduction and a relatively consistent average base flow. The City's current per capita water use reflects these conservation measures, and is expected to remain constant into the future.

A third component of the City's CSO reduction strategy, as documented in the Comprehensive Sewer Plan (2008), is the City's investment in reducing peak flows in its collection system. Since 1980, the City has invested over $40 million to separate stormwater from its combined system, and to remove I/I from its separated system. The City continues to make significant investments in peak flow reduction projects.

1.3 Federal Nexus

The City is providing this BA to facilitate review of the proposed action as required by section 7(c) of the Endangered Species Act (ESA). This BA has been prepared to facilitate coordination between the federal action agency and the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), jointly referred to as the Services. Section 7 of the ESA requires that, through consultation (or conferencing for proposed species) with the USFWS and/or NMFS, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat.

The proposed action will require a federal permit from the United States Army Corps of Engineers, which is the federal nexus for this project requiring consultation between the federal lead agency and the Services.

1.4 Report Objectives

This Biological Evaluation (BE) describes baseline conditions and potential effects to ESA regulated fish and wildlife and critical habitat that may be present in the vicinity of the action. This document describes potential direct and indirect effects of the proposed action as well as the effects of interrelated and interdependent actions upon listed species, critical habitat, and the environmental baseline within the project area related to the construction of the Phase 1 expansion and process upgrades at the WWTP and operational impacts with respect to the discharge of highly treated wastewater effluent to the existing marine outfall in Bellingham Bay. The proposed action will be constructed, operated, and maintained by the City.

This BE has the following objectives:

- To review information on species within the Action Area. Information on baseline conditions was drawn from public resource documents as referenced in the text. In addition, regional experts with specific knowledge of habitat conditions and fish use within the Action Area were contacted. A listing of pertinent references and contacts is provided at the end of this report;

- To conduct a review of the project area to document species habitat and site-specific conditions;
- To discuss impacts of the proposed action and effects to the species and habitats;
- To discuss permit conditions and additional impact avoidance and minimization measures;
- To provide a recommendation with regard to effect determinations;
- In addition, this BE addresses the proposed action's compliance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), which requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The objective of this EFH assessment is to determine whether or not the proposed action "may adversely affect" designated EFH for relevant commercially, federally-managed fisheries species within the proposed Action Area. For the purpose of this assessment, the proposed action for the EFH assessment and BA incorporate the same project elements. The EFH Assessment is included as Appendix C to this document.

1.5 Consultation History

No communications with the Services have occurred prior to preparation of this document. All species listings were obtained from both agencies' websites and are included in Appendix D.

2.0 PROJECT DESCRIPTION

2.1 Project Location

The Post Point WWTP is located on the shoreline of Bellingham Bay, southwest of the intersection of McKenzie Avenue and 4th Street, in the Fairhaven area of south Bellingham, Washington (Figure 1; Sections 2 and 11, Township 37 North, Range 2 East). The property is separated into two parcels. The WWTP is located on 19 acres of a 28.15-acre parcel. In addition, the City owns the adjoining 3.3-acre parcel in the northwest corner of the property. Access to the facility is off McKenzie Road at the northern portion of the boundary.

The 28.15-acre site is bounded by an intertidal lagoon and Burlington Northern Santa Fe railroad to the west and northwest (Photo 1); an industrial/transportation district to the north and northeast; and a residential neighborhood to the southeast, south, and southwest.

The northeastern portion of the WWTP site is developed with existing treatment structures and support buildings, access roads, parking areas, and landscaping (Figure 3). In addition to developed areas immediately adjacent to the WWTP, the City constructed a pedestrian recreational loop trail on the unused portion of the property in 1994 (Figure 3; Photo 2). The trail is used by the community and allows for public access along the lagoon and waterfront. The southeast corner of the property is a grassy field used by the community as an off-leash dog area (Photo 3). The slopes on the southern portion of the site are wooded (Photo 4).

2.1.1 Topography

The site grades slope gently downward to the northwest towards Bellingham Bay with open grassy areas present in the southwest and southeast corners of the site. Steeper slopes are present on the margins of the site toward the south and east with heavier wooded vegetation on the bluff to the southwest.

2.1.2 Geology

Subsurface soil and groundwater conditions in the southern half of the Post Point WWTP site were explored for the purposes of constructing new facilities in the area (GeoEngineers, 2010). In addition to explorations and local geologic maps, the geotechnical recommendations developed were based on the available subsurface information from the previous phases of site development (CH2M Hill, Post Point Wastewater Treatment Plant Upgrade Geotechnical Design Report, 1971; CH2M Hill, Post Point Wastewater Treatment Plant Upgrade Geotechnical Data Report, 1989; CH2M Hill, Post Point Wastewater Treatment Plant Upgrade, Initial Design Review Submittal – Design Guidelines, 1989). This section summarizes key geological information from the resulting report.

The site is underlain by the Chuckanut Formation bedrock, Frasier drift, alluvium and artificial fill (GeoEngineers, 2010). The majority of the Post Point WWTP site has been previously modified, including the excavation of peat and organic soils and replacement with structural fill material and some excavation of granular borrow soils in select areas.

2.1.3 Floodplains

Using the City's geographic information system (GIS) data, it has been determined that portions of the western section of the site lie within the 100-year floodplain based on 2007 FEMA floodway and floodplain mapping (Figure 4).

2.1.4 Wetlands

Cantrell & Associates (2011) delineated 10 wetlands on the WWTP site (Figure 4; Photo 5). The City does not regulate wetlands less than 1,000 square feet in size that are not hydrologically connected to a stream, do not contain essential habitat for priority species, and are not part of a wetland mosaic (Bellingham Municipal Code [BMC] 16.55.270.B.1). Most of the wetlands on the site are less than 1,000 square feet in size; however two groups of wetlands identified on the site meet the definition of a wetland mosaic. Wetlands A, B, C, and J constitute a Category IV wetland rating unit, and Wetlands D, E, G, and I constitute a second Category IV wetland rating unit. Wetland K (also known as Post Point lagoon) is a Category I Coastal Lagoon wetland. Table 2-1 below contains a summary of on-site wetlands and their appropriate ratings.

Table 2-1. Summary of Wetlands Located on the Post Point WWTP Site

Feature	Wetland Rating Unit	Class	Area On-Site Sq. Ft.		HGM Class	DOE Rating	Buffer Width (ft)
Wet-A	A/B/C/J	PSS/EME	43,117	45,256	Sloped	IV	50
Wet-B		PEMY	952		Sloped	IV	50
Wet-C		PEMY	737		Sloped	IV	50
Wet-J		PSSC	450		Sloped	IV	50
Wet-D	D/E/G/I	PFOE	13,070	14,369	Sloped	IV	50
Wet-E		PSSE	512		Sloped	IV	50
Wet-G		PEMC	311		Sloped	IV	50
Wet-I		PSSE	476		Sloped	IV	50
Wet-H	Wet-H	PEM/SSC	902		Sloped/Depression	IV	0
Wet-K	Wet-K	PFOE	144,165		Coastal Lagoon	I	100
Stream	N/A	Type 3 (f)	N/A		N/A	N/A	75

2.1.4.1 Post Point Lagoon

The Post Point Lagoon is approximately 800 feet along its long axis and between 110 and 240 feet wide (Figures 3 and 4; Photos 1 and 6). The Post Point Lagoon and surrounding area have been substantially altered by historic and current land use practices. Most notable is the placement of fill across the shallow subtidal and lower intertidal areas of the Post Point Lagoon to accommodate the old Great Northern, now BNSF, railroad causeway. The construction of the rail causeway resulted in a change from an open connection with Bellingham Bay to an enclosed estuarine lagoon with a single narrow opening. The opening has width of approximately 25 feet, with several sets of creosoted pilings under the bridge span. The lowest point of the inlet channel under the bridge is at approximately +5.6 to +5.9 feet mean lower low water (MLLW) (CGS 2007).

High velocity flood tides and wind-generated waves have transported gravel into the Post Point Lagoon creating a moderately sized delta on the landward side of the causeway, which results in the lagoon becoming ponded at mid to low tides. The lagoon also contains eelgrass, *Zostera marina* (CGS 2007). The shoreline and adjacent upland areas, particularly on the southeast side of the Post Point Lagoon have been subject to the placement of historical fill material. There is also evidence that infilling with sediment has occurred, particularly along the narrow portions of the northeast and southwest ends of the lagoon, as a result of erosion of fill slopes and settling of suspended sediments in areas with minimal exposure to wind and wave action (CGS 2007).

The landward shore of the rail causeway is largely covered with crushed gravel of varying sizes, and is mostly devoid of vegetation. Intertidal vegetation is present along the southeast shore. A narrow band of saltmarsh vegetation starts at approximately +7 feet MLLW along the southeast shore. Species include, from the lower elevation upwards, of *Salicornia viginica* (pickleweed), *Distichlis spicata* (saltgrass), *Triglochin maritimum* (sea arrow-grass), and *Plantago maritima* (sea plantain). Upland species are dominated by upland grasses, with lesser numbers of native

shrub and tree species that have been planted in recent years. The area around the small stream contains alder trees (Alnus rubra) and native shrubs. Much of the area has been open for public access with a small network of gravel trails (CGS 2007). Public use has historically resulted in damage to vegetation in and around the lagoon due to heavy foot traffic; however, many of these areas have been fenced off and revegetated to allow for improved habitat conditions.

In addition, the City has also been working to establish new marine eelgrass beds around Post Point WWTP's lagoons to improve the shoreline riparian corridor, upper intertidal salt marsh, and intertidal mud flat (http://www.cob.org/services/environment/restoration/post-pointlagoon.aspx). When the alternate Post Point WWTP outfall pipe was replaced in 2007, a healthy, well established bed of marine eelgrass was impacted, so some of the eelgrass was transplanted to the Post Point Lagoon. In 2008, restoration work was completed (Photo 7). This project benefited eelgrass beds by combining to form a complex interacting mosaic of marine habitats that provide critical rearing and refuge functions for migrating juvenile fish and wildlife (City of Bellingham, 2011). Restoration elements included:

- Placement of large woody debris (LWD) within and around the southeast portion of the lagoon (some below MLLW);
- Increasing shoreline length and complexity by removing areas of existing fill and increasing the saltmarsh area in the southeast portion of the lagoon;
- Re-establishing a native riparian buffer around the southeast lagoon shoreline;
- Protecting native vegetation and habitat elements by restricting access to sections of the upland, shoreline, and intertidal zones; and
- Installing signs to educate visitors about the value of nearshore ecosystem functions.

2.1.5 Streams

Cantrell & Associates (2011) documented a drainage feature at the base of a slope along the southern portion of the site (6th Field HUC: 1711000020404). The feature originates at a culvert that discharges stormwater from upland residential areas upslope and to the east of the project area (Figure 4). The on-site portion of this drainage feature begins at the culvert outlet in the southeastern portion of the property and flows west into Post Point Lagoon near the south-central portion of the southeast shore (Photo 6). The drainage feature contained some minimal flow at the time of the March 2011 site visits (Photo 8); however, it is anticipated that this feature may go dry during the summer months due to the hydrology of the stream being primarily stormwater driven (Photo 9). The City of Bellingham currently regulates this feature as a Type 3(f) stream in accordance with BMC 16.55.

2.1.6 Current Land Use

The existing site is currently occupied by the Post Point WWTP, serving the city of Bellingham, Washington, as well as areas of open space for use by the public. Land use to the east and south of the site is generally characterized as residential and forested land. Land use to the north is predominantly industrial and commercial. Bellingham Bay lies west of the site.

2.1.7 Upland Vegetation

The northeastern part of the site contains the WWTP structures, associated parking and access driveways, and ornamental landscaping (lawns, shrubs, and trees). Southeast of the WWTP facilities is an unmowed grassy area used by the public as an off-leash dog park. A steep slope vegetated with red alder and Himalayan blackberry borders the eastern and southern edges of the dog park. The southwest part of the WWTP site contains a steep, forested slope dominated by Douglas-fir and red alder. A series of walking trails forms a loop around the dog park area and the WWTP facilities, and provides public access along the inland side of Post Point Lagoon. The City of Bellingham has performed voluntary habitat restoration along the northern shoreline of the lagoon, and has installed upland plantings in the southwestern part of the site. The lagoon and planting areas are fenced to prevent public access and damage to the restoration areas.

2.2 Project Description

Construction of Phase 1 Improvements may be performed as part of several separate projects. As a result, construction may be intermittent during the Phase 1 duration. Construction is anticipated to begin in February of 2012 and be completed by June of 2014. Phase 1 improvements include: retrofit of the Chemically Enhanced Primary Treatment (CEPT) system into an existing building; Primary Effluent Pump Station (PEPS) modifications; construction of the blower building; (minimal) modifications to Activated Sludge Basins 2 and 3; construction of Secondary Clarifier 4; construction of the Selector/Activated Sludge Basin 1; and construction of a 10,000 square foot maintenance building in the northeast corner of the site.. Phase 1 improves the performance efficiency of the current primary and secondary processes, provides for necessary equipment replacement, and provides a redundant secondary process tank during maximum month conditions. Full build-out under Phase 1 improvements would include the construction of Activated Sludge Basin 4.

2.2.1 Primary Features of the Proposed Action

The existing WWTP site layout is shown in Figure 3. The proposed project would upgrade the Post Point WWTP by expanding the core primary and secondary processes, thereby increasing the WWTP's BOD treatment capacity. The WWTP is near capacity and risks violating its discharge permit requirements if improvements are not completed within the proposed timeframe. This project includes the following elements (Figure 5):

- Retrofit of an existing building to incorporate a chemical facility to enhance solids removal during primary treatment (CEPT);
- Modifications to existing primary effluent pump station (PEPS) and return activated sludge (RAS) pump station and flow splitting structures;
- A new anaerobic selector basin;
- Additional activated sludge basins and associated mechanical facilities (Activated Sludge Basin 4 [one of the two new basins] will likely be constructed as part of a future phase);
- A fourth secondary clarifier;

- A new blower building to provide oxygen to the biological process;
- Retrofits to the existing activated sludge basins for conversion to air;
- Modifications and improvements to existing electrical and control systems; and
- Construction of a 10,000 square foot maintenance building.

Construction will require extensive modifications to existing facilities and yard piping while in operation; integration of new structures within the existing site boundaries; and detailed sequencing to address operational needs, neighborhood impacts, and sensitive environmental areas surrounding the site.

2.2.1.1 Site Preparation

Phase 1 construction will occur primarily within the existing footprint of the Post Point WWTP site; however, expansion to the south and within the WWTP property boundary will be necessary to accommodate the new secondary clarifier and Activated Sludge Basin 4. The approximate acreage of expansion is estimated to be 1.0 acres, which includes 6,514 square feet (0.16 acres) of wetland fill. Construction will require excavation and grading of areas at the site. All grading and excavation will occur in pre-marked areas. Grading and excavation will require the use of excavators, bulldozers, and other mechanized equipment. The amount of grading and excavation required would vary depending on the specific projects being constructed; however, it is estimated that 300,000 cubic yards of native soil will be excavated and hauled off-site to an approved disposal location, and 150,000 cubic yards of imported structural fill material will be imported and provide base materials for the excavations.

Wetland Fill

The proposed WWTP improvements would result in a total of 6,514 square feet of fill within three wetlands (Wetland A, B, and G; Figure 6). Wetlands would be filled to allow construction of the new secondary clarifier, future activated sludge basin, and potentially the relocated walking trail west of the new clarifier (ESA, 2011).

Most of the on-site wetlands meet the criteria to be exempt from City regulation and therefore do not have a required buffer width (Cantrell & Associates, 2011). Three onsite wetlands and Post Point Lagoon (A, D, E, and K) are regulated by the City and have associated buffer requirements. The proposed action will also result in 13,019 square feet of permanent wetland and stream buffer impact, primarily resulting from the construction of the new secondary clarifier (ESA, 2011).

Tree Removal

Approximately 24 non-native trees will be removed to accommodate the new site facilities. Trees removed are primarily existing landscaping trees planted during the previous expansion that provide visual screening of the existing facilities. These trees do not provide suitable nesting or roosting habitat for listed species.

2.2.1.2 Staging Areas and Haul Routes

All equipment and materials will be stored and staged on-site in a portion of the property at the northeast corner of the site (Figure 7). This area is has been specifically designated as a staging area due to its location away from wetland, streams, and other surface water features including Post Point Lagoon. Material will be imported and exported from the site via McKenzie Road at the northern portion of the boundary.

2.2.1.3 Temporary Erosion and Sediment Control

Erosion and sedimentation impacts during construction are anticipated to be minor as the site is mostly flat. During construction, Best Management Practices (BMPs) will be employed to minimize the amount of erosion and sediment leaving the site or entering the WWTP's stormwater collection system. The BMPs will be consistent with the Washington State Department of Ecology and the City of Bellingham erosion control standards and, and may include the use of inlet protection, silt fence, straw wattles, and sediment traps as necessary. Following construction, disturbed areas will be paved or hydroseeded promptly. Temporary erosion and sedimentation control (TESC) measures will be included as part of the project design and construction. The TESC Plan will meet the requirements of Washington State Department of Ecology (Ecology) and the City of Bellingham standards, as well as additional measures deemed appropriate for the project (see Section 2.5).

The majority of construction activities will occur within developed portions of the site; however, the secondary clarifier will be constructed in Wetland B, a portion of Wetland A, and within 200 feet of Post Point Lagoon; the activated sludge basins will be constructed in Wetland G and within 200 feet of Wetlands A, E, D, and I; and mitigation for wetland impacts will include soil disturbing activities immediately adjacent to Post Point Lagoon necessary to expand the extent of estuarine wetland within the project area. Work adjacent to Post Point Lagoon has the highest potential for delivery of sediment and increasing turbidity within the lagoon; however, TESC BMPs such as those discussed above will be in place to minimize these impacts. In addition, construction in this area will be coordinated with low tide conditions to further minimize the adverse effects of sedimentation and turbidity within Post Point Lagoon.

2.2.2 Secondary Features of the Proposed Action

2.2.2.1 Dewatering

Construction dewatering may be required for deep excavation areas (e.g., the new secondary clarifier). In the event that perched aquifers are encountered during construction, groundwater may be pumped back to the head of the WWTP for treatment or collected in Baker Tanks, allowed to settle, and then discharged to vegetated areas on-site where it will either infiltrate or disperse to on-site wetlands, streams, and Post Point Lagoon. BMPs will be in place to minimize erosion and sediment delivery to surface waters and reduce flow velocities that may result in erosion of upland soils. These BMPs would include silt fencing, straw bales, check dams, and straw wattles.

2.2.2.2 Stormwater

The current facility site is approximately 19 acres, separated into two distinct drainage basins. The northern basin drains directly into Bellingham Bay and the southern basin of the site, where the proposed construction will occur, drains to a vegetated swale which discharges into a saltwater lagoon connected to Bellingham Bay. The natural swale currently provides basic treatment for the existing stormwater runoff. No significant changes in stormwater runoff management are planned outside the southern basin as no development will occur in this area as a result of the proposed action.

All chemical handling and transfers are separately contained within enclosed areas with floor drains that discharge into the WWTP headworks. This prevents chemical spills from contaminating stormwater runoff. All normal facility work is performed indoors or within the perimeter of the wastewater treatment basins (e.g. activated sludge, clarifiers, and chlorine contact chamber), except maintenance of building exteriors.

A Stormwater Pollution Prevention Plan (SWPPP) in compliance with City of Bellingham and Ecology permit requirements will be developed for the proposed action that includes BMPs designed to prevent erosion and sedimentation, and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activities. The SWPPP is also intended to prevent violations of surface water quality, groundwater quality and sediment management standards and prevent, during construction, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak flow rates and volumes of stormwater runoff.

The finished project will add 1.0 acres of developed land to the existing site. Developed site stormwater will be collected by catch basins and conveyed through underground piping to the existing discharge point at the drainage feature. In the future, the City may choose to discharge to a rain garden upstream. The proposed expansion is consistent with the existing site in its usage and characteristics; based on preliminary analyses, the site should be able to continue discharging under its current Industrial Stormwater General Permit (ISWGP) with slight modifications.

Table 2-2 below identifies the drainage areas used for calculations. Clarifiers and activated sludge basins were not included in the area calculations, as their stormwater runoff will be self-contained.

Table 2-2. Post Point WWTP Summary of Contributing Drainage Areas

Description	Existing (Acres)	Developed (Acres)
Lawn	3.46	2.87
Roof	0.88	1.12
Driveway (asphalt)	1.23	1.58
Concrete (sidewalk)	0.22	0.27

Stormwater Runoff and Flow Control

Based on the most recent Western Washington Hydrology Model (WWHM3), the proposed construction would increase stormwater runoff from the site by approximately 0.3 cubic feet per second for the 100-year storm event. However, the Ecology Stormwater Management Manual for Western Washington (SWMMWW) Volume 1, Section 2.5.7, indicates that flow control (detention) is not required because stormwater from the site does not discharge to a fresh-water body (Bellingham Bay). Additionally, and based on Vol. I Ch. 2.5.6 of the SWMMWW, the pavement is not considered a pollutant generating surface due to the low traffic volume at the site, which has restricted access and is infrequently used for maintenance purposes (Ecology 2005).

Stormwater Conveyance

The proposed system will require new catch basins, and a pump station. All storm drains will be 15-inch diameter corrugated double-wall polyethylene pipe or smaller. Roof drain connections to the storm drains will be 4-inch to 6-inch pipe as appropriate.

2.2.2.3 Wetland Mitigation

The City has taken steps to avoid and minimize wetland impacts through design and placement of the proposed WWTP structures. New structures would be located adjacent to the existing developed portion of the site and would be the minimum size necessary to accomplish the project's objectives. Construction of the new secondary clarifier would account for most of the project's unavoidable wetland impacts.

The City proposes to create 11,255 square feet of estuarine wetland adjacent to the Post Point lagoon (Photo 10). This would provide a 1.7:1 mitigation ratio for the 6,514 square feet of wetland impact. The proposed wetland creation project would expand the area of nearshore estuarine habitat, a type of wetland that is limited in the Puget Sound/Strait of Georgia region. Estuarine wetlands are considered to have high levels of function for fish and wildlife habitat. Wetland would be created by excavating and grading upland areas of the shoreline to allow tidal inundation, and replanting the graded area with native salt marsh plant species. Figure 6 shows a conceptual wetland creation area of approximately 11,255 square feet.

In addition, 37,856 square feet of wetland will be enhanced through planting of native vegetation. The buffer of the wetland creation area (20,488 square feet) would also be enhanced by removing an existing gravel-surface foot trail and planting the area with native shrub and herbaceous plant species.

Estuarine wetland (salt marsh) would be created by excavating and grading the existing shoreline along the southern extent of Post Point Lagoon and replanting the graded area with native saltmarsh species. Approximately 2,000 cubic yards of upland soil will be removed from the site to construct the wetland creation area. The conceptual plan to increase tidal marsh habitat within Post Point Lagoon will include the excavation and grading necessary to attain elevations of +7 to +9 feet above MLLW. The majority of excavation and grading will be performed in the dry, leaving an earthen berm between Post Point Lagoon and the construction area. Following completion of the majority of excavation and grading activities within the mitigation area, two openings will be excavated out of the berm to allow the tide to move in and out of the newly constructed habitat. The excavation of openings will be timed to occur during a low tide event,

which in addition to the placement of erosion control BMPs and performing the majority of excavation in the dry, will minimize the potential for creating excessive turbidity within Post Point Lagoon and Bellingham Bay.

The City has recently performed voluntary restoration of other shoreline areas within the lagoon using these same methods, and those past restoration efforts have been successful. Therefore, compensatory wetland creation in this area appears to have a high likelihood of success.

The goals of wetland creation project are to:

- Create 11,255 square feet of estuarine wetland as compensatory mitigation for 6,514 square feet of permanent impacts to palustrine emergent wetlands (Wetlands A, B, and G).

- Provide a net improvement in wetland functions on the site, particularly through increasing the area of great blue heron foraging habitat and increasing available salt marsh habitat

- Provide for permanent protection of the wetland creation area and the entire Post Point Lagoon through fencing and signs.

Other benefits will include an expansion of juvenile salmonid rearing habitat and an expansion of designated critical habitat for Puget Sound ESU Chinook salmon and Coastal-Puget sound DPS bull trout.

2.3 Operation

2.3.1 Municipal Discharge

The Post Point WWTP currently provides secondary treatment for wastewater from the City of Bellingham prior to marine discharge in Bellingham Bay. Three outfalls are defined and permitted in the City's current NPDES permit with the primary discharge (Outfall 001) located approximately 2,010-feet offshore at a depth of 76-feet below mean lower low water elevation (MLLW). The acute and chronic dilution factors associated with the Post Point WWTP mixing zone were determined using the Environmental Protection Agency (EPA) Plumes modeling software (Ecology, 2007b) and listed as 33:1 and 70:1, respectively, in the current NPDES permit (Ecology, 2007a).

Because the City has chosen to implement peak flow management strategies upstream of the treatment plant, the facility planning for capacity expansion to accommodate population growth assumes that peak day flow at the Post Point WWTP will not increase beyond current levels. The proposed improvements will increase treatment capacity for maximum month flow conditions; however, peak flows to/from the Post Point WWTP will not increase above their current level of 72 million gallons per day (mgd). Prior analysis has demonstrated that there is no reasonable potential to exceed water quality standards for the acute (peak flow) condition (Ecology 2007b; Carollo Engineers, 2011; Appendix E). Therefore, this analysis focuses on confirming the water quality impact associated with the chronic (maximum month) condition. As described herein, the analysis demonstrates that there is no reasonable potential to exceed water quality standards for

the chronic condition, based on the Environmental Protection Agency (EPA)'s methodology for calculating the reasonable potential analysis for toxins

Based on historical records, the Post Point WWTP exceeded 85 percent of the permitted WWTP BOD waste load capacity (25,530 pounds per day [ppd]) for 16 months between 2006 and 2009 with 4 consecutive months exceeded in 2008. In 2009, the WWTP reached 95 percent of its rated BOD loading capacity during the month of September. The current population growth estimates indicate the WWTP capacity will be exceeded within five years. In response, the City developed the 2011 Draft Facilities Planning Report to prevent a violation of the City's NPDES permit, which could result in a suite of penalties, including a moratorium on growth within the established Urban Growth Areas (UGAs). As such, the Facilities Plan was developed to take into consideration the current and anticipated future limitations that may be imposed through the NPDES renewal process for the planning horizon of the facility.

WWTP capacity upgrades as part of Phase1 are expected to increase WWTP capacity from a current monthly maximum of 20 mgd to a projected 34.3 mgd by the end of the Phase 1 planning horizon of 2034 (a 59 percent increase in discharge volume over existing conditions). This increase in capacity is needed to continue to meet applicable permit requirements while accommodating projected increases in wastewater influent flows and a subsequent increase in BOD and TSS loading at the WWTP.

BOD loading is anticipated to increase to a monthly maximum of 39,300 lbs/day by the end of the planning horizon of 2034. TSS loading is anticipated to remain below current NPDES limitations throughout the planning horizon of 2034. The current NPDES permit expires in November of 2012. Renewal of the permit will likely be delayed until the proposed capacity improvements are in service.

2.3.2 Projected Service Area Growth

Currently, the City provides sewer service to areas both within the City limits and to sewer service zones within the Urban Growth Area (UGA) of Whatcom County. The service area includes approximately 30-sq mi and over 83,000 customers. The system currently extends as far as Kelly Road to the north, Lake Samish Road to the south, Lake Whatcom to the east, and Bellingham Bay to the west (Figure 8). The Lake Whatcom Water and Sewer District (formerly known as Water District No. 10) provides sewer service to the east of the City's service area near Lake Whatcom. Lake Whatcom Water and Sewer District does not provide treatment of its sewage, but rather connects to the City's Silver Beach trunk sewer in Whatcom Falls Park. Lake Whatcom Water and Sewer District contracts with the City to provide treatment of its sewage at a maximum flow rate of 3,200 gallons per minute (gpm) (Carollo Engineers, 2011). Sewer service outside the corporate limits but within the UGA of the City is only permitted via annexation or by approval of the City Council based on a documented health related issue (Ordinance 2011-05-025). Elevation within the existing sewer service area ranges from sea level to 800 feet. The topography is characterized by a few major streams crossing rolling hills.

An approach to estimating the 20-year projection for wastewater flows and loadings was developed in the Comprehensive Sewer Plan (Carollo Engineers, 2009) based on historical population growth. In recent years, the City has experienced a slightly lower than projected population growth rate. In 2009, the County adopted a revised 20-year population and employment growth projections for all the jurisdictions use in the 2009 urban growth area

(UGA) boundary update and Bellingham's 2011 Comprehensive Plan update process. The adopted 2029 population forecast for Bellingham and the UGA is 116,200. This represents total growth of about 25,000 residents during the planning period.

The potential sewer service area includes Bellingham's incorporated City limits, and UGA. This future sewer service area, shown in Figure 9, is consistent with the Growth Management Act (GMA) and documented in the Comprehensive Sewer Plan (Carollo Engineers, 2009). Flow and load projections were developed using 12 years of historical WWTP records and the range of population projections. The flow projections for annual average (AA), maximum month (MM), and peak day (PD) conditions are projected to be 21.7 million gallons per day (mgd), 34.3 mgd, and 64.2 mgd, respectively.

2.3.3 Water Quality Requirements

2.3.3.1 Mixing Zone Boundary

Ecology has authorized allowable discharge mixing zones for the Post Point WWTP to discharge to the estuarine bay. Two levels of exposure are considered for water quality and human health impacts: acute and chronic. Chronic effects are those that can result from long-term exposure to concentrations of a particular pollutant. Acute effects are those that can occur as the result of short-term exposure. These effects are captured in a calculation of the reasonable potential for adverse water quality or human health effects by either chronic or acute exposure. Ecology defines the allowable mixing zone area for a permitted outfall in the Water Quality Program Permit Writer's Manual Publication No. 92-109 (Ecology, 2008b).

- Chronic Boundary: The allowable mixing zone is defined as a cylinder from the sea bottom to the water surface with a diameter of 400 feet plus twice the depth of the diffuser plus the length of the diffuser.
- Acute Boundary: The allowable mixing zone diameter is one-tenth the diameter of the chronic mixing zone.

As previously stated, this evaluation is focused only on the chronic condition, since peak flow conditions tor Outfall 001 are not changed by the proposed improvements. The mixing zone boundary for the chronic condition at Outfall 001 is 977 feet (298 meters).

2.3.3.2 Dilution Ratio

The dilution ratio for the chronic boundary is based upon the highest average month effluent flow rate (maximum month). The current dilution ratios for Outfall 001's chronic mixing zone is 70:1, as calculated by the EPA Plumes modeling software and the current rated maximum month flows to the WWTP. The maximum month flow capacity for the Post Point WWTP following the improvements will increase by up to 14 mgd beyond the current permitted flow, which will reduce the dilution ratio below current levels. Based on a linear reduction for the current mixing zone area and volume and as confirmed using the Visual Plumes dilution model UM3, the dilution ratio under chronic conditions at the future design flow of 34 mgd is estimated at 41:1, which is substantially lower than the current chronic dilution ratio of 70:1. The City and its engineering team conducted additional water quality evaluations to determine whether the increased flows and reduced dilution would result in water quality impacts, as described below.

2.3.3.3 Reasonable Potential Analysis

Ecology prepared a Reasonable Potential Analysis (RPA) to confirm there were no exceedances of the standards for water quality as part of the 2007 NPDES permit renewal process based on the EPA prescribed method detailed in Technical Support Document for Water Quality based Toxics Control (EPA, 1991). The following water quality parameters for the primary outfall were evaluated: arsenic, chromium, copper, lead, nickel, and zinc (dissolved fraction) and compared with the Surface Water Quality Standards for the State of Washington with respect to metals (Ecology, 2006). The conclusion from the RPA was that there is no reasonable potential for adverse water quality effects using dilution ratios of 70:1 for the chronic condition (Ecology, 2007a).

Using the same methodology, Carollo Engineers recalculated the reasonable potential analysis for a lowered chronic dilution ratio of 41:1 for Outfall 001. The analysis concludes that there is no change in the reasonable potential to exceed water quality criteria for any parameter, and that all applicable water quality standards will continue to be met. The results of the analysis are summarized in Appendix E.

2.4 Interrelated and Interdependent Actions

Interrelated Actions are those that are part of a larger action and depend upon the larger action for their justification (50 CFR 402.02). There are no interrelated actions associated with the proposed action. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). WWTP upgrades are interdependent actions. Each of these elements of the proposed project is fully analyzed in this BE.

2.5 Impact Avoidance and Minimization Measures

This section discusses impact avoidance and minimization measures that would be employed to minimize, reduce, or eliminate the potential for adverse effects of the proposed action upon listed species and baseline conditions within the project Action Area.

2.5.1 General Construction BMPs

- Comprehensive erosion and sediment control plans will be developed and implemented for each phase of construction in accordance with the 2005 Stormwater Management Manual for Western Washington (Ecology, 2005) or updated versions as they become available. The plans could include elements for site stabilization, slope protection, drainage way protection, and sediment retention. The proposed action would also comply with applicable erosion control standards for the City of Bellingham.
- Spill and erosion prevention and sediment control plans, as well as observance of all applicable safety and environmental regulations for handling chemicals, will be in place to minimize risks.
- In the unlikely event construction dewatering is necessary, dewatering water will be infiltrated to the ground on site and will comply with Industrial Stormwater General Permit (ISWGP) standards and permit requirements.

- Excavation and grading will be limited to pre-marked areas within the WWTP site.
- Construction activities will be scheduled soon after an area has been graded and prepared.
- Disturbed areas will be paved as part of facility expansion or hydroseeded as soon as possible after completion of construction.
- Straw bales or silt fences will be used to reduce runoff velocity in conjunction with collection, transport, and disposal of surface runoff generated in the construction zone.
- During construction, monitoring programs could be required to ensure compliance with the site erosion control plan and with local regulatory requirements. A Stormwater Pollution Prevention Plan (SWPPP) and Temporary Erosion and Sediment Control (TESC) plan will be included in project contract documents. The construction contractor and/or City staff would measure parameters such as turbidity, temperature, and pH of surface water discharge and visually monitor the site for signs of erosion and for correct implementation of control measures per these plans.
- Equipment will be stored and staged and minimum of 250 feet from surface waters when not in use.
- Refueling of equipment will take place a minimum of 250 feet from surface waters.
- Wetland impacts will be mitigated in accordance with local, state, and federal guidelines. The proposed mitigation will increase the amount of estuarine wetland, provide additional area for growth of salt marsh vegetation, and improve foraging and refuge for a variety of wildlife including great blue heron and juvenile salmonids.

2.5.2 Operational Conservation Measures for the Plant

- WWTP design will include source controls to minimize the risk of contamination from spills and leaks, in the rare event that a spill occurs. Spill containment provisions include double-walled storage facilities and emergency cleanup procedures. The site would be sloped to direct any drainage from spill-prone areas (i.e., sludge loading and chemical loading) back to the WWTP for processing. The design includes collecting and diverting stormwater from non-process areas of the WWTP site, both existing and new impervious surfaces, to on-site bio-swales for water quality treatment provided by settling basins and bioswales. All stormwater facilities will be designed in accordance with the 2005 Stormwater Management Manual for Western Washington (Ecology, 2005).
- Stormwater generated in areas of the WWTP site where it could potentially be exposed to contaminants will be collected and processed through the WWTP.
- WWTP improvements will accommodate higher flow volumes and BOD loading.
- Implementing the proposed process upgrades is necessary to allow for future process upgrades at the WWTP and to meet future NPDES requirements.
- Operation of the full Phase 1 WWTP improvements will result in a significant reduction in overall CSO-related bypass discharge events at the WWTP, from an average of nine events per year (average volume of discharge 27 million gallons) to zero events per year, which will result in improved water quality within Bellingham Bay.

3.0 ACTION AREA

The ESA requires that potential effects to listed and proposed endangered and threatened species be evaluated in relation to the complete range of area influenced by the proposed action (the Action Area) (50 CFR Part 402.02). The Action Area encompasses the complete extent where measurable direct and indirect effects resulting from the proposed action are foreseeable and are reasonably certain to occur (USFWS 1998; NMFS 1996).

For the purpose of this assessment, the Action Area generally includes the entire area within the WWTP service area (Figure 10). This area defines the extent of the proposed future sewer collection system where indirect effects could occur. Portions of four watersheds occur within the WWTP service area and are included within the project Action Area including the Squalicum Creek watershed, which drains a total of 15,800 acres, of which approximately 4,700 acres are in the northern part of the City's planning area, including Baker Creek, Spring Creek, McCormick Creek, Toad Creek, Upper Squalicum Creek, Squalicum Creek, and additional unnamed streams; the Bellingham Bay Watershed, which encompasses the smaller drainages of Whatcom, Padden and Chuckanut Creeks, as well as Fragrance and Padden Lakes; the Nooksack Silver Watershed, which includes approximately 10,100 acres, of which approximately 1,700 acres of the Silver Creek Drainage Basin are in the northwestern portion of the City's planning area. Major streams within this basin include Silver Creek (with seven unnamed tributaries draining into it), Tennant Creek (with four unnamed tributaries draining into it), and Bear Creek (with three unnamed tributaries draining into it); and portions of the Lake Whatcom watershed are included within the project Action Area. The Action Area also includes Bellingham Bay adjacent to the service area and an approximate 977-foot radius around Outfall 001 and 240-foot radius around Outfall 002 that are subject to indirect effects related to effluent water quality and future growth in the service area (Figure 10).

The Action Area also includes a terrestrial zone of effect, which includes the entire extent of the WWTP footprint and wetland mitigation area that will be subject to soil disturbing activities as well as areas within 3,793 feet of construction activities that will be subject to increased noise and disturbance during construction (Figure 10).

4.0 SPECIES AND CRITICAL HABITAT

4.1 Species List

NMFS and the USFWS indicate that the project will occur within the range of the federally-listed species and designated critical habitats shown in Table 4-1 below (NMFS, 2009; NMFS, 2011a; NMFS, 2011b; USFWS, 2010). Appendix D contains the complete NMFS and USFWS species lists. The Washington State Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) database and SalmonScape interactive mapping tool were also consulted to identify the known or presumed distribution of listed species within the immediate project vicinity (WDFW, 2011a, WDFW 2011b).

Table 4-1. Occurrence of Listed Species and Critical Habitat within the Project Action Area

Common Name	Scientific Name	ESA Status *	Jurisdiction	Critical Habitat
Puget Sound Evolutionarily Significant Unit (ESU) Chinook Salmon	Oncorhynchus tshawytscha	Threatened	NMFS	Yes
Puget Sound Distinct Population Segment (DPS) Steelhead	Oncorhynchus mykiss	Threatened	NMFS	None
Coastal-Puget Sound DPS Bull Trout	Salvelinus confluentus	Threatened	USFWS	Yes
Southern DPS Green Sturgeon	Acipenser medirostris	Threatened	NMFS	No
Yelloweye Rockfish	Sebastes ruberrimus	Threatened	NMFS	No
Canary Rockfish	Sebastes pinniger	Threatened	NMFS	No
Bocaccio Rockfish	Sebastes paucispinis	Endangered	NMFS	No
Marbled Murrelet	Brachyramphus marmoratus	Threatened	USFWS	No
Southern Resident Killer Whale	Orcinus orca	Endangered	NMFS	Yes
Stellar Sea Lion	Eumatopias jubatus	Threatened	NMFS	No
Humpback Whale	Megaptera novaeangliae	Endangered	NMFS	No

***Threatened:** Species are likely to become endangered within the foreseeable future.
Endangered: A species that is in danger of extinction throughout all or a significant portion of its range.

The USFWS is no longer providing site-specific species lists due to current workload and budget constraints. Therefore, the species list provided for this project is a county-wide species list that includes species that would not normally be included on a site-specific list due to their limited range or specific habitat requirements. For this project, these species include Canada lynx, gray wolf, grizzly bear, northern spotted owl, marsh sandwort, and golden paintbrush. The Canada lynx, gray wolf, and grizzly bear are wide-ranging species that are found in critically small numbers in Washington; most reliable observations are from the North Cascades (Almack and Fitkin, 1998; WDFW, 1999). They generally require remote, dense, and mature forests free from human activity. The northern spotted owl nests and roosts in mature/old growth coniferous forests with high canopy closure, a multi-layered, multi-species canopy dominated by large (>30 inches diameter at breast height) trees, tree deformities such as cavities and broken tops, large snags, woody debris, and space for flying below the canopy (USFWS, 1990). No forested habitats that provide trees of sufficient size or structure occur within the Action Area

In summary, Canada lynx, gray wolf, grizzly bear, and northern spotted owl, are not likely to occur on the site due to their limited range and lack of suitable habitat for these species. Therefore, these species or their designated critical habitats (where applicable) would not be affected by the project and these species are not addressed further in this BA.

4.2 Fish Species

This section outlines the distribution, listing and stock status, and critical habitat designations for listed fish species within the project Action Area.

4.2.1 Bull Trout

The Coastal-Puget Sound bull trout distinct population segment (DPS) is composed of 34 subpopulations (USFWS 1998b; USFWS 1999). In 1998, USFWS completed a status review of bull trout, identifying five DPSs in the continental U.S. (USFWS 1998a). The Coastal-Puget Sound DPS Bull Trout was listed as threatened under the ESA on November 1, 1999 (USFWS 1999).

4.2.1.1 Life History

The life history of the Coastal-Puget Sound DPS Bull Trout is described in the *Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for Bull Trout in the Coterminous U.S.; Final Rule* (USFWS 1999) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.1.2 Occurrence of Species in the Action Area

Little information is available or known about the anadromous form of bull trout or their movements in estuarine waters of Puget Sound (King County DNR and R2 Resource Consultants, 2000). There has some been some limited data collected and anecdotal information available from larger stocks, such as those in the larger Snohomish and Skagit River Basins, which indicate that bull trout have annual migrations to marine areas beginning in late winter and peaking in spring to mid-summer (Pentec, 2000). It is believed that these larger subadult and adult bull trout migrate to marine areas occupying shallow nearshore habitats. It is though that bull trout movements in the nearshore are closely correlated with forage fish spawning beaches. Most anadromous bull trout move back to fresh water by late summer.

Separate bull trout stocks have been identified in the Lower Nooksack River, Canyon Creek, and the upper middle Fork Nooksack River. All bull trout stocks in the Nooksack basin are native and maintained by wild production (USFWS, 2004). The status of all of the stocks is unknown. Therefore, it is anticipated that anadromous life history forms of adult and subadult bull trout may be present within the Action Area foraging and migrating between spawning and overwintering areas. No bull trout are known or expected to occur in the on-site stream that discharges into Post Point Lagoon (WDFW 2011a and 2011b). The on-site stream lacks the high elevation and cold temperatures necessary for spawning and early rearing.

4.2.1.3 Critical Habitat

Critical habitat for the Coastal-Puget Sound bull trout distinct population segment (DPS) was designated in September 2005 (70 Federal Register 185), and was revised on October 18, 2010 (75 Federal Register 200).USFWS has designated bull trout critical habitat along the eastern shore of Puget Sound extending from the border between the United States and Canada south to

the mouth of the Nisqually River. No critical habitat has been designated within the on-site drainage ditch; however, the extent of critical habitat for marine nearshore areas of Puget Sound is based on the extent of the photic zone. Designated critical habitat within the project Action Area includes all marine waters extending offshore to the depth of 33 feet relative to the mean low low-water line (MLLW).

Primary Constituent Elements (PCEs) for bull trout in marine nearshore waters, as defined by USFWS (70 Federal Register 185) are:

- Water temperatures that support bull trout use;
- Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;
- An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish; and
- Permanent water of sufficient quality and quantity such that normal reproduction, growth, and survival are not inhibited.

4.2.2 Puget Sound ESU Chinook Salmon

NMFS issued a ruling in May 1999 listing the Puget Sound ESU as threatened (NMFS 1999a). Primary factors contributing to declines in Chinook salmon in the Puget Sound ESU include habitat blockages, hatchery introgression, urbanization, logging, hydropower development, harvests, and flood control (NMFS 1998).

4.2.2.1 Life History

The life history of Puget Sound Chinook salmon is described in detail in *NOAA Technical Memorandum NMFS-NWFSC-35 Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California* (Myers et al. 1998) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.2.2 Occurrence of Species in the Action Area

There are three distinct Chinook salmon stocks that occur within the project area including: North Fork Nooksack, South Fork Nooksack, and Samish and mainstem Nooksack stocks (WDFW and WWTIT 1994). According to Smith (2002), a fourth late spawning Chinook stock in Hutchinson Creek has also been identified that was not mentioned in Salmon and Steelhead Stock Inventory (SASSI) report (WDFW and WWTIT 1994). Escapement levels are only available for the North Fork Nooksack stock in SASSI, and are believed to number under 300 per year based on carcass counts, which averaged 43 fish from 1985 to 1991. Shared Strategy (2007) lists the 2003 adult returns in the North/Middle Fork Nooksack stock at 210 fish, and the South Fork stock at 204 fish. Long-term fish population goals (potentially 100 years) for the two stocks are 10,552 and 7,608 fish, respectively (Shared Strategy 2007).

It is likely that juvenile Chinook may be present and rearing within the marine nearshore of Bellingham Bay and the Post Point Lagoon. Adults may also be present along the marine nearshore of Bellingham Bay migrating to spawning areas.

4.2.2.3 Critical Habitat

On April 30, 2002, the U.S. District Court for the District of Columbia approved a NMFS consent decree withdrawing a February 2000 critical habitat designation for this and 18 other ESUs. On December 14, 2004, NMFS proposed critical habitat for 13 Pacific Salmon ESUs, which includes the Puget Sound Chinook ESU (69 Federal Register 239).

On September 2, 2005, NMFS designated critical habitat for 12 salmon and steelhead ESUs in California and the Pacific Northwest (70 Federal Register 170). Critical habitat for Chinook includes all marine waters of Bellingham Bay extending from the line of extreme high tide out to a depth of 30 meters (98 feet) and the upstream extent of all tidally influenced estuarine areas, which includes Post Point Lagoon. No freshwater PCEs are located within the project Action Area.

Specific PCEs, applicable to the proposed action, for Chinook salmon in marine and estuarine areas, as defined by NMFS (70 Federal Register 170) include:

- Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. .
- Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

The only PCEs that occur within the Action Area include those associated with the nearshore marine area and estuarine areas. Due to the complex nature of marine ecosystems and lack of quantifiable information, it is difficult to determine whether or not the Action Area contains offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation of salmonids. Furthermore, it is also difficult to determine whether or not human activities have affected the offshore marine PCE. Therefore, an analysis of this PCE is not included. It is likely that this PCE has been degraded, but the extent of degradation is not measurable at this time.

4.2.3 Puget Sound DPS Steelhead

On May 7, 2007, NMFS announced the listing of the Puget Sound DPS of steelhead as a threatened species under the Endangered Species Act (72 Federal Register 91). Possible factors influencing the depletion of Puget Sound steelhead populations include habitat destruction and fragmentation, inadequate regulatory mechanisms of hatchery practices and land use activities, and potential genetic introgression between hatchery - and natural-origin steelhead.

4.2.3.1 Life History

The life history of Puget Sound Steelhead (*O. mykiss*) is described in the *Proposed Endangered Status for Five ESUs of Steelhead and Proposed Threatened Status for Five ESUs of Steelhead in Washington, Oregon, Idaho, and California* (61 Federal Register 155) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.3.2 Occurrence of Species in the Action Area

One summer run and five winter-run stocks are found in or near the Nooksack basin (WDFW and WWTIT 1994). The summer-run stock is found only in the South Fork Nooksack River. The stock is sustained by reproduction of wild fish; however the run size is generally small and no escapement goals have been established. Winter-run stocks within the Nooksack basin include five distinct stocks that are maintained by wild fish reproduction. These include Dakota Creek, the mainstem and North Fork Nooksack River, South Fork Nooksack River, Middle Fork Nooksack River, and the Samish River stocks. The Samish River stock is the only stock with an established escapement goal of 700 fish. The remaining four stocks contain insufficient population data to establish escapement goals.

Wild juveniles steelhead typically spend two full years in freshwater before outmigrating during the spring. Because of the larger size at outmigration, steelhead do not typically spend a large amount of time in the nearshore, rather they tend to quickly outmigrate to open water.

Therefore, the on-site unnamed stream, marine nearshore of Bellingham Bay, and the Post Point Lagoon are unlikely to support juvenile steelhead. Steelhead, if present, would most likely occur in offshore waters, which would include waters in and around the Post Point WWTP outfalls.

4.2.3.3 Critical Habitat

Critical habitat for Puget Sound DPS steelhead has not been designated or proposed at this time.

4.2.4 Yelloweye Rockfish

The yelloweye rockfish DPS is listed as threatened under the Endangered Species Act. The primary factors influencing the decline of the Puget Sound/Georgia Basin DPS yelloweye rockfish are overutilization by commercial and recreational fisheries, habitat degradation, degraded water quality including low dissolved oxygen and elevated levels of contaminants, and inadequate regulatory mechanism (75 Federal Register 81). Presently, the species distribution extends from northern Baja California to the Aleutian Islands in Alaska, but is most common from central California north to the Gulf of Alaska (Clemens and Wildby, 1961; Eschmeyer et al., 1983; Hart, 1973,; Love, 1996). The Puget Sound/Georgia Basin DPS distribution includes Puget Sound and the Georgia Basin within the state of Washington and the province of British Columbia, Canada (75 Federal Register 81).

4.2.4.1 Life History

The life history of yelloweye rockfish is described in the *Proposed Endangered Threatened and Not Warranted Status for Distinct Population Segments of Rockfish in Puget Sound* (74 Federal

Register 77) and the *Preliminary Scientific Conclusions of the Review of the Status of 5 Species of Rockfish: Bocaccio (Sebastes paucispinis), Canary Rockfish (Sebastes pinniger), Yelloweye Rockfish (Sebastes ruberrimus), Greenstriped Rockfish (Sebastes elongatus) and Redstripe Rockfish (Sebastes proriger) in Puget Sound, Washington* (NMFS, 2009) and are included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.4.2 Occurrence of Species in the Action Area

There is little information on the frequency of occurrence or densities of yelloweye rockfish within Puget Sound/Strait of Georgia waters. Yelloweye rockfish are a sedentary, deepwater species that are associated with high relief rocky habitats and often near steep slopes (Miller and Borton, 1980). Yelloweye rockfish are found less frequently in South Puget Sound as opposed to North Puget Sound waters. Yelloweye rockfish may be present within the marine water of Bellingham Bay and less likely to occur in the shallow waters of Post Point Lagoon within the Action Area.

4.2.4.3 Critical Habitat

NMFS intends to propose protective regulations and designate critical habitat for yelloweye rockfish under ESA Section 7(d); however, at this time NMFS has not designated or proposed critical habitat for the yelloweye rockfish.

4.2.5 Canary Rockfish

The canary rockfish DPS is listed as threatened under the Endangered Species Act. The primary factors influencing the decline of the Puget Sound/Georgia Basin DPS canary rockfish are overutilization by commercial and recreational fisheries, habitat degradation, degraded water quality including low dissolved oxygen and elevated levels of contaminants, and inadequate regulatory mechanism (75 Federal Register 81). Presently, the species distribution extends between Punta Colnett, Baja California and the western Gulf of Alaska (Boehlert, 1980; Mecklenberg et. al, 2002). The Puget Sound/Georgia Basin DPS distribution includes Puget Sound and the Georgia Basin within the state of Washington and the province of British Columbia, Canada (75 Federal Register 81).

