APPENDIX A: EFH ASSESSMENT

EFH Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect Essential Fish Habitat (EFH). 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 the marine nearshore environment for rearing as juveniles and migration for both adults and juveniles. Coho and pink salmon are known to occur within Chimacum Creek and spawn within the project Action Area. In addition, Chimacum Creek also provides adequate habitat for adult migration, juvenile out-migration, and rearing for coho and pink salmon.

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 *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.

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. Ground fishes such as ling cod, Cabezon, and brown rockfish potentially occur within Hood Canal and Port Townsend Bay. 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 Pacific sand lance is an important forage fish for juvenile Chinook salmon. Loss of prey is considered an adverse affect on EFH. Surf smelt, pacfic sand lance, and Pacific herring are known to breed along the beaches adjacent to Port Hadlock and Irondale.

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 construct a new sewer collection system, pump stations, a wastewater treatment plant, and reuse field to serve the Port Hadlock/Irondale UGA. A detailed description of the proposed action is included in Section 2.0 of the BA. Table A below indicates the federally managed Pacific salmon and life history forms that are potentially present within the project Action Area.

Table A. 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	X	X	X
Pink	X		X	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 12 acres of clearing and grading and excavation adjacent to Chimacum Creek, which have the potential to contribute to increased sedimentation and turbidity. Vegetation removal may also reduce the potential for LWD recruitment into the Chimacum Creek, which may reduce formation of complex habitats over the short-term. However, these activities will not occur within 300 feet of Chimacum Creek. The proposed action will also increase impervious surface within the basin by 3 acres.

Operation of the wastewater treatment plant should have some positive impacts to water quality due to removal of households and businesses within the service area from septic systems. In addition, the reuse of effluent to provide groundwater recharge will also benefit rearing, migration, and spawning habitat within Chimacum Creek by providing additional flow for improved passage and reduction of stream temperatures.

Adverse Effects on Essential Fish Habitat for Ground Fishes

No work is proposed within EFH for ground fish. All work will occur in upland areas. However, the proposed action will result in the discharge of highly treated effluent to the local groundwater table through land application of the treated effluent into a rapid rate infiltration field. It is anticipated that the effluent recharged to groundwater will interact with and flow toward Chimacum Creek, which eventually discharges to Port Townsend Bay and the marine environment. Operation of the wastewater treatment plant should have some positive impacts to water quality due to removal of households and businesses within the service area from septic systems. No direct outfall of treated effluent will occur within marine waters. It is not anticipated that the proposed action and its potential for creating degraded water quality conditions will occur due to the highly treated nature of the effluent, additional polishing provided by percolation through subsurface soils, mixing and dilution with groundwater, and the adherence to Class A Reclaimed Water Standards.

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:

- No in-water work will occur.
- In addition to performing all work in the dry, the proposed action will incorporate TESC measures including silt fencing, straw bales/wattles, mulch, to minimize the potential for sedimentation and turbidity of downstream areas.
- All construction will comply with the Jefferson County and Ecology erosion control standards.
- A spill prevention and pollution control plan will be in place prior to construction.
- All equipment will be staged and stored a minimum of 300 feet from surface waters when not in use.
- All cleared areas will be re-vegetated or paved following construction.
- Overall, the proposed action is expected to improve the quality of Chimacum Creek and marine and estuarine environments adjacent to Port Hadlock and Irondale by removing use of existing residential and commercial septic systems and providing flow augmentation for Chimacum Creek.
- Stormwater will be treated in accordance with the Department of Ecology's *2005 Stormwater Management Manual for Western Washington.* All stormwater will be detained and treated on-site within a stormwater pond and allowed to infiltrate into subsurface soils and groundwater.

