

Finding of No Significant Impact
Qwuloolt Section 544
Ecosystem Restoration Project
Marysville, Snohomish County, Washington

1. Background. The Qwuloolt Section 544 Ecosystem Restoration project (Qwuloolt Project) site is an area of former agricultural land located along Ebey Slough in the southern portion of Marysville in the Snohomish River delta. The area around the Qwuloolt Project site was historically a tidal marsh, with probably both a forested (spruce) and emergent (sedge/rush) vegetative component. At what was known as the Poortinga farm, a dike was constructed on the north bank of Ebey Slough and tidegates were installed at the mouth of Allen and Jones Creeks, and a series of ditches were dug to convert the land to pasture. As a consequence, the levee and tidegates prevented tidal access to the historic floodplain which destroyed the estuary marsh habitats and restricted salmon and other estuarine-dependent species from utilizing this highly productive environment. In addition, the newly reclaimed farm land was ditched fifty years ago to improve drainage, impairing water quality and decreasing habitat quality within the area.

2. Authority. The proposed Qwuloolt project is authorized by Section 544 of the Water Resources Development Act of 2000 (Public Law 106-541, December 11, 2000), which authorizes implementation of critical restoration projects in Puget Sound.

3. Proposed Action. Restoration actions that will be completed by the Section 544 Project include:

1. Lowering and breaching the Ebey Slough Dike in specific areas to restore tidal hydrology and tidal inundation to approximately 400 acres of the site.
2. Construction of a 4,500 foot setback levee to maintain the current level of flood risk management for the adjacent industrial park and the City of Marysville wastewater treatment facility.
3. Relocation and restoration of the mouth of Allen Creek to provide fish passage.
4. Permanent closure of existing tide gates at the current mouth of Allen Creek.

The work includes excavation and removal of 1,800 linear feet of dike at Ebey Slough, stream improvements to Allen Creek, temporary construction staging areas and construction of a 4,500 linear feet set-back levee. In total approximately 186,000 cubic yards (cy) of material will be excavated and 190,000 cy of material will be used as fill. There will be a permanent loss of approximately 13 acres of degraded palustrine emergent wetlands as a result of construction activities. However, over 400 acres of wetland will have improved functions and value as a result of the restoration activities.

4. SUMMARY OF IMPACTS. The impacts of the proposed project are described fully in the project environmental assessment (EA) dated May 2011, and summarized herein.

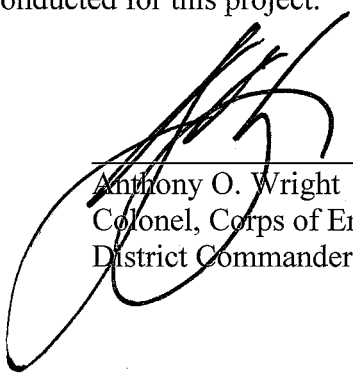
The proposed action would restore natural tidal hydrologic processes at the Qwuloolt Project site, thereby increasing tidal prism volume, increasing the area inundated, and improving sediment transport processes. Other benefits include off-channel refuge for many species of salmon and trout, increased primary productivity and food chain support. The proposed project would provide crucially important habitat for fish species listed under the Endangered Species Act (ESA).

Construction of the project will cause short term impacts such as noise disturbance to wildlife and recreational users in the vicinity of operating heavy machinery during excavation and construction of the restoration site; displacement of some rodent, amphibians and reptiles as the project area converts from a freshwater system to brackish; and disruption of local traffic in the project vicinity during construction. Longer term impacts include a change in vegetation within the project site from the current reed canarygrass/Canada thistle/blackberry community to an estuarine emergent marsh dominated by sedges and reeds as well as mudflats. Additionally, excavation and filling for the setback levee will fill approximately 13 acres of existing palustrine emergent marsh. Analysis indicates that the functional gains through restoration of more than 400 acres of estuarine marsh outweighs the palustrine wetland losses.

The Corps has coordinated with Federal agencies to assure careful consideration of fish and wildlife resources. The project complies with ESA via coverage under a 4(d) rule for restoration (for threatened steelhead and Chinook and their critical habitat) and a programmatic biological opinion (for threatened bull trout and listed terrestrial species and their critical habitat). Impacts of the work on salmonids will be reduced and/or avoided through implementation of construction timing restrictions. No historic properties would be affected by the proposed action. A Section 401 Water Quality Certification has been obtained from the Department of Ecology. The proposed work complies with the policies, general conditions, and general activities under the Coastal Zone Management Act.

5. Finding. Based on the analysis detailed in the project EA (attached) and summarized above, I have determined that the proposed project will not result in significant adverse environmental impacts, does not constitute a major Federal action significantly affecting the quality of the human environment and, therefore, does not require preparation of an environmental impact statement. The project must comply with all permit conditions as well as conditions set out in section 11 of the 404 (b)(1) analysis conducted for this project.

15 JUNE 2011
Date



Anthony O. Wright
Colonel, Corps of Engineers
District Commander

Environmental Assessment

Qwuloolt Section 544 Ecosystem Restoration Project Marysville, Washington

**FINAL
May 2011**



Cover photo by Erik Stockdale Washington Department of Ecology



**US Army Corps
of Engineers®**
Seattle District

**Qwuloolt Section 544
Ecosystem Restoration Project
Marysville, Washington
May 2011
Final Environmental Assessment**

Responsible Agencies: The study to explore the feasibility of this project was conducted by the U.S. Army Corps of Engineers, Seattle District (Corps) in cooperation and partnership with the Tulalip Tribes of Washington. The Corps is the lead federal agency for National Environmental Policy Act (NEPA) compliance for this project study in accordance with a May 2008 Agreement with the Tulalip Tribes of Washington. Other agencies and public entities involved are the U.S. Fish and Wildlife Service, The National Oceanic and Atmospheric Administration, the Natural Resource Conservation Service, Washington Department of Ecology, Washington State Department of Fish and Wildlife and Snohomish County.

Summary: In accordance with NEPA, this document evaluates the potential environmental impacts of the federal action. The project goal is to restore the project site to an estuarine emergent wetland by restoring historic hydrologic functions. The proposed project will restore intertidal estuarine emergent wetlands and mudflat by breaching a dike at Ebey Slough. This will improve habitat conditions for fish and wildlife species including threatened species such as juvenile Chinook, steelhead and bull trout. The work includes excavation and removal of 1,800 linear feet of dike at Ebey Slough, stream improvements to Allen Creek, and a set-back levee. In total about 186,000 cubic yards (cy) of material will excavated and 190,000 cy of material will be used as fill. There will be a permanent loss of about 13 acres of degraded palustrine emergent wetlands as a result of construction activities. Over 400 acres of wetland will have improved functions and value as a result of the restoration activities.

Impacts are generally related to the actual construction phase of the project and will be localized in nature, short in duration, and minor in scope. Minor temporal and spatial losses will be compensated for through restoration of tidal connectivity and hydrologic function that will restore a variety of native habitats where none currently exist. Impacts from this restoration project should not be significant, either individually or cumulatively.

The official comment period on this environmental assessment occurred from February 4 to February 29, 2009. This document and the Public Notice are available online at:
http://www.nws.usace.army.mil/ers/doc_table.cfm (under "Qwuloolt Project.")

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1.0 INTRODUCTION

The Qwuloolt Section 544 Ecosystem Restoration project (Qwuloolt Project) site is an area of former agricultural land (Poortinga property) located along Ebey Slough in the southern portion of Marysville (Figures 1 and 2) in the Snohomish River delta. The area around the Qwuloolt Project site was historically a tidal marsh, with probably both a forested (spruce) and emergent (sedge/rush) vegetative component. At what was known as the Poortinga farm, a dike was constructed on the north bank of Ebey Slough and tidegates were installed at the mouth of Allen and Jones Creeks, and a series of ditches were dug to convert the land to pasture. As a consequence, the levee and tidegates prevented tidal access to the historic floodplain which destroyed the estuary marsh habitats and restricted salmon and other estuarine-dependent species from utilizing this highly productive environment. In addition, the newly reclaimed farm land was ditched fifty years ago to improve drainage, impairing water quality and decreasing habitat quality within the area. Today only 20% of the total Snohomish River estuary area remains due to extensive diking and tide gates which restrict the river and tides from reaching wetland areas in the floodplain.

It is within the context of the past loss of large amounts of estuarine habitat and increasing threat to endangered species that the Qwuloolt Project has been developed. The Environmental Assessment (EA) focuses on the proposed work that the Corps of Engineers (Corps) will perform for restoration work. The project is separated into three main components: dike removal and breach, re-connecting the mouth of Allen Creek to Ebey Slough and a set-back levee construction.

This EA was prepared under the requirements of NEPA, 42 USC 4321 *et seq.*, 40 CFR Parts 1500-1508, to determine whether or not there would be significant impacts to the quality of the human environment from implementation of the preferred alternative for the Qwuloolt Project. A Public Notice (PL-09-01 dated February 4, 2009) was issued that described the proposed project.

The Corps portion of the work (reference the description of alternatives in Section 2.0) is just one component of the overall restoration efforts at the Qwuloolt Project site. The development of this restoration project has involved many participating entities including: the Tulalip Tribes of Washington; National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce; the U.S. Department of the Interior (DOI), including the U.S. Fish and Wildlife Service (USFWS); the Natural Resource Conservation Service (NRCS) of the U.S. Department of Agriculture; the Washington State Department of Ecology (DOE); Washington State Department of Fish and Wildlife (WDFW); and the Corps Seattle District. Additional interested local governments and organizations are participating in the planning, design, and implementation of the proposed restoration project. These entities include Snohomish County and Sound Transit.

There are two components to the overall restoration of the site:

- 1) Section 544 Qwuloolt Ecosystem Restoration Project conducted by the Corps with the non-Federal sponsor, the Tulalip Tribes of Washington (Tribes)
- 2) Site restoration conducted by the Tribes utilizing American Reinvestment and Recovery Act (ARRA) stimulus funding from the National Marine Fisheries Service

(NMFS) whereby the Tribes propose to do complementary restoration activities at the site including constructing a water runoff storage basin (about 6 acres); an 0.8 acre fill pad for water well protection; internal berms to reduce erosion potential and provide habitat complexity; starter channels to facilitate tidal channel formation; and filling of all former farm ditches.

While this EA concentrates on the Corps' proposed work, it also provides an overview of all the restoration activities proposed at the site to provide a complete picture. The Detailed Project Report for the Qwuloolt Project details the plan formulation process for the two related projects.

Initial involvement at the site started in 1995 when the Interagency Wetlands Reserve Program Team assessed and ranked a portion of the project site, the Poortinga dairy farm for restoration. The NRCS purchased a Wetland Reserve easement on the Poortinga farm in 1997. Then, in 1998 through the Natural Resource Damage Assessment and Restoration Program (NRDA), the NRDA Trustees (USFWS, NOAA, Tulalip Tribes, and DOE) identified a portion of the site for implementation of the NRDA program. Since then the purchase of additional properties has occurred to increase the footprint of the project for ecological benefits. From this perspective it has been practical to expand the project area to include all of the lowland within the original area designated as Diking District 3. Additional grants and funding sources have been sought over the past several years to support the Qwuloolt Project such as National Coastal Wetland Grant awards, ARRA, Planning Assistance to the States (PAS), Estuarine and Salmon Restoration Program and Washington State Salmon Recovery Funding Board.

1.1 Project Location

The Qwuloolt Project site is a 400-acre area of former agricultural land located in the southern portion of the City of Marysville, Washington (Sections 33 and 34, Township 30 North, Range 5 East) (Figure 1 and 2). The project borders include the City's sewage treatment plant to the west, an industrial park to the northwest, residential neighborhoods along 61st Street NE, and Sunnyside Boulevard to the north and east. Ebey Slough borders the site to the south.

The topography of the site is relatively flat, and is surrounded by dikes and short steep slopes. The project is located adjacent to Ebey Slough and to the southeast of the City of Marysville. The Qwuloolt Project site is a poorly drained wetland of approximately 400 acres dissected with drainage ditches. Jones and Allen Creeks discharge into Ebey Slough through four tide gates. This system of dikes and tide gates allowed the site to be used for agricultural production for seventy years until 1985.

1.2 Project Purpose and Need

The purpose of the Qwuloolt Project is to restore estuarine habitat at the Snohomish River site, which is currently a diked, fallow pasture. The loss of historic estuarine habitat has had a profound effect on the ecological health of the Snohomish River Basin and Puget Sound, as a whole. Estuaries provide a wide variety of resources and functions to the fauna and flora of the Northwest, including several species listed under the Endangered Species Act (ESA). Habitat loss has resulted in population declines of numerous species whose life histories are dependent on the estuary directly or indirectly. These species include salmonids, bull trout, numerous bird

species, and mammals, including the harbor seal and endangered orca whale. The Corps Section 544 program allows federal participation in projects and activities, which have “immediate and substantial ecosystem restoration, preservation and protection benefits” (P.L. 106-51, Section 544). The Qwuloolt Project offers an opportunity to restore habitat at a large, ecologically important estuarine site in the urbanized Snohomish River Estuary.

Restoration activities at the project site will provide the native habitats and natural processes conducive to the survival of a variety fish and wildlife species including juvenile salmonids and listed species under ESA. The resulting intertidal mudflat, brackish marsh, and riparian habitats would provide critically important transitional habitat where juvenile salmonids would have the opportunity to feed, rest, and undergo smoltification prior to out-migrating to Puget Sound and the Pacific Ocean.

The overall purpose of the restoration project is to restore significant ecosystem function, structure, and dynamic processes that have been degraded within the Snohomish River basin. The goal of the project is to restore tidal processes to 400 acres of currently fallow pasturelands. This will improve local streams and wetlands for fish such as endangered Chinook salmon, bull trout and steelhead providing access the project area for refuge and feeding. The purpose of the Qwuloolt Project is to restore the natural resources of the former estuarine marsh to as close to pre-settlement conditions as possible. The project objectives include:

- Create a self-sustaining brackish (salinity range of 0.5 to 7 ppt) tidal site with minimal construction and maintenance; consistent with the Corp’s Environmental Operating Principles;
- Restore natural hydrology, salinity, and sedimentation;
- Promote natural channel formation;
- Provide opportunities for juvenile salmon off channel rearing and forage areas;
- Maximize cover, forage and other habitat functions for fish and wildlife;
- Facilitate natural processes and functions to occur (sedimentation, plant propagation, export of organic material, channel complexity, edge, salinity gradient, water quality);
- Assist recovery and re-vegetation of native species;
- Provide public education on marsh restoration (public meeting, web site and signage); and
- Balance public access with ecological objectives.

Projects such as the Qwuloolt Project are needed for a variety of reasons. They provide critical habitat for listed species under ESA. This project will restore a portion of the historic habitat types and area that have been lost to the Snohomish Estuary from past development. Collins (2001) estimates only one sixth of the historic marsh remains in the Snohomish basin. Many species are dependent on estuarine marshes during significant portions of their life histories. Some of these species are of commercial value or are prey species for a variety of fauna. Fish species include juvenile sole; sculpins; shiner perch; stickleback; Chinook, pink, and chum salmon; steelhead; bull trout; and cutthroat trout. Bird species include geese, goldeneye, coot, gadwall, bufflehead, merganser, great blue heron, green-winged teal, killdeer, kingfisher, mallard, sandpiper, dunlin, goldfinch, junco, merlin, osprey, red tail hawk, bald eagle, redwinged

blackbird, and song sparrow. Mammal species include, harbor seal, orca or killer whale (Chinook salmon are a prey resource), raccoon, otter, deer, coyote and muskrat.

1.3 Authority

Federal involvement in ecosystem restoration is supported in law and regulation. The Corps Civil Works Ecosystem Restoration Policy (ER 1165-2-501), National Environmental Policy Act of 1969, Water Resource Development Act (WRDA) of 1986, and the WRDA of 1990 provide national policy directing consideration of projects that benefit ecological resources.

Specifically, Section 306 of the WRDA of 1990 authorized the Secretary of the Army to include environmental protection as one of the primary missions of the Corps. The proposed Qwuloolt Project is authorized by Section 544 of the Water Resources Development Act of 2000 (Public Law 106-541, December 11, 2000), which authorizes implementation of critical restoration projects in Puget Sound.

1.4 Associated Studies and Reports.

A wide variety of studies and evaluations have been completed for the Qwuloolt Project over the past ten years. These reports are incorporated into this Environmental Assessment by reference. A brief overview of these reports is provided.

Subsurface Explorations and Laboratory Testing Data Report. Kleinfelder West Inc. (2008).

In August 2008, a geotechnical consulting firm performed a geo-technical survey at the project site. The survey and associated laboratory analysis consisted of:

- Visual surface reconnaissance of the project area
- Eleven hollow stem auger or mud rotary borings with standard penetration tests. The borings were located along the probable levee alignments. Soil logs and blow counts accompanied the borings. Depths ranged from 21 to 51 feet.
- 31 hydrometer analysis and grain size distribution tests
- 30 Atterberg limit analysis
- 4 wash fines analysis
- 75 moisture content determinations

Based on the results of this survey the site appears to be dominated by alluvium with minor amounts of fill and weathered till and advanced outwash material. The soils at the site are generally “soft” (easily compacted).

Wetland Assessment for Restoration at Qwuloolt Marsh. NOAA (2006).

During the spring of 2006, staff from NMFS conducted a wetland delineation at the Qwuloolt Project site. The document notes that the soils at the site are mapped as hydric. Twenty seven plots were evaluated for wetland hydrology, soils and vegetation. The entire site is a wetland. Since the site was drained (but not effectively) for pasture it has subsided by a few feet and during the winter and spring ground water elevations are high. In November of 2008, the Seattle District Corps performed a wetland confirmation of the NMFS wetland assessment and corroborated that the entire Qwuloolt Project site is a palustrine emergent wetland. The determination concluded that the site is a water of the U.S. under section 404 of the Clean Water Act and is adjacent to Ebey Slough.

Level 1 Site Assessment for Hazardous Waste (HTRW). Seattle District Corps of Engineers (2008).

The objective of this HTRW study was to identify the presence and estimate the volume of any contamination at the former Poortinga property, the proposed site of the Qwuloolt Project. Another objective was to confirm the Phase I Environmental Site Assessment conducted by EMCON for the property dated January 13, 1998. A site visit was included in this analysis and potential HTRW concerns on project associated lands, easements, or rights-of-ways were reported. The HTRW screening study concurs with the conclusions presented in the Phase I Environmental Site Assessment by EMCON. HTRW concerns on the Poortinga property itself are low; the site appears free of obvious issues that may impact project plans for restoration of the site.

Phase 1 and Phase 2 Environmental Site Assessment prepared. EMCON (1998).

The contractor prepared a Phase 1 environmental site assessment and a limited Phase 2 site investigation of the Poortinga property for hazardous and toxic wastes. These investigations “revealed no evidence of recognized environmental conditions in connection with the subject property with the exception of the following:”

- The Poortinga Dairy Farm manure lagoons adjacent to the eastern property boundary appear to be releasing leachate onto the subject property. Note that this report was completed in 1998 and the lagoons were subsequently remediated and removed.
- Low levels of VOCs were detected adjacent to the Bowers property. Note that the Bowers property is outside the project boundaries.

The report concluded “With these two exceptions, the subject property appears relatively un-impacted beyond its use as a grazing pasture and no conditions that would represent a significant adverse impact on the utility of the site as a wetlands restoration project were observed or indicated”.

Archaeological Resource Assessment Qwuloolt Habitat Restoration Project. AMEC (2008).

In July, 2008 a cultural resources survey in support of section 106 compliance of the National Historic Preservation Act was performed. A Corps archeologist defined the Area of Potential Effect (APE). A literature review for the project was also completed. Once the literature review was finished, a research design was developed to identify any significant archeological or historic sites that may be impacted by activities associated with the project. Field studies in support of the research design were then accomplished. A ground surface investigation provided little information due to the dense foliage (reed canary grass predominantly). Then 40 excavator test pits (shallow trenches) were dug throughout the APE. Upon examination, the test pits provide no positive results for cultural resources. The survey and report concluded that no archaeological materials were located and the project will have no effect on cultural properties.

Assessment of Flood Risk. Phillip Williams and Associates (2008).

This memo considered the likelihood and magnitude of wave run-up during flood or high tide conditions using Corps wave generation, transformation, and run-up tools. Analysis showed that wave run-up on the shoreline could extend as high as 1.4 feet above the still water level. The analysis provided recommendations on levee design.

Hydrodynamic Modeling Study of the Snohomish River Estuary. Zhaoqing Yang, Battelle (PNWD-3864). (2007 and 2008).

This report documents development and modeling of the Snohomish estuary with the FVCOM 3D finite volume, unstructured grid CFD model. Battelle ran the model under two scenarios. The 2007 model was calibrated to one week of observed tides, winds, at a typical October flow condition at multiple locations to multiple parameters (current, stage, salinity). Under the first run of the model, results suggested the levee breaches proposed with this project would increase tidal flows downstream of restoration sites, but reduce them upstream. Salinity levels will increase due to increased tidal prism. Some increase in velocities and shear stresses are expected, but they were not likely to be a significant concern. The report presents plots of depth averaged 2D velocity fields, and shear at bottom of each grid cell. This effort did not model flood conditions.

In an update of the 2007 model, a second model run was performed that included 2-year recurrence interval riverine flood (62,000 cfs) during typical tidal cycle. The analysis compares model output at low flow and high flow, under fully restored, partially restored, and existing conditions. Comparisons of high flow under existing and with project conditions show no change in the water elevations. Flow increased to the distributary channels under high flow/restored conditions. Salinity changes were minimal. Bed stresses were reported to be “high (> 5.0 pa)”. Another run of the Battelle model will be completed in the near future to refine the high flow run and to update /improve boundary conditions, which may have contributed to the reportedly high bed stress estimates.

Allen Creek Flood Modeling. PWA (2008)

This memorandum summarized the flood analysis for Allen Creek, which was performed as part of the greater Qwuloolt Project. The purpose of this analysis was to assess the flood impact the tidal restoration will have on the community of Marysville along Allen Creek upstream of the 3rd Street crossing. Previous investigation had provided inconclusive results using a steady-state model. The existing steady-state HEC-RAS model was updated to include unsteady boundary conditions and geometry reflective of current conditions at the site. This model was run for a variety of flow conditions for existing and proposed conditions. The proposed restoration of the Qwuloolt Project site was incorporated into the model’s geometry and compared to baseline conditions. The hydraulic model predicted negligible changes in peak water surface elevations for the lower reach of Allen Creek due to the tidal restoration project. Additionally, a conceptual-level culvert design for the 3rd Street Bridge was incorporated into the post-restoration geometry and the model predicted significantly reduced water levels through Jennings Park up to the main Jennings Park Bridge. Based on this analysis the report concluded that the Qwuloolt Project will not increase flood levels or flood risk in Allen Creek. The existing culvert at 3rd Street is a hydraulic constriction that controls water levels upstream to the main Jennings Park Bridge.

Qwuloolt Tidal Wetland Preliminary Design. PWA. (2008)

This Preliminary Design Report (PDR) describes the design work to date for the Qwuloolt Project site, serving as complementary documentation to the design drawings for the project. The PDR briefly describes the design opportunities and constraints specific to the Qwuloolt Project site that formed the basis for the design. Services completed for the PDR include

hydrodynamic modeling, base map creation, extreme water level analysis, geomorphic assessments, stormwater drainage evaluation, and detailing of the preliminary design features.

Water Level Elevations (draft). Seattle District Corps of Engineers. (2007-2008)

This study investigated existing water level elevations in the Marysville Industrial Park, Allen Creek, and Ebey Slough. Data consisted of 6-minute pressure readings for 1 year period (low and high flow) at six locations. Flooding of the industrial park was documented on several occasions and was confirmed by property owners. Flood problems within the Industrial Park appear to be a result of an under-sized outfall to Ebey Slough on Allen Creek, resulting in ponding and backwater that then restricts outflow from the industrial park drainage system. Property owner mitigation strategies (bladder dam and pump) appear to increase flood levels by severely reducing the outflow capability of the drainage system.

2000-2001 Snohomish River Revised Flood Insurance (RFIS)-Seattle District Corps/WEST consultants for the Federal Emergency Management Authority FEMA (2000-2001)

A HEC-UNET model of the Snohomish River, including all major tributary channels was calibrated to reproduce flooding that occurred during the 1990 flood. This model was also used to determine the 10, 50, 100, and 500-year flood profiles, the 100 and 500-year floodplains, and floodway. The RFIS model assumes that the levee protecting the restoration site will fail under 100-year flood conditions. Thus, behind the levees, the FEMA 100-year flood elevation should be the same regardless of the size of any restoration project. No flood analysis of Allen or Jones Creeks was performed. The finalization date for the RFIS occurred in 2005.

Qwuloolt/Poortinga Technical Report for the Tulalip Tribes of Washington. Planning Assistance to the States (PAS), Seattle District, Corps of Engineers. (2002)

When the PAS study was initiated its sole focus was on what restoration opportunities were available and the analysis to support the restoration activities. The report identified four major habitats that should be expected to develop at the Qwuloolt Project site if the dike was removed: mudflats, emergent and fringing marsh (along the channels and at the upper portion of the intertidal range), channels, and upland vegetated areas. These separate habitat types would be interrelated and provide a complex interconnected mosaic of habitats that would recreate a historic estuarine system. Plant species from both the restoration site and a reference area were identified as well as the elevation range in which they occurred. One conclusion of the PAS study was the vegetation most likely to grow at the site would be estuarine emergent vegetation such as rushes and sedges. On a yearly basis, these plants die back in the fall and decompose. It is decomposition of this plant material that supplies organic material to the food chain within the estuary and nearshore ecosystems. Invertebrate assemblages associated with mudflats depend upon the organic material produced in marsh communities as food and nutrient sources. These invertebrate aquatic communities in mudflats comprise prey resources that juvenile fish depend upon. Tidal pumping helps to cycle and transport these nutrients and organisms throughout the estuary and nearshore system.

The Qwuloolt PAS included hydrologic model, topography survey and a vegetation analysis. The Seattle District Corps modified the FEMA RFIS UNET existing conditions model to represent potential levee breaches. The hydrologic model was re-calibrated with real-time low-

river flow and tidal data. Additional cross sectional data, and a storage area were added to the calibrated model to better represent the site. The 3rd Street box culvert was analyzed with the HY-8 culvert analysis program to predict backwater impacts on Allen Creek. Also within the reference area, an investigation of sedimentation rates was conducted.

The specific objectives for the hydrology and hydraulics portion of the PAS were:

1. Develop hydrology to characterize the site seasonally, and during floods, from major and minor flood sources.
2. Modify existing hydraulic models to describe project features and modifications.
3. Determine preferred modifications that facilitate restoration. Develop stage-duration relationships to describe likely hydraulic behavior of project.
4. Communicate potential impacts of project to sponsors and local communities.
5. Document assumptions and data gaps.