4.2.5.1 Life History

The life history of canary rockfish is described in the *Proposed Endangered Threatened and Not Warranted Status for Distinct Population Segments of Rockfish in Puget Sound* (74 Federal Register 77) and the *Preliminary Scientific Conclusions of the Review of the Status of 5 Species of Rockfish: Bocaccio (Sebastes paucispinis), Canary Rockfish (Sebastes pinniger), Yelloweye Rockfish (Sebastes ruberrimus), Greenstriped Rockfish (Sebastes elongatus) and Redstripe Rockfish (Sebastes proriger) in Puget Sound, Washington* (NMFS, 2009) and are included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.5.2 Occurrence of Species in the Action Area

There is little information on the frequency of occurrence or densities of canary rockfish within Puget Sound waters. Canary rockfish are a deepwater species that are associated with a variety of rocky and course substrate habitats throughout the Puget Sound basin (Miller and Borton, 1980). Canary rockfish may be present within Bellingham Bay and the Action Area. However, their presence within the estuarine habitat of Post Point Lagoon is highly unlikely.

4.2.5.3 Critical Habitat

NMFS intends to propose protective regulations for canary rockfish under ESA Section 7(d) and critical habitat for the species as well; however, at this time NMFS has not designated or proposed critical habitat for the canary rockfish.

4.2.6 Boccacio Rockfish

The bocaccio DPS is listed as endangered under the Endangered Species Act. The primary factors influencing the decline of the Puget Sound/Georgia Basin DPS bocaccio are overutilization by commercial and recreational fisheries, habitat degradation, degraded water quality including low dissolved oxygen and elevated levels of contaminants, and inadequate regulatory mechanism (75 Federal Register 81). Presently, the species distribution extends from Punta Blanca, Baja California, to the Gulf of Alaska off Krozoff and Kodiak Islands, Alaska (Chen, 1971; Miller and Lea, 1972). Within this range, they are most common from Oregon to northern Baja, California (Love et. al, 2002). The Puget Sound/Georgia Basin DPS distribution includes Puget Sound and the Georgia Basin within the State of Washington and the Province of British Columbia, Canada (75 Federal Register 81).

4.2.6.1 Life History

The life history of boccacio rockfish is described in the *Proposed Endangered Threatened and Not Warranted Status for Distinct Population Segments of Rockfish in Puget Sound* (74 Federal Register 77) and the *Preliminary Scientific Conclusions of the Review of the Status of 5 Species of Rockfish: Bocaccio (Sebastes paucispinis), Canary Rockfish (Sebastes pinniger), Yelloweye Rockfish (Sebastes ruberrimus), Greenstriped Rockfish (Sebastes elongatus) and Redstripe Rockfish (Sebastes proriger) in Puget Sound, Washington* (NMFS, 2009) and are included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.6.2 Occurrence of Species in the Action Area

There is little information on the frequency of occurrence or densities of bocaccio rockfish within Puget Sound/Strait of Georgia waters. Bocaccio rockfish are a deepwater species that are most commonly associated with steep slopes of sand or rocky substrates (Miller and Borton, 1980). Bocaccio rockfish may be present within Bellingham Bay and the Action Area. However, their presence within the estuarine habitat of Post Point Lagoon is highly unlikely.

4.2.6.3 Critical Habitat

NMFS intends to propose protective regulations for boccacio rockfish under ESA Section 7(d) and critical habitat for the species as well; however, at this time NMFS has not designated or proposed critical habitat for the boccacio rockfish.

4.2.7 Southern DPS Green Sturgeon

On April 7, 2006, NMFS announced the listing of the Southern DPS green sturgeon (*Acipenser medirostris*) as a threatened species under the Endangered Species Act (71 Federal Register 67). The primary factors responsible for the decline of the Southern DPS green sturgeon are the destruction, modification or curtailment of habitat and inadequacy of regulatory mechanisms (70 Federal Register 65); Adams et al., 2002; Adams et al., 2005).

4.2.7.1 Life History

The life history of the Southern DPS green sturgeon is described in the *Proposed Threatened Status for the Southern Distinct Population Segment Green Sturgeon* (70 Federal Register 65) and in the 2002 and 2005 Status Review for the North American Green Sturgeon, *Acipenser medirostris* (Adams et al., 2002; Adams et al., 2005) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.2.7.2 Occurrence of Species in the Action Area

Little is known about the distribution and abundance of green sturgeon in Puget Sound/Strait of Georgia, although they have been documented as occurring in the region (74 Federal Register 195). Most of the information that we do have comes from incidental by-catch in commercial fishing operations or the occasional documentation of individuals captured in gill nets (Randy McIntosh, NMFS, personal communication, 2010). While the occurrence of green sturgeon may be rare within the project Action Area, they are presumed to be present in Bellingham Bay. The occurrence of green sturgeon within the estuarine habitat of Post Point Lagoon is considered highly unlikely.

4.2.7.3 Critical Habitat

NMFS designated critical habitat for the Southern DPS green sturgeon on October 9, 2009 (74 Federal Register 195). Included in this designation are all marine waters within 60 fathoms (360 feet) from Monterey Bay California north to Cape Flattery, Washington, including the Strait of Juan de Fuca to its international boundary with Canada. Puget Sound and the Strait of Georgia were excluded from this final designation because the economic benefits of exclusion outweigh the benefits of inclusion and will not result in the extinction of the species (74 Federal Register 195).

Therefore, there is no designated critical habitat for the Southern DPS green sturgeon in the project Action Area.

4.3 Marine Mammal Species

4.3.1 Humpback Whale

The humpback whale was listed as endangered by NMFS on June 2, 1970. It was one of the first species listed under the Endangered Species Act. The North Pacific population was considerably reduced as a result of intensive commercial exploitation during the 20th century, and recovery has been very slow.

4.3.1.1 Life History

The life history of the humpback whale (*Megaptera novaeangeliae*) is described in *The Final Recovery of the Humpback Whale* (NMFS, 1991), and is included herein by reference. Life history information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.3.1.2 Occurrence of Species in the Action Area

Humpback whales are fairly common off the coast of Washington but not inside waters such as Puget Sound and the Strait of Juan de Fuca. The sightings of humpback whales in the Strait of Georgia and Puget Sound remained very infrequent through the late 1990's. There were two reported sightings of humpback whales in Puget Sound in May of 1976 and June of 1978 (Everitt et al., 1980); it was not until much later that a third sighting was documented in June of 1986 (Osborne et al., 1988). The movements of two individually identified juvenile humpback whales were documented in the waters of southern Puget Sound for several weeks in June and July of 1988 (Calambokidis and Steiger, 1990).

Due to their scarcity and seemingly low numbers within Puget Sound, Strait of Juan de Fuca, and Strait of Georgia, there have been few surveys that could be used to develop a data set and document their movements into and out of the region. In 2001 there were three reports of humpback whales; the number had risen to 30 reports by 2004. This increase in sightings is in part due to growth of the Orca Network and the accompanying increase in local awareness. Most reports of humpback whales were made by naturalists aboard whale watching vessels and can be considered reliable in terms of species identification. Inexperienced observers, particularly those that are shore-based, are most likely to misidentify a humpback as a gray whale, which are common in some areas during the late spring. In this case the number of humpbacks reported might actually be an underestimate.

While humpback whale abundance is rare within the inland waters of Puget Sound and the Straits of Georgia and Juan de Fuca, it is anticipated that individual whales could occur within the Action Area foraging or migrating to/from breeding and feeding areas, although in extremely low numbers.

4.3.1.3 Critical Habitat

No critical habitat has been designated for the humpback whale.

4.3.2 Southern Resident Killer Whale

NOAA Fisheries listed the Southern Resident Population killer whale, a portion of the killer whale population that may be found in Washington waters, as endangered in 2005 (70 Federal Register 222). NOAA Fisheries listed the Southern Resident Population of killer whale as depleted under the Marine Mammal Protection Act in May 2003 (Marine Mammal Commission, 2004). Possible factors influencing the depletion of Southern Resident killer whale populations include high levels of contamination, reduced availability of prey, and increased whale-watching activities near the San Juan Islands (NOAA Fisheries 2000).

4.3.2.1 Life History

The life history and habitat requirements of killer whales are described in the *Washington State Status Report for the Killer Whale* (Wiles 2004) and are included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.3.2.2 Occurrence of Species in the Action Area

The Southern Resident Population of killer whales is one of four populations known to occur in Washington: the Northern Resident, the Southern Resident, the transient, and the offshore (Wiles 2004). Three of these populations, the Southern Resident Population, Northern Resident Population and the transient population, periodically use the region around the San Juan Islands. These three groups of whales do not interbreed and do not normally interact. The Southern Resident Population (Eastern North Pacific Southern Resident Population) consists of three pods totaling between 80 and 90 animals (NMFS 2008a). They range widely between California and the Queen Charlotte Islands, but spend most of their time, especially from spring to fall, in northern Puget Sound, Georgia Strait, and the Strait of Juan de Fuca (Carretta et al. 2004). While in inland waters during the warmer summer months, all pods concentrate their activities in Haro Strait, Boundary Passage, the southern Gulf Islands, the eastern end of the Strait of Juan de Fuca, and several localities in the southern Georgia Strait (Heimlich-Boran 1988; Fellemen et al. 1991; Olson 1998; Ford et al. 2000). Less time is spent elsewhere including the areas surrounding the San Juan Islands, Admiralty Inlet west of Whidbey Island, and Puget Sound, although J pod is the only group known to regularly venture inside the San Juan Islands (Balcomb unpublished data). J pod is comprised of 22 individuals.

Southern Resident Population, Northern Resident Population, and transient killer whales occasionally move into rarely visited areas and inlets, probably in response to locally abundant food sources. Transient sightings in the Georgia Basin are centered on southeastern Vancouver Island, the San Juan Islands, and the southern edge of the Gulf Islands, with less activity occurring in Puget Sound and elsewhere in the Strait of Juan de Fuca and Georgia Strait (Olson 1998). Northern residents are distributed from the Olympic Peninsula to southeastern Alaska (Wiles 2004). Southern Resident killer whale use of Puget Sound in the vicinity of the Post Point WWTP outfalls is considered possible due to the fact that the area lies generally within the range of distribution; however, it would be considered rare or uncommon for Southern resident killer whales to occupy habitat in the vicinity on a regular basis. From January 2010 to March 2011, there were no sightings of killer whale within Bellingham Bay or the project area. The closest

sightings were reported between Lummi Island and the San Juan Islands (ORCA Network, 2011).

4.3.2.3 Critical Habitat

Critical habitat was designated for the Southern Resident killer whale in November 2006 (71 Federal Register 229). Critical habitat includes three specific areas of Puget Sound, Washington within Clallam, Jefferson, King, Kitsap, Island, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom counties. These three specific areas include the summer core area, the Puget Sound area, and the Strait of Juan de Fuca area. The proposed action is located within the Summer Core area adjacent to Whatcom County. Critical habitat within each of these areas includes all marine waters relative to a contiguous shoreline delimited by the line at a depth of 20 feet (6.1 meters) relative to extreme high water.

Those physical and biological features that are essential to the conservation of the species or that may require special management considerations must be considered when designating critical habitat. The PCEs for the Southern Resident killer whale include the following:

1. Water quality to support growth and development;
2. Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and
3. Passage conditions to allow for migration, resting, and foraging conditions.

All of the PCEs are found in the project area. Southern Resident killer whales have been sighted in all months of the year in the Summer Core area; however, the occurrence is more consistent and concentrated in the summer months of June through August (71 Federal Register 229). Occurrence of Southern Resident killer whale coincides with concentrations of salmon. In particular, Southern Residents concentrate around the Fraser River in British Columbia, which has the largest salmon runs in the Georgia Basin/Puget Sound Region (Northcote and Atagi, 1997). The summer core area also provides adequate passage conditions to allow for migration, feeding, and foraging conditions. The water quality PCE has been degraded by industrialization and is often associated with areas of higher human population.

4.3.3 Steller Sea Lion

The Steller sea lion (*Eumetopias jubatus*) was listed as a threatened species under the ESA on April 5, 1990 (55 Federal Register 233). Declines in Steller sea lion populations are due to substantial declines in the western portion of the range. Declines are attributed to direct and indirect interactions with fisheries, contaminants/pollutants, habitat degradation, illegal hunting/shooting, and offshore oil and gas exploration.

4.3.3.1 Life History

Life history information of the Steller sea lion is described in *Endangered and Threatened Species; Revised Recovery Plan for Distinct Population Segments of Steller Sea Lion* (NMFS, 2008b) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.3.3.2 Occurrence of Species in the Action Area

Sightings of Steller sea lions in Puget Sound number 50 or fewer per year (Jeffries, personal communication, 2005) and are most abundant from late fall to early spring when peak counts for the whole state have reached 1,000 animals (Jeffries et al. 2000). Steller sea lions are often observed with California sea lions and use their haulouts. No Steller sea lion haul out sites have been identified within several miles of the proposed action (WDFW 2011a). A haul out site for harbor seals is located north of the project area within Bellingham Bay (WDFW, 2011a).

4.3.3.3 Critical Habitat

There is no designated critical habitat designated for Steller sea lions in Puget Sound. The nearest designated critical habitat is in Oregon and California, at specified haulout sites.

4.4 Avian Species Evaluation

4.4.1 Marbled Murrelet

The marbled murrelet was listed by the USFWS in 1992 as a federally threatened species in Washington, Oregon, and California. Marbled murrelet critical habitat was designated in May 1996 in 50 CFR Part 17.11.

4.4.1.1 Life History

The life history of the marbled murrelet is described in the *Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Marbled Murrelet; Final Rule* (61 Federal Register 102) and is included herein by reference. This information has been summarized to assist in the discussion of effects related to the proposed action, and is included in Appendix F.

4.4.1.2 Occurrence of Species in the Action Area

Most of the project area is developed or developing. There are interspersed stands of coniferous and deciduous forest; however, the inadequate species composition, size, and age of the stands, in addition to the urbanized nature of the area, likely limits the use of the Action Area by marbled murrelet for nesting habitat. The project Action Area includes the nearshore and offshore areas of Bellingham Bay, which contain habitat for forage fish species that comprise a portion of the marbled murrelet diet. While, no marbled murrelet use of the project Action Area has been documented (WDFW 2011a), marbled murrelets are anticipated to use the marine areas of the project Action Area for foraging and may fly over the construction area while migrating between foraging and nesting areas.

4.4.1.3 Critical Habitat

The critical habitat designation includes 11 units in Washington State, including 1.2 million acres of federal land, 421,500 acres of state forest land, and 2,500 acres of private land. Not all suitable habitats are included in this designation, as only areas designated as most essential to murrelet survival in terms of quality, distribution, and ownership are included. The USFWS is

currently proposing to revise the 1996 critical habitat designation for marbled murrelet (73 Federal Register 148). This revision to critical habitat would not affect current critical habitat designations in Washington State.

The closest designated critical habitat is located approximately 20 miles east of the WWTP site (USFWS, 2011).

5.0 ENVIRONMENTAL BASELINE

5.1 Freshwater Environment

5.1.1 Summary of Baseline Conditions within Unnamed Stream

The unnamed stream flows through a highly urbanized setting throughout much of its length and is subject to many of the problems associated with an urbanized setting. Roadways and development have eliminated much of the natural riparian corridor reducing overall habitat complexity and also degrade water quality conditions throughout the basin by reducing shade and promoting erosion of upland soils into the streambed. Impervious surface areas within the basin have contributed to altered stream hydrology by reducing base flows and increasing the frequency and duration of peak flows. Loss of riparian wetlands and confinement of the channel has resulted in a loss of floodplain connectivity, off-channel rearing areas, refuge from high flow events, and limited the channel migration zone and natural supply of gravel to the streambed.

Properly functioning conditions (PFCs) are the sustained presence of natural habitat-forming processes necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1996). Indicators of PFCs vary between different landscapes based on unique physiographic and geologic features. Since aquatic habitats are inherently dynamic, PFCs are defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival (NMFS 1996). NMFS (1996) identify that PFCs commonly include the following elements: water quality, habitat accessibility, the suitability of various habitat elements, channel condition and dynamics, and overall watershed conditions. The unnamed stream is considered “not properly functioning” for all elements of PFC. The proposed action will not alter the unnamed stream or contribute to further degradation of baseline conditions.

5.2 Marine and Estuarine Environment

NOAA Fisheries have prepared guidance on the evaluation of PFC for salmonid fish in montane stream systems. A pathway-indicator matrix has not been published by the Services for marine or estuarine environments; however, marine and estuarine habitat requirements for salmonid stocks have been described by many authors (Fresh et al. 1981; Healy 1982; Levy and Northcote 1982; Shepherd 1981; Weitkamp et al. 2000). Table 5-1 summarizes indicators for PFC elements that have been adapted from the available literature and provide the basis for the evaluation of PFC for this assessment.

Table 5-1. Summary of Bellingham Bay and Post Point Lagoon PFC Indicators within the Action Area

Indicators	Summary	Pertinent Studies
Water Quality		
Turbidity	Concentrations between 300 mg/l and 4,000 mg/l are at risk. Concentrations above 4,000 mg/l are not properly functioning.	Nightingale and Simenstad (2001a); Nightingale and Simenstad (2001b); Healy (1991); Beauchamp et al. (1983); Sandercock (1991)
Dissolved Oxygen	Concentrations below 4.0 mg/l are not properly functioning. Dissolved oxygen concentrations between 4.0 mg/l and 7.0 mg/l constitute at risk habitat.	Ecology (2001); Reiser and Bjorn (1979); Beauchamp et al. (1983)
Water Contamination	Section 303(d) of the Clean Water Act (CWA) listed water bodies are defined as not properly functioning for the purpose of this assessment.	Ecology (2008)
Sediment Contamination	Sediment contaminant concentrations established by Ecology are determined at risk. Contaminant levels at or above toxic levels are not properly functioning.	Ecology (1990); Chapter 173-204 WAC
Physical Habitat		
Substrate/ Armoring	Shorelines with minor armoring by riprap and low-density shoreline development are considered at risk. Shoreline areas containing extensive armoring are not properly functioning.	Nightingale and Simenstad (2001a); Nightingale and Simenstad (2001b); Fresh et al. (1981); KCDNR (2001); Thom et al. (1994); Prinslow et al. (1979); Williams and Thom (2001)
Depth/Slope	Habitats that have been altered by wharves, bulkheads, and nearshore dredging to have steep side slopes, drop-offs, and nearshore deep-water habitats are considered not properly functioning. Areas that have naturally occurring steep slopes with narrow nearshore habitat areas are defined as at risk.	KCDNR (2001)
Tideland Condition	Habitat that has experienced loss of tidal areas through filling is considered not properly functioning. Areas where tidelands are fragmented by development are at risk.	Beechie and Wasserman (1994); Williams and Thom (2001); Shepard (1981)
Marsh Prevalence and Complexity	Habitat containing historical marshland that has been lost by filling and/or degradation is considered not properly functioning. Areas where marshes are fragmented by development are at risk.	Shepherd (1981); Simenstad et al. (1982); Healy (1991)
Refugia	At risk habitat consists of the presence of refugia insufficient in size, number and connectivity. A not properly functioning habitat condition exists when adequate habitat refugia do not exist.	NOAA Fisheries (1996)

Indicators	Summary	Pertinent Studies
Physical Barriers	An at-risk habitat is considered to contain a minimal amount and minimum sized overwater structures. A not properly functioning habitat is defined as habitat that contains a large number of structures along a shoreline that are likely a significant barrier to juvenile salmon.	Nightingale and Simenstad (2001b); Weitkamp et al. (2000)
Current Patterns	Areas that contain minor alterations are determined to be at risk. Areas where shoreline modifications and/or dredging are prevalent are determined to be not properly functioning.	Nightingale and Simenstad (2001b)
Physical Habitat		
Salt/Fresh Water Mixing Patterns and Locations	An altered condition that changes the natural surface hydrology is an at-risk habitat. A not properly functioning habitat contains significant impervious surface or a high level of modification of estuarine habitats.	
Biological Habitat		
Benthic Prey Availability	Sediments that have an impaired ability to support benthic invertebrates are not properly functioning. Sediments containing a benthic community that was altered from its natural state are considered at risk.	Healy (1991); Bax et al. (1978) Kjelson et al. (1982); Fresh et al. (1981)
Forage Fish Community	An at risk habitat has limited forage fish resources or habitat. Not properly functioning habitats have depleted forage fish resources or habitat.	Myers et al. (1998); USFWS (1998)
Aquatic Vegetation	If an area historically contained vegetation but the vegetation is degraded by disturbance then the habitat is considered at risk. Habitat without previously occurring vegetation as a result of shoreline development is considered not properly functioning.	Shafer (2002); Nightingale and Simenstad (2001a); Nightingale and Simenstad (2001b); Simenstad (2000); Goforth et al. (1979); Garono et al. (2002); Peeling and Goforth (1975)
Exotic Species	Habitat containing exotics that may compete with, or prey on, salmonids, are considered not properly functioning. If exotic species are present, but do not present any adverse effects, an “at risk” condition is assumed.	

Existing environmental conditions in Bellingham Bay and Post Point Lagoon are evaluated according to the criteria established in the matrix of pathways and indicators outlined above. A rating of properly functioning, at risk, or not properly functioning has been applied to each estuarine habitat indicator for the proposed Action Area. The ratings are presented in Table 5-2 and summarized in Appendix G by principal indicator (Water Quality, Physical Habitat, and Biological Habitat).

Table 5-2. Matrix of Pathways and Indicators in Bellingham Bay and Post Point Lagoon

Pathways and Indicators	Environmental Baseline			Long Term Effects of the Action(s)		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality						
Turbidity		X			X	
Dissolved Oxygen		X			X	
Water Contamination		X			X	
Sediment Contamination		X			X	
Physical Habitat						
Substrate/Armoring			X		X	
Depth/Slope		X			X	
Tideland Condition			X		X	
Marsh Prevalence and Complexity			X	X		
Refugia			X		X	
Physical Barriers	X				X	
Current Patterns		X			X	
Salt/Fresh Water Mixing Patterns and Locations		X			X	
Biological Habitat						
Benthic Prey Availability		X			X	
Forage Fish Community		X	X		X	
Aquatic Vegetation		X	X		X	
Exotic Species	X				X	

6.0 EFFECTS OF THE ACTION

The ESA requires that where a discretionary federal action may adversely affect listed species or critical habitat, federal agencies must analyze the direct and indirect effects that actions will add to the environmental baseline, together with the effects of future state or private actions reasonably certain to occur in the Action Area (50 CFR 402.02, 402.03, 402.14).

Under the ESA "direct effects" result from an agency action and include the action's immediate effects on a species or its habitat (50 CFR 402.02; USFWS and NMFS, 1998, p. 4-25). The ESA's regulations define "indirect effects" as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (40 CFR 1508.8; 50 CFR 402.02). A federal action's indirect effects may include the stimulation or inducement of growth or development activities carried out by other persons or entities (*National Wildlife Federation v. Coleman*, 529 F.2d 359; 5th Cir. Miss. 1976).

The ESA's implementing regulations also require a federal agency to analyze certain environmental impacts caused by the actions of others, not by the agency's proposed action. ESA regulations define these "cumulative effects" as including only the 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 (40 CFR 402.02). The ESA's regulations establish a separate category—the "environmental baseline"—for the past or 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 Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The impacts of future private, local, or state development are properly analyzed as cumulative effects if there is no causal relationship between the development and the federal action under consideration (see 40 CFR 1508.7; 50 CFR 402.02). If a causal relationship exists between a federal action and future private, local, or state development, the development's environmental impacts should be discussed as an indirect effect of the underlying federal action (see 40 CFR 1508.8; 50 CFR 402.02; *National Wildlife Federation v. Coleman*, above; and USFWS and NMFS, 1998, p. 4-28). Where future private, local, or state development is subject to federal discretion, it is not analyzed as part of an ongoing Section 7 consultation, because it will be addressed in a separate future Section 7 consultation (see 50 CFR 402.02 and USFWS and NMFS [1998], pp. 4-25, 4-28, 4-30).

6.1 Direct Effects

6.1.1 Construction

Activities necessary for construction of the WWTP upgrades and expansion will result in direct effects to the Action Area. In general, direct effects as a result of the construction of the WWTP upgrades will be minimal. WWTP expansion would occur primarily within the existing WWTP footprint.

The most probable mechanisms to affect listed species during construction are anticipated to be the potential for turbidity and sedimentation, and a small increase in local noise and disturbance as a result of the need to use heavy equipment to construct the Phase 1 WWTP improvements.

6.1.1.1 Turbidity and Sedimentation

The proposed action will include the temporary disturbance of soils during grading and excavating activities and potential construction dewatering activity. Grading and excavating could result in erosion from disturbed upland soils and increase the sediment load in runoff potentially entering Bellingham Bay, Post Point Lagoon, adjacent wetlands, and the unnamed stream adjacent to the site. Site-specific erosion control measures will not be specified until final design is complete; however, construction of the proposed action will be required to develop a Temporary Erosion and Sediment Control (TESC) Plan and implement erosion and sediment control BMPs that meet City and Ecology standards for construction. Because of the implementation of Best Management Practices and the overall distance of soil disturbing activities from Bellingham Bay (200 feet), sedimentation and turbidity of surface waters as a result of construction activities is expected to be extremely unlikely.

The highest potential for increased sedimentation and turbidity will occur as a result of excavation and grading of the new wetland mitigation area, which will be constructed adjacent to Post Point Lagoon. The potential for increased sedimentation and turbidity will be minimized by limiting the clearing, grading, and excavation to only those areas necessary to complete the

action, conducting work during the drier summer months to minimize the potential for sediment laden runoff to reach surface waters, using TESC BMPs such as silt fencing, straw bales, and or turbidity curtains, and limiting work adjacent to the lagoon to periods when the tide is at its lowest point. If these best management practices are applied, the potential for direct effect to listed fish species and their associated critical habitat is considered insignificant.

6.1.1.2 Construction Noise and Disturbance

The project would require the use of heavy equipment including excavators, skid steers, front-end loaders, cranes, auger drill rigs, backhoes, dozers, forklifts, vibratory hammer, concrete mixers, concrete pump trucks, sand blasting equipment, man lifts, air compressors, pneumatic chipping tools, welding machines, pressure washing equipment, hand tools, high cycle generators, and dump trucks. It is likely that sheet piles will be driven and removed with a vibratory hammer during excavation shoring activities. No impact pile driving is anticipated.

Foraging marbled murrelets are the only species being given consideration here because marbled murrelets may be present and foraging in the marine waters of Puget Sound, a distance of 180 feet from the closest construction activities. Tidal elevations would cause this distance to increase as the 180-foot distance is measured from the landward side of the shoreline. Suitable nesting habitat is not located within the project vicinity due to the urbanized nature of the project area. No in-water work is required.

To determine the combined noise level of all construction equipment operating together at the Post Point WWTP project area, the three loudest pieces of equipment were compared, using accepted methodology. A vibratory hammer has a maximum noise level (L_{max}) value of 101 A-weighted decibels (dBA) at a distance of 50 feet from the source; pneumatic chipping tools have an L_{max} value of 85 dBA at a distance of 50 feet from the source; and sand blasting equipment has an L_{max} value of 96 dBA at a distance of 50 feet from the source (WSDOT, 2010). Using the accepted methodology for decibel addition, the noise level generated from the project area will be 102 dBA at a distance of fifty feet from the source.

Since there is no available site-specific noise level data for the Post Point WWTP to characterize background noise levels, background noise levels were estimated based on population density. The City of Bellingham covers an area of approximately 25.6 square miles with a population of 77,550 as of April 1, 2010 (City of Bellingham, 2011). This equates to a population density of 3,029 people per square mile. Daytime noise levels for a population density between 3,000 and 10,000 people per square mile in the absence of traffic is 55 dBA (FTA, 2006). Therefore, 55 dBA was used to characterize background noise levels in the project Action Area.

To determine the distance construction noise will attenuate to the ambient baseline sound level, the following equation was used:

$$D = D_o * 10^{((\text{construction noise} - \text{ambient sound level in dBA})/\alpha)}$$

Where D = the distance from the noise source, D_o = the reference measurement distance (50 feet in this case), and $\alpha = 25$ for soft ground and 20 for hard ground.

For this project, the distance for construction related noise to attenuate to background noise levels would be 3,793 feet:

$D = 50 * 10^{((102-55)/25)}$

D = 3,155 feet

To determine the effects of construction noise on marbled murrelet, the construction noise level at a specific distance was calculated using the following Base 10 log equation:

L_{max} = Construction L_{max} at 50 feet – 25 * Log (D/D_o)

Where L_{max} = highest A-weighted sound level occurring during a noise event during the time that the noise is being measured at a distance of 50 feet. D = the distance from the noise source. D_o = the reference measurement distance (50 feet in this case). Since this is a soft site area (vegetated) a value of 25 is used. A value of 20 would be used if hard site conditions occurred.

Puget Sound is located approximately 200 feet west of the closest construction activity during a normal high-tide event; therefore, we want to determine the noise level generated from construction at this point, which corresponds to the point where marbled murrelets could potentially occur. Therefore D = 200 for the equation identified above. The results indicate that noise will have attenuated to 86.95 dBA by the time it reaches the shoreline of Puget Sound.

L_{max} = 102 dBA at 50 feet – 25 * Log (200/50)

L_{max} = 102 dBA at 50 feet – 25* Log (4)

L_{max} = 102 dBA at 50 feet – 15.05

L_{max} = **86.95 dBA**

Threshold distances have been identified and are defined as a known distance where noise at a given level elicits a response from a target species (marbled murrelet in this instance). This response can be visual, as in head turning or flushing from a nest, or the animal may show little reaction. Particularly for birds, little or no reaction does not mean that no effect has occurred.

Appendix 1 of the USFWS Biological Opinion (BO) for the Olympic National Forest program of activities (USDI, 2003) identifies four noise thresholds. These include: the noise-only detectability threshold, noise-only alert threshold, noise only disturbance threshold, and noise only injury threshold. These are described in more detail below. In providing this noise analysis, one must take into consideration the difference between the environmental conditions in Olympic National Park and that of the more urbanized setting in which the proposed project is located. The noise analysis presented in the USFWS Olympic National Forest BO focuses on habitats where nest sites may potentially occur. Nest sites are not likely to occur in the project area as discussed in this document. Murrelets, if they were to occur in the project area, would likely be foraging in Puget Sound. Birds in the project vicinity would likely be able to avoid the Action Area during construction activities, whereas marbled murrelets or young murrelets in nests would not necessarily be able to avoid the construction described in the cited BO.

The USFWS Olympic National Forest BO established four noise-related thresholds for assessing potential impacts to marbled murrelets. The first threshold is called a noise only "detectability" threshold, which occurs when the noise is detectable but a murrelet does not show any reaction. The detectability threshold was identified as being 4 decibels (dB) above the baseline sound level. In the case of the proposed project area, the detectability threshold would be approximately 59 dBA, since background noise is estimated at 55 dBA. The second threshold discussed in the

Olympic National Forest BO is the noise-only "alert" threshold; this threshold is reached when the murrelet shows apparent interest by turning the head or extending the neck. The alert threshold is fairly subjective, but was identified as 56 dBA for the Olympic National Forest. Background noise levels in the Action Area, at 55 dBA, are slightly below this threshold. It is likely that, due to acclimation of birds to more urbanized settings, this threshold may be higher for birds foraging in marine waters of Bellingham Bay near the more developed shorelines. The noise-only "disturbance" threshold is reached when the murrelet undertakes avoidance behavior, by flying off, hiding, diving, defending itself, moving the wings or body, or postponing a feeding. This value was established at 70 dBA. Finally, the noise-only "injury" threshold is reached when actual injury occurs, defined as an adult being flushed from the nest or the young missing a feeding. This threshold was determined to be 92 dBA. This injury threshold was related to old growth forest nesting habitat; it does not directly apply to the proposed action since the project is located outside of suitable nesting habitat and the fact that noise will be reduced to 86.95 dBA by the time it reaches Bellingham Bay and potential foraging murrelets.

As applied to the project area, noise thresholds discussed in the Olympic National Forest BO are summarized as follows:

- Detectability: 59 dBA (4 dB above baseline)
- Alert: 56 dBA for Olympic National Forest habitat (likely higher for Action Area)
- Disturbance: 70 dBA
- Injury: 92 dBA

The Washington State Department of Transportation (WSDOT) has developed a Terrestrial Noise Calculator to estimate noise levels at various distances from a noise source. This Terrestrial Noise Calculator was used to determine the distances from WWTP construction for noise to attenuate to: a) ambient noise levels of 55 dBA (3,793 feet); b) the disturbance threshold of 70 dBA (953 feet); and c) the injury/mortality threshold of 92 dBA (126 feet).

Based on this information, the project will not reach the injury/mortality threshold because the closest construction to the water is 200 feet, and the construction noise will have attenuated to below the injury/mortality threshold at 126 feet. The project may result in behavioral effects ("disturbance") within 953 feet of construction activities (753 feet offshore). Marbled murrelets that may be present and foraging within 753 feet of the shoreline may fly away from the construction area and delay foraging. However, it is anticipated that any murrelets foraging in the project area will seek out other suitable foraging areas in surrounding waters and resume foraging. It is also likely that murrelets may avoid the immediate construction area due to the increased noise and human activity. There is no break in the line of sight between construction activities and Puget Sound. The project will not result in injury or mortality of marbled murrelets foraging in the project action area; therefore the effects of construction noise on marbled murrelets are considered insignificant.

Construction related noise is anticipated to have no effect on listed fish species since no pile driving or other highly intensive noise is proposed within habitats that support listed fish species (no in-water work).

6.1.1.3 Construction Activities

Although not likely, accidents such as spills of hazardous materials (typically green cement or grout, fuel, oil, and hydraulic fluid) or other unanticipated construction accidents could occur which would degrade water quality and/or be toxic to fish, marine mammals, and birds. Direct effects to listed species or their associated critical habitat, related to spills of hazardous materials, is considered insignificant due to the fact that the majority of construction activities will occur in existing developed portions of the WWTP site, project construction will be performed in accordance with terms and conditions of state and federal permits that include protection of local water quality within the construction areas, construction equipment will be inspected daily for leaks and cleaned of debris (if working near surface waters), refueling of equipment will occur a minimum of 150 feet from surface waters, and equipment, when not in use, will be stored or staged a minimum of 150 feet from surface waters. In addition, a Spill Prevention Countermeasure and Control (SPCC) plan to address the potential release of hazardous materials will be developed and implemented as necessary for the proposed action.

The highest potential for construction related spills would occur during construction of the wetland mitigation area, which will require work immediately adjacent to the Post Point Lagoon. Equipment operating adjacent to these areas will use vegetable oil-based hydraulic fluids in addition to complying with the best management practices discussed above. The construction of the wetland mitigation area will include the excavation of two entrances to the mitigation site from Post Point Lagoon, which will allow for tidal inundation of the newly created marsh habitat. To further minimize the potential for accidental spills and subsequent degradation of surface water quality within Post Point Lagoon, the project proponent will only excavate the entrance to the mitigation site when the tide is out and excavation can occur in the dry. All other excavation related to construction of the wetland mitigation site will be conducted in the dry and prior to excavation of the entrances.

6.2 Indirect Effects

Operation of the expanded Post Point WWTP would have the potential to adversely affect protected species and their habitat through alteration or degradation of water quality conditions, resulting directly or indirectly through the discharge of potentially toxic contaminants. Stormwater discharges may also adversely affect water quality at stormwater discharge sites that would be developed and operated as a result of increased residential development or other changes in land use resulting from the expanded Post Point WWTP. These indirect effects are discussed in more detail below.

6.2.1 Effluent Discharge

The potential effects to marine species associated with wastewater discharge are generally related to nutrients, metals and chemical contamination. To evaluate the potential adverse effects of the Post Point WWTP discharge on receiving water quality, habitat conditions, and fish and wildlife resources, the existing NPDES permit was used as the technical foundation for the analysis included in this BA. The water quality impact analysis is based on the estimated changes in the concentrations and mass loading of pollutants of concern caused by the WWTP discharge into Bellingham Bay receiving waters.

6.2.1.1 Mixing Zones

The water quality standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The facility discharges to Bellingham Bay which is designated as a Class A (excellent) marine receiving water in the vicinity of the outfall. Other nearby point source outfalls include urban stormwater outfalls, the secondary outfall for the facility west of the end of Harris Avenue, and a CSO outfall. Significant nearby non-point sources of pollutants include stormwater street run-off from urban streets, and nearby industries that include Arrowac Fisheries, Puglia Shipyard, Padden Creek Boatworks, and Chambered Boats. Bellingham Bay, in the vicinity of the outfall, is an area considered as excellent marine receiving water for aquatic life uses, shellfish harvest primary contact recreational uses and other miscellaneous uses including wildlife habitat, harvesting, commerce navigation, boating, and aesthetics (WAC 173-201A-612). Corresponding water quality standards for Class A (excellent) waters for some of these uses are listed below in Table 6-1.

Table 6-1. Summary of Water Quality Criteria for use Designations in Excellent Marine Waters.

Use Designation for Excellent Marine Waters	Parameter	Criteria
Aquatic Life	Temperature	Highest 1-DMax – 16 ºC (60.8 º F)
	Dissolved Oxygen	Lowest 1-day minimum – 6.0 mg/L
	pH	Range 0f 7.0-8.5 with a human caused variation within the range of less than 0.5 units
	Turbidity	Human disturbance limited to a 5.0 NTUs increase above background if background is less than 50 NTUs or less. A 10% increase when background turbidity is more than 50 NTUs
Shellfish Harvest	Bacteria	Must not exceed a geometric mean of 14 colonies/100ml with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean exceeding 43 colonies/100ml.
Primary Contact Recreational Uses	Bacteria	Same as above

Pollutant concentrations in the proposed discharge meets water quality criteria with technology-based controls which the Department of Ecology has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in chapter 173-201A WAC and are defined as follows:

- The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of EPA Plumes modeling software. The

dilution factors under existing conditions have been determined to be 33:1 (acute) and 70:1 (chronic) for the aquatic life criteria under the existing NPDES permit. With the proposed improvements there will be no increase in peak day flow; therefore, the acute dilution factor is anticipated to remain the same. Additional analysis by Carollo Engineers indicates that under future conditions, the chronic dilution factor will be reduced to 41:1. The allowable chronic mixing zone (CMZ) is defined as a cylinder from the sea bottom to the water surface with a diameter of 400 feet plus twice the depth of the diffuser plus the length of the diffuser, which correlates to a CMZ radius of 977 feet from each discharge port. The acute mixing zone radius is 10 percent of the CMZ or approximately 98 feet from each discharge port. These new discharge volumes will continue to meet water quality standards, according to studies conducted by Carollo Engineers (2011; Appendix E). Overall, indirect effects related to a reduction in dilution of WWTP effluent are anticipated to have an insignificant effect on listed species due to the fact that the facility will still meet NPDES permit limitations for applicable surface water quality standards; the excellent water quality conditions of Bellingham Bay within the Action Area, which is capable of handling additional effluent volumes; and the fact that the implementation of Phase 1 improvements will essentially eliminate blended CSO discharges from the WWTP to Bellingham Bay.

- For the secondary outfall, the chronic mixing zone (CMZ) is a cylindrical volume extending from the sea bottom to the surface of the water centered at the terminus of the outfall. The maximum allowable radius of the CMZ is 200 feet plus the depth of the water as measured at the terminus (40 feet) for a total maximum CMZ radius of 240 feet. The acute mixing zone radius is 10 percent of the CMZ or approximately 24 feet. Discharge from the secondary outfall is infrequent. Since 2008, this outfall has only been used four times for a total of 3.5 hours. The primary outfall is essentially capable of handling 72 mgd; however, during extreme high tides, the elevation of Bellingham Bay rises and backs up into the chlorine contact basin, which causes head loss within the primary outfall and effluent backs up over a secondary weir where it flows by gravity to the secondary outfall. That being said, there is little potential for an increase in effluent discharge from the secondary outfall as a result of the proposed action and conditions will remain similar to what occurs today because discharges from the secondary outfall are largely related to tidal conditions. Therefore, the potential for indirect effects to listed species from effluent discharge from Outfall 002 is considered discountable.

6.2.1.2 Compliance with Water Quality Objectives

Water quality criteria, evaluation methodologies, and permitting procedures have been established by the United States Environmental Protection Agency (EPA) and Ecology to prevent acute and chronic toxicity in the receiving water. For each permitted increase in discharge, an evaluation of the effluent data, mixing, and receiving water characteristics is required to determine whether the increase in effluent flow may have a reasonable potential to exceed water quality criteria. If a reasonable potential to exceed water quality criteria is found, NPDES permit limits would then be established by Ecology to limit pollutant loadings to assure that water quality criteria are not exceeded.

Limited data exist on water column concentrations of toxic metals and organics in Puget Sound. In the absence of ambient water quality data, Ecology assumed that background concentrations for all toxics were zero in their 2007 RPA determination. In 2009 and 2010, Ecology performed limited water column sampling and analyzed concentrations of some toxics in Puget Sound waters and rivers tributary to Puget Sound. The study is summarized in Ecology's, *Control of Toxic Chemicals in Puget Sound - Characterization of Toxic Chemicals in Puget Sound and Major Tributaries*, 2009-10 (January 2011). In the 2009-2010 sampling program, Ecology did not sample in Bellingham Bay or northern Puget Sound. Conservatively, the following RPA update discussion assumes that the background concentrations of toxics to be the highest measured toxics concentrations at the three nearest marine water column sampling stations in Ecology's 2009-2010 toxic chemicals characterization. These three sampling stations are the Whidbey Basin, Haro Strait and the Strait of San Juan de Fuca – North stations.

The capacity improvements at the Post Point WWTP will not change the peak flow capacity above the current capacity of 72 mgd. A previous RPA prepared by Ecology during development of the 2007 NPDES permit renewal indicated that attainment of acute criteria would not be impacted by the 72 mgd discharge and no NPDES permit limits were established. Although there is no change in peak flow, Carollo Engineers updated the RPA based upon historic Post Point WWTP effluent samples and Puget Sound background toxics concentration characterization undertaken by Ecology in 2009 and 2010 (Appendix E). The updated RPA confirmed Ecology's 2007 RPA that Post Point WWTP effluent has no reasonable potential to cause exceedances of acute toxics criteria.

The updated RPA evaluation also considered the potential impact of maximum month flows increasing from 20 mgd to 34.3 mgd on meeting chronic water quality criteria (Appendix E). The RPA for chronic conditions was developed around the worst case, maximum month conditions. It used revised maximum month flow, revised mixing within the mixing zone, and updated effluent and background water quality data. Based upon the analysis, the updated RPA demonstrates that there is no reasonable potential for the Post Point WWTP effluent discharge to cause exceedances of chronic toxics criteria.

Toxics

The fact sheet to support the existing NPDES permit found that the following toxics are present in the discharge: chlorine, ammonia, antimony, arsenic, chromium, copper, lead, nickel, total phenolic compounds, zinc, phenol, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate (Ecology 2007b). A reasonable potential analysis was further conducted on these parameters to determine whether or not effluent limitations would be required in the NPDES permit. The following is a summary of Ecology's findings.

No valid ambient background data was available for di-n-butyl phthalate, acrylonitirile, benzene, chloroform, dichlorobromomethane, methylene chloride, toluene, phenol, or bis(2-ehtylhexyl) phthalate. Since no valid background data was available, a background of zero was assumed. Water quality standards and the water quality criteria for human health are met in the outfall pipe before discharge; therefore, the parameters above do not require a permit limit. Even so, a determination of reasonable potential using zero for background resulted in no reasonable potential to exceed water quality criteria outside of the mixing zone.

Methyl chloride is listed in the state of Washington's water quality criteria as a pollutant though no criteria are listed. This chemical is a naturally occurring constituent of phytoplankton processes, and as a by-product of the chlorination-dechlorination process used by most wastewater treatment facilities. It is an extremely volatile organic compound that readily and preferentially partitions to air. A recent paper published in Environmental Toxicology and Chemistry of total absorbable organic halides ranging from 950 µg/L to 1,125 µg/L showed no toxicity to bacteria (V. fischeri used in the Microtox test), algae (P. subcapitata used in a growth inhibition test), or invertebrates (Daphnia magna used in an immobilization and reproductive test). The amount reported in Bellingham's application was 2.5 µg/L, which is far below the values reported in the above-referenced document; therefore, no limit will be provided for this constituent (Ecology 2007b).

Metals

Metals, including copper, lead, mercury, and zinc, may be present in highly treated water. They do not break down and are considered persistent chemicals. In general, metals bind to sediment or particulates suspended in water, but they may also dissolve in water and accumulate in surface sediments or bioaccumulate in the tissues of aquatic life. Metals discharged to Bellingham Bay may cause a variety of effects on biological resources. The types of effects would vary depending upon the particular metal and the level of exposure. At high enough exposures, metals may cause immediate health risks, including death, to plants and animals. At lower levels, long-term effects such as those associated with reproduction or growth may potentially occur. In general, the acute toxicity levels of most metals for aquatic organisms are considerably higher than the levels that would be allowed by state and federal water quality standards (Mason 1991; World Health Organization 1998). Exposure to concentrated effluent on fish and marine mammal species is highly dependent upon the species exposed and their movement patterns. Adverse effects to salmonids from certain metals can include habitat avoidance and reduced olfactory function, which can increase the vulnerability of affected individuals to predators, reduce feeding efficiency, and reduce the likelihood of successful migration (Hansen et al. 1999). However, the effects attributable to the proposed action primarily are expected to be chronic and sub-lethal because mobility of salmonids should limit their overall exposure to concentrated effluent from the outfall.

The toxicity of dissolved copper and dissolved zinc is species-specific and effects may be visible at various levels of biological organization (i.e., on a molecular, cellular, tissue, or whole-organism level). Very little research has been conducted on ESA-listed species and results must be extrapolated based on physiological and environmental similarities. Laboratory results are extremely useful because there is an ability to control multiple variables; thus providing the ability to determine cause-and-effect relationships. However, laboratory studies have not been verified with field studies. Currently, there is limited peer reviewed science on the effects of pollutants of concern on listed species in the natural environment and agreement has not been reached that identifies the best available science to use in analysis. Thus this report focuses on the changes the project is having on the baseline and to determine the potential for exposure for listed species.

Dissolved copper and zinc are considered "constituents of concern" due to their toxicities at low and environmentally relevant concentrations, assuming the species at risk is present and the constituents are biologically available. For these constituents, NMFS has defined biological thresholds above which biological effects to species may occur. These thresholds are as follows:

- A 0.0056 mg/L (5.6 microgram/liter) increase in dissolved zinc over the receiving water's background concentration.
- A 0.002 mg/L (2.0 microgram/liter) increase in dissolved copper over the receiving water's background concentration.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal. Default values used in the 2007 RPA analysis came from either Washington State Water Quality Criteria or from Ecology's Environmental Assessment Program's ambient sampling of its Pt. Francis site (Ecology, 2007b). Reasonable potential calculations were made for arsenic, chromium, copper, lead, nickel, and zinc using a background concentration of zero since no valid background data was available for these parameters. No reasonable potential to exceed water quality standards was found; however, data are lacking for Outfall 002 to provide an adequate characterization for copper due to the short duration of its use. It is a requirement that copper to be composite sampled whenever Outfall 002 discharges effluent for three hours or more. A reasonable potential calculation will be performed for copper for Outfall 002 during the next permit cycle, provided that the outfall is used frequently enough such that the data can be collected.

Whole Effluent Toxicity

The water quality standards for surface waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the waste water in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their waste water with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment. Chronic toxicity tests measure various sublethal toxic responses, such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

In accordance with WAC 173-205-040, the City's effluent has been determined to have the potential to contain toxic chemicals. In 2001, one WET test had mortality greater than 20 percent. The fish species used for WET testing, Fathead minnows, had less than 65 percent survivability during one of the tests. To pass WET testing, it is required that at least 80 percent of the tested species survive. This is cause for the facility to continue acute WET testing through the duration of this permit on a quarterly basis. The existing permit contains requirements for whole effluent toxicity testing as authorized by RCW 90.48.520 and 40 CFR 122.44 and in accordance with procedures in chapter 173-205 WAC. If the acute critical effluent concentration (ACEC) is equal to or greater than 25 percent, the facility would have received a chronic limit also. However, in this case Bellingham's ACEC is 3.0 percent so therefore no chronic limit is included in this permit.

6.2.1.3 Nutrients

Excess nutrients (nitrogen and phosphorus) can artificially stimulate plant growth, resulting in algal blooms which speed up the aging process of aquatic systems in addition to contributing to low dissolved oxygen levels, which can affect salmonids, particularly juveniles. Low dissolved oxygen levels are of particular concern in inland Puget Sound/Strait of Georgia waters. Because of the position of Puget Sound/Strait of Georgia within the landscape, terrain, and bathymetry, there is inadequate mixing with waters from the Pacific Ocean resulting in a longer residence time for contaminants. Low dissolved oxygen levels can impair the respiration of fishes and other aquatic organisms resulting in both behavioral and physiological responses, including death. In addition, ammonia is toxic to salmonids.

As described above, treatment upgrades as part of Phase1 will result in an increase in effluent volume and BOD loading to receiving waters, which has the potential to reduce dissolved oxygen concentrations in Bellingham Bay. The proposed improvements to the primary and secondary treatment process will allow for additional BOD removal. The existing NPDES permit will need to be revised to include a higher limit for BOD in the Post Point WWTP influent from the existing maximum month of 25,530 lbs/day to 39,800 lbs/day by the year 2034. This increase in BOD loading is commensurate with increased influent volume over the same time frame.

The implementation of secondary treatment improvements will also provide the flexibility to achieve nitrogen removal in the future, with additional upgrades. In the near term, no reasonable potential to exceed surface water quality standards for ammonia or total nitrogen has been documented based on the updated RPA.

6.2.1.4 Unregulated Contaminants/Microconstituents

Municipal wastewater contains numerous unregulated contaminants generated from the daily use of products disposed of via the sewer system and industrial process discharges. Wastewater effluent has been implicated as a source of endocrine disrupting chemicals (EDCs), pharmaceuticals and personal care products (PPCPs), persistent, bioaccumulative and toxic chemicals (PBTs), polybrominated diphenyl ethers (PBDE's), and other compounds of anthropogenic origin in surface waters of the United States, Europe and Washington State (Koplin et al. 2002, Lester et al. 2004, King County, 2007).

There are currently no requirements for measuring these contaminants; however, they have been documented in treated wastewater effluent. Consequently, listed species may be exposed to these contaminants. Importantly, while the chemical concentrations are in many cases quite low, discharges occur on a continuous basis and include mixtures of compounds that may interact with each other under certain conditions. The potential toxicity effects of these mixtures can thus be both complex and additive.

Wastewater treatment plants have been a focus of research because they represent a point-source target for investigation, and not because they have been implicated as the most important, or significant, source of these substances in the environment.

King County has an active monitoring program and has comprehensive information on presence of conventional pollutants and unregulated chemicals in Puget Sound. BPA, a plasticizer, was

detected by King County in both marine and freshwaters, but at concentrations lower than any levels of effect reported in the literature. Nonylphenol was detected at relatively high concentrations in stormwater samples and was also detected at lower levels throughout King County lakes, streams, and marine waters at concentrations above some literature-based effect levels. Quantification of source loadings was not part of the study's design and is not possible with the available data. The limited data from marine waters suggests wastewater treatment plant outfalls may not be a significant source for these chemicals; however, the sampling in marine waters was spatially limited. Additional data would be required to provide more certainty regarding the spatial extent and concentrations of these chemicals in marine waters (King County, 2007). Other studies in Washington State have detected plasticizers and reproductive hormones, with the highest concentrations and greatest frequency found at stream stations (Lester et al, 2004).

Wastewater treatment plants are designed to remove conventional pollutants. These processes also remove many types of EDCs and PPCPs.

Several wastewater utilities participated in a study conducted by the Washington Department of Ecology, Environmental Protection Agency and the Puget Sound Partnership (Lubliner et al., 2010) to characterize PPCPs in municipal wastewater effluent, and the varying effectiveness of different types of wastewater treatment processes. In August 2008, a one-day screening was done at five municipal wastewater treatment facilities in the Pacific Northwest. Target analytes included 172 organic compounds (PPCPs, hormones, steroids, semi-volatile organics), as well as nutrients and total suspended solids. PPCPs were routinely found in the wastewater samples, including wastewater from the Plant. The results of the sampling were used to determine if removal of PPCPs differed between WWTPs such as the Post Point WWTP that provides secondary treatment, and WWTPs that provide advanced treatment for nutrient removal.

