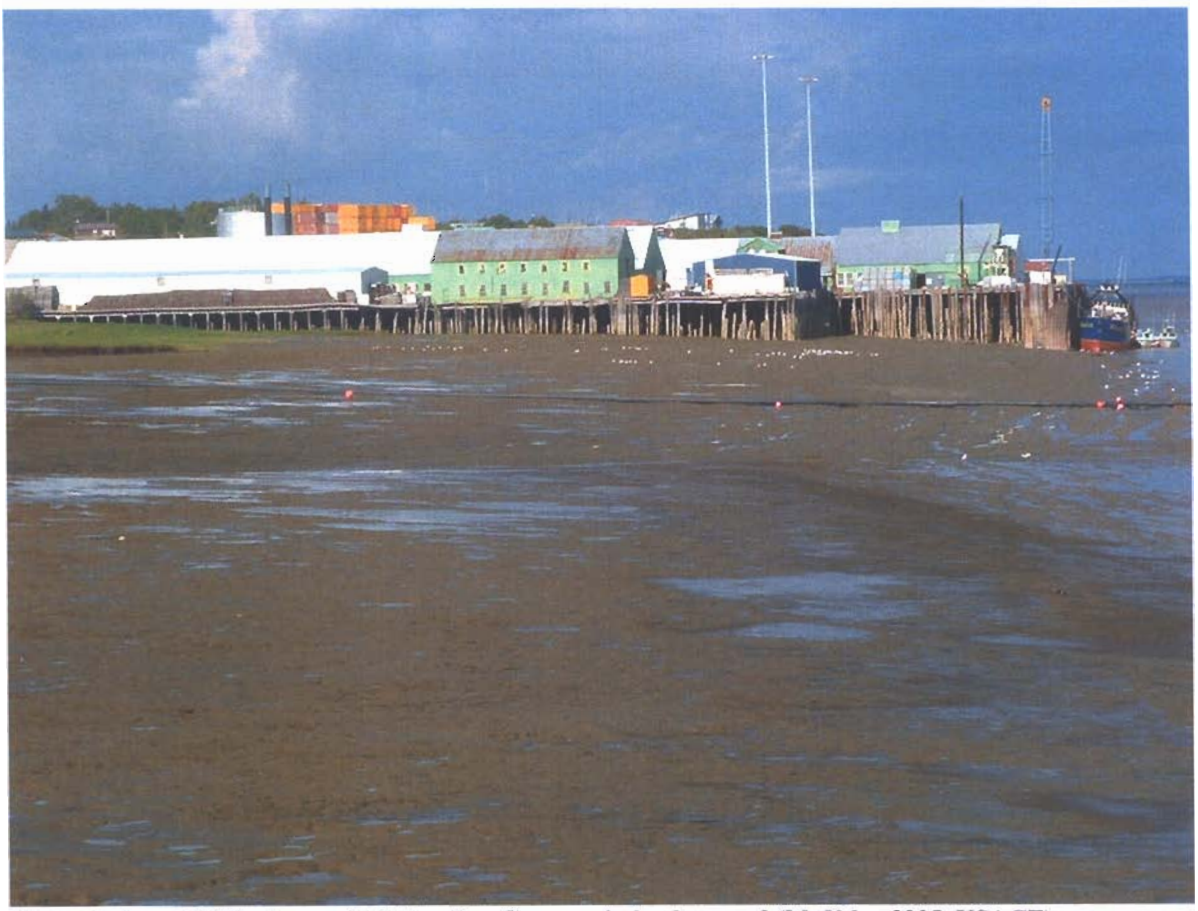
US Army Corps
of Engineers
Alaska District

Preliminary Assessment
Environmental Assessment and
Finding of No Significant Impact

Maintenance Dredging and Inwater Disposal
Dillingham Small Boat Harbor
Dillingham, Alaska



Disposal pipe at Dillingham with Peter Pan Cannery in background (M. Utley 2005, USACE).

September 2007

Dillingham Small Boat Harbor
Dredged Material Management Plan
Preliminary Assessment
Dillingham, Alaska

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1.0 Purpose

A Preliminary Assessment (PA) report is required for all Federal navigation projects to determine the need for a Dredged Material Management Plan (ER1105-2-100, 22 Apr 2000, Section E-15, page E-68). A PA report determines:

- If continued operation and maintenance of the project is economically justified.
- The consistency of existing environmental compliance documents with ongoing operation and maintenance activities.
- The dredged material storage capability under current disposal practices.
- The need for a Dredged Material Management Plan (based on projected storage capacity for dredged materials).

Federal Navigation projects are required to have storage capacity sufficient for 20 years disposal of dredged materials. If a PA of the dredging operation determines that 20 years storage capacity is not available, a Dredged Material Management Plan (DMMP) must be written to ensure management of the material for the 20 years of dredging and disposal.