Another important part of the work was to evaluate how the sizes of different breach options would affect restoration activities. It was useful to first compare the effects of several hypothetical breach widths and configurations, before determining the optimum size. Rectangular breaches were used to approximate trapezoidal sections that would be built in the field. Models were created for the following breach widths and configurations:

- one - 25 foot breach
- one - 50 foot breach
- one - 100 foot breach
- one - 200 foot breach
- two- 200 foot breaches
- Full removal

The modeling results suggested breach size and locations had a significant influence on the outcome of restoration actions. Between one 100 foot breach and one 50 foot breach, the site starts performing poorly, i.e. the range of water surface elevations decreases dramatically as the smaller breach limits the site's ability to respond to Ebey Slough tidal fluctuations. While this would allow for a lot of edge between marsh and upland, it would restrict juvenile fish access temporally, limit tidal inundation and diminish sheet flow across the site. These small breach options would not allow for restoring the historic hydrologic regime. For a hypothetical 25 foot breach, the site could become a small lake that ranged in elevation from 6.2 to 4.7 feet. For the larger breaches (two- 200 foot breaches) there was no ponding. The more dike that was removed the more the site was inundated, the more sheet flow there was across the site, the better fish access became and the more hydraulic continuity was maintained between Ebey Slough and the rest of the site.

2.0 ALTERNATIVES CONSIDERED

Over the past several years the project partners have considered a wide variety of restoration options. The large breach option with restoration to Allen Creek (Alternative 6) is the preferred alternative. It should be noted that there has been one change in the proposed project between the initial draft environmental assessment and the final. Project sponsors continue to evaluate measures that will achieve the project objectives but at the same time reduce project impacts

while maintaining public safety. It appears that one of the set-back levees that was included as part of the project proposal in the draft environmental assessment is no longer needed. This will reduce the amount of fill needed as well as impacts to wetlands. Project sponsors will continue to look to minimize the project impacts throughout the process.

2.1 The No-Action Alternative – Alternative 1

Old topographic surveys show that in the late 1800's the area referred to now as the Qwuloolt Project area was a homestead with fields and two structures surrounded by marsh and swamp. Much of the northern half of the Qwuloolt site was spruce swamp, with emergent marsh in the area between Jones Creek and Ebey Slough. By 1938, the time of the first aerial photo record, the majority of the site was cleared with levees constructed in the current configuration and tide gates were in place at the outlet of Allen and Jones Creeks (Figure 5). Once the site was converted to pasture, dairy farming occurred over the next 80 years. In the mid-eighties, haying and dairy practices ceased and the fields became fallow. Reed canary grass dominated the site (Figure 3) and displaced the pasture grasses that used to be maintained. At the time there were a few trees, some Canada thistle and Douglas spirea and clumps of Himalayan blackberry. The current condition is mostly a palustrine wetland with a high water table and numerous farm ditches that retain water throughout the year. For the 100 plus years that the site had restricted tidal access, its ground elevation has subsided by two to three feet. Allen and Jones Creeks bisect the project area in its lower reaches and still retain some tidal channel features. The site is drained through four tidegates at the mouth of these creeks (Figure 7). There is restricted (the tidegates are mostly closed unless to release water from Allen Creek) migratory fish access to the creeks through the tidegates. A dike runs continuously along the southern boundary bordered by Ebey Slough and prevents any tidal inundation of the site. While mostly a monoculture of canary grass, the site has little fishery value but does provide some wildlife benefit. Coyote, deer, river otter, raccoon, field mice, hawks and the occasional eagle utilize the site. Under the current situation, none of the organic material (carbon and other nutrients) generated at the site is released to the estuary.

Under the no-action alternative, the project area would likely remain undeveloped due to the establishment of conservation easements on many of the individual parcels.

2.2 Common Elements For All of the Action Alternatives.

Regardless which restoration alternative is chosen there are several structural elements that would be needed. For instance, all of the alternatives included some form of dike removal or breaching, this would require building set-back levees for flood risk reduction for adjacent landowners. The proposed project includes the following common elements for all alternatives:

- One set-back levee (4,500 feet)
- Temporary construction staging areas

2.3 Allen Creek Restoration Only - Alternative 2

The Allen Creek alternative focuses on only restoration of the larger creek on the site. This alternative proposes opening Allen Creek to Ebey Slough by removing four tide gates. Removing the tide gates would result in a small breach and would partially inundate the site requiring the need for a setback levee. The setback levee would be constructed at the same level of protection as all other alternatives. Due to subsidence at the site, a pond would develop, and

about a third of the site would convert to estuarine emergent marsh and mudflat. By opening up the creek mouth and removing the four tide gates, more than 13 miles of creek for spawning, rearing and foraging would become available. In the event of extreme weather, such as flooding, the pond would greatly increase in size. This could increase the chance of dike failure at the location of the small breach.

2.4 Small Breach at Ebey Slough - Alternative 3

Approximately 50 feet of the existing dike would be breached along Ebey Slough. Due to restricted size of the breach, tidal exchange into the project area would be constrained providing limited fish passage during only a portion of the tidal cycle. Based upon information obtained in the PAS study, the tidal range would only be from +3 feet to +6.8 feet (MLLW=0), and the duration of inundation is limited to just a few hours per tide cycle. At the highest tide, approximately half of the project area would be inundated. However, extreme events, such as storm surges or leap and neap tides, would require the same levee protection as all other alternatives. About half of the site would then convert to estuarine emergent marsh and mudflats. Some of the normal hydrologic processes such as sheet flow across the site and subsequent tidal channel formation also would be restricted. This alternative does not include restoration of Allen Creek.

2.5 Large Breach at Ebey Slough - Alternative 4

Approximately 2,000 feet breach, comprised of a 400 feet breach with an additional 1,600 feet of lowered dike, along the existing dike adjacent to Ebey Slough. This would allow for complete tidal exchange, which is expected to facilitate fish passage over the entire 400-acre area and restore much of the historic hydrology to the site. The entire site would convert to estuarine emergent marsh and mudflat. This alternative does not include restoration of Allen Creek. Under this alternative a 400 foot wide and 22 foot deep breach would be excavated in the existing dike that is along Ebey Slough. In addition, about 1,400 foot of the existing dike would also be lowered below the high tide line elevation. This would allow for complete tidal exchange which would facilitate fish passage over the entire 400 acres of the site and restore much of the historic hydrology to the area. No improvements to Allen Creek would occur under this alternative.

2.6 Small Breach and Restore Allen Creek - Alternative 5

This alternative includes both a small breach (50 feet) in the existing dike along Ebey Slough and full restoration on Allen Creek. As part of the 10 percent design, this alternative also included a large culvert at the north end of the project for improved water conveyance and a bridge across the area where the tide gates were removed. The restoration on Allen Creek provides an improvement in the stream hydrology and provides up to 13 miles of stream for migratory fish use. However, the fifty-feet wide breach severely diminishes tidal inundation into the project area allowing for only limited access to juvenile fish and would also limit estuarine habitat development. Based upon information obtained in the PAS study the tidal range would be from +3 feet to +6.8 feet (MLLW=0) and the duration of inundation is limited. About one half of the site would convert to estuarine emergent marsh and mudflat.

2.7 Large Breach and Restore Allen Creek - Alternative 6

This alternative includes both a large breach (2,000 feet with a 400 feet breach and an additional 1,600 feet of lowered dike) in the existing dike along Ebey Slough and full restoration on Allen Creek. This would allow full tidal inundation into the project area restoring hydrologic processes, such as sheet flow and providing easy access to juvenile fish. The restoration on Allen Creek provides an improvement in the stream hydrology by opening the mouth and realignment of the stream channel of the creek providing up to 13 miles of stream for migratory fish use. As part of the 10% design, this alternative was shown to also require a large culvert at the north end of the project for improved water conveyance and a bridge across the location where the tide gates were removed. The entire site would convert to an estuarine emergent marsh and mudflats. The large breach option provides the best hydraulic connectivity between Ebey Slough and the project site. This alternative achieves a full tidal range (-2 feet to 12 feet with MLLW at 0 feet). Additionally, this alternative meets all of the restoration goals and objectives developed for the project.

2.8 Analysis of Alternatives

In order to evaluate the different alternatives, two separate types of criteria were used. Biological information (summarized in Table 1) and how the alternatives meet the project objectives. The biological information utilized for the evaluation included how much estuarine habitat would be realized by each of the alternatives. The information to determine this came from topographical data and from the breach size of the specific alternative. Smolt numbers, that is the amount of juvenile salmon expected to utilize the site was derived from Haas (2001) and based on direct proportion of the numbers of fish estimated by the amount of available habitat. The final biological criteria, was the amount of nutrient export that could be expected by each alternative, delivered to the Snohomish estuary. The estimates for nutrient export came from literature values such as Lieth (1975) and the size (or acreages) of different vegetation communities expected in each of the alternatives. The results of the biological evaluations are summarized below in Table 1. The no action alternative, or current condition, does not supply any of these biological benefits while Alternative 6 (large breach and restoring the mouth of Allen Creek) provides the most biological benefits.

Table 1. Comparison of biometric outputs per alternative.

Alternative	Estuarine Habitat (acres)	Smolts (number per year)	Nutrient export to the estuary (grams carbon/year)
Alt. 1 No Action	0	0	0
Alt. 2 Allen Creek	115	101,000	33.0×10^8
Alt. 3 Small Breach	255	127,000	29.4×10^8
Alt.4 Large Breach	400	199,000	31.7×10^8
Alt. 5 Small Breach Plus Allen Creek	255	171,000	34.9×10^8
Alt.6 Large Breach Plus Allen Creek	400	243,000	37.2×10^8

The alternatives also were evaluated by how they met project objectives based on how alternative specific restoration measures provided the necessary processes and functions.

Alternative 1 - No Action Alternative

The no action alternative would not meet the goals and objectives established for the project since it would not promote natural channel formation, provide opportunities for juvenile salmon off channel rearing and forage areas and maximizing cover, improve forage and other habitat functions for fish and wildlife, nor would it allow for natural processes and functions to occur (sedimentation, plant propagation, export of organic material, channel complexity, salinity gradient, water quality) because no intertidal habitat would be created. The no-action alternative results in no change in environmental benefits. The no-action alternative is carried forward in the alternative impact analysis for baseline condition comparison.

Alternative 2 - Allen Creek Restoration Only

This alternative supports some of the project objectives such as providing opportunities for juvenile salmon off channel rearing and forage areas and improved access to 13 miles of stream corridor. Due to the small opening at the mouth of Ebey Slough objectives such as creating a self-sustaining brackish tidal marsh, restoring natural hydrology, salinity, and sedimentation and promoting natural channel formation would not be met. Additionally, this alternative may not be technically feasible. Removing the tide gates to Allen Creek near Ebey Slough would provide for a 25 foot opening which allows only for a limited tidal exchange and, due to subsidence at the site, would create a pond much of the time over the lower ground elevations. There is also the potential on an outgoing tide for significant erosion to occur creating a much wider opening than designed. This becomes particularly problematic due to the close proximity of the Marysville water treatment facility. A failure in this location could erode the area around the treatment ponds causing a much bigger problem. Since this alternative only addresses some of the project criteria and because this option may not be feasible, it is not carried forward for further consideration.

Alternative 3 - Small Breach at Ebey Slough

This alternative proposes to open a small 50 foot breach in the dike at Ebey Slough. Based upon information obtained in the PAS study the tidal range would only be from +3 to +6.8 (MLLW is 0 feet) and the duration of inundation is limited to just a few hours per tidal cycle. The site would be very fragmented due to the limited tidal influence. The chance to restore natural vegetation and provide vegetative structure to the site would be limited by the absence of a more natural hydrologic regime. This would also limit primary productivity and nutrient export. Some of the normal hydrologic processes such as sheet flow across the site and subsequent tidal channel formation would also be restricted. Due to the small size of the breach, tidal exchange into the project area would be muted and provide limited fish habitat during only a portion of the tidal cycle. This alternative does meet some of the project objectives such as providing opportunities for juvenile salmon off channel rearing and foraging areas (these opportunities are limited), but many of the project objectives are not met. This alternative, with its muted tidal response, does not allow for creating a template that allows natural processes and functions to occur (sedimentation, plant propagation, and export of organic material, channel complexity, salinity gradient, and water quality). Due to limited ability to meet project objectives, this alternative will not be carried forward for further consideration.

Alternative 4 - *Large Breach*

This alternative proposes a much larger breach in the dike at Ebey Slough. In this alternative, most of the existing grassland or fallow fields would be converted to estuarine emergent vegetation and mudflats. This alternative provides large core areas and connectivity because it would essentially be a mosaic of estuarine habitats such as mudflats emergent marsh and tidal channels. Primary productivity and nutrient export are greatly improved over the current condition. Juvenile fish such as Chinook, and chum salmon as well as steelhead would be able to utilize the site for feeding and rearing for most of the tidal cycle. Perhaps as many as several hundred thousand juvenile fish would be expected to benefit from the large breach opening as several hundred acres of estuarine marsh and mudflats would be available for feeding and refuge. The greater use of estuary habitats by juvenile salmon has been linked to greater overall survival. This is a great alternative but does not include any of the benefits that could be provided by Allen Creek in regards to additional spawning, feeding and rearing opportunities. For this reason this alternative will not be brought forward for further consideration.

Alternative 5 - *Allen Creek Restoration and a Small Breach*

This alternative combines Alternative 2 with Alternative 3. This option combines the restoration of Allen Creek by opening the mouth to Ebey Slough and bypassing the existing four tidegates in combination with the 50 foot small breach (total breach size would be 75 feet). Combining the two alternatives results in a large cumulative improvement over the baseline condition. Analysis of breach size done under the PAS study demonstrates that a breach of 75 feet is not adequate to provide full hydrologic connectivity. Fish access in the estuarine portion of the site would still be limited. Parameters such as primary productivity, nutrient export and total core area would be improved over the no action alternative but the site is still fragmented due to limited tidal inundation. Connectivity between different habitat types would suffer due to fragmentation caused by a muted tidal response. This alternative would provide improved access to Allen Creek and its benefit to many migratory fish. The down side to this alternative is the estuarine marsh would have limited amount of tidal inundation, channel formation would be diminished and sheet flow across the site as well as hydraulic connectivity to Ebey Slough would be greatly reduced. While this alternative has a combined benefit it still does not meet all the objectives that have been set for this project. For these reasons this alternative will not be carried forward for further consideration.

Alternative 6 - *Allen Creek Restoration and a Large Breach (the preferred alternative)*

This alternative is the full restoration alternative, which combines the restoration at the mouth of Allen Creek and a large breach (2,000 feet) at the project site. This alternative includes an improved connection to Allen Creek in conjunction with tidal exchange to 400 acres of current pasture land that will evolve into a very large emergent estuarine marsh. Tidal exchange would influence the entire site on a diurnal basis. If this alternative is realized, several hundred thousand juvenile fish would be expected to benefit on a yearly basis (Haas 2001). Migratory fish would be able to access the 13 miles of Allen Creek for breeding, feeding and refuge and thousands of juvenile fish would find refuge, food and off-channel habitat that would allow for increased rearing time spent in the estuary and improved survival.

Of all the alternatives, this alternative has the highest values for primary productivity and subsequent nutrient export. Because of the improvements in tidal inundation, connectivity between the estuarine habitats would be optimized. By reconnecting Allen Creek to the marsh plain and Ebey Slough and by restoring the full hydrologic connection between the Snohomish estuary and the Qwuloolt marsh it would allow natural processes and functions to occur such as sedimentation, export of organic material, channel formation, salinity gradient. It would also lead to improved water quality and it will facilitate the recovery and re-vegetation of native plant species, which would eventually maximize cover, forage and other habitat functions for fish and wildlife. For all of the previous mentioned reasons this alternative was chosen for comparison with the no-action baseline alternative. See Appendix F for project plans.

3.0 EXISTING CONDITIONS

3.1 Physical Characteristics

3.1.1 Snohomish River Basin:

The Snohomish River system is the second largest watershed in the Puget Sound region and consists of two primary drainage basins; the Skykomish and the Snoqualmie. These two rivers converge near the town of Monroe (the upstream extent of tidal influence), creating the Snohomish River, which then flows west and empties into Port Gardner, Puget Sound within the City of Everett. The entire Snohomish watershed drains approximately 1,780 square miles. The Snohomish River runs from Monroe to the estuary at a gradient of 1 foot/mile. The lower portion of the Snohomish River basin is flood protected with a series of levees built and maintained by independent diking and drainage districts. The average annual runoff is 7,090,000 acre-feet with an average annual flow of 9,951 cfs measured at Monroe (Snohomish Study Team, 1980, and Williams et al., 1985). In the lower reaches of the Snohomish River (below the town of Snohomish) the river bifurcates into three distributary channels: Ebey Slough, Steamboat Slough, and Union Slough.

Both Allen and Jones Creeks empty into Ebey Slough (at rivermile 2.3), a distributary of the lower Snohomish River that diverges from the main stem at river mile (RM) 8.1. Originating in central Snohomish County, and flowing nearly six miles south to Ebey Slough, the Allen Creek basin drains approximately 11 square miles of land (Snohomish County, 2002). Jones Creek, a major left-bank tributary, converges with Allen Creek near its mouth with Ebey Slough through four tidegates. Within the project site, the aquatic habitat of Allen and Jones Creeks is very similar: slow, low gradient glide habitat that meanders throughout the open floodplain that was historically tidally influenced. The riparian zones of both creeks in the project area predominately consist of reed canary grass and Himalayan blackberry with occasional occurrences of willow species and wild rose. Large woody debris (LWD) is largely non-existent and substrate is mainly fine gravel, sand or mud.

3.1.2 Geology and Soils

The project site is within the Eastern Puget Riverine Lowland, a physiographic province characterized by unconsolidated deposits described as quaternary sediments, dominantly glacial drift, including alluvium. The Snohomish County Soil Survey identifies the site as consisting primarily of Puget silty clay loam which is classified as a hydric soil. This very deep soil is

found in depressional areas on flood plains and was formed in alluvium. This soil type, generally has slopes between 0 and 2 percent and is characterized as having a slight erosion hazard. Geotechnical evaluations (e.g. blow counts) rate the soil at the site as very soft.

Geotechnical evaluations at the site show soils comprised of alluvial deposits consisting of loose and soft to medium and stiff sand, in some locations organic material, and fill consisting of sand with silt and gravel (Kleinfelder 2008).

Levees and short steep slopes surround the site. The southeastern portion of the site, along 59th Avenue NE contains the steepest hill slope adjacent to the site. The approximate percent slope along this edge of the site ranges between 15 and 20 percent.

According to the Washington State Department of Natural Resources (WDNR) the site has a moderate to high susceptibility to liquefaction, which classifies the site as a geological hazard area according to City of Marysville regulations. The last significant earthquake occurred in 1954 with an epicenter approximately 10 miles east of the site. It had a magnitude of 5.0. The project construction will consist of removing and filling areas with substantial volumes of soil. The details (volumes) of this fill and removal are discussed in Section 4.6, Wetlands.

3.1.3 Hazardous and Toxic Materials

A level one site assessment was conducted in February of 2008. Nothing was discovered on the Qwuloolt Project site during the evaluation. Next to the site on the western edge is an industrial park. Single home residences are found to the north and east of the project. A search of EPA's Enviromapper database revealed 31 regulated facilities either within about a mile of the property or upstream on tributaries of Allen and Jones Creeks.

3.1.4 Hydrologic Regime

The project location starts at rivermile 2.3 and continues upstream to rivermile 3.2. At this point Ebey Slough is affected by a diurnal tide with about a 14 foot tidal range. A long term tidal record does not exist at this site. In 2000, NOAA established a tide gage on Ebey Slough (NOAA 9447729) to monitor tidal elevation data which was collected from November 2000 to March 2002. The Seattle District Corps compared these data to Seattle (NOAA 9447130) to take advantage of the Seattle gage's longer period of record for calculation of accurate mean tidal parameters. Ebey Slough tides were found to be slightly higher (0 to 0.3 feet), and delayed by a few minutes as compared to Seattle tides but otherwise closely correlated in stage and timing (Seattle District Corps, 2002). Seattle tides were used without adjustment as a surrogate for Ebey Slough tides for purposes of flood modeling in the 2002 engineering report produced by the USACE.

Jones and Allen Creeks bisect the site and in their lower reaches are still contained within the former tidal channels. Both of these Creeks have a mean annual flow of less than 5 cfs. The mouth of Allen and Jones Creeks empties through four tide gates before entering Ebey Slough. While the tide gates limit tidal effects on the creek, there is some backwatering that occurs within the remnant channels.

3.1.5 Climate

The Puget Sound Basin has a mild climate characterized by wintertime clouds and rain and summertime sunshine. Average total precipitation for the Everett area is approximately 35 inches, falling almost entirely as rain with November and December being the wettest months. Average temperatures range from approximately 38° to 61°F (Kruckeberg, 1991). For the past several decades Puget Sound has been experiencing sea level rise. In recent years due to global warming the rate of sea level rise has increased. Sea level over the next fifty years is expected to rise by about 6 inches (Mote et.al, 2008).

3.2 Water Quality

Water quality in the vicinity of the Qwuloolt Project is considered poor. Ebey Slough is 303 (d) listed (Category 5) for pH, fecal coliform, and water column bioassay and the mainstem Snohomish River is listed for dissolved oxygen and fecal coliform. (WDOE, 2004).

Allen Creek is also 303 (d) listed for dissolved oxygen (Figure 4) (WDOE, 2004). Jones Creek has not been classified by Ecology. There are additional water quality concerns at the Qwuloolt Project site due to the remnant farm ditches that still retain water year around.

3.3 Vegetation

3.3.1 Historic vegetation

Based upon old topographic sheets, the historic vegetation was a mix of spruce swamp and estuarine emergent vegetation such as bull rush and sedges. There is still a remnant spruce dominated tidal marsh just to the south east of the project. Since the land was converted to agriculture and the site ditched, pasture grasses have dominated the area.

3.3.2 Current Vegetation

When the old Poortinga farm ceased operation, reed canary grass displaced the orchard grasses. There are some patches of Canada thistle and field buttercup. In the center portion of the project area there are a few dense patches of Douglas spirea. Trees onsite are infrequent and include alder and spruce.

3.4 Fish

3.4.1 Anadromous Salmonids

While the Snohomish River supports a wide variety of fish species, many of these species are in decline from a variety of factors that include significant amounts of habitat loss. In the last 100 years, the estuary has lost as much as 80 % (Collins 2001) of the fringing marshes that provide critical benefits to fish during some portion of their life cycle. Multiple migratory runs of both native and hatchery reared salmonid stocks occur seasonally in the Snohomish River Estuary. Native trout species include steelhead, cutthroat and bull trout. The system supports a diversity of salmonid species. There are nine species of anadromous salmonids that have been documented in the Snohomish River: summer/fall Chinook salmon, fall run coho salmon, fall run chum salmon, pink salmon, cutthroat, and summer/winter steelhead trout, and bull trout. The principal juvenile salmonid out-migration season occurs from mid-February through mid-June for steelhead, coastal cutthroat, coho, chum and Chinook (SASSI, 1992).

3.4.2 Forage Fish

Forage fish near the project area include Pacific herring, surf smelt, sand lance larvae, three spined stickleback, shiner perch, flounder, peamouth and various sculpin (Somerton, 1976). Juvenile forage fish prey on epibenthic invertebrates and crustaceans and are themselves important prey items for larger juvenile salmon and bull trout.

3.5 Wildlife

3.5.1 Birds

The Snohomish Estuary is a staging and stop-over area for bird migration along the West Coast Flyway. Delta habitats are also important to Puget Sound and resident bird populations. The shorelines and the waters of Snohomish Estuary provide habitat to a number of terrestrial and water dependent birds. These species include Canada geese, mallards, widgeon, goldeneye, cormorants, mergansers, coots, and gulls. Shorebirds include dunlins, sandpipers, dowitchers and killdeer. The Snohomish delta supports resident birds that may breed in the area, wintertime residents and migratory stopovers. Those over-wintering waterfowl species are generally found in the central Puget Sound region from early November through late April, with the highest concentrations during December through February. The remaining waterfowl are present year-round.

Osprey and bald eagle are frequently seen foraging for fish over the Snohomish Estuary and appear to be fairly tolerant of human disturbance when choosing nesting locations. Marsh hawks or harriers are common to the Qwuloolt Project site as well as red tailed hawks. Similarly, great blue herons are also seen frequently.

3.5.2 Marine Mammals

Harbor seals and Dall's porpoise are known to frequently forage in Port Gardner and are both State Monitor Species (Calambokidas 1991). Harbor seals are also common within the lower Snohomish River where they forage for fish. Similarly, orca whales and Pacific harbor porpoise are also common within Port Gardner, Pacific harbor porpoise is a State Candidate Species (Calambokidas 1991), and the southern resident distinct population segment of orca whales was recently listed as a federally threatened species (70 FR 69903). While these marine mammals may frequent Port Gardner it is approximately four miles to the proposed restoration site on Ebey Slough. Harbor seals and California sea lion probably utilize Ebey Slough. River otter are known to frequent the site.

Stellar sea lion, the southern resident distinct population segment of killer whale, and humpback whale are the only marine mammal species potentially within the larger Possession Sound/Port Gardner area that are federally proposed or listed as threatened or endangered species.

3.5.3 Amphibians, Reptiles, and Terrestrial Mammals

Due to its disturbed character, only a few disturbance-tolerant amphibians, reptiles, or terrestrial mammals would be expected to occur within or around the proposed restoration site. Adult tree frogs and garter snakes may occur within the power line corridor to the north of the site.

Raccoons, opossums, rats, mice, and voles may inhabit the remnant patches of riparian trees, tall reed canary grass and blackberries that are onsite.

3.6 Wetlands

Wetland loss as well as wetland conversion are serious concerns in the Snohomish delta. Urbanization and conversion of marsh to agriculture have been two of the most serious threats. Armoring of the bankline, diking and other means of preventing tidal intrusion has reshaped this estuary (Collins 2001). While there are still large areas of wetland in the lower basin, many of these have been altered converting estuarine marsh to palustrine systems. This trend of loss and conversion is typical to the area around the Qwuloolt Project. On-going restoration efforts by a wide variety of interest groups are now starting to reverse this trend.

In 2006, NOAA prepared a wetland assessment in support of the proposed Qwuloolt Project. The report states that the Qwuloolt Project site was historically tidally influenced. However, for over 70 years the area has been isolated from tidal influences by a system of dikes and tide gates. In addition, approximately 20 to 40 percent of the Jones Creek and Allen Creek channels have been filled and replaced with ditches. To make the property useable for agriculture, a drainage system was in use until the property was purchased in 1996. The wetlands determination was made using methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997), a manual consistent with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). NOAA determined that the majority of the Qwuloolt Project site is wetland, with occasional patches of upland on local high points.