In wastewater, approximately 21% of the 172 chemicals monitored in the Ecology study were reduced in treated effluents to below reporting limits by conventional secondary treatment such as that currently employed at the Post Point WWTP. The highest levels of removal were found for those treatment technologies providing nutrient removal. Secondary treatment alone achieved high removal efficiencies for hormones and steroids (Lubliner et al., 2010).

With a solids retention time (SRT) of 1 day, the Post Point WWTP currently has a lower SRT than the five WWTPs sampled in the Ecology study. The correlation between SRT and PPCP removal was observed in the results of the Ecology study. Other studies were cited in that report concluding that there is a strong correlation between better PPCP removals and the longer SRT routinely employed in biological nutrient processes (Lubliner et al., 2010). Increasing the SRT as part of the upgrade process is seen as an important step toward increased removal of PPCPs.

The upgraded WWTP will achieve an SRT averaging between 2 and 2.5 days, which would be difficult to correlate with an overall reduction in PPCP removal efficiency. However, the implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher PPCP removal in the future, with additional upgrades.

Effects of Common Unregulated Contaminants/Microconstituents

The review of studies has shown that endocrine disruption is undoubtedly adversely affecting wild fish populations, including salmonids, all over the world through a variety of pathways including hormone receptor interactions, interference with biosynthesis of sex steroids, disruption of hormonal control by the pituitary or reproductive and adrenal processes. However, in most cases the exact process or mode of action are poorly understood and the data that has been collected is largely confined to a few select species. Chemical compounds responsible for the adverse effects may be due to both synthetic and natural compounds.

Fish have been observed to undergo changes believed to be caused by the introduction of PPCPs. Although numerous endpoints are possible, the feminization of male fish is a commonly reported effect (Folmar et al., 1996; Alfonso et al., 2002; USGS, 2006; Liney et al., 2006; Barber et al., 2007). Fish feminization has been reported in lab studies and in rivers downstream of wastewater discharges. Wastewater effluent dominated streams or rivers seem most susceptible to fish feminization (Kolpin, 2002; Woodling et al., 2006). In addition, lower levels of wastewater treatment appear to result in an effluent with greater estrogenic content. It should be noted that some studies showed no signs of feminization in waters downstream of wastewater discharges and some studies reported feminization in sampling locations upstream of discharges (Jobling et al., 1998; Nichols et al, 1999; Angus et al., 2002; Giesy et al., 2003). The causes and thresholds of the feminization of different species of fish vary and research is ongoing.

Recent research has continued to focus on the feminization effects of PPCPs in the aquatic environment, as well as other impacts from PPCPs that are occurring to fish species. Rahman et al., 2009 reviewed the current knowledge of the effects of EDCs and PPCPs on the aquatic environment. The most discussed effects were associated with development and growth. Adverse reproductive effects to several fish species are detailed, as investigated by Cheshenko et al., 2008 (for teleost fish, which include salmonids) and others. Specific effects documented in teleost fish (bony fishes) exposed to estrogens and androgens include the following: kidney, liver and gonadal cell death; intersex; altered breeding behavior; fibrosis and inhibition of testicular development; ovarian follicle growth; and changes in the timing of maturation.

There are a number of challenges associated with consistently analyzing EDC and PPCP levels in the environment, as the extremely low concentrations at which they are present are difficult to consistently and accurately determine. The EPA has not set standards for analyzing emergent chemical levels. Rahmen et al., (2009) notes sample analysis variation between institutions, and highlights papers which are examining successful sample methodology (Ramirez et al., 2007).

A study associated with the Orange County Sanitation District municipal wastewater outfall showed a number of impacts associated with EDCs on male flatfish (Rempel et al., 2006). Specimens of the English Sole and Hornyhead Turbot were taken at the location of the marine outfall; males from this location showed feminization and other development impacts compared to male flatfish from a control location. The study, however, did not show an overall impact on flatfish abundance at the sample location.

It has also been demonstrated that low concentrations (0.025 µg/L) of environmental estrogens can affect reproductive behavior (Martinovic et al. 2003). Abnormal breeding behavior is considered a sub-lethal effect of exposure to endocrine disrupting compounds. Clotfelter et al.

(2004) compiled a summary of the variety of behavioral effects noted in numerous fish species exposed to endocrine disrupting chemical.

Other chemicals found in wastewater known to cause endocrine disruption in fish are more commonly detected in surface waters, including those in Washington State. These include plasticizers, fire retardants, and detergent metabolites such as nonylphenol (which has been banned in Canada). In general and with the exception of nonylphenol (Servos 1999), the majority of toxicity testing focuses on reproductive steroids.

Listed fish are exposed intermittently in the mixing zone of numerous treated wastewater discharges in Puget Sound, including the Post Point WWTP discharge. It is possible they are experiencing sub-lethal effects as noted above resulting in reduced reproductive success. Given that fish are exposed to mixtures of chemicals, many of which likely behave with a common mechanism of action, it is possible that fish in close proximity to an effluent discharge are exposed to higher EDC concentrations than those outside of the acute and chronic mixing zones. Exposure of salmonids to acute concentrations are not likely due to the depth of the outfall (76 feet) and the fact that salmonids are highly mobile and are not anticipated to spend large amounts of time within this depth stratum. It's also possible salmonids may experience other sub-lethal effects as a result of repeated exposure to municipal wastewater, but we are unable at this time to determine to what extent effects related to unregulated compounds would result in a significant impairment or disruption of behavioral patterns such as feeding, breeding, or sheltering. Of more concern are the listed rockfish species, which are generally more sedentary than salmonid species and are more likely to occur and spend larger amounts of time in the depth stratum of the outfall.

It should be noted that the proposed improvements to the Post Point WWTP are necessary to allow for implementation of potential additional and higher levels of treatment in the future, which may be required as future NPDES permit limitations are put into effect. While higher levels of treatment are not required at this time to meet existing NPDES permit limitations, completing the proposed actions will allow for newer systems to come on-line in the future, should regulatory requirements change.

6.2.1.5 Flows

Influent flows to the WWTP are anticipated to increase accompanying planned population growth within the service area, resulting in an incremental increase in effluent discharge through the 2034 design year. Currently, the maximum monthly flow is 20 mgd. It is projected that by 2034, the maximum monthly flow will increase to approximately 34.3 mgd. Although flows are anticipated to increase, process upgrades are anticipated to produce effluent quality meeting strict NPDES permit limitations. Overall, the proposed upgrades will result in higher BOD loading; however, this increase in BOD loading is anticipated to have an insignificant effect on dissolved oxygen levels within the immediate vicinity of the outfall due to existing current patterns, occurrence of seasonal variation in dissolved oxygen concentrations throughout the water column, and the fact that dissolved oxygen has not been identified as an water quality impairment within the project Action Area, which would indicate some capacity of the system to receive additional loading without contributing to impairment of the waterbody. Increased effluent volumes are not anticipated to have adverse effects to the temperature and salinity profiles of Bellingham Bay near the outfall locations, based on prior studies conducted at the primary outfall location (CH2M Hill, 1984).

6.2.2 Impervious Surface and Land Cover Alteration Associated with Plant Upgrades and Expansion

Stream degradation has been associated with the quantity of impervious surface in a basin (Booth 2000; May et al. 1997; Horner and May 2000). Studies in Puget Sound lowland streams show that alteration can occur in basins with as little as 10 percent total impervious surface. However, dramatic effects can be seen relative to discharge in basins where impervious surface exceeds 40 percent (May et al. 1997).

Currently, approximately 25.3 percent of the Post Point WWTP site is covered by impervious surfaces. Upon project completion, approximately 29.9 percent of the site will be covered by impervious surface, which is a 4.6 percent increase in impervious surface area. Indirect effects from pollution-generating impervious surfaces are anticipated to be minimal with the implementation of best management practices and other stormwater management measures described in Section 2.5 above which will meet the requirements of Ecology's *2005 Stormwater Management Manual for Western Washington*.

The new impervious surface area includes both process areas and non-process areas such as parking areas and roads. Runoff from impervious surface area within process areas will be collected and conveyed to the WWTP for treatment and discharged via the existing Post Point WWTP outfall. Bellingham Bay is exempt from stormwater quantity treatment requirements. Non-process areas will be collected and conveyed to bioswales and allowed to infiltrate into subsurface groundwater and/or flow to Post Point Lagoon. In addition to treatment provided, the proposed WWTP footprint represents a very small portion of the watershed. The location of the WWTP adjacent to Post Point Lagoon and Bellingham Bay is not anticipated to result in altered peak and base flows in the watershed.

6.2.3 Impervious Surface and Land Cover Alteration Associated with Future Population Growth

The changes in impervious surface and hydrological response that accompany population growth and development can and sometimes are considered to be indirect effects of proposed actions. In Bellingham's case, the population growth and development in the WWTP's service area includes areas within the City limits and those areas identified as urban growth areas (UGAs). These are areas identified as most suitable for urban density development, and are directed by the Washington State Growth Management Act (GMA) to be served by urban services. Growth within these areas would not be considered to be indirect effects of the proposed action, but more appropriately cumulative effects. Figure 8 shows the existing sewer system and Figure 9 shows the future sewer service area.

This is because Washington's Growth Management Act (GMA) eliminates any causal relationship between public infrastructure and future development. Under the GMA (RCW Ch. 36.70A), Municipal and Non-Municipal areas are required to use the state's census-based 20-year population projections to develop comprehensive land use plans ("comprehensive plans") to preemptively prescribe where and what type of development is allowed, as well as where and what type of development is *not* allowed. Each jurisdiction's individual zoning and building codes further define the actual parameters of permissible development in that jurisdiction, subject to the comprehensive plan as well as state and federal law, including FEMA flood

insurance requirements. (See RCW 36.70B.030, .040; WAC 365-195-800(1); WAC 365-195-855; see also *Moss v. City of Bellingham*, 109 Wn. App. 9, 19, — P.2d — Div. I, 2001, citing RCW 36.70B.040; see also 42 USC 4001;44 CFR Ch. 60.) These comprehensive plans concentrate future development in a designated urban areas, and avoid conversion of undeveloped land into sprawling, low-density development (see RCW 36.70A.020(1), (2)).

Under the GMA, the City was required to (and did) develop a comprehensive land use plan to designate where future population growth and development would occur (City of Bellingham, 2005. The Urban Growth Area boundary was revised by Whatcom County in 2009 (Ordinance 2009-071). As reflected in the comprehensive plan, land within the city limits and UGA will undergo a certain increment of additional and more intensive development even if the existing WWTP is not upgraded or expanded, however, this development would ultimately be limited by the WWTP capacity or the availability and appropriateness of on-site sewage disposal systems.. However, the GMA required the City to allow more intensive land use within its UGA than could be supported by on-site septic systems, in order to concentrate development there, to preserve rural areas and open space, and to avoid sprawl. Figure 11 shows current land use within the service area and Figure 12 shows current zoning designations within the service area.

The GMA also required the City to produce a comprehensive sewer plan to support that additional increment of development (see RCW 36.70A.070(4)). As such, expansion of the WWTP is directly attributable to the City's comprehensive plan (City of Bellingham, 2008), and as such, it is correctly analyzed as a cumulative effect, not as an indirect effect of the action. Federal appellate courts have ruled consistent with this analysis (see, for example, *City of Carmel-by-the-Sea v. U.S. Dep't of Transportation*, 123 F.3d 1142, 1162-63 (9th Cir. Cal. 1997); *Laguna Greenbelt, Inc. v. U.S. Dep't of Transportation*, 42 F.3d 517, 525 (9th Cir. Cal. 1994)).

There are additional reasons why the impacts of future development in the service area are more properly analyzed as cumulative effects. The first is that the primary purpose of ESA Section 7 consultation is to avoid jeopardy, and in so doing, to avoid and minimize impacts to listed species and designated critical habitat (16 USC 1536(a)(2); 50 CFR 402.02; USFWS and NMFS 1998, p. 4-19). The Services can require the project proponent to minimize such impacts as may be within the proponent's control. They may legitimately require a project proponent to undertake reasonable and prudent alternatives to avoid jeopardy, as well as reasonable and prudent measures to minimize the direct and indirect effects of the action (16 USC 1536(b)(4)(ii); 50 CFR 402.02; USFWS and NMFS 1998, p. 4-50).

As described above, the proposed project is intended to serve population growth identified in the comprehensive land use plans of the City and its UGA. Residential, commercial, and industrial growth is expected to occur within the service area between 2014 and 2034. This growth will likely alter wet weather (e.g., stormwater) runoff water quality and quantity as land is converted. Urban runoff has been identified as a potentially significant source of some pollutants, including dissolved metals such as copper and zinc, petroleum-based products, fecal coliform bacteria and others.

In order to address these concerns, the City has developed comprehensive stormwater treatment requirements as well as critical areas regulations, which are intended to be protective of sensitive habitats and the species of plants and wildlife that occur in these areas. The City currently requires all stormwater related infrastructure to meet the requirements of the Washington State Department of Ecology's *2005 Stormwater Management Manual for Western Washington*

(Ecology, 2005; Bellingham Municipal Code (BMC) 15.42) Proposed projects must be designed to comply with the manual in order to obtain a development permit As part of the water quality treatment and flow control regulations, the City encourages the use of non-structural preventive actions and source reduction approaches, such as low impact development (LID) techniques and experimental BMPs.

6.2.3.1 Drainage Basins within the Service Area

The WWTP's service area includes approximately 30 square miles and portions of four watersheds including the Nooksack/Silver Watershed, Lake Whatcom Watershed, Bellingham Bay Watershed, and the Squalicum Creek Watershed (Figure 13).

The Nooksack Silver Watershed includes approximately 10,100 acres, of which approximately 1,700 acres of the Silver Creek Drainage Basin are in the northwestern portion of the City's planning area. Major streams within this basin include Silver Creek (with seven unnamed tributaries draining into it), Tennant Creek (with four unnamed tributaries draining into it), and Bear Creek (with three unnamed tributaries draining into it). The basin also includes Lost Lake, located northeast of the airport. A channelized drainage and a network of sloughs are located to the west of Silver Creek, southwest of Rural Avenue. Silver Creek is presumed to contain Chinook salmon; however, steelhead and bull trout appear to be absent from the system (WDFW, 2011a; WDFW 2011b).

The Squalicum Creek Watershed drains a total of 15,800 acres, of which approximately 4,700 acres are in the northern part of the City's planning area, including Baker Creek, Spring Creek, McCormick Creek, Toad Creek, Upper Squalicum Creek, Squalicum Creek, and additional unnamed streams. Squalicum Creek has documented use by steelhead and Chinook salmon with steelhead occurring in some tributary streams including Toad and McCormick Creeks (WDFW, 2011a; WDFW, 2011b).

The Lake Whatcom watershed includes approximately 35,435 acres. The 970-acre Geneva UGA is entirely within the Lake Whatcom watershed, as well as 310 acres in the Hillsdale/Britton Road area. Lake Whatcom is divided into three large basins separated by underwater sills: Basin I, Basin II, and Basin III, each of which has its own drainage basin. All of the Lake Whatcom Watershed inside the Bellingham City limits and most of the watershed area in the UGA drain to Basin I. A small portion of the Geneva UGA drains to Basin II. There is no documented occurrence of steelhead or Chinook salmon within tributaries draining the Lake Whatcom Watershed within the City of Bellingham or its UGA (WDFW, 2011a; WDFW, 2011b).

Bellingham Bay Watershed encompasses the smaller drainages of Whatcom, Padden and Chuckanut Creeks, as well as Fragrance and Padden Lakes.

- Whatcom Creek is the outlet for Lake Whatcom located in the northeast section of Bellingham bay watershed. Whatcom Creek is combined with four smaller streams including Lincoln Creek, Cemetery Creek (East and West Forks), and Hannah Creek. Whatcom Creek serves as a major channel for Bellingham's storm water drainage system. The north half of the Yew Street Road UGA drains to the Whatcom Creek Drainage Basin. The Whatcom Creek Gorge Sub-basin drains the area adjacent to the eastern half of Whatcom Creek between Lake Whatcom and the freeway interchange at Ohio Street and Interstate 5. This stretch of Whatcom Creek includes the headwaters

flowing from the Lake and the cascading waterfalls in Whatcom Falls Park. The Fever Creek sub-basin drains the area bounded by Sunset Drive, Interstate 5, and the Lake Whatcom watershed. Whatcom Creek has documented use by Chinook salmon and steelhead. No bull trout have been identified within the Whatcom Creek drainage (WDFW, 2011a; WDFW, 2011b).

- Padden Creek drains the area generally lying between the headwaters and outflow from Lake Padden, South Samish Way, Old Fairhaven Parkway, Sehome High School, the Sehome Hill Arboretum, Lowell Elementary School, Viewcrest Drive, Fieldston Road, and the inter-tidal Padden Lagoon. Padden Creek has documented use by Chinook salmon and steelhead within the lower reach using these areas for spawning and rearing (WDFW, 2011a).
- Chuckanut Creek Drainage Basin drains the land area generally lying between the Lake Whatcom watershed, the Lake Padden cliffs above Interstate 5, and the ridge of Chuckanut Crest Drive. This drainage includes Chuckanut Creek, as well as four unnamed streams that flow into Chuckanut Creek. This drainage is steeply sloped and mostly forested. Cuckanut Creek has documented use by steelhead within the lower reaches. No use by bull trout or Chinook has been documented (WDFW, 2011a; WDFW, 2011b).

6.2.3.2 Buildable Lands Analysis for Service Area

In consultation with the City of Bellingham, Whatcom County produced a "land capacity analysis for the city and UGA in 2009. Table 6-2 below is a summary of projected land needs as a result of population growth projected through 2029. The primary growth anticipated will result in additional residential, commercial, and industrial development within the watersheds and basins discussed above with the majority of this growth anticipated to occur as infill within established urban, residential, and commercial areas. Under existing conditions, listed fish species use of streams and drainages within the existing sewer service area is primarily restricted to the lowermost reaches, which are already within developed areas. The primary exception is Squalicum Creek, which has steelhead use extending upstream of the City and UGA boundaries.

Table 6-2. Bellingham UGA 20 Year Growth Statistics Summary.

Census 2010 City Population	**80,885**
Census 2010 UGA Population	**10,366**
Census 2010 City & UGA Population	**91,251**
Adopted 2031 City & UGA Forecast Population	**116,200**
Net 20-Yr. Population Growth	**24,949**
City & UGA Total Jobs (2008 InfoUSA)	**52,776**
Adopted Net 20-Yr. Job Growth	**18,829**
Vacant Acres - Land Zoned Residential (2009 LCA)	**3,766**
Net Developable Acres - Land Zoned Residential (2009 LCA)	**1,135**
Vacant Acres - Land Zoned Commercial/Industrial (2009 LCA)	**3,714**
Net Developable Acres - Land Zoned Comm/Indust (2009 LCA)	**1,355**

It is anticipated that through the City's implementation of existing stormwater, critical areas, shoreline, and floodplain regulations, indirect effects associated with impervious surface and land use changes in response to growth are anticipated to have insignificant effect on water quality and listed species in the Action Area.

6.3 Analyses of Effects to Critical Habitat Primary Constituent Elements

6.3.1 Bull Trout Critical Habitat

6.3.1.1 Water Temperature

The proposed action includes process upgrades and expansion of the existing WWTP and increased flows of effluent from the WWTP. Analyses conducted as part of developing proposed upgrades for the WWTP determined no reasonable potential to exceed surface water quality standards for temperature. However, it is reasonable to assume that there will be some temperature variation around the diffuser, which when taking into consideration the salinity and density profiles of the seawater may extend outward from the diffusers some distance. However, the primary outfall (Outfall 001) diffusers are located at a depth of 76 feet below MLLW and approximately 2,010 feet offshore, and the secondary outfall (Outfall 002) is located at a depth of 41 feet below MLLW and 475 feet offshore. Bull trout critical habitat extends offshore to a depth of 33 feet MLLW, which is some distance from the diffusers and the likelihood of altering water temperatures in designated critical habitat is therefore considered insignificant.

6.3.1.2 Migratory Corridors

The proposed action includes no alterations that would contribute directly to creating conditions that may interfere with migration of bull trout along the marine shoreline. However, the proposed action will indirectly influence the future development of the area by providing sewer service to currently un-serviced areas. Additional residential/commercial/industrial development may result in additional recreational/commercial dock construction along the marine shoreline, which may potentially result in migratory corridor obstructions. These types of developments are highly unlikely and could not be attributed to expansion of the sewer Service Area because the majority of the Service Area is already sewered along the marine shoreline. The only exception would be the WWTP and associated properties, which are located along the marine shoreline and set-aside for future expansions. There are currently several regulatory mechanisms in-place to ensure that dock construction or other in-water work, if it were to occur, would be protective of the environment and minimize impacts to bull trout movements along the shoreline. These include the Bellingham Shoreline Master Program, Critical Area Ordinances, and the need for state and federal permits for in-water work. Projects requiring federal permits would undergo individual ESA consultation. No streams within the immediate project vicinity or the Service Area are known to support bull trout populations.

6.3.1.3 Prey Base

Pacific herring holding areas have been identified offshore of the Post Point WWTP, and sand lance and surf smelt spawning has been documented along the marine nearshore immediately north of the Post Point WWTP (WDFW, 2011a). These forage fish species are a prey species for anadromous life history forms of bull trout. However, spawning of these species is likely limited

by the extensive shoreline armoring that has occurred, which has limited sediment delivery to the nearshore and altered the overall productivity of eelgrass beds in the project Action Area. Construction has some limited potential to contribute to degraded water quality via sedimentation and turbidity of the marine nearshore; however, this is considered discountable due to the use of appropriate TESC measures and the distance from soil disturbing activities to the marine nearshore.

Operation of the Post Point WWTP will result in the continued discharge of highly treated wastewater, which although in compliance with all applicable water quality standards could potentially result in degraded localized water quality within the Action Area. It is not anticipated that forage fish would spend unusual amounts of time in and around the outfalls due to the fact that most species are highly mobile and not sedentary species thereby minimizing their exposure to highly treated effluent. The proposed action is anticipated to improve the capacity of the WWTP to reduce overall BOD loading and will improve SRT, potentially resulting in a slight increased removal of PPCPs and other contaminants. The operation of the WWTP does not create a reasonable potential to exceed any water quality standards, based on evaluations conducted by Ecology and the City (see Appendix E). In addition, the project proponent will include, as mitigation for wetland impacts, an increase in area of the Post Point Lagoon, which will contribute to providing additional salt marsh habitat and foraging opportunities for bull trout within the Action Area. The salt marsh habitat will provide cover and refuge for juvenile salmonids migrating along the shoreline, which are prey species for bull trout.

6.3.1.4 Water Quality/Quantity

The proposed action will result in an increase in effluent discharge volume from the Post Point WWTP, which discharges to Bellingham Bay via a primary and secondary outfall located 2,000 feet and 475 feet offshore, respectively. This has the potential to degrade water quality conditions within Bellingham Bay and the project Action Area. Under existing conditions, the Post Point WWTP discharges approximately 20 mgd of highly treated wastewater effluent to Puget Sound via the marine outfall. Under the proposed action, that number will increase to approximately 34.3 mgd by the year 2034. WWTP improvements were designed to accommodate additional flows due to anticipated growth and subsequently the BOD loading will increase in response to the additional volumes but remain within anticipated NPDES permit limitations, despite a projected 58 percent increase in flow. The longer solids retention time (SRT) may slightly increase the removal efficiency of a variety of contaminants of emerging concern, including PPCPs. The concentration of metals in the wastewater stream is anticipated to remain similar to existing levels and within marine surface water quality standards.

The two outfalls (Outfalls 001 and 002) are located at depths of approximately 76 feet and 41 feet respectively and are spaced approximately 1,300 feet apart with no overlap between mixing zones. The extent of bull trout critical habitat extends only to a depth of 33 feet below MLLW, which is outside the established chronic and acute mixing zone for Outfall 001, but potentially overlaps with Outfall 002. It should be noted that Outfall 002 is the secondary outfall and is only in operation during heavier flow events (those flows exceeding Outfall 001 rated capacity peak flow of 72 mgd). However, it is reasonable to conclude that due to varying tidal conditions and currents, treated wastewater could influence water quality conditions in the nearshore environment including that designated as critical habitat for Puget Sound DPS bull trout.

Although flows are anticipated to increase, WWTP upgrades are anticipated to produce effluent quality meeting strict NPDES permit limitations designed to protect beneficial uses.

The potential for growth within the service area may result in an increase in population and pollution generating impervious surface area associated primarily with new roadways in areas that were previously undeveloped. All new development will be subject to pertinent municipal stormwater regulations as well as critical areas regulations, which will ensure that all new impervious surface areas will be treated for quantity and quality prior to discharge. Furthermore, bull trout are not known to occur or spawn within any streams in the service area and their distribution is likely limited to a few individual anadromous life history forms that likely stray into the area from the Samish and Nooksack basin for foraging and overwintering. Therefore, the effects of future growth within the service area upon the water quality/quantity PCE for bull trout are considered insignificant.

6.3.2 Chinook Salmon Critical Habitat

Designated critical habitat for Puget Sound ESU Chinook salmon occurs within the project Action Area and includes the marine nearshore of Bellingham Bay and the estuarine area of Post Point Lagoon:

- Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
- Nearshore marine areas free of obstruction with water quality and quantity conditions and forage , including aquatic invertebrates and fishes supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

6.3.2.1 Estuarine Areas

Post Point lagoon is located immediately west of the Post Point WWTP. Historically, the Post Point Lagoon was connected to Bellingham Bay; however, construction of the BNSF railroad causeway filled in a portion of estuarine habitat leaving only a narrow opening beneath the causeway connecting the lagoon to Bellingham Bay. Waves and tidal action push gravels into the opening creating a shoal, which at low tides causes water to become impounded within the lagoon until the next high tide. This likely creates some water quality problems and may also create altered salinity profiles, especially during low tide conditions. Eelgrass and other aquatic vegetation have become established within the lagoon and provide forage areas for great blue herons as well as refuge and cover for salmonids. Extensive armoring along the west shore of the lagoon is associated with the BNSF railroad and some historic fill has been placed along the eastern shore reducing the size and complexity of this estuarine habitat.

The proposed action will include soil disturbing activities; however, these activities will primarily be restricted to the existing site footprint. The construction of the new Secondary Clarifier will be within 200 feet of Post Point Lagoon; however the closest activity will be the creation of additional estuarine habitat along the south shore of the lagoon as mitigation for

wetland impacts elsewhere on the project site. This will require clearing, grading and excavation immediately adjacent to Post Point Lagoon and within 200 feet of Bellingham Bay, which has the potential to increase turbidity and sediment loads within the lagoon. It is anticipated that juvenile Chinook may potentially be present and rearing within the lagoon during construction activities. With the implementation of soil and erosion control best management practices as well as adherence to Spill Prevention Countermeasure Control (SPCC) plan, it is anticipated that direct effect of project construction will have an insignificant effect on the water quality within estuarine habitat. The proposed action will increase the amount of available estuarine habitat upon completion and provide additional habitat for foraging, and increase cover and refuge by encouraging establishment of additional salt marsh vegetation. Therefore, the direct effects of construction are anticipated to have an insignificant effect on the estuarine area PCE for Chinook salmon.

The potential for growth within the Service Area may result in an increase in population and pollution generating impervious surface area associated primarily with new roadways and housing in areas that were previously undeveloped. All new development will be subject to pertinent municipal stormwater regulations as well as critical areas regulations, which ensure that all new impervious surface areas will be treated for quantity and quality prior to discharge and that development will provide adequate protection of natural resources. The shoreline area surrounding the site has been primarily built out and new development, if it were to occur, would include more focused development (infill). Therefore, land use changes and changes in impervious surface area as a result of future growth in the Service Area are anticipated to have an insignificant effect on the estuarine area PCE for Chinook salmon.

6.3.2.2 Nearshore Marine Areas

As with Post Point Lagoon, the nearshore marine areas adjacent to the Post Point WWTP have been severely altered by past and current land use practices. The railroad that parallels the shoreline has reduced sediment delivery to the nearshore and altered the substrate composition of the nearshore, aquatic vegetation communities of the nearshore, and virtually eliminated vegetation along the nearshore. As such, the composition and availability of forage fish and aquatic invertebrates have likely been reduced from historic levels.

The proposed action will require no in-water work and all soil disturbing activities will take place several hundred feet from the nearshore marine areas of Bellingham Bay. With the implementation of soil and erosion control best management practices, it is anticipated that the direct effects of project construction will have an insignificant effect of the nearshore marine PCEs within the Action Area.

The proposed action will result in an increase in effluent discharge volume from the Post Point WWTP, which discharges to Bellingham Bay via a primary and secondary outfall located 2,010 feet and 475 feet offshore, respectively. This has the potential to degrade water quality conditions within Bellingham Bay and the project Action Area. Under existing conditions, the Post Point WWTP discharges approximately 20 mgd of highly treated wastewater effluent to Puget Sound via the marine outfall. Under the proposed action, that number will increase to approximately 34.3 mgd by the year 2034. WWTP improvements were designed to accommodate additional flows due to anticipated growth and subsequently the BOD loading will increase in response to the additional volumes but remain within anticipated NPDES permit

limitations, despite a projected 58 percent increase in flow. The longer solids retention time (SRT) may increase the removal efficiency of a variety of contaminants of emerging concern, including PPCPs. The concentration of metals in the wastewater stream is anticipated to remain similar to existing levels and within marine surface water quality standards.

The two outfalls (Outfalls 001 and 002) are located at depths of approximately 76 feet and 41 feet respectively and are spaced approximately 1,300 feet apart with no overlap between mixing zones. The extent of Chinook critical habitat extends to a depth of 98 feet below MLLW, which is within the established chronic and acute mixing zone for Outfalls 001 and 002. It should be noted that Outfall 002 is the secondary outfall and is only in operation during heavier flow events (those flows exceeding Outfall 001 rated capacity peak flow of 72 mgd). Although flows are anticipated to increase, the proposed upgrades are anticipated to produce effluent quality meeting strict NPDES permit limitations. There is no reasonable potential for effluent to exceed surface water quality standards.

The potential for growth within the service area may result in an increase in population and pollution generating impervious surface area associated primarily with new roadways in areas that were previously undeveloped. All new development will be subject to pertinent municipal stormwater regulations as well as critical areas regulations, which ensure that all new impervious surface areas will be treated for quantity and quality prior to discharge. Designated critical habitat for Puget Sound ESU Chinook salmon is limited to the Silver Creek drainage in the northwest corner of the Service Area. Land Use in the Silver Creek drainage areas is a mixture of rural residential, agriculture, high density residential, forest lands, and the Bellingham International Airport. The conversion of forest land and agricultural land to more intensive land uses such as residential, commercial, or industrial land uses may have indirect effects on critical habitat through degradation of water quality if the rate and types of development allowed are not protective of water quality. The actual extent of critical habitat within Silver Creek lies outside the Service Area; therefore direct effects to critical habitat are not anticipated as a result of growth. No other streams containing designated critical habitat occur within the Action Area. Therefore, the effects of future growth within the service area upon the water quality/quantity PCE for Chinook salmon is considered insignificant.

6.3.3 Southern Resident Killer Whale Critical Habitat

Critical habitat for the Southern Resident killer whale was designated on November 29, 2006. PCEs for Southern Resident killer whales include the following (NMFS, 2008c):

- Water quality to support growth and development;
- Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and
- Passage conditions to allow for migration, resting, and foraging conditions.

6.3.3.1 Water Quality

Bellingham Bay is listed on the Washington State Department of Ecology list of impaired waterbodies for dissolved oxygen; however, these designated areas are well outside the project Action Area (Ecology, 2008). The proposed action will result in an incremental increase in

wastewater discharge to Bellingham Bay from a current monthly maximum of 20 mgd to 34.3 mgd by 2034 via the proposed process upgrades and expansion of the existing WWTP under Phase 1. With the proposed increase in flow, the Post Point WWTP will be upgraded to accommodate additional BOD loading commensurate with additional flow volumes and in accordance with existing and future NPDES permit limitations. Based on projected flow volumes, it has been identified that there was no reasonable potential to exceed surface water quality standards for marine receiving waters. In addition, the increased solids retention time will also increase the removal efficiency of many other contaminants of concern including PPCPs. Overall, the quantity of effluent being discharged will increase; however the quality of that discharge is also anticipated to meet stringent NPDES permit limitations. Therefore, the operation of the WWTP will not have an adverse affect on the water quality PCE in the Action Area.

The proposed action may also have indirect effects to water quality via growth in the service area of the WWTP. The stormwater treatment requirements and critical areas ordinances currently in place within the city of Bellingham and its UGA will minimize the potential for adverse effects to water quantity and quality within streams discharging to Bellingham Bay to insignificant levels.

The proposed action will not require in-water work within Bellingham Bay. The majority of soil disturbing activities will occur within the existing site footprint approximately 450 feet from Bellingham Bay and within 200 feet of the Post Point Lagoon. However, mitigation for wetland impacts incurred during construction will require clearing, grading, and excavation immediately adjacent to the Post Point Lagoon and within 200 feet of Bellingham Bay in order to create additional estuarine habitat, which has the potential to increase turbidity and sediment load within Post Point Lagoon. Killer whales are not anticipated to occupy habitat within the lagoon due to limited depth and narrow opening under the railroad causeway that connects the lagoon to outer Bellingham Bay. With the implementation of soil and erosion control best management practices as well as adherence to Spill Prevention Countermeasure Control (SPCC) plan, it is anticipated that direct effect of project construction will have an insignificant effect on the water quality PCE within the Action Area.

6.3.3.2 Prey

Southern Resident killer whales have been sighted intermittently and in all months of the year in the Puget Sound/Strait of Georgia area. The reason for the sightings in the Strait of Georgia likely corresponds to the seasonal returns of Pacific salmon to streams with abundant salmon runs, particularly the Fraser River system in British Columbia. The low abundance of salmonids returning to watersheds draining to Bellingham Bay is likely correlated to the low number of Southern Resident killer whale sightings in the Bellingham Bay area. The prey abundance PCE is likely limiting within the project Action Area.

The proposed action is will maintain compliance with surface water quality standards in Bellingham Bay and therefore is not anticipated to have an adverse affect on salmonids, a common prey species for Southern Resident killer whale. Therefore, the effects of the action upon the prey species PCE is considered insignificant.

6.3.3.3 Passage

Southern Resident killer whales range widely from Puget Sound to the Pacific Ocean and are occasionally observed in south Puget Sound waters. Southern Resident killer whales are more frequently in the Georgia Strait in response to seasonal movements of salmonids into the Fraser River system in British Columbia. The project will not reduce the ability of killer whales to rest, migrate or forage within the project Action Area. The proposed action will not require in-water work within Bellingham Bay and all construction activities will take place a minimum of 200 feet from Bellingham Bay.

6.4 Beneficial Effects

NMFS and USFWS (1998) identify beneficial effects as those that "are contemporaneous positive effects without any adverse effects." The project is proposed to provide upgrades and expand the existing WWTP. The action will be beneficial to both human health and the environment; however, these factors are not considered "beneficial effects" as defined in relation to the ESA.

7.0 EFFECT DETERMINATIONS

Provided that the construction techniques and conservation measures summarized herein are properly implemented, this project is anticipated to have the following effects on ESA regulated species and critical habitat:

7.1 Threatened and Endangered Species

7.1.1 Coastal-Puget Sound DPS Bull Trout

The overall effect determination for Coastal-Puget Sound DPS bull trout as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Coastal-Puget Sound DPS bull trout is warranted based on the following rationale:

- Anadromous life history forms of bull trout, primarily adults, are likely to occur along the marine shoreline of Bellingham Bay within the Action Area.
- The project will include excavation work during construction of the WWTP upgrades and mitigation for wetland impacts that could result in small amounts of localized sedimentation and turbidity within Bellingham Bay and Post Point Lagoon. Sedimentation and turbidity from construction could occur if not properly controlled on-site.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.

- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for Coastal-Puget Sound DPS bull trout is warranted based on the following rationale:

- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- Adult and sub-adult bull trout are highly mobile and are not anticipated to spend long periods of time around the outfall diffusers and therefore their risk of exposure to concentrated effluent is insignificant.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- Construction will primarily occur within the existing Post Point WWTP footprint (within 200 feet of post Point Lagoon and 450 feet of Bellingham Bay). The closest soil disturbing activities are associated with wetland mitigation activities, which will require clearing, grading, and excavation immediately adjacent to Post Point Lagoon. These activities will be timed to occur during the approved in-water work window. In addition all excavation will occur in the dry leaving an earthen berm between the excavation area and Post Point lagoon. Following excavation and grading activities, the berms will be broken during a low tide event allowing flows to enter the newly created habitat upon the following incoming tide. Furthermore, TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation of Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will also be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- No discharge of construction dewatering water will occur to surface waters and appropriate BMPs such as silt fencing, straw bales, check dams or others will be in place to protect discharge areas from erosive flows and potential for sediment laden water delivery to surface waters.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.

- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point Lagoon, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.
- Mitigation for wetland impacts includes the creation of additional estuarine habitat, which upon completion will provide additional cover, refuge, and forage potential for juvenile salmonids and forage fish. These species are common prey for bull trout. Therefore, the proposed action is anticipated to have some limited benefits for bull trout by enhancing forage fish habitat.
- The proposed action will allow for the facility to be expanded and/or upgraded in the future, meeting anticipated NPDES limitations.

7.1.2 Puget Sound DPS Steelhead

The overall effect determination for Puget Sound DPS steelhead as a result of the proposed action is “may affect, not likely to adversely affect.”

A “may affect” determination for Puget Sound DPS steelhead is warranted based on the following rationale:

- Adult steelhead are known to occur in Bellingham Bay and likely migrate through the Action Area to streams draining to Bellingham Bay and other adjacent drainages. Juvenile steelhead may be present in the marine waters of Bellingham Bay; however, after leaving their natal streams, they spend little time in the marine nearshore and generally move quickly to deeper offshore waters.
- The project will include excavation work during construction of the WWTP upgrades and mitigation for wetland impacts that could result in small amounts of localized sedimentation and turbidity within Bellingham Bay and Post Point Lagoon. Sedimentation and turbidity from construction could occur if not properly controlled on-site.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.

- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for Puget Sound DPS steelhead is warranted based on the following rationale:

- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- Adult and sub-adult steelhead are highly mobile and are not anticipated to spend long periods of time around the outfall diffusers and therefore their risk of exposure to concentrated effluent is insignificant.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- Construction will primarily occur within the existing Post Point WWTP footprint (within 200 feet of post Point Lagoon and 450 feet of Bellingham Bay). The closest soil disturbing activities are associated with wetland mitigation activities, which will require clearing, grading, and excavation immediately adjacent to Post Point Lagoon. These activities will be timed to occur during the approved in-water work window. In addition all excavation will occur in the dry leaving an earthen berm between the excavation area and Post Point lagoon. Following excavation and grading activities, the berms will be broken during a low tide event allowing flows to enter the newly created habitat upon the following incoming tide. Furthermore, TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation of Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will also be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- No discharge of construction dewatering water will occur to surface waters and appropriate BMPs such as silt fencing, straw bales, check dams or others will be in place to protect discharge areas from erosive flows and potential for sediment laden water delivery to surface waters.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.

- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point Lagoon, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.
- The proposed action will allow for the facility to be expanded and/or upgraded in the future, providing flexibility to meet anticipated NPDES limitations.

7.1.3 Puget Sound ESU Chinook Salmon

The overall effect determination for Puget Sound ESU Chinook salmon as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Puget Sound ESU Chinook salmon is warranted based on the following rationale:

- Adult Chinook are known to occur in Bellingham Bay and likely migrate through the Action Area to streams draining to Bellingham Bay and other adjacent drainages. Juvenile Chinook may be present and rearing in marine nearshore areas of Bellingham Bay and Post Point Lagoon.
- The project will include excavation work during construction of the WWTP upgrades and mitigation for wetland impacts that could result in small amounts of localized sedimentation and turbidity within Bellingham Bay and Post Point Lagoon. Sedimentation and turbidity from construction could occur if not properly controlled on-site.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for Puget Sound ESU Chinook salmon is warranted because:

- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- Adult Chinook salmon are highly mobile and are not anticipated to spend long periods of time around the outfall diffusers and therefore their risk of exposure to concentrated effluent is insignificant. Likewise, juvenile Chinook salmon are more likely to spend greater amounts of time within the nearshore environment and the potential for exposure to concentrated effluent is also insignificant.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- Construction will primarily occur within the existing Post Point WWTP footprint (within 200 feet of post Point Lagoon and 450 feet of Bellingham Bay). The closest soil disturbing activities are associated with wetland mitigation activities, which will require clearing, grading, and excavation immediately adjacent to Post Point Lagoon. These activities will be timed to occur during the approved in-water work window. In addition all excavation will occur in the dry leaving an earthen berm between the excavation area and Post Point lagoon. Following excavation and grading activities, the berms will be broken during a low tide event allowing flows to enter the newly created habitat upon the following incoming tide. Furthermore, TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation of Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will also be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- No discharge of construction dewatering water will occur to surface waters and appropriate BMPs such as silt fencing, straw bales, check dams or others will be in place to protect discharge areas from erosive flows and potential for sediment laden water delivery to surface waters.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.
- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point Lagoon, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.

- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.
- Mitigation for wetland impacts includes the creation of additional estuarine habitat, which upon completion will provide additional cover, refuge, and forage potential for juvenile Chinook salmon.
- The proposed action will allow for the facility to be expanded and/or upgraded in the future, providing flexibility to meet anticipated NPDES limitations.

7.1.4 Yelloweye, Canary, and Bocaccio Rockfish

The overall effect determination for rockfish as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for rockfish is warranted based on the following rationale:

- Adult and juvenile rockfish are likely to occur within Bellingham Bay at varying depths. Juvenile yelloweye rockfish prefer shallow, high relief zones while adults are generally found at depths ranging from 300 to 590 feet. Juveniles canary rockfish prefer shallow, high relief zones while adults are generally found at depths ranging from 160 to 820 feet. Juvenile bocaccio rockfish prefer floating kelp bed associations and then eventually settle to depths ranging from 60 to 100 feet in rock reefs. Adults migrate to deeper waters and can be found 100 feet above unhardened sea floor in the water column.
- The project will include excavation work during construction of the WWTP upgrades and mitigation for wetland impacts that could result in small amounts of localized sedimentation and turbidity within Bellingham Bay and Post Point Lagoon. Sedimentation and turbidity from construction could occur if not properly controlled on-site.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for rockfish is warranted for the proposed action because:

- Rockfish are not as mobile as salmonids and could be present at the depths of the outfall diffusers. The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- Construction will primarily occur within the existing Post Point WWTP footprint (within 200 feet of post Point Lagoon and 450 feet of Bellingham Bay). The closest soil disturbing activities are associated with wetland mitigation activities, which will require clearing, grading, and excavation immediately adjacent to Post Point Lagoon. These activities will be timed to occur during the approved in-water work window. In addition all excavation will occur in the dry leaving an earthen berm between the excavation area and Post Point lagoon. Following excavation and grading activities, the berms will be broken during a low tide event allowing flows to enter the newly created habitat upon the following incoming tide. Furthermore, TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation of Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will also be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- No discharge of construction dewatering water will occur to surface waters and appropriate BMPs such as silt fencing, straw bales, check dams or others will be in place to protect discharge areas from erosive flows and potential for sediment laden water delivery to surface waters.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.
- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point Lagoon, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation

for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

- The proposed action will allow for the facility to be expanded and/or upgraded in the future, providing flexibility to meet anticipated NPDES limitations.

7.1.5 Southern DPS Green Sturgeon

The overall effect determination for Southern DPS green sturgeon as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Southern DPS green sturgeon is warranted based on the following rationale:

- Adult and sub-adult green sturgeon are presumed to occur in the marine waters of the Strait of Georgia Puget Sound, including Bellingham Bay.
- The project will include excavation work during construction of the WWTP upgrades and mitigation for wetland impacts that could result in small amounts of localized sedimentation and turbidity within Bellingham Bay and Post Point Lagoon. Sedimentation and turbidity from construction could occur if not properly controlled on-site.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for Southern DPS green sturgeon is warranted for this proposed action because:

- Green sturgeon are not as mobile as salmonids and could be present at the depths of the outfall diffusers. The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.

- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- Construction will primarily occur within the existing Post Point WWTP footprint (within 200 feet of post Point Lagoon and 450 feet of Bellingham Bay). The closest soil disturbing activities are associated with wetland mitigation activities, which will require clearing, grading, and excavation immediately adjacent to Post Point Lagoon. These activities will be timed to occur during the approved in-water work window. In addition all excavation will occur in the dry leaving an earthen berm between the excavation area and Post Point lagoon. Following excavation and grading activities, the berms will be broken during a low tide event allowing flows to enter the newly created habitat upon the following incoming tide. Furthermore, TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation of Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will also be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- No discharge of construction dewatering water will occur to surface waters and appropriate BMPs such as silt fencing, straw bales, check dams or others will be in place to protect discharge areas from erosive flows and potential for sediment laden water delivery to surface waters.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.
- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point Lagoon, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

7.1.6 Humpback Whale

The overall effect determination for humpback whale as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination is warranted based on the following rationale:

- Humpback whales are very rare in the vicinity of Bellingham Bay; however, it is possible, although highly unlikely that they may be present at times during the construction and operation of the facility.
- The proposed action will result in a temporary increase of noise levels above ambient conditions and will also result in an increase in human activity during construction activities adjacent to Bellingham Bay
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination is warranted for this proposed action for humpback whale because:

- The project is not likely to have a significant effect on forage species within the area.
- No in-water work will be required within Bellingham Bay. The closest work will occur adjacent to Post Point Lagoon and will not include pile driving or other highly intensive construction noise. Humpback whale use of the lagoon is highly unlikely given the narrow opening to Bellingham Bay, shallow depths, and the relative proximity of the lagoon to the WWTP and other development.
- Vibratory pile driving will be restricted to upland sites necessary to shore deep excavations. This work will be within 200 feet of Post Point Lagoon and 450 feet of Bellingham Bay. Mitigation for wetland impacts will require work immediately adjacent to Post Point Lagoon and 200 feet from Bellingham Bay. The railroad causeway will provide a visual break between the mitigation activities and Bellingham Bay.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with

Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.

- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The project is not likely to have a significant effect on salmon populations or other forage species within the area.
- The project will have no in-water work and will not block any migration routes or permanently alter marine habitat.
- The WWTP is designed to meet stringent NPDES permit discharge requirements under current and after-project conditions.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.
- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point lagoon Bay, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Humpback whales are highly mobile and are not anticipated to spend large amounts of time foraging or migrating through the Action Area.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.

7.1.7 Southern Resident Killer Whale

The overall effect determination for as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Southern Resident killer whale is warranted based on the following rationale:

- Killer whales may infrequently forage and migrate through Bellingham Bay within the Action Area.

- Forage species such as Pacific salmon use Puget Sound within the Action Area for rearing, foraging and migration.
- The proposed action will result in a temporary increase of noise levels above ambient conditions and will also result in an increase in human activity during construction activities adjacent to Bellingham Bay
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination is warranted for this proposed action for Southern Resident killer whales because:

- The project is not likely to have a significant effect on salmon populations or other forage species within the area.
- No in-water work will be required within Bellingham Bay. The closest work will occur adjacent to Post Point Lagoon and will not include pile driving or other highly intensive construction noise. Killer whale use of the lagoon is highly unlikely given the narrow opening to Bellingham Bay, shallow depths and the relative proximity of the lagoon to the WWTP and other development.
- Vibratory pile driving will be restricted to upland sites necessary to shore deep excavations. This work will be within 200 feet of Post Point Lagoon and 450 feet of Bellingham Bay. Mitigation for wetland impacts will require work immediately adjacent to Post Point Lagoon and 200 feet from Bellingham Bay. The railroad causeway will provide a visual break between the mitigation activities and Bellingham Bay.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater

generated from process areas will continue to be collected and conveyed to the WWTP for processing.

- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The project will have no in-water work and will not block any migration routes or permanently alter marine habitat.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.
- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point lagoon Bay, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Killer whales are highly mobile and are not anticipated to spend large amounts of time foraging or migrating through the Action Area.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

7.1.8 Stellar Sea Lion

The overall effect determination for Steller sea lion as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Steller sea lion is warranted based on the following rationale:

- Steller sea lion may occasionally use the project Action Area for foraging and migration.
- The proposed action will result in a temporary increase of noise levels above ambient conditions and will also result in an increase in human activity during construction activities adjacent to Bellingham Bay.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.

- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity within the WWTP's service area.

A "not likely to adversely affect" determination for Steller sea lion is warranted for this proposed action because:

- There are no documented haulout sites for Steller sea lion within several miles of the project Action Area.
- No in-water work will be required within Bellingham Bay. The closest work will occur adjacent to Post Point Lagoon and will not include pile driving or other highly intensive construction noise. Steller sea lion use of the lagoon is highly unlikely given the narrow opening to Bellingham Bay and the relative proximity of the lagoon to the WWTP and other development.
- Vibratory pile driving will be restricted to upland sites necessary to shore deep excavations. This work will be within 200 feet of Post Point Lagoon and 450 feet of Bellingham Bay. Mitigation for wetland impacts will require work immediately adjacent to Post Point Lagoon and 200 feet from Bellingham Bay. The railroad causeway will provide a visual break between the mitigation activities and Bellingham Bay.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Post Point Lagoon and Bellingham Bay. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The project is not likely to have a significant effect on salmon populations or other forage species within the area.
- The project will have no in-water work and will not block any migration routes or permanently alter marine habitat.
- All equipment and materials will be stored and staged within the construction footprint located greater than 350 feet from surface waters.

- Refueling will occur farther than 200 feet from any surface water feature, including on-site wetlands, Bellingham Bay, Post Point lagoon Bay, and the unnamed stream to the south of the project area. All equipment operators will be trained in spill response and a Spill Prevention Countermeasure and Control (SPCC) plan will be prepared specifically for this project.
- Steller sea lions are highly mobile and are not anticipated to spend large amounts of time foraging or migrating through the Action Area.
- Future development within the service area will require the strict adherence to development regulations including local critical area ordinances, stormwater management regulations, and shoreline regulations, which require protective buffers around streams and wetlands as well as appropriate treatment methodologies for stormwater, mitigation for impacts, and limited use of variances and exceptions to these regulations. The requirement for the use of low impact development technologies is also present within many of the development regulations. There are also other state and federal permit requirements associated with work in regulated critical areas that are protective of aquatic resources. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

7.1.9 Marbled Murrelet

The overall effect determination for marbled murrelet as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for marbled murrelet is warranted based on the following rationale:

- Marbled murrelets may forage within the marine waters Bellingham Bay, including the Action Area.
- The proposed action will result in a temporary increase of noise levels above ambient conditions and will also result in an increase in human activity during construction activities. Construction is anticipated to create noise within the disturbance threshold for marbled murrelets extending 750 feet offshore that may be foraging in the marine waters of Bellingham Bay west of the existing WWTP.
- The project action will require tree removal.
- The proposed action may affect prey species within the Action Area.

A "not likely to adversely affect" determination for marbled murrelet is warranted based on the following rationale:

- No suitable nesting habitat for marbled murrelet exists within the Action Area. The project area is within the City limits and is surrounded by residential,commercial, and industrial development. Forested area, where present, are fragmented by human development.
- No in-water work will be required within Bellingham Bay. The closest work will occur adjacent to Post Point Lagoon and will not include pile driving or other highly intensive construction noise. Marbled murrelet use of the lagoon is highly unlikely given the narrow opening to Bellingham Bay and the relative proximity of the lagoon to the WWTP and other development.

- Construction activities are located approximately 200 feet from suitable foraging habitat. No impact pile driving will be required.
- Tree removal will be restricted to landscaping trees within the existing site perimeter. These trees provide no suitable nesting habitat for murrelets.
- The proposed action will result in improved water quality being discharged to Puget Sound and is anticipated to improve conditions for forage fish species.
- Marbled murrelets would likely avoid the Action Area during construction. Suitable foraging habitat is available elsewhere and in adjacent habitats outside the construction area.