2.0 Project Description and Authorization

The Dillingham Small Boat Harbor was authorized by the River and Harbor Act of 3 July 1958 (House Doc. 390, 84th Congress, 2nd Session), which initially provided for a small boat basin of 230,000 square feet (ft^2) dredged to a depth of +2 feet mean lower low water (MLLW). The harbor and 1,100-foot-long entrance was dredged at the mouth of Scandinavian Creek where it enters Nushagak Bay (figure 1). A sheet-pile sill with elevation of 7 feet MLLW was authorized for placement at the basin outlet, but design modification replaced the sheet-pile sill with a rock sill. An embankment was constructed on three sides of the basin to protect moored vessels from waves.

The project depth was reduced in 1963 from +2 feet to +7 feet MLLW due to excessive siltation. Maintenance was suspended in 1964 pending restudy of the project. In 1968 a supplemental design memorandum was approved authorizing re-excavation to the project depth of +2 feet MLLW and the purchase of a dredge owned by the Corps of Engineers. The harbor was dredged with the Corps dredge, "Dillingham" from 1969 through 1988. The Corps dredge was sold in 1988 and the harbor dredged by contract beginning in 1989. The rock sill was removed to the depth of the existing bottom in 1999.

The harbor (table 1 and figure 1) currently provides moorage for about 320 commercial fishing and recreational craft. At conclusion of the 2004 dredging season, controlling depth of the basin was +2 feet MLLW and entrance channel was +2.6 feet MLLW (Alaska District 2006a). The project is subject to rapid siltation due to sediment from the turbid Nushagak Bay settling out in the harbor basin.

Table 1: Existing Project dimensions (Dillingham Harbor, 2006 Project Maps and Index Sheets, AK District).

CWIS No.	Feature	Length (feet)	Width (feet)	Depth (feet)
04800	Entrance Channel	1,100	40	Varies
	Basin (50 acres)	700	650 – 800	+2
	Rock Sill [a]	N/A	N/A	+7

a Removed to depth of existing bottom.

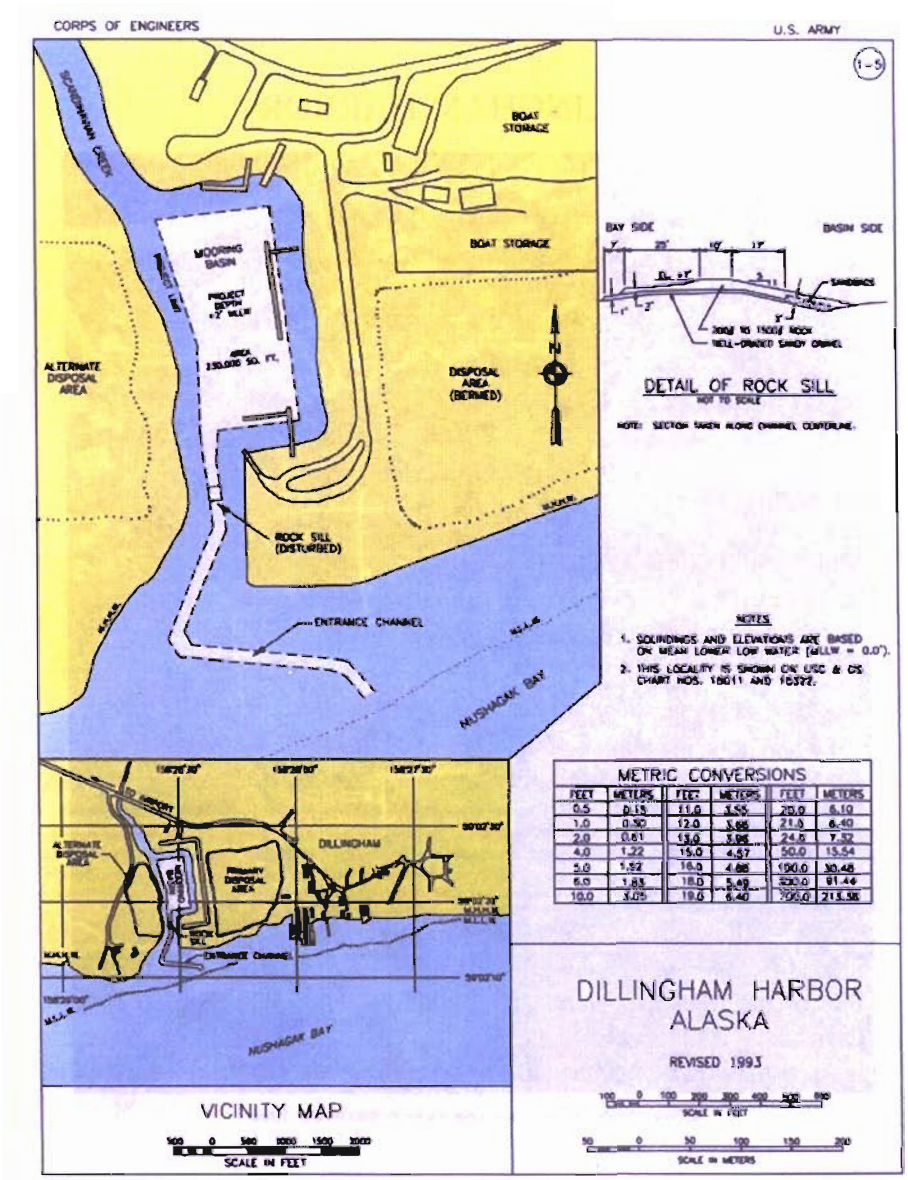

Figure 1: Dillingham Harbor, Alaska (Dillingham Harbor, 2006 Project Maps and Index Sheets, AK District).

