

# **DRAFT ENVIRONMENTAL ASSESSMENT**

## **Ediz Hook Beach Nourishment**

### **Clallam County, Washington**



US ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

June 2011



**US Army Corps  
of Engineers**  
Seattle District

## **Ediz Hook Beach Nourishment**

### **Clallam County, Washington**

#### **Draft Environmental Assessment**

**Responsible Agencies:** The responsible agency for this routine maintenance work is the U.S. Army Corps of Engineers (Corps), Seattle District.

**Abstract:** This document evaluates the impacts of the Corps maintenance of the Ediz Hook Beach Erosion Control Project. The purpose of the erosion control project is to protect the sand spit from erosion, thereby protecting Port Angeles Harbor and the small boat basin from direct wave action, and maintaining access to the U.S. Coast Guard Station, Port Angeles, located at the end of the spit.

During the summer of 2011, the Corps is planning to perform routine maintenance work, consisting of beach nourishment on two sections of the northwest side of Ediz Hook. Approximately 50,000 tons of 3 to 12- inch rounded gravel and cobbles from an existing upland quarry would be placed onto two stockpile areas along Ediz Hook prior to being moved to the nourishment sites. The cobble would be placed between the rock revetment and the mean lower low water (MLLW) depth contour. In addition, readily accessible armor rocks that have fallen from the revetment onto the beach or moved during construction would be re-keyed onto the revetment.

Potential impacts of the proposed work are described in this document. Impacts would generally be highly localized in nature, short in duration, and minor scope. Impacts are not expected to be significant either individually or cumulatively.

Please send requests for additional information to:

Ms. Elizabeth L. McCasland  
Environmental Resources Branch  
U.S. Army Corps of Engineers  
PO Box 3755  
Seattle, WA 98134  
Elizabeth.l.mccasland@usace.army.mil

# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Background.....	1
1.2	Authority.....	1
<b>2.0</b>	<b>NEED AND PURPOSE .....</b>	<b>4</b>
<b>3.0</b>	<b>ALTERNATIVES.....</b>	<b>4</b>
3.1	No Action.....	4
3.2	Preferred Alternative: Beach Nourishment with Cobble .....	5
3.3	Conservation Measures.....	8
<b>4.0</b>	<b>EXISTING ENVIRONMENT .....</b>	<b>9</b>
4.1	Geology and Soils.....	9
4.2	Water Quality.....	9
4.3	Vegetation.....	9
4.4	Fish and Wildlife .....	10
4.5	Cultural Resources and Native American Concerns.....	11
4.6	Land Use.....	11
4.7	Utilities and Public Services.....	12
4.8	Air Quality and Noise .....	12
4.9	Transportation.....	12
4.10	Socioeconomics.....	12
4.11	Recreation.....	12
4.12	Aesthetics .....	13
<b>5.0</b>	<b>ENVIRONMENTAL EFFECTS .....</b>	<b>13</b>
5.1	Geology and Soils.....	13
5.2	Water Quality.....	13
5.3	Vegetation.....	14
5.4	Fish and Wildlife .....	14
5.5	Cultural Resources and Native American Concerns.....	16
5.6	Land Use.....	16
5.7	Utilities and Public Services.....	17
5.8	Air Quality and Noise .....	17
5.9	Transportation.....	17
5.10	Socio-Economics.....	18
5.11	Recreation.....	18
5.12	Aesthetics .....	18
5.13	Best Management Practices and Mitigation .....	19
5.14	Unavoidable Adverse Effects .....	19
5.15	Irreversible and Irretrievable Commitments of Resources.....	19
5.16	Cumulative Impacts.....	19
<b>6.0</b>	<b>COORDINATION .....</b>	<b>20</b>
<b>7.0</b>	<b>ENVIRONMENTAL COMPLIANCE .....</b>	<b>20</b>
7.1	National Environmental Policy Act.....	20
7.2	Endangered Species Act .....	20
7.3	Clean Water Act, Section 401 and 404.....	20
7.4	Coastal Zone Management Act.....	21
7.5	Fish and Wildlife Coordination Act.....	21
7.6	National Historic Preservation Act.....	21
7.7	Executive Order 12898, Environmental Justice.....	21
<b>8.0</b>	<b>CONCLUSION .....</b>	<b>22</b>

<b>9.0</b>	<b>PREPARERS.....</b>	<b>22</b>
<b>10.0</b>	<b>REFERENCES.....</b>	<b>22</b>
<b>11.0</b>	<b>Acronyms and Abbreviations .....</b>	<b>23</b>

**List of Figures**

Figure 1.	Ediz Hook Beach Nourishment Project, Port Angeles, Clallam County, WA.....	2
Figure 2.	Ediz Hook and Port Angeles Harbor Features .....	3
Figure 3.	Ediz Hook beach nourishment, Area A.....	6
Figure 4.	Ediz Hook beach nourishment, Area B; and typical cross section.....	7

**List of Tables**

Table 1.	Protected Species Potentially Occurring in the Project Area .....	10
Table 2.	Species of Concern Determination Summary.....	15

**List of Appendices**

Appendix A:	Biological Evaluation – Threatened and Endangered Species
Appendix B:	National Historic Preservation Act Section 106 Coordination with State Historic Preservation Office and Affected Tribes
Appendix C:	Public Comments

# **1.0 INTRODUCTION**

This Draft Environmental Assessment (EA) is prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 USC §§ 4321-4370e), Sec. 102(C). It evaluates the environmental, cultural and social effects of the proposed beach nourishment and shoreline stabilization intended to prevent further loss of shoreline on Ediz Hook, Clallam County, Washington. Erosion from wave action and the lack of new sediment feeding the spit has caused incremental bank failure along several hundred feet of shoreline at the site.

The primary focus of the project is to perform routine maintenance work on the Ediz Hook Beach Erosion Control Project. Access for the project would be via the Ediz Hook Road. The work would take place on two sections of beach along the northwest, Strait of Juan de Fuca, side of the Ediz Hook spit (Figure 1).

## **1.1 BACKGROUND**

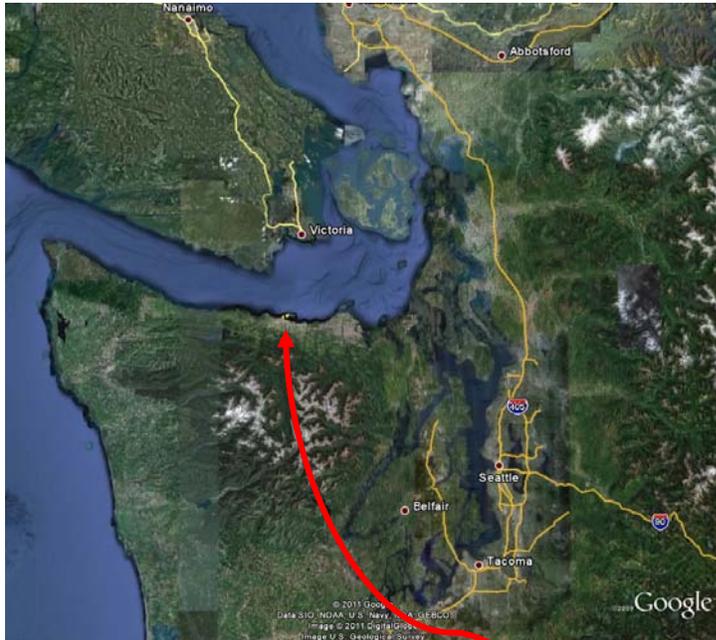
Ediz Hook is located on the northern shore of the Olympic Peninsula in Port Angeles, Clallam County, Washington (Township 30 North, Range 6 West, Sections 32, 33, and 34). The spit juts easterly approximately 3.5 miles into the Strait of Juan de Fuca, forming Port Angeles Harbor (Figure 1).