Conclusion and Effect Determination

EFH for Pacific salmon and groundfish is present in the project Action Area. The proposed action will not require any work or work within 300 feet of EFH for federally managed Pacific coast ground fish and Pacific salmon, including Chinook, coho, and pink salmon. The primary concern is with water quality and the discharge of highly treated effluent into the groundwater and its potential effects to EFH. Effluent water quality, resulting from the proposed treatment process at the wastewater treatment plant is expected to improve baseline conditions for chemical contaminants and temperature and will also augment stream flows providing better spawning, rearing, and migration habitat, particularly for salmonids. All other potential effects of the action upon EFH, including vegetation removal, soil disturbing activities, are expected to be short-term effects and will be further minimized by the conservation measures listed above. Therefore, the proposed action *will not adversely effect* EFH for Pacific salmon or Pacific coast 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 B: SPECIES LISTS

Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated Sept. 25, 2008)

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	***Endangered***	
	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.

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

(Revised October 2, 2007)

LISTED

Brown pelican (*Pelecanus occidentalis*) [outer coast]

Bull trout (*Salvelinus confluentus*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Short-tailed albatross (*Phoebastria albatrus*) [outer coast]

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

CANDIDATE

None

SPECIES OF CONCERN

Aleutian Canada goose (*Branta canadensis leucopareia*)
Bald eagle (*Haliaeetus leucocephalus*)
Cascades frog (*Rana cascadae*)
Cassin's auklet (*Ptychoramphus aleuticus*)
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]
Destruction Island shrew (*Sorex trowbridgii destructioni*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Olive-sided flycatcher (*Contopus cooperi*)
Olympic torrent salamander (*Rhyacotriton olympicus*)
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*)
Tufted puffin (*Fratercula cirrhata*)
Valley silverspot (*Speyeria zerene bremeri*)
Van Dyke=s salamander (*Plethodon vandykei*)
Western toad (*Bufo boreas*)

APPENDIX C: LISTED 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). Resident bull trout spend their entire life cycle within their natal or nearby streams. Fluvial populations spawn in tributary streams where the young rear from two to three years before migrating to a river where they grow to maturity (Knowles and Gumtow 1999). Adfluvial forms spawn and rear in headwater streams like fluvial fish, but migrate to lakes and reservoirs to mature (KCDNR 2000). Anadromous bull trout spawn in tributary streams, with major growth and maturation occurring in the marine or estuarine environment (Sims 2000). 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).

Like many other salmonids, bull trout migrate to fresh water streams to spawn. Spawning begins in late August, peaking in September and October, and ending in November (WDFW 2000). Bull trout spawn in streams with clean gravel substrates and cold water temperatures (less than 9ºC/48ºF) (USFWS 1998). 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). Fecundity for bull trout can reach up to 5,000 eggs. Emergence from the streambed typically occurs in late winter and early spring (KCDNR 2000). Among migratory forms (fluvial, adfluvial, and anadromous), outmigration to larger rivers, lakes and the ocean most commonly occurs at age two, but has been observed for ages of one to three years (FERC 1999).

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 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).

Hood Canal Summer-run Chum Salmon

Hood Canal Summer-run chum populations are one of three genetically distinct lineages of chum salmon in the Pacific Northwest region (Ames et al. 2000). Hood Canal Summer-run chum salmon occurring in and near the Port Hadlock are part of the Hood

Canal Summer-run ESU population, which was listed as a threatened fish stock by NOAA Fisheries on March 25, 1999. The life history and habitat requirements of Hood Canal Summer-run chum salmon are described by Ames et al. (2000) and are included by reference and briefly summarized herein. Hood Canal Summer-run chum salmon are genetically distinct from other chum salmon stocks and have a distinctive life history (Ames et al. 2000). Summer chum enter freshwater spawning areas from late August through late October, during times when interaction with other Pacific salmon species and races is minimized (Ames et al. 2000). Fry emerge between February and the last week of May. Fry immediately migrate downstream to estuarine areas where they inhabit nearshore areas. Upon their arrival in tidal waters, chum fry inhabit shallow estuarine habitats, then migrate along marine shorelines (Nightingale and Simenstad 2001). Once juvenile chum reach a size of 1.7 to 2 inches (45 to 50 mm), they move to deeper off-shore areas (Ames et al. 2000).