The wetland is bounded by the Marysville's sewer treatment plant to the west, Ebey Slough to the south, and residential development to the north and east. The wetland is approximately 370 acres in size. The majority of the wetland is palustrine emergent (PEM), with some palustrine scrub shrub (PSS) areas. In November, 2008 Corps and NMFS personnel confirmed this delineation using the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region*, (USACE 2008. ERDC/EL TR-08-423). The conclusion of the wetland confirmation was that the NOAA delineation was accurate, the site is jurisdictional under section 404 of the Clean Water Act and the site is adjacent to Ebey Slough.

3.7 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Fish species that are listed as threatened or endangered in the project vicinity include bull trout, steelhead and Chinook salmon. Critical habitat designated for Chinook and bull trout includes the project site. The Puget Sound Southern Resident distinct population segment of killer whales, also known as orcas, has been listed as an endangered species, and critical habitat has been designated for Puget Sound but does not include the project site (critical habitat for orcas includes portions of Puget Sound greater than 20 foot depth). The Corps is using a Programmatic Biological Assessment for Restoration Actions in Washington to assess potential impacts of the proposed work on species protected under the Act. See Appendix A for ESA compliance.

3.7.1 Puget Sound Southern Resident Distinct Population Segment of Killer Whales

The Southern Resident distinct population segment (DPS) of killer whales, also known as orcas, was designated as a federally endangered species on November 18, 2005 by the NOAA Fisheries

Service (70 FR 69903). Southern Resident orcas in the eastern North Pacific occupy the California Current ecosystem and range throughout the inland waterways of Puget Sound, the Strait of Juan de Fuca, and the Southern Georgia Strait during the spring, summer, and fall. They have also recently been documented in the coastal waters off Oregon, Washington, Vancouver Island, and the Queen Charlotte Islands. Little is known about the winter range and movements of the Southern Resident orcas which occur in large, stable groups (pods) with a matrilinear social structure. The Southern Resident population contains three pods, J Pod, K Pod, and L Pod. During non-summer months, J pod is sighted more frequently in Puget Sound than the other two pods (Wiles 2004). Southern Resident orcas feed primarily on fish, particularly on Chinook salmon. Orca critical habitat includes portions of Port Gardner waterward of the minus 20 foot (MLLW) depth contour.

3.7.2 Puget Sound Steelhead and Chinook Salmon

The Puget Sound evolutionarily significant unit of Chinook salmon was listed as a threatened species in March 1999. Critical habitat was designated September 2, 2005. Like all Pacific salmon, Chinook reproduce in fresh water but spend the majority of their life cycle in the marine environment. Chinook remain at sea an average of two to four years before returning to their natal stream to spawn.

The natural spawning populations of Chinook salmon within the Snohomish River system are separated into two distinct stocks: Skykomish Chinook and Snoqualmie Chinook (WDFW 2002 SaSI), both of which are considered to be depressed.

Adult Chinook migrate into the Snohomish River estuary and upstream to their natal streams between September and October. Juvenile Chinook salmon are generally then present in the Snohomish River estuary from March through July or August, with peaks in outmigration generally occurring in May and June.

On September 2, 2005, NOAA Fisheries designated critical habitat areas in Washington, Oregon, and Idaho for 12 Evolutionarily Significant Units (ESU) of west coast salmon listed as threatened and endangered under the ESA (70 FR 52630). Critical habitat for the Puget Sound Chinook salmon Evolutionarily Significant Unit (ESU) has been designated in the action area. Adjacent floodplains are not included as critical habitat, although it is recognized that the quality of aquatic habitat within stream channels is intrinsically related to the character of the floodplains and associated riparian zones, and that human activities that occur outside the river channels can have demonstrable effects on physical and biological features of the aquatic environment (69 FR 74584).

Puget Sound steelhead were listed as threatened in May of 2007 (NMFS 2007). Critical habitat has not been proposed or designated.

Steelhead can spend up to seven years in freshwater prior to smoltification and then three years in salt water prior to first spawning. Steelhead are iteroparous (spawn more than once) whereas the Pacific salmon is semelparous (spawn once and die). In rivers that have steelhead populations, at least one life history stage of steelhead would generally be present year-round.

Most adult summer steelhead enter fresh water as sexually immature fish between May and October, but migration can extend from April to mid-December (Haring, 2002; Snohomish Basin Recovery Technical Team, 2008). At the time of entry, adult summer steelhead are several months to as much as a year from spawning. Feeding while holding and maturing in freshwater is minimal, so these maturing adult steelhead trout rely on their body fat reserves for sustenance.

Adult winter steelhead enter the Snohomish between November and early May as sexually maturing fish, with most of the returning adults a few weeks to several months from spawning (Snohomish Basin Recovery Technical team, 2008).

3.7.3 Coastal/Puget Sound Bull Trout and Critical Habitat

Bull trout were historically found throughout the Pacific Northwest, from Northern California to the upper Yukon and Mackenzie drainages in Canada. The USFWS issued the determination of threatened status for the coastal/Puget Sound distinct population segment in the federal register on November 1, 1999.

Bull trout have more specific habitat requirements as compared to other salmonids, generally restricting their spawning and juvenile rearing to high quality habitats. Particularly important requirements are water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors. Bull trout prefer deep pools of cold rivers, lakes, and reservoirs, often seeking out the coldest water in a watershed (USFWS 1999). Streams with abundant cover (cut banks, root wads, and other woody debris) and clean gravel and cobble beds provide the best habitat. Their preferred summer water temperature is generally less than 55°F, while temperatures less than 40°F are tolerated. Spawning during fall usually starts when water temperatures drop to the mid- to low-40s. Cold, clear water is required for successful reproduction (USFWS 1999).

Juvenile bull trout, particularly young of year, also have very specific habitat requirements. Small bull trout are primarily bottom-dwellers, occupying positions above, on, or below the stream bottom. Good hiding cover is also important to all life stages of all forms of bull trout. Fry and juveniles can be found in pools or runs in close proximity with cover provided by boulders, cobble, large woody debris, and undercut banks. Age 1+ and older juveniles utilize deeper, faster water than underyearlings, often in pools with shelter-providing large organic debris or clean cobble substrate.

On September 26, 2005, the U.S. Fish and Wildlife Service designated critical habitat in Washington, Oregon, Idaho, and Montana for bull trout, including the Coastal/Puget Sound bull trout population (70 FR 56212). Designated critical habitat for bull trout includes the Snohomish delta. As designated, bull trout critical habitat within this system is defined as the lateral extent of the width of the stream channel as defined by its bankfull elevation.

3.8 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires that Federal agencies identify and assess the effects of Federally assisted undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are those that are listed on or eligible for listing on the National

Register of Historic Places (NRHP). Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Cultural resources studies related to this project have been conducted separately from the NEPA process.

Two surveys have been completed on site. The first survey was conducted in the interior portion of the project in 2006 by USFWS and Tulalip Tribes staff members. The second survey was conducted in August of 2008 by Lara Rooke (of AMEC) and Tulalip Tribes staff. These studies are part of the National Historic Preservation Act of 1966, as amended (NHPA), Section 106 compliance process for the project. Studies completed to date include an examination of the archaeological and historical site records at the Washington State Office of Archaeology and Historic Preservation (OAHP), a pedestrian reconnaissance survey of the project area, and the excavation of test pits. The records search and excavations indicated that no properties listed on the National Register of Historic Places (NRHP) or the state listings are located within the proposed project area

3.9 Land Use

The property is located in a developed area that supports a mix of residential uses and agricultural, and light industrial activities. Historically the site and surrounding area was mainly in agricultural production.

In the City of Marysville's Shoreline Master Plan (2006), the site has been designated as Urban Conservancy. There are a few areas adjacent to the sites that are designated as High Intensity and Shoreline Residential. The Marysville Shoreline Master Plan specifically recommends consideration of the proposed project site for restoration but exempts properties that would be adjacent the restored Qwuloolt Project site from some of the regulations that affect other shoreline lands.

3.10 Recreation

There is passive recreation in the area with a few trails around the perimeter. In their Shoreline Master Plan (2006), the City of Marysville has indicated intentions to develop a more formal recreational trail system in the coming years.

3.11 Air Quality and Noise

Air quality in the Marysville area is meeting all of the Environmental Protection Agency's (EPA) ambient air quality requirements. During the summer of 2008, there were concerns for ozone levels from air monitoring data. Fine particulates may also be of concern.

3.12 Transportation

The project site is bounded by 47th Street and the Marysville treatment facility on the west side and is restricted by a locked gate, residences to the North and East and Ebey Slough along the south. The site is somewhat isolated from the rest of the city and there is not much of a road network in the actual project area. Access to the site is by way of 47th Street.

3.13 Aesthetics

The project site is a fallow agricultural field. It has a large viewshed looking to the south. Large open areas are visible and provide bird watching and walking opportunities. See Figure 3.

4.0 ENVIRONMENTAL EFFECTS

The effects of the proposed project (restoration of Allen Creek and a large breach) are compared against the baseline conditions associated with the no-action alternative.

4.1 Physical Characteristics

4.1.1 Snohomish River Basin

No Action Alternative:

Under the No Action Alternative, there would be no change to the current conditions of the Ebey Slough or the Snohomish river delta. The project site would remain undeveloped and largely dominated by invasive, non-native herbs and shrubs.

Preferred Alternative:

Under the preferred alternative, the dike on Ebey Slough would be breached to allow tidal waters to inundate most of the 400 acre site. There may be some small changes to banks of Ebey Slough due to the large tidal prism at the site. The design of the breach and levee include features to minimize erosion yet the potential for erosion exists, especially internally within the site where new tidal channels may be formed through erosive processes.

4.1.2 Geology and Soils

No Action Alternative:

Under the No Action Alternative, there would be no change to the current conditions of the geology or soils within the project site.

Preferred Alternative:

Under the project as proposed there would be 101,000 cubic yards (cy) of excavation of soils just to create a breach in the existing dike (see section 4.6 for a complete breakdown of excavation and fill quantities). There would also be additional excavation from re-configuration of the channel for Allen creeks as well. There will also be placement of fill for construction of the set-back levee. All of these actions would cause some compaction of soils in the immediate area.

4.1.3 Hazardous and Toxic Materials

No Action Alternative:

Under the no action alternative there would be no change to the current condition of hazardous and toxic materials. Based upon a level one site assessment for hazardous and toxic waste concerns at the Qwuloolt property itself are low; the site appears free of obvious issues that may impact project plans for restoration of the site.

Preferred Alternative:

The level one site investigation that was conducted at the Qwuloolt Project revealed little or no concern for hazardous and toxic materials. This project as proposed will not change that. If

there are hazardous materials (such as paint) used during the construction phase all proper handling and disposal requirements will be followed.

4.1.4 Hydrologic Regime

No Action Alternative:

Under the No Action Alternative, there would be no change in the discharge or daily stream flows in Ebey Slough or Allen and Jones Creeks.

Preferred Alternative:

One of the purposes of the Qwuloolt Project is to change the hydrologic regime. The project intends to restore tidal hydrology in an area that was converted to agriculture (about 400 acres). A large breach in the existing dike is proposed (400 feet by 22 feet deep) and an additional 1,600 feet of dike will be lowered to allow gradual erosion of this section of the dike. These dike modifications will completely inundate the site and restore as closely as possible the hydrologic regime prior to conversion of the site to agricultural use. Since the site has been isolated from the historic tidal inundation it has subsided by two to three feet as soils oxidized and were compacted. With the proposed project, a large tidal prism (up to 1,400 acre-feet) is expected. The distributary channels (like Ebey Slough) in the Snohomish delta were formed under similar large tidal prisms and were capable of channeling the flow for a much larger estuary. As stated previously, it is estimated the lower Snohomish has lost over 80% of its previous tidal wetland (Collins 2003).

Allen Creek enters the Qwuloolt Project area from the north passing under a bridge at 4th Street and through a culvert at 3rd Street before entering the site. It travels the remaining length (about 5,000 feet) to join Ebey Slough by passing through two tidegates. One of the concerns from removing and breaching the dike at Ebey Slough was the potential for flooding. Floods could come from large events from either the Snohomish river (Ebey Slough) or from Allen Creek itself, or in combination. All of these scenarios were evaluated using both a one dimensional, steady state HEC-RAS hydrodynamic model as well as a steady state model to determine if restoration activities would raise the creek's water level during flood events. The modeling indicates that the project does not increase flood levels or flood risk upstream (beyond the project limits) of the existing 3rd Street culvert. The current dike offers about a ten year event flood protection. Based upon flood analysis conducted for this project "the Qwuloolt Wetland Restoration Project will not increase flood levels or flood risk in Allen Creek" (PWA, Allen Creek Flood Modeling, 2008).

The top elevation of the set-back levee was based on two sets of hydraulic calculations. The first method starts with the crest elevation equal to the low point on the existing levee (11.7 feet NAVD) plus accommodation for wave run up (2 feet) and the predicted sea level rise by 2050 (0.5 feet), yielding a levee crest elevation of 14.2 feet NAVD without considering settlement. The other method suggested the hydraulic criteria is estimated by adding the 10-yr water level (estimated to be 11.6 feet NAVD), 2 feet to account for wind/wave run up, and 0.5 feet of sea level rise, yielding 14.1 feet NAVD levee crest elevation. A larger freeboard is often used if wave run up is ignored, with typical freeboard values between 2 and 3 feet.

4.1.5 Climate

No Action Alternative:

Under the No Action Alternative, there would be no change in regards to climate nor would the effects of sea level rise have to be considered.

Preferred Alternative:

Under the preferred alternative, effects of sea level rise were taken into consideration for the project design. Currently the set back levee is designed to a crest elevation of +14.5 feet NAVD88 with crest width of 12 feet (PWA 2008; Corps 2009). The setback levee design accommodates the projected intermediate sea level rise estimate of 0.72 feet. However, it is recommended that the operations and maintenance plan address adapting the setback levee to accommodate larger sea level rise if these circumstances arise. For instance, if monitoring data indicates mean sea level rise approaching the “high” estimate of 1.95 feet by the year 2060, the levee design should be able to incorporate incremental lifts in crest height while still functioning as intended. Adjacent landowners to the south and east of the project are protected by elevation differences. Houses are situated on a hill above the 100-year flood plain. On the east side of the project area there is also a drainage ditch that separates the project site from the upland housing area.

4.2 Water Quality

4.2.1 Water Quality Class

No Action Alternative:

Under the No Action Alternative, there would be no change in the water quality classification as listing on the Department of Ecology’s 303(d) list of threatened and impaired waters. Waters on the site will remain impaired. The site would still contain farm ditches that stagnate.

Preferred Alternative:

For the preferred alternative restoration of intertidal habitats within the project site and reconnection of the project site with Ebey Slough will improve water quality in the area for a few reasons. Tidal exchange of water twice a day should improve water quality conditions by allowing the site to drain more completely. It is expected at the beginning of the project that 1,400 acre feet of water will be replaced on each tidal event. With this additional mixing dissolved oxygen levels should improve.

Allen Creek should also experience some water quality improvements as the creek will not backwater just upstream of the tidegates on an outgoing tide but will have a more natural flow regime established.

4.2.2 Turbidity

No Action Alternative:

Under the No Action Alternative, there would be no change in the characteristic turbidity in both Allen and Jones Creeks as well as Ebey Slough.

Preferred Alternative:

Under the Preferred Alternative, there would be small-scale, temporary increases in turbidity within Ebey Slough as a result of construction activities to excavate the final breach. In order to reduce temporary increases in turbidity and potential related effects on juvenile salmonids in the

river, all ‘in-water’ construction work will take place during the fish window of July 16-February 15, and will take place during the lowest portions of the tidal cycle. Construction techniques, sequencing, and timing will minimize soil disturbance to the extent practical to minimize the generation of turbidity during connection of the tidal channel to Ebey Slough. Similarly, the design and implementation of the erosion-control and the Storm Water Pollution Prevention plans (SWPPP) will incorporate best management practices (BMPs) to further reduce the duration and magnitude of the temporary increases in turbidity. Because such increases will occur only during the portions of the construction sequence that require ‘in water’ work, turbidity impacts will be localized and temporary, and are expected to return to normal levels as soon as ‘in-water’ construction activities are completed. Turbidity monitoring during construction will ensure that these temporary increases are in compliance with State Water Quality certification. Some site erosion (e.g. channel, surface) should be expected as the site adjusts to the new hydrologic regime. The impacts from this erosion should be temporary and difficult to detect over background levels.

Ultimately, by restoring tidal connectivity and native plant communities to the project site, the Preferred Alternative will incrementally improve the filtration of overland flow from the site into Ebey Slough.

4.2.3 Dissolved Oxygen

No Action Alternative:

Under the No Action Alternative, there would be no change in the impaired characteristic condition of dissolved oxygen levels in Ebey Slough. Similarly, Jones and Allen Creeks dissolved oxygen would remain impaired.

Preferred Alternative:

Under the Preferred Alternative, there could be small-scale, temporary decreases in dissolved oxygen within the river channel as a result of increases in turbidity related to construction activities breaching the existing dike. In order to reduce temporary decreases in dissolved oxygen and potential related effects on juvenile salmonids in the river, all ‘in-water’ construction work will take place during the fish window of July 16-February 15, or as otherwise determined by WDFW and will take place during the lowest portions of the tidal cycle. Mixing with water from Ebey Slough and increased velocities through the new channel should offset some of these problems. Construction techniques, sequencing, and timing will minimize soil disturbance to the extent practical to minimize the generation of turbidity (and consequent reduction in dissolved oxygen concentrations) during connection of the tidal channel to Ebey Slough. Similarly, the design and implementation of the erosion-control and the SWPPP will incorporate BMPs to further reduce the duration and magnitude of the temporary increases in turbidity and potential impacts of dissolved oxygen levels. Similar methods will be employed when working near or in Allen Creek. Any decreases during construction might occur only during the portions of the construction sequence that require ‘in water’ work, any reduction in dissolved oxygen will be localized and temporary, and would be expected to return to normal levels as soon as ‘in-water’ construction activities are completed. Monitoring of water quality conditions during construction will ensure that these temporary decreases are in compliance with State Water Quality Certification. Once the construction is completed it is expected that dissolved oxygen problems should decrease because of the large tidal exchange.

4.2.4 Water Temperature

No Action Alternative:

Under the No Action Alternative, there would be no change in the characteristic temperature profile of Ebey Slough or Jones and Allen Creeks.

Preferred Alternative:

Under the Preferred Alternative, water temperature conditions on the site and in the local vicinity may be slightly improved. Water in Allen Creek will have better drainage and will not go through a tidegate which impounded water on the outgoing tide. Since there will be a large tidal exchange twice a day this may also improve temperature conditions locally in Ebey Slough.

4.3 Vegetation

No Action Alternative:

Under the No Action Alternative, there would be no change in the existing extent of vegetation at the Qwuloolt Project site. Under this alternative the site would stay in predominantly reed canary grass and Canada thistle with the scrub-shrub areas dominated by Himalayan blackberry and Douglas spirea.

Preferred Alternative:

Under the Preferred Alternative, there would be a complete change in the vegetation at the site. Once the dike is breached, increased salinity will alter the vegetative community eliminating reed canary grass, Douglas spirea, and Himalayan blackberry from the area. Estuarine emergent vegetation (such as sedges and rushes) and mudflat will replace the existing vegetation. A vegetation survey was conducted on Ebey Island just across the Slough from the project site, both elevation and species were recorded. At the lower intertidal elevation conducive to vegetation, Lyngby sedge was the most common plant. A few feet higher in elevation, soft stem bulrush and cattail were the most frequent. The same vegetation pattern can be seen at the Marysville mitigation area, just downstream and adjacent to the project site (Figure 6).

Initially after the dike breach much of the project area will be mudflat. There will be some elevations that recruit emergent vegetation right away. One advantage for the establishment of estuarine vegetation is it will act as a local food source for juvenile fish that will occupy the site. Estuarine emergent vegetation is a good source of insects or prey items for young fish. The broad leaves of plants like sedges provide the structure for insects to rest or lay eggs. Inevitably some insects or eggs then fall into the water to become prey resources for young fish. Plants like sedges are also tremendously high in primary productivity with organic carbon export one of the significant byproducts with tidal flushing at the site, the resultant nutrients and prey species are sent back out to the estuary where many organisms directly benefit. When site conditions are conducive, estuarine plants will establish due to a large local seed source. There will be some plantings at the site specifically in riparian areas once construction is complete.

4.4 Fish

4.4.1 Anadromous Salmonids

No Action Alternative

Under the No Action Alternative, there would be no change to the site that would affect anadromous salmonids in Ebey Slough. Allen and Jones Creeks would still have a tidegate that would limit access.

Preferred Alternative:

Under the Preferred Alternative, there would be a temporary increase in turbidity, accompanied with slight short term decrease in dissolved oxygen as a result of construction. To minimize these impacts, actions such as timing of work and implementing different construction techniques during construction will be implemented. This may alter fish behavior so they temporarily avoid the breach area. This may have a short term impact to salmonids. Salmon are mobile and do have the ability to avoid problem areas. Allen Creek will be relocated. The relocation process will temporarily displace some juvenile fish. Measures such as netting fish prior to construction will reduce the impact.

Once in-water construction is completed the proposed Qwuloolt Project will have numerous advantages to anadromous salmon. Many of the project objectives were oriented towards improving habitat conditions for both migratory and resident fish. Once the dike is breached, 400 acres of intertidal habitat become available for juvenile rearing, feeding and refuge. Estuarine plants and mudflats will provide a food source. On a high tide the entire site will become a large rearing area and on an outgoing tide, small tidal channels will act as refuge. With an improved connection to Ebey Slough, both Allen and Jones Creeks will be accessible to migratory species. Chinook, chum, pink, steelhead, bull trout, and cutthroat are few of the species that will benefit as a result of the project. Each year, several hundred thousand juvenile salmonids are expected to benefit from this project (Haas 2001).

4.4.2 Forage Fish***No Action Alternative:***

Under the No Action Alternative, there would be no change to the site that would affect forage fish in Ebey Slough. Allen and Jones Creeks would still have a tidegate that limited access.

Preferred Alternative:

Forage fish will also gain a large improvement over the current condition. Bottom fish such as flounder and sole are attracted to tidal habitats and other fish such as shiner perch and three spined stickleback also prefer estuarine marshes. Many of these fish are also prey resources to larger salmon.

4.5 Wildlife***4.5.1 Birds******No Action Alternative:***

Under the No Action Alternative, the site remains the same. There is currently some habitat for birds, primarily waterfowl and hawks. The adjacent Marysville mitigation areas has tidal mudflats for shorebirds.

Preferred Alternative:

Under the Preferred Alternative, there would be an increase in function to 400 acres of intertidal brackish marsh and mudflat created as a result of this restoration project. These habitats would directly increase foraging habitat for shore and water birds in the Snohomish delta area by increasing habitat for the intertidal plants, invertebrates, and fish that they feed on. It is expected the site will see an increase in raptor use especially for birds of prey like osprey as additional foraging opportunities present themselves.

Shorebirds, waterfowl, great blue herons, and the variety of passerines foraging or resting within and along Ebey Slough at the time of construction may be temporarily displaced due to the noise and movement of the machinery. It will be a low impact and for a short duration since there are many similar undisturbed habitats in the direct vicinity of the project such as Ebey Island, the Marysville mitigation site and the Marysville treatment lagoons. The change in vegetation at the site may reduce vegetative cover for some birds but plants will rapidly reestablish in portions of the site providing new cover.

4.5.2 Marine Mammals

No Action Alternative

Under the No Action Alternative, there would be no change to the site that would affect marine mammals within.

Preferred Alternative:

Under the Preferred Alternative, there would be an increase of intertidal brackish marsh created as a result of this restoration project. These habitats would directly increase foraging habitat for fish in the lower Snohomish delta by increasing habitat for the benthic and epibenthic invertebrates on which they feed. Thus, this restoration project provides food web support to marine mammals such as the harbor seal that forage on fish within Port Gardner and the lower estuary.

Any marine mammals (most likely harbor seals and river otter) that are foraging within Ebey Slough at the time of construction may be temporarily displaced due to the noise and movement of the machinery. However, these effects would be temporary and displaced seals or otters would be expected to return to the area after construction is completed. No haul-out or pupping areas exist in this area of the slough. Construction of the restoration site is not expected to result in a long-term reduction in the abundance or distribution of any prey items local marine mammals would be seeking.

For effects to ESA listed marine mammals, reference Section 4.7.

4.5.3 Amphibians, Reptiles, and Terrestrial Mammals

No Action Alternative

Under the No Action Alternative the former Poortinga farm remains the same and as such species as raccoons, opossums, mice, voles, rats, and garter snakes would maintain existing populations.

Preferred Alternative:

Under the Preferred Alternative, there would be an increase of intertidal marsh created as a result of this restoration project. These marsh habitats would directly increase foraging habitat for amphibians, reptiles, and terrestrial mammals that can adapt to the brackish water.

Amphibians, reptiles, and terrestrial mammals foraging or resting within the project area at the time of construction may be temporarily displaced due to the noise and movement of the machinery. However, these effects would be temporary and displaced animals would be expected to return to the area after construction is completed. There will be expected changes in

population levels of some amphibians and rodents due to a conversion of fresh water to brackish habitats as well as short term construction impacts. The farm ditches on site that contained stagnant water will be filled displacing amphibians that were dependent upon them. Rodents such as field mice will likely vacate the project site once it is flooded. “Flooding” in the project area and displacement of small animals is an existing condition that occurs fairly frequently. In the past, lower Allen Creek periodically overtops its banks and floods the Qwuloolt Project area. The undersized tide gates and dike on Ebey Slough allows for a bathtub-like condition to develop onsite where the water entering the site is not effectively drained and standing water occurs in the area for several days at a time. When this happens small animals including rodents are either drowned or disperse around the area. The coyote and deer that currently use the site will have an increase in the amount of disturbance from the temporary construction but should be able to utilize the site once the disturbance is ended.

Prior to tidal inundation at the site the project area will be mowed and hayed reducing cover and available food sources. Heavy equipment used in construction at the site will also impact local rodents. Since the Qwuloolt site is a large open area it attracts rodent predators. Predators such as red tailed hawks, marsh hawks, short eared owls and coyote are frequently observed in the project area. Much of the diet of these predators consists of rodents. Not all of the site will be flooded all of the time. Even after the site is opened to the tide there will still be some areas that rodents will occupy. The surrounding area is not all in housing. That is, there are areas that rodents can disperse to that are not all residential such as the Allen Creek corridor. The project area (over 400 acres) and surroundings are quite large and provide opportunities for small animals to disperse into.

There are also some preventative measures that individual landowners could reasonably implement. These include:

1. Removal of all debris in the yard that might provide protective cover.
2. Keep lawn vegetation mowed to a low level.
3. Removal of potential food source such as household trash, waste grain, or other foods that might attract rodents or other nuisance animals.
4. Sealing openings into buildings and around water pipes, electrical wires, vents and doors. Usually 1/8 inch mesh hardware cloth or sheet metal works best.
5. Deployment of traps such as baited snap traps or registered baits deployed according to manufacturer’s instructions are often effective.