7.2 Critical Habitat

7.2.1 Critical Habitat for Coastal-Puget Sound DPS Bull Trout

The overall effect determination for critical habitat for Coastal Puget Sound DPS bull trout as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Coastal-Puget Sound DPS bull trout critical habitat is warranted based on the following rationale:

- The project lies within designated critical habitat along the marine nearshore environment of Bellingham Bay and Post Point lagoon adjacent to the WWTP extending offshore to a depth of 33 feet below MLLW
- Water temperature, water quality/quantity, prey base, and migratory PCEs are present within the Action Area.
- The proposed action will result in WWTP process upgrades and discharge of highly treated wastewater effluent in the vicinity of designated critical habitat.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will add approximately one acre of new impervious surface area to the basin.
- The proposed action will require excavation and grading within the 19-acre expansion area and immediately adjacent to Post Point Lagoon.
- Prey species for bull trout are available within the marine nearshore environment.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity adjacent to the marine nearshore environment.

A "not likely to adversely affect" determination is warranted for this proposed action for Coastal-Puget DPS bull trout critical habitat because:

- The proposed action will require excavation and grading along Post Point Lagoon to mitigate for wetland impacts resulting from the proposed WWTP expansion. This action will increase the amount of estuarine habitat and result in an expansion of critical habitat for bull trout within the Action Area. Work will be conducted in accordance with

allowable in-water work window, which coincides with periods when bull trout, salmonids, and forage fish are least likely to occur in the Action Area. In addition erosion and spill prevention and erosion and sediment control BMPs will be in place to minimize the potential release of construction related contaminants and the potential for increased turbidity. All excavation and grading adjacent to the lagoon will be conducted in the dry, leaving a earthen barrier between the excavation area and Post Point Lagoon until such point that the tide is out and openings into the newly created habitat can be excavated and the tide allowed into the newly created habitat upon the following incoming tide.

- Mitigation includes creating habitat for the expansion of salt marsh habitat within Post Point Lagoon. This will increase cover and refuge for prey species of bull trout, which will provide for long-term benefits for both predator and prey.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Puget Sound and subsequently the estuary and marine nearshore environment during construction of the proposed action. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The proposed action is not likely to have an adverse affect on species that may provide forage for bull trout.
- Future development within the Service Area will be required to meet existing regulatory requirements such as local critical area ordinances, stormwater regulations and shoreline regulations as well as other state and federal permit requirements associated with work in regulated critical areas. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

7.2.2 Critical Habitat for Puget Sound ESU Chinook Salmon

The overall effect determination for designated critical habitat for Puget Sound ESU Chinook salmon as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Puget Sound ESU Chinook salmon critical habitat is warranted based on the following rationale:

- The project lies within designated critical habitat along the marine nearshore environment of Bellingham Bay and the estuarine areas associated with Post Point Lagoon.
- Nearshore and estuarine PCEs are present within the Action Area.
- The proposed action will result in WWTP process upgrades and discharge of treated wastewater effluent into designated critical habitat.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2010 feet offshore at a depth of 76 feet are anticipated to increase from a current average daily volume of 20 mgd to 34.3 mgd by the year 2034. Flows in excess of the primary outfall capacity will be discharged via the secondary outfall located 500 feet offshore at a depth of 41 feet.
- Construction of the proposed action will result in an increase in impervious surface within the basin.
- The proposed action will require soil disturbing activities in the vicinity of Post Point Lagoon.
- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity adjacent to the marine nearshore environment.

A "not likely to adversely affect" determination is warranted for this proposed action for Puget Sound ESU Chinook salmon critical habitat because:

- The proposed action will require excavation and grading along Post Point Lagoon to mitigate for wetland impacts resulting from the proposed WWTP expansion. This action will increase the amount of estuarine habitat and result in an expansion of critical habitat for Chinook salmon within the Action Area. Work will be conducted in accordance with allowable in-water work windows, which coincides with periods when Chinook salmon, and forage fish are least likely to occur in the Action Area. In addition erosion and spill prevention and erosion and sediment control BMPs will be in place to minimize the potential release of construction related contaminants and the potential for increased turbidity. All excavation and grading adjacent to the lagoon will be conducted in the dry, leaving a earthen barrier between the excavation area and Post Point Lagoon until such point that the tide is out and openings into the newly created habitat can be excavated and the tide allowed into the newly created habitat upon the following incoming tide.
- Mitigation includes the expansion of salt marsh habitat within Post Point Lagoon. This will increase cover and refuge for juvenile Chinook salmon and increase the overall extent of critical habitat for Chinook salmon.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment

improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.

- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processin*g*.
- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Puget Sound and subsequently the estuary and marine nearshore environment during construction of the proposed action. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The proposed action is not likely to have an adverse affect on species that may provide forage for Chinook salmon.
- Future development within the Service Area will be required to meet existing regulatory requirements such as local critical area ordinances, stormwater regulations and shoreline regulations as well as other state and federal permit requirements associated with work in regulated critical areas. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

7.2.3 Critical Habitat for Southern Resident Killer Whale

The overall effect determination for critical habitat for the Southern Resident killer whale as a result of the proposed action is "may affect, not likely to adversely affect."

A "may affect" determination for Southern Resident killer whale critical habitat is warranted based on the following rationale:

- The project lies within designated critical habitat.
- The Action Area contains PCEs essential to the conservation of the Southern Resident killer whale in South Puget Sound. PCEs include passage conditions to allow for migration, resting, and foraging, and water quality to support growth and development.
- The proposed action will result in WWTP process upgrades and discharge of treated wastewater effluent in the vicinity of designated critical habitat.
- The proposed action will allow for an incremental increase in effluent discharge volumes. Effluent flows discharged via the primary marine outfall located 2,010 feet offshore at a depth of 76 feet is anticipated to increase from a current maximum monthly volume of 20 mgd to 34.3 mgd by the year 2034.
- The proposed action will require soil disturbing activities in the vicinity of Post Point Lagoon.
- The proposed action will add approximately 1 acres of new impervious surface to the basin.

- The proposed action will facilitate future development within the Action Area indirectly resulting in an increase in impervious surface area and increased human activity adjacent to the marine nearshore environment.

A "not likely to adversely affect" determination is warranted for this proposed action for Southern Resident killer whale critical habitat because:

- The proposed action will not require any work within marine habitats. Therefore, the migration of killer whale through the project area will not be impeded by the proposed action.
- The proposed action will not require any in-water work within designated critical habitat and therefore there are no anticipated direct effects to critical habitat PCEs in the Action Area as a result of construction. The majority of construction activities are anticipated to occur within the existing site footprint; however, some soil disturbing activities will be necessary immediately adjacent to Post Point Lagoon to mitigate for wetland impacts. BMPs will be in place to minimize turbidity and potential for accidental release of construction related spills.
- The proposed improvements will result in additional discharge volumes; however, BOD loading will continue to be commensurate with volume increases due to the addition of a new secondary clarifier. The proposed WWTP improvements are not anticipated to result in any reasonable potential to exceed surface water quality standards. The Post Point WWTP is designed to meet stringent NPDES permit discharge requirements under current and post-project conditions. The implementation of proposed secondary treatment improvements will provide the flexibility to achieve higher effluent water quality, with additional future upgrades.
- While some new impervious surface will be added to the basin, all stormwater generated from construction and operation of the facility will be treated in accordance with Ecology's *2005 Stormwater Management Manual for Western Washington.* Stormwater generated from process areas will continue to be collected and conveyed to the WWTP for processing.
- TESC measures and a Stormwater Pollution Prevention Plan will be in place to minimize the potential for turbidity and sedimentation Puget Sound and subsequently the estuary and marine nearshore environment during construction of the proposed action. Spill prevention plans and other construction related BMP's will be in place to prevent spills of oils, hydraulic fluids, or other contaminants into surface waters.
- The proposed action is not likely to have an adverse affect on aquatic fish species that may provide forage for Southern Resident killer whale. The existing low numbers of salmon returning to Bellingham Bay tributaries likely limits movements of killer whales into this area on a regular basis.
- Future development within the Service Area will be required to meet existing regulatory requirements such as local critical area ordinances, stormwater regulations and shoreline regulations as well as other state and federal permit requirements associated with work in regulated critical areas. Future development requiring a federal permit or federal funding will undergo separate ESA consultation.

- Substantial reduction of CSO-related bypass events at the WWTP from an average of 9 per year to 1 per year or less, will result in reduced BOD and contaminant loading to Bellingham Bay, with accompanying improvements to water quality.

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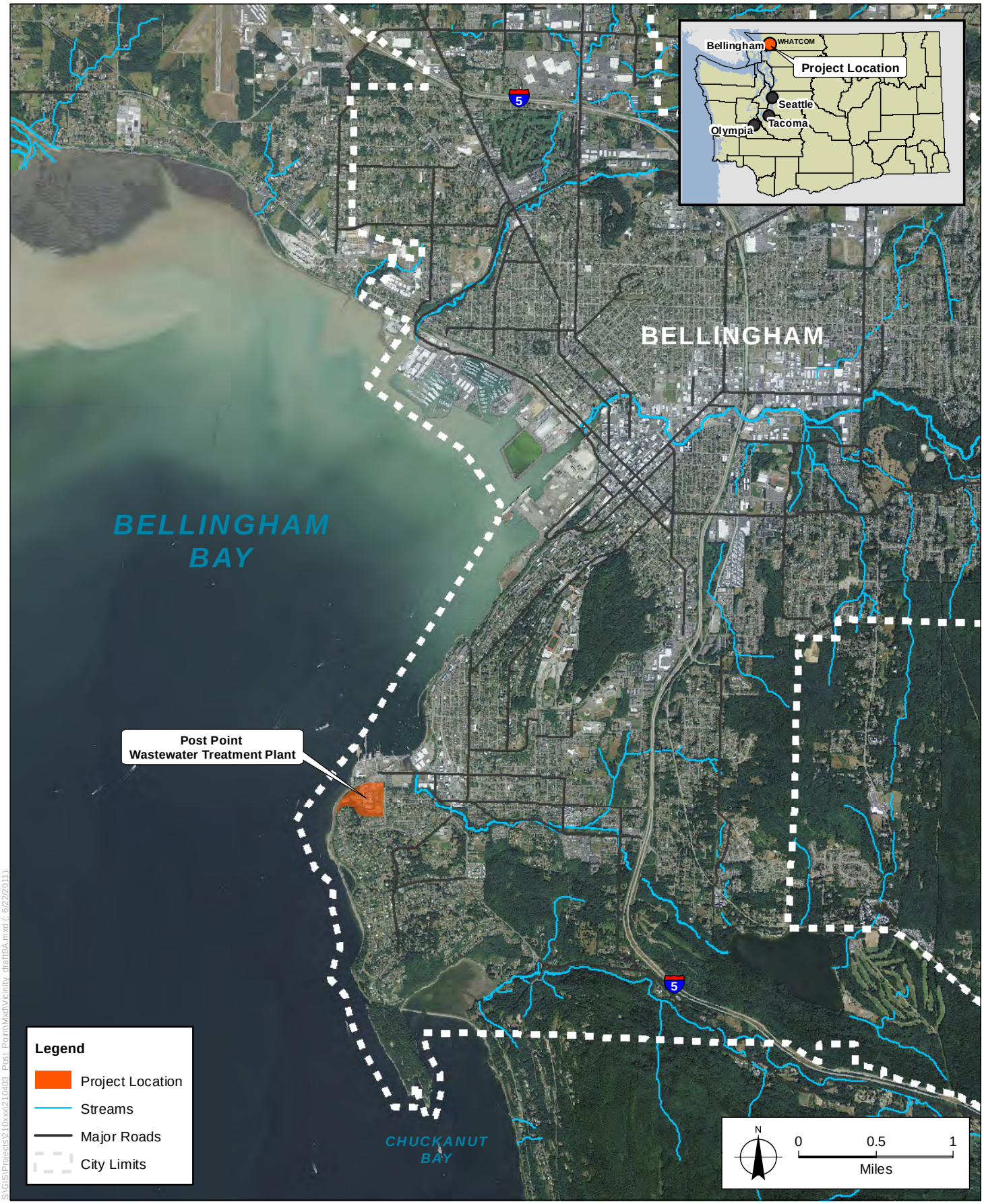
FIGURES AND PHOTOS



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SOURCE: City of Bellingham, 2010; Ecology, 2006; NAIP (USDA), 2009 (Aerial)

Post Point Biological Assessment. 210403

Figure 1
Vicinity Map
Bellingham, Washington

Outfall 2

122°31'6"W
48°43'13"N

Outfall 1

122°31'22"W
48°43'11"N

Post Point Wastewater Treatment Plant

N

0 65 130
Feet

Legend

- Outfalls
- Site Boundary
- OHWM (Marine Shoreline)
- Shoreline of Statewide Significance
- Conservancy II (SMP Designation)
- Buildings (Proposed)
- Contours (5')
- Parcels

S:\GIS\Projects\210xxx\210403_Post_PointMxd\Outfalls.mxd (ATR, 6/22/2011)

SOURCE: Buildings, (Cantrell & Associates, 2009); Contours, OHWM (Marine Shoreline), Parcels & SMP Designation (City of Bellingham, 2008); Shoreline of Statewide Significance (Ecology, 2000).

Post Point Biological Assessment . 210403

Figure 2

WWTP Outfalls

Bellingham, Washington

SOURCE: Contours, OHWM (Marine Shoreline), Parcels & SMP Designation (City of Bellingham, 2008); Shoreline of Statewide Significance (Ecology, 2000).

Post Point Biological Assessment . 210403

Figure 3

Post Point WWTP Existing Site Plan

Bellingham, Washington

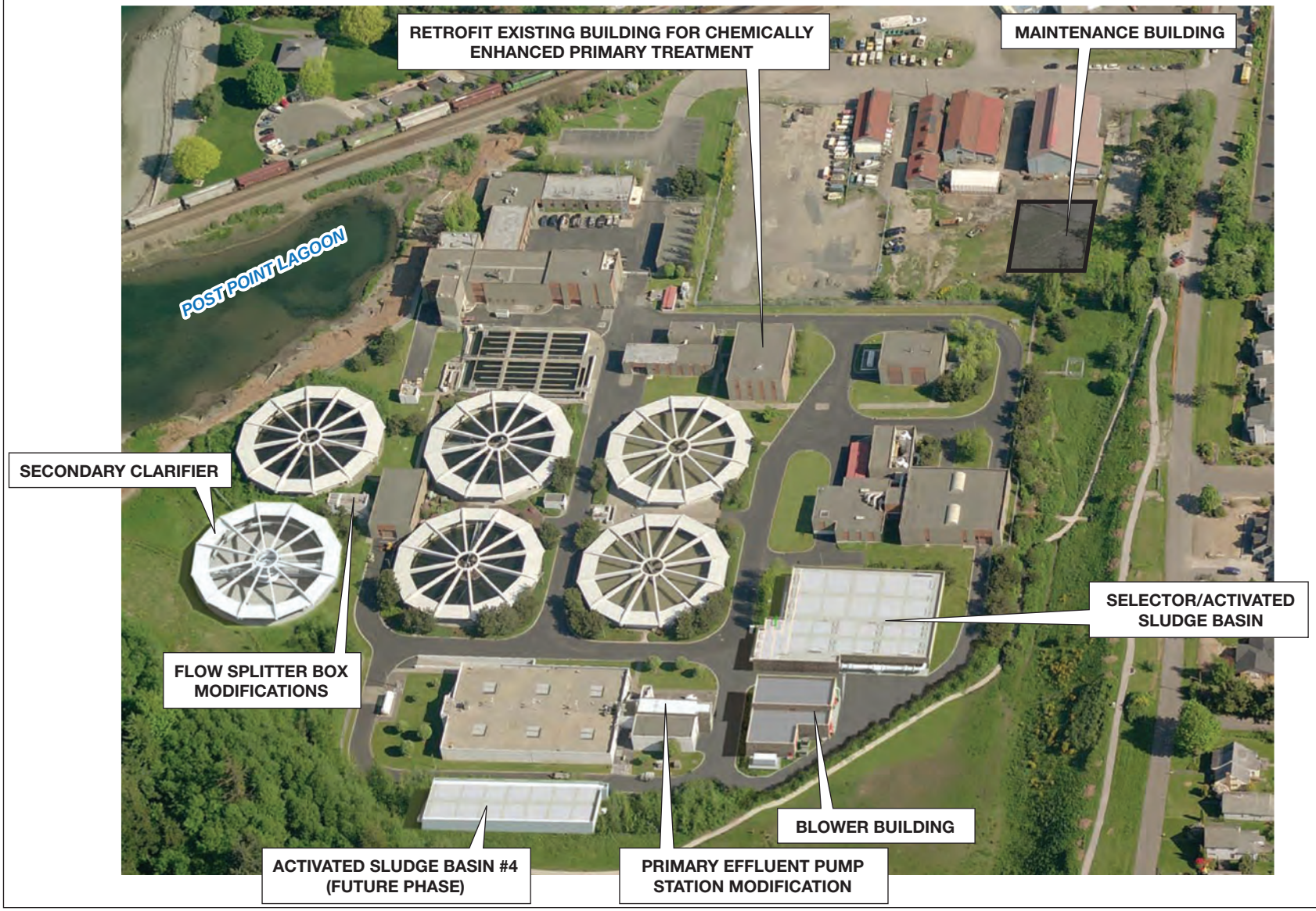
SOURCE: Bald Eagle, WDFW; Stream, (Cantrell & Associates, 2011; Wilson Engineering, 2009); Floodplain, (Whatcom County, 2004); Heron Boundaries, Roost Tree, (Nahkeeta Northwest); Marine Shoreline, Parcels, Aerial Photo (City of Bellingham, 2008, 2010); Wetlands (Cantrell and Associates, 2009); Fence (Carollo, 2010)

Post Point Biological Assessment . 210403

Figure 4

Post Point WWTP On-site Critical Areas

Bellingham, Washington



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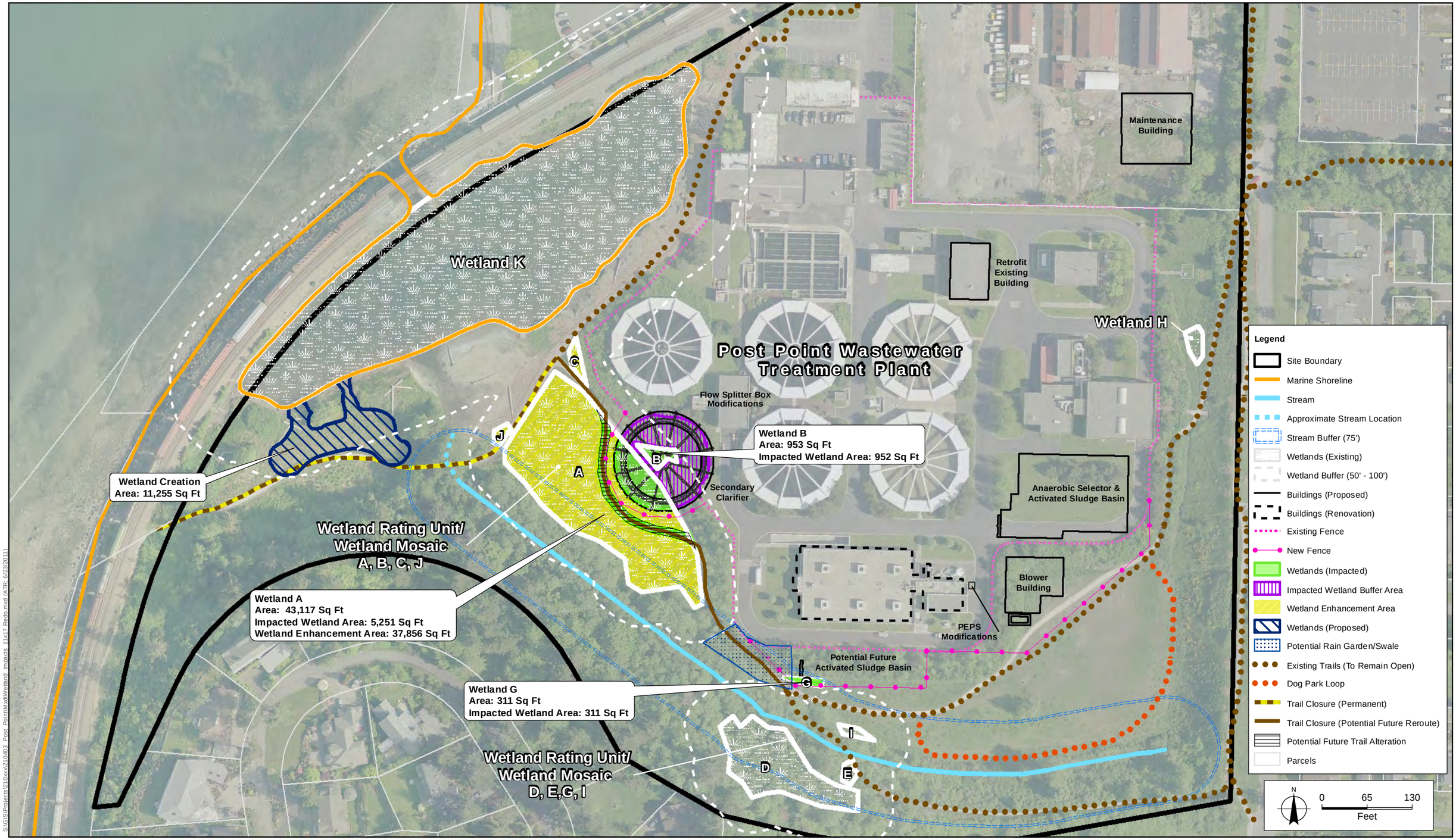
CREATED BY: JAB / DATE LAST UPDATED: 06/23/11

SOURCE: Carollo; City of Bellingham; ESA.

Post Point Biological Assessment . 210403

Figure 5
Proposed Site Plan
Bellingham, Washington



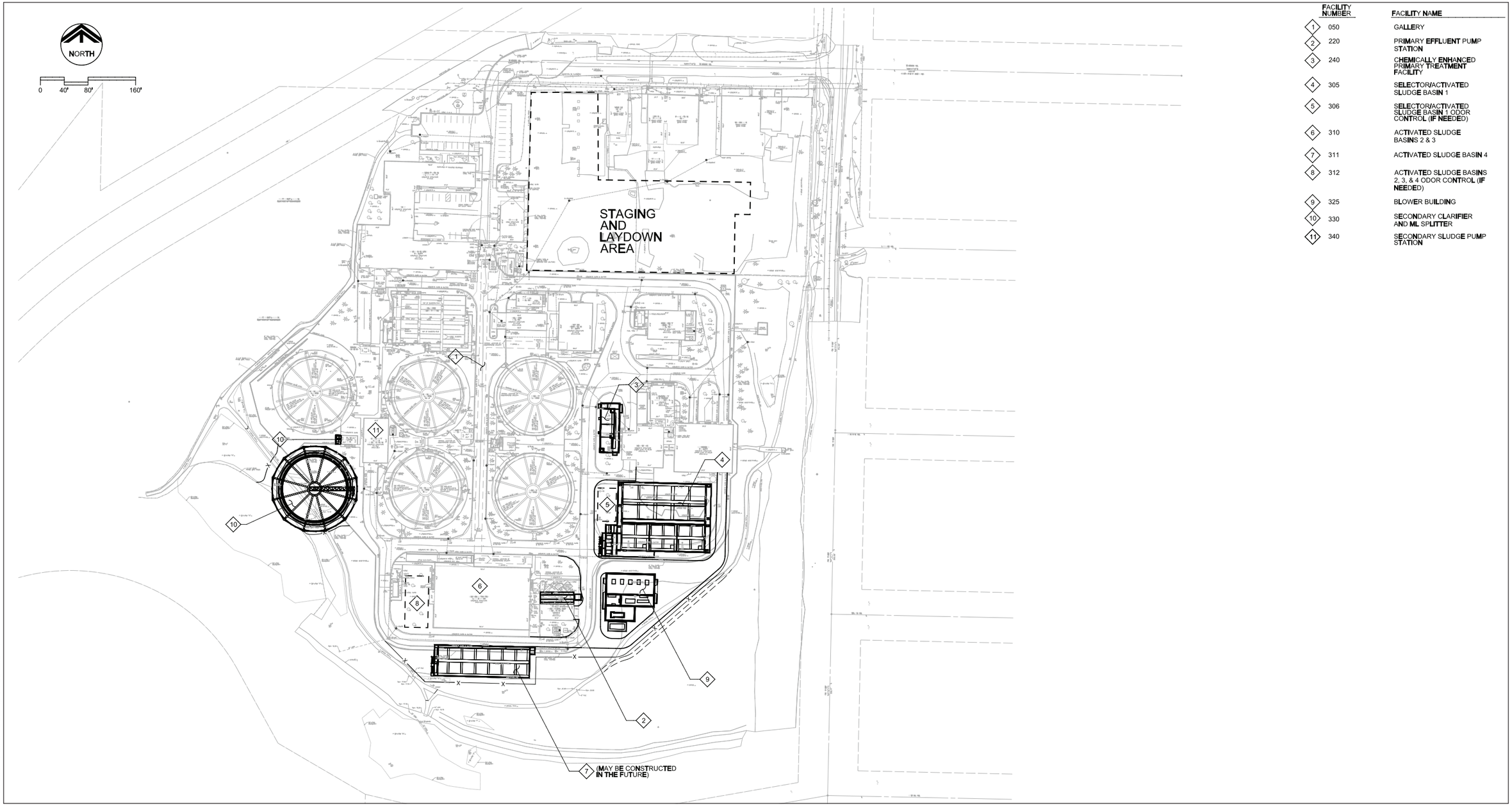
S:\GIS\Projects\210xxx\210403_Post_Point\MxdWetland_Impacts_11x17_Redo.mxd (ATR: 6/23/2011)

SOURCE: Stream, (Cantrell & Associates, 2011; Wilson Engineering, 2009); Existing Trails, Marine Shoreline, Parcels, Aerial Photo (City of Bellingham, 2008, 2010); Rain Garden, Wetland Buffer, Stream Buffer, Impacted Wetland Buffer, Impacted Wetland, Wetland Enhancement Area, (ESA Adolfson 2010); Wetlands (Cantrell and Associates, 2009); Fence, Rain Garden (Carollo, 2010); Dog Park Loop, Wetlands Proposed (Philbin Group, 2011)

Post Point Mitigation Plan . 210403

Figure 6

Wetland and Buffer Impacts and Conceptual Mitigation Areas
Bellingham, Washington

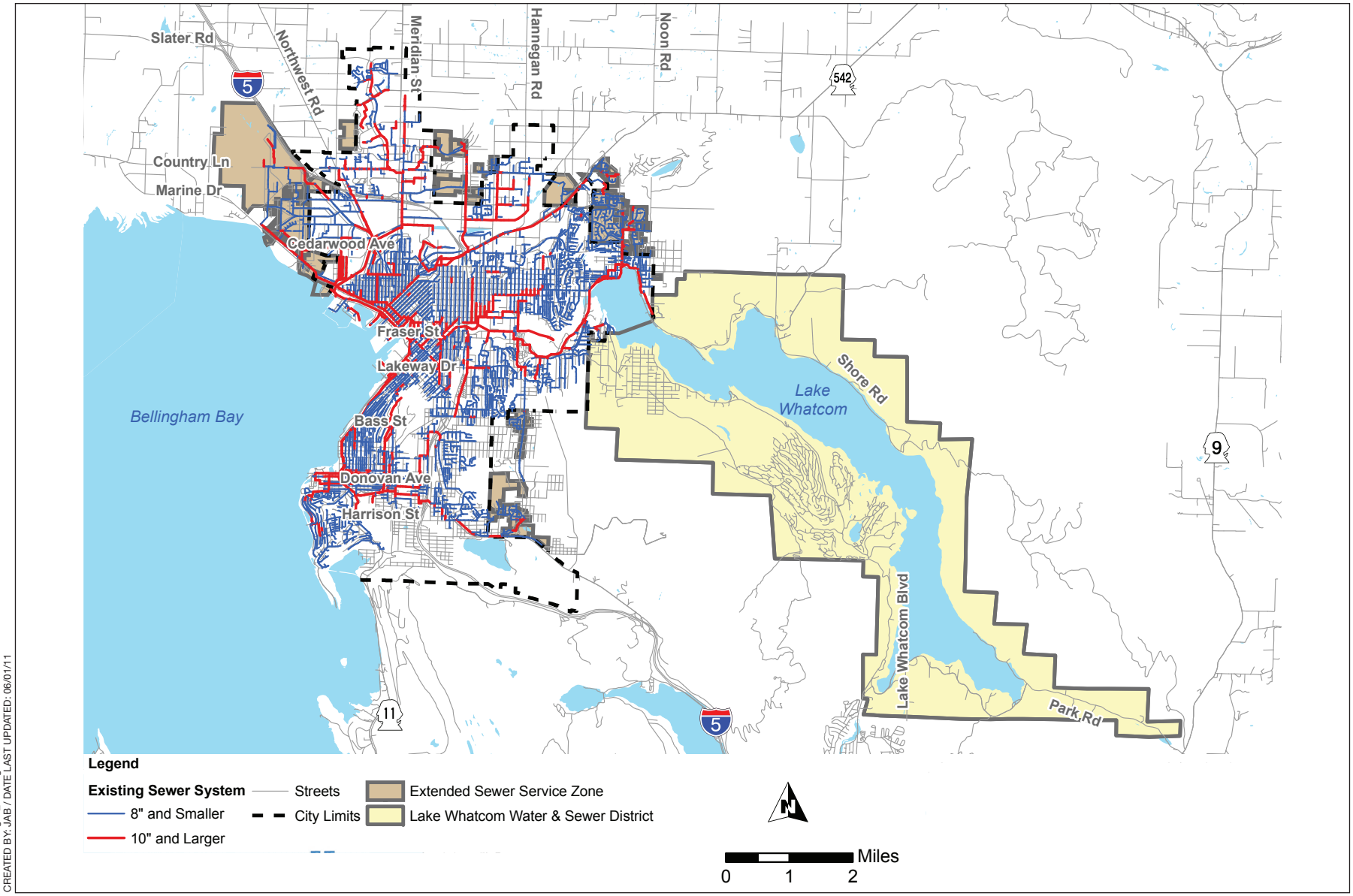


FACILITY NUMBER		FACILITY NAME
1	050	GALLERY
2	220	PRIMARY EFFLUENT PUMP STATION
3	240	CHEMICALLY ENHANCED PRIMARY TREATMENT FACILITY
4	305	SELECTOR/ACTIVATED SLUDGE BASIN 1
5	306	SELECTOR/ACTIVATED SLUDGE BASIN 1 ODOR CONTROL (IF NEEDED)
6	310	ACTIVATED SLUDGE BASINS 2 & 3
7	311	ACTIVATED SLUDGE BASIN 4
8	312	ACTIVATED SLUDGE BASINS 2, 3, & 4 ODOR CONTROL (IF NEEDED)
9	325	BLOWER BUILDING
10	330	SECONDARY CLARIFIER AND ML SPLITTER
11	340	SECONDARY SLUDGE PUMP STATION

FILE NAME: Fig07_ProposedSitePlan.ai
CREATED BY: JAB / DATE LAST UPDATED: 06/01/11

SOURCE: Wilson Survey/Engineering; Carollo; City of Bellingham, 2010.

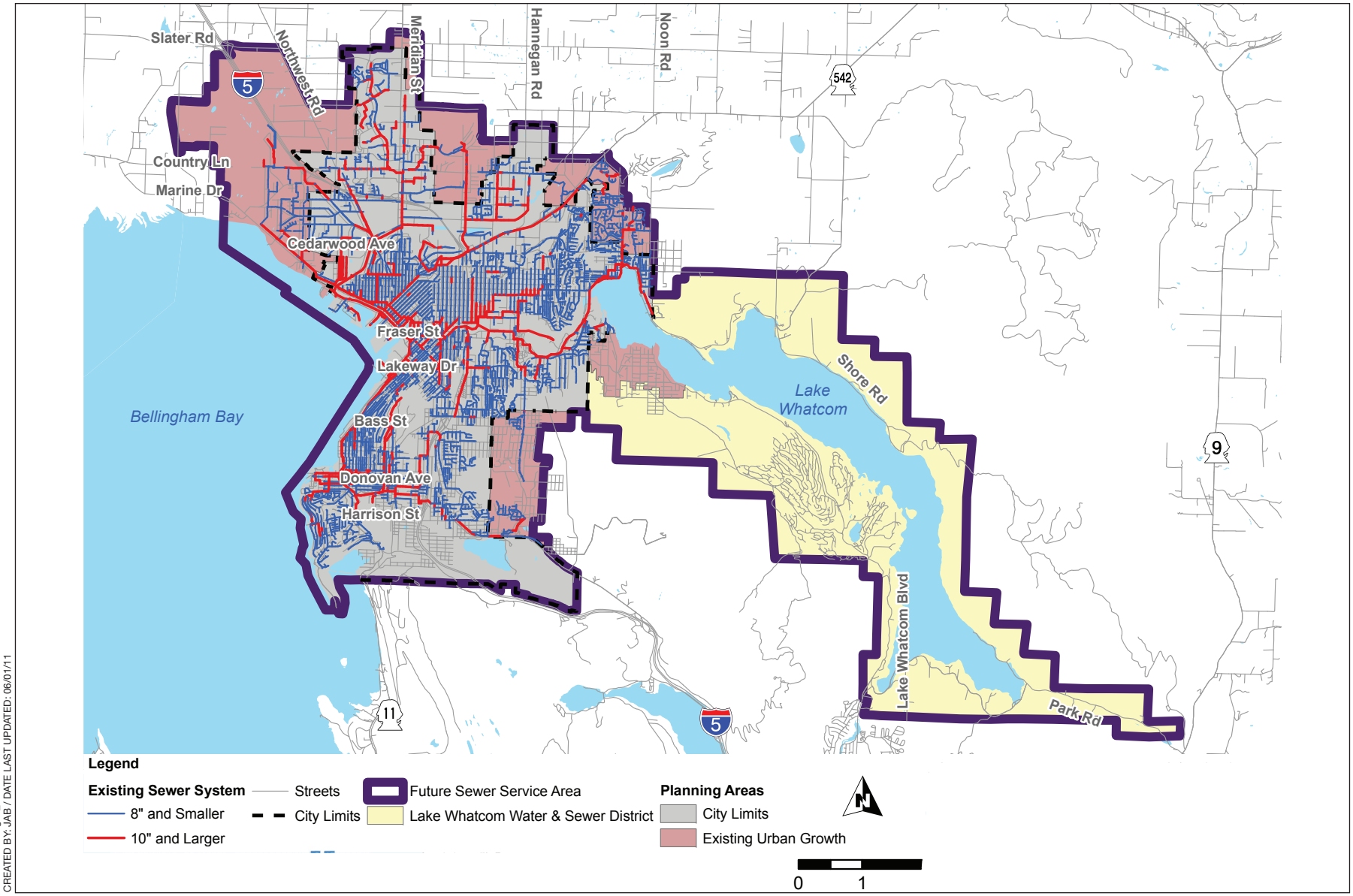
Figure 7
Staging and Laydown Area
Bellingham, Washington



FILE NAME: Fig08_ExistingSewerArea.ai
CREATED BY: JAB / DATE LAST UPDATED: 06/01/11

SOURCE: Carollo, City of Bellingham.

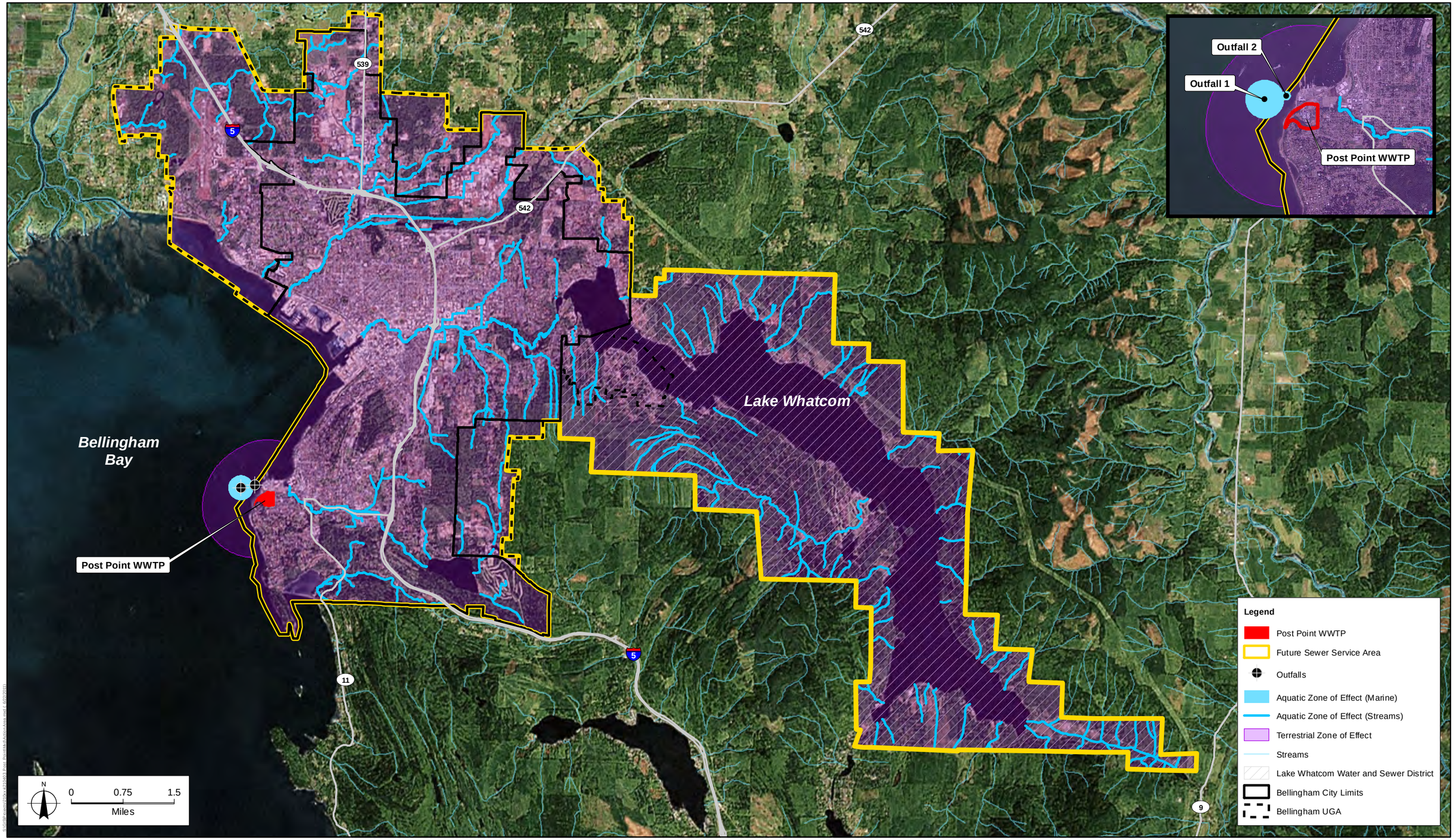
Figure 8
Existing Sewer Service Area
Bellingham, Washington



FILE NAME: Fig09_FutureSewerArea.ai
CREATED BY: JAB / DATE LAST UPDATED: 06/01/11

SOURCE: Carollo, City of Bellingham.

Figure 9
Future Sewer Service Area
Bellingham, Washington



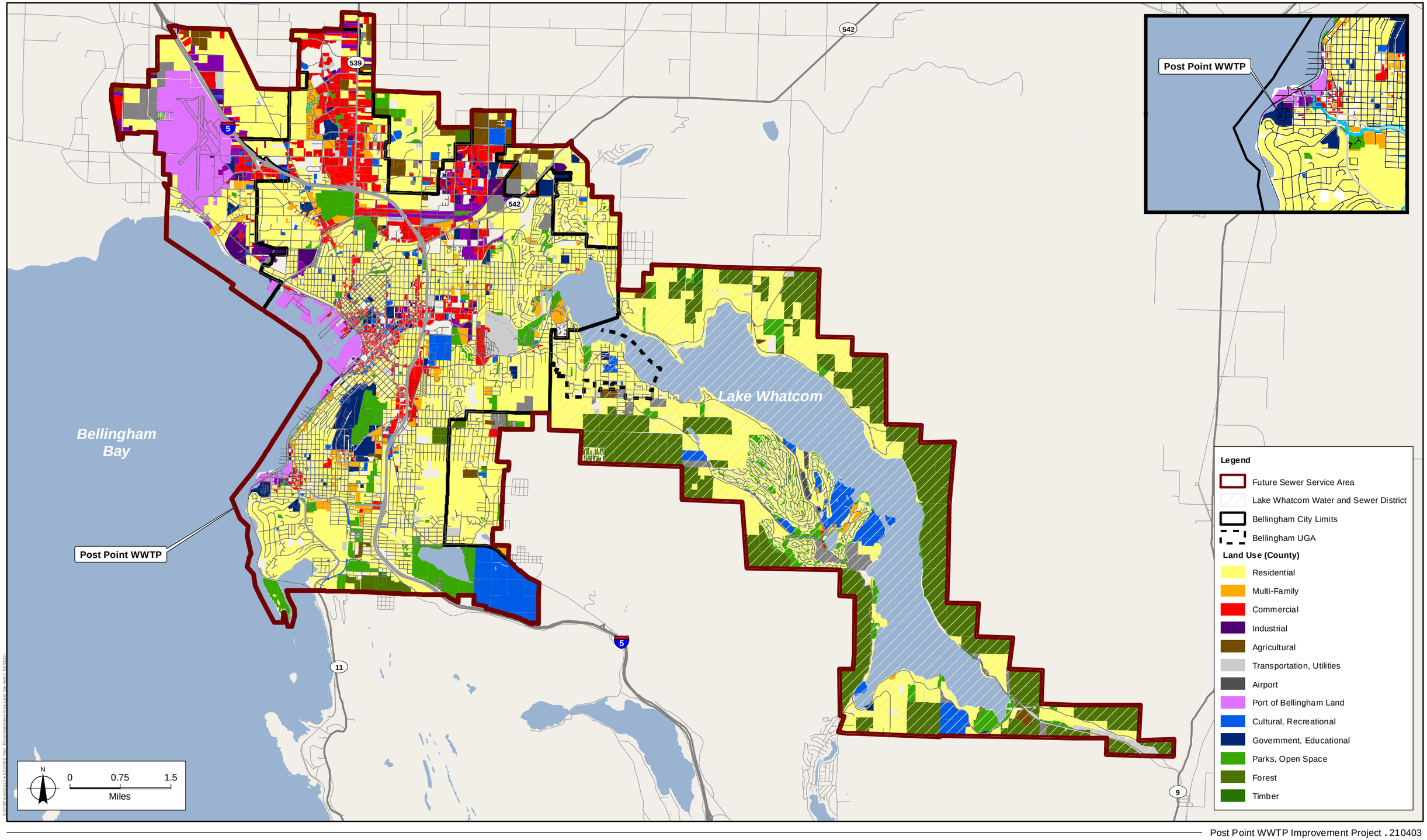
SOURCE: Aquatic Zone of Effect, Terrestrial Zone of Effect, (ESA, 2011); City Limits, Post Point WWTP, Streams, UGA, (City of Bellingham, 2010); Lake Whatcom Water and Sewer District (LWWSD), (LWWSD, 2011); Roads, (Whatcom County, 2003)

Post Point WWTP Improvement Project . 210403

Figure 10

Post Point WWTP Action Area

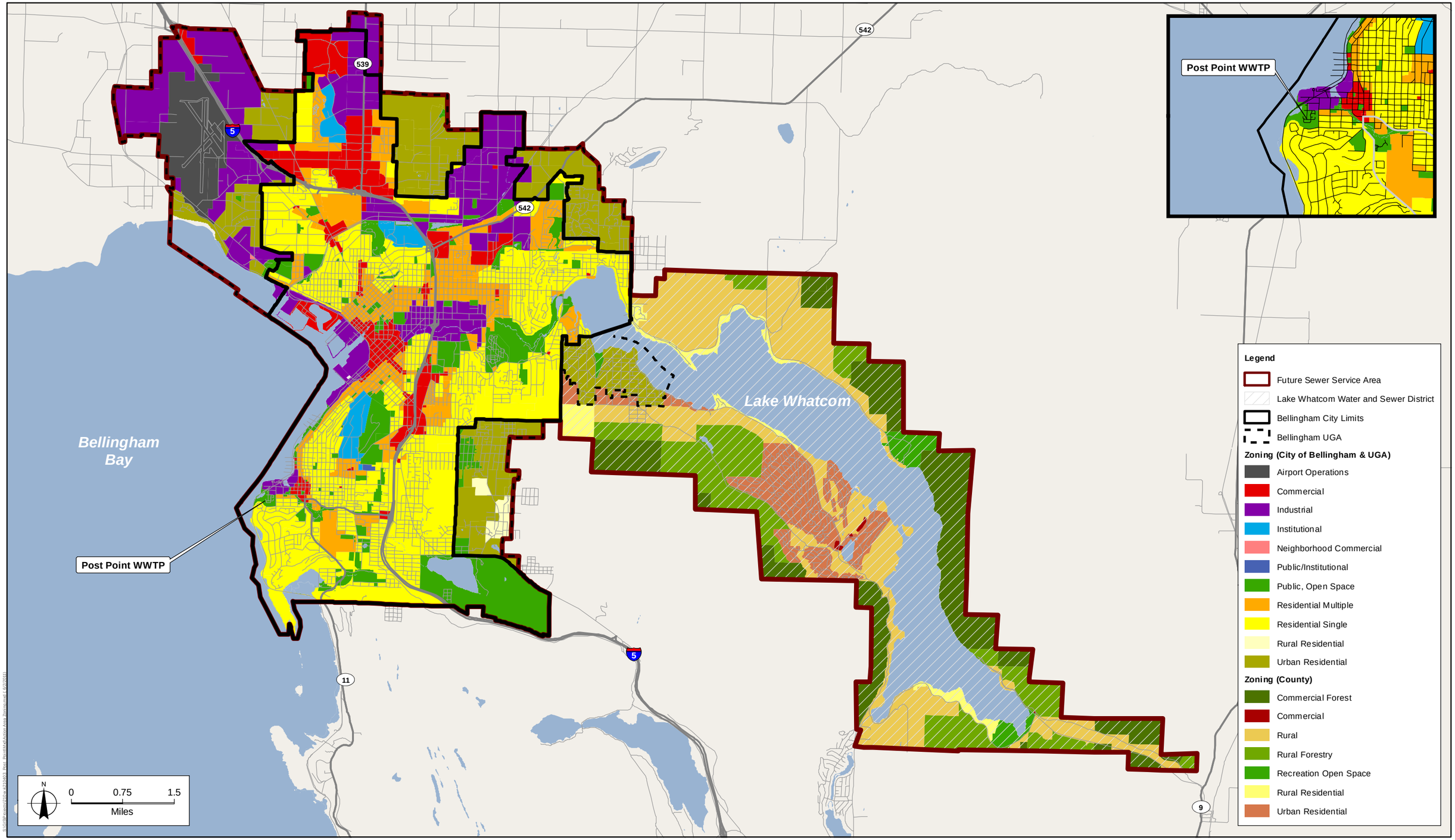
Bellingham, Washington



SOURCE: City Limits, UGA, Land Use (City of Bellingham, 2010); Lake Whatcom Water and Sewer District (LWWSD), (LWWSD, 2011); Land Use, (Whatcom County, 2005); Roads, (Whatcom County, 2003)

Post Point WWTP Improvement Project . 210403

Figure 11
Land Use
Bellingham, Washington



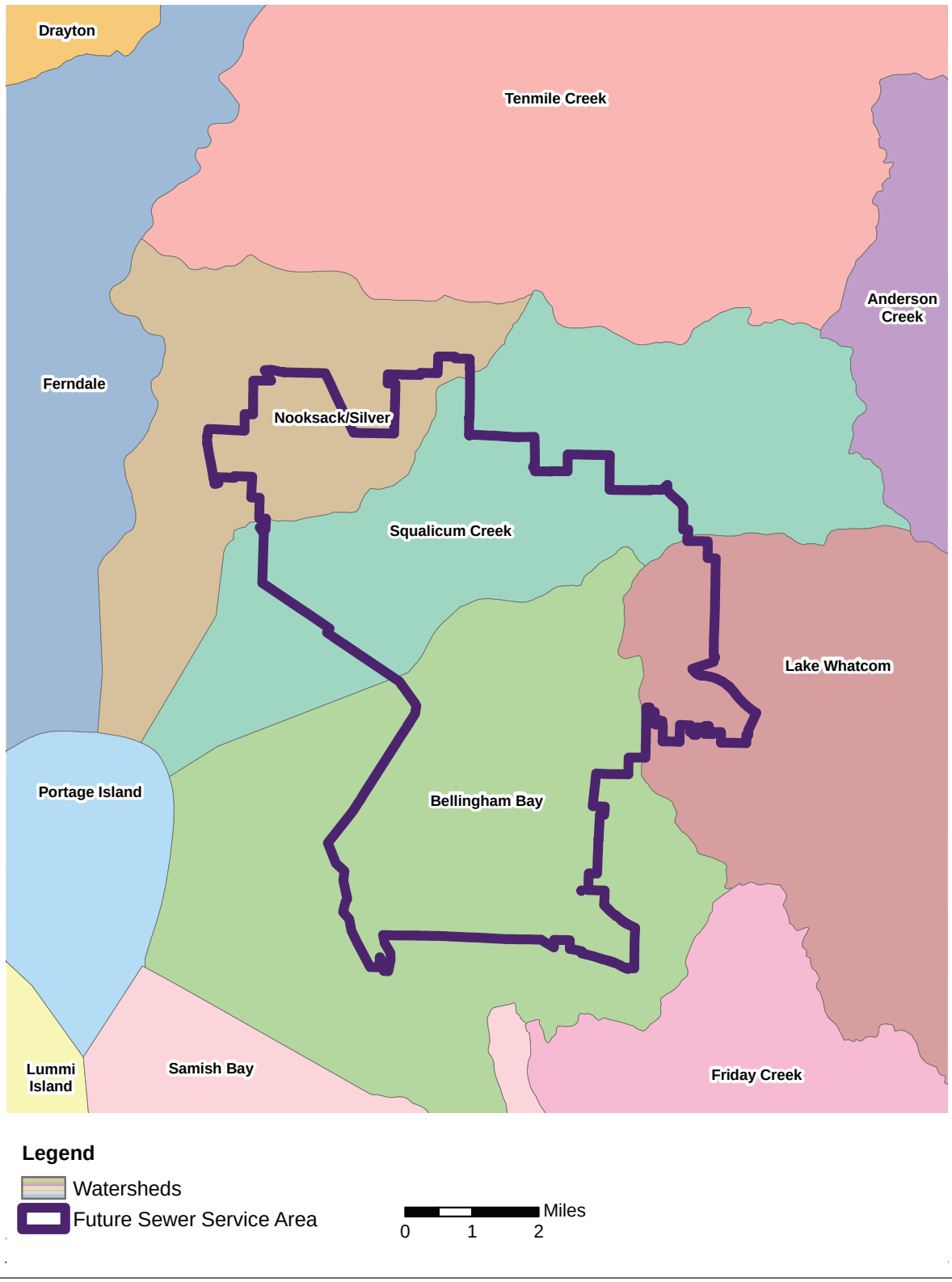
SOURCE: City Limits, UGA, Zoning (City of Bellingham, 2010); Lake Whatcom Water and Sewer District (LWWSD), (LWWSD, 2011); Roads, (Whatcom County, 2003); Zoning, (Whatcom County, 2005);

Post Point WWTP Improvement Project . 210403

Figure 11

Zoning

Bellingham, Washington



FILE NAME: Fig09_Watersheds.ai
CREATED BY: JAB / DATE LAST UPDATED: 06/01/11

SOURCE: Carollo, City of Bellingham.