Summer chum of the Hood Canal and Strait of Juan de Fuca region are defined as those fish that have an average peak of spawning before November 1. One distinguishing characteristic of this group of summer chum is an early nearshore marine area, adult run timing (early August into October). This early timing creates a temporal separation from the more abundant indigenous fall chum stocks, which spawn in the same area, allowing for reproductive isolation between summer and fall chum stocks in the region.

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 in Hood Canal are included in the Puget Sound Chinook ESU, a population currently listed as threatened under the ESA in Washington State. The life history and habitat requirements of Puget Sound Chinook salmon are described by Myers et al. (1998) and are briefly summarized herein. 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. Chinook require varied habitats during different phases of their life. Peak spawning occurs within the streams between mid-October and mid-November (Haring 2000). Spawning habitat typically consists of lower mainstem areas with large quantities of gravel and greater flows (Haring 2000). Upstream migration of adult fall Chinook salmon in south Puget Sound's lowland streams typically extends from mid-September to mid-November. After spending 3 to 4 months rearing in the lowland streams, fry enter the estuaries around May or early June, depending on the spring flows (Haring 2000). Chinook generally migrate to salt water in the spring and summer. Most Chinook spend from two to four years feeding in the North Pacific before returning to spawn. Chinook salmon die after spawning.

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).

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.

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).

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. 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 D: PFC ASSESSMENT DETAILS

Properly Functioning Conditions

Ideally, reliable scientific information would exist for all listed populations that would allow the effects of an action to be quantified in terms of population impacts (NMFS, 1996). As stated in the August 29, 1996 supplement to the NMFS guidance document, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS, 1996), in the absence of population-specific information, an assessment must define the biological requirements of a listed fish species in terms of properly functioning conditions (PFC). PFC is 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). A parallel approach is utilized by the USFWS in relation to determining effects to bull trout populations (USFWS 1998).

Indicators of PFC vary between different landscapes based on unique physiographic and geologic features. Since aquatic habitats are inherently dynamic, PFC is defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival. NMFS (1996) and the USFWS (1998) identify that PFC commonly includes the following elements: water quality, habitat accessibility, the suitability of various habitat elements, channel condition and dynamics, flow/hydrology, and overall watershed conditions. Estimates in the PFC assessment discussed below and presented in Table 5-1 are based on observations made during the field visit, and from background materials.

Water Quality

Water quality indicators for properly functioning conditions as described by NMFS (1996) and the USFWS (1998) include temperature, sediment/turbidity, and chemical contamination/nutrients.

Temperature

Water quality standards according to NMFS are properly functioning for temperature indicators when stream temperatures are at a range of 50 to 57 ºF. Temperature indicators are not properly functioning when they reach above 60 ºF and above 64 ºF for migration and rearing of salmonids (NMFS 1996). Temperature data collected between 1992 and 2001 by the Jefferson County Conservation District, the Port Gamble S'Klallam Tribe and Bahls and Rubin (1996) within the lower 2.3 miles of Chimacum Creek indicate annual instantaneous maximum temperatures ranging from 61.7 ºF to 66.2 ºF (Correa 2002). In addition, Chimacum Creek is listed on the Washington Department of Ecology's 303(d) list of impaired water bodies for the temperature parameter (Ecology 2009). Therefore, its baseline condition is *not properly functioning* for the temperature element based on NMFS standards.

The proposed action will include reuse of wastewater effluent. Effluent will meet Class A reclaimed water standards. In addition, effluent will be directed to a rapid-rate infiltration basin, where the highly treated effluent will percolate into subsurface groundwater. As with most groundwater in the region, flow will be toward Chimacum Creek. It is anticipated that contributions of effluent to the groundwater will improve low summer base flows and contribute to reduction in stream temperatures. Therefore, the proposed project is expected to *restore* the temperature conditions of Chimacum Creek (Table 5-1).