4.6 Wetlands

No Action Alternative:

The Qwuloolt Project area is currently dominated by palustrine emergent wetlands that are in a degraded condition. Reed canary grass, Himalayan blackberry and Canada thistle (Snohomish County noxious weed) dominate the site. Water quality is also a concern in the abandoned farm ditches. Under the no action alternative this would not change.

Preferred Alternative:

There is little doubt that wetlands will be affected under the preferred alternative. One of the objectives of the project (i.e. create a self-sustaining brackish tidal site with minimal construction and maintenance) is to change the current condition of a degraded palustrine emergent wetland

that is currently in place to a much better functioning estuarine emergent wetland. As a result function will be restored and values will improve. In regards to impacts, temporary impacts from construction are to be expected in the areas of fill and excavation. There will be a permanent filling of some of the existing wetlands. Out of 400 acres of current wetland, approximately 13 acres of palustrine emergent wetland will be filled in order to construct set-back levees. Additionally, there will be excavation at the site to create the breach, and to provide access to Allen and Jones Creeks. Areas converted from existing condition to a new channel are not considered as part of the impacts to wetland area. As evidenced in the 1938 photos, historic tidal channels were much more prevalent, therefore this part of the construction activity is just restoring the site to historical condition. The material that is excavated on site is expected to stay on site to be used as in the set-back levee. Any excess material will be used to fill in low areas to enhance positive drainage and bring some lower tidal elevations up to estuarine emergent elevation. The removal of the existing dike is expected to restore about three acres of wetland within the footprint of the dike.

Table 2. Excavation and Fill Quantities.

Total volume of excavation	186,000 cy	
Total volume of fill	190,000 cy	
Total acreage of wetlands with fill	29.0 acres	Fill will be placed in 8 acres of wetlands to bring them to emergent vegetation elevation
Total acreage of permanent wetland loss	13.0 acres	Construction including set-back levees will result in the loss of 13 acres of degraded wetlands.
Total wetland gain	3 acres	Wetlands gained through removal of dike at Ebey Slough.
Total acreage of wetland and mudflat with functional improvement	400 acres	Current impacted wetlands will be improve by restoring tidal process over 400 acres of current degraded wetland will be converted to estuarine emergent wetlands and mudflats.

In regards to wetland impacts, there are both pluses and minuses for this project in regards to wetlands. The project cannot go forward without allowing for the construction of set-back levees and other project features that maintain flood protection for adjacent properties. The discussion then becomes one of tradeoffs weighing considerations of issues like the benefits of an estuarine emergent system in comparison to the current condition of a palustrine emergent system, the increase in function and values expected from the new wetland system, and the systemic benefits throughout the lower Snohomish ecosystem in relationship to the short-term impacts. To address these concerns, Table 3 was developed. It contains many of the pertinent functions associated with these different types of wetlands and in a qualitative way evaluates the changes that can be expected. Table 3 compares the expected results for restoring estuarine

emergent marsh over the current palustrine emergent marsh. The restoration of the estuarine emergent marsh is intended to approximate the historic condition as closely as possible. Many of the functions identified in the Table 3 are included in the objectives for the project. Also noted are functions that will have a larger than local benefit. For instance, the proposed project is expected to have system-wide benefits for fish habitat support, primary productivity (nutrient export) and shorebird and migratory waterfowl support.

Table 3. Comparison of Functions and Values of Current and Proposed Site Conditions

Function	Palustrine emergent	Estuarine emergent	Discussion
Water quality	minus	plus	Currently there are some water quality problems on site. Low dissolved oxygen and temperature in Allen, Jones and Ebey Slough, and stagnant water in the farm ditches. Once tidal exchange is restored with a diurnal tide many of the problems should improve.
Base flow management	minus	plus	Currently the site is isolated from Ebey Slough. Once the dike is removed there will be a free exchange of flow. Estuarine wetlands will be able to store some water for release in low flow periods.
Sedimentation	minus	plus	One of the goals is to improve sedimentation retention on site to build up marsh plain. Monitoring has shown this to be the case. The current condition is going through subsidence.
Nitrogen removal	same	same	Sedge and rush dominated marshes are famous for nitrogen removal. Reed canary grass also has the benefit of nitrogen removal.
Fish habitat support	minus	plus System wide benefit	There is little comparison between the amount of fish habitat support (including endangered species) that can be realized for the restoration of the Qwuloolt marsh. Each year, several hundred thousand fish will benefit from this project from feeding and refuge. The current condition is dismal. Lower Allen and Jones Creeks currently have limited benefits to local populations and a tidegate that restricts fish access.

Function	Palustrine emergent	Estuarine emergent	Discussion
Shore bird and migratory waterfowl support	minus	plus System wide benefit	Currently, the site supports some waterfowl (mallards, Canada geese) and no shorebirds. Conversion to an estuarine emergent system which includes mudflats will provide both a food source and additional habitat for shorebirds. Currently the Marysville mitigation site supports several species of shorebird.
Vegetation	minus	plus	The current condition includes almost a monotype of reed canary grass with some Canada thistle, both are considered noxious weeds and have low wildlife potential. The restored site will have sedges, rushes and cattail, a more diverse plant community that is very beneficial to wildlife.
Flood storage	same	same	Under the restored condition there should be improved hydrologic connectivity but storage remains about the same.
Primary productivity	minus	plus System wide benefit	Partly due to tidal exchange, estuarine emergent communities are one of the most productive natural communities. They are about 20% more productive than palustrine emergent communities. For the estuarine community, all of the organic output is distributed over a wide area by the tide, unlike the current condition.

For the proposed restoration alternative, we see several improvements in wetland function over the current condition. Some of these benefits are of greater scale and will be realized over a system wide area and timeframe. Although there will be a permanent loss of to 13 acres of the currently degraded wetlands, the overall improvement through restoration will far outweigh the impacts. In this sense the project is self mitigating. The partners involved in the Qwuloolt Project have been very conscious of avoiding and minimizing wetland impacts during project planning and design. It is the intention of the project to gain as much new estuarine emergent wetland as possible.

4.7 Threatened and Endangered Species

A synopsis of site-specific information relevant to the proposed restoration project site is presented below. In addition, a discussion of critical habitat is also included.

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect threatened or endangered species or designated critical habitat that may be found in Ebey Slough.

Preferred Alternative:

Currently, Puget Sound Chinook salmon, Coastal/Puget Sound bull trout, and steelhead are the listed species that may occur in the project vicinity. Under the Preferred Alternative, there would be a large increase of intertidal brackish marsh created as a result of this restoration project. These habitats would directly increase foraging habitat for Chinook, bull trout, and steelhead in the lower Snohomish delta by providing off-channel refuge for juveniles. The estuarine habitats provided by the proposed project will also provide for an increase in the abundance of invertebrates that fish prey upon. The in-water construction of this project would occur when juvenile and adult Chinook salmon, steelhead and bull trout are least likely to be present in Ebey Slough. Therefore, while the proposed construction may affect these species, it is not likely to adversely affect them.

During the construction period, the majority of the project footprint is landward of the geographical extent of designated critical habitat. A functionally significant but geographically minor portion of the recommended alternative involves in-water work: breaching the dike to gain tidal inundation and access to Allen Creek. The opening of this breach is slated to be the last significant component of the project to be completed. This in-water work would fall within the limits of the designated critical habitat in Ebey Slough.

The project is expected to provide clear net benefits in enhancing habitat for listed and other species, and restoration of intertidal, estuarine habitat in the lower Snohomish has been identified as a significant recovery action in the 2005 *Snohomish River Basin Salmon Conservation Plan*. Specifically, the top two recommendations under this plan are:

1. Improving habitat quality and quantity in the nearshore, estuary and mainstem to get the listed species back on track.
2. Minimizing habitat losses and making habitat gains through restoration in the rest of the basin.

The Qwuloolt Project satisfies both of these recommendations and is in fact one of the most important estuarine restoration projects identified in the plan. Estuaries and their associated intertidal habitats provide essential foraging and resting habitats that juvenile salmonids utilize while undergoing the physiological transformations that enable them to enter into saltwater. This restoration effort will recreate intertidal marsh vegetation in the Snohomish Estuary and in so doing, contribute to enhanced juvenile salmonid survival during outmigration.

This project will have no effect on any listed marine mammals including the orca whale.

4.8 Cultural Resources***No Action Alternative:***

In regards to cultural resources there would be no impacts under the no action alternative.

Preferred Alternative:

Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by NEPA and with other statutes. The Washington State Archaeological Sites and Resources Act (RCW 27.53) and the Indian Graves and Records Act (RCW 27.44) may also apply. Based upon the surveys conducted on site, under the preferred alternative there is an anticipation of no effect but during the construction phase we

will continue to monitor to insure there will be no impact. If some cultural property is discovered during construction, work will be suspended temporarily until the appropriate authorities are notified and measures are taken to preserve and protect resources that are unearthed, all proper procedures will be adhered to.

In a letter dated December 9, 2008, from the Washington State Department of Archaeology and Historic Preservation, the State Archaeologist concurred with the Corps determination that no historic properties will be affected by the proposed project.

4.9 Land Use

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect local land use. Due to the many conservation easements on the parcels contained within the project, it will probably remain open space.

Preferred Alternative:

Under the Preferred Alternative, the change to estuarine emergent wetland habitat as a result of this restoration project would change the habitat type in the project area from palustrine emergent wetland. As discussed in Section 4.1.4, the Qwuloolt Project will provide the same level of flood risk management for adjacent properties and uses as currently exists. As the level of flood risk would not change and the project would not otherwise encumber services or opportunities, there would likely be no change in the use of adjacent industrial residential or commercial facilities as a result of the project.

4.10 Recreation

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect local recreation. The area would continue to be used as it is currently, but no new areas of recreational improvements or access would be created.

Preferred Alternative:

The Qwuloolt Project site is the largest open space within the City of Marysville. Memorial Park is immediately adjacent and upstream on Allen Creek. Harborview Park overlooks the site from a residential development to the East. The Snohomish Estuary Water Trail System, managed by Snohomish County Parks and Recreation, follows Ebey Slough to the south. Although no “trailside” amenity is provided by this proposed project, there is a potential for additional recreational features in the future. The City of Marysville has proposed adding recreational trails to City owned property and easements within the project area.

4.11 Air Quality and Noise

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect local air quality or noise levels.

Preferred Alternative:

Under the preferred alternative, construction vehicles may temporarily increase air emissions and noise in the immediate project vicinity. Noise associated with the usage of heavy machinery

may disturb recreational users or residents. Much of the residential area is removed from the main construction area. However, these impacts will be temporary and highly localized, and are not expected to result in significant impacts.

4.12 Transportation

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect local transportation routes or volumes along 3rd Avenue and 47th Street.

Preferred Alternative:

Under the Preferred Alternative, construction vehicles may temporarily increase the volume of traffic in the immediate project vicinity during excavation of the site. Construction vehicles including trucks carrying construction material may disrupt traffic along 3rd Avenue and 47th Street. It is estimated that during the two years of project construction about 3,500 trucks will be accessing the area. Congestion could increase during peak commuting hours due to the movement of construction vehicles back and forth to the restoration site, particularly along 47th Street and 3rd Avenue. However, these impacts will be temporary and highly localized, and are therefore not expected to be significant.

4.13 Aesthetics

No Action Alternative:

Under the No Action Alternative, there would be no change to the site that would affect local aesthetics.

Preferred Alternative:

Under the Preferred Alternative, wildlife (primarily birds) attracted to the site would likely increase the aesthetic attractiveness of the project site. However, due to the industrialized area to the west of the site, it is unlikely that this area would become a recreational destination due to its aesthetic resources. Rather, an increased recreational use of the site could result from more frequent or longer visits by local residents, bird watchers and recreational kayakers as a result of the restoration actions.

During excavation construction of the site, the aesthetic attractiveness of the general area likely would be reduced due to the noise and air emissions generated by the construction equipment, which may disturb recreational use. The site is removed from much of the general public and the project impacts are temporary in nature, which should have a minor negative effect on aesthetics. However, these impacts will be temporary and highly localized, and are not expected to result in significant impacts. It is expected that residents in the area will have an enhanced water view once the project is completed.

5.0 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects of the proposed project include: (1) noise disturbance to wildlife and recreational users in the vicinity of operating heavy machinery during excavation and construction of the restoration site; (2) displacement of some rodent, amphibians and reptiles as the project area converts from a freshwater system to brackish; (3) disruption of local traffic in the project vicinity during construction; (4) mortality of the current reed canary grass, Canada

thistle and blackberry and some trees within the project site, and (5) excavation and filling of approximately 13 acres of existing palustrine emergent marsh. Given the temporary, localized, and minor nature of these effects, the Corps has determined that the proposed restoration project is not expected to result in significant adverse environmental impacts.

6.0 CUMULATIVE IMPACTS

Cumulative impacts result from the “individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). As such they include the impacts of this restoration project considered in conjunction with current and future restoration projects constructed or planned within the lower Snohomish river delta.

The Snohomish delta is fortunate to be experiencing a number of estuarine habitat restoration projects. Of note there is Spencer island, Ebey Island, Union Slough and several more restoration activities being planned (Smith Island, Diking District 6 are two examples). While these various projects will restore a fraction of the 80% of historic habitat lost, they do demonstrate a significant improvement and a commitment by Tribal, Federal, State and Local agencies in improving the Snohomish ecosystem. Planning efforts such as *Snohomish Estuary Wetland Integration Plan* (SEWIP) (1997), Tulalip Tribe’s *Ecosystem Restoration Opportunities in the Snohomish River Valley* (2001) and the *Snohomish River Basin Salmon Conservation Plan* (2005) have provided excellent analysis and a road map for restoration in the area. Because of the dictates of local geology and hydrology, estuarine restoration is a very limited nature but these unique habitats provide benefits throughout the watershed.

If additional restoration sites are constructed in the Snohomish river delta by other entities it should be expected they also will also have negative short term effects during construction. However, these negative effects are temporary and are associated only with the actual construction of the project, concentrated mainly as the restored site is hydraulically connected to the estuary. The combination of mitigation measures, best management practices, and post-construction monitoring of the restored sites reduce the cumulative, short-term (i.e. construction related) impacts of these projects to an insignificant level.

More significantly, these short term negative effects are compensated for by the long-term, spatially cumulative benefits of restored habitat improvements in the overall watershed condition through decreased fragmentation of habitats, and the ultimately increased ability of the watershed to support critical life history stages of native fish and wildlife populations. Thus, the proposed restoration project will have beneficial cumulative effects within the watershed.

The Qwuloolt Project will encompass approximately 400 acres of restored habitat along Ebey Slough in the lower Snohomish Estuary.

Another cumulative effect of the Qwuloolt Project is the additional site work and restoration activities that will be performed by the Tulalip Tribe. If the Corps is successful in completing its restoration activities (dike removal and breach, re-connecting the mouth of Allen Creek to Ebey slough and a set-back levee construction), then it can be reasonably assumed that the Tulalip Tribes will do additional site enhancements such as creation of new starter channels, placing of

berms, constructing a storm water retention facility, well head protection and filling of existing farm ditches. The actions will be complementary to the work that the Corps would be doing.

7.0 ENVIRONMENTAL COMPLIANCE

This project has been coordinated with the following agencies:

- Tulalip Tribes of Washington
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- Washington State Department of Ecology
- Washington State Department of Fish and Wildlife
- Washington State Historic Preservation Office
- Snohomish County
- City of Marysville

In addition a Notice of Availability for the draft EA and Public Notice was sent to over 500 local property owners on 4 February 2009 and was circulated for 21 days.

7.1 Clean Air Act

The Clean Air Act (CAA) was established “to protect and enhance the quality of the nation’s air resources so as to promote public health and welfare and the productive capacity of its population.” The CAA authorizes the EPA to establish the National Ambient Air Quality Standards to protect public health and the environment. The CAA establishes emission standards for stationary sources, volatile organic compound emissions, hazardous air pollutants, and vehicles and other mobile sources. The CAA also requires the states to develop implementation plans applicable to particular industrial sources.

The effects on air quality from the proposed project would be minimal and the project is exempted from the conformity requirements of the CAA because it would not exceed *de minimis* levels of emissions and the project site is not within a non-attainment area.

7.2 Clean Water Act (CWA)

The CWA was established to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The CWA sets goals to eliminate discharges of pollutants into navigable waters, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment. Section 404 of the CWA disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no reasonable alternatives. As documented in the evaluation under the 404(b)(1) Guidelines in Appendix C, the proposed project is consistent with Section 404. Section 401 of the CWA requires federal agencies to comply with state water quality standards. Pursuant to Section 401 of the CWA, the Department of Ecology issued Water Quality Certification Order #6509 this project on March 12, 2009 (Appendix D).

7.3 Coastal Zone Management Act (CZMA)

The CZMA requires federal agencies to comply with state and local plans to protect and enhance coastal zone and shorelines. The project is consistent with CZMA based on the Corp’s CZM

consistency determination and the Department of Ecology's resulting CZMA concurrence letter dated March 12, 2009 (Appendix D).

7.4 Endangered Species Act (ESA)

ESA requires federal agencies to protect listed species and consult with USFWS or NMFS regarding the effects of proposed actions on threatened and endangered species and designated critical habitat. Because the Qwuloolt Project has received funding from the Washington State Salmon Recovery Board, the NMFS has determined that Qwuloolt project complies with section 4(d) Limit Number 8 (Habitat Restoration) so no formal or informal consultation is necessary. The project received concurrence from the USFWS on January 23, 2009. Appendix A provides copies of the relevant documentation.

7.5 Fish and Wildlife Coordination Act

The U.S. Fish and Wildlife Coordination Act (FWCA, 16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. Formal reporting requirements of the FWCA are not applicable for small restoration projects such as the Qwuloolt Project. Nevertheless, the Corps has fully coordinated with the USFWS and given full consideration of fish and wildlife conservation during project planning. The USFWS has been intricately involved with the Qwuloolt Project since the initial property purchase in 1998, has represented the Department of the Interior on the Tulalip Trustee Council, and has been on the planning committee since its initiation. Per an e-mail from the USFWS in January 2011 (Lantor, pers. comm., 2011), they are in complete support of this restoration project. The Corps will continue to coordinate closely with the USFWS during the final design and construction phases.

7.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act (MSA) (formerly the Magnuson-Stevens Fishery Conservation and Management Act, MSFCMA) and the 1996 Sustainable Fisheries Act require consultation with NMFS for all federal agency actions that may adversely affect Essential Fish Habitat (EFH) (16 USC 1801 *et seq.*, 50 CFR 600) (Pacific Fishery Management Council, 2003). EFH is defined by the MSA in 50 CFR 600.905-930 as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." As part of the permitting process, consultation with NMFS is required for MSA-managed species residing or migrating near the site. As a result of the Qwuloolt Project receiving funding from the Washington State Salmon Recovery Board, the NMFS has determined that Qwuloolt Project complies with section 4(d) Limit Number 8 (Habitat Restoration) so no formal or informal consultation is necessary. This also covers the requirements for EFH.

7.7 National Environmental Policy Act (NEPA)

The NEPA (42 U.S.C. 4321 *et seq.*) provides a commitment that Federal agencies will consider the environmental effects of their actions. It also requires that an environmental impact statement (EIS) be included in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. The EIS must provide detailed information regarding the proposed action and alternatives, the environmental impacts of the alternatives, appropriate mitigation measures, and any adverse environmental impacts that cannot be avoided if the proposal is implemented. Agencies are required to

demonstrate that these factors have been considered by decisionmakers prior to undertaking actions. Major Federal actions are evaluated through an EA to determine whether or not there are significant effects on the quality of the human environment. An EA results in either a finding of significant impact, such that an EIS will be prepared, or in the preparation of a Finding of No Significant Impact (FONSI). This EA has been undertaken specifically in pursuit of NEPA.

Per NEPA requirements, this assessment evaluates environmental consequences from the proposed federal actions at the Qwuloolt Project. The Corps solicited comments from interested agencies and members of the public. Comment received have been catalogued and addressed in Appendix E.

7.8 National Historic Preservation Act (NHPA)

NHPA requires federal agencies to identify and protect cultural and historic resources. The Corps determination for the proposed project is “No Historic Properties Affected.” In a letter dated December 9, 2008, the Washington Department of Archaeology and Historic Preservation concurred with the Corps determination. Thus, the project complies with the NHPA.

7.9 Rivers and Harbors Act

The Rivers and Harbors Act prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the U.S. in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. The proposed project would remove an existing levee along the shoreline of the Ebey Slough and would not hinder navigation in any way.

7.10 Executive Order (EO) 11988: Floodplain Management Guidelines

EO 11988 requires federal agencies to evaluate the potential effects of actions on floodplains and to avoid undertaking actions that directly or indirectly induce growth in the floodplain or adversely affect natural floodplain values. The project is an estuarine restoration project that will maintain the existing level of flood protection for adjacent properties and will not induce growth in floodplain.

7.11 Executive Order 11990: Protection of Wetlands

EO 11990 encourages federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs. The restoration of the estuarine emergent marsh is intended to approximate the historic condition as closely as possible and will result in a net gain in ecological function for the site and the lower Snohomish system.

7.12 Executive Order 12898: Environmental Justice

EO 12898 requires federal agencies to consider and address environmental justice by identifying and assessing whether agency actions may have disproportionately high and adverse human health or environmental effects on minority or low-income populations. No interference with Native American tribal treaty rights would result from the proposed project. The proposed project will not result in adverse human health or environmental effects on minority or low-income populations in the local area.

8.0 CONCLUSION

Based on this EA and coordination with Federal agencies, the Tulalip Tribes of Washington, and State and City agencies, the Qwuloolt Project is not expected to result in significant adverse environmental impacts. There will be short term temporary construction related impacts, but once tidal hydrology is restored the new marsh will rapidly recover. Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an EIS.

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Figures

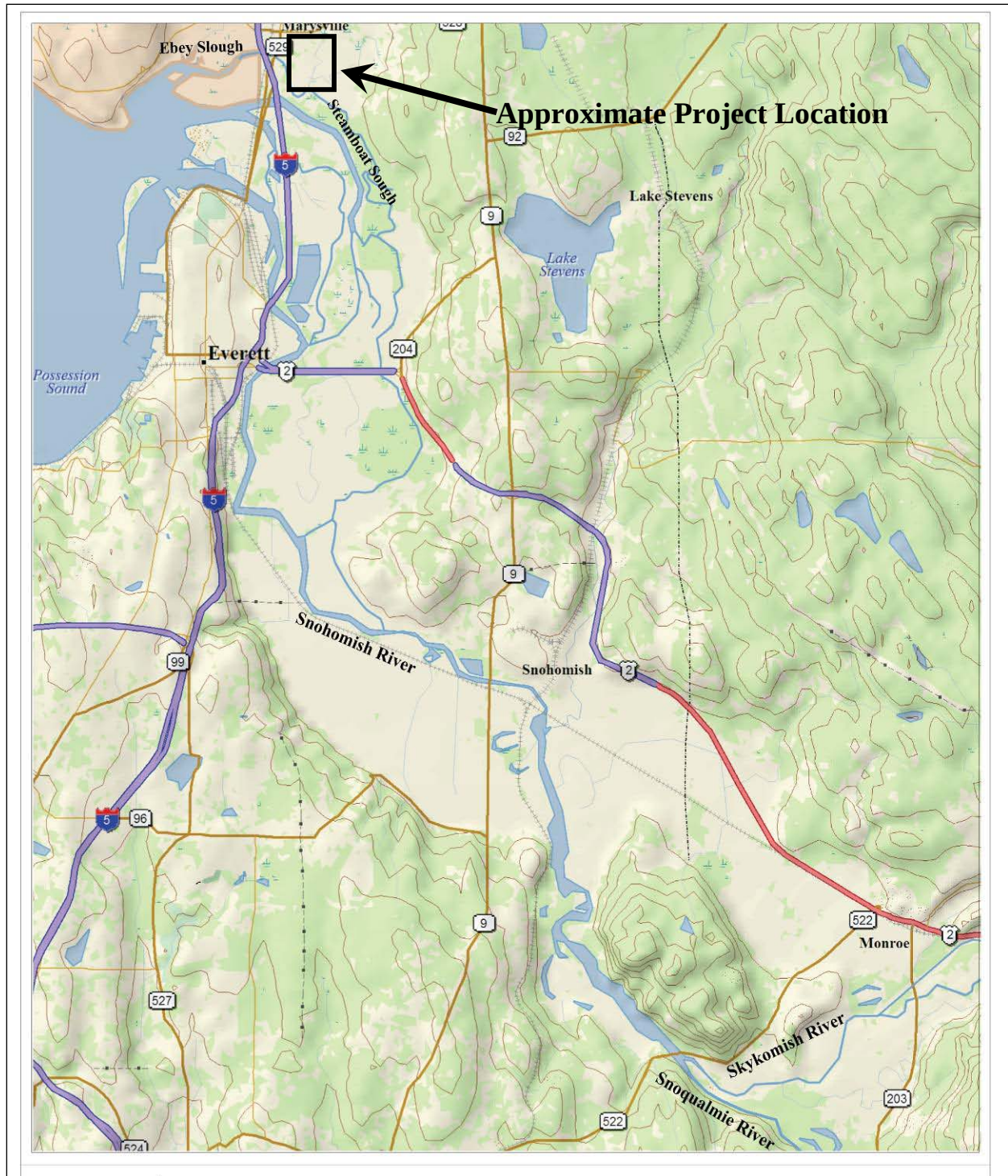


Figure 1. Snohomish River Basin. The Qwuloolt Project site is at the upper left corner, east of Marysville.
(map courtesy of AMEC)