3.0 Maintenance Dredging Operations

The Dillingham Small Boat Harbor is dredged annually due to heavy silting in the basin and the upper entrance channel and would become unusable to the commercial fishing fleet within 1 to 2 years without dredging. The official dredging window is from May through October, but the traditional dredging window is from May 1 to June 30 to mitigate conflict with the fishing fleet. Quantities and contract costs of dredging at Dillingham from fiscal year 2000 through 2007 are in table 2.

Table 2: Dredged Quantities and Contract Costs FY 00 through FY 07.

Fiscal Year	Quantity (Cubic Yards)	Contract Costs ($)	Disposal
2000	76,475	299,199	Inland
2001	101,076	274,418	Inland
2002	74,104	320,308	Inland
2003	103,299	551,605	Inland
2004	90,000	356,653	In-water
2005	90,000	470,302	In-water
2006	98,320	571,920	In-water
2007	99,868	524,300	In-water

Dredging is with a contracted hydraulic cutterhead and pipeline suction dredge that pumps the sediment and water through a portable, 12-inch pipeline to a disposal site. From 1969 to 2003 disposal was in two inland confined dewatering facilities (CDFs) on private land adjacent to the harbor (figure 2) (Alaska District 1974). The site west of the harbor is referred to as the "Old Western Site" and reached capacity in 1979 (Alaska District 1979). The disposal site east of the harbor is referred to as the "Peter Pan Site" because the land is owned by Peter Pan Seafoods of Seattle, Washington. The Peter Pan CDF reached capacity in 2003. Beginning in 2004 disposal has been directly into the Nushagak River estuary (figure 2) under a trial and interim disposal agreement with the State of Alaska Department of Natural Resources pending implementation of a DMMP starting in 2009 (Alaska District 2003 and 2005a). Current disposal is through a floating pipeline to a defined disposal area over water that averages -26 feet MLLW in depth. Strong currents in the disposal area are expected to disperse the dredged sediments within the naturally high bedload of the Nushagak River estuary.

4.0 Disposal Alternatives Considered

The following alternatives for disposal of sediment dredged from the Dillingham Small Boat Harbor were considered.

4.1 Alternative 1: No Action Alternative, Disposal at Peter Pan Site

Under a No-Action alternative, sediment dredged from the harbor would continue to be discharged into the privately owned Peter Pan disposal site without refurbishment. The No-Action alternative was eliminated from consideration because the Peter Pan disposal site reached capacity in 2003 and the berms confining the dredged sediment have been weakened by wave erosion from the Nushagak River. Retention time is insufficient and effluent flowing from the CDF will not meet State water quality standards for discharge in fresh water (DEC 2003).

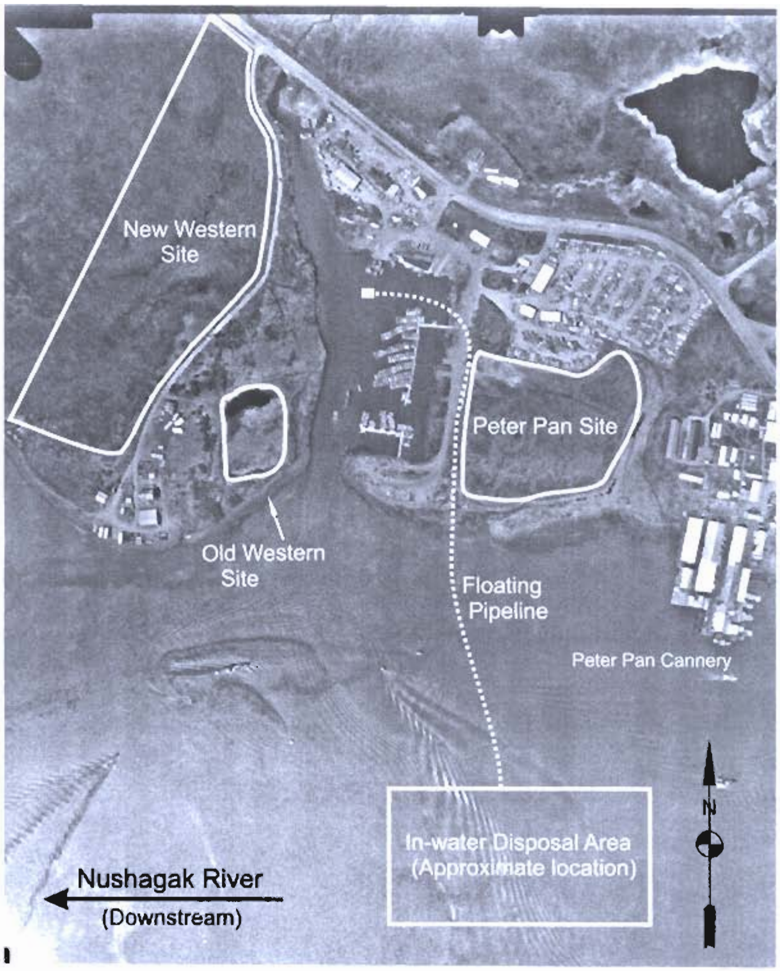

Figure 2. Dillingham harbor with approximate locations of alternative features.