Sediment/Turbidity

Sediment/Turbidity indicators are properly functioning when turbidity is low and less than 12 percent of fine material (0.85 mm) is present in the existing gravel (NMFS 1996).

A culvert failure in 1985-1986 at Irondale road (RM 1.0) resulted in large amounts of fine sediment deposition within the lower reach of the stream, effectively cementing the gravels and eliminating available spawning habitat within the reach. Since that time and through intensive restoration activities, the gravels within the reach have been restored and the cementing effects of the washout have been diminished. Sediment has been a noticeable problem in Chimacum Creek since the soils adjacent to the stream have a high fine content (Al Lathem, personal communication *in* Correa 2002). Naturally occurring slope failures in addition to the number of roads and development surrounding the Irondale and Port Hadlock areas contribute to the fine sediment supply in Chimacum Creek. Considerable amounts of sediment enter the stream as a result of Jefferson County ditch maintenance.

The proposed treatment method for the Port Hadlock facility is a membrane bioreactor. This method employs some of the most advanced treatment technologies for removing contaminants of concern. MBR treatment results in low levels of turbity (less than 1 NTU) in the effluent. In addition, the wastewater effluent will be discharged into the groundwater using a rapid-rate infiltration basin Turbidity is not anticipated to increase above ambient conditions as a result of the discharge of highly treated water into the groundwater. During construction at the facility, minor erosion and sedimentation are likely to occur. These impacts are anticipated to be minor as the site is relatively flat, and there is dense riparian vegetation and wetlands between the wastewater treatment plant site, diascharge area, and Chimacum Creek. Best Management Practices (BMPs) will be employed to minimize the amount of erosion and sedimentation leaving the site or entering the wastewater treatment plant's stormwater collection system. The BMPs will be consistent with *Ecology's Stormwater Management Manual for Western Washington* (Ecology 2005), and may include the use of inlet protection, silt fence, straw waddles, and sediment traps as necessary. Clearing will only occur in areas of active construction. Following construction, disturbed areas will be revegetated promptly.

Based on NMFS criteria, baseline conditions for sediment are *at risk* due to the highly erodible nature of soils, road density and location, and increasing development within the basin. Since the project will include the application of appropriate BMPs and sediment control measures, as well as MBR treatment and discharge of effluent into a rapid-rate infiltration basin, the project is anticipated to *maintain* baseline conditions (Table 5-1).

Chemical (Contaminants and Nutrients)

Chemical contamination indicators are properly functioning when low levels of chemical contamination from agricultural, industrial and other sources are present and no excess nutrients or no Clean Water Act (CWA) 303(d) list designated reaches are present (NMFS 1996).

Chimacum Creek is listed on the Department of Ecology's 303(d) list of impaired water bodies for fecal coliform and temperature (Ecology 2009). Due to these listings, presence of agricultural activity and commercial and residential development, it is likely that Chimacum Creek is *not properly functioning* for the chemical contamination/ nutrients element based on NMFS standards.

Proposed treatment includes MBR treatment, which includes ultraviolet disinfection. Membrane filtration with disinfection is highly effective at removing bacteria (coliform organisms), pathogens, and other contaminants, and is expected to significantly safer than the existing septic systems, which are a likely source of fecal coliform contamination in the watershed. Nutrients in MBR-treated effluent include both phosphorous and nitrogen (most typically in the form of ammonia). Phosphorus is typically a limiting nutrient in freshwater systems and is usually found at relatively low ambient levels. As phosphorus appears to be the limiting nutrient for algae growth, the future NPDES permit will include a mass load limit for total phosphorus. MBR-treated effluent is anticipated to minimize total phosphorous and ammonia. The existing wastewater treatment plant is not designed to target removal of phosphorus, but does achieve some removal.