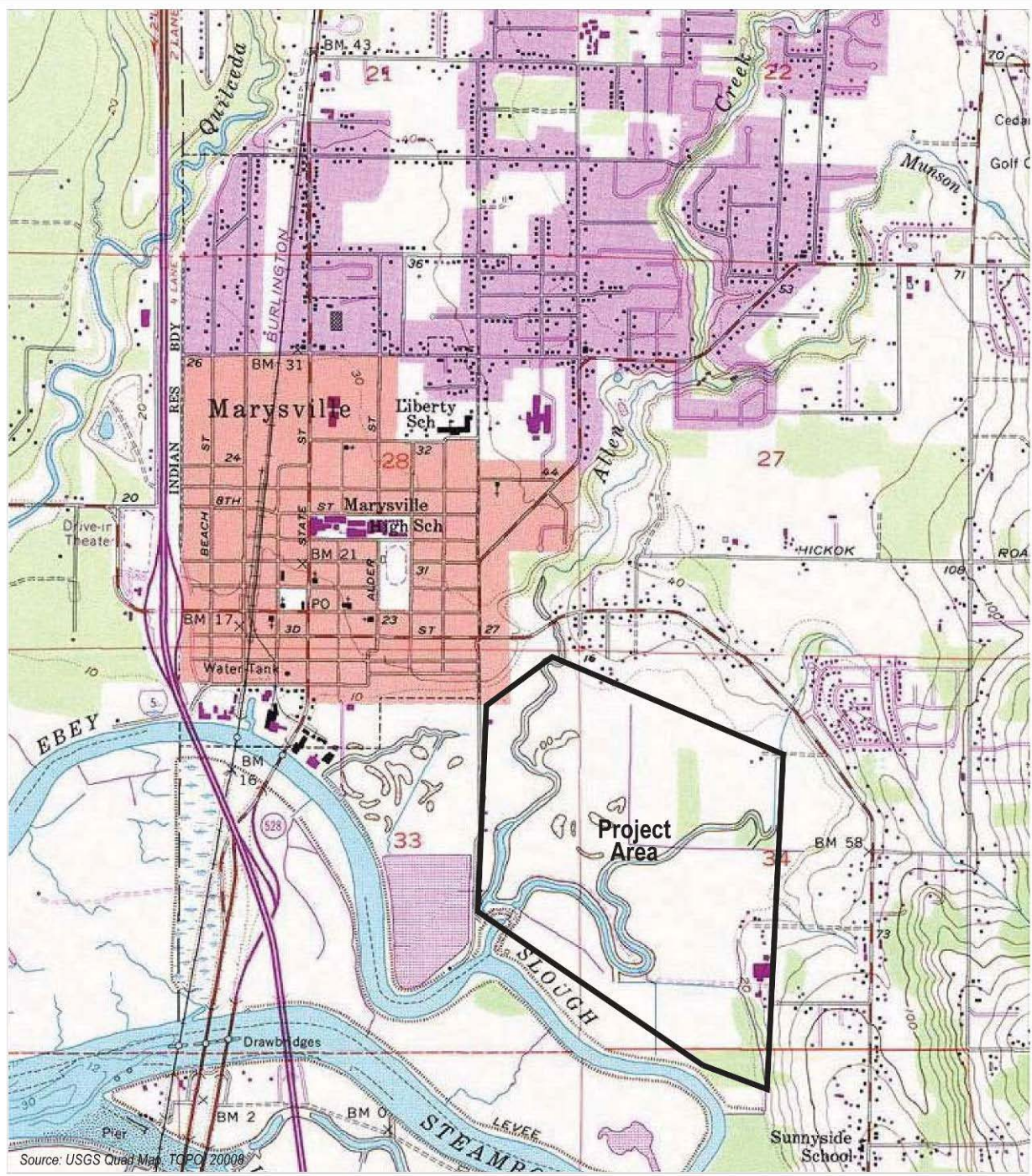


Figure 2. Qwuloolt Project Area.
(map courtesy of AMEC)



Figure 3. Qwuloolt Project Site, November 2008. A sea of reed canarygrass.
(photo by Pat Cagney)



Figure 4. Qwuloolt Project Site. Northern part of the site where Allen Creek enters the site.
(photo by Pat Cagney)



Figure 5. Qwuloolt Project 1938 Air Photo. Much of the land is already converted to agriculture. You can still see vestiges of the many tidal channels. (Historic Photo Army Corps of Engineers)



Figure 6. City of Marysville mitigation area. Vegetation includes Lyngby's sedge and cattail.
(photo by Pat Cagney)



Figure 7. Tide gate outlet of Allen Creek.
(photo by Zac Corum)

Appendix A

Endangered Species Act Compliance

Cagney, Patrick T NWS

From: Baird, Maryann NWS
Sent: Friday, January 23, 2009 9:31 AM
To: 'Jason Lehto'; Cagney, Patrick T NWS
Subject: FW: Qwuloolt Restoration Project (CENWS-PM-PL-ER)

Jason and Pat - Below is your approval to use the Corps' 2008 Fish Passage and Restoration PC to meet your ESA requirements with FWS. Congratulations! Maryann

-----Original Message-----

From: Martha_L_Jensen@fws.gov [mailto:Martha_L_Jensen@fws.gov]
Sent: Friday, January 23, 2009 9:21 AM
To: Baird, Maryann NWS; Printz, Jacalen M NWS
Cc: Judy_Lantor@fws.gov; stephanie.ehinger@noaa.gov
Subject: Qwuloolt Restoration Project (CENWS-PM-PL-ER)

Maryann

I have reviewed the Specific Project Information Form (SPIF) for the proposed removal and setback of approximately 2,200 linear feet of levees. The project will restore approximately 370 acres of tidal marsh and reconnect Allen and Jones Creeks back to their historic channels. The project is located in the lower Snohomish River adjacent to Ebey Slough and Island, Snohomish County, Washington (legal description: T30N, R5E, Section 33). The project meets all of the requirements outlined in the Fish Passage/Habitat Restoration Programmatic (FWS Ref. # 13410-2008-F-0209) for Activity Type 3: Levee Removal and Setback

The SPIF and Memorandum to the Services requesting approval of the project under the Programmatic were received in our office on January 12, 2009. The Corps has determined that the proposed action "may affect, but is not likely to adversely affect" the bull trout (*Salvelinus confluentus*) and designated critical habitat for the bull trout.

The COE has met their obligations under Section 7 of the Endangered Species Act and no further consultation on this action is required.

The TAILS tracking number for this project is 13410-2009-I-0112 (x. Ref. 13410-2008-F-0209).

If you have any questions, please contact me at the number below.
Thank you

Martha Jensen
Fish and Wildlife Biologist,
Division of Consultation and Technical Assistance Western Washington Fish and Wildlife
Office 510 Desmond Dr SE Lacey, WA 98503
tel: (360) 753-9000/ fax: (360) 753-9008 martha_l_jensen@fws.gov

Self-certification of Proposed Habitat Restoration Activity

Consistency with the

Habitat Restoration Program, 4(d) Rule, Limit 8

In order for a proposed habitat restoration activity to be consistent with the Habitat Restoration Program (HRP), the project proponent needs to review the elements of the HRP and certify, using the checklist below.

The HRP includes habitat protection and restoration projects funded by the SRFB that meet the following characteristics:

- ☒ Are part of a habitat portion of a salmon recovery plan approved by a Regional Salmon Recovery Organization and the State of Washington and published in the Federal Register by NMFS; and
- ☒ Are part of an adopted Implementation Schedule developed by a Regional Organization to implement the habitat portion of a Salmon Recovery Plan; and
- ☒ Are funded in part or wholly with Washington State and/or Pacific Coastal Salmon Recovery Fund (PCSRF) monies managed by the SRFB and are consistent with the technical and procedural criteria outlined by SRFB; and
- ☒ Are being done for the purpose of habitat restoration; and
- ☒ Are projects that fit within a specific list of eligible actions:

In-Stream Passage

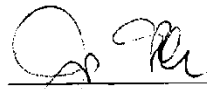
In-Stream Diversion Screening

In-Stream Habitat

Riparian Habitat Restoration

Upland Habitat Restoration or Protection

Estuarine and Marine Nearshore Habitat Restoration


/s/ Project Proponent

11/24/08
Date

Appendix B

National Historic Preservation Act, Section 106 Compliance



STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
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December 9, 2008

Ms. Deborah Johnston
Environmental Resources Section
Seattle District, Corps of Engineers
PO Box 3755
Seattle, Washington 98124-3755

Re: Qwuloot Habitat Restoration Project
COE# N.A.
Log No: 120808-24-COE-S

Dear Ms. Johnston:

Thank you for contacting our department. We have reviewed the additional materials you provided for the proposed Qwuloot Habitat Restoration Project in Marysville, Snohomish County, Washington.

We concur with your determination of No Historic Properties Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribes and this department notified.

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,


Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: rob.whitlam@dahp.wa.gov

cc: H. Gobin



Appendix C

Section 404 Clean Water Act Compliance

404(b)(1) Guidelines Evaluation for the Qwuloolt Project

1. Introduction

The purpose of this document is to record the Corps' evaluation and findings regarding this project pursuant to Section 404 of the Clean Water Act (CWA) and the Rivers and Harbors Act (RHA).

The Qwuloolt Project is a multi-agency project that looks to restore some of the critical estuarine processes and habitats that were historically prevalent in the Snohomish delta but are now scarce. The project goal is to return the historic hydrologic processes to the Qwuloolt Project area. The proposed project will restore intertidal estuarine emergent wetlands and mudflats by breaching a dike on Ebey Slough. This will improve habitat conditions for fish and wildlife species including threatened and endangered species like juvenile Chinook, steelhead, and bull trout.

The proposed Qwuloolt Project is authorized by Section 544 of the Water Resources Development Act of 2000 (Public Law 106-541, December 11, 2000), which authorizes implementation of critical restoration projects in Puget Sound.

The agencies developing this project are the U.S. Army Corps of Engineers, Seattle District (Corps) in cooperation and partnership with the Tulalip Tribes of Washington, U.S Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Natural Resource Conservation Service (NRCS), Washington Department of Ecology (DOE), and Washington State Department of Fish and Wildlife (WDFW). Other participating entities include Snohomish County.

The Corps portion of the work is a just one component of the overall restoration efforts at the Qwuloolt site and is the focus of this 404(b)(1) evaluation. The Corps portion of the restoration at the Qwuloolt site is separated into three main actions: dike removal and breach, re-connecting the mouth of Allen Creek to Ebey Slough; and set-back levee construction.

In addition to the restoration work proposed by Corps in this analysis, the Tulalip Tribes will also complete additional restoration activities at Qwuloolt. The Tulalip Tribes also propose to do complementary restoration activities at the site including constructing a water runoff storage basin (about 6 acres), an 0.8 acre fill pad for water well protection, internal berms to reduce erosion potential and provide habitat complexity, and starter channels to facilitate tidal channel formation; and filling of all former farm ditches.

While this 404(b)(1) analysis concentrates on the Corps proposed work, it is important to provide an overview of all the restoration activities proposed at the site to provide a complete picture.

1.1 Location.

The Qwuloolt Project site is a 400-acre area of former agricultural land located in the southern portion of the City of Marysville, Washington (Sections 33 and 34, Township 30 North, Range 5 East) (Figure 1). The project borders include the City's sewage treatment plant to the west, an industrial park to the northwest, residential neighborhoods along 61st Street NE, and Sunnyside Boulevard to the north and east. Ebey Slough borders the site to the south.

The topography of the site is relatively flat, and is surrounded by dikes and short steep slopes. The project is located adjacent to Ebey Slough and to the southeast of the City of Marysville. The Qwuloolt Project site is a poorly drained wetland of approximately 400 acres dissected with drainage ditches. Jones and Allen Creeks discharge into Ebey Slough through four tide gates. This system of dikes and tide gates allowed the site to be used for agricultural production for seventy years until 1985.

1.2 Project History.

The Qwuloolt Project is an area of former agricultural land (Poortinga property) located along Ebey Slough in the southern portion of Marysville. The area around the Qwuloolt project site was historically a tidal marsh, with likely forested (spruce) and emergent (sedge/rush) vegetative components. At what was known as the Poortinga farm, a dike was constructed on the north bank of Ebey Slough, tide gates were installed at the mouth of Allen and Jones Creeks, and a series of ditches were dug to convert the land to pasture. As a consequence, the levee and tide gates prevented tidal inundation of the historic floodplain, which destroyed the estuary marsh habitats and restricted salmon and other estuarine-dependent species from utilizing this highly productive environment. In addition, stream channels upstream of the tide gates were ditched fifty years ago, impairing water quality and decreasing habitat quality within Allen and Jones Creeks. These actions contributed to estuary-wide habitat losses. Due to extensive diking and tide gates which restrict the river and tides from reaching wetland areas in the floodplain, less than 20% of the historic Snohomish River estuarine wetlands remain today.

It is within this context of the past loss of large amounts of estuarine habitat and increasing threat to endangered species that the Qwuloolt Project has been developed. Restoration activities will be shared by both the Corps of Engineers and the Tulalip Tribes. This 404(b)(1) analysis evaluates the following work that the Corps proposes to accomplish: dike removal and breach, re-connecting the mouth of Allen Creek to Ebey slough, and a set-back levee construction

1.3 Project Need or Purpose.

The purpose of the Qwuloolt Project is to restore estuarine habitat at the Snohomish River site, which is currently a diked, fallow pasture. The loss of historic estuarine habitat has had a profound effect on the ecological health of the Snohomish River Basin and Puget Sound, as a whole. Estuaries provide a wide variety of resources and functions to the fauna and flora of the Northwest, including several species listed under the Endangered Species Act (ESA). Habitat loss has resulted in population declines of numerous species whose life histories are dependent on the estuary directly or indirectly. These species include salmonids, bull trout, numerous bird species, and mammals, including the harbor seal and endangered orca whale. The Corps Section 544 program allows federal participation in projects and activities, which have “immediate and substantial ecosystem restoration, preservation and protection benefits” (P.L. 106-51, Section 544). The Qwuloolt Project offers an opportunity to restore habitat at a large, ecologically important estuarine site in the urbanized Snohomish River Estuary.

The overall purpose of the Qwuloolt Project is to restore the natural resources of the former estuarine marsh to as close to pre-settlement conditions as possible. To achieve this purpose requires restoration of historic hydrologic conditions such as tidal inundation, stream processes

and associated functions. It should be noted that the goal and the following objectives are similar to the stated purpose of the Guidelines (Part 230.1 (a)) "...to restore and maintain the chemical, physical and biological integrity of waters of the United States." By restoring the historic tidal regime to the project area the following project objectives will also be accomplished.

- Create a self-sustaining brackish (salinity range of 0.5 to 7 ppt) tidal site with minimal construction and maintenance; consistent with the Corp's Environmental Operating Principles.
- Restore natural hydrology, salinity, and sedimentation;
- Promote natural channel formation;
- Provide opportunities for juvenile salmon off channel rearing and forage areas;
- Maximize cover, forage and other habitat functions for fish and wildlife;
- Facilitate natural processes and functions to occur (sedimentation, plant propagation, export of organic material, channel complexity, edge, salinity gradient, water quality);
- Assist recovery and re-vegetation of native species;
- Provide public education on marsh restoration (public meeting, web site and signage);
- Balance public access with ecological objectives.

Projects such as the Qwuloolt Project are needed for a variety of reasons. They provide critical habitat for listed species under ESA. This project will restore a portion of the historic habitat types and area that have been lost to the Snohomish Estuary from past development. Collins (2001) estimates only one sixth of the historic marsh remains in the Snohomish basin. Many species are dependent on estuarine marshes during significant portions of their life histories. Some of these species are of commercial value or are prey species for variety of fauna. Fish species include juvenile sole; sculpins; shiner perch; stickleback; Chinook, pink, and chum salmon; steelhead; bull trout; and cutthroat trout. Bird species include geese, goldeneye, coot, gadwall, bufflehead, merganser, great blue heron, green-winged teal, killdeer, kingfisher, mallard, sandpipers, dunlin, goldfinch, juncos, merlin, osprey, redbelt hawk, bald eagle, redwinged blackbird, and song sparrows. Mammal species include, harbor seal, orca or killer whale (Chinook salmon are a prey resource), raccoon, otter, deer, coyote and muskrat.

2.0 Proposed Project.

The proposed Qwuloolt Project will consist of lowering and breaching the existing dike at Ebey Slough to reestablish tidal inundation to site, reconnecting the site to the Slough, restoring the natural shoreline, and planting native intertidal and riparian vegetation. There will be additional restoration actions completed on Allen Creek of which a portion is contained within the project site. One set-back levee will be required to be constructed to maintain the pre-project level of flood protection to the adjacent landowners. The resulting intertidal mudflat, brackish marsh, and riparian habitats would provide critically important transitional habitat where juvenile salmonids would have the opportunity to feed, rest, and undergo smoltification prior to out-migrating to Puget Sound and the Pacific Ocean. The project is separated into three main components; dike removal and breach, stream restoration of Allen Creek and set-back levee construction.

The work will include excavation and removal of 1,800 linear feet of dike at Ebey Slough, , stream improvements to Allen Creek, and construction of set-back levees. In total, about 186,000 cubic yards (cy) of material will excavated and 190,000 cy of material will be used as fill. There will be a permanent loss of about 13 acres of degraded palustrine emergent wetlands as a result of construction activities for the set-back levee. Over 400 acres of wetland will have improved function and value as a result of the restoration activities.

2.1 Method of Excavation and Discharge.

The Qwuloolt site is currently cut off from Ebey Slough by a dike that fronts the slough. The entire site is considered to be a palustrine emergent wetland. It is bisected by two creeks (Allen and Jones creeks). The construction of the project is separated into four main components; dike removal and breach, stream restoration of Allen Creek, and set-back levee construction. Most of the internal construction needed for the project can be accomplished prior to breaching the dike at Ebey Slough. The majority of work will be done by typical construction equipment such as excavators, front end loaders, bull dozers, and dump truck.

2.2 Timing of Excavation and Discharge.

Best management practices will be followed for the internal site work. The levee construction could start as soon as permits and funding are secured. The actual dike breach will be accomplished during the “fish window” of July 16-February 15 provided by Washington Department of Fish and Wildlife.

2.3 Projected Life of the Proposed Project.

From the Corps perspective for economic evaluation, the project life is 50 years. But once the dike is breached and the tidal regime restored, the site will start to evolve from a hydrologic and vegetation stand point and continue to mature until the next major geologic event.

3. Alternatives.

3.1 Alternative Description

Several alternatives were evaluated for this project. They include:

Alternative 1 - The No Action Alternative

Old topographic surveys show that in the late 1800's the area referred to now as the Qwuloolt Project area was a homestead with fields and two structures surrounded by marsh and swamp. The much of the northern half of the Qwuloolt site was spruce swamp, with emergent marsh in the area between Jones Creek and Ebey Slough. By 1938, the time of the first aerial photo record, the majority of the site was cleared with levees constructed in the current configuration and tide gates were in place at the outlet of Allen and Jones creeks. Once the site was converted to pasture, dairy farming occurred over the next 80 years. In the mid-eighties, haying and dairy practices ceased and the fields became fallow. Reed canary grass dominated the site (Figure 3) and displaced the pasture grasses that used to be maintained. At the time there were a few trees, some Canada thistle and Douglas spirea and clumps of Himalayan blackberry. The current condition is mostly a palustrine wetland with a high water table and numerous farm ditches that retain water throughout the year. For the 100 plus years that the site had restricted tidal access, its ground elevation has subsided by two to three feet. Allen and Jones creeks bisect the project

area in its lower reaches and still retain some tidal channel features. The site is drained through four tidegates at the mouth of these creeks. There is restricted (the tidegates are mostly closed unless to release water from Allen Creek) migratory fish access to the creeks through the tidegates. A dike runs continuously along the southern boundary bordered by Ebey Slough and prevents any tidal inundation of the site. While mostly a monoculture of canary grass, the site has little fishery value but does provide some wildlife benefit. Coyote, deer, river otter, raccoon, field mice, hawks and the occasional eagle utilize the site. Under the current situation, none of the organic material (carbon and other nutrients) generated at the site is released to the estuary.

Common elements for all of the action alternatives.

Regardless which restoration alternative is chosen there are several structural elements that would be needed. For instance, all of the alternatives included some form of dike removal or breaching, this would require building set-back levees for flood risk reduction for adjacent landowners. The proposed project includes the following common elements for all alternatives:

- One set-back levee (4,500 feet)
- Temporary construction staging areas

Alternative 2 - Allen Creek Restoration Only

The Allen Creek alternative focuses on only restoration of the creek. The Allen Creek alternative focuses on only restoration of the larger creek on the site. This alternative proposes opening Allen Creek to Ebey Slough by removing four tide gates. Removing the tide gates would result in a small breach and would partially inundate the site requiring the need for a setback levee. The setback levee would be constructed at the same level of protection as all other alternatives. Due to subsidence at the site, a pond would develop, and about a third of the site would convert to estuarine emergent marsh and mudflat. By opening up the creek mouth and removing the four tide gates, more than 13 miles of creek for spawning, rearing and foraging would become available. In the event of extreme weather, such as flooding, the pond would greatly increase in size. This could increase the chance of dike failure at the location of the small breach.

Alternative 3 - Small Breach at Ebey Slough

Approximately 50 feet of the existing dike would be breached along Ebey Slough. Due to restricted size of the breach, tidal exchange into the project area would be constrained providing limited fish passage during only a portion of the tidal cycle. Based upon information obtained in the PAS study, the tidal range would only be from +3 feet to +6.8 feet (MLLW=0), and the duration of inundation is limited to just a few hours per tide cycle. At the highest tide, approximately half of the project area would be inundated. However, extreme events, such as storm surges or leap and neap tides, would require the same levee protection as all other alternatives. About half of the site would then convert to estuarine emergent marsh and mudflats. Some of the normal hydrologic processes such as sheet flow across the site and subsequent tidal channel formation also would be restricted. This alternative does not include restoration of Allen Creek.

Alternative 4 - Large Breach at Ebey Slough

Approximately 2,000 feet breach, comprised of a 400 feet breach with an additional 1,600 feet of lowered dike, along the existing dike adjacent to Ebey Slough. This would allow for complete

tidal exchange, which is expected to facilitate fish passage over the entire 400-acre area and restore much of the historic hydrology to the site. The entire site would convert to estuarine emergent marsh and mudflat. This alternative does not include restoration of Allen Creek. Under this alternative a 400 foot wide and 22 foot deep breach would be excavated in the existing dike that is along Ebey Slough. In addition, about 1,400 foot of the existing dike would also be lowered below the high tide line elevation. This would allow for complete tidal exchange which would facilitate fish passage over the entire 400 acres of the site and restore much of the historic hydrology to the area. No improvements to Allen Creek would occur under this alternative.

Alternative 5 - Allen Creek and Small Breach

This alternative includes both a small breach (50 feet) in the existing dike along Ebey Slough and full restoration on Allen Creek. As part of the 10 percent design, this alternative also included a large culvert at the north end of the project for improved water conveyance and a bridge across the area where the tide gates were removed. The restoration on Allen Creek provides an improvement in the stream hydrology and provides up to 13 miles of stream for migratory fish use. However, the fifty-foot wide breach severely diminishes tidal inundation into the project area allowing for only limited access to juvenile fish and would also limit estuarine habitat development. Based upon information obtained in the PAS study the tidal range would be from +3 feet to +6.8 feet (MLLW=0) and the duration of inundation is limited. About one half of the site would convert to estuarine emergent marsh and mudflat.

Alternative 6- Allen Creek and Large Breach

This alternative includes both a large breach (2,000 feet with a 400 feet breach and an additional 1,600 feet of lowered dike) in the existing dike along Ebey Slough and full restoration on Allen Creek. This would allow full tidal inundation into the project area restoring hydrologic processes, such as sheet flow and providing easy access to juvenile fish. The restoration on Allen Creek provides an improvement in the stream hydrology by opening the mouth and realignment of the stream channel of the creek providing up to 13 miles of stream for migratory fish use. As part of the 10% design, this alternative was shown to also require a large culvert at the north end of the project for improved water conveyance and a bridge across the location where the tide gates were removed. The entire site would convert to an estuarine emergent marsh and mudflats. The large breach option provides the best hydraulic connectivity between Ebey Slough and the project site. This alternative achieves a full tidal range (-2 feet to 12 feet with MLLW at 0 feet). Additionally, this alternative meets all of the restoration goals and objectives developed for the project.

3.2 Analysis of Alternatives

All of the action alternatives are focused in some measure of restoration. However the major difference between restoration alternatives is how the site is restored and how much of the site is restored. All of the alternatives involve restoring some level of tidal inundation to the project area, either by removing tide gates or breaching of dike at Ebey Slough. All of the alternatives have similar levels of impact on the existing site. As stated above (see “common elements for all alternatives”), once a breach in the dike is made some amount of tidal waters enters the site necessitating that all of the action alternatives construct set-back levees to provide flood protection. Project goals and objectives aim to maximize the amount of restoration with every

effort to minimize the impacts. The current condition at the Qwuloolt site is the entire area is a palustrine emergent wetland. From a 404 perspective, all of the action alternatives involve converting this palustrine emergent wetland to an estuarine emergent and mudflat system. This change will allow for increased functions and value while returning the site to its historic condition. With the change there will be impacts to some of the wetlands that currently exist on site. The placement of fill for construction of setback levees for flood protection will result in a permanent loss of about 13 acres of palustrine emergent wetlands. At the onset of restoration there will be a prevalence of mudflats due to subsidence at the site, so it is desirable to encourage the development of vegetated estuarine emergent marsh. Areas converted from existing condition to new channel are not considered as part of the impacts to wetland area. As evidenced in the 1938 photo, historic tidal channels were much more extensive, therefore this part of the construction activity is just restoring to a previous and documented pre-impact activity. The material that is excavated on site is expected to stay on site to be used as berm material or fill in farm ditches. Any excess material will be used to fill in low areas to enhance positive drainage and bring some lower mudflat elevations up to estuarine emergent marsh elevations. The removal of the existing dike is expected to restore about three acres of wetland. So the amount of fill and excavation for this project is summarized in Table 4 and, with the exception of wetland gained due to dike removal, is the same for any of the action alternatives.

Table 4. Excavation and Fill Quantities

Total volume of excavation	186,000 cy	
Total volume of fill	190,000 cy	
Total acreage of wetlands with fill	29.0 acres	Fill will be placed in 8 acres of wetlands to bring them to emergent vegetation elevation
Total acreage of permanent wetland loss	13.0 acres	Constructing set-back levees, fill pad and water treatment will result in loss of 13 acres of currently degraded wetlands
Total wetland gain	3 acres	Wetlands gained through removal of dike at Ebey Slough
Total acreage of wetland and mudflat with improved functions	400 acres	Current impacted wetlands will be improved by restoring tidal process over 340 acres. Current degraded wetlands will be converted to estuarine emergent wetlands and mudflats

Source: Corps 2009

3.3 Alternative selection

Alternative 1 - No Action

The no action alternative would not meet the goals and objectives established for the project since it would not promote natural channel formation, provide opportunities for juvenile salmon

off channel rearing and forage areas and maximizing cover, improve forage and other habitat functions for fish and wildlife, nor would it allow for natural processes and functions to occur (sedimentation, plant propagation, export of organic material, channel complexity, salinity gradient, water quality) because no intertidal habitat would be created. The no-action alternative results in no change in environmental benefits. The no-action alternative is carried forward in the alternative impact analysis for baseline condition comparison.