4.2 Alternative 2: Disposal at the Peter Pan Site with Maintenance Hauling

Alternative 2 would reinstate dewatering dredged sediment in the privately owned Peter Pan Site (figure 2) and disposal by trucking to at another location. Approximately 90,000 cubic yards (yd^3) of dewatered sediment would be removed annually to an unknown location, and the berms rebuilt annually to prepare the site for dewatering. Alternative 2 was eliminated from consideration because:

(1) The Corps does not have authority to continue disposal in the privately owned Peter Pan Site CDF.

(2) The City of Dillingham (the local sponsor) has not responded to requests they identify inland locations on which to dispose of an initial 90,000 yd^3 and an estimated 1,800,000 yd^3 of sediment over the 20-year project life.

(3) There is insufficient time between spring thaw and dredging operations to prepare the Peter Pan Site (removing an estimated 7,500, 12-yd^3 dump truck loads of previous season sediment to an inland disposal/storage site).

(4) Effluent flowing from the site will not meet State of Alaska water quality standards because there is insufficient area for retention and clarification of the effluent before returning it to the river.

4.3 Alternative 3 - Confined Disposal Facility on Wetland

Alternative 3 would construct a 60-acre CDF on a large bog-type wetland west of the harbor. This location is referred to as the "New Western Site" (figure 2). Alternative 3 was eliminated from consideration because:

(1) Studies conducted by the Corps in 2004 determined that the wetland is a bog up to 40 feet deep covered by a relatively thin layer of floating vegetation (Alaska District 2005b).
(2) Alternative 3 would be on private land and the City of Dillingham (the local sponsor) has not indicated a willingness to acquire and provide the land for construction of a CDF.
(3) Corps engineers estimates that 800,000 yd^3 of gravel from a local borrow pit and 64,600 yd^3 of previously dredged sediment from the Old Western Site would be needed to construct confinement berms on the New Western Site.
(4) The cost of materials at an estimated \$20 per yd^3 delivered on site would be approximately \$17,292,000 of which the City of Dillingham would be responsible for 20 percent before crediting the cost of lands, easements, relocations, and rights-of way (LERR). The City of Dillingham has not indicted a willingness to cost share this alternative.
(5) Corps engineers estimate that disposal on the site would jeopardize the integrity of a private road leading to a privately-owned fuel distribution facility and tank farm. The road would have to be upgraded and it is likely it would have to be maintained for the life of the alternative.
(6) The old Western Site, a material source, is privately owned and the City of Dillingham (the local sponsor) has not acquired authority to take materials from the site.

4.4 Alternative 4 – Wetland Disposal without Confinement

Alternative 4 would allow the sediment and its carrier water to run free across the wetland described in Alternative 3. This alternative was eliminated from consideration because:

(1) The hydraulic characteristics of the wetland bog are unknown.
(2) Alternative 4 would be on private land and the City of Dillingham (the local sponsor) has not indicated a willingness to provide this land for a disposal site.
(3) Alternative 4 could affect the integrity of the main Dillingham highway and a private road leading to a fuel distribution facility and tank farm resulting in maintenance to these roads for the life of the project.

4.5 Alternative 5 – Wetland Disposal by Injection

(1) Alternative 5 would inject the sediment and its carrier effluent under the surface vegetation of the wetland bog described in Alternative 3. This alternative was eliminated from consideration for the same reasons that Alternative 4 was eliminated.

4.6 Alternative 6– In-water Disposal

Alternative 6 is disposal in the Nushagak River estuary via a floating pipeline to a defined disposal area in -26 feet MLLW and approximately 800 feet offshore (figure 2). Alternative 6 (in-water disposal) is the preferred alternative because:

(1) It has been proven technically feasible, environmentally benign, and cost effective to return the sediment to the Nushagak River estuary.
(2) Sediments returned to the river are not significantly contaminated above ambient levels during their relatively short stay in the harbor.
(3) In-water disposal meets State of Alaska water quality standards with approval and application of a mixing zone.
(4) In-water disposal results in only minor and temporary disruption of fishing fleet activities and navigation.
(5) Impact to subsistence activities by in-water disposal is negligible.
(6) Impact to adult salmon by in-water disposal is negligible.
(7) Potential impact to out migrating sockeye salmon smolt can be easily and effectively mitigated.
(8) In-water disposal does not appear to result in long-term shoaling or retention of a significant disposal mound on the river bottom.

Unlimited disposal capacity is available with in water disposal. The dredged material is composed of 7 percent sand, 25 percent clay, 32 percent fine silt, and 37 percent coarse silt (Teeter 2003). This disposal operation does not add inland sediment to the Nushagak River, but moves natural river sediment back to the river after a short stay in the harbor. Contaminants in sediment placed back to the river are not elevated significantly beyond ambient levels.