Figure 13
Watersheds
Bellingham, Washington

Photo 1. Looking west across Post Point Lagoon toward BNSF Railroad causeway and opening to Bellingham Bay (March 2011).

Photo 2. Pedestrian trail that runs along south and west side of the Post Point WWTP (March 2011)

Photo 3. Looking north toward WWTP, pedestrian trail and dog park area (September 2010).

Photo 4. Forested area to the south of the WWTP (September 2010).

Photo 5. On-site wetland along south perimeter of the WWTP (September 2010).

Photo 6. Southeast corner of Post Point Lagoon looking northwest toward railroad causeway. Small unnamed stream discharges to Post Point Lagoon in forefront of photo (September 2010).

Photo 7. Restoration area completed in 2008 at north end of Post Point Lagoon looking southwest (September 2010).

Photo 8. Unnamed stream that discharges to the southeast side of Post Point Lagoon (March 2011).

Photo 9. Unnamed stream that discharges to the southeast side of Post Point Lagoon (September 2011).

Photo 10. Looking southwest at proposed wetland mitigation area along Post Point Lagoon (April 2011).

APPENDIX A: POST POINT WWTP NPDES PERMIT

Permit No. WA-002374-4
Issuance Date: November 2, 2007
Effective Date: November 15, 2007
Expiration Date: November 15, 2012
Minor Modification Date: December 18, 2007

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT No. WA-002374-4

State of Washington
DEPARTMENT OF ECOLOGY
Bellingham Field Office
1440 – 10th Street, Suite 102
Bellingham, WA 98225

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

CITY OF BELLINGHAM

210 Lottie Street

Bellingham, Washington 98225

Plant Location: 200 McKenzie Ave. Bellingham, WA 98225	Receiving Water: Bellingham Bay
Waterbody I.D. No.: 1229892484144	Discharge Location Outfall 001: Latitude: 48° 43' 11" N Longitude: 122° 31' 22" W
Plant Type: Pure Oxygen Activated Sludge	Discharge Location Outfall 002: Latitude: 48° 43' 13" N Longitude: 122° 31' 06" W

is authorized to discharge in accordance with the Special and General Conditions that follow.

Richard Grout
Manager
Bellingham Field Office
Washington State Department of Ecology

TABLE OF CONTENTS

GENERAL CONDITIONS

SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3	Discharge Monitoring Report	Monthly	December 15, 2007
S3.E	Noncompliance Notification	As necessary	
S3.F	Shellfish Protection	As necessary	
S3.G	Other Noncompliance Reporting	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S4.E	Infiltration and Inflow Evaluation	1/permit cycle	November 30, 2012
S4.F	Wasteload Assessment	Annually	March 15, 2009
S5.G	Operations and Maintenance Manual Update or Review Confirmation Letter	Annually	November 30, 2008
S6.D	Industrial User Survey	1/permit cycle	November 30, 2012
S7	Residual Solids Management Plan	1/permit cycle	November 30, 2012
S8	Application for Permit Renewal	1/permit cycle	May 15, 2012
S9	Spill Plan	1/permit cycle	November 1, 2009
S10.C	Acute Toxicity Compliance Monitoring Reports	4/year January, March, June, September	60 days following required sampling
S10.C	Acute Toxicity TI/TRE Plan	As necessary	
S10.D	Acute Toxicity: “Causes and Preventative Measures for Transient Events”	As necessary	
S11.B	Combined Sewer Overflow Report	Annually	July 1, 2008
S11.C	Combined Sewer Overflow Reduction Plan Amendment	1/permit cycle	August 30, 2012
S13	Outfall Evaluation	1/permit cycle	October 30, 2008
G1	Notice of Change in Authorization	As necessary	
G4	Permit Application for Substantive Changes to the Discharge	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G8	Application for Permit Renewal	1/permit cycle	May 15, 2012
G21	Notice of Planned Changes	As necessary	
G22	Reporting Anticipated Noncompliance	As necessary	

SPECIAL CONDITIONS

S1. DISCHARGE LIMITATIONS

A. Effluent Limitations

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee is authorized to discharge municipal wastewater at the permitted location subject to complying with the following limitations:

EFFLUENT LIMITATIONS[a]: OUTFALL 001 WINTER – October through March		
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand[a] (5-day)	30 mg/L, 5004 lb/day 80% removal of influent BOD	45 mg/L, 7506 lb/day
Total Suspended Solids	30 mg/L, 5004 lb/day 80% removal of influent TSS	45 mg/L, 7506 lb/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH[b]	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[c]**
Total Residual Chlorine (if WQ-based)	198 µg/L, 33 lb/day	429 µg/L, 72 lb/day
	Quarterly	
Whole Effluent Toxicity	Acute Limit = 3.0%	

[a] The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.

[b] Indicates the range of permitted values. When pH is continuously monitored, excursions between 5.0 and 6.0, or 9.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 are violations. The instantaneous maximum and minimum pH shall be reported monthly.

[c] The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.

EFFLUENT LIMITATIONS[a]: OUTFALL 001 **SUMMER – April through September**		
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand (5-day)	30mg/L, 3830 lb/day 85% removal of influent BOD	45 mg/L, 5745 lb/day
Total Suspended Solids	30 mg/L, 5004 lb/day 85% removal of influent TSS	45 mg/L, 7506 lb/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH[b]	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[c]**
Total Residual Chlorine (if WQ-based)	198 µg/L, 33 lb/day	429 µg/L, 72 lb/day
Quarterly		
Whole Effluent Toxicity	Acute Limit = 3.0%	
[a] The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
[b] Indicates the range of permitted values. The instantaneous maximum and minimum pH shall be reported monthly. The pH shall not be averaged.		
[c] The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.		

B. Mixing Zone Descriptions

The acute mixing zone has a dilution ratio of 33:1.

The chronic mixing zone has a dilution ratio of 70:1.

S2. MONITORING REQUIREMENTS

A. Monitoring Schedule

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
Wastewater Influent	BOD_5	mg/l	Influent Headworks	5/week	24-hr composite
"	TSS	mg/l	Influent Headworks	5/week	24-hr composite
"	Flow	MGD	Influent Headworks	Daily	Measurement
Wastewater Effluent	Flow	MGD	Final Effluent	Daily	Measurement
"	BOD_5	mg/l	Final Effluent	5/week	24-hr composite
"	TSS	mg/l	Final Effluent	5/week	24-hr composite
"	pH	Standard Units	Final Effluent	Daily	Grab
"	Temperature	°C	Final Effluent	Daily	Grab
"	Total Residual Chlorine	µg/l	Final Effluent	Daily	Grab
"	Fecal Coliform	Count/ 100 mL	Final Effluent	5/week	Grab
"	Copper (total) Outfall 002	µg/L	Final Effluent	Sample Outfall 002 when it receives flow for three hours or more	Flow dependent composite
"	WET	% Survival	Final Effluent before chlorination	Quarterly (January, March, June, September)	24-hr composite

* Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance.

B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit shall be representative of the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit shall conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (APHA), unless otherwise specified in this permit or approved in writing by the Department of Ecology (Department).

C. Flow Measurement

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the quantity of monitored flows. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations and at a minimum frequency of at least one calibration per year. Calibration records shall be maintained for at least three years.

D. Laboratory Accreditation

All monitoring data required by the Department shall be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, chapter 173-50 WAC. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. Conductivity and pH shall be accredited if the laboratory must otherwise be registered or accredited. The Department exempts crops, soils, and hazardous waste data from this requirement pending accreditation of laboratories for analysis of these media.

S3. REPORTING AND RECORD KEEPING REQUIREMENTS

The Permittee shall monitor and report in accordance with the following conditions. The falsification of information submitted to the Department shall constitute a violation of the terms and conditions of this permit.

A. Reporting

The first monitoring period begins on the effective date of the permit. Monitoring results shall be submitted monthly. Monitoring data obtained during each monitoring period shall be summarized, reported, and submitted on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by the Department. DMR forms shall be

postmarked or received by the Department no later than the 15th day of the month following the completed monitoring period, unless otherwise specified in this permit. Priority pollutant analysis data shall be submitted no later than forty-five (45) days following the monitoring period. Unless otherwise specified, all toxicity test data shall be submitted within sixty (60) days after the sample date. The report(s) shall be sent to the addresses below ***respectively***:

Department of Ecology Northwest Regional Office 3190 – 160th Avenue SE Bellevue, WA 98008-5452	and	Department of Ecology Bellingham Field Office 1440 10th Street, Suite 102 Bellingham, WA 98225-7028

All laboratory reports providing data for organic and metal parameters shall include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected.

Discharge Monitoring Report forms must be submitted monthly whether or not the facility was discharging. If there was no discharge during a given monitoring period, submit the form as required with the words "no discharge" entered in place of the monitoring results.

B. Records Retention

The Permittee shall retain records of all monitoring information for a minimum of three (3) years. Such information shall include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Department.

C. Recording of Results

For each measurement or sample taken, the Permittee shall record the following information: (1) the date, exact place, method, and time of sampling or measurement; (2) the individual who performed the sampling or measurement; (3) the dates the analyses were performed; (4) the individual who performed the analyses; (5) the analytical techniques or methods used; and (6) the results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit using test procedures specified by Condition S2 of this permit, then the results of such monitoring shall be included in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Twenty-four Hour Notice of Noncompliance Reporting

1. The Permittee must take the following action upon violation of any permit condition:

   Immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the noncompliance and correct the problem and, if applicable, immediately repeat sampling and analysis. The results of any repeat sampling shall be submitted to Ecology within thirty (30) days of sampling.

2. The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at **(425) 649-7000 and (360) 715-5208**, within 24 hours from the time the Permittee becomes aware of the circumstances:

   a. Any noncompliance that may endanger health or the environment (for example, a fecal coliform measurement in the effluent which is too numerous to count);

   b. Any unanticipated bypass that exceeds any effluent limitation in the permit (See Part S5.F., "Bypass Procedures");

   c. Any upset that exceeds any effluent limitation in the permit (See G.15, "Upset");

   d. Any violation of a maximum daily or instantaneous maximum discharge limitation for any of the pollutants in S1.A.; or

   e. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limitation in the permit.

3. The Permittee must also provide a written submission within five days of the time that the Permittee becomes aware of any event required to be reported under subpart 2, above. The written submission must contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected;

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

   e. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

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

5. Reports must be submitted to the addresses in S3.A.

F. Reporting - Shellfish Protection

Unauthorized discharges, such as collection system overflows, plant bypasses, or failure of the disinfection system, shall be reported immediately to the Department of Ecology and the Department of Health, Shellfish Program. The Department of Ecology's Northwest Regional Office 24-hour number is (**425) 649-7000**, the Bellingham Field Office number is (**360) 715-5208**, the Department of Health's Shellfish 24-hour number is (**360) 236-3330,** and their **pager number is 360-786-4183 (24-hour emergency pager)**.

G. Other Noncompliance Reporting

The Permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for S3.A ("Reporting") are submitted. The reports must contain the information listed in paragraph E above, ("Twenty-four Hour Notice of Noncompliance Reporting"). Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

H. Maintaining a Copy of This Permit

A copy of this permit must be kept at the facility and be made available upon request to Department of Ecology inspectors.

S4. FACILITY LOADING

A. Design Criteria

Flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded:

Average flow for the maximum month:	20 MGD
BOD_5 loading for maximum month:	25,530 lb/day
TSS loading for maximum month:	47,000 lb/day

B. Plans for Maintaining Adequate Capacity

The Permittee shall submit to the Department a plan and a schedule for continuing to maintain capacity when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months; or
2. When the projected increase would reach design capacity within five years,

whichever occurs first. If such a plan is required, it shall contain a plan and schedule for continuing to maintain capacity. The capacity as outlined in this plan must be sufficient to achieve the effluent limitations and other conditions of this permit. This plan shall address any of the following actions or any others necessary to meet the objective of maintaining capacity.

1. Analysis of the present design including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria specified in paragraph A, above.

2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.

3. Limitation on future sewer extensions or connections or additional waste loads.

4. Modification or expansion of facilities necessary to accommodate increased flow or waste load.

5. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by the Department prior to any construction. The plan shall specify any contracts, ordinances, methods for financing, or other arrangements necessary to achieve this objective.

C. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

D. Notification of New or Altered Sources

The Permittee shall submit written notice to the Department whenever any new discharge or a substantial change in volume or character of an existing discharge into the POTW is proposed which: (1) would interfere with the operation of, or exceed the design capacity of, any portion of the POTW; (2) is not part of an approved general sewer plan or approved plans and specifications; or (3) would be subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act. This notice shall include an evaluation of the POTW's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the POTW, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

E. Infiltration and Inflow Evaluation

1. The Permittee shall conduct an infiltration and inflow evaluation. Refer to the U.S. EPA publication, *I/I Analysis and Project Certification*, available as Publication No. 97-03 at: Publications Office, Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600. Plant monitoring records may be used to assess measurable infiltration and inflow.

2. A report shall be prepared which summarizes any measurable infiltration and inflow. If infiltration and inflow have increased by more than 15 percent from that found in the first report based on equivalent rainfall, the report shall contain a plan and a schedule for: (1) locating the sources of infiltration and inflow; and (2) correcting the problem.

3. The report shall be submitted by October, 2011, with your next permit application.

F. Wasteload Assessment

The Permittee shall conduct an annual assessment of their flow and waste load and submit a report to the Department by March 15, 2009, and annually thereafter. The report shall contain the following: an indication of compliance or noncompliance with the permit effluent limitations; a comparison between the existing and design monthly average dry weather and wet weather flows, peak flows, BOD, and total suspended solids loadings; and (except for the first report) the percentage increase in these parameters since the last annual report. The report shall also state the present and design population or population equivalent, projected population growth rate, and the estimated date upon which the design capacity is projected to be reached, according to the most restrictive of the parameters above. The interval for review and reporting may be modified if the Department determines that a different frequency is sufficient.

S5. OPERATION AND MAINTENANCE

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

A. Certified Operator

An operator certified for at least a Class IV plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant shall be in charge during all regularly scheduled shifts.

B. O & M Program

The Permittee shall institute an adequate operation and maintenance program for their entire sewage system. Maintenance records shall be maintained on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records shall clearly specify the frequency and type of maintenance recommended by the manufacturer and shall show the frequency and type of maintenance performed. These maintenance records shall be available for inspection at all times.

C. Short-term Reduction

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limitations on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee shall give written notification to the Department, if possible, thirty (30) days prior to such activities, detailing the reasons for, length of time of, and the potential effects of the reduced level of treatment. This notification does not relieve the Permittee of their obligations under this permit.

D. Electrical Power Failure

The Permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations either by means of alternate power sources, standby generator, or retention of inadequately treated wastes.

The Permittee shall maintain Reliability Class III (EPA 430-99-74-001) at the wastewater treatment plant, which requires a backup power source sufficient to operate the screening or comminuting facilities, the main wastewater pumps, the primary sedimentation basins, the disinfection facility, and critical lighting and ventilation during peak wastewater flows.

E. Prevent Connection of Inflow

The Permittee shall strictly enforce their sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

F. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited, and the Department may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, or 3) is applicable.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health as determined by the Department prior to the bypass. The Permittee shall submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

   c. The Department is properly notified of the bypass as required in Condition S3.E of this permit.

3. Bypass which is anticipated and has the potential to result in noncompliance of this permit.

   The Permittee shall notify the Department at least thirty (30) days before the planned date of bypass. The notice shall contain: (1) a description of the bypass and its cause; (2) an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing; (3) a cost-effectiveness analysis of alternatives including comparative resource damage assessment; (4) the minimum and maximum duration of bypass under each alternative; (5) a recommendation as to the preferred alternative for conducting the bypass; (6) the projected date of bypass initiation; (7) a statement of compliance with SEPA; (8) a request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedence of any water quality standard is anticipated; and (9) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

   For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above shall be considered during preparation of the engineering report or facilities plan and plans and specifications and shall be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

The Department will consider the following prior to issuing an administrative order for this type of bypass:

a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, the Department will approve or deny the request. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by the Department under RCW 90.48.120.

G. Operations and Maintenance Manual

The approved Operations and Maintenance Manual shall be kept available at the treatment plant and all operators shall follow the instructions and procedures of this manual.

The O&M Manual shall be reviewed by the Permittee at least annually. Substantial changes or updates to the O&M Manual shall be submitted to the Department by November 30, 2008, whenever they are incorporated into the manual.

S6. PRETREATMENT

A. General Requirements

The Permittee shall work with the Department to ensure that all commercial and industrial users of the publicly owned treatment works (POTW) are in compliance with the pretreatment regulations promulgated in 40 CFR Part 403 and any additional regulations that may be promulgated under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

B. Wastewater Discharge Permit Required

The Permittee shall not allow significant industrial users (SIUs) to discharge waste water to the Permittee's sewerage system until such user has received a wastewater discharge permit from the Department in accordance with chapter 90.48 RCW and chapter 173-216 WAC, as amended.

C. Identification and Reporting of Existing, New, and Proposed Industrial Users

1. The Permittee shall take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewerage system (see Appendix B of fact sheet for definitions).

2. Within thirty (30) days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be an SIU, the Permittee shall notify such user by registered mail that, if classified as an SIU, they shall be required to apply to the Department and obtain a State Waste Discharge Permit. A copy of this notification letter shall also be sent to the Department within this same 30-day period.

3. The Permittee shall also notify all PSIUs, as they are identified, that if their classification should change to an SIU, they shall be required to apply to the Department for a State Waste Discharge Permit within thirty (30) days of such change.

D. Industrial User Survey

1. The Permittee shall complete and submit to the Department an Industrial User Survey listing all SIUs and PSIUs discharging to the POTW. The survey shall be received by the Department with the Permittee's next permit application. At a minimum, the list of SIUs and PSIUs shall be developed by means of a telephone book search, a water utility billing records search, and a physical reconnaissance of the service area. Information on PSIUs shall at least include: the business name, telephone number, address, description of the industrial process(es), and the known wastewater volumes and characteristics. For assistance with the development of the Industrial User Survey, the Permittee shall refer to the Department's guidance document entitled "Performing an Industrial User Survey."

E. Duty to Enforce Discharge Prohibitions

1. In accordance with 40 CFR 403.5(a), the Permittee shall not authorize or knowingly allow the discharge of any pollutants into its POTW which cause pass-through or interference, or which otherwise violates general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC-173-216-060.

2. The Permittee shall not authorize or knowingly allow the introduction of any of the following into their treatment works:

   a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).

b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.

c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.

d. Any pollutant, including oxygen-demanding pollutants, (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.

e. Petroleum oil, nonbiodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass-through.

f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.

g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40°C (104°F) unless the Department, upon request of the Permittee, approves, in writing, alternate temperature limits.

h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.

i. Waste waters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. All of the following are prohibited from discharge to the POTW unless approved in writing by the Department under extraordinary circumstances (such as a lack of direct discharge alternatives due to combined sewer service or the need to augment sewage flows due to septic conditions):

   a. Noncontact cooling water in significant volumes.

   b. Storm water, and other direct inflow sources.

   c. Waste waters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.

4. The Permittee shall notify the Department if any industrial user violates the prohibitions listed in this section.

S7. RESIDUAL SOLIDS

Residual solids include screenings, grit, scum, primary sludge, waste activated sludge, and other solid waste. The Permittee shall store and handle all residual solids in such a manner so as to prevent their entry into state ground or surface waters. The Permittee shall not discharge leachate from residual solids to state surface or ground waters. The Permittee shall submit a residual solids management plan with their next permit application.

S8. APPLICATION FOR PERMIT RENEWAL

The Permittee shall submit an application for renewal of this permit by **May 15, 2012.**

S9. SPILL PLAN

The Permittee shall submit to the Department an update to the existing Spill Control Plan by November 1, 2009.

The updated Spill Control Plan shall include the following:

- A description of operator training to implement the plan.
- A description of the reporting system which will be used to alert responsible managers and legal authorities in the event of a spill.
- A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
- A list of all oil and petroleum products, materials, which when spilled, or otherwise released into the environment, are designated Dangerous Waste (DW) or Extremely Hazardous Waste (EHW) by the procedures set forth in WAC 173-303-070, or other materials which may become pollutants or cause pollution upon reaching state's waters.
- Plans and manuals required by 40 CFR Part 112, contingency plans required by chapter 173-303 WAC, or other plans required by other agencies which meet the intent of this section may be submitted.

S10. ACUTE TOXICITY

A. Effluent Limit for Acute Toxicity

The effluent limit for acute toxicity is no acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the zone of acute criteria exceedence assigned pursuant to WAC 173-201A-100. The zone of acute criteria exceedence is authorized in Section S1.B of this permit. The ACEC equals 3.0 percent effluent.

In the event of failure to pass the test described in Subsection B of this section for compliance with the effluent limit for acute toxicity, the Permittee is considered to be in compliance with all permit requirements for acute whole effluent toxicity as long as the requirements in Subsection C are being met to the satisfaction of the Department.

B. Monitoring for Compliance With an Effluent Limit for Acute Toxicity

The Permittee shall conduct monitoring to determine compliance with the effluent limit for acute toxicity. The acute toxicity tests shall be performed using at a minimum 100 percent effluent, the ACEC, and a control. Acute toxicity testing shall follow protocols, monitoring requirements, and quality assurance/quality control procedures specified in this section. Testing shall begin within sixty (60) days of the permit effective date, and as close to a quarterly schedule of January, March, June, and September as is practical. A written report shall be submitted to the Department within sixty (60) days after the sample date. The percent survival in 100 percent effluent shall be reported along with all compliance monitoring results.

Compliance monitoring shall be conducted **quarterly** using each of the species and protocols listed below on a rotating basis:

1. Top smelt, *Atherinops affinis* (96-hour static-renewal test, method: EPA-821-R-02-012).

2. Mysid shrimp, *Mysidopsis bahia/ Americamysis bahia* (48-hour static test, method: EPA-821-R-02-012).

The Permittee is in violation of the effluent limit for acute toxicity in Subsection A and shall immediately implement Subsection C if any acute toxicity test conducted for compliance monitoring determines a statistically significant difference in survival between the control and the ACEC using hypothesis testing at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in survival between the control and the ACEC is less than 10 percent, the hypothesis test shall be conducted at the 0.01 level of significance.

C. Response to Noncompliance With an Effluent Limit for Acute Toxicity

If a toxicity test conducted for compliance monitoring under Subsection B determines a statistically significant difference in response between the ACEC and the control, the Permittee shall begin additional compliance monitoring within one week from the time of receiving the test results. This additional monitoring shall be conducted weekly for four consecutive weeks using the same test and species as the failed compliance test. Testing shall be conducted using a series of at least five effluent concentrations and a control in order to be able to determine appropriate point estimates. One of these effluent concentrations shall equal the ACEC and be compared statistically to the nontoxic control in order to determine compliance with the effluent limit for acute toxicity as described in Subsection B. The discharger shall return to the original monitoring frequency in Subsection B after completion of the additional compliance monitoring.

If the Permittee believes that a test indicating noncompliance will be identified by the Department as an anomalous test result, the Permittee may notify the Department that the compliance test result might be anomalous and that the Permittee intends to take only one additional sample for toxicity testing and wait for notification from the Department before completing the additional monitoring required in this subsection. The notification to the Department shall accompany the report of the compliance test

result and identify the reason for considering the compliance test result to be anomalous. The Permittee shall complete all of the additional monitoring required in this subsection as soon as possible after notification by the Department that the compliance test result was not anomalous. If the one additional sample fails to comply with the effluent limit for acute toxicity, then the Permittee shall proceed without delay to complete all of the additional monitoring required in this subsection. The one additional test result shall replace the compliance test result upon determination by the Department that the compliance test result was anomalous.

If all of the additional compliance monitoring conducted in accordance with this subsection complies with the permit limit, the Permittee shall search all pertinent and recent facility records (operating records, monitoring results, inspection records, spill reports, weather records, production records, raw material purchases, pretreatment records, etc.) and submit a report to the Department on possible causes and preventive measures for the transient toxicity event which triggered the additional compliance monitoring.

If toxicity occurs in violation of the acute toxicity limit during the additional compliance monitoring, the Permittee shall submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to the Department. The TI/RE plan submittal shall be within sixty (60) days after the sample date for the fourth additional compliance monitoring test. If the Permittee decides to forgo the rest of the additional compliance monitoring tests required in this subsection because one of the first three additional compliance monitoring tests failed to meet the acute toxicity limit, then the Permittee shall submit the TI/RE plan within sixty (60) days after the sample date for the first additional monitoring test to violate the acute toxicity limit. The TI/RE plan shall be based on WAC 173-205-100(2) and shall be implemented in accordance with WAC 173-205-100(3).

D. Sampling and Reporting Requirements

1. All reports for effluent characterization or compliance monitoring shall be submitted in accordance with the most recent version of Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* in regards to format and content. Reports shall contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data on floppy disk for electronic entry into the Department's database, then the Permittee shall send the disk to the Department along with the test report, bench sheets, and reference toxicant results.

2. Testing shall be conducted on 24-hour composite effluent samples. Samples taken for toxicity testing shall be cooled to 0 - 6 degrees Celsius while being collected and shall be sent to the lab immediately upon completion. The lab shall begin the toxicity testing as soon as possible but no later than 36 hours after sampling was ended.

3. All samples and test solutions for toxicity testing shall have water quality measurements as specified in Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* or most recent version thereof.

4. All toxicity tests shall meet quality assurance criteria and test conditions in the most recent versions of the EPA manual listed in Subsection A and the Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If test results are determined to be invalid or anomalous by the Department, testing shall be repeated with freshly collected effluent.

5. Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed in Subsection A or pristine natural water of sufficient quality for good control performance.

6. Effluent samples for whole effluent toxicity testing shall be collected just prior to the chlorination step in the treatment process.

7. The Permittee may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the ACEC.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing, and do not comply with the acute statistical power standard of 29 percent as defined in WAC 173-205-020, must be repeated on a fresh sample with an increased number of replicates to increase the power.

S11. COMBINED SEWER OVERFLOWS

A. Discharge Locations

The following is a list of combined sewer overflows (CSO's), which are occasional point sources of pollutants as a result of precipitation events. Discharges from these sites are prohibited except as a result of and during precipitation events. No authorization is given by this permit for discharge from a CSO that causes adverse impacts that threaten characteristic uses of the receiving water as identified in the water quality standards, chapter 173-201A WAC.

DISCHARGE NO.	LOCATION	RECEIVING WATER
#3	"C" Street	Bellingham Bay

B. Combined Sewer Overflow Report

By **July 1, 2008**, and annually thereafter, the Permittee shall submit a CSO Report to the Department for review and approval, which complies with the requirements of WAC 173-245-090(1).

C. Combined Sewer Overflow Reduction Plan Amendment

In conjunction with the application for renewal of this permit, the Permittee shall submit an amendment of its CSO Reduction Plan to the Department for review and approval. The amendment shall comply with the requirements of WAC 173-245-090(2).

D. Nine Minimum Controls

In accordance with WAC 173-245 and US EPA CSO control policy (59 FR 18688), the Permittee shall implement and document the following nine minimum controls (NMC) for CSOs. Compliance with the NMC shall be documented in the annual CSO report as required in SB.

The Permittee shall comply with the following technology-based requirements:

1. The Permittee shall implement proper operation and maintenance programs for the sewer collection system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSO's. The program shall consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.

2. The Permittee shall implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSO's.

3. The Permittee shall review and modify as appropriate its existing pretreatment program to minimize CSO impacts for the discharges from nondomestic users.

4. The Permittee shall operate the POTW treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSO's. The Permittee shall deliver all flows to the treatment plant within the constraints of the treatment capacity of the POTW.

5. Dry weather overflows from CSO outfalls are prohibited.

6. The Permittee shall implement measures to control solid and floatable materials in CSO's.

7. The Permittee shall implement a pollution prevention program focused on reducing the impact of CSO's on receiving waters.

8. The Permittee shall implement a public notification process to inform the citizens of when and where CSO's occur. The process must include: a mechanism to alert persons of the occurrence of CSO's and a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSO's.

9. The Permittee shall monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This shall include collection of data that will be used to document the existing baseline conditions, evaluate the efficacy of the technology-based controls, and determine the baseline conditions upon which the long-term control plan will be based.

10. No later than **August 30, 2012,** complete and submit for review and approval a CSO plan amendment.

S12. WET WEATHER OPERATION

A CSO-related bypass of the secondary treatment portion of the Post Point Waste Water plant is authorized when the flow rate to the facility exceeds 37 MGD as a result of a precipitation event. Bypasses that occur that are under this amount or are not wet weather related are not authorized under this condition and are subject to the bypass provisions as stated in condition S5.F of the permit. In the event of a CSO-related bypass authorized under this condition, the Permittee shall minimize the discharge of pollutants to the environment. At a minimum CSO-related bypass flows must receive primary clarification, solids and floatables removal, and disinfection. The final discharge must at all times meet the effluent limitations of this permit as listed in S1.

The Permittee shall maintain records of all CSO-related bypasses at the treatment plant. These records shall document the date and duration of each bypass event. The report must also document the magnitude of the precipitation event. All bypassing occurrences must be reported to Ecology. The report must include the above information as well as any results of sampling taken during the bypass and their location. The report shall be included with that months discharge monitoring report. A final annual CSO report shall be received by the Department as specified in condition S.10.B.

S13. OUTFALL EVALUATION

The Permittee shall inspect **Outfall 001**, the submerged portion of the outfall line and diffuser to document its integrity and continued function. If conditions allow for a photographic verification, it shall be included in the report. By **October 30, 2008**, the inspection report shall be submitted to the Department.

GENERAL CONDITIONS

G1. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to the Department shall be signed and certified.

A. All permit applications shall be signed by either a principal executive officer or a ranking elected official.

B. All reports required by this permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the Department.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

C. Changes to authorization. If an authorization under paragraph B.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2, above, must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section shall make the following certification:

> *"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

G2. RIGHT OF INSPECTION AND ENTRY

The Permittee shall allow an authorized representative of the Department, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.

B. To have access to and copy - at reasonable times and at reasonable cost - any records required to be kept under the terms and conditions of this permit.

C. To inspect - at reasonable times - any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor - at reasonable times - any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. PERMIT ACTIONS

A. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

1. Violation of any permit term or condition.

2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.

3. A material change in quantity or type of waste disposal.

4. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination [40 CFR Part 122.64(3)].

5. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit [40 CFR Part 122.64(4)].

6. Nonpayment of fees assessed pursuant to RCW 90.48.465.

7. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

B. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

1. A material change in the condition of the waters of the state.

2. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

3. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

4. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

5. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

6. The Department has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

7. Incorporation of an approved local pretreatment program into a municipality's permit.

C. The following are causes for modification or alternatively revocation and reissuance:

1. Cause exists for termination for reasons listed in A1 through A7 of this section, and the Department determines that modification or revocation and reissuance is appropriate.

2. The Department has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G8) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. REPORTING PLANNED CHANGES

The Permittee shall, as soon as possible, but no later than sixty (60) days prior to the proposed changes, give notice to the Department of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in: 1) the permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b); 2) a significant change in the nature or an increase in quantity of pollutants discharged; or 3) a significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation of the terms and conditions of this permit.

G5. PLAN REVIEW REQUIRED

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications shall be submitted to the Department for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications shall be submitted at least one hundred and eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities shall be constructed and operated in accordance with the approved plans.

G6. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. TRANSFER OF THIS PERMIT

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Department.

A. Transfers by Modification

Except as provided in paragraph (B) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

B. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

1. The Permittee notifies the Department at least thirty (30) days in advance of the proposed transfer date.

2. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

3. The Department does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. REDUCED PRODUCTION FOR COMPLIANCE

The Permittee, in order to maintain compliance with its permit, shall control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. DUTY TO PROVIDE INFORMATION

The Permittee shall submit to the Department, within a reasonable time, all information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also submit to the Department upon request, copies of records required to be kept by this permit.

G11. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. ADDITIONAL MONITORING

The Department may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. PAYMENT OF FEES

The Permittee shall submit payment of fees associated with this permit as assessed by the Department.

G14. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G15. UPSET

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

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
1) an upset occurred and that the Permittee can identify the cause(s) of the upset;
2) the permitted facility was being properly operated at the time of the upset;
3) the Permittee submitted notice of the upset as required in Condition S3.E; and
4) the Permittee complied with any remedial measures required under S4.C of this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. DUTY TO COMPLY

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. TOXIC POLLUTANTS

The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this Condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. REPORTING ANTICIPATED NONCOMPLIANCE

The Permittee shall give advance notice to the Department by submission of a new application or supplement thereto at least one hundred and eighty (180) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Department.

G21. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Department, it shall promptly submit such facts or information.

G22. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date.

APPENDIX B: FUTURE PERMITTING CONSIDERATIONS

6.5.2.5 Estimated Costs

The estimated capital, O&M, and net present worth costs for the five secondary alternatives are summarized in Table 6.9. All estimates were based on the design criteria presented in the previous section. Details of how these cost estimates were developed was described in Section 6.3.1.2.

Table 6.9 Net Present Worth for Secondary Alternatives

Secondary Alternative	Capital Cost [1] ($ Millions)	O&M Present Value [2, 3] ($ Millions)	Total Present Value [3] ($ Millions)
Alternative 1 – Expand Core	35	6.7	42
Alternative 2 – Convert to MBR	130	18	148
Alternative 3 – Parallel BAF	45	10	55
Alternative 4 – Parallel MBR	77	13	90

Notes:
(1) Project costs for secondary improvements in March 2009 dollars (ENR Index 8534). Costs do not include primary or associated site/ground improvements.
(2) Includes annual operations and maintenance costs including: energy consumption, chemical usage, and labor costs.
(3) Assumes 4.5% discount rate and 20 year life-cycle period.

6.5.3 Potential Future Permitting Considerations

As discussed in Chapter 4, three potential future permitting constraints have been identified that may impact current planning considerations: nutrient removal, flow blending, and emerging regulation of TOrCs. This analysis considers the flexibility of each proposed alternative to meet these possible future NPDES permit constraints. At this level of evaluation, planning considerations are limited to confirming a general planning strategy to meet the future constraint, developing a ballpark footprint on the City's north property for any improvements needed to implement the strategy, and estimating a relative capital cost difference based on historical data. As the selected secondary alternative is developed further, the planning considerations will also encompass future constructability issues.

6.5.3.1 Nutrient Removal

Planning considerations regarding the level of nutrient removal focused on potential limitations for nitrogen. Modeling assumes design year flow and load influent estimates with future year round ammonia (as nitrogen) and total inorganic nitrogen discharge limits of 1 mg/L and 8 mg/L, respectively. Each of the four alternatives presented previously for Post Point WWTP Improvements is capable of meeting these nutrient removal requirements by either de-rating the existing process capacity and adding additional parallel treatment units or by adding supplemental downstream processes to meet the water quality limits. The footprint requirements to achieve nitrogen removal can be met for all alternatives by

combining the footprint of the existing secondary treatment process with the available footprint within the City's property to the north. The options for modifying the four treatment alternatives under consideration to meet nitrogen limits were as follows:

Alternative 1 – Core Process Expansion. For this alternative, two options are possible: Install tertiary treatment capacity; or de-rate the existing capacity and construct parallel treatment.

– If tertiary treatment were installed, the secondary effluent would be pumped to a two-step BAF system capable of handling the 34.4 mgd maximum month flow, where nitrification occurs in the first stage followed by denitrification. Tertiary treatment would require an alkalinity feed, an external carbon source, and a tertiary pump station for the BAF process.
– If parallel treatment were installed, the core process would be de-rated to approximately 12 to 15 mgd; the remaining 19 to 22 mgd of maximum month capacity would be handled by constructing either a parallel BAF or MBR process (similar to those described in Alternatives 3 and 4). Parallel treatment would require alkalinity feed, external carbon source, and a pump station for the parallel process.

Alternative 2 – Conversion to MBR. No modifications would be required for this alternative. To reach the total inorganic nitrogen limit of 8 mg/L, the system might require additional alkalinity feed and an external carbon source.

Alternative 3 – Parallel BAF, Alternative 4 – Parallel MBR. For these alternatives, the existing core process would be de-rated and additional parallel basins would be needed.

– The core process would be de-rated to approximately 4 to 6 mgd, and the remaining 28 to 30 mgd of maximum month capacity would be handled by constructing a either a parallel three stage BAF with solids separation facilities for backwash or a single stage MBR process.
– The 14 mgd single stage BAF constructed as Alternative 3 would also require an additional two stage nitrogen-removal BAF system. Secondary treatment would require alkalinity feed, external carbon source, and pump station(s) for the parallel process.

6.5.3.2 Flow Blending

To prevent microbial washout in the secondary treatment process, the City's current NPDES permit allows the WWTP to bypass a portion of the flow around the secondary treatment process. Primary effluent is blended with secondary effluent prior to disinfection and discharge. Secondary alternatives were evaluated to determine their future capability for decreasing the secondary bypass flow from both process and hydraulic considerations. Because flow is pumped to the WWTP, this evaluation assumes that the peak day flow rate

is equal to the peak hour flow rate. The results of the capacity analysis for each secondary alternative to accommodate larger peak flows were as follows:

- Alternative 1 – Core Process Expansion. This option provides the most flexibility to accommodate large peak flows while operating in contact stabilization (C/S) mode; it allows more solids inventory to be retained within the biological system. With all four clarifiers in operation and routing the primary effluent input to approximately the mid-point of the activated sludge basins, the aerobic SRT would be decreased to approximately one day. This would decrease the solids loading to the clarifiers and effectively maximize the allowable overflow rate to the clarifiers. This mode can only be used to address peak flow management for short periods of time and cannot be operated in conjunction with nutrient removal for this facility. If Alternative 1 is designed with the flexibility to operate in C/S mode and elimination of secondary bypass is required in the future, up to 72 mgd could be treated through the secondary process with this configuration.

- Alternative 2 – Conversion to MBR. This results in the most restrictive expansion for handling larger peaking events. Because the MBR process is typically limited to a hydraulic peaking factor of two (peak hour flow/average flow), its maximum wet weather capacity would be approximately 43 mgd. To eliminate bypass, up to 29 MG of daily combined sewage would either need to be handled by additional treatment facilities or be equalized in an off-line storage facility. Due to the construction cost and associated footprint requirements, storage of volumes greater than 10 to 12 MG is typically not cost-effective. Therefore, it is assumed that additional secondary facilities would be constructed to treat the bypassed flows during peak flow events.

- Alternative 3 – Parallel BAF. This process could handle the majority of the peak flow through a combination of treatment through the base and parallel processes. The BAF process would likely be limited to a hydraulic or process peaking factor of up to three times the average flow. The existing HPO system is designed to handle a maximum month flow of 20 mgd, and has successfully handled peak day flows of 40 mgd. The parallel BAF would be designed to handle 15 mgd during max month flow and 27 mgd during peak day flow. Approximately 5 MG of daily peak flow would either be temporarily stored in an off-line equalization facility or treated through additional (new) secondary facilities.

- Alternative 4 – Parallel MBR. This process could handle a significant portion of the peak flow through a combination of treatment through the base and parallel processes. As discussed previously, the MBR process would likely be limited to a hydraulic or process peaking factor of up to two times the average flow. The existing HPO system is designed to handle a maximum month flow of 20 mgd and has successfully handled peak day flows of 40 mgd. The parallel MBR would be designed

to handle 15 mgd during max month flow and 18 mgd during peak day flow. Approximately 14 MG of daily peak flow would need to be handled through additional (new) secondary facilities.

6.5.3.3 Future Trace Organic Compound Removal Considerations

Trace organic chemicals are not currently regulated, and permit limitations on TOrCs are not anticipated during the planning period. There is accumulating evidence that even very low concentrations of some TOrC compounds can affect aquatic biota. On-going research is required to define future permit limits and treatment requirements. There is some evidence that increasing sludge age (SRT) reduces the concentration of certain TOrC compounds in the final effluent. Secondary alternatives are being considered that would provide the flexibility to increase the SRT in the expanded secondary process and/or with parallel MBR treatment, if needed, to provide future nitrogen removal.

6.5.3.4 Summary of Potential Future Permitting Conditions

Overall, Alternative 1 provides the most flexibility for meeting potential future nutrient and flow blending limits in a cost-effective manner. This planning strategy to convert to future nutrient removal is based on current costs and available technologies. It is uncertain when these future constraints would be placed on the Post Point plant. A comparison of implementing potential nutrient or flow blending future permit constraints to each secondary alternative is provided in Table 6.10. The relative capital cost difference factor presented in Table 6.10 combines the capital cost for the secondary expansion referenced for the alternative in Table 6.9 with the capital cost associated with the future permit conversion. These costs assume separate construction projects for expansion and conversion, as discussed in previous sections.

As summarized in Table 6.9, Alternative 1 is the most cost-effective method of meeting the projected treatment capacity during the planning period based on the current NPDES permit effluent limits from both a capital cost and an O&M perspective. Within the precision of the cost estimate, the combined capital costs for constructing an expanded and converted nutrient removal facility were determined to be relatively similar for the four alternatives. The O&M costs for maintaining nutrient removal on a year round basis was estimated at three times the cost of operating the plant without nutrient removal. Conversely, Alternative 1 was the most cost-effective alternative capable of reducing flow blending in the future. It is estimated that there will not be a large impact on O&M costs to accommodate these infrequent high-flow events.

6.5.4 TBL+ Based Recommendations

As described previously, the TBL+ approach was used in this project to determine the key tradeoffs of each alternative. Figure 6.11 illustrates the minimized areas of impact for each of the four TBL+ areas (economic, social, technical, and environmental), while Table 6.11 summarizes the key tradeoffs and uncertainties associated with each evaluation. The detailed results of the TBL+ analyses are presented in Appendix E.

Table 6.10 Present Value for Future Permitting Conditions

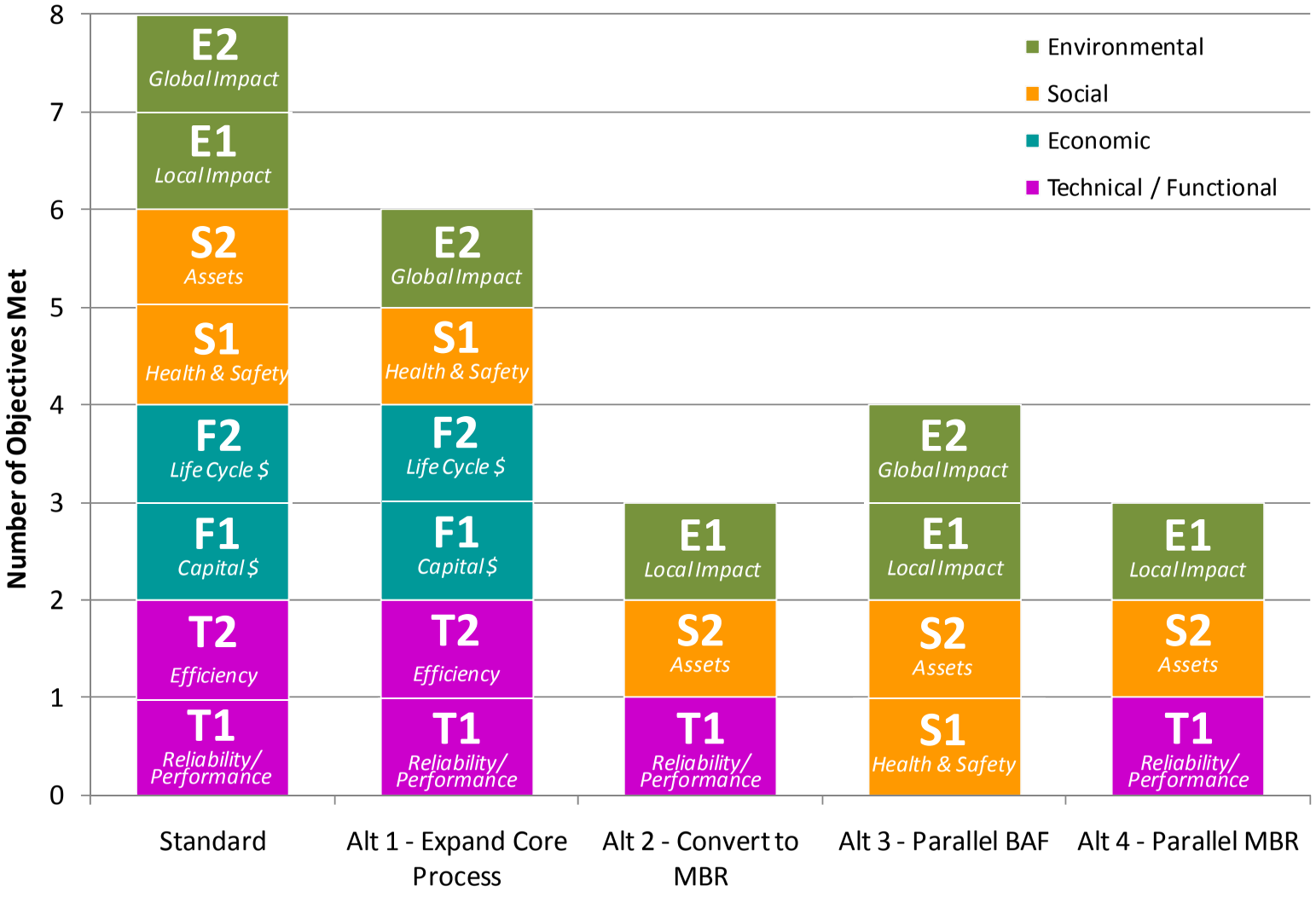
Secondary Alternatives	Conversion for Future Nutrient Removal	Relative Capital Cost Difference Factor[(1)]	Conversion for Future Blending Reduction	Relative Capital Cost Difference Factor[(2)]
Alternative 1	De-rate the core process to BNR mode-of-operation and construct 19 – 22 mgd of parallel BAF/MBR capacity.	1.0	Convert to C/S mode of operation to provide 72 mgd of secondary treatment capacity.	1.0
Alternative 2	None required.	1.1	Construct additional secondary treatment to handle an additional 29 mgd of peak capacity.	4
Alternative 3	De-rate the core process to BNR mode of operation and construct 28 – 30 mgd of parallel BAF capacity.	1.0	Construct additional secondary treatment to handle an additional 9 mgd of peak capacity.	1.5
Alternative 4	De-rate the core process to BNR mode of operation and construct 28 – 30 mgd of parallel MBR capacity.	1.2	Construct additional secondary treatment to handle an additional 14 mgd of peak capacity.	2.5

Notes:

(1) Project costs for secondary improvements in March 2009 dollars (ENR Index 8534). Costs include those associated with secondary expansion and conversion as separate projects, but do not include primary or associated site/ground improvements.

(2) Does not include annual O&M costs.

It is recommended that Alternative 1, Expansion of the Core Process, be carried forth for further detailed evaluation as part of the Post Point WWTP Improvements. It is anticipated that the social and environmental impacts associated with Alternative 1 could feasibly be mitigated by the City to achieve no net loss in overall habitat and community assets for the area. Social and environmental mitigation efforts are being developed with input from various stakeholders such as community members, regulators, and environmental experts.



TRIPLE BOTTOM LINE PLUS SUMMARY
SECONDARY TREATMENT ALTERNATIVES

FIGURE 6.11

Table 6.11 Key Tradeoffs for Secondary Alternatives

	Secondary Alternative 1	Secondary Alternative 2	Secondary Alternative 3	Secondary Alternative 4
Technical/Functional				
Provide reliable, safe treatment now and in the future.	Impacts existing fence line and uses a significant portion of the area allocated for future expansion.	Impacts existing fence line. Similar technology principles have not been tested at the plant. Only a limited number of facilities have been in operation for >20 years.	Similar technology principles have not been tested at the plant. Only a limited number of facilities have been in operation for >20 years.	Similar technology principles have not been tested at the plant. Only a limited number of facilities have been in operation for >20 years.
Maintain and improve an efficient municipal infrastructure.	Moderate additions or changes to mechanical equipment.	Secondary clarifier infrastructure is no longer required. Process has extensive mechanical and electrical equipment compared to other alternatives.	No modifications required to the existing process during construction. O&M requirements will be more diverse and will likely be duplicated for two different biological processes.	No modifications required to the existing process during construction. O&M requirements will be more diverse and will likely be duplicated for two different biological processes. Process has extensive mechanical and electrical equipment compared to other alternatives.
Economic				
Minimize capital costs.	Estimated project cost approximately matches the CIP budget identified in *Comprehensive Sewer Plan* (Carollo Engineers, 2009).	Estimated project cost is 4 times higher than CIP budget identified in *Comprehensive Sewer Plan* (Carollo Engineers, 2009).	Estimated project cost within a 10% increase of CIP budget identified in *Comprehensive Sewer Plan* (Carollo Engineers, 2009). 20% capital increase over lowest-cost alternative.	Estimated project cost is 2 times higher than CIP budget identified in *Comprehensive Sewer Plan* (Carollo Engineers, 2009).
Minimize life-cycle costs.	---	Nearly 4 times the life-cycle cost of the lowest-cost alternative.	20% life-cycle cost premium over the lowest-cost alternative.	Double the life-cycle cost of the lowest-cost alternative.
Maximize benefit:cost ratio.[(1)]	---	---	---	---
Social				
Protect public health and safety.	Potential occasional use of chemical rated as a moderate-to-serious human health hazard (sodium hypochlorite) in response to process upsets.	Frequent use of chemical rated as a moderate-to-serious human health hazard (sodium hypochlorite, sodium hydroxide, citric acid).	Potential occasional use of chemical rated as a moderate-to-serious human health hazard (sodium hypochlorite) in response to process upsets.	Frequent use of chemical rated as a moderate-to-serious human health hazard (sodium hypochlorite, sodium hydroxide, citric acid).
Maintain good public relations and protect/enhance cultural, educational, and recreational assets.	Undeveloped area used by public will likely be reduced. Up to 800 ft of existing trail may be impacted. Expansion may not allow for a continuous trail loop without entering sensitive environmental buffer areas.	Undeveloped area used by public will likely be reduced. Up to 800 ft of existing trail may be rerouted. Results in increased chemical delivery traffic.	---	Results in increased in chemical delivery traffic.

Table 6.11 Key Tradeoffs for Secondary Alternatives

	Secondary Alternative 1	Secondary Alternative 2	Secondary Alternative 3	Secondary Alternative 4
Environmental				
Protect and enhance environmental assets locally.	Construction may impact sensitive environmental areas (blue heron rookery, jurisdictional wetlands).	Construction may impact sensitive environmental areas (blue heron rookery, jurisdictional wetlands). Results in a higher water quality with partial total nitrogen removal.	While effluent from a single stage BAF unit is anticipated to meet the NPDES permit requirements, the process will likely produce a lower water quality than has been historically achieved by the existing HPO system.	Results in a higher blended water quality with partial total nitrogen removal.
Protect and enhance environmental assets globally.	Minimizes GHG emissions.	GHG emissions are > 2 times higher than the lowest-emission alternative.	Minimizes GHG emissions.	GHG emissions are > 2 times higher than lowest-emission alternative.
Alternative Uncertainties				
	Environmental permit restrictions associated with sensitive areas (rookery/wetlands).	Environmental permit restrictions associated with sensitive areas (rookery/wetlands).	---	---

Notes:
(1) The criterion realizes an overall core value for the City and will be applied in the complete Post Point WWTP improvements programmatic evaluation.

APPENDIX C: EFH ASSESSMENT

EFH Background

The Pacific Fisheries Management Council (PFMC) has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fisheries (NOAA Fisheries 1999; PFMC 1999).

The EFH designation for the Pacific salmon fishery includes all those streams, lakes, ponds, wetlands, and other water bodies, currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers indentified by PFMC (1999). In estuarine and marine environments, proposed designated EFH extends from near-shore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Pint Conception (PFMC 1999).

The Pacific salmon management unit includes Chinook, coho, and pink salmon. All three species use likely occur within the project area, including juvenile use of Post Point Lagoon and nearshore environment of Bellingham Bay for rearing and adult and sub-adult use of Bellingham Bay for migration and foraging.