Ediz Hook provides storm protection to Port Angeles Harbor and its boat basin, provides a land-link to the mainland for the U.S. Coast Guard (USCG) station located on the spit's eastern end, and provides day use recreation for local residents and tourists (Figure 2). The proposed beach nourishment area is located on the Strait side of the spit.

## **1.2 AUTHORITY**

Section 4 of the 1974 Water Resources Development Act (Public Law 93-251) authorized the Ediz Hook Beach Erosion Control Project. The authorization included construction and maintenance of rock protection, as well as initial and periodic beach nourishment. The initial construction took place in 1977 and 1978. Planned maintenance of the project included a program of beach nourishment of approximately 100,000 cubic yards every five years. Periodic beach nourishment has occurred in 1985, 1997 and 2002.

A final Environmental Impact Statement (EIS) was filed for the project on 7 May 1973. Additionally, three previous EAs were completed in 1984, 1997, and 2002 to assess the impacts of proposed beach nourishment and revetment repair. These reports are incorporated by reference, and available for inspection at the Seattle District Office.



**Figure 1. Ediz Hook Beach Nourishment Project, Port Angeles, Clallam County, WA.**



- 1) Nippon Paper Industries
  - 2) Sail & Paddle Park, City of Port Angeles Parks & Recreation
  - 3) Harborview Park, City of Port Angeles Parks & Recreation
  - 4) US Coast Guard Group Port Angeles Station
  - 5) Port of Port Angeles
- Yellow lines – beach nourishment sites

**Figure 2. Ediz Hook and Port Angeles Harbor Features**

## **2.0 NEED AND PURPOSE**

The purpose of the Ediz Hook Beach Erosion Control Project is to protect the sand spit from erosion, thereby maintaining protection of Port Angeles Harbor and the small boat basin from direct wave action, and preserving access to a U.S. Coast Guard station located at the tip of the spit. The supply of sand, gravel, and cobble materials carried to the spit via longshore currents is reduced as compared to historic conditions. This reduction has been attributed to shoreline armoring along the toe of feeder bluffs west of Ediz Hook, and two dams on the Elwha River.

## **3.0 ALTERNATIVES**

The Corps evaluated two alternatives for maintenance of the Ediz Hook Erosion Control Project, the no action alternative and the proposed alternative. Under the no action alternative, the Corps would not maintain the erosion control project.

In the 2002 nourishment cycle, Washington Department of Fish and Wildlife (WDFW) suggested changing the gradation of the nourishment materials specified in the project operation and maintenance manual (US Army Corps of Engineers 1981). WDFW has encouraged the Corps to use a larger proportion of coarse sand and gravels less than one inch in diameter in the nourishment materials. This is because the proposed nourishment material grain size gradation is slightly coarser than that of the native material, particularly along the seaward tip of the spit where sediment sizes are somewhat smaller than those at the base. In addition, anecdotal information suggests that historical beaches along the Ediz Hook shoreline were composed of more sand than is present today (Wray and Valadez 2011).

Upon consultation with the project coastal engineer, it was determined that such a change would not meet the project goals. Fine material tends to be unstable on the beach, moving rapidly offshore where it is distributed over broad areas, providing little or no functional use in beach erosion control or storm protection. When material consisting of a mixture of cobbles, gravel, coarse sand, fine sand, and silt is used as beach fill, natural sorting processes act upon it, redistributing the finer material offshore and developing a coarser grained residual on the beach face and in the surf zone (US Army Corps of Engineers 1976). The Corps' authority for this nourishment program is to protect the revetment structure from being undermined by storm waves. Larger sized material would be more resistant to erosion, thereby remaining in the littoral system longer and reducing replenishment frequency.

### **3.1 NO ACTION**

Under the no-action alternative, no work would be done to stabilize the shoreline. The shoreline would continue to erode and landward resources would continue to be placed at risk. The no-action alternative would result in continued erosion of the ocean side of the spit. Over time, the elevation of the fore beach would be lowered, resulting in increases in wave height and greater damage to the revetment. If the neck of the Hook eroded to the extent that the spit breached, the Coast Guard station may need to be relocated. Although the no-action alternative does not meet authorized project objectives, it will be carried forward for comparison purposes.

### 3.2 PREFERRED ALTERNATIVE: BEACH NOURISHMENT WITH COBBLE

The action area for the proposed project is comprised of the upland portions of Ediz Hook, on the northwestern side of the spit, and adjacent Strait waters out to the -20 foot Mean Lower Low Water (MLLW)<sup>1</sup> depth contour, which is where the active sediment transport zone ends (Figure 1).

Beach nourishment material would be placed along the face of the revetment at two stockpile locations. The nourishment material, consisting of about 50,000 tons (approximately 34,500 cubic yards) of 3- to 12- inch rounded gravel and cobble from an existing upland gravel pit, would be brought to the stockpile areas by 20-cubic yard end-dump trucks. The trucks would dump their loads forming the top of the berm at the +12 ft MLLW contour and the berm would extend seawards approximately 25 ft. Gravity would do the work to bring the nourishment material down to the 0 ft MLLW contour, approximately 40 feet seaward from the revetment face. No grooming of the slope by mechanical means would be necessary. Approximately 10 tons (7 cubic yards) of material would be placed per linear foot of beach. The affected area of nourishment would be approximately 5200 feet (ft) in length. The waterward face of the stockpile would not be graded; instead, it would be allowed to reach a natural angle of repose, likely on the order of 1.5:1 or 2:1. However, a small bulldozer may be used to spread material laterally along the top of stockpiles to allow for dump truck access. The maximum width of the dump truck access would be 25 feet in the cross-shore direction (figures 3 and 4).

Each of the two stockpiles would have a single access point, created by removal of revetment stones. These stones would be side cast landward of the revetment and would be restored before equipment demobilization. The addition of revetment stones (riprap) is not planned during this maintenance cycle. A small equipment staging area would be located on an existing concrete/gravel pad adjacent to the Nippon mill.

Beach logs and pieces of driftwood, larger than 1-ft diameter and greater than 6 ft in length, found in the beach nourishment reaches would be removed from the beach prior to construction of the fill, placed landward of the work area, but seaward of the road. Upon completion of fill placement, the beach logs and driftwood would be replaced on the beach above elevation +12 ft MLLW. All other debris, including small beach logs, small pieces of driftwood, trash, and other items, would be removed and disposed offsite.

In all, approximately 6.5 acres of cobble habitat between elevations 0 ft and +12 ft MLLW, and a length of 5200 linear feet, would be directly affected by the beach nourishment and creation of the stockpiles. Once on the beach, the nourishment material is expected to disperse over the entire spit rapidly.

---

<sup>1</sup> The mean high water datum at this location is +7.10 ft MLLW. The highest estimated tide is approximately +11 ft MLLW.