It is possible to enter the harbor on extreme high tides by cutting short the entrance channel and entering the harbor by crossing tide flats. The floating pipeline requires vessels to enter the harbor via the entrance channel at all times when the harbor can be entered. The floating pipeline prohibits the practice of short cutting the entrance channel during dredging and disposal.

In-water disposal at Dillingham is untested during a major storm event. The dredging contractor would be required to have a safety plan that would maintain the safety and integrity of the dredging and in-water disposal operation during a major storm event. Storms are rare in June compared with late September, October, and November.

Pre and post disposal bathymetric surveys would be standard practice for in-water disposal. The post 2006 survey indicates that a mound was forming at the – 20-foot MLLW depth (figure 3). A comparison of the post 2006 and pre 2007 surveys (figure 4) suggests the mound migrated upstream on strong flood tide currents over the winter, as would be expected. A mound in 2006 likely resulted from the discharge of about 5,000 yd^3 of gravel dredged from the entrance channel. The source of the gravel is unknown, but it could have been from eroding fill downstream of the entrance channel or gravel naturally carried by the extreme bedload of the Nushagak River estuary. Whatever the source, the dredging subcontractor reported that the quantity of gravel appears to be diminishing and was just under 2,000 yd^3 in the 2007 discharge (2007 E-mail communication, Nehalem Dredging Company). Recent construction of large sheet-pile docks upstream and downstream of the entrance channel may also be cutting off the supply of gravel to the entrance channel.

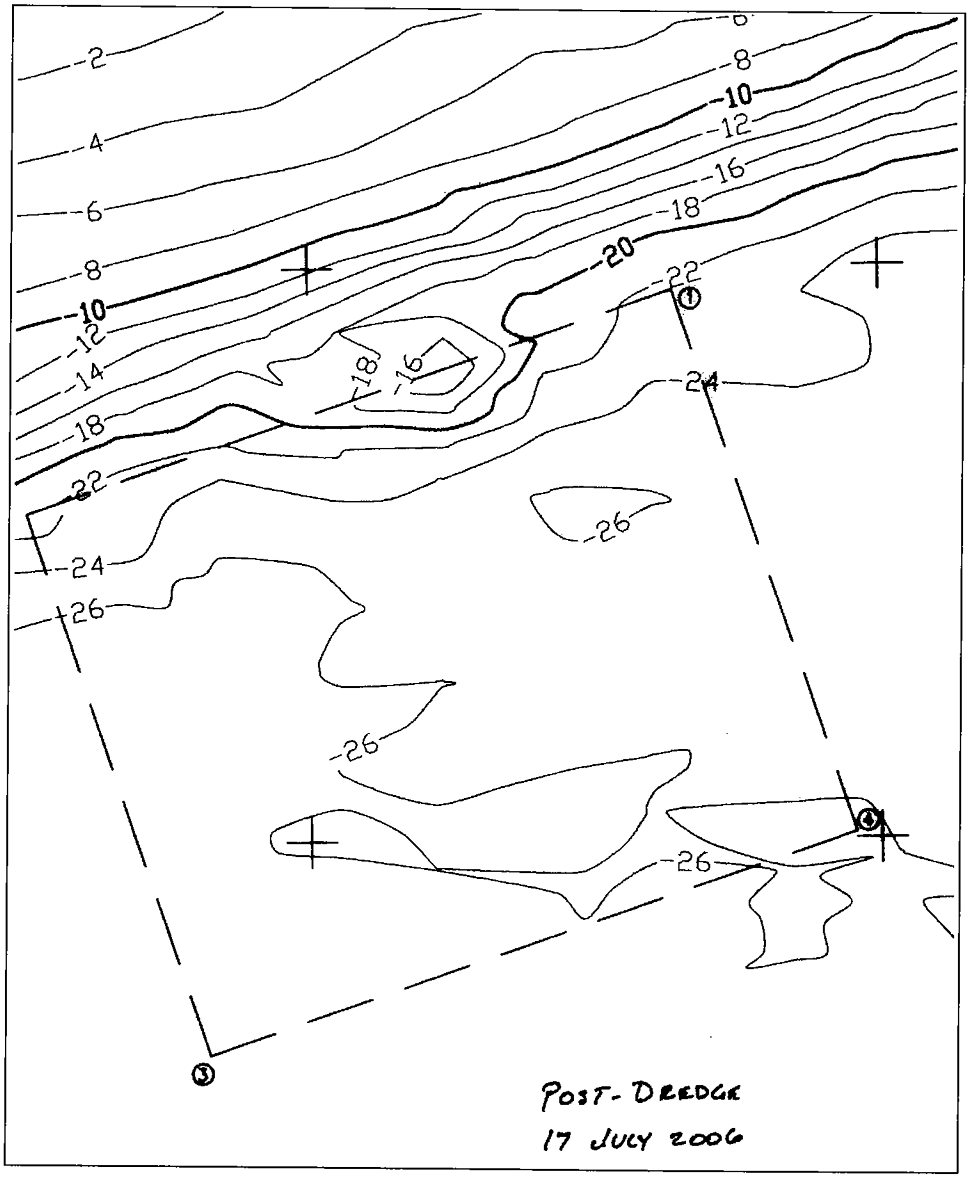

Figure 3. Post 2006 disposal bathymetric survey at Dillingham, Alaska showing what appears to be a disposal mound at the -20-foot MLLW depth.