In addition to Pacific salmon, EFH has been designated for groundfish and coastal pelagic species. EFH for Pacific coast groundfish is generally defined as the aquatic habitat from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths seaward. The west coast groundfish management unit includes 83 species that typically live on or near the bottom of the ocean. Species groups include sharks and skates, rockfishes (55 species), flatfishes (12 species) and ground fishes.

The *Coastal Pelagic Species Fishery Management Plan* describes the habitat requirements of five pelagic species: Northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel and market squid (PFMC 1998). These four finfish and market squid are treated as a single species complex because of similarities in their life histories and habitat requirements. EFH for coastal pelagic species is generally defined all marine and estuarine waters from the shoreline offshore above the thermocline. Coastal pelagics are schooling fish not associated with the ocean bottom that migrate in coastal waters. These fishes are primarily associated with the open ocean and coastal waters (PFMC 1998), and are not likely to occur within the project area.

The objective of this EFH assessment is to determine whether or not the proposed action "may adversely affect" designated EFH for relevant commercially, federally-managed fisheries species within the proposed Action Area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

Description of the Proposed Action

For the purpose of this assessment, the proposed action for the EFH assessment and BA incorporate the same project elements. The project proponent proposes to upgrade and expand the existing WWTP. A detailed description of the proposed action is included in Section 2.0 of the BA. Table A-1 below indicates the federally managed Pacific salmon and life history forms that are potentially present within the project Action Area.

Table C-1. Fish species and life-stages with essential fish habitat in the Action Area

Salmon Species	Eggs	Larvae	Young Juvenile	Juvenile	Adult	Spawning
Chinook			X	X	X	
Coho				X	X	
Pink			X	X	X	

Potential Adverse Effects of the Proposed Action

Potential impacts of the proposed action to ESA listed fish species and habitats are discussed in Section 6.0 of this BA and are expected to be similar for all federally managed Pacific salmon that occur within the Action Area.

Adverse Effects on Essential Fish Habitat for Salmonids

The proposed action will include soil disturbing activities necessary to construct the proposed WWTP process upgrades in Phase 1 within the existing 19 acre WWTP footprint. The majority of construction activity will occur within 200 feet of Post Point Lagoon and several hundred feet from Bellingham Bay; however, wetland mitigation activities, which include soil disturbance, will occur immediately adjacent to Post Point Lagoon and within 180 feet of Bellingham Bay. There will be no in-water work as part of the proposed action. The potential to adversely affect EFH through increased turbidity and sedimentation is extremely unlikely given the distance from EFH and the implementation of impact avoidance and minimization measures discussed further below.

The highest potential for adverse affects to EFH is related to the increase in effluent discharge volumes proposed over the Phase 1 planning horizon. Currently the plant produces an average daily volume of effluent of 20 mgd. By the year 2034, that number is expected to rise to 34.3 mgd. Overall, process upgrades at the WWTP are designed to meet current NPDES limitations for effluent water quality and no reasonable potential for the facility to exceed surface water quality standards has been identified. Implementation of Phase 1 improvements would also result in an overall reduction in CSO events and would allow for future process upgrades to meet any future NPDES permit requirements, which would have an overall beneficial effect on water quality due to the higher level of treatment.

The upgraded WWTP under the proposed action would provide sufficient wastewater capacity to service anticipated population growth within the service area. Development associated with the planned population growth would likely result in additional impervious surface in the basin and potential for degradation of water quality and habitat in these areas, thereby indirectly affecting EFH in streams containing pink, coho, and Chinook salmon. The WWTP service area covers portions of four watersheds including the Nooksack/Silver watershed, which includes major streams within this basin including Silver Creek (with seven unnamed tributaries draining into it), Tennant Creek (with four unnamed tributaries draining into it), and Bear Creek (with three unnamed tributaries draining into it); the Bellingham Bay Watershed, which encompasses the smaller drainages of Whatcom, Padden and Chuckanut Creeks, as well as Fragrance and Padden Lakes; the Squalicum Creek Watershed, which

includes Baker Creek, Spring Creek, McCormick Creek, Toad Creek, Upper Squalicum Creek, Squalicum Creek, and additional unnamed streams; and the Lake Whatcom Watershed

Pink salmon are known to use the Nooksack River, Silver Creek, and Whatcom Creek. Chinook use is limited to Squalicum Creek, Whatcom Creek, Padden Creek, Silver Creek, and the Nooksack River. Coho occur in most streams within these watersheds. All species could be anticipated within the marine environment that borders the service area. The vast majority of fish distribution is within the lower portions of the watersheds, which have primarily been develop and sewer service is already provided to these areas. Changes in land use in the more undeveloped portions of these watersheds may result in additional impervious surface in the basin and potential for degradation of water quality and habitat in these areas. Potential impacts to riparian habitat from development in the service area is limited given existing shoreline regulations, critical areas regulations, and stormwater management requirements enforced by the City of Bellingham. In addition, growth within the City is focused more on infill rather than development of the UGA.

Adverse Effects on Essential Fish Habitat for Ground Fishes

Adverse effects on EFH for ground fish would be similar to that for federally managed Pacific salmon

Adverse Effects on Essential Fish Habitat for Coastal Pelagic Species

No areas of EFH for coastal pelagic species occur within the Action Area.

Essential Fish Habitat Conservation Measures

The following measures will be implemented to minimize the potential adverse effects on designated EFH described above:

- The proposed action will incorporate TESC measures including silt fencing, straw bales/wattles, and mulch to minimize the potential for sedimentation and turbidity to nearby surface waters.
- All construction will comply with adopted City of Bellingham and Ecology erosion control standards.
- No in-water work will occur.
- A spill prevention and pollution control plan will be in place prior to construction.
- All equipment will be staged and stored a minimum of 250 feet from surface waters when not in use.
- All equipment will be refueled a minimum of 250 feet from surface waters.
- All disturbed areas will be promptly hydroseeded or paved following construction.
- The upgraded Plant will comply with all permit limits established in its NPDES discharge permit.
- Future development in the service area will be required to meet regulatory requirements such as local critical area ordinance and shoreline regulations as well as other state and federal permit requirements associated with work in regulated critical areas. Future development requiring a federal permit or federal funding will undergo separate ESA and EFH consultation.

Conclusion and Effect Determination

EFH for Pacific salmon and ground fish are present in the project Action Area. The proposed action is expected to result in the temporary soil disturbance adjacent to designated EFH for federally managed Pacific salmon, including Chinook, coho, and pink salmon and ground fish, which could potentially result in sedimentation and turbidity of these areas if not properly controlled. All other potential effects of the action upon Pacific salmon and ground fish EFH, including soil disturbing activities, are expected to be short-term effects and will be further minimized by the conservation measures listed above.

The discharge water from the upgraded WWTP would be required to meet surface water quality standards included in the existing and future NPDES permit to be issued for the upgraded WWTP. Therefore, the proposed action *will not adversely effect* EFH for Pacific salmon or ground fish.

EFH References

Pacific Fisheries Management Council (PFMC). 1998. *The Coastal Pelagic Fishery Management Plan: Amendment 8*. Pacific Fishery Management Council.

Pacific Fisheries Management Council (PFMC). 1999. *Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon*. Pacific Fisheries Management Council.

APPENDIX D: SPECIES LISTS

Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated July 1, 2009)

Species[1]			Current Endangered Species Act Listing Status[2]	ESA Listing Actions Under Review
Sockeye Salmon (*Oncorhynchus nerka*)	1	Snake River	***Endangered***	
	2	Ozette Lake	***Threatened***	
	3	Baker River	*Not Warranted*	
	4	Okanogan River	*Not Warranted*	
	5	Lake Wenatchee	*Not Warranted*	
	6	Quinalt Lake	*Not Warranted*	
	7	Lake Pleasant	*Not Warranted*	
Chinook Salmon (*O. tshawytscha*)	8	Sacramento River Winter-run	***Endangered***	
	9	Upper Columbia River Spring-run	***Endangered***	
	10	Snake River Spring/Summer-run	***Threatened***	
	11	Snake River Fall-run	***Threatened***	
	12	Puget Sound	***Threatened***	
	13	Lower Columbia River	***Threatened***	
	14	Upper Willamette River	***Threatened***	
	15	Central Valley Spring-run	***Threatened***	
	16	California Coastal	***Threatened***	
	17	Central Valley Fall and Late Fall-run	***Species of Concern***	
	18	Upper Klamath-Trinity Rivers	*Not Warranted*	
	19	Oregon Coast	*Not Warranted*	
	20	Washington Coast	*Not Warranted*	
	21	Middle Columbia River spring-run	*Not Warranted*	
	22	Upper Columbia River summer/fall-run	*Not Warranted*	
	23	Southern Oregon and Northern California Coast	*Not Warranted*	
	24	Deschutes River summer/fall-run	*Not Warranted*	
Coho Salmon (*O. kisutch*)	25	Central California Coast	***Endangered***	
	26	Southern Oregon/Northern California	***Threatened***	
	27	Lower Columbia River	***Threatened***	• Critical habitat
	28	Oregon Coast	***Threatened***	
	29	Southwest Washington	*Undetermined*	
	30	Puget Sound/Strait of Georgia	***Species of Concern***	
	31	Olympic Peninsula	*Not Warranted*	
Chum Salmon (*O. keta*)	32	Hood Canal Summer-run	***Threatened***	
	33	Columbia River	***Threatened***	
	34	Puget Sound/Strait of Georgia	*Not Warranted*	
	35	Pacific Coast	*Not Warranted*	
Steelhead (*O. mykiss)*	36	Southern California	***Endangered***	
	37	Upper Columbia River	***Threatened***	
	38	Central California Coast	***Threatened***	
	39	South Central California Coast	***Threatened***	
	40	Snake River Basin	***Threatened***	
	41	Lower Columbia River	***Threatened***	
	42	California Central Valley	***Threatened***	
	43	Upper Willamette River	***Threatened***	
	44	Middle Columbia River	***Threatened***	
	45	Northern California	***Threatened***	
	46	Oregon Coast	***Species of Concern***	
	47	Southwest Washington	*Not Warranted*	
	48	Olympic Peninsula	*Not Warranted*	
	49	Puget Sound	***Threatened***	• Critical habitat
	50	Klamath Mountains Province	*Not Warranted*	
Pink Salmon *(O. gorbuscha)*	51	Even-year	*Not Warranted*	
	52	Odd-year	*Not Warranted*	

1 The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as "species" under the ESA.

ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries that may occur:

off Washington & Oregon

- Southern Resident killer whale (*Orcinus orca*) (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- blue whale *(Balaenoptera musculus)* (E)
- fin whale (*Balaenoptera physalus)* (E)
- sei whale (*Balaenoptera borealis)* (E)
- sperm whale (*Physeter macrocephalus)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

in Puget Sound

- Southern Resident killer whale *(Orcinus orca)* (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

(E) = Endangered
(T) = Threatened

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Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- distinct population segment, or DPS, of bocaccio *(Sebastes paucispinis)* (E) in Puget Sound
- distinct population segment, or DPS, of canary rockfish *(Sebastes pinniger)* (T) in Puget Sound
- distinct population segment, or DPS, of yelloweye rockfish *(Sebastes ruberrimus)* (T) in Puget Sound
- southern distinct population segment, or DPS, of eulachon (Columbia River smelt) *(Thaleichthys pacificus)* (T)
- southern distinct population segment, or DPS, of north American green sturgeon (*Acipenser medirostris*) (T), listed in the NOAA Fisheries Southwest Region

(E) = Endangered
(T) = Threatened

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LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN WHATCOM COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WASHINGTON FISH AND WILDLIFE OFFICE

(Revised December 15, 2010)

LISTED

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS
Canada lynx (*Lynx canadensis*)
Gray wolf (*Canis lupus*)
Grizzly bear (*Ursus arctos = U. a. horribilis*)
Marbled murrelet (*Brachyramphus marmoratus*)
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

DESIGNATED

Critical habitat for bull trout
Critical habitat for the marbled murrelet
Critical habitat for the northern spotted owl

PROPOSED

Dolly Varden (*Salvelinus malma*) due to similarity of appearance
Revised critical habitat for bull trout

CANDIDATE

Fisher *(Martes pennanti)* – West Coast DPS
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS
Yellow-billed cuckoo (*Coccyzus americanus*)

SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)
Cascades frog (*Rana cascadae*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Tailed frog (*Ascaphus truei*)
Western gray squirrel (*Sciurus griseus griseus*)
Botrychium ascendens (triangular-lobed moonwort)
Cimicifuga elata (tall bugbane)

APPENDIX E: REASONABLE POTENTIAL ANALYSIS

PROJECT MEMORANDUM

Project Name:	Post Point WWTP Improvements	**Date:**	June 13, 2011
Client:	City of Bellingham	**Project Number:**	8153A.10
Prepared By:	R. Samstag, Bob Eimstad	**Reviewed By:**	B. Matson, S. Leung
Subject:	Reasonable Potential Analysis		
Distribution:	F. Anthony, R. Routhe, L. Bateman		

1.0 INTRODUCTION AND SUMMARY

Proposed improvements to the Post Point Wastewater Treatment Plant (WWTP) will increase treatment capacity to accommodate planned growth over a 20-year planning period. Under some conditions, an increase in treated effluent flow may have the potential to cause exceedances of water quality criteria established to protect beneficial uses of the receiving water. This memorandum evaluates whether the increase in maximum month flow at the Post Point WWTP will result in a reasonable potential for exceedances of established water quality criteria.

Water quality criteria, evaluation methodologies, and permitting procedures have been established by the United States Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) to prevent acute and chronic toxicity in the receiving water. For each permitted increase in discharge, an evaluation of the effluent data, mixing, and receiving water characteristics is required to determine whether the increase in effluent flow may have a reasonable potential to exceed water quality criteria. If a reasonable potential to exceed water quality criteria is found, National Pollutant Discharge Elimination System (NPDES) permit limits would then be established by Ecology to limit pollutant loadings to assure that water quality criteria are not exceeded.

Water quality criteria for toxics in Washington marine waters are established in the Washington Administrative Code (WAC) 173-201A-240. Ecology requires that acute toxicity criteria must be met at the edge of the Zone of Initial Dilution (ZID) under peak flow conditions and chronic toxicity criteria must be met at the edge of the Mixing Zone (MZ) for all flow conditions at or below the maximum month effluent flow.

The capacity improvements at the Post Point WWTP will not change the peak flow capacity above the current capacity of 72 mgd. A previous reasonable potential analysis (RPA) by Ecology during development of the 2007 NPDES permit renewal indicated that attainment of acute criteria would not be impacted by the 72 mgd discharge and no NPDES permit limits were established. Although there is no change in peak flow, this previous RPA is updated within this memorandum based upon historic Post Point WWTP effluent samples and Puget Sound background toxics concentration characterization undertaken by Ecology in 2009 and 2010. The updated RPA confirmed Ecology's 2007 RPA that Post Point WWTP effluent has no reasonable potential to cause exceedances of acute toxics criteria.

Maximum month flows will increase from 20 mgd to 34.3 mgd and the potential impact of this additional flow on meeting chronic water quality criteria is considered within this memorandum. The RPA for chronic conditions was developed around the worst case, maximum month conditions. It used revised maximum month flow, revised mixing within the mixing zone, and updated effluent and background water quality data. Based upon the analysis, the updated RPA demonstrates that there is no reasonable potential for the Post Point WWTP effluent discharge to cause exceedances of chronic toxics criteria.

2.0 INFORMATION, DATA AND ASSUMPTIONS USED IN RPA

A determination of reasonable potential is dependent upon effluent flow, effluent quality, mixing at the point of discharge into the receiving water, background toxic concentrations in the receiving water, the water quality criteria, and physical and chemical factors that impact the potential toxicity of each pollutant.

2.1 WWTP Outfalls

The Post Point WWTP has two outfalls:

- Primary Outfall (001) is rated to handle flows up to 55 mgd under high tide conditions and will accommodate the peak 72 mgd flow at most conditions. The primary outfall discharges 2,010 feet offshore through thirty-five (35), 6-inch diameter port diffusers at an average depth of 76 feet below mean lower low water (MLLW).
- Auxiliary Outfall (002) serves as the secondary WWTP discharge during high tide conditions and periods of peak stormwater induced flows. Outfall 002 was replaced in 2008 and terminates approximately 475 feet offshore at a depth of 41 feet below MLLW through a 54-inch diameter duckbill check valve. Since its construction in 2008, this outfall has been used four times for a total of 3.5 hours of discharge.

The frequency and volume of discharge through the Auxiliary Outfall (002) will be unchanged by the treatment plant improvements. This memorandum evaluates only the impacts of the improvements to dilution conditions at Primary Outfall (001).

2.2 Effluent Flows

The Post Point WWTP currently discharges a maximum monthly average flow of 20 mgd of secondary-treated, disinfected effluent to Bellingham Bay The treatment plant improvements will increase the rated maximum monthly treatment capacity to 34.3 mgd. The new maximum monthly effluent flow of 34.3 mgd is used for the chronic toxicity evaluation.

The Post Point WWTP currently discharges a maximum peak flow of 72 mgd to Bellingham Bay. The treatment plant improvements will not increase this flow. The peak effluent flow of 72 mgd is used for the update to the previous acute toxicity evaluation.

2.3 Effluent Quality

Post Point WWTP effluent metals data from 2001 through 2007 was used for the RPA analysis. Non-detect measurements were reported at the Practical Quantification Limit (PQL). Post Point WWTP effluent chlorine and ammonia data from 1998 through current was used for the RPA analysis. Effluent data used for the RPA analysis is included in Appendix A.

2.4 Effluent Mixing in the Receiving Water

Ecology has authorized allowable discharge mixing zones for the Post Point WWTP to discharge to the estuarine Bellingham Bay. Water quality criteria have been established by Ecology to prevent both chronic and acute toxicity. Chronic effects are those effects that can result from long-term exposure to concentrations of a potential toxin and chronic criteria must be met at the boundary of the mixing zone. Acute effects are those that can occur as the result of short-term exposure and acute criteria must be met at the boundary of the ZID.

Ecology defines the allowable mixing zone area for a permitted outfall in the *Water Quality Program Permit Writer's Manual* Publication No. 92-109 (Ecology, November 2010).

- Chronic Boundary: The allowable mixing zone is defined as a cylinder from the sea bottom to the water surface with a diameter of 400 feet plus twice the depth of the diffuser plus the length of the diffuser. For the Post Point WWTP, the mixing zone boundary at Outfall 001 is 977 feet (298 meters). Chronic water quality criteria must be met at the mixing zone boundary.
- Acute Boundary: The allowable ZID is one-tenth the diameter of the chronic mixing zone. Acute water quality criteria must be met at the edge of the ZID.

The dilution ratio for the chronic boundary is based upon the highest average month effluent flowrate (maximum month). Effluent dilution within the mixing zone is dependent upon flow, diffuser design, and physical conditions at the point of discharge. The current Outfall 001 mixing zone dilution, calculated at the current maximum month flow of 20 mgd, is 70:1, This was calculated by the *EPA Plumes* modeling software.

The Post Point WWTP maximum month effluent flows will increase to 34.3 mgd following the treatment plant improvements. Based on a linear reduction for the current mixing zone volume, and as confirmed using the *Visual Plumes* dilution model, UM3, the dilution ratio within the mixing zone at the future design flow of 34.3 mgd will be reduced to 41:1. Peak flows are unchanged by the treatment plant improvements. As a result, the dilution ratio within the ZID remains at 33:1 as previously calculated by the *EPA Plumes* modeling software.

2.5 Background Toxics Concentrations in Puget Sound

Limited data exists on water column concentrations of toxic metals and organics in Puget Sound. In the absence of ambient water quality data, Ecology assumed that background concentrations for all toxics were zero in their 2007 RPA determination. In 2009 and 2010, Ecology performed limited water column sampling and analyzed concentrations of some toxics in Puget Sound waters and rivers tributary to Puget Sound. The study is summarized in Ecology's, *Control of Toxic Chemicals*

in Puget Sound - Characterization of Toxic Chemicals in Puget Sound and Major Tributaries, 2009-10 (January 2011).

In the 2009-2010 sampling program, Ecology did not sample in Bellingham Bay or northern Puget Sound. Conservatively, this update assumes that the background concentrations of toxics to be the highest measured toxics concentrations at the three nearest marine water column sampling stations in Ecology's 2009-2010 toxic chemicals characterization. These three sampling stations are the Whidbey Basin, Haro Strait and the Strait of San Juan de Fuca – North stations.

2.6 Effluent Limitations and Water Quality Criteria

The Post Point WWTP operates under a NPDES permit, which places limits on various water quality parameters, flow rates, and waste loadings. The current NPDES permit (Permit No. WA-002082-6) was issued in 2007 by the Ecology and expires in 2012.

In addition to establishing effluent limitations such as the Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), fecal coliform; and pH, the NPDES permit also requires that the discharges not cause exceedances of the toxics water quality criteria in the receiving water as defined in WAC 173-201A-240. These criteria are presented in Appendix B.

3.0 REASONABLE POTENTIAL ANALYSIS

When the Post Point WWTP NPDES permit was renewed in 2007, Ecology prepared a RPA to confirm there was no reasonable potential for the effluent from the Post Point WWTP to cause exceedances of established acute and chronic toxics criteria in Bellingham Bay. The 2007 RPA was developed consistent with the *EPA Technical Support Document for Water Quality-based Toxics Control* (March 1991).

In 2007, Ecology evaluated arsenic, chromium, copper, lead, nickel, and zinc, acrylonitrile, benzene, chloroform, ichlorobromomethane, methyl chloride, toluene, phenol, bis (2-ethylhexyl) phthalate, and di-N-butylphthalate. Ecology concluded that there was no reasonable potential for exceedances of water quality criteria based on the evaluation of 72 mgd peak flow and 20 mgd maximum month flow.

This study updates Ecology's 2007 RPA. The following updates and modifications were made to Ecology's 2007 RPA:

- Mixing at chronic conditions was revised based upon the increase in maximum month flows from 20 mgd to 34.3 mgd. This resulted in the chronic condition dilution ratio changing from 70:1 to 41:1. No change was made to peak flows or the acute condition dilution ratio. Dilution at Outfall 001 is shown in Appendix C.
- Background toxics concentrations were updated based upon highest concentrations measured at the three nearest marine water column sampling stations in Ecology's 2009-2010 sampling program. These stations were the Whidbey Basin, Haro Strait, and the Strait of Juan de Fuca – North. Although these stations are not in Bellingham Bay, using these background concentrations results in a more conservative approach than taken in the 2007 RPA.

- Effluent toxics data was updated. This included a calculation of the actual coefficient of variance (CV) instead of an assumed value of 0.6 used in the 2007 RPA. The CV is used in the RPA to estimate the anticipated highest concentration based upon the highest measured effluent concentration value and the variability of the data set for each pollutant parameter.

As with the 2007 RPA, the updated RPA was developed consistent with the *EPA Technical Support Document for Water Quality-based Toxics Control* (March 1991). The updated RPA found no reasonable potential for exceedances of acute, chronic and human health water quality criteria. The updated RPA can be found in Appendix D.

APPENDIX A

TREATMENT PLANT EFFLUENT DATA – METALS, NH4, CHLORINE

Date		Antimony		Arsenic		Beryllium		Cadmium		Chromium		Copper
		ug/L		ug/l		ug/l		ug/l		ug/l		ug/l
01/11/00	<	1.0	<	1.0	<	1.0	<	1.0		2.0		6.0
03/08/00	<	1.0	<	1.0	<	1.0	<	1.0	<	1.0	<	5.0
05/15/00	<	1.0		1.0	<	1.0	<	1.0		1.0		9.0
07/17/00	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
09/12/00	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
11/20/00	<	5.0		16.0	<	5.0	<	5.0	<	5.0	X	24.0
01/09/01	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	X	13.0
03/14/01	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	X	24.0
05/08/01	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
07/10/01	<	5.0	<	5.0	<	5.0	<	5.0		15.0		54.0
09/18/01	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
11/06/01	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
01/15/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
03/05/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	X	15.0
05/14/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
07/09/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
09/10/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0
11/05/02	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	X	23.0
01/15/03	<	5.0	<	5.0	<	5.0	<	5.0	<	5.0	<	25.0
03/11/03	<	5.0	<	5.0	<	10.0	<	5.0	<	10.0	<	25.0
05/07/03	<	1.0		1.0	<	1.0	<	1.0	<	1.0		10.0
07/01/03	<	1.0		1.0	<	1.0	<	1.0	<	1.0		6.0
09/10/03	<	1.0		1.0	<	2.0	<	1.0		2.0		8.0
11/11/03	<	1.0	<	1.0	<	1.0	<	1.0	<	5.0		98.0
01/06/04	<	1.0		1.0	<	1.0	<	1.0	<	5.0		31.0
03/10/04	<	1.0	<	1.0	<	1.0	<	1.0	X	1.0		11.0
05/04/04	<	1.0		1.0	<	1.0	<	1.0	<	5.0		8.6
07/07/04	<	1.0		1.3	<	1.0	<	1.0	X	1.0		6.6
09/14/04	<	1.0		1.0	<	1.0	<	1.0	<	5.0		6.0
11/03/04	<	1.0	<	1.0	<	1.0	<	1.0	<	5.0		9.7
01/06/05	<	1.0		1.2	<	1.0	<	1.0	<	5.0		21.0
03/01/05		0.5		1.2	<	1.0	<	1.0	<	5.0		14.0
05/10/05	<	1.0		1.3	<	1.0	<	1.0	<	5.0		9.3
07/12/05	<	1.0		1.0	<	1.0	<	1.0	<	5.0		6.0
09/07/05		1.5		1.5	<	1.0	<	1.0	<	5.0		5.9
11/01/05	<	1.0		1.1	<	1.0	<	1.0	<	5.0		6.8

Date		Antimony		Arsenic		Beryllium		Cadmium		Chromium		Copper
		ug/L		ug/l		ug/l		ug/l		ug/l		ug/l
01/10/06	<	1.0		1.0	<	1.0	<	1.0	<	5.0	X	18.0
03/08/06	<	1.0		1.0	<	1.0	<	1.0	<	1.0		8.0
05/17/06	<	1.0		1.4	<	1.0	<	1.0	<	5.0		82.0
07/12/06	<	1.0		2.0	<	1.0	<	1.0	<	5.0	<	20.0
09/06/06	<	1.0		1.6	<	1.0	<	1.0	<	5.0	X	19.0
10/24/06												10.0
11/13/06	<	1.0		1.1	<	1.0	<	1.0	<	5.0		17.0
01/09/07	<	1.0	<	1.0	<	1.0	<	1.0	<	5.0		22.0
03/07/07	<	1.0		1.0	<	1.0	<	1.0	<	5.0		6.0
05/09/07	<	1.0		1.0	<	1.0	<	1.0	<	5.0		6.5
07/10/07	<	1.0		1.5	<	1.0	<	1.0	<	5.0		8.7
09/18/07	<	1.0		1.0	<	1.0	<	1.0	<	5.0		6.0
11/06/07	<	1.0		1.4	<	1.0	<	1.0	<	5.0		10.0
AVE:	**<**	**2.4**		**2.7**	**<**	**2.5**	**<**	**2.4**		**4.6**		**18.8**
MAX*:	**<**	**5.0**		**16.0**	**<**	**10.0**	**<**	**5.0**		**15.0**		**98.0**
SD		**1.9**		**2.7**		**2.2**		**1.9**		**2.3**		**17.6**
CV		**0.8**		**1.0**		**0.8**		**0.8**		**0.5**		**0.9**
N:		**48**		**48**		**48**		**48**		**48**		**48**

Date		Lead		Mercury		Nickel		Selenium		Silver		Thallium		Zinc
		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l
01/11/00	<	1.0	<	0.5		1.0	<	1.0	<	1.0	<	1.0		27.0
03/08/00	<	1.0	<	0.5	<	1.0	<	1.0	<	1.0	<	1.0		37.0
05/15/00		1.0	<	0.5		2.0		7.0	<	1.0	<	1.0		68.0
07/17/00	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		37.0
09/12/00	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		50.0
11/20/00	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		45.0
01/09/01	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		90.0
03/14/01	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		50.0
05/08/01	<	5.0	<	0.5	<	5.0		5.0	<	5.0	<	5.0		37.0
07/10/01	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		49.0
09/18/01	<	5.0	<	0.5	<	5.0		5.0	<	5.0	<	5.0		47.0
11/06/01	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		33.0
01/15/02	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		38.0
03/05/02	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		38.0
05/14/02	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		38.0
07/09/02		5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		86.0
09/10/02	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		39.0
11/05/02	X	4.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		60.0
01/15/03	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		34.0
03/11/03	<	5.0	<	0.5	<	5.0	<	5.0	<	5.0	<	5.0		40.0
05/07/03	<	1.0	<	0.5		3.0		2.0	<	1.0	<	1.0		54.0
07/01/03	<	1.0	<	0.5	<	1.0		1.0	<	1.0	<	1.0		276.0
09/10/03	<	1.0	<	0.5		3.0		1.6	<	1.0	<	1.0		43.0
11/11/03	<	1.0	<	0.5		3.0	<	5.0	<	1.0	<	1.0		154.0
01/06/04	<	1.0	<	0.5		3.0	X	2.0	<	1.0	<	1.0		43.0
03/10/04	<	1.0	<	0.5		2.0	X	1.0	<	1.0	<	1.0		121.0
05/04/04	<	1.0	<	0.5		2.8	X	2.7	<	1.0	<	1.0		58.0
07/07/04	<	1.0	<	0.5		3.0	X	1.8	<	1.0	<	1.0		49.0
09/14/04	<	1.0	<	0.5		3.0	X	1.0	<	1.0	<	1.0		48.0
11/03/04	X	0.9	<	0.5		3.0	<	5.0	<	1.0	<	1.0		42.0
01/06/05	X	0.9	<	0.5		2.9		1.9	<	1.0	<	1.0		41.0
03/01/05	X	0.9	<	0.5		2.5		1.9	X	0.4	<	1.0		43.0

Date		Lead		Mercury		Nickel		Selenium		Silver		Thallium		Zinc
		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l
05/10/05	<	1.0	<	0.5		2.2		1.8	<	1.0	<	1.0		40.9
07/12/05		4.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		34.0
09/07/05	X	0.9	<	0.5		2.7	X	2.1	X	0.7	<	1.0		31.0
11/01/05	<	1.0	<	0.5		1.7		1.0	<	1.0	<	1.0		30.0
01/10/06		1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		156.0
03/08/06	<	1.0	<	0.2		3.0	<	5.0	<	1.0	<	1.0		36.0
05/17/06	<	1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		55.0
07/12/06	<	1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		38.0
09/06/06	<	1.0				3.0			<	1.0	<	1.0		56.0
10/24/06			<	0.2			<	5.0						
11/13/06		1.3	<	0.5		2.5	<	5.0	<	1.0	<	1.0		32.0
01/09/07	<	1.0	<	0.5		2.3	<	5.0	<	1.0	<	1.0		26.0
03/07/07	<	1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		32.0
05/09/07	<	1.0	<	0.2		2.3	<	5.0	<	1.0	<	1.0		32.0
07/10/07	<	1.0	<	0.5		2.4	<	5.0	<	1.0	<	1.0		40.0
09/18/07	<	1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		40.0
11/06/07	<	1.0	<	0.2		2.0	<	5.0	<	1.0	<	1.0		45.0
AVE:		**2.5**	<	**0.4**		**3.3**		**4.0**	<	**2.4**	<	**2.4**		**55.0**
MAX*:		**5.0**	<	**0.5**		**5.0**		**7.0**	<	**5.0**	<	**5.0**		**276.0**
SD		**1.9**		**0.1**		**1.4**		**1.7**		**1.9**		**1.9**		**42.8**
CV		**0.8**		**0.3**		**0.4**		**0.4**		**0.8**		**0.8**		**0.8**
N:		**48**		**48**		**48**		**48**		**48**		**48**		**48**

A "<" signifies a value below the practical quantification limit (PQL) of the instrument, method, or test series.

A "X" indicates that the result was below the PQL.

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/1/2006	19.7	0.01	
1/2/2006	17.1	0.01	
1/3/2006	15.6	0.01	
1/4/2006	14.1	0.01	
1/5/2006	17.8	0.01	
1/6/2006	22.0	0.01	
1/7/2006	20.1	0.01	
1/8/2006	18.8	0.02	
1/9/2006	24.5	0.01	
1/10/2006	38.2	0.01	
1/11/2006	30.0	0.02	
1/12/2006	27.2	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/13/2006	26.1	0.01	
1/14/2006	22.7	0.01	
1/15/2006	17.4	0.02	
1/16/2006	22.4	0.01	
1/17/2006	24.7	0.01	
1/18/2006	18.1	0.01	
1/19/2006	16.3	0.01	
1/20/2006	19.4	0.01	
1/21/2006	15.4	0.01	
1/22/2006	14.0	0.01	
1/23/2006	14.2	0.02	
1/24/2006	13.3	0.01	
1/25/2006	13.0	0.03	
1/26/2006	15.8	0.02	
1/27/2006	13.7	0.05	
1/28/2006	14.7	0.03	
1/29/2006	19.1	0.01	
1/30/2006	34.7	0.01	
1/31/2006	22.3	0.01	
2/1/2006	24.7	0.01	
2/2/2006	21.0	0.02	
2/3/2006	18.0	0.01	
2/4/2006	24.2	0.02	
2/5/2006	24.9	0.01	
2/6/2006	18.9	0.01	
2/7/2006	15.9	0.01	
2/8/2006	15.7	0.02	
2/9/2006	14.2	0.03	
2/10/2006	13.1	0.03	
2/11/2006	12.4	0.02	
2/12/2006	11.7	0.02	
2/13/2006	12.6	0.01	
2/14/2006	11.7	0.01	
2/15/2006	11.2	0.01	
2/16/2006	11.1	0.01	
2/17/2006	10.5	0.01	
2/18/2006	10.1	0.02	
2/19/2006	9.5	0.01	
2/20/2006	9.9	0.01	
2/21/2006	10.0	0.01	
2/22/2006	10.7	0.01	
2/23/2006	19.4	0.02	
2/24/2006	13.8	0.02	
2/25/2006	12.2	0.02	
2/26/2006	12.9	0.01	
2/27/2006	13.3	0.01	
2/28/2006	13.0	0.02	
3/1/2006	12.0	0.01	
3/2/2006	12.2	0.02	
3/3/2006	11.5	0.01	
3/4/2006	10.8	0.01	
3/5/2006	10.7	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
3/6/2006	10.8	0.01	
3/7/2006	10.7	0.01	
3/8/2006	11.9	0.01	
3/9/2006	12.9	0.01	
3/10/2006	13.9	0.02	
3/11/2006	12.0	0.01	
3/12/2006	11.1	0.01	
3/13/2006	11.4	0.01	
3/14/2006	11.2	0.01	
3/15/2006	10.8	0.02	
3/16/2006	10.6	0.01	
3/17/2006	10.3	0.02	
3/18/2006	9.7	0.02	
3/19/2006	9.5	0.02	
3/20/2006	9.5	0.01	
3/21/2006	9.6	0.04	
3/22/2006	9.7	0.02	
3/23/2006	9.7	0.03	
3/24/2006	10.4	0.02	
3/25/2006	9.5	0.02	
3/26/2006	9.2	0.01	
3/27/2006	9.8	0.01	
3/28/2006	11.0	0.01	
3/29/2006	10.3	0.01	
3/30/2006	10.3	0.01	
3/31/2006	10.1	0.02	
4/1/2006	13.8	0.04	
4/2/2006	11.6	0.01	
4/3/2006	11.4	0.01	
4/4/2006	10.9	0.01	
4/5/2006	10.8	0.01	
4/6/2006	10.4	0.01	
4/7/2006	10.2	0.02	
4/8/2006	9.9	0.01	
4/9/2006	12.1	0.02	
4/10/2006	12.0	0.04	
4/11/2006	10.8	0.01	
4/12/2006	10.8	0.01	
4/13/2006	11.3	0.02	
4/14/2006	16.5	0.02	
4/15/2006	14.7	0.01	
4/16/2006	13.9	0.02	
4/17/2006	12.8	0.01	
4/18/2006	11.9	0.01	
4/19/2006	13.0	0.02	
4/20/2006	11.3	0.08	
4/21/2006	15.2	0.02	
4/22/2006	12.1	0.01	
4/23/2006	11.3	0.01	
4/24/2006	11.3	0.02	
4/25/2006	11.2	0.01	
4/26/2006	11.0	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
4/27/2006	10.7	0.01	
4/28/2006	10.3	0.02	
4/29/2006	12.4	0.02	
4/30/2006	11.0	0.01	
5/1/2006	11.2	0.04	
5/2/2006	10.6	0.01	
5/3/2006	10.5	0.01	
5/4/2006	10.5	0.01	
5/5/2006	10.1	0.05	
5/6/2006	9.8	0.01	
5/7/2006	12.3	0.01	
5/8/2006	10.8	0.01	
5/9/2006	10.8	0.01	
5/10/2006	10.8	0.01	
5/11/2006	10.6	0.01	
5/12/2006	10.1	0.02	
5/13/2006	9.5	0.02	
5/14/2006	9.3	0.02	
5/15/2006	10.0	0.01	
5/16/2006	10.3	0.01	
5/17/2006	10.2	0.01	
5/18/2006	10.2	0.01	
5/19/2006	9.9	0.03	
5/20/2006	9.7	0.01	
5/21/2006	9.8	0.01	
5/22/2006	12.2	0.01	
5/23/2006	11.0	0.02	
5/24/2006	10.9	0.01	
5/25/2006	10.5	0.01	
5/26/2006	10.3	0.01	
5/27/2006	9.7	0.01	
5/28/2006	10.4	0.01	
5/29/2006	10.2	0.02	
5/30/2006	10.1	0.01	
5/31/2006	10.4	0.02	
6/1/2006	11.6	0.02	
6/2/2006	11.5	0.01	
6/3/2006	10.3	0.01	
6/4/2006	12.7	0.02	
6/5/2006	12.5	0.01	
6/6/2006	11.4	0.01	
6/7/2006	10.7	0.01	
6/8/2006	13.7	0.02	
6/9/2006	12.4	0.02	
6/10/2006	10.9	0.01	
6/11/2006	10.4	0.01	
6/12/2006	10.4	0.01	
6/13/2006	10.4	0.01	
6/14/2006	10.4	0.01	22.8
6/15/2006	10.2	0.02	
6/16/2006	10.0	0.01	
6/17/2006	9.4	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
6/18/2006	9.3	0.01	
6/19/2006	9.7	0.02	
6/20/2006	9.9	0.01	
6/21/2006	9.8	0.02	27.3
6/22/2006	9.9	0.01	
6/23/2006	10.0	0.01	
6/24/2006	9.7	0.01	
6/25/2006	9.5	0.01	
6/26/2006	10.1	0.01	
6/27/2006	10.0	0.01	
6/28/2006	10.0	0.01	
6/29/2006	10.5	0.01	
6/30/2006	10.4	0.01	
7/1/2006	9.4	0.01	
7/2/2006	9.3	0.01	
7/3/2006	9.3	0.01	
7/4/2006	9.1	0.01	
7/5/2006	9.4	0.01	22.6
7/6/2006	9.4	0.02	
7/7/2006	9.5	0.01	
7/8/2006	9.2	0.01	
7/9/2006	9.3	0.01	
7/10/2006	9.6	0.01	
7/11/2006	9.9	0.01	
7/12/2006	11.1	0.01	24.5
7/13/2006	9.9	0.01	
7/14/2006	9.8	0.03	
7/15/2006	9.5	0.03	
7/16/2006	9.4	0.02	
7/17/2006	9.8	0.01	
7/18/2006	10.0	0.01	
7/19/2006	10.0	0.01	
7/20/2006	10.0	0.01	27.2
7/21/2006	10.3	0.01	
7/22/2006	10.1	0.02	
7/23/2006	10.0	0.02	
7/24/2006	10.5	0.02	
7/25/2006	10.3	0.02	
7/26/2006	10.1	0.03	24.8
7/27/2006	10.4	0.02	
7/28/2006	10.4	0.01	
7/29/2006	9.2	0.02	
7/30/2006	9.3	0.02	
7/31/2006	9.9	0.01	
8/1/2006	9.6	0.02	
8/2/2006	9.7	0.01	27.0
8/3/2006	10.0	0.03	
8/4/2006	9.9	0.02	
8/5/2006	9.5	0.02	
8/6/2006	9.4	0.01	
8/7/2006	10.2	0.01	
8/8/2006	13.3	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
8/9/2006	10.7	0.01	
8/10/2006	11.2	0.02	
8/11/2006	9.7	0.01	
8/12/2006	9.4	0.01	
8/13/2006	9.3	0.01	
8/14/2006	9.7	0.01	
8/15/2006	9.8	0.01	
8/16/2006	9.9	0.01	
8/17/2006	9.8	0.02	
8/18/2006	10.1	0.01	
8/19/2006	9.7	0.01	
8/20/2006	9.3	0.01	
8/21/2006	10.1	0.01	
8/22/2006	10.0	0.02	
8/23/2006	9.6	0.01	20.9
8/24/2006	9.2	0.02	
8/25/2006	9.5	0.02	
8/26/2006	9.4	0.04	
8/27/2006	9.2	0.03	
8/28/2006	10.2	0.02	
8/29/2006	9.7	0.02	
8/30/2006	9.6	0.01	27.6
8/31/2006	9.3	0.02	
9/1/2006	9.4	0.01	
9/2/2006	9.0	0.03	
9/3/2006	8.6	0.02	
9/4/2006	9.1	0.01	
9/5/2006	9.4	0.02	
9/6/2006	8.2	0.04	27.9
9/7/2006	9.3	0.03	
9/8/2006	9.1	0.01	
9/9/2006	11.4	0.04	
9/10/2006	9.1	0.02	
9/11/2006	9.1	0.02	
9/12/2006	9.2	0.01	
9/13/2006	8.9	0.02	31.3
9/14/2006	9.0	0.01	
9/15/2006	8.7	0.01	
9/16/2006	8.6	0.01	
9/17/2006	8.6	0.01	
9/18/2006	9.6	0.01	
9/19/2006	12.5	0.03	
9/20/2006	11.1	0.01	
9/21/2006	10.0	0.01	24.7
9/22/2006	8.7	0.01	
9/23/2006	9.1	0.02	
9/24/2006	8.9	0.01	
9/25/2006	10.5	0.01	
9/26/2006	9.6	0.01	27.6
9/27/2006	9.5	0.01	
9/28/2006	9.5	0.02	
9/29/2006	9.1	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
9/30/2006	9.1	0.02	
10/1/2006	8.9	0.03	
10/2/2006	9.1	0.02	
10/3/2006	9.1	0.04	
10/4/2006	9.1	0.08	33.3
10/5/2006	9.2	0.02	
10/6/2006	9.0	0.02	
10/7/2006	8.5	0.01	
10/8/2006	8.7	0.02	
10/9/2006	8.8	0.02	
10/10/2006	8.7	0.01	
10/11/2006	8.8	0.01	36.0
10/12/2006	8.9	0.02	
10/13/2006	8.8	0.02	
10/14/2006	8.6	0.03	
10/15/2006	11.0	0.01	
10/16/2006	9.3	0.01	
10/17/2006	9.2	0.01	
10/18/2006	9.4	0.01	30.1
10/19/2006	10.2	0.01	
10/20/2006	9.4	0.01	
10/21/2006	8.9	0.01	
10/22/2006	8.7	0.01	
10/23/2006	8.9	0.01	
10/24/2006	9.2	0.02	
10/25/2006	9.3	0.02	
10/26/2006	9.1	0.01	
10/27/2006	9.1	0.02	
10/28/2006	8.7	0.02	
10/29/2006	10.6	0.01	
10/30/2006	8.8	0.03	
10/31/2006	8.6	0.01	
11/1/2006	8.7	0.01	
11/2/2006	9.3	0.01	
11/3/2006	13.7	0.02	
11/4/2006	16.0	0.01	
11/5/2006	16.7	0.01	
11/6/2006	36.2	0.01	
11/7/2006	21.7	0.01	
11/8/2006	15.9	0.01	
11/9/2006	13.2	0.01	
11/10/2006	14.4	0.01	
11/11/2006	15.3	0.01	
11/12/2006	22.0	0.01	
11/13/2006	31.1	0.01	
11/14/2006	19.1	0.01	
11/15/2006	17.3	0.01	
11/16/2006	15.9	0.01	
11/17/2006	13.9	0.01	
11/18/2006	13.3	0.01	
11/19/2006	13.7	0.02	
11/20/2006	13.1	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
11/21/2006	16.2	0.02	
11/22/2006	13.9	0.02	
11/23/2006	16.9	0.01	
11/24/2006	22.5	0.01	
11/25/2006	22.9	0.01	
11/26/2006	19.7	0.01	
11/27/2006	16.4	0.01	
11/28/2006	14.7	0.01	
11/29/2006	14.2	0.02	
11/30/2006	23.5	0.01	
12/1/2006	20.7	0.01	
12/2/2006	17.6	0.01	
12/3/2006	15.5	0.01	
12/4/2006	18.0	0.01	
12/5/2006	16.4	0.01	
12/6/2006	14.4	0.01	
12/7/2006	13.2	0.01	
12/8/2006	12.4	0.01	
12/9/2006	12.3	0.01	
12/10/2006	12.1	0.01	
12/11/2006	13.1	0.01	
12/12/2006	16.4	0.01	
12/13/2006	22.5	0.01	
12/14/2006	34.4	0.01	
12/15/2006	25.6	0.05	
12/16/2006	17.6	0.01	
12/17/2006	14.4	0.01	
12/18/2006	13.3	0.01	
12/19/2006	13.3	0.01	
12/20/2006	12.8	0.01	
12/21/2006	16.4	0.01	
12/22/2006	14.2	0.01	
12/23/2006	19.7	0.01	
12/24/2006	16.9	0.01	
12/25/2006	17.1	0.01	
12/26/2006	14.8	0.01	
12/27/2006	14.5	0.02	
12/28/2006	12.8	0.05	
12/29/2006	12.2	0.06	
12/30/2006	11.4	0.05	
12/31/2006	11.0	0.04	
1/1/2007	12.4	0.05	
1/2/2007	33.2	0.05	
1/3/2007	29.1	0.06	
1/4/2007	24.1	0.03	
1/5/2007	24.3	0.02	
1/6/2007	27.1	0.01	
1/7/2007	31.4	0.04	
1/8/2007	22.0	0.01	
1/9/2007	18.9	0.01	
1/10/2007	17.1	0.01	
1/11/2007	15.4	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/12/2007	13.7	0.01	
1/13/2007	12.7	0.02	
1/14/2007	11.9	0.02	
1/15/2007	12.0	0.02	
1/16/2007	13.3	0.01	
1/17/2007	13.6	0.01	
1/18/2007	17.2	0.01	
1/19/2007	18.6	0.01	
1/20/2007	16.7	0.02	
1/21/2007	14.3	0.02	
1/22/2007	16.3	0.01	
1/23/2007	18.9	0.01	
1/24/2007	15.6	0.01	
1/25/2007	14.1	0.03	
1/26/2007	13.0	0.01	
1/27/2007	12.1	0.01	
1/28/2007	11.3	0.01	
1/29/2007	11.3	0.01	
1/30/2007	11.3	0.08	
1/31/2007	11.1	0.01	
2/1/2007	11.0	0.01	
2/2/2007	10.6	0.02	
2/3/2007	10.5	0.02	
2/4/2007	11.9	0.01	
2/5/2007	11.7	0.01	
2/6/2007	11.4	0.01	
2/7/2007	11.4	0.01	
2/8/2007	13.9	0.02	
2/9/2007	12.4	0.02	
2/10/2007	11.7	0.02	
2/11/2007	11.5	0.02	
2/12/2007	11.2	0.01	
2/13/2007	11.5	0.01	
2/14/2007	13.9	0.01	
2/15/2007	17.2	0.01	
2/16/2007	14.3	0.01	
2/17/2007	13.0	0.01	
2/18/2007	12.2	0.01	
2/19/2007	19.3	0.01	
2/20/2007	22.9	0.01	
2/21/2007	16.6	0.01	
2/22/2007	14.4	0.01	
2/23/2007	14.5	0.01	
2/24/2007	14.7	0.01	
2/25/2007	14.5	0.01	
2/26/2007	13.9	0.02	
2/27/2007	12.8	0.01	
2/28/2007	12.2	0.01	
3/1/2007	13.0	0.01	
3/2/2007	13.5	0.01	
3/3/2007	15.0	0.01	
3/4/2007	13.4	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
3/5/2007	14.0	0.01	
3/6/2007	13.2	0.01	
3/7/2007	16.3	0.01	
3/8/2007	19.4	0.01	
3/9/2007	16.0	0.01	
3/10/2007	15.8	0.01	
3/11/2007	29.4	0.01	
3/12/2007	26.7	0.01	
3/13/2007	18.7	0.01	
3/14/2007	16.8	0.01	
3/15/2007	15.0	0.01	
3/16/2007	16.8	0.01	
3/17/2007	22.0	0.01	
3/18/2007	24.1	0.01	
3/19/2007	19.5	0.01	
3/20/2007	17.8	0.01	
3/21/2007	15.0	0.01	
3/22/2007	17.2	0.01	
3/23/2007	19.0	0.01	
3/24/2007	26.6	0.01	
3/25/2007	22.0	0.01	
3/26/2007	18.6	0.01	
3/27/2007	15.5	0.01	
3/28/2007	13.1	0.01	
3/29/2007	12.4	0.03	
3/30/2007	12.1	0.01	
3/31/2007	11.7	0.02	
4/1/2007	11.2	0.01	
4/2/2007	11.2	0.02	
4/3/2007	11.2	0.02	
4/4/2007	10.9	0.03	
4/5/2007	11.0	0.01	
4/6/2007	10.8	0.03	
4/7/2007	10.5	0.02	
4/8/2007	10.6	0.02	
4/9/2007	12.4	0.01	
4/10/2007	11.2	0.02	
4/11/2007	10.6	0.01	
4/12/2007	10.7	0.01	
4/13/2007	10.5	0.01	
4/14/2007	10.9	0.02	
4/15/2007	10.3	0.03	
4/16/2007	10.9	0.02	
4/17/2007	12.0	0.05	
4/18/2007	11.2	0.01	
4/19/2007	10.7	0.01	
4/20/2007	10.2	0.01	
4/21/2007	10.0	0.01	
4/22/2007	10.0	0.01	
4/23/2007	10.4	0.02	
4/24/2007	11.2	0.01	
4/25/2007	10.7	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
4/26/2007	11.2	0.03	
4/27/2007	14.1	0.01	
4/28/2007	14.1	0.03	
4/29/2007	11.8	0.01	
4/30/2007	11.6	0.01	
5/1/2007	11.2	0.01	
5/2/2007	11.4	0.02	
5/3/2007	10.9	0.01	
5/4/2007	10.5	0.02	
5/5/2007	9.9	0.02	
5/6/2007	10.1	0.02	
5/7/2007	10.5	0.02	
5/8/2007	10.3	0.01	
5/9/2007	10.1	0.01	
5/10/2007	9.8	0.01	
5/11/2007	9.8	0.02	
5/12/2007	9.4	0.02	
5/13/2007	9.1	0.03	
5/14/2007	9.7	0.01	
5/15/2007	9.8	0.01	
5/16/2007	9.8	0.01	
5/17/2007	9.8	0.02	
5/18/2007	9.7	0.01	
5/19/2007	9.5	0.03	
5/20/2007	12.0	0.01	
5/21/2007	13.0	0.01	
5/22/2007	10.7	0.02	
5/23/2007	10.8	0.04	
5/24/2007	10.4	0.02	
5/25/2007	9.9	0.02	
5/26/2007	9.4	0.01	
5/27/2007	9.1	0.02	
5/28/2007	9.6	0.02	
5/29/2007	10.1	0.02	
5/30/2007	10.5	0.01	
5/31/2007	10.0	0.01	
6/1/2007	9.9	0.01	
6/2/2007	9.9	0.01	
6/3/2007	9.9	0.02	
6/4/2007	10.1	0.01	
6/5/2007	10.2	0.02	
6/6/2007	10.8	0.01	
6/7/2007	9.8	0.01	
6/8/2007	9.8	0.03	
6/9/2007	10.2	0.02	
6/10/2007	10.0	0.02	
6/11/2007	10.1	0.01	
6/12/2007	9.8	0.01	23.1
6/13/2007	9.7	0.03	
6/14/2007	9.5	0.02	
6/15/2007	10.0	0.02	
6/16/2007	9.2	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
6/17/2007	10.0	0.03	
6/18/2007	9.7	0.02	
6/19/2007	9.6	0.03	
6/20/2007	9.5	0.03	
6/21/2007	10.3	0.02	22.2
6/22/2007	9.9	0.02	
6/23/2007	9.4	0.02	
6/24/2007	9.3	0.01	
6/25/2007	9.8	0.02	
6/26/2007	9.5	0.01	22.9
6/27/2007	9.6	0.02	
6/28/2007	9.4	0.01	
6/29/2007	9.9	0.02	
6/30/2007	9.4	0.04	
7/1/2007	9.0	0.03	
7/2/2007	9.3	0.02	22.4
7/3/2007	9.8	0.02	
7/4/2007	8.9	0.01	
7/5/2007	9.3	0.03	
7/6/2007	9.1	0.05	
7/7/2007	8.8	0.04	
7/8/2007	8.9	0.02	
7/9/2007	9.4	0.02	
7/10/2007	9.7	0.02	27.2
7/11/2007	10.7	0.02	
7/12/2007	10.5	0.02	
7/13/2007	9.7	0.03	
7/14/2007	9.4	0.01	
7/15/2007	9.2	0.02	
7/16/2007	9.8	0.01	
7/17/2007	9.9	0.03	23.5
7/18/2007	10.7	0.03	
7/19/2007	10.6	0.02	
7/20/2007	10.7	0.01	
7/21/2007	10.0	0.02	
7/22/2007	10.4	0.02	
7/23/2007	11.1	0.02	
7/24/2007	9.6	0.02	22.0
7/25/2007	9.6	0.02	
7/26/2007	9.5	0.01	
7/27/2007	9.5	0.01	
7/28/2007	9.2	0.02	
7/29/2007	8.9	0.01	
7/30/2007	9.3	0.01	
7/31/2007	9.6	0.01	19.9
8/1/2007	9.7	0.02	
8/2/2007	9.6	0.01	
8/3/2007	9.7	0.03	
8/4/2007	9.2	0.01	
8/5/2007	9.1	0.02	
8/6/2007	9.4	0.02	
8/7/2007	9.6	0.01	20.4