Alternative 2 - Allen Creek Restoration Only

This is a good alternative that supports some of the project objectives such as providing opportunities for juvenile salmon off channel rearing and forage areas and improved access to 13 miles of stream corridor. Due to the small opening at the mouth of Ebey Slough objectives such as creating a self-sustaining brackish tidal marsh, restoring natural hydrology, salinity, and sedimentation and promoting natural channel formation would not be met. Additionally, this alternative may not be technically feasible. Removing the tide gates to Allen Creek near Ebey Slough would provide for a 25 foot opening which allows only for a limited tidal exchange and, due to subsidence at the site, would create a pond much of the time over the lower ground elevations. There is also the potential on an outgoing tide for significant erosion to occur creating a much wider opening than designed. This becomes particularly problematic due to the close proximity of the Marysville water treatment facility. A failure in this location could erode the area around the treatment ponds causing a much bigger problem. Since this alternative only addresses some of the project criteria and because this option may not be feasible, it is not carried forward for further consideration.

Alternative 3 - Small Breach at Ebey Slough

This alternative proposes to open a small 50 foot breach in the dike at Ebey Slough. Based upon information obtained in the PAS study the tidal range would only be from +3 to +6.8 (MLLW is 0 feet) and the duration of inundation is limited to just a few hours per tidal cycle. The site would be very fragmented due to the limited tidal influence. The chance to restore natural vegetation and provide vegetative structure to the site would be limited by the absence of a more natural hydrologic regime. This would also limit primary productivity and nutrient export. Some of the normal hydrologic processes such as sheet flow across the site and subsequent tidal channel formation would also be restricted. Due to small size of the breach, tidal exchange into the project area would be muted and provide limited fish habitat during only a portion of the tidal cycle. This alternative does meet some of the project objectives such as providing opportunities for juvenile salmon off channel rearing and foraging areas (these opportunities are limited), but many of the project objectives are not met. This alternative, with its muted tidal response, does not allow for creating a template that allows natural processes and functions to occur (sedimentation, plant propagation, and export of organic material, channel complexity, salinity gradient, and water quality). Due to limited ability to meet project objectives, this alternative will not be carried forward for further consideration.

Alternative 4 - Large Breach at Ebey Slough

This alternative proposes a much larger breach in the dike at Ebey Slough. In this alternative, most of the existing grassland or fallow fields would be converted to estuarine emergent vegetation and mudflats. This alternative provides large core areas and connectivity because it would essentially be a mosaic of estuarine habitats such as mudflats emergent marsh and tidal

channels. Primary productivity and nutrient export are greatly improved over the current condition. Juvenile fish such as Chinook, and chum salmon as well as steelhead would be able to utilize the site for feeding and rearing for most of the tidal cycle. Perhaps as many as several hundred thousand juvenile fish would be expected to benefit from the large breach opening as several hundred acres of estuarine marsh and mudflats would be available for feeding and refuge. The greater use of estuary habitats by juvenile salmon has been linked to greater overall survival. This is a great alternative but does not include any of the benefits that could be provided by Allen Creek in regards to additional spawning, feeding and rearing opportunities. For this reason this alternative will not be brought forward for further consideration.

Alternative 5 - Restore Allen Creek and a Small Breach

This alternative combines Alternative 2 with Alternative 3. This option combines the restoration of Allen Creek by opening the mouth to Ebey Slough and bypassing the existing four tidegates in combination with the 50 foot small breach (total breach size would be 75 feet). The combining of the two alternatives results in a large cumulative improvement over the baseline condition. Analysis of breach size done under the PAS study demonstrates that a breach of 75 feet is not adequate to provide full hydrologic connectivity. Fish access in the estuarine portion of the site would still be limited. Parameters such as primary productivity, nutrient export and total core area would be improved over the no action alternative but the site is still fragmented due to limited tidal inundation. Connectivity between different habitat types would suffer due to fragmentation caused by a muted tidal response. This alternative would provide improved access to Allen Creek and its benefit to many migratory fish. The down side to this alternative is the estuarine marsh would have limited amount of tidal inundation, channel formation would be diminished and sheet flow across the site as well as hydraulic connectivity to Ebey Slough would be greatly reduced. While this alternative has a combined benefit it still does not meet all the objectives that have been set for this project. For these reasons this alternative will not be carried forward for further consideration.

Alternative 6 - Restore Allen Creek and a Large Breach- The preferred alternative

This alternative is the full restoration alternative, which combines the restoration at the mouth of Allen Creek and a large breach (1,800 feet) at the project site. This alternative includes an improved connection to Allen Creek in conjunction with tidal exchange to 400 acres of current pasture land that will evolve into a very large emergent estuarine marsh. Tidal exchange would influence the entire site on a diurnal basis. If this alternative is realized, several hundred thousand juvenile fish would be expected to benefit on a yearly basis (Haas 2001). Migratory fish would be able to access the 13 miles of Allen Creek for breeding, feeding and refuge and thousands of juvenile fish would find refuge, food and off-channel habitat that would allow for increased rearing time spent in the estuary and improved survival.

Of all the alternatives, this alternative has the highest values for primary productivity and subsequent nutrient export. Because of the improvements in tidal inundation, connectivity between the estuarine habitats would be optimized. By reconnecting Allen Creek to the marsh plain and Ebey Slough and by restoring the full hydrologic connection between the Snohomish estuary and the Qwuloolt marsh it would allow natural processes and functions to occur such as sedimentation, export of organic material, channel formation, salinity gradient. It would also lead to improved water quality and it will facilitate the recovery and re-vegetation of native plant

species, which would eventually maximize cover, forage and other habitat functions for fish and wildlife. For all of the previous mentioned reasons this alternative was chosen for comparison with the no-action baseline alternative. See Public Notice for site plan drawings (the public notice is also available online at http://www.nws.usace.army.mil/ers/doc_table.cfm “Qwuloolt Project”).

4.0 Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem.

4.1 Substrate.

There will be some initial short term impacts to the substrate from the filling and excavation proposed for construction. These impacts will diminish rapidly as the tidal actions and depositional patterns re-establish themselves once the dike is breached.

4.2 Suspended Particulates/Turbidity.

There will be short term increases of suspended particulates and turbidity due to dike breaching and reconnecting the site to Ebey Slough. Much of the internal site construction will occur prior to making this connection. These short-term impacts will be reduced to the extent practicable or avoided through implementation of timing restrictions and best management practices.

4.3 Water Quality.

There would be a short term impact to water quality parameters such as dissolved oxygen due to construction activities. Through implementation of timing restrictions and best management practices, these short-term impacts will be reduced to the extent practicable or avoided. Dissolved oxygen decreases are expected to be slight and only during the actual dike breach. Dissolved oxygen should improve within the site itself due to daily tidal water exchange to the farm ditches and also locally in Ebey Slough as a result of improved mixing because of the project.

4.4 Current Patterns and Water Circulation.

Water circulation in the project area should improve once the dike is removed and diurnal tidal circulation is restored. The currents near the breach opening will change (greater in magnitude) in incoming and outgoing tides due to the amount of drainage (1,400 acre-feet) from the restoration site.

4.5 Normal Water Fluctuations

No diversions, obstructions or changes to bottom contour will result from the proposed project. Increased water fluctuations are expected on an outgoing tide in the immediate vicinity of the dike breach as part of the tidal process, once the historic tidal regime is restored. Distributary channels, such as Ebey Slough, evolved within a much larger estuary than the current condition.

4.6 Salinity Gradients.

Modeling results indicate that there will be small salinity intrusion corresponding to upstream tidal currents at low flow. Salinity time series accomplished during the execution of the model indicate that the increases of river flow negate this trend. Higher river flow (estimated as the 2 year event) has a greater influence on salinity patterns than tidal flow.

5.0 Potential Impacts on Biological Characteristics of the Aquatic Ecosystem.

5.1 Threatened and Endangered Species.

Currently Puget Sound Chinook, Puget Sound steelhead, and bull trout are all threatened species and critical habitat designated for Chinook and bull trout includes the project vicinity. In regards to species managed by the National Marine Fisheries Service (Chinook and steelhead), no formal or informal consultation was necessary because the project complies with Section 4(d) Limit Number 8 (Habitat Restoration).

For bull trout, which is managed by the U.S. Fish and Wildlife Service, informal consultation has been completed through the Seattle District Corps of Engineer's Habitat Restoration Programmatic (2008). A Specific Project Information Form (SPIF) was submitted to the USFWS and they determined that the project complies with all terms and conditions of the programmatic consultation.

5.2 Aquatic Food Web.

No negative impacts to the aquatic food web are anticipated from this project. One of the project objectives is to create a template that allows for natural processes and functions to occur such as plant propagation and the export of organic material. By establishing estuarine vegetation, the site will act as a local food source for juvenile fish. Estuarine emergent vegetation is a good source of insects for young fish to eat. The broad leaves of plants like sedges provide the structure on which an insects can rest or lay eggs. Often these insects or eggs then fall into the water to become prey resources for young fish. Plants like sedges are also tremendously high in primary productivity with organic carbon as one of the significant byproducts. As the tides circulate the water at the site, the resultant nutrients and prey species are exported back out to the estuary where many organisms directly benefit.

5.3 Fish.

There will a short term disturbance for some fish when the dike is breached. The impacts should be minimal since fish are mobile and timing of construction will be set to limit exposure. Fish that utilize the estuary for any portion of their life cycle are expected to benefit from this project. Juvenile fish, such as salmon, trout, shiner perch, c-o sole and starry flounder are expected to have increased food and refuge as a result of the restoration actions.

5.4 Wildlife.

Noise associated with project construction and disturbances to the surrounding uplands and riparian zone may have an effect on bird and terrestrial mammals in the project vicinity. The impacts of any sound disturbance would likely result in temporary displacement of animals. Construction activities and disturbances on the land may temporarily disrupt local movements of mammals and other wildlife.

6.0 Special Aquatic Sites

6.1 Wetlands.

Wetlands will be affected as part of the proposed project. One of the objectives of the project (i.e. create a self-sustaining brackish tidal site with minimal construction and maintenance) is to

change the current condition from a degraded palustrine emergent wetland to an estuarine emergent wetland. As a result, both function and value will improve. Loss of historic estuarine marsh habitat is a serious concern in the Snohomish delta. Urbanization and conversion of marsh to agriculture have been two of the most serious threats. Armoring of the bankline, diking and other means of preventing tidal intrusion has reshaped this estuary. While there are still large areas of wetland in the lower basin, many of these have been altered by converting estuarine marsh to palustrine systems. This trend of loss and conversion is typical of the area around the Qwuloolt Project. Ongoing restoration efforts by a wide variety of interest groups in the Snohomish Delta are now starting to reverse this trend by restoring tidal action to degraded palustrine wetlands and restoring estuarine emergent marsh.

In regards to impacts, temporary impacts from construction are expected in the areas of fill and excavation but these will rapidly recover. Additionally, there will be a permanent filling of some existing wetlands. Out of 400 acres of current wetland, approximately 13 acres of palustrine emergent wetland will be filled in order to construct set-back levees. Areas converted from existing condition to new channel are not considered as part of the impacts to wetland area. As evidenced in the 1938 photo, tidal channels were much more extensive historically. Therefore this part of the construction activity will restore site conditions to previous and documented configuration. The material that is excavated on site is expected to stay on site to be used as levee material. Any excess material will be used to fill in low areas to enhance positive drainage and bring some lower tidal elevations up to estuarine emergent marsh elevations. The removal of the existing dike is expected to restore about three acres of wetland.

In regards to wetland impacts, there are both pluses and minuses for this project in regards to wetlands. The project cannot go forward without allowing for the construction of set-back levees and other project features that maintain flood protection for adjacent properties. The discussion then becomes one of tradeoffs weighing considerations of issues like the benefits of an estuarine emergent system in comparison to the current condition of a palustrine emergent system, the increase in function and values expected from the new wetland system, and the systemic benefits throughout the lower Snohomish ecosystem in relationship to the short-term impacts. To address these concerns, Table 5 was developed. It contains many of the pertinent functions associated with these different types of wetlands and in a qualitative way evaluates the changes that can be expected. Table 5 compares the expected results for restoring estuarine emergent marsh over the current palustrine emergent marsh. The restoration of the estuarine emergent marsh is intended to approximate the historic condition as closely as possible. Many of the functions identified in the Table 5 are included in the objectives for the project. Also noted are functions that will have a larger than local benefit. For instance, the proposed project is expected to have system-wide benefits for fish habitat support, primary productivity (nutrient export) and shorebird and migratory waterfowl support.

Table 5. Comparison of Functions and Values of Current and Proposed Site Conditions

Function	Palustrine emergent	Estuarine emergent	Discussion
Water quality	minus	plus	Currently there are some water quality problems on site. Low dissolved oxygen and temperature in Allen, Jones and Ebey Slough, stagnant water in the farm ditches. Once tidal exchange is restored with a diurnal tide many of the problems should improve.
Base flow management	minus	plus	Currently the site is isolated from Ebey Slough, once the dike is removed there will be a free exchange of flow. Estuarine wetlands will be able to store some water for release in low flow periods.
Sedimentation	minus	plus	One of the goals is to improve sedimentation retention on site to build up marsh plain. Monitoring has shown this to be the case. The current condition is going through subsidence.
Nitrogen removal	same	same	Sedge and rush dominated marshes are famous for nitrogen removal. Reed canary grass also has the benefit of nitrogen removal.
Fish habitat support	minus	plus System wide benefit	There is little comparison between the amount of fish habitat support (including endangered species) that can be realized for the restoration of the Qwuloolt marsh. Each year, several hundred thousand fish will benefit from this project from feeding and refuge. The current condition is dismal. Lower Allen and Jones Creeks currently have limited benefits to local populations and a tidegate that restricts fish access.
Shore bird and migratory waterfowl support	minus	plus System wide benefit	Currently, the site supports some waterfowl (mallards, Canada geese) and no shorebirds. Conversion to an estuarine emergent system which includes mudflats will provide both a food source and additional habitat for shorebirds. Currently the Marysville mitigation site supports several species of shorebird.

Function	Palustrine emergent	Estuarine emergent	Discussion
Vegetation	minus	plus	The current condition includes almost a monotype of reed canary grass with some Canada thistle, both are considered noxious weeds and have low wildlife potential. The restored site will have sedges, rushes and cattail a much more diverse plant community that is very beneficial to wildlife.
Flood storage	same	same	Under the restored condition there should be improved hydrologic connectivity but storage remains about the same.
Primary productivity	minus	plus System wide benefit	Partly due to tidal exchange, estuarine emergent communities are one of the most productive natural communities. They are about 20% more productive than palustrine emergent communities. For the estuarine community, all of the organic output is distributed over a wide area by the tide, unlike the current condition.
Function	Palustrine emergent	Estuarine emergent	Discussion
Water quality	minus	plus	Currently there are some water quality problems on site. There is low dissolved oxygen and temperature in Allen Creek, Jones Creek and Ebey Slough, stagnant water in the farm ditches. Once tidal inundation is restored with a diurnal tide many of these problems should improve.
Base flow management	minus	plus	Currently the site is isolated from Ebey Slough, once the dike is removed there will be a free exchange of flow. Estuarine wetlands will be able to store some water for release in low flow periods.
Sedimentation	minus	plus	One of the objectives of the project is to improve sedimentation retention on site to build up marsh plain. Monitoring has shown this to be the case. The current condition is going through subsidence. The proposed project will restore natural sedimentation processes.
Nitrogen removal	same	same	Sedge and rush dominated marshes are famous for nitrogen removal. Reed canary grass also has the benefit of nitrogen removal.

Function	Palustrine emergent	Estuarine emergent	Discussion
Fish habitat support	minus	plus system wide benefit	There is little comparison between the amount of fish habitat support (including endangered species) that can be realized for the restoration of the Qwuloolt marsh as compared to the existing condition. Each year, several hundred thousand fish will benefit from this project from feeding and refuge. The current condition is dismal. Lower Allen and Jones Creeks currently have limited benefits to local populations and a tidegate that restricts fish access.
Shore bird and migratory waterfowl support	minus	plus system wide benefit	Currently, the site supports some waterfowl (mallards, Canada geese) and no shorebirds. Conversion to an estuarine emergent marsh system which includes mudflats will provide both a food source and additional habitat for shorebirds. Currently the Marysville mitigation site supports several species of shorebird.
Vegetation	minus	plus	The current condition includes a very limited and uniform vegetation pattern of reed canary grass with some Canada thistle, both are considered invasive weedy species and have low wildlife potential. The restored site will have sedges, rushes and cattail a much more diverse plant community and very beneficial to wildlife.
Flood storage	same	same	Under the restored condition there should be improved hydrologic connectivity but flood storage remains about the same.
Primary productivity	minus	plus system wide benefit	Partly due to tidal exchange, estuarine emergent marshes communities are one of the most productive natural communities. They are about 20% more productive than palustrine emergent marsh communities. For the estuarine community, all of the organic output is distributed over a wide area by the tide, unlike the current condition.

Source Corps 2009

For the proposed restoration alternative, we see several improvements in wetland function over the current condition. Some of these benefits are of greater scale and will be realized over a system wide area and timeframe. Although there will be a permanent loss of to 13 acres of the currently degraded wetlands, the overall improvement through restoration will far outweigh the impacts. In this sense the project is self mitigating. The partners involved in the Qwuloolt Project have been very conscious of avoiding and minimizing wetland impacts during project planning and design. It is the intention of the project to gain as much new estuarine emergent wetland as possible.

In 2006, NOAA prepared a wetland assessment in support of the proposed Qwuloolt stream restoration project. The report states that the Qwuloolt site was historically tidally influenced. However, for over 70 years the area has been isolated from tidal influences by a system of dikes and tide gates. In addition, approximately 20 to 40 percent of the Jones Creek and Allen Creek channels had been filled and replaced with ditches. To make the property useable for agriculture, a drainage system was in use until the property was purchased in 1996. The wetlands determination was made using methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997), a manual consistent with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). NOAA determined that the majority of the Qwuloolt site is wetland, with occasional patches of upland on local high points.

The wetland is bounded by the City's sewer treatment plant to the west, Ebey Slough to the south, and residential development to the north and east. The wetland is approximately 370 acres in size. The majority of the wetland is palustrine emergent (PEM), with some palustrine scrub shrub (PSS) areas. In November, 2008 Corps and NMFS personnel confirmed this delineation using the *Interim Regional Supplement to the Corps of Engineers Wetland delineation Manual: Western Mountains, Valleys and Coast Region*, USACE 2008. ERDC/EL TR-08-423. The conclusion of the wetland confirmation was the NOAA delineation was accurate, the site is jurisdictional under Section 404 of the Clean water Act and the site is adjacent to Ebey Slough.

6.2 Sanctuaries and Refuges.

The proposed action will have no effect on sanctuaries or refuges and is not located in the proximity of any sanctuaries or refuges.

6.3 Mudflats.

The project will create new mudflats once the dike is opened to tidal inundation and no mudflats are anticipated to be impacted during construction activities.

6.4 Vegetated Shallows.

There are no vegetated shallows located in the proximity of the project.

6.5 Rifle and pool complexes.

There are no rifle and pool complexes in the lower portions of Allen or Jones Creeks or in Ebey Slough. The project will not impact rifle or pool complexes.

7.0 Potential Impacts on Human Use Characteristics.

7.1 Municipal and Private Water Supplies.

There will be no impacts to municipal water supplies located within the project area. There is one known private well in the area, this project will facilitate well head protection for the land owner.

7.2 Recreational and Commercial Fisheries.

Recreational and commercial fisheries will benefit from this project. One of the project purposes is to improve opportunities for a wide variety of salmon and trout. This would include juvenile salmon off-channel rearing and forage areas as well as improvement in spawning and migratory opportunities in Jones and Allen Creeks. Once in-water construction is completed, the proposed Qwuloolt Project will have numerous advantages to anadromous salmon. Many of the project objectives were oriented towards improving habitat conditions for both migratory and resident fish. Once the dike is breached, approximately 400 acres of intertidal habitat become available for juvenile rearing, feeding and refuge. Estuarine plants and mudflats will provide a food source. On a high tide, the entire site becomes a large rearing area and on an outgoing tide, small tidal channels act as refuge. With an improved connection to Ebey Slough, both Allen and Jones creeks will be accessible to migratory species. Chinook, chum, and pink salmon; bull trout; cutthroat; shiner perch; and sole are few of the species that will benefit as a result of the project. Each year, several hundred thousand juvenile salmonids are expected to utilize the Qwuloolt area and benefit from this project.

7.3 Water Related Recreation.

There may be a slight benefit to the project. There will be more shoreline edge as a result of breaching the dike and allowing tidal inundation. Small water craft such as canoes or kayaks could enter the site on a high tide.

7.4 Aesthetics

The project site is a fallow agricultural field. It has a large view shed looking to the south. Large open areas are visible and provide bird watching and walking opportunities. The project as proposed will not affect the aesthetics at the site except for during construction.

7.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves.

None of these will be affected by the project. There are no such designated areas in or around the project area.

7.6 Public Coordination.

There has been a good deal of public coordination for this project. An informal public workshop was held with many local residents attending with the potential for additional workshops in the near future. Several news articles have appeared in the local papers. In addition, a Notice of Availability for the draft EA and Public Notice was sent to over 500 local property owners on February 4, 2009 and was circulated for 21 days.

8.0 Evaluation and Testing of Discharge Material.

8.1 General Evaluation of Dredge or Fill Material.

A Level 1 Site Assessment for Hazardous Toxic and Radiological Waste (HTRW) was conducted at the project area in February of 2008. The objective of this HTRW study was to identify the presence and estimate the volume of any contamination at the former Poortinga property, Marysville, WA, the proposed site of the Qwuloolt Project. Another objective is to confirm the Phase I Environmental Site Assessment conducted by EMCON for the property dated January 13, 1998. A site visit was included in this analysis and potential HTRW concerns on project associated lands, easements, or rights-of-ways were reported. The HTRW screening study concurs with the conclusions presented in the Phase I Environmental Site Assessment dated January 13, 1998. HTRW concerns on the Poortinga property itself are low; the site appears free of obvious issues that may impact project plans for restoration of the site.

8.2 Water Column Effects.

This is not a dredging project where dredged material is disposed through the water column. It is a habitat restoration/construction project where most of the work is can be completed prior to breaching the dike on Ebey Slough. There will be some short term construction related impacts to the water column. Once the dike is removed at Ebey Slough, there will be a short term elevation in turbidity as the tide inundates the site. In the long term there will be water column benefits to the project. Once estuarine vegetation becomes established, it will help filter the water column. One of the project objectives is to improve the sedimentation in the area, with the expectation that this will enhance marsh creation. Another benefit to the water column from this project will be more planktonic, epibenthic, and water column primary producers at the site. Nutrient export from the marsh will provide a food source for water column dependant species such as copepods and amphipods which are prey species for juvenile fish and shore birds.

8.3 Effects on Benthos.

There will be large changes in benthos at the site, which is consistent with the project objectives to maximize cover, forage and other habitat functions for fish and wildlife. The site is currently a palustrine emergent wetland with associated infaunal species such as polychaetes. Once the dike is removed and the tide allowed in, the benthos of the site will change completely to estuarine-associated species of annelids, polychaetes, nematodes, and related fauna. These species will be more diverse and abundant than the current condition and will be a prey resource for juvenile fish and shorebirds.

8.4 Comparison of Excavation and Discharge Sites.

All of the disposal of excavated material will occur on site. Any excess of material will be used to fill in existing farm ditches or to create berms that will be used for wind protection and establishing emergent estuarine vegetation. The location of the material excavated is the same as the disposal site.

8.5 Physical Tests and Evaluations.

In August 2008, a geo-technical survey was performed at the project site¹. The geo-technical survey and associated laboratory analysis consisted of:

- A visual surface reconnaissance of the project area.
- Eleven hollow stem auger or mud rotary borings with standard penetration tests. The borings were located along the probable levee alignments. Soil logs and blow counts accompanied the borings. Depths ranged from 21 to 51 feet.
- 31 Hydrometer analysis and grain size distribution tests.
- 30 Atterberg limit analysis
- 4 Wash fines analysis
- 75 Moisture content determinations.

Based on the results of the boring, the site is dominated by alluvium with minor amounts of fill and weathered till and advanced outwash material. The soils at the site are generally “soft” (easily compacted).

Several hydrological models developed for the project (HEC-RAS steady state, HEC RAS unsteady state, UNET) evaluated conditions at the Qwuloolt site. Based upon results of the modeling efforts, the proposed restoration project will not increase water levels during high flows or flood risk along Allen Creek. A three dimensional hydrodynamic model for the estuary was developed by Battelle Pacific Northwest National Laboratory to evaluate the effects of four large (almost 1300 acres of total restoration) restoration actions (including Qwuloolt) on the Snohomish estuary. A salinity time series for a high-river flow condition shows a drop in values below 5 parts per thousand and tidal variation of salinity distribution in Ebey Slough was predicted to be close to zero salinity by high river discharge.

9.0 Factual Determinations.

9.1 Physical Substrate Determinations.

The physical substrate will not be significantly affected by the proposed action.

9.2 Water Circulation, Fluctuations, and Salinity Determinations

As described above, water circulation, fluctuation and salinity will not be significantly affected by the proposed action.

9.3 Suspended Particulates/Turbidity.

Suspended particulates and turbidity will not be significantly increased from the proposed action.

9.4 Contaminants.

Based upon site assessments, no contamination is expected to be encountered at the site. If contaminated material/soil is encountered, it will be handled according to existing laws and statutes.

9.5 Aquatic Ecosystem and Organisms Determination.

The proposed action will benefit the aquatic ecosystem.

¹ Kleinfelder, 2008. Subsurface Explorations and Laboratory Testing Data Report.

9.6 Determination of Cumulative Effects on the Aquatic Ecosystem.

The proposed project is one of several recently constructed or proposed estuarine restoration projects in the Snohomish delta. The project as proposed, because of its size and processes that it seeks to restore, will have both individual and cumulative positive effects on the aquatic ecosystem.

9.7 Determination of Secondary Effects on the Aquatic Ecosystem.

No secondary effects are anticipated as a result of the proposed action.

10.0 Proposed and Alternative Actions to Minimize Adverse Effects.

Several actions have been included in this project to both avoid and minimize adverse effects. Design components such as set-back levees were placed at the edges of the property to maximize the amount of restoration while ensuring that the risk of flooding offsite properties remains unchanged. Filling and excavation was kept to a minimum to achieve project objectives and provide the same level of flood protection that the existing tide gate and diking system currently provide. With the removal of over 1,800 linear feet of existing dike along Ebey Slough, three acres of new wetland will be restored.

The largest effort to minimize adverse effects comes from land acquisition efforts performed by the project partners. For the last ten years, parcels of land and easements have been secured that both expand the amount of wetlands that are being restored and have reduced the amount of fill needed for restoration actions. A good example of how this has worked is the northern portion of the site near Allen Creek. Two parcels were secured that allowed for an additional 4 acres of restoration and at the same time shortened the need for additional set-back levee by two hundred feet and removed the need to install a tide gate at the northern end of Allen Creek as it enters the property. Further actions are ongoing to reduce the need for a portion or all of a set-back levee at the northeastern portion of the property. If a purchase agreements or easements can be negotiated an additional 3 acres of fill will not be needed.