Comparison of the post 2006 and pre 2007 surveys (figure 4) and the post 2007 survey (figure 5) indicates that mound building on the river bottom would not be a significant problem in the future. The potential of mound building from in-water disposal would also be mitigated by requiring disposal over the deepest depth in the disposal area and not just over the inshore boarder of the disposal area.

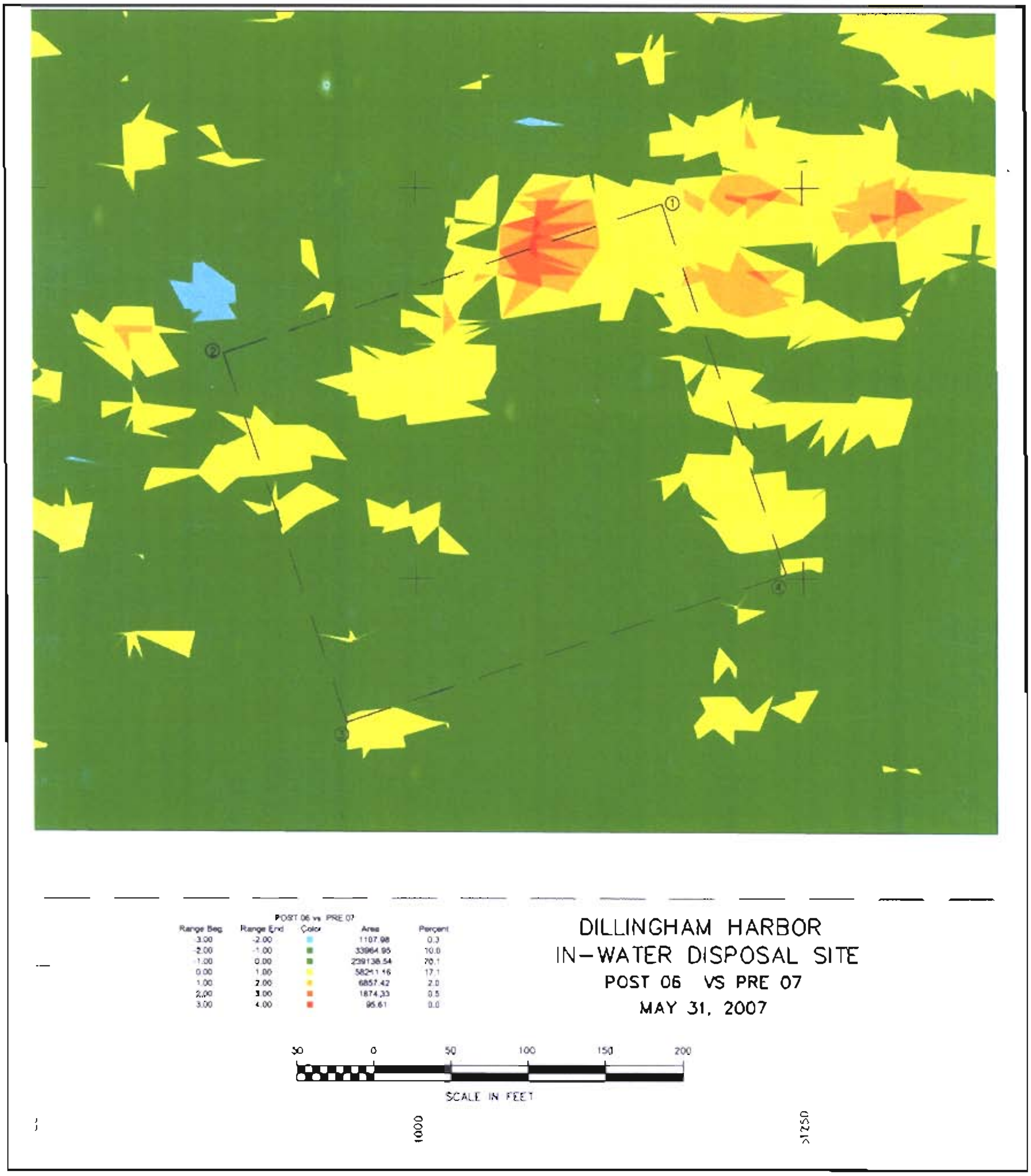

Figure 4. A comparison of the post 2006 disposal bathymetric survey at Dillingham, Alaska with the pre 2007 bathymetric survey showing elevations in bottom contour.

4.6 Environmentally Preferred Alternative

Alternative 6 (in-water disposal) is the environmentally preferred alternative because:

(1) It does not impact wetlands and associated hydraulic functions.

(2) It does not result in significant adverse impacts to subsistence activities.

(3) It allows effective and easily implemented mitigation for out migrating sockeye salmon smolt.

(4) It does not result in significant impact to adult salmon or interfere with their upstream migration.