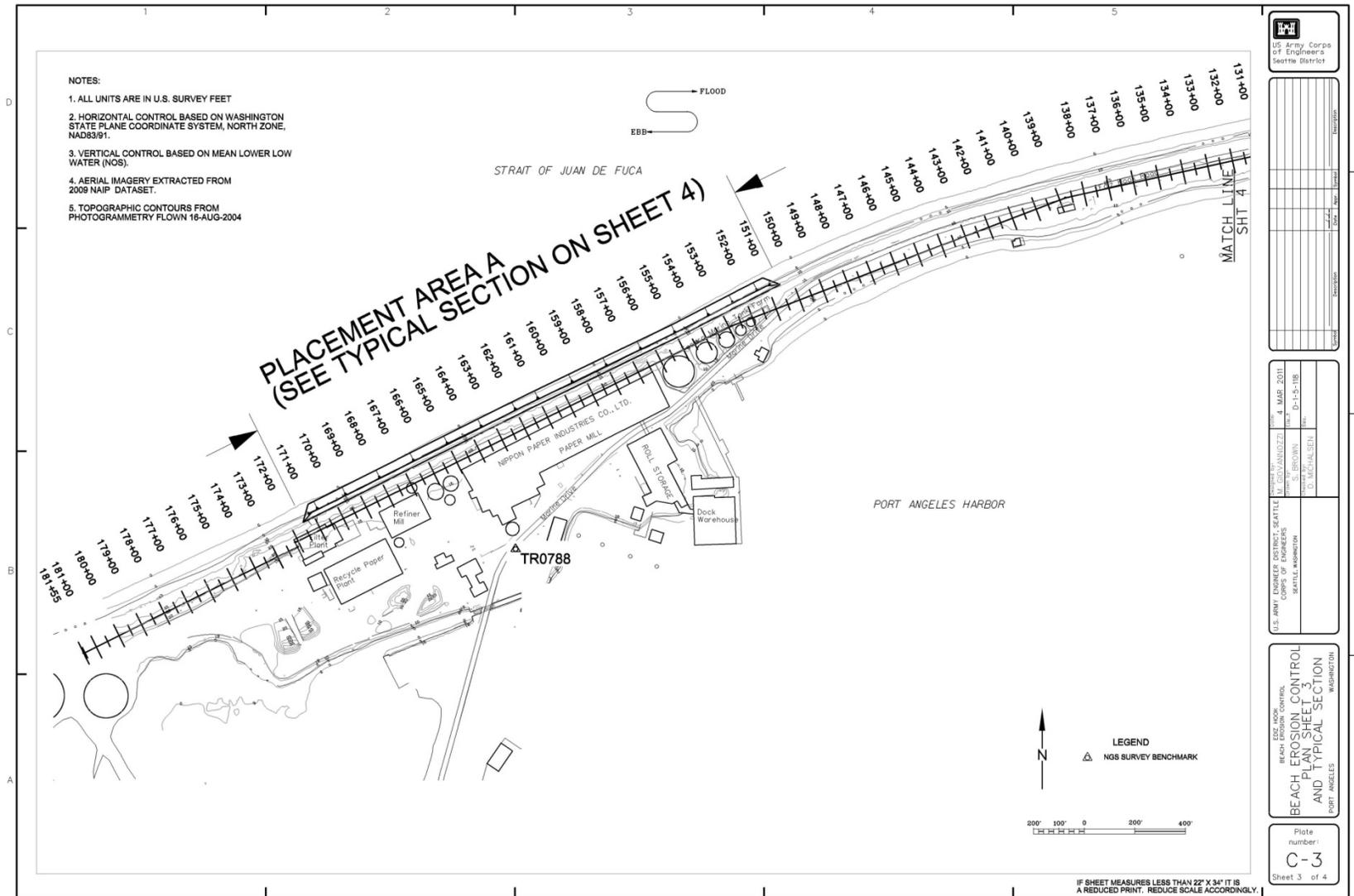


Figure 3. Ediz Hook beach nourishment, Area A

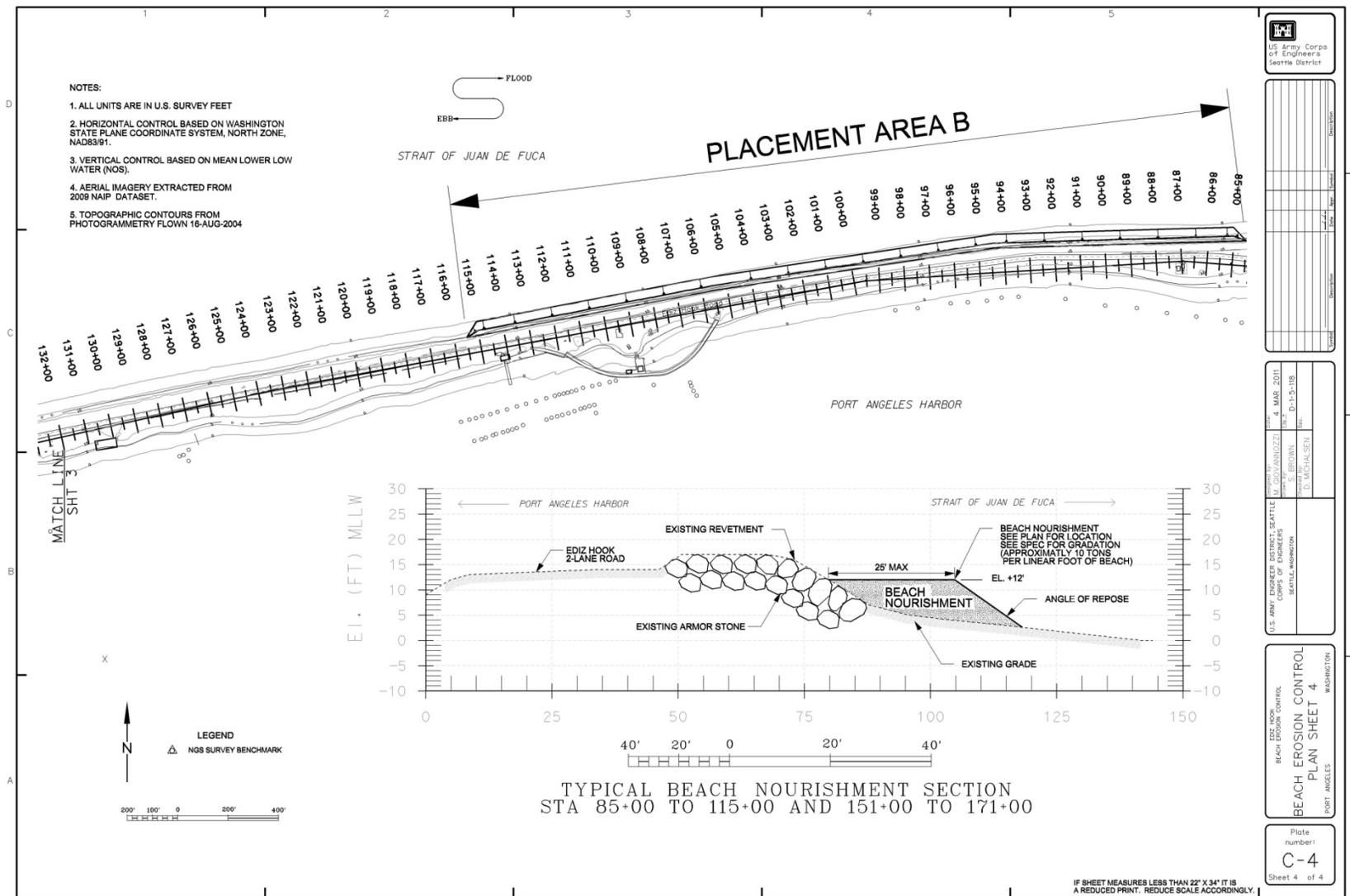


Figure 4. Ediz Hook beach nourishment, Area B; and typical cross section.