11.0 Review of Conditions for Compliance with the Guidelines.

The following terms and conditions must be followed for compliance for the proposed project:

If human remains, historic resources, or archaeological resources are encountered during construction, all ground disturbing activities in the vicinity of the discovery will immediately cease and the construction manager shall immediately notify the Corps archaeologist for this project. The archaeologist will initiate the Federal and State coordination required to determine if the resources warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places. Work shall not re-commence until notified that all requirements have been fulfilled.

The construction contractor shall comply with the conditions specified in Water Quality Certification Order #6509.

The Corps will comply with Washington State Department of Fish and Wildlife timing restrictions for all in water work in Ebey Slough.

Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date

The Lead Construction Contractor must provide a copy of the authorization transmittal letter, the permit form, and drawings to all contractors performing any of the authorized work.

No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

The work will not interfere with the public's right to free navigation on navigable waters of the United States.

Prior to any construction a stormwater pollution prevention plan will be developed and followed and a NPDES construction permit obtained.

The work will not use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged will be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

Monitoring will be conducted at the site to demonstrate goal and objectives are being met. If project goals and objectives are not being met, then adaptive management and a contingency plan approved by project proponents (Tulalip Tribes, National Marine Fisheries Northwest Restoration Center, U.S Fish and Wildlife Service, Washington Department of Ecology, the Seattle District Corps of Engineers and the City of Marysville) shall be implemented.

11.1 Availability of Practicable Alternatives

The availability of practicable alternatives is discussed in detail in the EA developed for the project and section 3 of this evaluation. The preferred alternative (Alternative 6) improves both the function and value over the current conditions of the wetlands on site and is the most beneficial to fish and wildlife.

11.2.1 Water Quality.

The proposed excavation and discharge will comply with water quality standards and requirements pursuant to the Clean Water Act of Water Quality Certification Order #6509. The project will meet with the terms of the conditions included within the certification.

11.2.2 Threatened and Endangered Species and Essential Fish Habitat.

Three listed species occur in the project area, they are Chinook salmon and steelhead (managed by the National Marine Fisheries Service) and bull trout (managed by the U.S. Fish and Wildlife Service).

Because the Qwuloolt Project has received funding from the Washington State Salmon Recovery Board, the National Marine Fisheries Service has determined that Qwuloolt Project complies with section 4(d) Limit Number 8 (Habitat Restoration), so no formal or informal consultation is necessary. This also covers the requirements for Essential Fish Habitat.

For bull trout, a Specific Project Information Form was submitted for the Habitat Restoration Programmatic Biological Opinion (2008). The Corps had concluded that this project may effect , but is not likely to adversely affect bull trout and designated critical habitat. On January 23, 2009, we received concurrence on this determination from the U. S. Fish and Wildlife Service and that additional consultation is not required.

11.2.3 Marine Sanctuaries

There are no marine sanctuaries in the vicinity of the project

11.2.4 Coastal Zone Management Act

The Corps prepared a Coastal Zone Consistency evaluation and provided this information to Washington Department of Ecology, who concurred with the Corps' determination.

11.2.5 National Historic Preservation Act

In a letter dated December 9, 2008, the State Historic Preservation Officer concurred with the determination that no historic properties will be affected by this project.

11.3 Extent of Degradation of the Waters of the United States.

The proposed action will neither cause nor contribute to degradation of the water of the United States. The project is intended to improve the quality of waters of the U.S. by restoring wetlands at the set to the historic condition which will improve both functions and value over the current condition.

11.4 Steps to Minimize Potential Adverse Impacts on the Aquatic Ecosystem.

Appropriate and practicable steps such as planning for anticipated impacts, sensitivity to the environment through design and maintenance controls to minimize potential adverse impact of the proposed project on the aquatic ecosystem have been incorporated into the project design. See section 10 of this evaluation for additional information.

12.0 Findings.

This is a Corps project and the Corps does not issue itself permits. The Corps conducted the analyses presented in the above 404(b)(1) Evaluation and General Policies for the Evaluation of Permit Applications analysis, and the Corps finds that this project complies with the substantive elements of Section 404 of the Clean Water Act and the Rivers and Harbors Act provided that the inclusion of the practicable conditions in section 11.0 are met and appropriate regulatory approvals have been obtained.

Appendix D

Coastal Zone Consistency Concurrence and Water Quality Certification



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

March 12, 2009

REGISTERED MAIL
RB 670 356 909 US

Patrick Cagney
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, WA 98124

RE: Water Quality Certification Order #6509 for U.S. Army Corps of Engineers
(Corps) Reference #PL-09-01 to restore a portion of the Snohomish River estuary
to improve habitat for fish and wildlife species, Ebey Slough, Marysville,
Snohomish County, Washington

Dear Mr. Cagney:

On December 24, 2008, you submitted a letter request to the Department of Ecology (Ecology) for a Section 401 Water Quality Certification (401 Certification) under the federal Clean Water Act (CWA) for the proposed project. A joint public notice was distributed by the Corps for the above-referenced project pursuant to the provisions of Chapter 173-225 WAC on February 04, 2009.

This project proposes:

- To restore a portion of the Snohomish River estuary to improve habitat for fish and wildlife species.
- Excavation and removal of 1800 linear feet of dike at Ebey slough, creation of new channels, stream improvements to Jones and Allen creeks, construction of internal berms and set back levees.
- Total excavation of approximately 186,000 cubic yards of material and fill of 275,000 cubic yards of material. Project will have a permanent loss of approximately 18 acres of palustrine emergent wetlands and improved function and value of over 340 acres of wetland.

On behalf of the State of Washington, through the enclosed Order, Ecology certifies that the work described in the request for 401 Certification and the February 04, 2009, public notice complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, as amended, and applicable state laws. This certification is subject to the conditions contained in the enclosed Order.

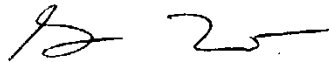


(Over)



If you have any questions, please contact Lori Lull at 425-649-7271, LENL461@ecy.wa.gov. The enclosed Order may be appealed by following the procedures described in the Order.

Sincerely,



Geoff Tallent
Section Manager
Northwest Regional Office
Shorelands and Environmental Assistance Program

GT:lcl:cja
Enclosure

cc: Jamie Bails, Washington Department of Fish and Wildlife
John Van Soest
Cheryl Dungan, City of Marysville

e-cc: JP Fontaine - jfontainevoid@aol.com
Mary Faure' - maryf@thebondshop.net
Elwyn Wood, edwood3@bellsouth.net
Tim Schlender - HQ
Loree' Randall - HQ
Erik Stockdale - Ecology NWRO
Barbara Nightingale - Ecology NWRO
ecyrefedpermits@ecy.wa



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

March 12, 2009

CERTIFIED MAIL
7007 0220 0004 6659 3713

Patrick Cagney
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, WA 98124

RE: Coastal Zone Management Consistency Determination for Corps Reference
#PL-09-01 U.S. Army Corps of Engineers Environmental Assessment and Clean
Water Act Public Notice, Qwuloolt Habitat Restoration Project, Ebey Slough,
Snohomish County, Washington

Dear Mr. Cagney:

The above-referenced public notice issued by the U.S. Army Corps of Engineers (Corps)
for proposed work in navigable waters has been reviewed.

On December 24, 2008, the Corps submitted a Coastal Zone Management Act
Consistency Determination with the Washington State Coastal Zone Management
Program (CZMP). Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of
1972 as amended, the Department of Ecology (Ecology) concurs with the Corps'
determination that the proposed work is consistent with Washington's CZMP. This
concurrence is based upon the Corps' compliance with all applicable enforceable policies
of the CZMP, including Section 401 of the Clean Water Act.

If you have any questions regarding Ecology's consistency determination please contact
Lori Lull at 425-649-7271.

You have the right to appeal this decision to the Pollution Control Hearings Board. To
appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the
"date of receipt" of this document. Filing means actual receipt by the Board
during regular office hours.

Patrick Cagney
March 12, 2009
Page 3 of 3

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Ch. 43.21B RCW.

Sincerely,



Geoff Tallent
Section Manager
Northwest Regional Office
Shorelands and Environmental Assistance Program

GT:lcl:cja

cc: Jamie Bails, Washington Department of Fish and Wildlife
John Van Soest
Cheryl Dungan, City of Marysville

e-cc: JP Fontaine - jfontainevoid@aol.com
Mary Faure' - maryf@thebondshop.net
Elwyn Wood, edwood3@bellsouth.net
Loree' Randall – Ecology HQ
Erik Stockdale - Ecology NWRO
Barbara Nightingale – Ecology NWRO
ecyrefedpermits@ecy.wa

IN THE MATTER OF GRANTING A) ORDER #6509
WATER QUALITY) Corps Reference No. PL-09-01
CERTIFICATION TO: U.S. Army) Qwuloolt Habitat Restoration Project, City of
Corps of Engineers) Marysville, Ebey Slough, Snohomish County,
in accordance with 33 U.S.C. 1341) Washington.
(FWPCA § 401), RCW 90.48.120, RCW)
90.48.260 and Chapter 173-201A WAC)

TO: Patrick Cagney
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, WA 98124

On December 24, 2008, the U.S. Army Corps of Engineers submitted a letter to the Department of Ecology (Ecology) requesting a Section 401 Water Quality Certification. A joint public notice was distributed by the Corps for the above-referenced project pursuant to the provisions of Chapter 173-225 WAC on February 04, 2009.

The project proposes:

- To restore a portion of the Snohomish River estuary to improve habitat for fish and wildlife species.
- Excavation and removal of 1800 linear feet of dike at Ebey slough, creation of new channels, stream improvements to Jones and Allen creeks, construction of internal berms and set back levees.
- Total excavation of approximately 186,000 cubic yards of material and fill of 275,000 cubic yards of material. Project will have a permanent loss of approximately 18 acres of palustrine emergent wetlands and improved function and value of over 340 acres of wetland.

The project site is located near and within the City of Marysville (Longitude 48°02'33.82"N Latitude 122°09'28.55"), WRIA# 7, Snohomish Watershed.

AUTHORITIES:

In exercising authority under 33 U.S.C. § 1341, RCW 90.48.120, and RCW 90.48.260, Ecology has examined this application pursuant to the following:

1. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. §1311, 1312, 1313, 1316, and 1317 (FWPCA § 301, 303, 306 and 307);

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2. Conformance with the state water quality standards contained in Chapter 173-201A WAC and authorized by 33 U.S.C. §1313 and by Chapter 90.48 RCW, and with other applicable state laws; and
3. Conformance with the provision of using all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

WATER QUALITY CERTIFICATION CONDITIONS:

Through issuance of this Order, Ecology certifies that it has reasonable assurance that the activity as proposed and conditioned will be conducted in a manner that will not violate applicable water quality standards and other appropriate requirements of state law. In view of the foregoing and in accordance with 33 U.S.C. §1341, RCW 90.48.120, RCW 90.48.260 Chapter 173-200 WAC and Chapter 173-201A WAC, water quality certification is granted to the Applicant subject to the conditions within this Order.

Certification of this proposal does not authorize the Applicant to exceed applicable state water quality standards (Chapter 173-201A WAC), ground water standards (Chapter 173-200 WAC) or sediment quality standards (Chapter 173-204 WAC). Furthermore, nothing in this certification shall absolve the Applicant from liability for contamination and any subsequent cleanup of surface waters, ground waters or sediments occurring as a result of project construction or operations.

A. General Conditions

- A1. For purposes of this Order, the term "Applicant" shall mean U.S. Army Corps of Engineers and their agents, assignees and contractors.
- A2. For purposes of this Order, all submittals required as conditions shall be sent to Ecology's Northwest Regional Office, Attn: 401/CZM Federal Project Manager, 3190 160th Ave SE, Bellevue, WA 98008-5452. Any submittals shall reference Order #6509 and Corps Reference No. PL-09-01.
- A3. Work authorized by this Order is limited to the work described in the U.S. Army Corps of Engineers letter requesting 401 certification received by Ecology on December 24, 2008 and Public Notice issued February 4, 2009. The Applicant will be out of compliance with this Order and must reapply with an updated application if the information contained in the 401 request and public notice is voided by subsequent changes to the project not authorized by this Order.
- A4. Within 30 days of receipt of an updated JARPA, Ecology will determine if the revised project requires a new water quality certification and public notice or if a modification to this Order is required.

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- A5. Copies of this Order shall be kept on the job site and readily available for reference by Ecology personnel, the construction superintendent, construction managers and lead workers, and state and local government inspectors.
- A6. The Applicant shall provide access to the project site and all mitigation sites upon request by Ecology personnel for site inspections, monitoring, necessary data collection, and/or to ensure that conditions of this Order are being met.
- A7. Nothing in this Order waives Ecology's authority to issue additional orders if Ecology determines that further actions are necessary to implement the water quality laws of the state. Further, Ecology retains continuing jurisdiction to make modifications hereto through supplemental order, if additional impacts due to project construction or operation are identified (*e.g.*, violations of water quality standards, downstream erosion, etc.), or if additional conditions are necessary to further protect water quality.
- A8. The Applicant shall ensure that all appropriate project engineers and contractors at the project site have read and understand relevant conditions of this Order and all permits, approvals, and documents referenced in this Order. The Applicant shall provide Ecology a signed statement (see Attachment A for an example) from each project engineer and contractor that they have read and understand the conditions of this Order and the above-referenced permits, plans, documents, and approvals. These statements shall be provided to Ecology before construction begins at the project site.
- A9. This Order does not authorize direct, indirect, permanent, or temporary impacts to waters of the state or related aquatic resources, except as specifically provided for in conditions of this Order.
- A10. Failure of any person or entity to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce its terms.

B. Construction Conditions

- B1. All work in and near the water shall be done so as to minimize turbidity, erosion, and other water quality impacts. Construction stormwater, sediment, and erosion control Best Management Practices (BMP's) suitable to prevent exceedances of state water quality standards shall be in place before starting clearing, filling and grading work and shall be maintained throughout construction.
- B2. The project shall be clearly marked/staked prior to construction. Clearing limits, travel corridors and stockpile sites shall be clearly marked. Sensitive areas and buffers that are to be protected from disturbance shall be marked so as to be clearly visible to equipment operators. Equipment shall enter and operate within the marked clearing limits corridors and stockpile areas.

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- B3. The applicant shall construct flood protection levees. Levees shall provide the same (or greater) level of flood protection that currently exists.
- B4. The Applicant shall obtain and comply with all stormwater requirements within the National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit for Construction Activity for this project.

C. Water Quality Conditions

- C1. Because this project will cause a long term benefit for the water quality Ecology has determined that a larger mixing zone is appropriate. In granting this mixing zone, Ecology finds that the Applicant's supporting information clearly indicates that the mixing zone does not have reasonable potential to 1) cause a loss of sensitive or important habitat; 2) substantially interfere with the existing or characteristic uses of Ebey Slough; 3) result in damage to the ecosystem; and 4) adversely affect public health.
 - a. A turbidity mixing zone is granted for a distance of 400 feet for the activity of the breach of the dike on Ebey Slough for a maximum of one week.
- C2. At least 30 days prior to beginning in-water work, the Applicant shall submit a Water Quality Monitoring and Protection Plan (WQMPP) to the Federal Permit Coordinator for review and approval. In water work shall not begin until Ecology approves the WQMPP.
 - a. At a minimum the WQMPP shall include:
 - i. The name(s) and phone number(s) of the person responsible for onsite monitoring and reporting.
 - ii. The BMP's and procedures to be used to protect water quality during the specific proposed in-water activities.
 - iii. A water sampling plan for turbidity and dissolved oxygen.
 - iv. A map with numbered or named sampling locations associated with the in-water activities that require monitoring.
 - b. A background sample shall be collected at the beginning of each sampling event.
 - c. Ecology must approve, in writing, any changes or additions to the WQMPP.
 - d. Monitoring results shall be submitted weekly to the Ecology Federal Permit Coordinator, per condition A.2.
 - e. Additional monitoring may be required if the monitoring results indicate that the water quality standards have not been met.

D. Monitoring Requirements

- D1. Within 120 days of completing construction, the Applicant shall submit a final as-built report with maps to Ecology, unless additional time is requested in writing and approved by Ecology.

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- D2. The Applicant shall submit final restoration monitoring plan to Ecology prior to construction.
- D3. The Applicant shall submit monitoring reports to Ecology documenting conditions at the restoration site for years 1 and 5, unless otherwise approved by Ecology.

E. Timing Requirements

- E1. This Order is valid until all compliance requirements in this document have been met.

F. Notification Requirements

- F1. Notification shall be provided to Ecology via phone 425-649-7271 or email to Ecology's Federal Project Coordinator.
 - a. At least ten (7) days prior to any pre-construction meeting.
 - b. At least three (3) days prior to the start of construction at the project site.
 - c. Within fourteen (14) days after completion of all construction phases.
 - d. Immediately following a violation of water quality standards or any condition of this Order

NOTE: These notifications shall include the Applicant's name, project name, project location, the number of this Order, contact and contact's phone number.

G. Emergency/Contingency Measures

- G1. The Applicant shall develop a spill prevention and containment plan for this project, and shall have spill cleanup materials and an emergency call list available on site.
- G2. Any work that is out of compliance with the provisions of this Order, or conditions causing distressed or dying fish, or any discharge of oil, fuel, or chemicals into state waters, including wetlands, or onto land with a potential for entry into state waters, is prohibited. If these occur, the Applicant or operator shall immediately take the following actions:
 - a. Cease operations that are causing the compliance problem.
 - b. Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.
 - c. In the event of finding distressed or dying fish, the applicant shall collect fish specimens and water samples in the affected area within the first hour of the event. These samples shall be held in refrigeration or on ice until the applicant is instructed by Ecology on what to do with them. Ecology may require analyses of these samples before allowing the work to resume.

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- d. In the event of a discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of any spilled material and used cleanup materials.
 - e. Immediately notify Ecology's 24-Hour Spill Response Team at 1-800-258-5990 of the nature of the problem, any actions taken to correct the problem, and any proposed changes in operations to prevent further problems.
- G3. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters, including wetlands.
- G4. If at any time during work the proponent finds buried chemical containers, such as drums, or any unusual conditions indicating disposal of chemicals, the proponent shall immediately notify Ecology's 24-Hour Spill Response Team at 1-800-258-5990.

H. Appeal Process

You have a right to appeal this Order. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your Notice of Appeal.
- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board

Mail appeal to:

The Pollution Control Hearings Board
PO Box 40903
Olympia, WA 98504-0903

Deliver your appeal in person to:

The Pollution Control Hearings Board
4224 – 6th Ave SE Rowe Six, Bldg 2
Lacey, WA 98503

OR

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2. To serve your appeal on the Department of Ecology

Mail appeal to:

The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, WA 98504-7608

OR

Deliver your appeal in person to:

The Department of Ecology
Appeals Coordinator
300 Desmond Dr SE
Lacey, WA 98503

3. And send a copy of your appeal to:

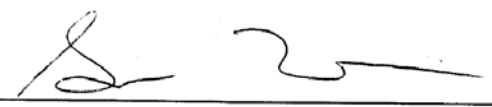
Department of Ecology
Northwest Regional Office
Attn: Lori Lull
3190 160th Avenue SE
Bellevue, WA 98008

For additional information visit the Environmental Hearings Office Website:
<http://www.cho.wa.gov>

To find laws and agency rules visit the Washington State Legislature Website:
<http://www1.leg.wa.gov/CodeReviser>

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Ch. 43.21B RCW.

Dated March 12, 2009 at Bellevue, Washington.



Geoff Tallent
Section Manager
Shorelands and Environmental Assistance Program
Department of Ecology
State of Washington

ATTACHMENT A**U.S. ARMY CORPS OF ENGINEERS
QWULOOLT HABITAT RESTORATION PROJECT
Water Quality Certification Order #6509****Statement of Understanding of
Water Quality Certification Conditions**

I have read and understand the conditions of Order #6509 Section 401 Water Quality Certification for the U.S. Army Corps of Engineers Qwuloolt Habitat Restoration Project. I have also read and understand all permits, plans, documents, and approvals associated with the project referenced in this Order.

Signature_____
Date_____
Title_____
Company

Environmental Resources Section

December 2008

COASTAL ZONE CONSISTENCY DETERMINATION**Section 544 Qwuloolt Restoration Project****City of Marysville, Snohomish County, WASHINGTON****1. INTRODUCTION**

The Seattle District Corps of Engineers (Corps) is proposing to construct a habitat restoration project on Ebey Slough in the City of Marysville, Snohomish County. The purpose of the project is to improve fish and wildlife species that utilize estuarine type habitat by removing an existing dike and allowing tidal inundation to over 360 acres. The project will benefit Allen Creek by providing better access than the existing tide gates that currently restrict migratory fish. The project will specifically benefit endangered species such as Chinook salmon and steelhead and bull trout. The Corps is authorized to do a restoration project such as Qwuloolt under their Puget Sound and Adjacent Waters program (Section 544 of the Water Resources Act of 2000). This CZMA determination pertains to work that includes the removal of the dike along Ebey Slough, construction of two set back levees for flood protection, the filling of existing farm ditches, stream connections and improvements along lower Allen and Jones creeks as well as excavation of a large breach that allows for tidal inundation. The current site is considered a jurisdictional (under section 404 Clean Water Act) palustrine emergent wetland comprised primarily of reed canarygrass, the restored habitat will still be a jurisdictional upon completion of the project but will be estuarine emergent marsh and mudflat.

2. WASHINGTON STATE COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved state Coastal Zone Management (CZM) programs. The Shoreline Management Act (SMA) of 1972 (RCW 90.58) is the core of authority of Washington's CZM program. Primary responsibility for the implementation of the SMA is assigned to local government. The Qwuloolt restoration project is in the City of Marysville, which developed the Marysville Shoreline Master Program which has an effective date of October 31, 2006 as chapter 18.16 of the Municipal Code.

3. MARYSVILLE SHORELINE MASTER PROGRAM

The City of Marysville implemented the SMA through the adoption of goals and policies in Chapter 18.16 of the City's municipal code. This coastal zone consistency determination is based on review of applicable policies and standards of the City of Marysville Shoreline Master Program (SMP). Applicable portions of the shoreline environment guidelines are presented below, with the Corps' consistency indicated in ***bold italics***.

Applicable SMP elements and provisions:

Chapter 3. Environmental Designation Provisions**Section B. Environment Descriptions****3. Urban Conservancy Environment.**

a. Purpose. “Purpose of Urban Conservancy designation is to protect and restore ecological functions in urban and developed settings, while allowed limited water-oriented uses.”

b. Designation Criteria. The designation criteria for Urban Conservancy include: They have potential for ecological restoration and they retain important ecological functions, even though partially developed;”

The nature of this ACOE project is ecological restoration and not commercial development. The project as proposed is consistent with the purpose of the designation and lies within boundary of the shoreline environment designation depicted in the Shoreline Master Plan map.

Section C. Shoreline Use and Modification Matrices.

Shoreline Modifications Table allows for beach restoration/enhancement with footnote #5 allowing specifically: “The shoreline modification may be allowed for environmental restoration or if the City determines that there will be a net increase in desired shoreline ecological functions.”

The restoration activities proposed for this project are focused upon restoring the aquatic environment and associated ecological services and functions.

Chapter 4. General Provisions.

5. Flood Hazard Reduction and River Corridor Management.

5.a. Applicability. The provisions in this section apply to those areas within shoreline jurisdiction lying along Ebey Slough and the Snohomish floodplain corridors, including rivers, streams, associated wetlands in the floodplain, and river deltas. “

The provisions in this section are intended to address two concerns especially relevant to river shorelines:

- 1) Protecting human safety and minimizing flood hazard to human activities and development.
- 2) Protecting and contributing to the restoration of ecosystem-wide processes and ecological functions found in the applicable watershed or sub-basin.

b. Policies. 1. “Implement a comprehensive program to manage the city’s riparian corridors that integrates the following city ordinances and activities.”

h. “The ecological restoration of selected shoreline areas. “

b. Policies. 2. “In regulating development on shorelines within SMA jurisdiction, endeavor to achieve the following:

b. Protection and, where appropriate, the restoration of the physical integrity of the ecological system processes, including water and sediment transport and natural channel movement.”

c. Protection of water quality and natural groundwater movement.

d. Protection of fish, vegetation, and other life forms and their habitat vital to the aquatic food chain.”

The Qwuloolt project is one of the projects identified in the SMP for restoration. The above three objectives are three of the more significant objectives of the Qwuloolt project. By removing the dike on Ebey Slough, and letting the tide back into the site, and by improving the connection to Allen Creek, water and sediment transport will be greatly improved. Presently,

there is only a minimal connection through tide gates. The project proposes to fill in existing old farm ditches that are now prevalent at the site. These ditches hold water especially in warm summer months. By removing the ditches and allowing for a diurnal tide, water quality at the Qwuloolt site will be very much improved over the current condition. Additionally, opening up the site and making a breach at Ebey Slough will allow for thousands of juvenile fish such as Chinook, chum, coho and perch to utilize the area. With a much better connection to Allen Creek, it is expected that migratory fish will also be able to forage and spawn in this drainage.

b. Policies. 6. “Encourage the removal or breaching of dikes to provide greater wetland area for flood water storage and habitat; provided, such an action does not increase the risk of flood damage to existing human development.”

Extensive hydrologic analysis of the site, incorporating maximum events, has led to the design of the levee setbacks, per the project proposal, that predict that the project, as proposed, will not increase the risk of flood over the current condition.

c. Regulations

Review of these regulations for flood hazard reduction indicate that the Qwuloolt project is in accordance and consistent with these regulations.

7. Public Access

The city of Marysville is currently evaluating a trail system and public access in the area. The Qwuloolt project will work with the City to insure, where possible, access to the new natural area.

11. Vegetation Conservation.

The policies of this section focus on maintaining natural native shoreline vegetation and managing and removing of invasive weedy species.

Currently, the Qwuloolt site is dominated by Reed canary grass with Canada thistle and some spirea. This palustrine wetland is close to being a monoculture. Once the project is completed, and the tide is allowed back in, the slightly brackish water will kill off the Reed canary grass, thistle and spirea. The former pasture fields have subsided over the past 100 years so initially much of the site will be mudflat, with the exception of some estuarine emergent vegetation constructed on some of the internal berms. After several years, the site is expected to evolve similarly to the Marysville mitigation area or like Ebey Island across the Slough. Dominant vegetation will be Hard stem bull rush, sedge, and cattail. This approach is consistent to what is identified in the policies and regulations under this section.

12. Water Quality.

Policies in this section require erosion control measures during construction and minimization of impacts pursuant to local, state and federal requirements.

It is the intent of the Qwuloolt project to do exactly this. The project will be applying for water quality certification from Department of Ecology and will abide by permit conditions. Prior to construction, development of a Stormwater Pollution Prevention Plan will prescribe best management practices to be followed and monitored during the construction phase of this project.