The proposed wastewater treatment plant will produce a high quality effluent and will be subject to stringent NPDES permit requirements. The combination of expected low concentrations of pollutants in highly treated water from the wastewater treatment plant and further polishing provided by rapid-rate infiltration into groundwater is expected to result in no significant adverse change to ambient water quality and quantity. The proposed action is anticipate to improve overall water quality by removing residents off of septic systems, which are currently sources or potential sources of contamination to adjacent surface waters including Chimacum Creek and Puget Sound. BMPs will also be conducted to minimize water quality impacts to the stream during construction. Therefore, the project is anticipated to *restore* baseline conditions.

Habitat Access

<u>Physical Barriers</u>

Physical barrier indicators are considered properly functioning when any man-made barriers present in the watershed allow upstream and downstream fish passage at all flows (NMFS 1996).

No man-made barriers are present in the Action Area. Based on the matrix of pathways and indicators criteria, the baseline conditions are *properly functioning*. The proposed project will have no effect on habitat access. Therefore, the proposed action will *maintain* baseline conditions at both the Action Area and watershed scales (Table 5-1).

Habitat Elements

Habitat elements include substrate, large woody debris (LWD), pool frequency, pool quality, off-channel habitat, and refugia (NMFS 1996; USFWS 1998).

Substrate

NMFS describes standards for properly functioning conditions for substrate as having dominant substrate of gravel or cobble with clear interstitial spaces, or less than 20 percent embeddedness of dominant substrate.

No specific studies were found to document the quality of the spawning substrate in Chimacum Creek. The area supports spawning habitat for coho salmon, winter steelhead, and summer and fall chum salmon; therefore, it is assumed that substrate contains a fair percentage of adequate spawning gravels and cobble. However, as indicated previously, sediment is a problem in the basin and contributes to degradation of spawning habitat throughout the basin. Based on this data and NMFS criteria, substrate conditions are *at risk*. The proposed project does not include any in-water work and will include the application of appropriate BMPs and sediment control measures and is not expected to increase sedimentation rates. Therefore, the proposed project will *maintain* current levels of substrate embeddedness (Table 5-1).

Large Woody Debris

Large woody debris is properly functioning when greater than 80 pieces of LWD is present per mile and LWD pieces are greater than 24 inches in diameter and greater than 50 feet in length (NMFS 1996).

The lower portion of Chimacum Creek confined within a ravine has a fair amount LWD with good recruitment potential from the mixed forest riparian zone. The reaches above the ravine have good recruitment potential but little LWD within the active channel (Correa 2002). It is likely that Chimacum Creek within the Action Area is *at risk* for the LWD element based on NMFS standards. The proposed action will require the clearing and grading of up to 12 acres of land vegetated with a mixture of grasses and trees to accommodate the treatment plant and rapid-rate infiltration basin. The exact number of trees to be removed has not been determined at this point; however it is anticipated that tree removal will not be required within riparian zone of Chimacum Creek. Consequently, the project is anticipated to *maintain* LWD functions (Table 5-1).

Pool Frequency

Pool frequency is properly functioning if pools meet the frequency standards of 56 to 74 pools per mile for a stream width of 15 to 20 feet and if LWD recruitment standards are met (NMFS 1996).

Pool frequency depends mostly on the number of pieces of LWD, the number of stream meanders, channel gradient and sediment supply. Downstream of Irondale Road, pool habitat comprises only 17 percent of habitat types and upstream pool habitats increase to approximately 20 percent (Ball et al. 2001). There is no data available to determine the exact frequency of pools; however, it is likely based on the percentage of pool habitat described above, LWD recruitment standards, and sediment inputs into the system that the pool frequency element is *at risk* based on NMFS standards. The proposed action will not increase fine sediment inputs into the stream and will not result in removal of LWD within the riparian zone. MBR treatment results in low levels of turbidity (less than 1 NTU) in the effluent, and the additional discharge of effluent to groundwater via a rapid-rate infiltration basin will also minimize stream turbidity to insignificant levels. Turbidity is not anticipated to increase above ambient conditions as a result of the discharge of highly treated water into the groundwater. Therefore, the proposed action will *maintain* current pool frequency conditions (Table 5-1).