The construction period is expected to take place late summer to fall and would be in compliances with conservation windows.

- 1) **Rock Sources.** Rock sources would be existing commercial or governmental quarries.
- 2) **Access.** Access to the beach would be restricted to one site for each of the placement areas. Revetment stones removed for access would be replaced before equipment is demobilized.
- 3) **Duration.** Work is expected to take 8 weeks, which includes mobilization and demobilization as well as allowances for weather delays. At a rate of 10,000 tons of rock per week, it is expected to take a total of 5 weeks to place the 50,000 tons of rock
- 4) **Habitat Loss Prevention and/or Mitigation.** No upland or sub-tidal habitat would be lost. Approximately 6.5 acres of intertidal beach, 5200 linear ft, would be filled as a result of the project. To lessen potential project effects to sub-tidal habitat, all work would take place from land and above the MLLW contour. Equipment and vehicular access would be from the road and would stop at the approximate +12 ft MLLW contour. Further, lessen potential impacts to threatened, endangered, and sensitive species work would take place in during the work window of July 15 to November 1.
- 5) **Material Quantities.** Approximately 50,000 tons of 3 to 12 inch washed cobble would be place on 5200 linear feet of beach.

### 3.3 CONSERVATION MEASURES

Construction would occur when Chinook, Hood Canal chum, and bull trout are least likely to be present in the action area. The proposed construction schedule (between mid-July to September) is outside of the USFWS in-water closure period for bull trout in Puget Sound marine waters (February 16 - July 15), and the NMFS closure period for Chinook in Puget Sound marine waters (March 1 – July 1). The work would also occur outside bald eagle wintering season (November 1 – March 1).

The placement of the nourishment materials and all rock removal and re-keying work would be timed to avoid periods when tidal waters have inundated the project site.

In addition, several construction best management practices (BMPs) would be implemented:

- use of motorized equipment on the beach would be minimized, with a single access point for each stockpile area and a 50 ft work corridor waterward of the armor rocks;
- some large woody debris may be removed from the nourishment stockpile areas prior to gravel/cobble placement, but any logs would be moved to adjacent beach areas instead of off-site;
- drive trains of equipment would not operate in the water;
- biodegradable hydraulic fluids would be used for machinery at the site;
- at least one fuel spill kit with absorbent pads would be onsite at all times; and
- no equipment fueling or servicing would occur within 300 feet of the water.

## 4.0 EXISTING ENVIRONMENT

### 4.1 GEOLOGY AND SOILS

Ediz Hook is a 3.5-mile long spit with an average top elevation of +14 ft MLLW, and widths ranging from 90 ft to 750 ft. The spit was formed by the eastward movement of littoral sand, gravel, and cobbles from eroding sea cliffs immediately to the west, and from river borne sediments of the Elwha River. Shoreline armoring along feeder bluffs west of Ediz Hook and dams on the Elwha River have reduced the materials carried to the spit by longshore currents. In addition to contributing to erosion at Ediz Hook, this reduced sediment supply has caused the eastern edge of the pre-dam Elwha delta to erode, and the barrier beach at Freshwater Bay to recede and steepen.

### 4.2 WATER QUALITY

Port Angeles Harbor has many commercial and industrial facilities along its shoreline. Over the past century, the Harbor has been used by a number of industries including saw mills and plywood manufacturing, pulp and paper production, marine shipping/transport, boat building and refurbishing, petroleum bulk fuel facilities, marinas, and commercial fishing. Since the early 1900s, pulp and paper mills have comprised a dominant portion of Port Angeles' industrial sector. Treated and untreated mill process effluents were commonly discharged into the Harbor, and wood product sources throughout the Harbor have been identified as significant sources of chemicals of potential concern (COPCs) in marine sediments. Petroleum storage and transport businesses have historically operated and currently conduct business along the Port Angeles waterfront. Spills and leaks from petroleum facilities and tankers, as well as from facilities with leaking underground storage tanks (UST), have introduced COPCs into the Harbor. Marinas, shipping industries, and docks and piling infrastructure all have a variety of potentially associated COPCs. Historically and currently, the Harbor has received discharges from Combined Sewer Outfalls (CSO), deepwater effluent outfalls, septic systems in various stages of maintenance outside the city limits, non-point source runoff from stormwater, and surface water discharge from creeks with varying degrees of residential and commercial land-use influences. All these discharges may contribute COPCs to the Harbor (Washington Department of Ecology 2008).

### 4.3 VEGETATION

Upland vegetation along Ediz hook consists of terrestrial salt-tolerant grasses and shrubs. No trees are present on the spit, other than some shore pines (*Pinus contorta*) planted near the Coast Guard administrative buildings. Eelgrass (*Zostera marina*) is present in the sheltered waters of Port Angeles Harbor east of the spit and mid-length on the northwest side of the spit, and kelp beds are present in Strait of Juan de Fuca waters west of the spit (Norris and Fraser 2006, and Norris et al 2011). The species composition of the kelp beds in the vicinity of Ediz Hook shift seasonally, and consist of an overstory of the annual brown kelp *Nereocystis luetkeana*, commonly known as bull kelp, and a varied understory of Laminariales and fleshy red algae. *N. luetkeana* densities are highest in the summer and fall months, while fleshy red algae are seasonally present in the winter and spring months. The perennial brown algae *Pterygophora californica* is the dominant understory component of *Nereocystis* beds in this area of Strait (Shaffer, et al. 2007).

## 4.4 FISH AND WILDLIFE

### 4.4.1 FISH

Out-migrating juvenile salmonids utilize waters in the vicinity of Ediz Hook. The peak migration period is between March 15 and June 15. Juvenile salmon inhabiting nearshore marine and estuarine waters feed on pelagic and epibenthic invertebrates. Forage fish such as Pacific herring, sand lance, and surf smelt are also present in the project area. A documented sand lance spawning beach is located on the harbor side of Ediz Hook. Pacific halibut reside in Strait of Juan de Fuca waters near Ediz Hook. During summer months, adult halibut dwell in the shallower waters feeding on forage fish and crustaceans. In November, they migrate into deeper waters to spawn.

### 4.4.2 WILDLIFE

Ediz Hook and adjacent waters provide habitat for a variety of shorebirds and waterfowl. The protected waters of Port Angeles Harbor attract plovers, whimbrels, oyster catchers, geese, loons, ducks, turnstones and sanderlings. Auklets, puffin, and common murre are occasional visitors, and the project area is one of the Olympic Peninsula's best viewing areas for gull species.

### 4.4.3 THREATENED AND ENDANGERED SPECIES

Several species listed protected under the Endangered Species Act are potentially found in Ediz Hook (Table 1.). 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. The Corps has prepared a Biological Evaluation (BE) to assess potential impacts of the proposed work on species protected under the Act. Section 7 Endangered Species Act consultation will be completed prior to construction.