(5) It does not adversely affect water quality in the Nushagak River estuary.
(6) It does not adversely affect threatened or endangered species.
(7) It does not adversely affect protected marine mammals.
(8) It does not adversely affect birds, protected or unprotected.
(9) It does not adversely affect essential fish habitat.
(10) It does not result in long-term shoaling or mound building on the river bed between disposal seasons.
(11) It does not result in long-term disruption of harbor activities.

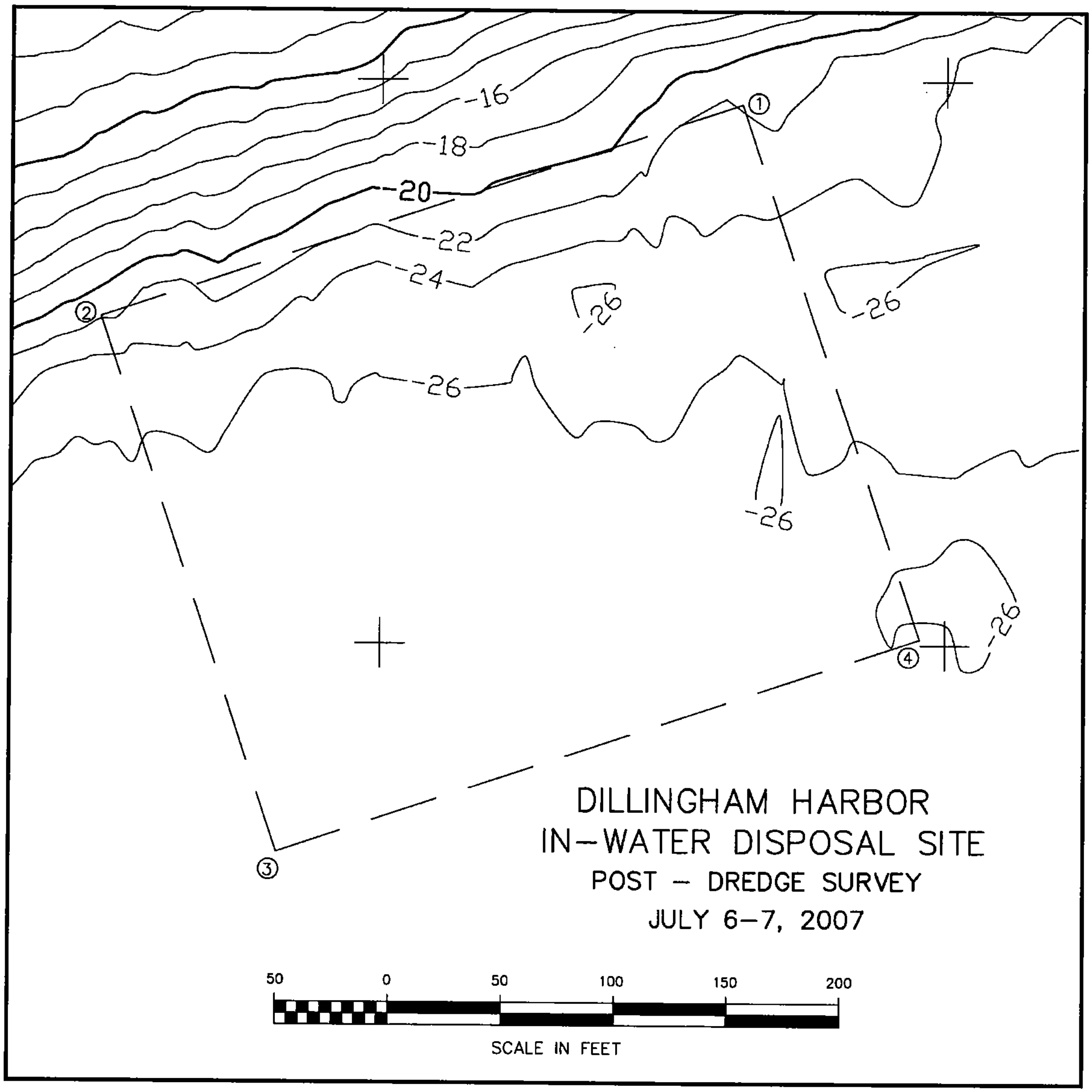

Figure 5. Post 2007 disposal bathymetric survey at Dillingham, Alaska.

4.7 Locally Preferred Alternative

Meetings were held in Dillingham in November 2003 and April 2006 during which the city manager was asked to propose a locally preferred alternative for disposal of the dredged sediments. A follow-up letter requesting the city to propose a locally preferred alternative was not answered (Appendix A, Correspondence). The City of Dillingham voiced preference for inland disposal during the above meetings, but apparently does not have an official, locally preferred alternative for this disposal of dredged material. The City of Dillingham has not responded to requests by the Corps and its representatives to identify and provide land for inland disposal.

4.8 Public Testimony and Comment

Public testimony and comment at public meetings held in Dillingham in November 2003 and April 2006 focused on the potential effects of in-water disposal on: (1) out migrating sockeye salmon smolt, (2) disrupting the upstream migration of returning adult salmon, (3) fouling subsistence beaches with sediment, (4) preventing boats from entering the harbor by cutting across the tide flats during high tide, and(5) building a permanent shoal on the river bottom. The Alaska District held meetings with the Alaska Department of Natural Resources and Fish and Game during which the follow mitigation measures were determined.