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
8/8/2007	8.9	0.01	
8/9/2007	9.8	0.01	
8/10/2007	9.5	0.02	
8/11/2007	9.2	0.02	
8/12/2007	9.2	0.02	
8/13/2007	9.5	0.03	
8/14/2007	10.0	0.01	21.6
8/15/2007	9.5	0.02	
8/16/2007	9.5	0.02	
8/17/2007	9.6	0.01	
8/18/2007	8.9	0.01	
8/19/2007	9.4	0.02	
8/20/2007	9.5	0.01	
8/21/2007	9.7	0.01	23.0
8/22/2007	9.2	0.01	
8/23/2007	9.4	0.02	
8/24/2007	9.5	0.02	
8/25/2007	9.7	0.04	
8/26/2007	9.0	0.03	
8/27/2007	9.4	0.01	
8/28/2007	9.6	0.02	21.8
8/29/2007	9.6	0.02	
8/30/2007	9.5	0.01	
8/31/2007	10.1	0.01	
9/1/2007	9.0	0.01	
9/2/2007	8.6	0.02	
9/3/2007	9.1	0.02	
9/4/2007	9.4	0.01	
9/5/2007	9.1	0.01	
9/6/2007	9.2	0.02	
9/7/2007	9.3	0.02	
9/8/2007	9.2	0.01	
9/9/2007	9.1	0.02	
9/10/2007	9.5	0.06	
9/11/2007	9.3	0.01	
9/12/2007	9.2	0.01	
9/13/2007	9.2	0.02	
9/14/2007	9.1	0.02	
9/15/2007	8.6	0.04	
9/16/2007	8.8	0.03	
9/17/2007	9.0	0.02	
9/18/2007	9.5	0.03	24.6
9/19/2007	8.5	0.01	
9/20/2007	8.8	0.05	
9/21/2007	9.3	0.12	
9/22/2007	8.8	0.03	
9/23/2007	8.7	0.06	
9/24/2007	8.8	0.02	
9/25/2007	9.4	0.03	23.1
9/26/2007	8.9	0.02	
9/27/2007	10.1	0.01	
9/28/2007	9.4	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
9/29/2007	9.0	0.07	
9/30/2007	12.9	0.04	
10/1/2007	10.9	0.04	
10/2/2007	13.8	0.01	16.2
10/3/2007	10.9	0.01	
10/4/2007	10.9	0.01	
10/5/2007	10.2	0.02	
10/6/2007	9.9	0.01	
10/7/2007	12.2	0.01	
10/8/2007	9.8	0.01	
10/9/2007	9.9	0.02	19.8
10/10/2007	10.0	0.02	
10/11/2007	10.6	0.02	
10/12/2007	9.7	0.02	
10/13/2007	9.3	0.02	
10/14/2007	9.4	0.04	
10/15/2007	9.8	0.03	
10/16/2007	11.6	0.02	23.9
10/17/2007	10.2	0.02	
10/18/2007	10.6	0.02	
10/19/2007	15.3	0.04	
10/20/2007	11.2	0.01	
10/21/2007	11.9	0.02	
10/22/2007	13.6	0.03	
10/23/2007	11.5	0.02	18.8
10/24/2007	11.8	0.02	
10/25/2007	10.8	0.02	
10/26/2007	10.2	0.03	
10/27/2007	9.8	0.04	
10/28/2007	9.7	0.06	
10/29/2007	10.3	0.01	
10/30/2007	9.8	0.03	19.4
10/31/2007	9.7	0.01	
11/1/2007	9.6	0.02	
11/2/2007	9.5	0.03	
11/3/2007	10.1	0.04	
11/4/2007	9.7	0.02	
11/5/2007	9.6	0.02	
11/6/2007	9.8	0.03	26.1
11/7/2007	10.3	0.03	
11/8/2007	11.3	0.03	
11/9/2007	14.5	0.03	
11/10/2007	12.4	0.03	
11/11/2007	10.6	0.06	
11/12/2007	11.9	0.03	
11/13/2007	11.6	0.03	18.6
11/14/2007	10.7	0.03	
11/15/2007	11.3	0.03	
11/16/2007	13.8	0.02	
11/17/2007	12.7	0.02	
11/18/2007	11.4	0.01	
11/19/2007	11.2	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
11/20/2007	10.9	0.03	
11/21/2007	10.1	0.01	
11/22/2007	9.0	0.05	
11/23/2007	8.7	0.03	
11/24/2007	6.9	0.01	
11/25/2007	9.2	0.01	
11/26/2007	11.7	0.01	
11/27/2007	12.6	0.03	
11/28/2007	11.2	0.02	
11/29/2007	10.6	0.01	
11/30/2007	10.2	0.04	
12/1/2007	9.7	0.04	
12/2/2007	14.4	0.01	
12/3/2007	30.3	0.03	
12/4/2007	21.3	0.03	8.7
12/5/2007	17.1	0.03	
12/6/2007	14.0	0.02	
12/7/2007	12.2	0.03	
12/8/2007	11.2	0.01	
12/9/2007	10.6	0.02	
12/10/2007	10.4	0.02	
12/11/2007	10.5	0.03	
12/12/2007	10.4	0.01	
12/13/2007	12.4	0.01	
12/14/2007	13.2	0.01	
12/15/2007	13.9	0.02	
12/16/2007	12.7	0.03	
12/17/2007	13.1	0.02	
12/18/2007	13.6	0.01	
12/19/2007	17.8	0.01	
12/20/2007	14.1	0.01	
12/21/2007	12.2	0.03	
12/22/2007	15.6	0.03	
12/23/2007	16.0	0.02	
12/24/2007	14.2	0.02	
12/25/2007	12.0	0.02	
12/26/2007	14.7	0.01	
12/27/2007	15.0	0.01	
12/28/2007	18.3	0.02	
12/29/2007	15.5	0.02	
12/30/2007	13.1	0.01	
12/31/2007	12.3	0.03	
1/1/2008	11.2	0.06	
1/2/2008	13.6	0.01	
1/3/2008	12.5	0.01	
1/4/2008	12.6	0.02	
1/5/2008	11.5	0.05	
1/6/2008	10.9	0.02	
1/7/2008	11.2	0.01	
1/8/2008	11.8	0.03	14.2
1/9/2008	12.0	0.10	
1/10/2008	17.1	0.04	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/11/2008	16.4	0.02	
1/12/2008	15.2	0.01	
1/13/2008	14.7	0.02	
1/14/2008	17.2	0.03	
1/15/2008	15.2	0.03	
1/16/2008	13.5	0.01	
1/17/2008	12.5	0.02	
1/18/2008	11.9	0.02	
1/19/2008	13.4	0.01	
1/20/2008	12.3	0.04	
1/21/2008	11.8	0.06	
1/22/2008	11.1	0.07	
1/23/2008	10.9	0.03	
1/24/2008	10.7	0.02	
1/25/2008	10.2	0.02	
1/26/2008	10.0	0.04	
1/27/2008	10.2	0.03	
1/28/2008	10.1	0.03	
1/29/2008	11.8	0.03	
1/30/2008	11.2	0.02	
1/31/2008	13.3	0.02	
2/1/2008	12.9	0.02	
2/2/2008	12.9	0.04	
2/3/2008	11.6	0.04	
2/4/2008	11.3	0.02	
2/5/2008	15.1	0.02	16.8
2/6/2008	14.3	0.01	
2/7/2008	16.3	0.02	
2/8/2008	14.9	0.02	
2/9/2008	17.3	0.01	
2/10/2008	16.4	0.02	
2/11/2008	16.4	0.01	
2/12/2008	15.0	0.01	
2/13/2008	13.6	0.02	
2/14/2008	12.8	0.03	
2/15/2008	13.3	0.02	
2/16/2008	12.8	0.01	
2/17/2008	11.6	0.02	
2/18/2008	11.6	0.02	
2/19/2008	11.4	0.01	
2/20/2008	11.2	0.02	
2/21/2008	11.1	0.02	
2/22/2008	10.9	0.01	
2/23/2008	10.5	0.07	
2/24/2008	10.1	0.02	
2/25/2008	10.2	0.03	
2/26/2008	10.0	0.04	
2/27/2008	10.3	0.01	
2/28/2008	10.1	0.02	
2/29/2008	10.8	0.01	
3/1/2008	11.0	0.04	
3/2/2008	10.2	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
3/3/2008	11.0	0.02	
3/4/2008	10.5	0.03	19.0
3/5/2008	10.2	0.02	
3/6/2008	10.0	0.02	
3/7/2008	10.5	0.02	
3/8/2008	10.7	0.06	
3/9/2008	10.2	0.04	
3/10/2008	12.2	0.03	
3/11/2008	13.4	0.01	
3/12/2008	11.6	0.01	
3/13/2008	11.5	0.01	
3/14/2008	12.1	0.01	
3/15/2008	12.5	0.03	
3/16/2008	13.1	0.01	
3/17/2008	14.3	0.02	
3/18/2008	12.8	0.03	
3/19/2008	12.0	0.01	
3/20/2008	13.2	0.01	
3/21/2008	13.7	0.01	
3/22/2008	11.8	0.01	
3/23/2008	18.8	0.02	
3/24/2008	16.1	0.01	
3/25/2008	13.4	0.02	
3/26/2008	14.5	0.03	
3/27/2008	12.7	0.01	
3/28/2008	13.4	0.05	
3/29/2008	22.6	0.03	
3/30/2008	20.5	0.01	
3/31/2008	16.7	0.02	
4/1/2008	14.4	0.01	10.6
4/2/2008	13.2	0.02	
4/3/2008	12.3	0.03	
4/4/2008	12.4	0.02	
4/5/2008	11.4	0.02	
4/6/2008	11.4	0.01	
4/7/2008	11.5	0.01	
4/8/2008	12.5	0.03	
4/9/2008	11.5	0.02	
4/10/2008	11.8	0.02	
4/11/2008	11.2	0.02	
4/12/2008	10.8	0.02	
4/13/2008	10.6	0.06	
4/14/2008	10.8	0.06	
4/15/2008	10.6	0.02	
4/16/2008	10.3	0.02	
4/17/2008	10.1	0.06	
4/18/2008	9.8	0.04	
4/19/2008	9.7	0.03	
4/20/2008	9.6	0.02	
4/21/2008	10.1	0.02	
4/22/2008	10.3	0.02	
4/23/2008	10.2	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
4/24/2008	10.3	0.05	
4/25/2008	10.0	0.03	
4/26/2008	9.2	0.04	
4/27/2008	9.6	0.04	
4/28/2008	10.2	0.02	
4/29/2008	13.5	0.02	
4/30/2008	10.8	0.03	
5/1/2008	10.2	0.02	
5/2/2008	10.0	0.03	
5/3/2008	10.5	0.05	
5/4/2008	10.2	0.03	
5/5/2008	10.1	0.02	
5/6/2008	10.0	0.01	17.6
5/7/2008	9.7	0.02	
5/8/2008	10.0	0.01	
5/9/2008	11.0	0.01	
5/10/2008	9.6	0.03	
5/11/2008	12.7	0.06	
5/12/2008	10.8	0.03	
5/13/2008	13.2	0.03	
5/14/2008	20.0	0.03	
5/15/2008	14.6	0.03	
5/16/2008	12.9	0.02	
5/17/2008	11.7	0.03	
5/18/2008	11.5	0.09	
5/19/2008	11.5	0.03	
5/20/2008	12.3	0.05	
5/21/2008	11.4	0.03	
5/22/2008	10.9	0.02	
5/23/2008	10.6	0.04	
5/24/2008	10.1	0.02	
5/25/2008	9.8	0.03	
5/26/2008	10.3	0.07	
5/27/2008	10.4	0.03	
5/28/2008	10.3	0.02	
5/29/2008	9.9	0.04	
5/30/2008	9.9	0.02	
5/31/2008	9.7	0.03	
6/1/2008	9.5	0.05	
6/2/2008	9.8	0.05	
6/3/2008	15.0	0.06	22.3
6/4/2008	19.1	0.03	
6/5/2008	13.8	0.02	
6/6/2008	17.2	0.02	
6/7/2008	13.2	0.01	
6/8/2008	11.9	0.01	
6/9/2008	13.9	0.02	
6/10/2008	14.4	0.01	14.8
6/11/2008	12.4	0.02	
6/12/2008	11.6	0.02	
6/13/2008	11.1	0.04	
6/14/2008	10.4	0.04	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
6/15/2008	10.0	0.03	
6/16/2008	10.2	0.01	
6/17/2008	10.3	0.02	
6/18/2008	10.0	0.05	
6/19/2008	9.8	0.07	
6/20/2008	9.8	0.07	
6/21/2008	9.4	0.03	
6/22/2008	9.1	0.02	
6/23/2008	9.6	0.02	
6/24/2008	10.2	0.02	21.4
6/25/2008	10.3	0.01	
6/26/2008	9.4	0.03	
6/27/2008	9.5	0.03	
6/28/2008	9.4	0.01	
6/29/2008	9.6	0.04	
6/30/2008	9.9	0.03	
7/1/2008	9.7	0.02	23.8
7/2/2008	9.8	0.01	
7/3/2008	10.2	0.01	
7/4/2008	9.3	0.02	
7/5/2008	9.0	0.03	
7/6/2008	9.2	0.04	
7/7/2008	9.7	0.05	
7/8/2008	9.2	0.02	22.4
7/9/2008	10.2	0.03	
7/10/2008	9.8	0.03	
7/11/2008	9.5	0.01	
7/12/2008	9.2	0.03	
7/13/2008	9.2	0.03	
7/14/2008	9.8	0.01	
7/15/2008	10.0	0.02	
7/16/2008	9.3	0.03	
7/17/2008	9.2	0.03	19.9
7/18/2008	9.4	0.04	
7/19/2008	9.1	0.06	
7/20/2008	9.0	0.04	
7/21/2008	9.3	0.03	
7/22/2008	9.6	0.03	21.5
7/23/2008	8.6	0.02	
7/24/2008	9.6	0.05	
7/25/2008	9.6	0.05	
7/26/2008	9.1	0.05	
7/27/2008	10.0	0.03	
7/28/2008	9.4	0.04	20.1
7/29/2008	9.3	0.02	
7/30/2008	9.1	0.03	
7/31/2008	9.3	0.03	
8/1/2008	9.2	0.01	
8/2/2008	8.8	0.05	
8/3/2008	8.7	0.05	
8/4/2008	9.5	0.04	
8/5/2008	9.5	0.02	21.0

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
8/6/2008	9.7	0.02	
8/7/2008	9.7	0.01	
8/8/2008	9.4	0.04	
8/9/2008	9.6	0.05	
8/10/2008	10.0	0.04	
8/11/2008	9.6	0.02	
8/12/2008	9.5	0.01	
8/13/2008	9.5	0.03	
8/14/2008	9.6	0.05	
8/15/2008	10.0	0.05	
8/16/2008	9.4	0.02	
8/17/2008	9.3	0.04	
8/18/2008	9.5	0.03	
8/19/2008	10.3	0.03	
8/20/2008	11.5	0.05	
8/21/2008	13.2	0.03	
8/22/2008	10.0	0.02	
8/23/2008	9.6	0.03	
8/24/2008	12.4	0.04	
8/25/2008	10.6	0.04	
8/26/2008	10.7	0.01	
8/27/2008	11.2	0.01	16.8
8/28/2008	11.2	0.01	
8/29/2008	10.5	0.02	
8/30/2008	9.7	0.02	
8/31/2008	9.1	0.02	
9/1/2008	9.3	0.02	
9/2/2008	9.0	0.01	
9/3/2008	8.6	0.02	
9/4/2008	9.3	0.04	
9/5/2008	9.0	0.07	
9/6/2008	8.9	0.06	
9/7/2008	8.9	0.04	
9/8/2008	9.0	0.03	
9/9/2008	9.2	0.02	
9/10/2008	9.3	0.03	
9/11/2008	9.3	0.03	
9/12/2008	9.0	0.04	
9/13/2008	8.8	0.07	
9/14/2008	8.9	0.08	
9/15/2008	9.4	0.02	
9/16/2008	9.2	0.02	23.4
9/17/2008	9.1	0.02	
9/18/2008	9.1	0.01	
9/19/2008	8.8	0.01	
9/20/2008	11.2	0.04	
9/21/2008	10.1	0.03	
9/22/2008	9.8	0.02	
9/23/2008	9.5	0.02	
9/24/2008	9.6	0.04	
9/25/2008	9.7	0.04	
9/26/2008	9.4	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
9/27/2008	9.2	0.05	
9/28/2008	9.1	0.06	
9/29/2008	9.4	0.04	
9/30/2008	9.5	0.02	
10/1/2008	9.4	0.02	
10/2/2008	9.4	0.04	
10/3/2008	8.8	0.03	
10/4/2008	10.8	0.05	
10/5/2008	9.4	0.03	
10/6/2008	9.7	0.03	
10/7/2008	10.4	0.02	22.0
10/8/2008	9.5	0.01	
10/9/2008	9.8	0.01	
10/10/2008	9.2	0.02	
10/11/2008	9.2	0.02	
10/12/2008	9.0	0.04	
10/13/2008	11.7	0.03	
10/14/2008	10.3	0.03	
10/15/2008	9.8	0.04	
10/16/2008	10.3	0.05	
10/17/2008	10.4	0.01	
10/18/2008	9.9	0.07	
10/19/2008	9.5	0.08	
10/20/2008	9.8	0.04	
10/21/2008	9.6	0.01	
10/22/2008	9.5	0.01	
10/23/2008	9.5	0.02	
10/24/2008	9.2	0.01	
10/25/2008	9.1	0.03	
10/26/2008	9.0	0.02	
10/27/2008	9.0	0.05	
10/28/2008	9.4	0.02	
10/29/2008	9.3	0.02	
10/30/2008	9.5	0.03	
10/31/2008	10.8	0.03	
11/1/2008	9.7	0.05	
11/2/2008	17.1	0.08	
11/3/2008	14.9	0.03	
11/4/2008	21.7	0.07	10.4
11/5/2008	13.8	0.02	
11/6/2008	23.5	0.01	
11/7/2008	36.1	0.02	
11/8/2008	24.3	0.03	
11/9/2008	16.1	0.01	
11/10/2008	15.1	0.03	
11/11/2008	15.5	0.01	
11/12/2008	24.1	0.01	
11/13/2008	16.4	0.01	
11/14/2008	13.6	0.03	
11/15/2008	12.4	0.05	
11/16/2008	11.8	0.03	
11/17/2008	11.3	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
11/18/2008	11.1	0.03	
11/19/2008	11.1	0.05	
11/20/2008	11.4	0.04	
11/21/2008	11.3	0.02	
11/22/2008	11.3	0.05	
11/23/2008	10.8	0.02	
11/24/2008	10.5	0.04	
11/25/2008	11.2	0.05	
11/26/2008	10.3	0.04	
11/27/2008	9.2	0.05	
11/28/2008	11.4	0.05	
11/29/2008	22.2	0.05	
11/30/2008	18.4	0.02	
12/1/2008	14.7	0.02	
12/2/2008	14.4	0.04	
12/3/2008	13.0	0.07	
12/4/2008	11.7	0.10	
12/5/2008	11.3	0.07	
12/6/2008	11.3	0.03	
12/7/2008	12.3	0.02	
12/8/2008	11.4	0.01	
12/9/2008	12.2	0.01	
12/10/2008	12.2	0.02	
12/11/2008	11.4	0.04	
12/12/2008	15.1	0.05	
12/13/2008	15.0	0.03	
12/14/2008	12.4	0.01	
12/15/2008	11.6	0.02	
12/16/2008	11.4	0.02	
12/17/2008	11.2	0.02	
12/18/2008	10.3	0.03	
12/19/2008	9.9	0.03	
12/20/2008	9.7	0.06	
12/21/2008	10.0	0.04	
12/22/2008	10.2	0.05	
12/23/2008	9.9	0.03	
12/24/2008	11.9	0.04	
12/25/2008	12.0	0.07	
12/26/2008	12.7	0.03	
12/27/2008	37.3	0.03	
12/28/2008	30.8	0.03	
12/29/2008	26.4	0.02	
12/30/2008	19.9	0.03	
12/31/2008	17.7	0.02	
1/1/2009	22.3	0.02	
1/2/2009	17.7	0.02	
1/3/2009	15.0	0.03	
1/4/2009	17.4	0.01	
1/5/2009	24.0	0.02	
1/6/2009	37.6	0.01	
1/7/2009	70.0	0.02	
1/8/2009	59.8	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/9/2009	37.7	0.01	
1/10/2009	42.6	0.01	
1/11/2009	40.6	0.01	
1/12/2009	32.3	0.01	
1/13/2009	28.0	0.01	
1/14/2009	24.8	0.02	
1/15/2009	22.2	0.01	
1/16/2009	18.6	0.01	
1/17/2009	14.4	0.05	
1/18/2009	12.6	0.03	
1/19/2009	12.5	0.02	
1/20/2009	11.9	0.02	
1/21/2009	11.6	0.01	
1/22/2009	11.3	0.04	
1/23/2009	11.0	0.01	
1/24/2009	10.6	0.01	
1/25/2009	10.4	0.01	
1/26/2009	10.7	0.03	
1/27/2009	10.3	0.01	
1/28/2009	10.4	0.01	
1/29/2009	10.2	0.02	
1/30/2009	10.1	0.01	
1/31/2009	9.8	0.04	
2/1/2009	9.8	0.05	
2/2/2009	10.3	0.02	
2/3/2009	10.2	0.01	
2/4/2009	10.0	0.02	
2/5/2009	9.9	0.01	
2/6/2009	11.3	0.04	
2/7/2009	10.2	0.06	
2/8/2009	10.2	0.04	
2/9/2009	11.7	0.03	
2/10/2009	10.8	0.02	
2/11/2009	11.7	0.03	
2/12/2009	10.9	0.07	
2/13/2009	10.3	0.02	
2/14/2009	10.0	0.04	
2/15/2009	9.6	0.01	
2/16/2009	9.9	0.02	
2/17/2009	9.8	0.02	
2/18/2009	9.9	0.01	
2/19/2009	9.6	0.01	
2/20/2009	9.6	0.02	
2/21/2009	9.4	0.04	
2/22/2009	9.3	0.02	
2/23/2009	10.1	0.02	
2/24/2009	10.7	0.01	
2/25/2009	17.9	0.10	
2/26/2009	15.5	0.03	
2/27/2009	13.9	0.01	
2/28/2009	12.8	0.02	
3/1/2009	13.9	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
3/2/2009	14.7	0.01	
3/3/2009	13.1	0.01	
3/4/2009	12.1	0.01	
3/5/2009	12.0	0.03	
3/6/2009	11.0	0.03	
3/7/2009	10.8	0.03	
3/8/2009	10.5	0.04	
3/9/2009	10.3	0.02	
3/10/2009	10.3	0.01	
3/11/2009	10.2	0.02	
3/12/2009	10.0	0.01	
3/13/2009	10.0	0.02	
3/14/2009	13.2	0.07	
3/15/2009	13.1	0.03	
3/16/2009	15.7	0.02	
3/17/2009	15.8	0.01	
3/18/2009	13.5	0.03	
3/19/2009	13.6	0.03	
3/20/2009	12.8	0.02	
3/21/2009	11.7	0.02	
3/22/2009	11.0	0.01	
3/23/2009	10.9	0.03	
3/24/2009	12.6	0.02	
3/25/2009	11.5	0.01	
3/26/2009	10.9	0.01	
3/27/2009	10.8	0.04	
3/28/2009	11.1	0.09	
3/29/2009	11.7	0.02	
3/30/2009	11.4	0.02	
3/31/2009	18.6	0.04	
4/1/2009	16.7	0.05	
4/2/2009	25.4	0.01	
4/3/2009	16.3	0.01	
4/4/2009	13.9	0.02	
4/5/2009	12.5	0.02	
4/6/2009	12.4	0.01	
4/7/2009	11.8	0.01	
4/8/2009	11.3	0.01	
4/9/2009	11.0	0.01	
4/10/2009	10.6	0.01	
4/11/2009	10.2	0.03	
4/12/2009	13.4	0.02	
4/13/2009	12.6	0.03	
4/14/2009	12.6	0.01	
4/15/2009	10.6	0.02	
4/16/2009	10.9	0.02	
4/17/2009	15.2	0.01	
4/18/2009	12.2	0.01	
4/19/2009	11.7	0.01	
4/20/2009	11.3	0.01	
4/21/2009	11.4	0.01	
4/22/2009	11.1	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
4/23/2009	10.6	0.02	
4/24/2009	10.4	0.03	
4/25/2009	9.7	0.02	
4/26/2009	9.9	0.02	
4/27/2009	10.3	0.02	
4/28/2009	10.0	0.02	
4/29/2009	10.1	0.02	
4/30/2009	10.2	0.04	
5/1/2009	9.8	0.07	
5/2/2009	10.1	0.12	
5/3/2009	10.6	0.09	
5/4/2009	11.6	0.08	
5/5/2009	12.2	0.04	
5/6/2009	14.8	0.05	
5/7/2009	21.8	0.03	
5/8/2009	13.4	0.01	
5/9/2009	11.5	0.07	
5/10/2009	10.9	0.10	
5/11/2009	13.1	0.02	
5/12/2009	16.4	0.02	
5/13/2009	14.4	0.03	
5/14/2009	25.3	0.12	
5/15/2009	15.5	0.04	
5/16/2009	13.2	0.03	
5/17/2009	12.5	0.01	
5/18/2009	13.8	0.01	
5/19/2009	17.1	0.03	
5/20/2009	13.5	0.01	
5/21/2009	12.4	0.02	
5/22/2009	11.7	0.01	
5/23/2009	10.7	0.01	
5/24/2009	10.2	0.03	
5/25/2009	10.5	0.03	
5/26/2009	11.2	0.02	
5/27/2009	10.7	0.01	
5/28/2009	10.6	0.02	
5/29/2009	10.4	0.06	
5/30/2009	10.0	0.08	
5/31/2009	10.0	0.02	
6/1/2009	10.3	0.07	
6/2/2009	10.4	0.02	21.5
6/3/2009	10.5	0.04	
6/4/2009	10.5	0.02	
6/5/2009	10.4	0.01	
6/6/2009	9.9	0.02	
6/7/2009	9.8	0.04	
6/8/2009	11.3	0.02	
6/9/2009	10.9	0.03	21.8
6/10/2009	10.5	0.04	
6/11/2009	10.1	0.04	
6/12/2009	10.4	0.03	
6/13/2009	9.8	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
6/14/2009	9.2	0.05	
6/15/2009	9.6	0.04	
6/16/2009	9.5	0.03	19.8
6/17/2009	9.7	0.01	
6/18/2009	9.6	0.01	
6/19/2009	9.4	0.02	
6/20/2009	8.9	0.05	
6/21/2009	8.7	0.05	
6/22/2009	9.3	0.03	
6/23/2009	9.4	0.01	23.6
6/24/2009	10.2	0.01	
6/25/2009	9.3	0.02	
6/26/2009	9.2	0.02	
6/27/2009	8.9	0.04	
6/28/2009	8.9	0.03	
6/29/2009	9.5	0.03	
6/30/2009	9.6	0.03	22.1
7/1/2009	9.7	0.07	
7/2/2009	9.7	0.10	
7/3/2009	9.5	0.02	
7/4/2009	9.4	0.04	
7/5/2009	9.5	0.01	
7/6/2009	10.0	0.01	
7/7/2009	10.0	0.03	25.5
7/8/2009	10.4	0.02	
7/9/2009	9.5	0.03	
7/10/2009	8.4	0.04	
7/11/2009	9.2	0.03	
7/12/2009	9.3	0.03	
7/13/2009	11.0	0.03	
7/14/2009	9.7	0.02	
7/15/2009	9.8	0.02	
7/16/2009	10.1	0.01	20.5
7/17/2009	10.3	0.03	
7/18/2009	10.1	0.01	
7/19/2009	10.2	0.02	
7/20/2009	10.7	0.02	
7/21/2009	10.8	0.02	
7/22/2009	10.9	0.02	
7/23/2009	10.9	0.02	
7/24/2009	11.5	0.02	
7/25/2009	11.2	0.02	
7/26/2009	10.6	0.02	
7/27/2009	11.2	0.02	
7/28/2009	11.7	0.01	
7/29/2009	11.8	0.02	
7/30/2009	11.8	0.01	
7/31/2009	11.1	0.01	
8/1/2009	9.5	0.02	
8/2/2009	9.3	0.02	
8/3/2009	10.0	0.01	
8/4/2009	9.8	0.02	22.6

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
8/5/2009	10.2	0.01	
8/6/2009	10.3	0.01	
8/7/2009	9.5	0.03	
8/8/2009	9.6	0.04	
8/9/2009	9.6	0.02	
8/10/2009	11.0	0.01	
8/11/2009	12.7	0.08	
8/12/2009	10.2	0.05	
8/13/2009	9.8	0.01	
8/14/2009	9.6	0.03	
8/15/2009	9.2	0.03	
8/16/2009	8.9	0.04	
8/17/2009	9.6	0.03	
8/18/2009	9.6	0.05	
8/19/2009	10.0	0.02	
8/20/2009	10.0	0.02	
8/21/2009	9.9	0.02	
8/22/2009	9.2	0.02	
8/23/2009	9.2	0.01	
8/24/2009	9.6	0.03	
8/25/2009	9.5	0.03	
8/26/2009	10.5	0.02	
8/27/2009	9.7	0.02	
8/28/2009	9.5	0.02	
8/29/2009	8.5	0.05	
8/30/2009	9.3	0.05	
8/31/2009	9.6	0.05	
9/1/2009	9.7	0.01	
9/2/2009	9.5	0.02	
9/3/2009	9.6	0.06	
9/4/2009	9.2	0.06	
9/5/2009	9.3	0.08	
9/6/2009	9.4	0.04	
9/7/2009	11.8	0.04	
9/8/2009	8.5	0.01	
9/9/2009	10.4	0.03	
9/10/2009	9.8	0.02	
9/11/2009	9.7	0.06	
9/12/2009	9.2	0.04	
9/13/2009	9.3	0.03	
9/14/2009	9.6	0.02	
9/15/2009	9.3	0.02	28.6
9/16/2009	9.0	0.04	
9/17/2009	9.0	0.01	
9/18/2009	9.1	0.01	
9/19/2009	12.3	0.03	
9/20/2009	9.4	0.03	
9/21/2009	9.7	0.04	
9/22/2009	9.9	0.03	
9/23/2009	9.9	0.02	
9/24/2009	9.7	0.04	
9/25/2009	9.3	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
9/26/2009	8.9	0.01	
9/27/2009	8.9	0.01	
9/28/2009	9.5	0.01	
9/29/2009	9.7	0.01	
9/30/2009	9.3	0.02	
10/1/2009	10.0	0.02	
10/2/2009	9.6	0.02	
10/3/2009	8.9	0.01	
10/4/2009	8.9	0.01	
10/5/2009	9.0	0.01	
10/6/2009	9.0	0.03	
10/7/2009	8.9	0.02	
10/8/2009	8.9	0.01	
10/9/2009	8.8	0.01	
10/10/2009	8.2	0.03	
10/11/2009	8.4	0.01	
10/12/2009	8.6	0.02	
10/13/2009	8.9	0.02	
10/14/2009	9.0	0.01	
10/15/2009	7.8	0.02	
10/16/2009	9.7	0.02	
10/17/2009	30.5	0.04	
10/18/2009	14.6	0.05	
10/19/2009	11.5	0.01	
10/20/2009	11.7	0.01	
10/21/2009	12.0	0.01	
10/22/2009	10.5	0.02	
10/23/2009	23.7	0.01	
10/24/2009	14.3	0.01	
10/25/2009	13.2	0.01	
10/26/2009	32.4	0.01	
10/27/2009	18.1	0.01	
10/28/2009	13.8	0.01	
10/29/2009	17.6	0.01	
10/30/2009	16.2	0.02	
10/31/2009	20.4	0.01	
11/1/2009	14.5	0.01	
11/2/2009	13.3	0.01	
11/3/2009	12.5	0.02	
11/4/2009	12.0	0.01	
11/5/2009	13.1	0.01	
11/6/2009	16.5	0.01	
11/7/2009	18.6	0.01	
11/8/2009	18.2	0.02	
11/9/2009	16.4	0.01	
11/10/2009	19.7	0.01	
11/11/2009	20.3	0.01	
11/12/2009	15.3	0.02	
11/13/2009	15.9	0.01	
11/14/2009	13.8	0.01	
11/15/2009	14.0	0.02	
11/16/2009	17.9	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
11/17/2009	38.9	0.02	
11/18/2009	27.3	0.01	
11/19/2009	28.4	0.01	
11/20/2009	23.9	0.01	
11/21/2009	20.6	0.01	
11/22/2009	33.6	0.01	
11/23/2009	22.3	0.01	
11/24/2009	17.6	0.01	
11/25/2009	18.4	0.01	
11/26/2009	35.6	0.01	
11/27/2009	19.7	0.01	
11/28/2009	18.3	0.02	
11/29/2009	17.2	0.01	
11/30/2009	18.2	0.03	
12/1/2009	16.1	0.02	
12/2/2009	14.5	0.02	
12/3/2009	13.6	0.02	
12/4/2009	12.4	0.02	
12/5/2009	11.6	0.02	
12/6/2009	11.1	0.02	
12/7/2009	11.1	0.01	
12/8/2009	11.0	0.01	
12/9/2009	10.5	0.02	
12/10/2009	10.4	0.01	
12/11/2009	10.2	0.01	
12/12/2009	9.5	0.01	
12/13/2009	9.5	0.01	
12/14/2009	9.8	0.02	
12/15/2009	12.4	0.02	
12/16/2009	13.1	0.01	
12/17/2009	13.1	0.01	
12/18/2009	11.6	0.01	
12/19/2009	12.3	0.02	
12/20/2009	13.1	0.01	
12/21/2009	16.0	0.02	
12/22/2009	13.5	0.01	
12/23/2009	11.9	0.03	
12/24/2009	10.8	0.01	
12/25/2009	9.3	0.01	
12/26/2009	9.7	0.01	
12/27/2009	9.6	0.01	
12/28/2009	9.8	0.01	
12/29/2009	9.9	0.01	
12/30/2009	11.2	0.02	
12/31/2009	12.2	0.02	
1/1/2010	15.0	0.04	
1/2/2010	23.9	0.01	
1/3/2010	16.8	0.02	
1/4/2010	28.0	0.01	
1/5/2010	25.6	0.02	
1/6/2010	17.4	0.01	
1/7/2010	15.0	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
1/8/2010	19.5	0.02	
1/9/2010	19.7	0.02	
1/10/2010	15.6	0.02	
1/11/2010	19.1	0.02	
1/12/2010	23.6	0.02	8.0
1/13/2010	17.7	0.01	
1/14/2010	18.0	0.02	
1/15/2010	26.4	0.01	
1/16/2010	18.4	0.02	
1/17/2010	16.5	0.02	
1/18/2010	15.6	0.02	
1/19/2010	14.1	0.01	
1/20/2010	13.1	0.02	
1/21/2010	12.6	0.02	
1/22/2010	11.8	0.02	
1/23/2010	11.6	0.02	
1/24/2010	11.3	0.02	
1/25/2010	11.4	0.03	
1/26/2010	11.1	0.02	
1/27/2010	10.8	0.02	
1/28/2010	10.6	0.02	
1/29/2010	10.6	0.01	
1/30/2010	12.2	0.02	
1/31/2010	11.5	0.02	
2/1/2010	11.7	0.02	
2/2/2010	11.9	0.01	
2/3/2010	11.8	0.01	
2/4/2010	11.6	0.02	
2/5/2010	11.4	0.02	
2/6/2010	10.6	0.02	
2/7/2010	10.5	0.02	
2/8/2010	10.7	0.01	
2/9/2010	10.4	0.02	
2/10/2010	10.4	0.02	
2/11/2010	10.7	0.01	
2/12/2010	10.7	0.01	
2/13/2010	10.0	0.01	
2/14/2010	15.5	0.02	
2/15/2010	12.9	0.01	
2/16/2010	14.9	0.01	
2/17/2010	12.7	0.02	
2/18/2010	12.0	0.02	
2/19/2010	11.4	0.03	
2/20/2010	10.8	0.02	
2/21/2010	10.8	0.03	
2/22/2010	10.5	0.02	
2/23/2010	10.5	0.01	
2/24/2010	15.2	0.01	
2/25/2010	13.6	0.02	
2/26/2010	12.7	0.03	
2/27/2010	14.3	0.02	
2/28/2010	12.7	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
3/1/2010	12.5	0.01	
3/2/2010	12.0	0.01	
3/3/2010	11.6	0.03	
3/4/2010	11.0	0.08	
3/5/2010	10.8	0.01	21.4
3/6/2010	10.1	0.02	
3/7/2010	10.6	0.02	
3/8/2010	10.4	0.08	
3/9/2010	10.5	0.02	
3/10/2010	10.6	0.01	
3/11/2010	10.8	0.03	
3/12/2010	18.1	0.03	
3/13/2010	13.4	0.02	
3/14/2010	12.7	0.02	
3/15/2010	13.1	0.01	
3/16/2010	12.3	0.02	
3/17/2010	11.9	0.02	14.5
3/18/2010	11.3	0.02	
3/19/2010	10.8	0.01	
3/20/2010	10.1	0.03	
3/21/2010	10.7	0.04	
3/22/2010	13.4	0.02	
3/23/2010	11.4	0.02	
3/24/2010	11.1	0.01	
3/25/2010	12.6	0.04	
3/26/2010	23.2	0.09	
3/27/2010	14.7	0.01	
3/28/2010	15.8	0.02	
3/29/2010	20.0	0.04	
3/30/2010	16.0	0.04	
3/31/2010	14.3	0.02	
4/1/2010	12.9	0.03	
4/2/2010	12.7	0.02	
4/3/2010	12.4	0.07	
4/4/2010	11.6	0.03	
4/5/2010	11.5	0.05	
4/6/2010	11.9	0.01	
4/7/2010	11.8	0.01	
4/8/2010	16.8	0.02	
4/9/2010	13.7	0.01	
4/10/2010	12.0	0.01	
4/11/2010	11.5	0.01	
4/12/2010	11.4	0.01	
4/13/2010	12.5	0.01	
4/14/2010	12.0	0.02	
4/15/2010	11.3	0.02	
4/16/2010	10.9	0.05	
4/17/2010	10.3	0.04	
4/18/2010	10.1	0.02	
4/19/2010	10.4	0.03	
4/20/2010	10.4	0.02	
4/21/2010	14.6	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
4/22/2010	11.8	0.03	
4/23/2010	11.1	0.04	
4/24/2010	11.2	0.02	
4/25/2010	10.6	0.01	
4/26/2010	10.9	0.03	
4/27/2010	11.6	0.01	
4/28/2010	11.0	0.01	
4/29/2010	10.6	0.02	
4/30/2010	10.3	0.03	
5/1/2010	10.7	0.10	
5/2/2010	13.5	0.01	
5/3/2010	16.5	0.01	
5/4/2010	13.6	0.07	
5/5/2010	12.3	0.01	
5/6/2010	11.6	0.01	
5/7/2010	11.0	0.02	
5/8/2010	10.2	0.03	
5/9/2010	10.1	0.02	
5/10/2010	10.5	0.03	
5/11/2010	10.4	0.03	
5/12/2010	10.1	0.07	
5/13/2010	10.1	0.07	
5/14/2010	9.9	0.01	
5/15/2010	9.5	0.01	
5/16/2010	9.7	0.01	
5/17/2010	9.7	0.06	
5/18/2010	11.2	0.04	
5/19/2010	11.5	0.02	
5/20/2010	10.8	0.01	
5/21/2010	10.1	0.03	
5/22/2010	9.6	0.03	
5/23/2010	9.5	0.03	
5/24/2010	9.7	0.02	
5/25/2010	9.9	0.02	
5/26/2010	11.3	0.02	
5/27/2010	10.4	0.02	
5/28/2010	24.0	0.10	
5/29/2010	14.6	0.01	
5/30/2010	12.1	0.01	
5/31/2010	15.3	0.01	
6/1/2010	13.0	0.01	
6/2/2010	19.1	0.02	
6/3/2010	16.9	0.02	
6/4/2010	15.1	0.04	
6/5/2010	12.7	0.03	
6/6/2010	13.7	0.03	
6/7/2010	13.9	0.02	
6/8/2010	12.6	0.04	
6/9/2010	16.7	0.02	
6/10/2010	13.6	0.02	
6/11/2010	13.2	0.02	
6/12/2010	12.0	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
6/13/2010	11.3	0.03	
6/14/2010	10.9	0.01	
6/15/2010	12.6	0.02	
6/16/2010	11.3	0.01	
6/17/2010	10.9	0.02	
6/18/2010	10.6	0.02	
6/19/2010	10.0	0.07	
6/20/2010	9.6	0.02	
6/21/2010	10.0	0.02	
6/22/2010	10.2	0.01	
6/23/2010	10.2	0.02	
6/24/2010	9.9	0.02	
6/25/2010	9.9	0.02	
6/26/2010	9.3	0.02	
6/27/2010	9.4	0.01	
6/28/2010	9.6	0.01	
6/29/2010	9.4	0.03	
6/30/2010	9.4	0.03	
7/1/2010	9.3	0.03	
7/2/2010	9.3	0.02	
7/3/2010	8.7	0.01	
7/4/2010	8.4	0.01	
7/5/2010	8.9	0.02	
7/6/2010	9.3	0.01	
7/7/2010	9.8	0.02	
7/8/2010	9.8	0.03	
7/9/2010	9.9	0.02	
7/10/2010	9.3	0.04	
7/11/2010	9.2	0.02	
7/12/2010	9.6	0.01	
7/13/2010	9.4	0.03	
7/14/2010	9.4	0.03	
7/15/2010	9.4	0.01	
7/16/2010	9.4	0.03	
7/17/2010	8.9	0.02	
7/18/2010	8.7	0.03	
7/19/2010	9.5	0.01	
7/20/2010	9.6	0.02	
7/21/2010	10.5	0.05	21.2
7/22/2010	9.6	0.03	
7/23/2010	9.8	0.05	
7/24/2010	8.9	0.03	
7/25/2010	8.9	0.02	
7/26/2010	9.6	0.02	
7/27/2010	9.5	0.02	
7/28/2010	9.5	0.02	
7/29/2010	9.4	0.02	
7/30/2010	9.4	0.02	
7/31/2010	9.1	0.02	
8/1/2010	8.5	0.03	
8/2/2010	9.2	0.04	
8/3/2010	9.4	0.02	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
8/4/2010	9.5	0.03	
8/5/2010	9.5	0.01	
8/6/2010	9.0	0.02	
8/7/2010	9.5	0.04	
8/8/2010	9.1	0.06	
8/9/2010	9.3	0.04	
8/10/2010	9.1	0.02	
8/11/2010	9.2	0.04	25.0
8/12/2010	9.4	0.02	
8/13/2010	9.4	0.02	
8/14/2010	9.1	0.04	
8/15/2010	9.4	0.02	
8/16/2010	9.9	0.02	
8/17/2010	9.7	0.02	
8/18/2010	9.7	0.02	
8/19/2010	9.9	0.01	
8/20/2010	9.6	0.01	
8/21/2010	8.8	0.01	
8/22/2010	8.9	0.01	
8/23/2010	9.5	0.02	
8/24/2010	9.6	0.02	
8/25/2010	9.5	0.02	
8/26/2010	9.4	0.02	
8/27/2010	9.2	0.02	
8/28/2010	9.1	0.02	
8/29/2010	8.6	0.02	
8/30/2010	9.2	0.02	
8/31/2010	11.5	0.03	
9/1/2010	11.0	0.02	
9/2/2010	9.4	0.03	
9/3/2010	9.4	0.02	
9/4/2010	8.8	0.02	
9/5/2010	8.4	0.01	
9/6/2010	9.8	0.02	
9/7/2010	11.9	0.04	19.0
9/8/2010	9.7	0.02	
9/9/2010	9.2	0.02	
9/10/2010	9.1	0.03	
9/11/2010	8.6	0.06	
9/12/2010	15.1	0.03	
9/13/2010	13.1	0.01	
9/14/2010	9.2	0.01	
9/15/2010	10.7	0.02	
9/16/2010	10.9	0.01	
9/17/2010	11.3	0.01	
9/18/2010	13.6	0.02	
9/19/2010	14.5	0.05	
9/20/2010	13.0	0.02	
9/21/2010	11.9	0.01	
9/22/2010	10.3	0.01	
9/23/2010	10.4	0.01	
9/24/2010	10.6	0.03	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
9/25/2010	9.9	0.02	
9/26/2010	13.4	0.03	
9/27/2010	10.5	0.03	
9/28/2010	13.1	0.02	
9/29/2010	11.1	0.02	
9/30/2010	10.5	0.02	
10/1/2010	10.1	0.02	
10/2/2010	9.6	0.03	
10/3/2010	9.6	0.04	
10/4/2010	9.9	0.03	
10/5/2010	9.5	0.02	
10/6/2010	9.6	0.02	
10/7/2010	9.6	0.02	
10/8/2010	9.7	0.02	
10/9/2010	10.9	0.02	
10/10/2010	13.6	0.01	
10/11/2010	11.1	0.02	
10/12/2010	10.4	0.02	21.0
10/13/2010	10.1	0.01	
10/14/2010	9.8	0.01	
10/15/2010	9.4	0.01	
10/16/2010	9.2	0.05	
10/17/2010	9.1	0.04	
10/18/2010	9.7	0.03	
10/19/2010	9.8	0.02	
10/20/2010	9.7	0.02	
10/21/2010	9.4	0.02	
10/22/2010	9.1	0.06	
10/23/2010	9.3	0.03	
10/24/2010	11.3	0.09	
10/25/2010	12.9	0.06	
10/26/2010	11.5	0.01	
10/27/2010	10.7	0.02	
10/28/2010	10.4	0.02	
10/29/2010	9.9	0.02	
10/30/2010	9.9	0.02	
10/31/2010	11.9	0.03	
11/1/2010	20.2	0.02	
11/2/2010	17.0	0.02	
11/3/2010	13.1	0.02	
11/4/2010	11.9	0.01	
11/5/2010	11.9	0.02	
11/6/2010	11.4	0.02	
11/7/2010	11.4	0.02	
11/8/2010	11.5	0.03	
11/9/2010	11.1	0.03	
11/10/2010	10.8	0.02	
11/11/2010	10.7	0.03	
11/12/2010	10.3	0.01	
11/13/2010	10.9	0.02	
11/14/2010	12.1	0.01	
11/15/2010	14.6	0.01	

Date	Effluent Flow mgd	Final Effluent Chlorine mg/L	NH3-N in Secondary Effluent mg/L
11/16/2010	13.4	0.03	
11/17/2010	14.9	0.05	12.3
11/18/2010	19.5	0.02	
11/19/2010	14.3	0.01	
11/20/2010	13.3	0.01	
11/21/2010	12.1	0.03	
11/22/2010	11.5	0.03	
11/23/2010	11.2	0.02	
11/24/2010	10.7	0.02	
11/25/2010	10.0	0.02	
11/26/2010	16.3	0.02	
11/27/2010	15.9	0.02	
11/28/2010	13.0	0.02	
11/29/2010	12.9	0.01	
11/30/2010	16.5	0.03	
12/1/2010	14.1	0.02	
12/2/2010	12.5	0.01	
12/3/2010	11.7	0.03	
12/4/2010	11.2	0.02	
12/5/2010	10.7	0.02	
12/6/2010	10.8	0.01	
12/7/2010	11.6	0.04	
12/8/2010	24.1	0.02	
12/9/2010	28.3	0.05	
12/10/2010	21.3	0.03	
12/11/2010	18.8	0.02	
12/12/2010	55.5	0.02	
12/13/2010	33.4	0.02	
12/14/2010	32.5	0.02	
12/15/2010	23.7	0.01	
12/16/2010	17.5	0.01	
12/17/2010	14.9	0.01	
12/18/2010	14.2	0.01	
12/19/2010	13.3	0.01	
12/20/2010	12.7	0.01	
12/21/2010	12.1	0.01	
12/22/2010	11.6	0.01	
12/23/2010	11.9	0.02	
12/24/2010	11.6	0.02	
12/25/2010	10.3	0.01	
12/26/2010	13.2	0.01	
12/27/2010	13.1	0.02	
12/28/2010	12.4	0.01	
12/29/2010	11.5	0.02	
12/30/2010	10.7	0.01	
12/31/2010	10.4	0.02	

APPENDIX B

WAC 173-201A-240 TOXICS CRITERIA

Toxics Substances Criteria

	Freshwater		Marine Water	
Substance	Acute	Chronic	Acute	Chronic
Aldrin/Dieldrin e	2.5a	0.0019b	0.71a	0.0019b
Ammonia (un-ionized NH3) hh	f,c	g,d	0.233h,c	0.035h,d
Arsenic dd	360.0c	190.0d	69.0c,ll	36.0d,cc,ll
Cadmium dd	i,c	j,d	42.0c	9.3d
Chlordane	2.4a	0.0043b	0.09a	0.004b
Chloride (Dissolved) k	860.0h,c	230.0h,d	-	-
Chlorine (Total Residual)	19.0c	11.0d	13.0c	7.5d
Chlorpyrifos	0.083c	0.041d	0.011c	0.0056d
Chromium (Hex) dd	15.0c,l,ii	10.0d,jj	1,100.0c,l,ll	50.0d,ll
Chromium (Tri) gg	m,c	n,d	-	-
Copper dd	o,c	p,d	4.8c,ll	3.1d,ll
Cyanide ee	22.0c	5.2d	1.0c,mm	d,mm
DDT (and metabolites)	1.1a	0.001b	0.13a	0.001b
Dieldrin/Aldrin e	2.5a	0.0019b	0.71a	0.0019b
Endosulfan	0.22a	0.056b	0.034a	0.0087b
Endrin	0.18a	0.0023b	0.037a	0.0023b
Heptachlor	0.52a	0.0038b	0.053a	0.0036b
Hexachlorocyclohexane (Lindane)	2.0a	0.08b	0.16a	-
Lead dd	q,c	r,d	210.0c,ll	8.1d,ll
Mercury s	2.1c,kk,dd	0.012d,ff	1.8c,ll,dd	0.025d,ff
Nickel dd	t,c	u,d	74.0c,ll	8.2d,ll
Parathion	0.065c	0.013d	-	-
Pentachlorophenol (PCP)	w,c	v,d	13.0c	7.9d
Polychlorinated Biphenyls (PCBs)	2.0b	0.014b	10.0b	0.030b
Selenium	20.0c,ff	5.0d,ff	290c,ll,dd	71.0d,

					x,ll,dd
Silver dd		y,a	-	1.9a,ll	-
Toxaphene		0.73c,z	0.0002d	0.21c,z	0.0002d
Zinc dd		aa,c	bb,d	90.0c,ll	81.0d,ll

Notes to Table 240(3):

a. An instantaneous concentration not to be exceeded at any time.

b. A 24-hour average not to be exceeded.

c. A 1-hour average concentration not to be exceeded more than once every three years on the average.

d. A 4-day average concentration not to be exceeded more than once every three years on the average.

e. Aldrin is metabolically converted to Dieldrin. Therefore, the sum of the Aldrin and Dieldrin concentrations are compared with the Dieldrin criteria.

f. Shall not exceed the numerical value in total ammonia nitrogen (mg N/L) given by:

$$\textit{For salmonids present:} \quad \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

$$\textit{For salmonids absent:} \quad \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

g. Shall not exceed the numerical concentration calculated as follows:

Unionized ammonia concentration for waters where salmonid habitat is an existing or designated use:

$$0.80 \div (FT)(FPH)(RATIO)$$

where:

$RATIO = 13.5;\ 7.7 \le pH \le 9$

$RATIO = (20.25 \times 10^{(7.7-pH)}) \div (1 + 10^{(7.4-pH)});\ 6.5 \le pH \le 7.7$

$FT = 1.4;\ 15 \le T \le 30$

$FT = 10^{[0.03(20-T)]};\ 0 \le T \le 15$

$FPH = 1;\ 8 \le pH \le 9$

$FPH = (1 + 10^{(7.4-pH)}) \div 1.25;\ 6.5 \le pH \le 8.0$

Total ammonia concentrations for waters where salmonid habitat is not an existing or designated use and other fish early life stages are absent:

where: A = the greater of either T (temperature in degrees Celsius) or 7.