**Table 1. Protected Species Potentially Occurring in the Project Area**

Species	Listing Status	Critical Habitat
Marbled Murrelet ( <i>Brachyramphus marmoratus</i> )	Threatened	Designated – not in project area
Southern distinct population green sturgeon ( <i>Acipenser medirostris</i> )	Threatened	Designated
Southern distinct population smelt (eulachon) ( <i>Thaleichthys pacificus</i> )	Threatened	Proposed – not in project area
Bocaccio ( <i>Sebastes paucispinis</i> ) Puget Sound / Georgia Basin distinct population segment	Endangered	--
Canary rockfish ( <i>S. pinniger</i> )	Threatened	--
Yelloweye rockfish ( <i>S. ruberrimus</i> )	Threatened	--
Coastal/Puget Sound bull trout ( <i>Salvelinus confluentus</i> )	Threatened	Designated
Puget Sound Chinook salmon ( <i>Onchorhynchus tshawytscha</i> )	Threatened	Designated

Species	Listing Status	Critical Habitat
Hood Canal summer-run chum salmon ( <i>O. keta</i> )	Threatened	Designated
Puget Sound steelhead ( <i>O. mykiss</i> )	Threatened	--
Southern resident Killer whale ( <i>Orcinus orca</i> )	Endangered	Designated
Steller sea lion ( <i>Eumetopias jubatus</i> )	Threatened	Designated – not in project area
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	Endangered	Designated – not in project area
Puget Sound/Strait of Georgia coho salmon ( <i>O. kisutch</i> )	Species of Concern	--
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Species of Concern	--

#### 4.5 CULTURAL RESOURCES AND NATIVE AMERICAN CONCERNS

A professional cultural resources reconnaissance survey was conducted for the 2002 beach nourishment cycle. The survey consisted of an examination of the archaeological and historic site records at the Washington State Department of Archaeology and Historic Preservation (DAHP) and a pedestrian survey of the project area. A total of four archeological sites and one historic property are located within a 1 mile vicinity of the project area. Of the four archaeological sites; two have been previously recorded within or closely adjacent to the proposed project. The records search indicated that no properties listed on the National Register of Historic Places (NRHP) are located within the proposed project area. However, one archaeological site and the Ediz Hook Light Station are listed on the NRHP and are located within 1 mile of the project area. The pedestrian survey did not find any evidence of prehistoric or historic-period cultural material within the proposed project area. Records were rechecked in March 2011, and no new archeological data was found for the proposed project area.

#### 4.6 LAND USE

##### 4.6.1 COAST GUARD GROUP PORT ANGELES

The U.S. Coast Guard air-sea rescue station that serves Washington's coastal and inland waters lies on the seaward end of Ediz Hook. Established in 1935, Group Port Angeles is the nation's oldest operating air station, in operation since 1935. There are approximately 300 men and women based at this station, including a helicopter rescue crew. The base has a 24-hour operations center; military exchange, medical clinic, administrative building; and temporary quarters for personnel during their 24-hour shifts. The base has a 4,000 foot long runway used in the training of Coast Guard helicopter pilots and crew. The runway is considered too short and narrow for larger-aircraft landings, although larger cargo planes have occasionally used it to land. Logs thrown up by storms and large flocks of sea gulls make the runway hazardous.

##### 4.6.2 NIPPON PAPER INDUSTRIES USA

Nippon Paper Industries USA Co., Ltd. owns and operates the 90 year old paper mill on the landward end of Ediz Hook. The company today manufactures telephone book paper and other

lightweight products, such as paper for advertising inserts, flyers, directories, and newsprint. Approximately 40 percent of the paper is produced from recycled fibers. More than 200 people are currently employed at the mill site. Nippon Paper Industries has plans to build a \$71 million cogeneration plant at the mill that would use forest biomass to produce energy. The mill currently uses steam from an electric boiler, two oil-fired boilers, and a large biomass boiler.

#### **4.7 UTILITIES AND PUBLIC SERVICES**

There are no utilities or public services in the immediate area of the project site. Utilities are aligned with Ediz Hook Road.

#### **4.8 AIR QUALITY AND NOISE**

Clallam County meets EPA Ambient Air Quality standards, and those set by the State of Washington for suspended particulates and sulfur dioxide. Principal sources of sound along much of the project area are natural (i.e., wind and surf). Areas near the Coast Guard station and Nippon mill would periodically have higher noise levels (e.g., helicopters).

#### **4.9 TRANSPORTATION**

Port Angeles Harbor is the only deep-draft harbor on the northern shore of the Olympic Peninsula; it is easily accessible to the largest vessels due to its natural depths of up to 192 feet. Licensed pilots board almost all ships destined for Puget Sound ports in Port Angeles. Port Angeles Harbor also provides moorage for log ships, oil tankers, two commercial ferries, recreational fishers, crabbers and shrimpers.

#### **4.10 SOCIOECONOMICS**

The project is located near the city of Port Angeles, Washington in Clallam County. Employment within the county is primarily related to management/professional, service, sales, transportation, education/health, and social services. In the 2005-2009 5-year estimates, the US Census Bureau estimated that non-whites made up 25.5 percent of the total population in Clallam County, and the percentage of residents with incomes below poverty level was 13.5 percent (US Census Bureau 2009)<sup>2</sup>.

The end of the spit is home to a USCG air-sea rescue station (Section 4.6.1) which currently has approximately 300 personnel based there. The Nippon Mill on the landward end of the spit employs over 200 people. The City of Port Angeles hosts a ferry landing, linking it with Victoria, British Columbia, Canada. The various businesses utilizing the Port have the direct impact of over 1600 jobs, and business revenue of over \$190 million. Indirectly the Port's economic benefits in Clallam County are approximately 3,500 jobs with an income of \$90 million (Port of Port Angeles 2010).

#### **4.11 RECREATION**

Two Port Angeles city parks and a portion of an 8 mile long waterfront trail are located on Ediz Hook. There are also a number of picnic areas and boat launches along the eastern side of the

---

<sup>2</sup> Specific data sets, such as demographics from Census 2010 are not yet available (March 2011)

spit. Recreational fishing occurs in the harbor, from boats or the city pier. The large number of shorebirds, gulls, and waterfowl in the area make the spit a prime location for birdwatchers.

## **4.12 AESTHETICS**

The rock revetment lies between the beach and the road to the end of the hook. Pleasing views of the Olympic Mountains, Strait of Juan de Fuca, the San Juan Islands, Canada, and the City of Port Angeles are visible from the spit.

## **5.0 ENVIRONMENTAL EFFECTS**

The anticipated effects of the two alternatives are documented together below so as to allow comparison of the alternatives in relation to each affected resource.

### **5.1 GEOLOGY AND SOILS**

#### **5.1.1 NO-ACTION**

Beach soil characteristics would not be affected by this alternative. However, the erosive nature of soils on site would continue to be an issue, with wave-induced instability and sloughing as an ongoing effect. Without nourishment, there is risk that a breach would occur on the landward end of the spit, which over time would lead to the erosion of the entire spit eliminating the protection from direct wave action provided to Port Angeles Harbor and the small boat basin, and eliminating access to the U.S. Coast Guard Station, Port Angeles, located at the end of the spit.

#### **5.1.2 BEACH NOURISHMENT**

The revetment, along with the reduction in sediment available to naturally feed the beach, has resulted in a steepening of the beach profile along the western side of Ediz Hook. The proposed nourishment project would delay the conversion of the beach fronting the revetment from a high intertidal beach to a subtidal beach. Bathymetric surveys conducted prior to and after past nourishment activities showed a restored beach profile above -10 ft MLLW, with little change in the beach profile between -10 ft and -20 ft MLLW. Generally, most of the nourishment materials are caught up by the littoral flow and distributed in the first two winter seasons. The deep water to the east of Ediz Hook has and would continue to intercept the littoral drift. Therefore, no change to beaches east of Ediz Hook would occur as a result of the project.