Pool Quality

Pool quality is properly functioning when pools are greater than one meter in depth with good cover and cool water, and pools have minor reduction of volume by fine sediment (NMFS 1996).

Within Chimacum Creek, pool quality is poor. Few deep pools exist where there is adequate cover (TAG 2002). The average pool depth below Irondale Road is approximately one foot (Bahls and Rubin 1996) with adequate coverage. Mean pool depth increses to approximately three feet upstream of Irondale Road; however, riparian cover decreases as well as you move upstream (TAG 2002). While pools sometimes meet the depth requirements for properly functioning conditions, the number of pools that meet this criteria in combination with inadequate riparian cover results in an *at risk* condition for the pool quality element based on NMFS standards. Under the proposed action, there will be no in-water work. All work will occur outside the riparian zone of Chimacum Creek. No streamside or riparian vegetation will be removed as a result of the proposed action, and furthermore, BMPs will be in place to minimize erosion and sedimentation, which can reduce pool volume. Therefore, the proposed action is expected to *maintain* current pool quality conditions within Chimacum Creek (Table 5-1).

Refugia

The refugium habitat element is properly functioning when habitat refugia are present and are adequately buffered (NMFS 1996). Some amount of refugia habitat capable of supporting and maintaining all life stages of salmonids exists within the Action Area in the mainstem Chimacum Creek; however spawning habitat has been degraded by sedimentation and rearing and holding areas have also been diminished by infilling of pools with fine sediments. Due to the presence of a fairly intact buffer system and somewhat degraded refugia, Chimacum Creek within the Action Area is *at risk* for the refugia element. The proposed action is expected to *maintain* current refugia conditions.

Off-Channel Habitat

Off-channel habitats are properly functioning when backwaters with cover and low energy off-channel habitat are present within the area (NMFS 1996). The main channel contains few high flow channels but does maintain good connectivity with the floodplain and streamside wetlands that have fair to good riparian cover. Off-channel habitat in the Action Area is considered *at risk*. The proposed project will not create off-channel habitat and therefore will *maintain* existing conditions (Table 5-1).

Channel Condition and Dynamics

NMFS (1996) and the USFWS (1998) define properly functioning channel conditions and river dynamics as a width/depth ratio of less than 10:1, naturally stable river banks, and a prevalence of riparian and riverside wetlands hydrologically linked to the river system.

Width/Depth Ratio

Although quantitative channel measurements were not taken during the site visit, the width to depth ratio appears to be *properly functioning* (less than 10:1) based on observations of the Chimacum Creek channel. The project will *maintain* current width-to-depth ratios as it will not alter stream channel morphology or increase sedimentation (Table 5-1).

Streambank Condition

Overall streambank stability is good within Chimacum Creek and the Action Area. Several small slope failures have occurred over the past decade and have contributed sediments to the lower watershed. Naturally occurring failures are necessary for the continued recruitment of spawning gravels within this reach (Correa 2002). The streambank condition is *properly functioning*. The project will not affect the streambank condition and is expected to *maintain* existing conditions (Table 5-1).

Floodplain Connectivity

Chimacum Creek has access to the floodplain throughout the project Action Area, although the stream has been ditched and channelized in the vicinity of Ness's Corner (RM 2.0). The area between Hunt Road and the confluence with the East Fork Chimacum Creek (upstream end of project Action Area) was historically impounded by a beaver dam. This area is now a wetland and maintains its wetland characteristics (TAG 2002). Floodplain habitat is fair to good. The lower one mile is confined within a ravine with mixed forest cover that provides spawning habitat for coho salmon, fall and summer chum salmon, winter steelhead in addition to rearing habitat for coho and steelhead. The majority of the ravine and associated estuary/nearshore marine habitats are largely protected through conservation easements maintained by the Jefferson County Land Trust. Areas upstream of the ravine have been degraded through past land uses; however, these areas are in recovery (TAG 2002). Therefore, floodplain connectivity is *at risk* based on NMFS criteria. Project effects are anticipated to *maintain* floodplain connectivity baseline conditions (Table 5-1).