Applied as a thirty-day average concentration of total ammonia nitrogen (in mg N/L) not to be exceeded more than once every three years on average. The highest four-day average within the thirty-day period should not exceed 2.5 times the chronic criterion.

Total ammonia concentration for waters where salmonid habitat is not an existing or designated use and other fish early life stages are present:

where: B = the lower of either 2.85, or $1.45 \times 10^{0.028 \times (25-T)}$. T = temperature in degrees Celsius.

Applied as a thirty-day average concentration of total ammonia nitrogen (in mg N/L) not to be exceeded more than once every three years on the average. The highest four-day average within the thirty-day period should not exceed 2.5 times the chronic criterion.

h. Measured in milligrams per liter rather than micrograms per liter.

i. ≤ (0.944)(e(1.128[ln(hardness)]-3.828)) at hardness = 100. Conversion factor (CF) of 0.944 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.136672 - [(ln hardness)(0.041838)].

j. ≤ (0.909)(e(0.7852[ln(hardness)]-3.490)) at hardness = 100. Conversions factor (CF) of 0.909 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.101672 - [(ln hardness)(0.041838)].

k. Criterion based on dissolved chloride in association with sodium. This criterion probably will not be adequately protective when the chloride is associated with potassium, calcium, or magnesium, rather than sodium.

l. Salinity dependent effects. At low salinity the 1-hour average may not be sufficiently protective.

m. $\le (0.316)(e^{(0.8190[\ ln(hardness)] + 3.688)})$

n. $\le (0.860)(e^{(0.8190[\ ln(hardness)] + 1.561)})$

o. $\le (0.960)(e^{(0.9422[\ ln(hardness)] - 1.464)})$

p. $\le (0.960)(e^{(0.8545[\ ln(hardness)] - 1.465)})$

q. ≤ $(0.791)(e^{(1.273[\ln(\text{hardness})] - 1.460)})$ at hardness = 100. Conversion factor (CF) of 0.791 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.46203 - [(ln hardness)(0.145712)].

r. ≤ $(0.791)(e^{(1.273[\ln(\text{hardness})] - 4.705)})$ at hardness = 100. Conversion factor (CF) of 0.791 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.46203 - [(ln hardness)(0.145712)].

s. If the four-day average chronic concentration is exceeded more than once in a three-year period, the edible portion of the consumed species should be analyzed. Said edible tissue concentrations shall not be allowed to exceed 1.0 mg/kg of methylmercury.

t. ≤ $(0.998)(e^{(0.8460[\ln(\text{hardness})] + 3.3612)})$

u. ≤ $(0.997)(e^{(0.8460[\ln(\text{hardness})] + 1.1645)})$

v. ≤ $e^{[1.005(\text{pH}) - 5.290]}$

w. ≤ $e^{[1.005(\text{pH}) - 4.830]}$

x. The status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 ug/ l in salt water.

y. ≤ $(0.85)(e^{(1.72[\ln(\text{hardness})] - 6.52)})$

z. Channel Catfish may be more acutely sensitive.

aa. ≤ $(0.978)(e^{(0.8473[\ln(\text{hardness})] + 0.8604)})$

bb. ≤ $(0.986)(e^{(0.8473[\ln(\text{hardness})] + 0.7614)})$

cc. Nonlethal effects (growth, C-14 uptake, and chlorophyll production) to diatoms (*Thalassiosira aestivalis* and *Skeletonema costatum*) which are common to Washington's waters have been noted at levels below the established criteria. The importance of these effects to the diatom populations and the aquatic system is sufficiently in question to persuade the state to adopt the USEPA National Criteria value (36 µg/L) as the state threshold criteria, however, wherever practical the ambient concentrations should not be allowed to exceed a chronic marine concentration of 21 µg/L.

dd. These ambient criteria in the table are for the dissolved fraction. The cyanide criteria are based on the weak acid dissociable method. The metals criteria may not be used to calculate total recoverable effluent limits unless the seasonal partitioning of the dissolved to total metals in the ambient water are known. When this information is absent, these metals criteria shall be applied as total recoverable values, determined by back-calculation, using the conversion factors incorporated in the criterion equations. Metals criteria may be adjusted on a site-specific basis when data are made available to the department clearly demonstrating the effective use of the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced by USEPA or ecology. Information which is used to develop effluent limits based on applying metals partitioning studies or the water effects ratio approach shall be identified in the permit fact sheet developed pursuant to WAC 173-220-060 or 173-226-110, as appropriate, and shall be made available for the public comment period required pursuant to WAC 173-220-050 or 173-226-130(3), as appropriate. Ecology has developed supplemental guidance for conducting water effect ratio studies.

ee. The criteria for cyanide is based on the weak acid dissociable method in the 19th Ed. Standard Methods for the Examination of Water and Wastewater, 4500-CN I, and as revised (see footnote dd, above).

ff. These criteria are based on the total-recoverable fraction of the metal.

gg. Where methods to measure trivalent chromium are unavailable, these criteria are to be represented by total-recoverable chromium.

hh. The listed fresh water criteria are based on un-ionized or total ammonia concentrations, while those for marine water are based on un-ionized ammonia concentrations. Tables for the conversion of total ammonia to un-ionized ammonia for freshwater can be found in the USEPA's Quality Criteria for Water, 1986. Criteria concentrations based on total ammonia for marine water can be found in USEPA Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA440/5-88-004, April 1989.

ii. The conversion factor used to calculate the dissolved metal concentration was 0.982.

jj. The conversion factor used to calculate the dissolved metal concentration was 0.962.

kk. The conversion factor used to calculate the dissolved metal concentration was 0.85.

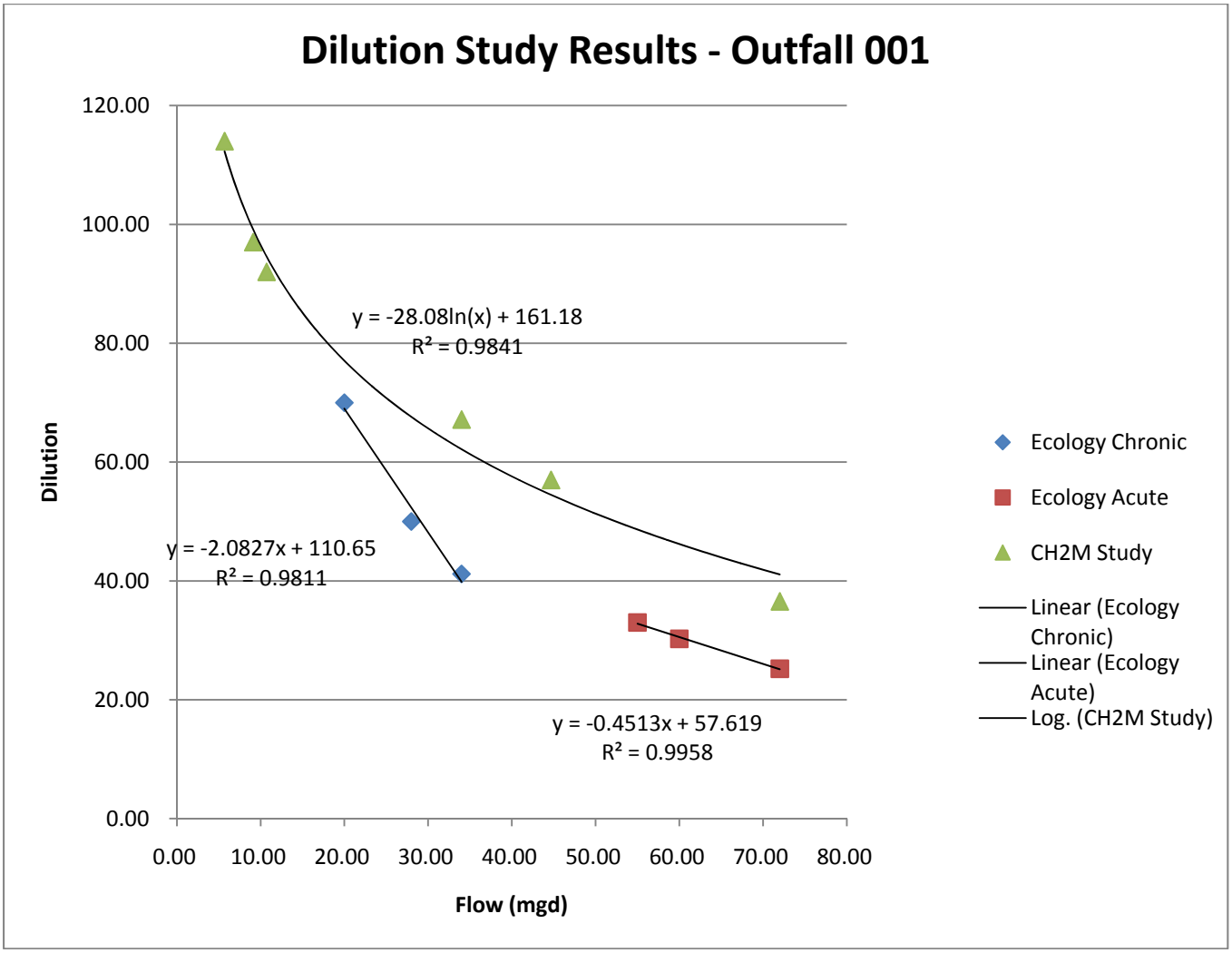
ll. Marine conversion factors (CF) which were used for calculating dissolved metals concentrations are given below. Conversion factors are applicable to both acute and chronic criteria for all metals except mercury. The CF for mercury was applied to the acute criterion only and is not applicable to the chronic criterion. Conversion factors are already incorporated into the criteria in the table. Dissolved criterion = criterion x CF

Metal	CF
Arsenic	1.000
Cadmium	0.994
Chromium (VI)	0.993
Copper	0.83
Lead	0.951
Mercury	0.85
Nickel	0.990
Selenium	0.998
Silver	0.85
Zinc	0.946

mm. The cyanide criteria are: 2.8µg/l chronic and 9.1µg/l acute and are applicable only to waters which are east of a line from Point Roberts to Lawrence Point, to Green Point to Deception Pass; and south from Deception Pass and of a line from Partridge Point to Point Wilson. The chronic criterion applicable to the remainder of the marine waters is l µg/L.

APPENDIX C

DILUTION – OUTFALL 001


Dilution Study Results - Outfall 001
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Dilution
y = -28.08ln(x) + 161.18
R² = 0.9841
y = -2.0827x + 110.65
R² = 0.9811
y = -0.4513x + 57.619
R² = 0.9958
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
Flow (mgd)
Ecology Chronic
Ecology Acute
CH2M Study
Linear (Ecology Chronic)
Linear (Ecology Acute)
Log. (CH2M Study)

APPENDIX D

POST POINT WWTP RPA – OUTFALL 001

METALS AND AMMONIA RPA FOR POST POINT WWTP – OUTFALL 001

Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) *ug/L*	State Water Quality Standard Acute *ug/L*	State Water Quality Standard Chronic *ug/L*	Max concentration at edge of... Acute Mixing Zone *ug/L*	Max concentration at edge of... Chronic Mixing Zone *ug/L*	**LIMIT REQ'D?**	Effluent percentile value	*Pn*	Max effluent conc. measured (metals as total recoverable) *ug/L*	Coeff Variation *CV*	*s*	# of samples *n*	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Ammonia	0.95	0.95	0.000	18,200	2730	910.07	729.35	NO	0.95	0.939	30000	0.60	0.55	48	1.05	33	41
Arsenic	1.00	1.00	1.610	69	36.000	2.09	1.99	NO	0.95	0.939	16	1.00	0.83	48	1.08	33	41
Chromium (Hexavalent)	0.99	0.99	0.000	1100	50.000	0.47	0.38	NO	0.95	0.939	15	0.50	0.47	48	1.05	33	41
Copper	0.83	0.83	0.410	4.800	3.1000	3.03	2.51	NO	0.95	0.941	98	0.90	0.77	49	1.07	33	41
Lead	0.95	0.95	0.131	210	8.1000	0.28	0.25	NO	0.95	0.939	5	0.80	0.70	48	1.07	33	41
Nickel	0.99	0.99	0.000	74	8.2000	0.16	0.12	NO	0.95	0.939	5	0.40	0.39	48	1.04	33	41
Zinc	0.95	0.95	0.690	90	81.000	9.16	7.48	NO	0.95	0.939	276	0.80	0.70	48	1.07	33	41

This spreadsheet calculates the reasonable potential to exceed state water quality criteria based upon a small number of samples. The procedure and calculations are per the procedures in *Technical Support Document for Water Quality Based Toxics Control* – U.S. EPA, March 1991.

ORGANIC HUMAN HEALTH RPA FOR POST POINT WWTP – OUTFALL 001

Revised 3/00 Parameter	Ambient Concentration (Geometric Mean) *ug/L*	Water Quality Criteria for Protection of Human Health *ug/L*	Max concentration at edge of Acute mixing zone. *ug/L*	**LIMIT REQ'D?**	**Expected Number of Compliance Samples per Month**	**AVERAGE MONTHLY EFFLUENT LIMIT** *ug/L*	**MAXIMUM DAILY EFFLUENT LIMIT** *ug/L*	Estimated Percentile at 95% Confidence	*Pn*	Max effluent conc. measured *ug/L*	Coeff Variation *CV*	**S**	# of samples from which # in col. K was taken *n*	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Di_N-Butyl Phthalate	0.0000	12000.00	0.01	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	1.00	0.60	0.6	365	0.26	0.26	41.0
Acronitrile	0.0000	0.66	0.11	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	17.20	0.60	0.6	365	0.26	4.54	41.0
Benzene	0.0000	71.00	0.01	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	1.00	0.60	0.6	365	0.26	0.26	41.0
Chloroform	0.0000	470.00	0.03	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	4.80	0.60	0.6	365	0.26	1.27	41.0
Dichlorobromomethane	0.0000	22.00	0.01	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	1.00	0.60	0.6	365	0.26	0.26	41.0
Methly Chloride	0.0000	1600.00	0.01	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	1.20	0.60	0.6	365	0.26	0.32	41.0
Toluene	0.0000	200000.00	0.03	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	3.90	0.60	0.6	365	0.26	1.03	41.0
Phenol	0.0000	4600000.00	0.03	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	3.90	0.60	0.6	365	0.26	1.03	41.0
Bis (2-Ethlylhexy)Phthalate	0.0000	5.90	0.19	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.99	28.90	0.60	0.6	365	0.26	7.63	41.0

APPENDIX F: SPECIES LIFE HISTORY INFORMATION

Coastal – Puget Sound Bull Trout Life History

In 1998, USFWS completed a status review of bull trout, identifying five distinct population segments (DPSs) in the continental U.S. (USFWS, 1998a). The Coastal-Puget Sound bull trout DPS is composed of 34 subpopulations (USFWS, 1998b; USFWS, 1999). USFWS listed bull trout in the Coastal-Puget Sound DPS as threatened under the ESA on November 1, 1999 (USFWS, 1999).

Bull trout have a complex life history that includes a resident form and a migratory form. The individuals of the migratory form may be stream dwelling (fluvial), lake dwelling (adfluvial), or ocean/estuarine dwelling (anadromous) (USFWS, 1998). Individuals of each form may be represented in a single population; however, migratory populations may dominate where migration corridors and subadult rearing habitats are in good condition (USFWS, 1998). Most inland populations of bull trout are either fluvial or adfluvial, migrating from larger rivers and lakes to spawn in smaller tributary streams in September through October (Wydoski and Whitney, 1979). Bull trout spawn in streams with clean gravel substrates and cold water temperatures (less than 9ºC/48ºF) (USFWS, 1998). Spawn timing is relatively short, spanning from late October through early November. Redds are dug by females in water 8 to 24 inches deep, in substrate gravels 0.2 to 2 inches in diameter (Wydoski and Whitney, 1979). Emergence generally occurs in the spring. Bull trout are opportunistic feeders, consuming fish in the water column and insects on the bottom (WDW, 1991). Low stream temperatures and clean substrates are key features of bull trout habitat. This species is most commonly associated with pristine or only slightly disturbed basins (USFWS, 1998).

The Coastal-Puget Sound DPS of bull trout, which includes the Nooksack subpopulation, is unique because it is thought to contain the only anadromous forms of bull trout within the continental U.S. (USFWS, 1998a). The status of the migratory (fluvial, adfluvial, and anadromous) forms is of greatest concern throughout most of their range. The majority of the remaining populations in some areas may be largely composed of resident bull trout (Leary et al., 1991; Williams and Mullan, 1992).

Separate bull trout stocks have been identified in the Lower Nooksack River, Canyon Creek, and the upper middle Fork Nooksack River. All bull trout stocks in the Nooksack basin are native and maintained by wild production (USFWS, 2004a). The status of all of the stocks is unknown.

Puget Sound ESU Chinook Salmon Life History

NMFS completed an ESA status review of Chinook salmon populations from Washington, Oregon, Idaho, and California and defined 15 evolutionarily significant units (ESUs) within the region. Naturally spawned spring, summer/fall, and fall Chinook salmon runs from the Puget Sound ESU were considered likely to become endangered in the foreseeable future (Myers et al., 1998). NMFS issued a ruling in May 1999 listing the Puget Sound ESU as threatened (NMFS, 1999).

Chinook salmon have a historic range from the Ventura River in California to Point Hope, Alaska in North America; and from Hokkaido, Japan to Anadyr River in Russia (63 Federal Register 45; Myers et al., 1998). The abundance of Chinook salmon in the Puget Sound ESU has declined substantially from historic levels, and there is concern over the effects of

hatchery supplementation on genetic fitness of stocks, as well as severely degraded spawning and rearing habitats throughout the area (Myers et al., 1998). In addition, harvest exploitation rates in excess of 90 percent were estimated to occur on some Puget Sound Chinook salmon stocks. Subsequent to this status review, primary factors contributing to declines in Chinook salmon in the Puget Sound ESU were identified as habitat blockages, hatchery introgression, urbanization, logging, hydropower development, harvests, and flood control (NMFS, 1998).

Chinook require varied habitats during different phases of their life. Spawning habitat typically consists of riffles and the tailouts of pools with clean substrates dominated by cobbles. These habitats are located in the mainstem of rivers and large tributaries. Adult Chinook salmon spawn in freshwater streams in the late summer and fall. Fry emerge in the late winter and early spring. Juvenile Chinook rear in the lower mainstem of rivers and tributaries before entering the estuary and salt marshes (Myers et al., 1998). Typically, fall Chinook fry (also termed "ocean type Chinook") feed for a short period after emergence (a few days to several months) and then migrate to the ocean or remain in the lower river for a year (Wydoski and Whitney, 1979; Healey, 1991). Spring Chinook fry ("stream type") Chinook may rear in fresh water over the summer and may migrate to the ocean in the fall, or may overwinter in fresh water and outmigrate the following spring. Most juvenile Chinook in the Puget Sound Basin are expected to smolt within the first year after emergence. During the summer and autumn, stream type Chinook juveniles commonly rear in habitats with cover provided by brush and woody debris. In winter, juvenile Chinook frequently use boulder pockets along stream margins for cover (Hillman et al., 1989). Juvenile Chinook may rear in freshwater from three months to two years (63 Federal Register 45; Weitkamp et al., 1995); however, Chinook generally migrate to salt water in the spring and summer. After outmigration to estuarine and saltwater habitats, Chinook tend to utilize estuaries and coastal areas for rearing, where they feed on small crustaceans and insects (Wydoski and Whitney, 1979; Healey, 1991). As juveniles grow, they tend to eat more larval and juvenile fishes, including herring, anchovies, pilchard, and rockfish. Most Chinook spend from two to four years feeding in the North Pacific before returning to spawn. Adult Chinook salmon return to spawn in their natal streams from mid-May through October (Myers et al., 1998). Chinook salmon die after spawning.

Puget Sound DPS Steelhead Life History

On May 7, 2007, NMFS announced the listing of the Puget Sound distinct population segment (DPS) of steelhead as a threatened species under the Endangered Species Act (72 Federal Register 91).

The DPS distribution extends from the United States/Canada border and includes all naturally spawned anadromous winter-run and summer-run populations in streams and river basins of the Strait of Juan de Fuca (east of and including the Elwha River), Puget Sound (north to include the Nooksack River), and Hood Canal. Possible factors influencing the depletion of Puget Sound steelhead populations include habitat destruction and fragmentation, inadequate regulatory mechanisms of hatchery practices and land use activities, and potential genetic introgression between hatchery - and natural-origin steelhead.

Steelhead exhibit one of the most complex suite of life history traits of any salmonid species. Steelhead may be anadromous or freshwater residents (which are usually referred to as

rainbow or redband trout). Biologically, steelhead can be divided into two reproductive ecotypes: "stream maturing" and "ocean maturing." Stream maturing, or summer run steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn. Ocean maturing, or winter run steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. Steelhead adults typically spawn between December and June. Depending on water temperature, steelhead eggs may incubate in redds for 1.5 to 4 months before hatching. Puget Sound DPS steelhead typically smolt after 2 years, though they may spend 1 to 4 years in fresh water. They then reside in marine waters for typically 2 or 3 years prior to returning to their natal stream to spawn. Steelhead are iteroparous, but rarely spawn more than twice before dying; most that do so are females (64 CFR 222).

Yelloweye Rockfish

Rockfish comprise a diverse group of marine fishes including 102 species worldwide and 72 species in the northeastern Pacific Ocean (Kendall, 1991). Rockfish are among the most common mid-water and bottom dwelling fish species on the Pacific coast of North America (Love et. al, 2002). Adult rockfish can be one of the most abundant fish species associated with coastal benthic habitats such as kelp forests, rocky reefs, and rocky outcroppings in submarine canyons at depths greater than 980 feet (Yoklavich, 1998). The life history of rockfish is different than most other bony fishes in that rockfish fertilization and embryo development is internal as opposed to external egg fertilization in other species. Females give birth to live larval young, which disperse to open waters extending several hundred miles offshore (Love et. al, 2002).

Yelloweye rockfish primarily inhabit waters between 25 and 474 meters (m) (80 and 1,560 feet) in depth, but are most common between 91 and 180 m (300 to 590 feet) (Love et. al, 2002). Yelloweye rockfish are one of the largest (up to 25 pounds) and longest lived (up to 118 years) species of rockfish (Love, 1996; Love et. al, 2002; O'Connell and Funk, 1987).

Yelloweye rockfish sexually mature at about the age of six (Love, 1996). Fertilization generally occurs between September and April, though fertilized individuals may be seen during any month of the year (Wyllie-Echeverria, 1987). Female yelloweye rockfish can produce between 1.2 and 2.7 million eggs, which is considerably more than most rockfish species (Love et. al, 2002). Although thought to only spawn once per year (MacGregor, 1970), there is evidence from studies in Puget Sound that spawning may occur up to twice per year (Washington et. al, 1978). Estimates of pelagic larval dispersion duration are not available for yelloweye rockfish; however, the pelagic larval duration is thought to be similar to that of canary rockfish and bocaccio (116-155 days) (Varanasi, 2007). Parturition is thought to occur during late spring and early summer (Washington et. al, 1978). Following the pelagic larval stage, juvenile yelloweye rockfish settle primarily in shallow, high relief zones, crevices, and sponge gardens (Love et. al, 1991; Richards et, al, 1985). As the juveniles grow and mature they move to deeper water, but maintain an association with rocky, high relief areas (Carlson and Straty, 1981; Love et. al, 1991; O'Connell and Carlisle, 1993; Richards et. al, 1985). Therefore, yelloweye rockfish are less frequently observed in South Puget Sound and are more commonly found in North Puget Sound (Miller and Borton,

1980) such as the Strait of Georgia and Canadian Gulf Islands, which exhibit more complex, high relief, rocky habitats (Yamanaka et. al, 2006).

Yelloweye rockfish are opportunistic feeders, and due to their larger size, adults can feed on larger prey including smaller yelloweye rockfish and are preyed upon less frequently (Rosenthal et. al, 1982). Typical adult forage includes sand lance, gadids, flatfish, shrimp, crabs and gastropods (Love et. al, 2002; Yamanaka et. al, 2006). Juveniles and larval life history forms of yelloweye rockfish feed on species similar to that of canary rockfish and bocaccio. Predators of yelloweye rockfish include salmon and orcas (Ford et. al, 1998; Love et. al, 2002)

Canary Rockfish

Canary rockfish primarily inhabit waters between 50 and 250 meters (m) (160 and 820 feet) in depth, but may be found in waters as deep as 425 m (1,400 feet) (Boehlert, 1980) and can live up to 84 years (Drake et. al, 2008). Canary rockfish were at one time considered fairly common in the greater Puget Sound area (Holmberg, 1967).

Canary rockfish spawn once per year (Guillemot, 1985). Female canary rockfish can produce between 280,000 and 1.9 million eggs per year with larger females producing even more. Fertilization can occur as early as September off central California (Lea, 1999), but peaks in December (Phillips, 1960; Wyllie-Echeverria, 1987). Birth or parturition generally occurs between January and April with the peak occurring in April (Phillips, 1960). Parturition off the Washington and Oregon coasts occurs between September and March, with peaks in December and January (Barss, 1989; Wyllie- Echeverria, 1987). In British Columbia, parturition occurs a little later than other areas with a peak in February (Hart, 1973; Westrheim, 1975). Canary rockfish larvae are readily dispersed with a pelagic larval duration of approximately 116 days (Shanks and Eckert, 2005).

Canary rockfish larvae feed primarily on plankton including crustacean larvae, invertebrate eggs, and copepods (Love, 2002). Juveniles feed primarily on zooplankton such as harpacticoids (an order of copepods), barnacle cyprids (final larval stage), and euphasiid eggs and larvae. Predators of juvenile canary rockfish include other fishes (cabezon, lingcod, other rockfishes, salmon), birds, and porpoises (Love, 1991; Morejohn, 1978; Roberts, 1979). Adult canary rockfish are planktivores/carnivore, foraging on euphasiids and other crustaceans and small fish (Cailliet, 2000; Love, 2002). Predators of adult canary rockfish include yelloweye rockfish, salmon, sharks, dolphins, seals, and possibly river otters (Merkel, 1957; Morejohn, 1978; Rosenthal, 1982).

Canary rockfish are generally associated with course and rocky habitats that occur throughout the Puget Sound basin (Miller and Borton, 1980) and are broadly distributed throughout the Strait of Georgia (COSEWIC, 2007).

Boccacio Rockfish

Bocaccio primarily inhabits waters between 50 and 250 meters (m) (160 and 820 feet) in depth, but may be found in waters as deep as 475 m (1,560 feet) (Orr et. al, 2000) and are suspected to live as long as 54 years (Drake et. al, 2008). Bocaccio were at one time

considered fairly common in the greater Puget Sound area (Holmberg, 1967). In the Georgia Basin and based upon available information, bocaccio are generally not associated with areas containing hard substrates. This may be due to their pelagic behavior or availability or prey items.

Reproduction (copulation and fertilization) generally occurs in the fall between August and November. Female boccacio rockfish can produce 20,000 to over 2 million eggs, which is more than many other rockfish species (Love et. al, 2002). Bocaccio larvae are readily dispersed with a pelagic larval duration of approximately 155 days (Shanks and Eckert, 2005). Larvae and pelagic juveniles tend to be associated with floating kelp mats and are therefore generally near the surface. Most boccacio remain pelagic between 3.5 And 5.5 months before settling to shallower areas. Several weeks after settlement, juveniles move to deeper water 18-30 m (60-100 feet) where they are found on rock reefs (Carr, 1983; Feder, 1974; Johnson, 2006; Love, 2008). As bocaccio mature into adults, generally between four and six years (MBC, 1987), they move into deeper water habitats (typically found at least 98 feet off the bottom) and associated hard substrata (Love et. al, 2002). In the Georgia Basin, and based upon available information, bocaccio are generally not associated with areas containing hard substrates. This may be due to their pelagic behavior or availability or prey items (74 Federal Register 77). Boccacio are also known to stray into mud flats (Love et. al, 2002).

Bocaccio larvae feed primarily on plankton larval krill, diatoms, and dinoflagellates. Pelagic juveniles are opportunistic, feeding on fish larvae, copepods, krill, and other prey. Larger juveniles and adults are generally picivorous, eating other rockfish, sablefish, hake, anchovies, lanternfish, and squid. Predators of juvenile bocaccio include Chinook salmon, terns, and harbor seals (Love et. al, 2002). The primary predators of adult bocaccio are marine mammals (COSEWIC, 2002).

Southern DPS Green Sturgeon

Green sturgeon have a complex anadromous life history (Adams et al., 2002). The green sturgeon spends more time in the ocean than any other species of sturgeon. The Southern DPS green sturgeon is only known to spawn in the Sacramento River (Adams et al., 2002; Adams et al., 2005; 74 Federal Register 195). Males are sexually mature at age 15, while females become sexually mature at age 17. Green sturgeon are thought to spawn every three to five years (Tracy, 1990). In the Sacramento River, spawning typically occurs in the late spring and early summer as far upstream as Keswick Dam (CDFG, 2002). Juvenile green sturgeon appear to spend between one and three years in freshwater before they migrate to marine habitats (Nakamoto et al., 2005). The green sturgeon disperses widely into the ocean following their out-migration and prior to returning to their natal streams to spawn (Moyle et al., 1992). Tagged fish from the Sacramento River were generally captured to the north in coastal and estuarine waters (CDFG, 2002). Green sturgeon, as well as all sturgeon species, are long-lived and slow growing (Farr et al., 2002).

Southern Resident Population Killer Whale Life History

Southern Resident killer whales, which are present in Puget Sound, prey on fish of many species but predominantly feed on salmon (Wiles 2004). Transient killer whales, which

occasionally enter Puget Sound, prey primarily on marine mammals, primarily harbor seals in Washington (Wiles 2004). There are no known predators of killer whales.

Male killer whales average about 26 feet (8 m) in length; females are about 23 feet (7 m) in length (Heyning and Dahlheim 1988). Males live about 50 to 60 years and females 80 to 90 years (Reeves et al., 2002). Females reach sexual maturity when they are about 16 feet (5 m) in length and give birth every 3 to 8 years after that (Heyning and Dahlheim 1988). Calves are about 6.5 feet (2 m) long when born and, although weaned at about 12 months, they remain closely tied to their mother until they are about 2 years old (Heyning and Dahlheim 1988). There is no specific breeding season for killer whales, although most breeding behavior in Puget Sound is observed in summer and fall (Osborne et al. 1988).

Resident whales live in small groups called matrilines in which all the whales are linked by maternal descent (Wiles 2004). Several matrilines make up a pod. For instance the Southern Resident L pod is made up of 12 matrilines consisting of 41 individual whales. Most pods have only 1 to 4 matrilines (Wiles 2004). Transient whales live in smaller groups than residents, usually up to about 10 animals.

Habitat use by resident and transient killer whales differs, and much of the information known about habitat use is preliminary. Killer whales use a wide variety of habitats throughout the year. Distribution of resident whales while in the inland waters of Washington and British Columbia is strongly correlated with areas of greater salmon abundance. Resident killer whales rarely enter water less than about 15 feet (5 m) deep. Transient whales often enter small inlets and shallow areas while hunting for harbor seals (Wiles 2004).

Humpback Whale

The humpback whale is distributed worldwide in a wide range of ocean habitats in all ocean basins, from the waters surrounding tropical islands to shallow waters off continental coasts, though in the North Pacific it does not occur in Arctic waters. In the winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres. In the summer, they inhabit waters from southern California throughout the Gulf of Alaska to the southern Chukchi Sea.

Most humpbacks migrate considerable distances to high latitude summering areas, where they feed intensively on krill and schooling fish. Summer ranges are often relatively close to shore, including major coastal embayments and channels. They build up body fat reserves in the summer and then migrate to warmer subtropical areas during the winter breeding season. They frequently employ an interesting feeding behavior called bubble net feeding in which they surround a school of schooling fish with a curtain of bubbles, created by releasing air bubbles while swimming in circles beneath their prey. Some individuals feed in the same areas year after year.

Humpback whales mate and give birth while on the wintering areas. They are also known to mate during their winter migration to warmer waters. It is thought that little feeding occurs on the wintering grounds. They reach sexual maturity at 5-8 years of age or when both sexes reach a length of approximately 37 feet. Adult males are typically about 45 feet long and adult females are slightly larger at about 48 feet long. Females normally reproduce every two or three years, giving birth to a calf that is 14 to 15 feet long and that weighs up to 4,400

pounds. The gestation period is 12 months. The mother must feed her newborn about 100 pounds of milk each day for a period of approximately seven months until it is weaned. After weaning, the length of the calf is nearly twice as long (~ 25 feet) and its weight has increased five fold (2,000 pounds). Calves may stay with the mother up to one year. Humpbacks typically travel in pods numbering about two to three individuals. Scientists estimate the average life span of humpbacks in the wild to be between 30-40 years, although no one knows for certain.

Humpbacks have become renowned for their various acrobatic displays and complex vocal patterns. The name "humpback" refers to the high arch of their backs when they dive. One of the humpback's more spectacular behaviors is the *breach*. Breaching is a true leap where a whale generates enough upward force with its powerful flukes to lift approximately 2/3 of its body out of the water. Researchers are not certain why whales breach, but believe that it may be related to courtship or play activity. The "songs" of humpbacks are made up of complex vocal patterns. All whales within a given area and season seem to use the same songs. However, the songs appear to change from one breeding season to the next. Scientists believe that only male humpbacks sing. While the purpose of the songs is not known, many scientists think that males sing to attract mates, or to communicate among other males of the pod.

Stellar Sea Lion Life History

The species is divided into two distinct stocks, the eastern and western, at 144 degrees west latitude. The western stock, which encompasses the Aleutian Islands, Commander Islands, Japan and Siberia, have seen dramatic declines over the past quarter century (Angliss and Outlaw, 2005).

The Steller sea lion ranges from the Channel Islands off the southern California coast north to the Bering Sea. Although they occur regularly in Puget Sound, populations of this species are largest in waters off of British Columbia and Alaska (NOAA Fisheries 1992). Steller sea lions are more common on the outer coast of Washington than in inland waters such as Puget Sound (Pat Gearin, National Marine Fisheries Service, Marine Mammal Research, personal communication, 2002).

Large breeding colonies (rookeries) are present on islands off of the Oregon coast, the Scott Islands (north of Vancouver Island), and on British Columbia and Alaska coastal islands; none occur in Washington. Males mature between 3-8 years of age, while females begin to reproduce at ages 4-6 (Angliss and Outlaw, 2005). Pupping and breeding occur in May and July. Their terrestrial habitat also includes haul-outs that may include sand beaches, rocky shores, and marine buoys. Sightings of Steller sea lions in Puget Sound number 50 or fewer per year (Jeffries, personal communication, 2005) and are most abundant from late fall to early spring when peak counts for the whole state have reached 1,000 animals (Jeffries et al. 2000). Steller sea lions are often observed with California sea lions and use their haul outs. Steller sea lion feed primarily on hake (*Merluccius productus*), herring, octopus (*Octopus* sp.), Pacific cod (*Gadus macrocephalus*), rockfish (*Sebastes* sp.), and salmon (NOAA Fisheries 1992.)

Marbled Murrelet Life History

Marbled murrelets are found from the Aleutian Islands of Alaska south to central California, and individual birds may winter as far south as southern California. In Washington, marbled murrelets are year-round residents on coastal waters. Murrelets feed within 500 feet (152 m) of the shore (Ehrlich et al. 1988) to 1.2 miles (1.93 km) from the shore (WDW 1991), at depths of less than 100 feet (30.5 m). Their preferred prey includes small fish and crustaceans (WDW 1991; Ehrlich et al. 1988). However, nestlings are usually fed larger second year fish (USFWS 1997).

Historical data are limited, but murrelets are currently rare and uncommon in areas where they were common or abundant in the early 1900s, especially along the southern coast of Washington, northern coast of Oregon, and coast of California south of Humboldt County (Sealy and Carter 1984; Marshall 1988; Carter and Erickson 1992; Nelson et al. 1992; and Ralph 1994). An estimate for the number of individuals in Washington is 5,000 to 6,000 birds (Speich et al. 1992 and Speich and Wahl 1995). The breeding population in Washington is estimated to be 1,900 to 3,500 pairs (Speich et al. 1992).

Marbled murrelets nest and roost in mature and old growth forest areas of western Washington (WDW 1991). The nesting period extends from April 1 to September 15. Although they do not nest in colonies like many other seabirds, they may nest in clusters, and tend to nest in the same forest stand in successive years (USFWS 1997). Nest trees are typically greater than 32 inches (81 cm) (dbh). Murrelets prefer large flat conifer branches, often covered with moss (WDW 1991). These branches can range from four to 25 inches (10 to 63 cm) in diameter. Nesting branches are usually located in the upper third of the tree canopy layer (USFWS 1997).

Marbled murrelet population decline has been attributed primarily to the loss and fragmentation of old-growth nesting habitat caused by logging and development (Ralph and Miller 1995). It is believed that forest fragmentation may be making nests near forest edges vulnerable to predation by other birds, such as jays, crows, ravens, and great-horned owls. In addition, this species is vulnerable to fishing nets and oil spills (Marshall 1988).

The USFWS conducted a 5-year review of marbled murrelet status in 2003 (USFWS 2004b). Based on available information in the Washington, Oregon, and California, the status review estimated there are currently 2,223,048 acres of suitable murrelet nesting habitat. The status review found that the marbled murrelet population is not stable through reproduction due to low fecundity levels across the 3-state area, as determined through nest success values (i.e., the number of fledglings per breeding pair of murrelets per year). In general, both radio telemetry and at-sea survey methods indicate that murrelet breeding success appears to decline from north to south. Predation has consistently been the most significant cause of nest failure. Murrelets appear to select platforms that provide protection from predation (USFWS 2006). The factors affecting rates of predation on murrelet nests are not fully clear, yet key elements seem to be proximity to humans, abundance of avian predators, and proximity and type of forest edge to the nest. The status review did not find that a change in classification from threatened was warranted.

APPENDIX G: PFC ASSESSMENT FOR BELLINGHAM BAY

Properly Functioning Conditions for Estuarine and Marine Environment

Water Quality

Turbidity

No information is available on turbidity, but it is assumed that there is some seasonal variation in turbidity. During the wet months, major rivers and streams can contribute large loads of fine sediment to the marine waters of Bellingham Bay; thus increasing overall turbidity. There are no major sediment delivery systems in the immediate project Action Area; however, turbidity may be influenced by the Nooksack River to the north. It is anticipated that the project Action Area is likely "at risk" for the turbidity indicator. The proposed action is anticipated to maintain these conditions.

Dissolved Oxygen

Dissolved oxygen (DO) is currently a high priority water quality issue throughout Puget Sound and the Strait of Georgia and especially in Hood Canal and the Central and Southern Puget Sound regions. Bellingham Bay waters meet the criteria for excellent quality and DO levels should not fall below 6.0 mg/L. Currently, inner Bellingham Bay is not listed on the Ecology 303(d) list of impaired waterbodies for the dissolved oxygen parameter, nor has it been identified as a water of concern for that parameter (Ecology, 2008).

Water quality data was collected from six locations around the primary outfall diffuser in 1984 as part of the City's *Application for Variance from Secondary Treatment Requirements – Final Report to EPA Region X* (CH2M Hill, 1984), which included dissolved oxygen measurements extending from the surface to 24 meters (78.7 feet) in depth. Data was collected in January, May, and August of 1984. The January 1984 sampling indicated dissolved oxygen concentrations ranged from 7.0 to 9.0 mg/L. Sampling during May indicated dissolved oxygen concentrations ranged from 2.5 mg/L to 10 mg/L with the lowest concentrations generally occurring within the lower portion of the water column. August sampling indicated dissolved oxygen concentrations ranging from 5.8 mg/L to 10 mg/L, again with the lower concentrations being observed within the lower portion of the water column near the bottom elevation. Dissolved oxygen concentrations appear to be seasonally influenced.

Elevated levels of dissolved inorganic nitrogen (DIN), which is the sum of ammonium, nitrite, and nitrate, are delivered to Bellingham Bay primarily from freshwater inputs and discharges from outfalls. Elevated levels of these nutrients cause large algae blooms. When the algae die, they settle to the bottom and decompose. During the decomposition process, oxygen is used up and low levels of DO can occur and have an adverse affect on marine life.

While there are no 303(d) listed areas within inner Bellingham Bay for the dissolved oxygen parameter and Bellingham Bay has not been identified as a water of concern for that parameter, dissolved oxygen concentrations within the lower water column often do not meet surface water quality standards. Therefore, the project Action Area is considered "at risk" for the dissolved oxygen elements due to seasonally low dissolved oxygen concentrations. The proposed action is anticipated to result in an incremental increase in flows and loads from the Post Point WWTP to Bellingham Bay as a result of proposed capacity expansions; however, it is anticipated that the proposed improvements will continue to meet existing NPDES

permit limitations, future NPDES effluent limitations, and surface water quality standards for the dissolved oxygen element . The proposed action is anticipated to "maintain" the dissolved oxygen element within the project Action Area.

Water Contamination

A mixture of residential, industrial, and commercial activities surrounds the marine waters of the project Action Area. Bellingham Bay continues to be affected by a variety of point and non-point pollution sources, including municipal wastewater treatment plant effluent, industrial effluent, leaking septic tanks, stormwater runoff, combined sewer overflows, fuel spills, and contaminated sediments. The project Action Area is not listed on the Ecology 2008 303(d) list of impaired water bodies for any parameter. It appears that Bellingham Bay within the Action Area is "at risk" for the water contamination indicator. The proposed action is anticipated to result in an incremental increase in flows and loads from the Post Point WWTP to Bellingham Bay as a result of proposed capacity expansions; however, it is anticipated that the proposed improvements will continue to meet existing NPDES permit limitations, future NPDES effluent limitations, and surface water quality standards. The proposed action is anticipated to "maintain" the water contamination element within the project Action Area.

Sediment Contamination

As with water contamination, the marine environment of south Bellingham Bay is surrounded by a mixture of residential, industrial, and commercial activities. Bellingham Bay continues to be affected by a variety of point and non-point pollution sources, including municipal wastewater treatment plant effluent, industrial effluent, leaking septic tanks, stormwater runoff, combined sewer overflows, and fuel spills, which can all contribute to degraded sediment quality. The project Action Area does not currently contain any 303(d) listed sediments. Therefore, the project Action Area is "at risk" for the sediment contamination element. The proposed action is expected to maintain these conditions.

Physical Habitat

Substrate/Armoring

The shorelines around the vast majority of the project Action Area are modified or extensively armored. This is primarily due to the presence of an existing railroad that parallels the shoreline within the Action Area. Due to the extensive shoreline armoring, including riprap, the Action Area is "not properly functioning" for the substrate/armoring indicator. The proposed action is expected to maintain these conditions.

Depth/Slope

No information is currently available regarding depth and slope in the Action Area. However, due to extensive shoreline armoring and scouring caused by wave action, it is anticipated that the Action Area is "at risk" for the depth/slope indicator. The proposed action is expected to maintain these conditions.

Tideland Condition and Marsh Prevalence and Complexity

Extensive tideland conditions are not found within the project Action Area. The mouth of Post Point Lagoon has been modified extensively with riprap levees and other armoring to existing land uses. The marine nearshore has also been cut off from the upland areas by extensive armoring along the existing railroad tracks. This and past land use actions have severely limited the formation of tidelands and marsh habitats or removed them entirely. Post Point Lagoon immediately west of the WWTP contained some limited salt marsh habitat. The closest functioning tideland and marsh habitat is located in the Nooksack River delta area several miles north of the Post Point WWTP. The Action Area is "not properly functioning" for the tideland condition or marsh prevalence and complexity indicators. The proposed action is expected to minimally "restore" these conditions by increasing the areal extent of marsh habitat within the Post Point Lagoon, which is being conducted as mitigation for wetland impacts elsewhere on the site.

Refugia

The substantial armoring along the majority of the shoreline along Bellingham Bay has created steep slopes and limited available refugia. Post Point Lagoon provides important refugia; however, the small size, narrow opening to Bellingham Bay, and presence of a gravel sill at the entrance to Bellingham Bay minimizes the function and value of the area as refugia. While there are some refugia available in the project Action Area, the extensive armoring along the shoreline within the project Action Area has eliminated the vast majority of refugia. Therefore, the Action Area is considered "not properly functioning" for the refugia indicator. The proposed action is expected to minimally "restore" these conditions by increasing the areal extent of marsh habitat within the Post Point Lagoon, which is being conducted as mitigation for wetland impacts elsewhere on the site.

Physical Barriers

Currently, there are no physical barriers that would prevent migration of fish or wildlife within the marine waters of the Action Area; therefore, the Action Area is "properly functioning" for the physical barrier indicator. The proposed action is expected to maintain these conditions.

Current Patterns

Current patterns in Bellingham Bay are influenced by the interaction of inflowing Pacific Ocean waters through the Strait of Juan de Fuca, tides, wind, freshwater inputs, and local bathymetry. Studies were conducted around the existing primary outfall diffuser in 1984 as part of the City's *Application for Variance from Secondary Treatment Requirements – Final Report to EPA Region X* (CH2M Hill, 1984). The measurements were conducted during the three critical periods identified for discharge from this outfall, which included a fall (October 13 through November 12), winter (January 17 through February 17) and Spring (May 1 through June 1) sample period. Current direction was measure from both the upper and lower water columns. Data indicated that during the fall, currents within the upper water column (30 feet) moved north, while currents in the lower water column showed little to no movement. Data collected during the winter months showed almost a complete reversal of current patterns with the upper and lower water column (30 feet) both transporting to the

southwest. Storm events during this time period coincided with higher discharge from the Nooksack River to the north, which resulted in an increase in transport to the south. Data collected during the spring showed transport within the upper water column to the southwest and transport within the lower water column to the northeast (CH2M Hill, 1984).

The presence of extensive shoreline modifications along the shoreline of Bellingham Bay north of the Post Point WWTP and maintenance dredging within Bellingham Bay, likely influence current patterns to some degree; however, it is the natural processes of tides, wind, freshwater inputs, and inflow from the Pacific Ocean that greatly influence current patters within Bellingham Bay. Therefore, the project Action Area is "at risk" for the current patterns element. The proposed action does not include dredging or shoreline modifications along Bellingham Bay that would influence current patterns. Therefore, the proposed action is anticipated to "maintain" baseline conditions for the current pattern element within the project Action Area..

Salt/Freshwater Mixing Patterns and Locations

A small unnamed stream passes south of the existing WWTP prior to entering Post Point Lagoon. The lagoon was formed when the railroad causeway was constructed across a portion of Bellingham Bay, isolating a portion of Bellingham Bay into a lagoon. Wave action has since created a gravel shoal at the entrance, which on occasion causes water within the lagoon to become ponded on outgoing tides; thereby altering salt/freshwater mixing patterns and locations. This, in combination with the highly modified shoreline and existing impervious surfaces within estuarine habitat, likely creates an "at risk" condition for the salt/freshwater mixing patters and locations element. The proposed action is expected to maintain these conditions.

Biological Habitat

Benthic Prey Availability

The presence of shoreline armoring has altered the delivery of sediments to the marine nearshore and likely caused a shift in the benthic species composition within the Action Area. The Action Area is anticipated to be "at risk" for the benthic prey availability indicator. The proposed action is expected to maintain these conditions.

Forage Fish Community

Sand land and surf smelt spawning has been documented along the shoreline immediately north of the Post Point Lagoon and along the marine nearshore of Bellingham Bay (WDFW, 2011a). In addition, extensive eelgrass beds are located within sub-tidal and intertidal habitats of Bellingham Bay in the nearshore environment adjacent to the Post Point WWTP, which provide spawning habitat for Pacific herring. Pacific herring holding areas have also been identified offshore of the post Point WWTP within Bellingham Bay (WDFW, 2011a). The availability of forage fish habitat has been altered by shoreline armoring, specifically related to the railroad causeway and adjacent industrial, commercial, and residential development. Therefore, the project Action Area is "at risk" for the forage fish community element. The proposed action includes no additional armoring or modifications to nearshore habitat, other than increasing the area of salt marsh habitat within Post Point Lagoon as

mitigation for wetland impacts elsewhere on the site. Therefore, the proposed action is anticipated to "maintain" the forage fish community element within the project Action Area.

Aquatic Vegetation

As discussed above, extensive eelgrass beds are located within the marine waters of Bellingham bay and Post Point Lagoon, immediately adjacent to the Post Point WWTP. It is likely that shoreline modifications have altered sediment delivery to the nearshore and thus resulting in some disturbance to aquatic vegetation. The Action Area is considered "at risk" for the aquatic vegetation element. As mitigation for wetland impacts elsewhere on the Post Point WWTP site, the project proponent is proposing to increase the area of salt marsh habitat within the Post Point Lagoon, which will provide an overall benefit to aquatic vegetation by increasing available coverage area. Therefore, the proposed action is anticipated to "maintain" or slightly "restore" the aquatic vegetation element within the project Action Area.

Exotic Species

No exotic species have been identified that would pose a risk, either through predation or competition within the marine waters of Bellingham Bay and Post Point Lagoon. Therefore, the project Action Area is assumed to be "properly functioning" for the exotic species element. The proposed action is anticipated to "maintain" the exotic species element within the project Action Area.