The nourishment material would be placed as high as possible in the intertidal zone, thereby mimicking natural sediment erosion and transport processes to the maximum extent possible. The beach nourishment material would be slightly coarser than that of the native material. The larger sized material would be more resistant to erosion, thereby remaining in the littoral system longer and reducing replenishment frequency.

### **5.2 WATER QUALITY**

#### **5.2.1 NO-ACTION**

The shoreline would continue to erode, resulting in continued suspension of solids, and turbid conditions. There would be no change to water temperature.

## **5.2.2 BEACH NOURISHMENT**

Any increases in turbidity resulting from the proposed action would be minor considering the large grain sizes of the nourishment material. The nourishment materials would be washed at the quarry so that the percentage of fines would be quite low (less than 3 percent by weight). Any sediment plumes attributable to the project would be temporary, localized, and equivalent to those created by natural sediment transport processes. With respect to chemical contamination, the proposed action would not affect baseline conditions for this indicator.

## **5.3 VEGETATION**

### **5.3.1 NO-ACTION**

Under the no action plan, terrestrial plants would be subjected to greater wave action and over time as the spit erodes, would lose their foothold. In the long term, if a breach should occur, then the remaining land and its associated plant community would be subjected to greater risk of erosion. Indirect impacts may affect sub-aquatic vegetation, such as eel grass beds, if the hydrology and currents change due to a breach in the land spit.

### **5.3.2 BEACH NOURISHMENT**

The proposed action is not expected to have an effect on the kelp bed offshore of the Ediz Hook revetment for two reasons. First, the nourishment material would be placed upon the beach adjacent to the kelp bed during mid-summer months. Algae are most vulnerable to sediment impacts during spring months, when increasing light levels trigger reproduction. Second, the nourishment materials would have a coarse grain size and therefore are not expected to remain suspended in the water column for very long. This reduces the chance for sub-threshold light levels that could affect macroalgae growth rates or reproductive cycles. No impacts to the terrestrial vegetation or eelgrass beds are anticipated as the cobble material will be dumped above the MLLW contour (0 ft), and the surveyed beds in the area are below the -15 ft contour (Norris and Fraser, 2006).

## **5.4 FISH AND WILDLIFE**

### **5.4.1 FISH**

#### **5.4.1.1 No-Action**

The shoreline would continue to erode without beach nourishment. Over time the beach would convert from high intertidal beach to a subtidal beach. Indirect impacts such as a change in the fish species composition could occur if a breach would occur in the spit.

#### **5.4.1.2 Beach Nourishment**

In addition to protecting the integrity of the revetment, maintenance of a higher, more gently graded beach profile would maintain the range of intertidal elevations necessary to support the epibenthic invertebrates which serve as prey for a wide variety of marine fishes. However, the proposed action would temporarily adversely affect epibenthic prey organisms, particularly gammarid amphipods, within and adjacent to the 5 acre beach nourishment footprint.

Amphipods are mobile epifauna that are adapted to heavy disturbance regimes, and are thus expected to recolonize the nourishment area quickly. The scale of mortality impacts which would result from the proposed project is not likely to affect amphipod population dynamics in the project area. Likewise, a shift in benthic assemblage composition due to the use of nourishment material slightly coarser than native material is not expected.

Forage fish such as herring, surf smelt, and sand lance, would not be directly impacted by the proposed action for two reasons. First, placement of the nourishment materials would occur above the waterline at low tides so as not to directly interfere with fish usage of beach habitat. Second, turbidity is not expected to increase substantially above ambient conditions due to the large grain size of the material. Indirect effects are also not anticipated since no documented spawning beaches occur in the project area. NOAA-sponsored studies have shown that the epibenthic fauna which would likely be impacted by material placement do not appear to constitute a significant fraction of these species' diet, as they tend to rely more on pelagic organisms (Simenstad, et al. 1977).

The nourishment material would be placed along Ediz Hook soon after the end of the juvenile salmonid outmigration period. This schedule would allow for maximum recovery of the epibenthos prior to the 2012 salmonid outmigration period.

**5.4.2 WILDLIFE**

**5.4.2.1 No Action**

As the intertidal beach erodes to subtidal beach, foraging habitat for wildlife would decrease for those species who feed in the intertidal zone.

**5.4.2.2 Beach Nourishment**

Noise associated with the project may have a temporary effect on bird populations in the vicinity of operating heavy machinery. The impacts of any sound disturbance would likely result in displacement of animals rather than injury. Disposal operations are not expected to result in a long-term reduction in the abundance and distribution of any prey items. No breeding or nesting areas would be directly impacted. Therefore, any impacts would be minor.

**5.4.3 THREATENED AND ENDANGERED SPECIES**

**5.4.3.1 No Action**

Under the No-Action alternative, land use is expected to continue similar to baseline conditions, with no changes expected to threatened or endangered species or their critical habitats.

**5.4.3.2 Beach Nourishment**

Construction would occur when Puget Sound Chinook, Hood Canal chum, and bull trout are least likely to be present in the action area, and during a portion of the year when bald eagles are most tolerant of disturbance. The maintenance work would be scheduled to occur between July 16 and September 30 to accommodate work windows. Effect determinations made in the project Biological Evaluation (BE) are listed in Table 2. Section 7 Endangered Species Act consultation will be completed with the USFWS and NMFS prior to construction.

**Table 2. Species of Concern Determination Summary**

<b>Species</b>	<b>Effects Determination</b>	<b>Critical Habitat Determination</b>
Marbled Murrelet	Not likely to adversely affect	No effect
Green Sturgeon	Not likely to adversely affect	Not likely to adversely affect
Eulachon	Not likely to adversely affect	Not likely to adversely affect
Rockfish	Not likely to adversely affect	--

<b>Species</b>	<b>Effects Determination</b>	<b>Critical Habitat Determination</b>
Bull trout	Not likely to adversely affect	Not likely to adversely affect
Chinook salmon	Not likely to adversely affect	Not likely to adversely affect
Chum salmon	Not likely to adversely affect	No effect
Steelhead	Not likely to adversely affect	--
Killer whale	No effect	No effect
Steller sea lion	Not likely to adversely affect	No effect
Leatherback sea turtle	No effect	No effect
Coho salmon	Not likely to adversely affect	--
Bald Eagle	Not likely to adversely affect	--

## **5.5 CULTURAL RESOURCES AND NATIVE AMERICAN CONCERNS**

### **5.5.1 NO-ACTION**

Without implementation of the proposed action, the Ediz Hook spit is at risk of breaching in the long term. The two archeological / historic sites could potentially be damaged should this breach occur.

### **5.5.2 BEACH NOURISHMENT**

The project would continue to provide protection from seaward side erosion to an archaeological site and a historic site, the Ediz Hook Light Station. The proposed nourishing of two areas along the spit's beach and re-keying boulder-sized revetment rocks that have fallen onto the beach should not disturb the underlying old spit material. Consequently, there does not appear to be any possibility of disturbing any previously unrecorded archaeological deposits during construction-related activities. One archaeological site near the project area may contain archaeological deposits that are eligible for listing on the National Register of Historic Places.

## **5.6 LAND USE**

### **5.6.1 NO-ACTION**

Without beach nourishment, wave run up against the revetment that protects Ediz Hook Road would increase, causing the revetment to fail. Without the revetment to mitigate wave action, the road would be subject to pounding waves, and would be damaged. Access to points towards the end of the road, to the City of Port Angeles two parks, and the USCG Station, would be cut off. If a breach occurred in the spit, the protection the spit provides to Port Angeles Harbor and the small boat basin from direct wave action would be eliminated, and access to the U.S. Coast Guard Station, Port Angeles, located at the end of the spit would be eliminated.