Flow/Hydrology

Change in Peak/Base Flows

NMFS (1996) states that flow/hydrology is not properly functioning when there are pronounced changes in peak flows and base flows, and there has been a significant increase in impervious surface coverage within a basin. Clearing of mature forest vegetation over large areas of the watershed and construction of roads in upland forest areas has reduced natural infiltration, thereby increasing runoff rates and peak flows. Therefore, the baseline condition is *at risk*.

Approximately 18 percent of the Action Area is currently impervious surface. The proposed action will increase impervious surface both directly and as a result of construction of the wastewater treatment plant and associated facilities, and indirectly as a result of the anticipated growth in the Service Area. However, all stormwater generated from the site will be infiltrated and future development activities will be required to comply with Jefferson County stormwater management standards. In addition, the proposed action is anticipated to improve low summer base flow conditions by reuse of highly treated wastewater. All effluent will be treated to Class A reclaimed water standards and then discharged to a rapid-rate infiltration basin where it will percolate into the groundwater and contribute flows to Chimacum Creek.

Overall, the proposed action is anticipated to have beneficial effects to base flow conditions; however, subsequent population growth and associated increases in impervious surface area within the basin will minimize these benefits. Therefore, the proposed action is anticipated to *maintain* baseline conditions for flow/hydrology within the project Action Area (Table 5-1).

Increase in Drainage Network

The project Action Area is located in a developing commercial and residential area containing State Route 19 (SR-19), SR-116, and many surface streets. Given the large amount of impervious surface in the project area, the baseline condition is *at risk*. Though the proposed project is anticipated to increase the amount of impervious surface at the facility, stormwater from the expanded process area will be diverted to the facility's storm drainage system and then pumped into the treatment process for processing. The onsite stormwater system will be designed in accordance with the Ecology Stormwater Maintenance Manual for Western Washington. The proposed action will not result in any increase in drainage network within the basin. Therefore, the proposed action will *maintain* the current baseline condition (Table 5-1).

Watershed Conditions

NMFS (1996) defines "not properly functioning" watershed conditions as having many valley bottom roads, the disturbance of greater than 15 percent of the entire watershed, and fragmented riparian conditions.

Road Density and Location

SR-116, Irondale Road, and Hunt Road cross Chimacum Creek within the project area. Numerous small residential roadways are also present in the vicinity of the proposed action. These roadways reduce the riparian buffer functions of Chimacum Creek. The baseline conditions are *at risk*. The project will not contribute to an increase in road density. Therefore, the project will *maintain* baseline conditions at the watershed scale (Table 5-1).

Disturbance History

The predominant land use disturbance in the sub-basin is associated with logging, residential and commercial development and agricultural (present and historic). The geology in the area has resulted in unstable slopes along the lower reaches of Chimacum Creek, which have caused several small landslides over the last decade. Several areas along the reach have also been identified as seismic hazard areas. Due to the location of the Action Area and its watershed, disturbances exist in unstable or potentially unstable areas. Natural processes (sediment, LWD, and hydrology regimes) are mostly *at risk*. Therefore, based on the matrix of pathways and indicators criteria, the existing baseline conditions are *at risk.* The proposed project includes minor vegetation clearing, which will be compensated for by replanting the cleared area following construction. Therefore, the project will *maintain* baseline conditions (Table 5-1).

Riparian Reserves

There has been a moderate loss of connectivity between the riparian reserve system and functions have been reduced due to past and current land use within the Action Area. Protection of the lower 1.0 mile of the stream via conservation easements has improved this connectivity; however, development in the upper watershed continues to threaten riparian reserves and limit use of riparian areas by sensitive species. Therefore, the project Action Area is *at risk* for the riparian reserve element based on NMFS standards Due to the location of the proposed action, largely outside of the riparian zone, the project is anticipated to *maintain* this function at the watershed scale (Table 5-1).