Chapter 5. Shoreline Modifications Provisions.

B. Policies and Regulations

1.6. General Policies and Regulations. “Impaired ecological functions should be enhanced and/or restored where feasible and appropriate while accommodating permitted use.”

The Qwuloolt project will restore impaired ecological function in the vicinity of the project area. The project, as beach restoration/enhancement, is a permitted modification. There will be limited shoreline stabilization in a few areas of high erosion potential but these have been kept to a minimum and are needed for stability and sustainability.

7. Shoreline Restoration and Ecological Enhancement.

a. Applicability. “Shoreline restoration and/or enhancement is the improvement of the natural characteristics of upland, tidal or submerged shoreline using native materials.”

b. Policies. 2. “All shoreline restoration and/or enhancement should protect the integrity of adjacent natural resources including aquatic habitats and water quality.

b. Policies.4. “The city will pursue the recommendations in the shoreline consistent with this plan prepared as part of this SMP update. The City will give priority to projects consistent with this plan.”

c. Regulations. 1. “Shoreline enhancement may be permitted if the project proponent demonstrates that no significant change to sediment transport or river current will result which will adversely affect ecological processes, properties, or habitats. “

c. Regulations. 4 “Shoreline restoration and ecological enhancement projects may be permitted in all shoreline environments, provided: **a.** The project’s purpose is the restoration of natural character and ecological functions of the shoreline, and **b.** It is consistent with the implementation of a comprehensive restoration plan approved by the City, or the City finds that the project provides an ecological benefit and is consistent with this master program.”

The Qwuloolt project is consistent with all of these policies and regulations described in this section of the master plan. The project as currently designed will not affect the natural resources on adjacent lands. It will not impact navigation on Ebey Slough or public use. The project has used best available science during the development of project studies and design and it intends to improve sediment transport at the site by restoring tidal inundation. The Qwuloolt project should be permissible under Marysville Shoreline Master Program because the purpose of the project is to restore the ecological functions of the shoreline and it is included (see Chapter 9 of the Program) as part of the comprehensive restoration plan.

Chapter 6. Shoreline Use Provisions.

6. In-Stream Structures

c. Regulations. “In-Stream structures are permitted only for the purposes of environmental restoration.”

The Qwuloolt project is focused on restoration and does not include development other than the stated purpose of restoration of ecological functions. Uses such as agriculture, boating facilities, commercial development, industry, log storage, transportation and parking are not part of the Qwuloolt proposal. It does include the use of in-stream structures, primarily the use of large woody debris and there is the potential for passive recreational use. Both of these uses are consistent with the Marysville SMP.

Chapter 9. Restoration Plan.

9.1 Restoration Goals and Objectives

9.1.1. Goal 1. “Assure presentation, protection and restoration of salmon habitat to a sufficient extent and quality to support the productivity and

diversity of all wild salmon stocks in the Snohomish river basin at a level that will sustain fisheries and non-consumptive salmon-related cultural and ecological values (SBSRF 2001)."

9.1.2 Goal 2. "Assure preservation, protection and restoration of all ecological functions."

9.2. List of Existing and Ongoing Projects and Programs

9.2.1 Qwuloolt/Poortinga Estuarine Restoration Project. "The primary element of the City's Shoreline Restoration Plan is its participation in the Qwuloolt/Poortinga Estuarine Restoration Project. "

The Qwuloolt project is consistent with both Goal 1 and the objectives of the SMP for the restoration plan. In Section 9.2.1, there is a long description of the Qwuloolt project. It is the intent of the ACOE to construct the plan as described in this section.

4. STATEMENT OF CONSISTENCY

Based on the above evaluation, the Corps has determined that the proposed action complies with the policies, general conditions, and activities as specified in the City of Marysville Shoreline Master Program adopted by the City Council and approved by the Director of the Washington Department of Ecology. The proposed action is thus considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the Marysville Shoreline Master Program.

5. ENFORCEABLE POLICIES

Throughout the Qwuloolt Restoration project the Corps will adhere to the following enforceable policies:

Environmental Compliance

LAWS AND REGULATIONS RELATING TO THE PROPOSED QWUOOLT RESTORATION PROJECT	ISSUES ADDRESSED
National Environmental Policy Act (NEPA) 42 U.S.C. 4321 et seq.	Requires all federal agencies to consider the environmental effects of their actions and to seek to minimize negative impacts
Clean Air Act	Requires federal agencies to consult with state air pollution control agencies to assure that construction plans conform to local air quality standards.
Clean Water Act (CWA) 33 U.S.C. 1251 et seq.; Section 404	Requires federal agencies to protect waters of the United States. Disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no reasonable alternatives.
Clean Water Act Section 401	Requires federal agencies to comply with state water quality standards.
Rivers and Harbors Act	Prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the U.S. in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army.
Endangered Species Act 16 U.S.C. 1531 et seq.;	Requires federal agencies to protect listed species and consult with US Fish & Wildlife or NMFS regarding the proposed action.
National Historic Preservation Act 16 U.S.C. 461;	Requires federal agencies to identify and protect cultural and historic resources.
Coastal Zone Management	Requires federal agencies to comply with state and local plans to protect

Act (CZMA) 16 U.S.C. 1451 et seq.; 15 CFR 923	and enhance coastal zone and shorelines.
Construction NPDES Section 402 of the Clean water Act	Requires federal agencies to comply with state standards Requires preparation of a storm water pollution prevention plan.
LAWS AND REGULATIONS RELATING TO THE PROPOSED ALTERNATIVES	ISSUES ALLREADY ADDRESSED
Executive Order 11988: Floodplain Management Guidelines	Requires federal agencies to evaluate the potential effects of actions on floodplains and to avoid undertaking actions that directly or indirectly induce growth in the floodplain or adversely affect natural floodplain values
Executive Order 11990: Protection of Wetlands	Encourages federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs
Executive Order 12898: Environmental Justice	Requires federal agencies to consider and address environmental justice by identifying and assessing whether agency actions may have disproportionately high and adverse human health or environmental effects on minority or low-income populations

Appendix E

Comments Received and Responses

A draft EA and 404(b)(1) analysis were prepared to evaluate the Qwuloolt Project. A Public Notice was prepared to solicit public comment on the proposed project. The Public Notice, draft EA, and 404(b)(1) analysis were all posted on the Corps web site (www.nws.usace.army.mil/ers/doc_table.cfm) for the duration of the comment period (4 February to 24 February 2009). Individual mailers were sent to over 500 local addresses and to government agencies that could have interest in the project. The mailers included information about the Public Notice and the website posting. The following agencies were contacted: NRCS, USFWS, NOAA, WDFW, WDOE, Snohomish County and the City of Marysville. At the end of the comment period only four responses were received. Below are the four responses with comments. The Corps' replies to these comments are in bolded italics directly below the original comment.

1. Comment from Elwyn Wood

Elwyn Wood provided comments via an e-mail titled Comments on Breach the Dikes on Ebey Slough - Qwuloolt Project which the Corps received on March 9, 2009. The specific comments and Corps responses follow:

This effort is only compounding the problem caused by the Tulalip Tribe allowing Seattle to dump garbage in the wetlands. Where were you guys then?

Based on the limited information provided, this comment is beyond the scope of the proposed project.

I suspect that this project will go on regardless of any opposition.

The purpose of the Public Notice was to provided the public an opportunity to submit comments and for the Corps and its partners to consider these comments. All comments, including any in opposition, were considered and potential impacts evaluated, including any comments or new information not considered prior to release of the draft EA.

I would make a suggestion that you limit the amount of dike that is removed and that the openings are armored to prevent further erosion. This would allow recovery of the farm land when folks come to their senses and realize that they can't possibly produce needed food from a few fish from this boondoggle.

The lands in the project area were purchased to restore estuarine habitat. This is the historic condition prior to conversion to farming. Limiting the size of the breach or amount of dike that will be removed will detract from the natural hydrologic processes that the proposed project seeks to restore. By limiting the hydrologic process, the site will not function well and the benefits to fish and wildlife will be diminished.

I'm not just another 'nut case'. I own farm land that is about to be flooded.

To avoid any impacts to Mr. Wood's property, a 2.8 acre easement was purchased from Mr. Wood.

I appreciate efforts to increase fish production, as I spent over 40 years in commercial fishing in Alaska.

I have a PhD in Oceanography, and spent five years with the federal government contracting for and monitoring environmental research projects.

This effort is just a 'feel good' project for the 'tree huggers'

2. Comment from John Van Soest

John Van Soest provided comments via an e-mail which the Corps received on February 22, 2009. The specific comments and Corps responses follow:

Thank you for all you've done to make this happen.

I'm very anxious to see this get done, I've been looking forward to this for a long time.

Thank you,

John

Sun 2/22/2009 3:47 PM

Comment noted and the process is being expedited as much as possible.

3. Comment from JP Fontaine

JP Fontaine provided comments via an e-mail which the Corps received on February 24, 2009. The specific comments and Corps responses follow:

Dear Mr. Cagney,

Being a nearby homeowner, I have two concerns regarding the above-mentioned subject.

One being the concern over a potential overrun of rats and other rodents to nearby homeowners, when they scramble to find new homes. If I am correct in my thought as to where this project is set to take place, there must be thousands of rodents in the area. I encountered a similar problem, when an adjacent lot was cleared for development. My home is a fairly new one (2005), as are most of the surrounding homes. I did not have a rat problem until the clearing occurred. It was necessary to employ a Pest Control Company, and the problem is under control at this time. The rats actually chewed through the bottom seal on the garage door, and moved into my garage. So, you can understand why this is of real concern to me.

Is there a measure in place to deal with the removal of rodents, so that nearby homeowners are not adversely affected by the project? If not, will there be funds

available to reimburse affected homeowners? In this troubled economy, I am sure not to be standing alone when it comes to personal availability of excess funds.

Displaced rodents are a legitimate concern for the potential restoration at the Qwuloolt Project site. It should be noted that the “flooding” in the project area and displacement of small animals is a currently existing condition. In the past, lower Allen Creek periodically overtops its banks and floods the Qwuloolt Project area. The undersized tide gates and dike on Ebey slough allows for a bathtub like condition to develop onsite where the water entering the site is not effectively drained and standing water occurs in the area for several days at a time. When this happens small animals including rodents are either drowned or disperse around the area.

Prior to tidal inundation at the site the project area will be mowed and hayed reducing cover and available food sources. Heavy equipment used in construction at the site will also impact local rodents. Since the Qwuloolt site is a large open area it attracts rodent predators. Predators such as red tailed hawks, marsh hawks, short eared owls and coyote are frequently observed in the project area. Much of the diet of these predators consists of rodents. Not all of the site will be flooded all of the time. Even after the site is opened to the tide there will still be some areas that rodents will occupy. The surrounding area is not all in housing. That is, there are areas that rodents can disperse to that are not all residential such as the Allen Creek corridor. The project area (over 400 acres) and surroundings are quite large and provide opportunities for small animals to disperse into.

There are also some preventative measures that individual landowners could reasonably implement. These include:

- 1. Removal of all debris in the yard that might provide protective cover.***
- 2. Keep lawn vegetation mowed to a low level.***
- 3. Removal of potential food source such as household trash, waste grain, or other foods that might attract rodents or other nuisance animals.***
- 4. Sealing openings into buildings and around water pipes, electrical wires, vents and doors. Usually 1/8 inch mesh hardware cloth or sheet metal works best.***
- 5. Deployment of traps such as baited snap traps or registered baits deployed according to manufacturer’s instructions are often effective.***

As a result of the previous discussion, we are currently not considering employing a pest control company or removal of rodents. A change in the Final Environmental Assessment text has been made to reflect this comment and response.

My other concern is that of potential flooding problems in the future, with the excavation and removal of 1,800 linear feet of dike at Ebey Slough. Granted, I am not knowledgeable in this area, but it seems to create a possibility. Hopefully, consideration of habitat conditions was given to nearby homeowners, as well as to the fish and wildlife species. I am an animal lover, but I purchased my permit-approved home with the non-existence of this project. I hope the U.S. Army Corps of Engineers has given very deep

thought as to how this project will affect nearby homeowners, and that nearby homeowners will be assured not to suffer adversely.

The Corps and all of the project participants have given a lot of thought to the potential flooding and potential impacts to adjacent properties and homes. As noted in the Draft Environmental Assessment in section 1.4 a variety of studies were done. Many of these focused on site hydrology and evaluated what will happen if and when there is a breach and dike removal. The studies also evaluated flooding impacts from Allen Creek, tidal inundation and high flows on Ebey Slough. Specific evaluations included Assessment of Flood Risk and Allen Creek Flood Modeling performed by Philip Williams and Associates as well as an evaluation of FEMA's 2000 Snohomish River Revised Flood Insurance Rate Maps. The results of these studies influenced the design for the Qwuloolt Project. A large set-back levee (over 4,500ft) is proposed to be constructed on the western edge of the Qwuloolt site will be constructed, this design feature is intended to provide the same level of flood protection for adjacent developed properties that currently exists. It should be noted that all of the surrounding housing in the project area is outside of FEMA's 100 flood-plain.

A response would be appreciated. Thank you for your time.

Sincerely,
JP Fontaine

4. Comment from the City of Marysville

The Department of Community Development from the City of Marysville provided comments via a letter dated February 24, 2009. The specific comments and Corps responses follow:

Dear Mr. Cagney,

Thank you for the opportunity to comment on the *Draft Environmental Assessment for the Qwuloolt Project*, prepared by the USACE. Upon review, the City of Marysville respectfully offers the following comments:

1. The City of Marysville should be listed as a Responsible Agency on page i, paragraph 1 of the draft.

In an e-mail dated February 3, 2009 when asked if the City of Marysville would like to be listed as a partner for the project in the Public Notice, Ms. Gloria Hirashima responded for the City in the negative stating "I think it best if we are not listed in the notice". So we honored Ms. Hirashima request and did not include the City of Marysville as a responsible party.

2. The Project Objectives should include a statement to the effect of avoiding any adverse impacts related to shoreline erosion or channel erosion that can impact adjacent properties and infrastructure.

One of the project objectives is to “Maintain the same level of flood protection that currently exists”. Other project objectives include” Restore natural channel formation” and “Restore natural hydrology, salinity and sedimentation”. In certain places within the Qwuloolt Project some erosion will occur as new channels are formed within the project area. The project partners see this type of erosion as a benefit in order to create new channels and new habitat features for juvenile fish, so including such a statement that is suggested here would be counterproductive to other project objectives and limit some of the benefits of the project. While erosion will occur primarily within the project site, we are not anticipating adverse erosion to adjacent properties. Design elements such as the breach size, configuration and location as well as the protective armoring of the proposed set-back levee are intended to reduce the risk of erosion off-site.

3. Under Common Elements for all of the Action Alternatives: The water runoff storage basin is referred to as about 6.5 acres – should this be 6.5 acre-feet (volume) rather than 6.5 acres (area)? What is the basis for this volume? What level of protection is it intended to provide? How was it determined – is it designed in accordance with current Western Washington methodologies?

The size of the storage basin will be somewhere between 5 to 6.5 acres in size (area) and not acre feet. The existing Industrial Park is not undergoing any re-development or adding new facilities as part of the project. The standards and codes do not require providing new facilities. Since the City of Marysville has permitted the Industrial Park to discharge into existing wetlands within the Qwuloolt Project area, the project partners have designed a water detention facility to improve the quality of the water. The proposed water detention facility is designed to contain about a twenty five year event. Additional information on the storage basin can be found in the “Industrial Park Stormwater Improvements” prepared by Philip Williams and Associates 2008 and previously provided to the City. Construction of the water runoff storage basin is not part of the proposed restoration project by the Corps and will be accomplished by the Tulalip Tribe.

4. Under water quality, construction behind the dike will provide protection from tidal influences but construction will be conducted within a floodplain. Work within the OHWM will be required along the existing streams and ditches that cross the area. Erosion control during construction will need to be carefully managed. Also, is there a potential for increased beach erosion once the project is completed as a result of more shoreline be newly exposed to wave erosion? Are protection measures proposed to prevent shoreline erosion?

A temporary erosion control plan will be prepared prior to construction. The second part of this comment relates to a “beach” within the Qwuloolt Project area. We have no knowledge of a “beach” within the project area. Refer back to comment 2, as some erosion will occur within the Qwuloolt Project area as a result of tidal inundation. Scour and erosion within the project area to create new channels are considered beneficial.

5. Wetlands: Reference is made to a 6.5 acre detention facility (see comment #3). Is this in reference to an area or is it intended to be a volume (acre-feet)?

This is the same detention facility discussed in comment three. The size of the facility is expected to be between 5 and 6.5 acres in size not volume.

6. Wetlands: Will the material excavated on-site be suitable for construction of berms? Material may need to be sorted during excavation to make sure the berms are constructed with proper material. The berms should be constructed to acceptable standards.

All levee material will meet approved specification for suitable material for construction. The source of this material may be from on site and may be supplemented with additional material from an approved source that conforms to the specification. The internal site berms will be constructed from material from on site.

7. Wetlands: Temporary vs. permanent wetland impacts should be identified.

The wetland impacts identified in the table in Section 4.6 are permanent wetland impacts.

8. Wetlands: Based on the Excavation and Fill Quantities, there will be nearly 89,000 cubic yards of material required to be brought onto the site. That is roughly 8,900 truckloads assuming 10 cubic yards per truck. What impact will the truck traffic have on the City roads and/or adjoining properties?

While much of the material that is needed to construct the project will be generated on-site there will be some materials brought to the site in the form of rock and soils. About 35,000 cy of material for levee construction will be obtained from sources outside the project area. The 89,000 cubic yards figure for imported material mentioned in this comment is not an accurate statement. The estimate of imported material and other impacts of transportation are discussed in section 4.12 of the EA.

9. Wetlands: There is no mention of a planting plan as well as plant establishment requirements. Mention is made that final elevations would be “conducive to estuarine emergent vegetation” but there is no indication that planting plans to establish such vegetation are a part of this project. Are plantings and associated establishment requirements planned to support the claim that functions and values will be improved?

The planting plan is still under discussion as the project partners have not reached a decision if they want to have the site colonize by emergent plants naturally or “jump start” the vegetation by planting. Natural re-colonization seems to have worked at the adjacent Marysville Mitigation site. There are only a few estuarine emergent plants that can utilize the project site and there are good seed sources for these plants within the Snohomish system. A detailed analysis of estuarine emergent vegetation and elevations is included in “Qwuloolt/Poortinga Technical Report” (2002) and “Wetland Assessment for Restoration at Qwuloolt Marsh” (2006) that is mentioned in section 1.4 of the EA. Once a decision on how to proceed is made, it will be documented and available online.

10. Land Use: The restoration project is bounded by the city’s sewer lagoons and the Brashler Industrial Park along the project’s west boundary and by single-family residential developments along the northerly and easterly boundaries. The project will remove a large section of dike and tidally inundate approximately 400 acres of fallow agricultural land. The proposed inundation area currently acts as a large detention area during storm events, the proposed breach will not only eliminate or greatly reduce the

storage capacity of this area, but will also bring a large body of water within feet of multiple private properties abutting the restoration area which currently do not experience flooding issues, even during large storm events. The City is concerned that this project has the potential to negatively impact abutting properties from flooding. The City is also concerned with the level of flood protection being proposed by the construction of levees designed for a 10-year water level adjacent to the City's sewer lagoon and the industrial park. An underestimation of existing flood protection based on the existing dike elevation alone, without considering the holding capacity of the 'inundation area', could result in an underestimation of current flood protection and could result in significant environmental damage, particularly to the sewer lagoon if the newly built dike is undersized. Other city owned properties either adjacent to Allen Creek, Ebey Slough, and/or within the 100-year floodplain which may be impacted include Third Street right-of-way; Third Street and Trunk line D sewer pump station(s); the water front park; sewer trunk line D; and portions of the trail system located within the floodplain.

Extensive analysis was completed on potential flooding effects from Allen Creek, Ebey Slough and the combination of Allen Creek and Ebey Slough. This analysis included evaluating typical flow and flows from 100 year events. These studies that have analyzed the hydrologic conditions around the project area and are identified in section 1.4 of the EA. Copies of these studies have been supplied to the City of Marysville. It is the intent of the project to provide the same level of flood protection currently provided by the dike at Ebey Slough (about a 10 year event). All of the surrounding residences are above the 100 year flood plain. A set-back levee on the west side of the project will provide the industrial park and treatment lagoons with the same level of protection that they currently receive. In regards to storage capacity, studies have indicated it should be about the same that currently exists, while the proposed breach in the dike will allow for tidal inundation it will also provide for better drainage since there will be improved conveyance over the currently undersized tide gates. This portion of the response is contained with the "Allen Creek Flood Modeling" performed by Philip Williams and Associates (2008) "Based upon our analysis it is concluded that the Qwuloolt Project will not increase flood levels or risk in the project area around Allen Creek. The vicinity of the 3rd Street crossing will be subject to day-to-day tidal action resulting in more frequent occurrences of water levels in the high tide range. These areas that will be exposed to tidal action are below the extreme flood stage and are therefore already subject to flooding. The existing culvert at 3rd Street is a hydraulic constriction that controls water levels upstream to the main Jennings Park Bridge, and the flood risks is not affected by the proposed Qwuloolt Tidal Restoration Project"

11. Land Use: The USACE's brief statements with regards to the potential flood hazards associated with this project appear inadequate. No analysis and/or basis for their conclusion that the project as proposed will not increase the risk of flood over the current conditions is offered. Nor is any analysis provided with their conclusion that the Qwuloolt project would not result in significant impacts.

The EA and its associated reference data reports includes ample analysis of flood risks and is considered the best information available concerning flood hazards. See response to the previous comment.

12. Land Use: The analysis also makes brief mention of some areas identified as ‘high erosion’ areas and states that limited shoreline stabilization will occur in a few areas. One of the areas identified as a ‘high erosion’ area was the southern tip of the city’s sewer lagoon, this is of major concern to the city and should be addressed in more detail in the analysis before concluding that the project as proposed would not result in significant impacts.

The location of the specific statement “high erosion area was the southern tip of the city’s sewer lagoon” cannot be found in EA. Although, the Coastal Zone Consistency (CZM) evaluation (attachment to the EA) does mention high erosion and states:

“1.6. General Policies and Regulations. ”Impaired ecological functions should be enhanced and/or restored where feasible and appropriate while accommodating permitted use.”

The Qwuloolt Project will restore impaired ecological function in the vicinity of the project area. The project, as beach restoration/enhancement, is a permitted modification. There will be limited shoreline stabilization in a few areas of high erosion potential but these have been kept to a minimum and are needed for stability and sustainability”

Since the CZM statement does not identify the “southern tip of the city’s sewer lagoon” it should be considered as a general statement and the reasonable assumption that the author was considering areas around the actual breach at the project site and not the “southern tip of the city’s sewer lagoon”.

13. Recreation: Reference is made to the ‘potential’ for improved trail access. The description should be more definitive. The USACE analysis of providing public access in accordance with the City’s *Shoreline Master Program* (SMP) and *Shoreline Management Act* (SMA) is deficient. No information and/or analysis relative to the public access requirement as required in the city’s SMP and state SMA has been provided (please see attached City response letter dated 01/14/2009 to Lori Lull, Department of Ecology regarding the USACE CZM consistency analysis).

There is a consensus among the project partners that there may be potential for improved trail access, although no definitive plans have been developed. The partners are currently working with the City of Marysville to develop a plan that balances the restoration objectives and sensitive ecological resources of the project with recreational trail access.

14. Anticipated Impacts: Even though ‘maintaining flood protection’ is a stated objective, there is no discussion under Anticipated Impacts that addresses flood protection. It would be useful to define how the area currently functions for flood storage, how the area is expected to function after the breach and any anticipated changes. Is there a series of events that could cause high flood levels than currently experienced? Are there assurances that adjoining property owners will not see any increase in flood levels for moderate (more frequent) as well as extreme events? Are any adjacent properties going to be exposed to more flooding (for moderate or extreme events) than they are currently exposed to?

See response to comment 10.

15. Anticipated impacts: There is no mention of visual impacts. The appearance of the site is expected to be significantly different once it is subjected to tidal influences.

The Environmental Analysis has a discussion of visual impacts under section 4.13.

16. Anticipated impacts: There is no mention of air quality impacts. Will there be odors associated with the decomposition of organic matter after construction? How will dust be controlled during project construction?

Air and noise impacts are discussed in section 4.11. An odor problem is not anticipated or if odors do occur they would not be noticeable above the existing smell that is generated by the City's wastewater treatment plant that is adjacent to the project site. In regards to dust, the site is vegetated and a wetland so the Corps doesn't anticipate undue dust problems during construction. There will be dust control for the streets adjacent to the site (street sweeper) during construction.

17. Anticipated impacts: What is the impact on ground water? Will the more frequent higher water levels in the estuary create more frequent higher ground water levels? Will the salinity of the ground water be affected? Will existing plants and/or adjacent landscaping on abutting private property be affected? Would higher ground water levels result in sloughing of adjacent properties over time?

The results of the Qwuloolt Project on groundwater are expected to be variable but changes should occur only within the project area. The ground water information obtained was part of a study conducted during 2007 and 2008 (reference Water Level Elevations (draft) report identified in section 1.4 of the EA). During the study it was determined that groundwater elevations at the site are already high and subject to tidal influence already. The site is large and water table fluctuations will differ across the site. The very upper end of the Project area (closer to the resident area) will be less tidally affected and will be inundated only briefly during each tidal cycle.

Salinity in the Ebey Slough area is considered "brackish", 1 to 5 parts per thousand and is not anticipated to effect groundwater outside the project area.

For further information see the Environmental Assessment and its associated analysis.

18. Anticipated impacts: According to Snohomish County Tomorrow HARZA maps, the project site is located in a High Seismic Area that is subject to liquefaction, there is no mention of potential impacts related to seismic activity.

The Qwuloolt Project area will remain in a high seismic area and a potential seismic impact and the potential for liquefaction are incorporated in the design of the set-back levee.

19. Anticipated impacts. There is no discussion regarding the potential effects of increased tidal exchange as a result of removing the berms. This potential issue has been the subject of detailed studies to define how the increased volume of water might change erosion or scour along the pathway of the water. Description of the potential effects should be included.

See response to question #10.

The City understands the primary focus of the Qwuloolt project is to restore the aquatic environment, and does support the restoration effort and this project. However, it is the City's opinion that a more detailed analysis specifically addressing the issues raised above is necessary to ensure this project does not result in a significant adverse impact to the environment.

The Environmental Assessment is based upon the best information available and has sufficient detailed analysis to make informed decisions regarding the implementation of this project. Numerous studies are highlighted in section 1.4 of the EA and are incorporated by reference. Much, if not all of these studies have previously been supplied to the City or are available upon request.

Sincerely,

Cheryl Dungan
Planning Manager – Land Use

Appendix F Project Plans