### **5.6.2 BEACH NOURISHMENT**

The project would have no effects on land use in the immediate vicinity. With beach nourishment, wave run-up would be lessened, and the revetment protecting Ediz Hook Road would remain more stable. Severe storms and their associated waves could still affect the road.

Construction vehicles may disrupt traffic for Coast Guard personnel, those utilizing the City of Port Angeles Sail and Paddle Park or Harborview Park, or those employed at the Nippon paper mill. These impacts would be temporary and highly localized, and are therefore are expected to be minor.

## **5.7 UTILITIES AND PUBLIC SERVICES**

### **5.7.1 NO-ACTION**

There is expected to be no effect on utilities or public services as a result of continued erosion under the No-Action Alternative.

### **5.7.2 BEACH NOURISHMENT**

No effect to utilities or public services is expected under the Preferred Alternative, since none are on the site.

## **5.8 AIR QUALITY AND NOISE**

### **5.8.1 NO-ACTION**

No impact concerning air quality or noise would occur as a result of taking no action to address the erosion.

### **5.8.2 BEACH NOURISHMENT**

The operation of heavy equipment associated with the project would temporarily increase air emissions, including greenhouse gases, and noise in the immediate project vicinity. These increases would be minor in scope, temporary in duration, and are not expected to result in significant impacts. The total volatile organic compound emissions for this project during construction were also anticipated to be well below the *de minimis* level of 100 tons per year. Therefore, this action conforms to the Washington State Air Quality standards, administered locally by the Northwest Air Pollution Authority. Diesel fuel consumption by heavy machinery required for construction, material haul-off, and gasoline consumption for travel to the sites for all Corps projects, including this project, are a part of world-wide cumulative contributions to change in climate by way of increases in greenhouse gas emission

## **5.9 TRANSPORTATION**

### **5.9.1 NO-ACTION**

If the wave driven erosion continued unchecked, causing damage to the Ediz Hook Road, then access to facilities beyond the point of the damage or breach would hampered or cut-off completely. Further, protection for all sized of water craft utilizing the natural harbor formed by the Hook would be detrimentally effected.

### **5.9.2 BEACH NOURISHMENT**

A primary purpose of the proposed project is to the protect Port Angeles Harbor and the small boat basin from direct wave action and to provide access to the U.S. Coast Guard Station, Port Angeles. With the maintenance work completed, there is less risk of erosion to the road or risk of breach in the continuity of the spit. In the immediate vicinity of the project area, no impacts to commercial or recreational vehicles or watercraft are expected to result from the maintenance work.

## **5.10 SOCIO-ECONOMICS**

### ***5.10.1 NO-ACTION***

Under the no action plan, continued protection of Port Angeles Harbor and the small boat basin from direct wave action and access to the USCG station are at risk. Potentially the station could be relocated and the Port Angeles community could lose the economic benefit of the approximately 300 employees stationed there. The Nippon Mill on the landward end of the spit would be increased risk for wave damage, potentially causing the mill to close and the company to relocate or layoff the 200 or more people employed. Watercraft and associated businesses utilizing the harbor would also be at risk if a breach occurred in the spit, causing the waterfront to be subject to increased wave action. The Port Angeles community would suffer the indirect economic impacts of the potential loss of over 500 jobs.

### ***5.10.2 BEACH NOURISHMENT***

By nourishing the beach, those businesses and services utilizing the Ediz Hook Road would not be at risk of closing or forced relocation due to the spit eroding away. The Port Angeles harbor and those businesses associated with it would remain protected.

## **5.11 RECREATION**

### ***5.11.1 NO-ACTION***

Without beach nourishment, the direct loss of the recreational benefits those people enjoy utilizing the beach for such activities as walking, beach combing, fishing, and watching wildlife. Indirect impacts would be the increased risk of damage to the Ediz Hook Road, which could cut off access to the City's Sail and Paddle Park and Harborview Park, which would include loss of access to the small watercraft boat launch. Protection to Port Angeles Harbor and the small boat basin from direct wave action would also be eliminated.

### ***5.11.2 BEACH NOURISHMENT***

As stated above, construction vehicles may temporarily disrupt local and tourist traffic on and adjacent to Ediz Hook. Noise associated with the usage of heavy machinery may disturb recreational users of the parks on the spit. Use of the beach areas in and directly adjacent to the stockpile footprints would be precluded during construction for safety reasons. However, these impacts would be also be temporary and highly localized, so no significant impacts on recreation are anticipated. Protection to Port Angeles Harbor and the small boat basin from direct wave action with the spit in place would be continued.

## **5.12 AESTHETICS**

### ***5.12.1 NO-ACTION***

With no-action plan, the viewshed of the spit would be imperiled as the erosive wave action would continue unchecked. Over time a breach could occur, leaving increased rubble in it's wake.

### ***5.12.2 BEACH NOURISHMENT***

The stockpiles would not block views of the Strait of Juan de Fuca from the road. The stockpile areas are expected to be indistinguishable from adjacent areas shortly after project completion. Once construction is complete, the viewshed would be returned to the current conditions.

### **5.13 BEST MANAGEMENT PRACTICES AND MITIGATION**

By observing the conservation measures outlined in Section 3.3, mitigation would take the form of avoidance and minimization.

### **5.14 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; (2) mortality of sessile and mobile epibenthic invertebrates within and directly adjacent to the stockpile footprints; and (3) disruption of local and tourist traffic in the project vicinity. Given the temporary, localized, and minor nature of these effects, the Corps has determined that the proposed maintenance work is not expected to result in significant adverse environmental impacts.

### **5.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

The proposed restoration program would not entail any significant irretrievable or irreversible commitments of resources. The work would require importing cobbles and gravels from an existing, licensed quarry. These materials would remain on the beach for a limited amount of time, and then be lost to deeper waters at the eastern end of the spit.

### **5.16 CUMULATIVE IMPACTS**

As described in previous sections, erosion at Ediz Hook is thought to be symptomatic of a reduction in sand, gravel, and cobble materials carried to the spit via longshore currents. The reduction in sediment transport can be at least partially attributed to two factors: a municipal drinking water/industrial supply water line and associated shoreline armoring running along the toe of feeder bluffs west of Ediz Hook, and two dams on the Elwha River. In the fall of 2011 and continuing into 2012, removal of the two dams is scheduled to occur. According to the 1996 Environmental Impact Statement for the removal of the two dams, a 35 percent increase in sediment load from the Elwha River is expected. It could take up to 5 years before the natural source of sediment would be seen on Ediz Hook (National Park Service 1996).

The proposed work is intended to counteract some of the adverse impacts associated with these past development projects. The placement of nourishment materials would mimic natural littoral processes, thereby reducing the symptoms of a chronic sediment shortage.

The Washington Department of Natural Resources and the Environmental Protection Agency is proposing a restoration project on the nearshore harbor side of Ediz Hook. This project would consist of removing pilings, creosote bulkheads, concrete pads, and associated fill materials. The beach would be restored by filling with approximately 3,500 cubic yards of sand and gravel.

With the removal of the two dams on the Elwha River, the natural sediment source for Ediz Hook should increase; however, it is not anticipated to cease requiring beach nourishment cycles or other beach rebuilding activities, it may only lengthen the time span between cycles.

## 6.0 COORDINATION

The following agencies and entities have been involved with the environmental coordination of the proposed project:

- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service
- Washington Department of Fish and Game
- Washington Department of Ecology
- Lower Elwha Tribal Council

## 7.0 ENVIRONMENTAL COMPLIANCE

### 7.1 NATIONAL ENVIRONMENTAL POLICY ACT

This Environmental Assessment (EA) is being prepared pursuant to Sec. 102(C) of NEPA, and includes compliance with other laws, regulations and Executive Orders as discussed below. A 20-day public review of this EA commences on June 29, 2011.

### 7.2 ENDANGERED SPECIES ACT

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 or proposed threatened or endangered species and their critical habitats. A Biological Evaluation and Section 7 ESA consultation will be completed prior to construction. The Corp has determined that the project **may affect but is not likely to adversely affect** marbled murrelet, green sturgeon, eulachon, rockfish, bull trout, Chinook salmon, steelhead, and Steller sea lion. The project **may affect but would not likely adversely affect** the critical habitat of green sturgeon, eulachon, bull trout and Chinook salmon. The proposed project would have **no effect** on the critical habitat of marbled murrelet, chum salmon, and Steller sea lion. The project would have **no effect** on killer whales or leatherback sea turtles or their critical habitats.

### 7.3 CLEAN WATER ACT, SECTION 401 AND 404

The Corps does not issue permits for its own civil works activities. Nevertheless, the Corps complies substantively with Section 404. Under the Corps Regulatory Program, Nationwide Permit (NWP) 3 applies to the repair, rehabilitation, or replacement of a previously authorized structure. The Corps' Ediz Hook Beach Nourishment project meets the criteria for NWP 3 and the requirements for the State water quality certification for NWP 3. The Corps has concluded that this Ediz Hook Beach Nourishment effects are functionally analogous to the effects of a repair to an authorized structure conducted in accordance with NWP 3, and that State's water quality certification for NWP 3 applies to this project.

Verification of a Section 401 Water Quality Certification and Coastal Zone Management Act (CZMA) under a Nationwide Permit 3 was submitted to the Washington Department of Ecology in May 2011.

## **7.4 COASTAL ZONE MANAGEMENT ACT**

Pursuant to the CZMA, the Corps' actions are also required to be consistent to the maximum extent practicable with the the approved State Coastal Zone Management Program. The State has provided CZMA consistency concurrence for NWP 3. Therefore, since the work is functionally analogous to work covered by NWP 3, the NWP CZMA consistency determination applies to this work and the work is in compliance with CZMA. As noted above, Ecology was provided this information in May 2011.

## **7.5 FISH AND WILDLIFE COORDINATION ACT**

The Fish and Wildlife Coordination Act (16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. A Fish and Wildlife Coordination Act Report was completed for the initial construction of the project but is not required for maintenance work.

## **7.6 NATIONAL HISTORIC PRESERVATION ACT**

The National Historic Preservation Act (16 USC 470) requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. To comply with the National Historic Preservation Act, a historic site records search was conducted at the Washington State DOAHP and a pedestrian archaeological reconnaissance survey was conducted of the proposed project area in August 2002. Both the SHPO and the Lower Elwha Tribe were consulted. The 2002 pedestrian survey included the 2011 beach nourishment area and determined that the nourishment and placement of boulder sized revement rocks should not disturb native sediment. The pedestrian survey did not find any evidence of prehistoric or historic-period cultural material within the proposed project area. The SHPO concurred with the Corps determination that there would be no adverse affect to NRHP eligible properties for the undertaking

If, during construction activities, the contractor observes items that might have historical or archaeological value, the contractor would stop operations and notify the Corps archaeologist. The contractor shall prevent his employees from trespassing on, removing, or otherwise damaging such resources. The Corps archaeologist will make notification to the State Historic Preservation Officer and affected tribes.

If human remains are found, the Clallam County Sheriff will be called to determine if the human remains are of recent and potentially criminal origin. Concurrently, the Corps archaeologist will notify the appropriate Indian tribe(s) for consultation about the nature and disposition of the remains, should the Sheriff's Department determine that the remains are not the result of a crime. The contractor shall redirect work to other areas or tasks until the disposition of the remains is arranged to the satisfaction of the appropriate Indian group.

## **7.7 EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE**

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. Since no adverse human health or environmental effects

are anticipated to result from the project, the Corps has determined that no disproportional adverse impacts to low-income or minority populations would occur.

## 8.0 CONCLUSION

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 environmental impact statement. A signed FONSI will complete this environmental review.

## 9.0 PREPARERS

The following people contributed directly to preparation of this document:

Elizabeth L. McCasland, Biologist/Environmental Coordinator  
Kara Kanaby, Archeologist  
Michael Giavannozzi, Civil Engineer  
John A. Hicks, Project Manager  
Michael R. Scuderi, Supervisory Biologist

## 10.0 REFERENCES

National Park Service. 1996. "Elwha River Ecosystem Restoration Final Environmental Impact Statement." Port Angeles, WA: Olympic National Park.

Norris, J.G. and I.E. Fraser. 2006. Eelgrass mapping along the Elwha Nearshore. Clallam County Planning, Port Angeles, WA.

Norris, J.G., I.E. Fraser, and H. Julich. 2011. Defining fish use of subtidal vegetated habitats of the Elwha and comparative shorelines. Clallam County Planning, Port Angeles, WA

Port of Port Angeles. 2010. *Financial Reports*. Available on line:  
<http://www.portofpa.com/about/financial-reports.html> (accessed March 2011).

Shaffer, J.A., D. Penttila, M. McHenry, and D. Vilella. 2007. "Observations of eulachon, *Thaleichthys pacificus*, in the Elwha River, Olympic Peninsula Washington." *Northwest Science* 81: 76-81.

Simenstad, C.A., B. S Miller, J. N. Cross, K. L. Fresh, S. N. Steinfort, and J. C. Fegley. 1977. *Nearshore fish and macroinvertebrate assemblages along the Strait of Juan de Fuca including food habits of nearshore fish*. Technical Memorandum, NOAA.

US Army Corps of Engineers. 1976. *Ediz Hook beach erosion control general design memorandum*. USACE, Seattle District, Seattle, WA.  
—. 1981. *Ediz Hook beach erosion control operation and maintenance manual*. USACE, Seattle District, Seattle, WA

US Census Bureau. 2005. *Clallam County fact sheet 2005-2009*. 2009. Available on line: <http://factfinder.census.gov> (accessed March 2011).

Washington Department of Ecology. 2008. *Port Angeles Harbor Sediment Characterization Study, Port Angeles; sampling and analysis plan*. Lacey, WA.

Wray, J., and J. Valadez. 2011. "History of the Elwha nearshore." *Elwha Nearshore Consortium, 14 February 2011*. Port Angeles, WA.

## **11.0 ACRONYMS AND ABBREVIATIONS**

BMP	best management practice
DPS	distinct population segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESU	evolutionary significant unit
Ft	foot/feet (measurement)
MLLW	mean lower low water
MHHW	mean higher high water
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
OAHP	Washington State Office of Archaeology and Historic Preservation
PFMC	Pacific Fishery Management Council
SHPO	State Historic Preservation Officer
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WNDR	Washington Department of Natural Resources
WDOE	Washington Department of Ecology
WRIA	water resource inventory area

This page intentionally left blank

## Appendix A: Biological Evaluation on Threatened and Endangered Species

This page intentionally left blank

Appendix B: National Historic Preservation Act Section 106 Coordination with  
State Historic Preservation Office and Affected Tribes

This page intentionally left blank

## Appendix C: Public Comments