(1) Out migrating sockeye salmon smolt.
   a. The discharge would be injected 10 feet below the surface at all tide levels to mitigate contact with surface oriented salmon smolt. This mitigation measure was used successfully during the 2005 and 2006 disposals, and will be used during 2007 and 2008.

(2) Disruption of migrating adult salmon.
   a. Significant changes to the subsistence catch that might be related to in-water disposal would be detected during routine catch monitoring by the Alaska Department of Fish and Game. No significant changes in the subsistence catch were detected during 2004 and 2005.

(3) Fouling subsistence beaches with dredged sediment.
   a. The Alaska District conducted accretion studies on subsistence beaches during 2004 (Alaska District 2004). Sediment accretion was not detected and the study indicated the beaches are eroding.

(4) Preventing boats from entering the harbor by cutting across the tide flats during high tide.
   a. This is unavoidable due to the need to place a floating discharge pipe out to the disposal site and vessels must use the entrance channel during dredging and in-water disposal. The pipe is well marked and a notice to mariners is published to mitigate its placement.

(5) Building a permanent shoal on the river bottom.
   a. The Alaska District would conduct pre and post dredging bathymetric surveys during the permitted trial and interim in-water disposals (2005, 2006, 2007 and 2008).

5.0 Disposal Limitations

5.1 Inland

Inland disposal is limited by:

(1) Failure of the City of Dillingham to provide land for disposal of dredged materials as described in Alternatives 1, 2 and 3.

(2) Environmental destruction of a 60-acre wetland bog on the New Western Site and possibly wetland hydraulic functions over a larger area (Alternative 2).
(3) Resource agency staff and the local CRSA representative have voiced concern about filling wetlands (Alternative 2 and 3).
(4) Costs to excavate and haul 864,600 yd^3 of material for construction of a CDF in the wetland bog on the New Western Site (Alternative 2).
(5) Potentially adverse impacts to the wetland hydraulics resulting from injection of dredged materials under the vegetative mat of the wetland bog on the New Western Site (Alternative 3).
(6) Potential need for maintenance of adjacent public and private roads for the life of the project (Alternatives 2 and 3).

5.2 In-water

In-water disposal is limited by:

(1) The length and diameter of floating pipe that be safely anchored to withstand strong flood tide currents in the Nushagak River estuary.
(2) A period of operation prior to June 30 so dredging and disposal operations do not interfere excessively with operations of the local fishing fleet.
(3) A need for relatively storm free weather conditions to keep the floating pipeline in operation.

6.0 Mitigation Measures of Maintenance Dredging and In-water Disposal

Dredging operations are mitigated by timing dredging prior to the peak use of the harbor by the commercial fishing fleet. Peak fleet activities focus on sockeye salmon that run in July. Timing dredging and disposal operations prior to the July sockeye salmon fishery allows the harbor to be dredged when it is used by fewer vessels and allows the floating pipeline to be positioned with few temporary impediments to vessels entering and leaving the harbor.

Natural turbidity in the Nushagak River estuary ranges from about 3,300 mg/l suspended solids on the bottom to an average of 140 mg/l suspended solids near the surface (PND 1988). The millions of sockeye salmon smolt that migrate to sea though the 2.5-mile wide Nushagak River estuary select water of highest quality through which to migrate, and in the Nushagak River estuary the highest quality water (lowest suspended solids) is near the surface in the center of the river. Consequently, in-water disposal is mitigated by injecting the discharge a minimum of 10 feet below the surface at all tide stages. Turbidity resulting from in-water disposal was monitored in 2005 (Alaska District 2005c). This study showed that measurable turbidity was effectively dispersed within 50 meters (164 feet) of the discharge point.

Few if any benthic fish or invertebrates are expected to inhabit the river bottom within the discharge area because of the high bedload that is present. Consequently, mitigation for disposal on the river bottom is not necessary. Post and pre-dredged bathymetric surveys show that any mound resulting from the discharge is dispersed by tidal currents and is not detectable by the following dredging season.

7.0 Threatened and Endangered Species

Endangered whales and Steller sea lions are present in outer Nushagak Bay but are not present near the project site. Threatened Steller's eiders and spectacled eiders might occupy the outer Nushagak Bay, but are not expected to be present near the project site. This disposal alternative is not expected to have any adverse effect on listed threatened or endangered species.

Informal consultation regarding listed species has not been requested for this PA but would be requested as part of the NEPA process for implementation of dredging and disposal as recommended in this PA. Informal consultation was conducted for each of the trial and interim in-water disposal actions that preceded the action described in this PA (Alaska District 2003, 2005a).

8.0 Essential Fish Habitat

The preferred disposal alternative is not expected to have any significant effects on Essential Fish Habitat (EFH).

9.0 Beneficial Use Considerations

No beneficial environmental uses of dredged material from the Dillingham Harbor have been proposed or are being considered. Disposal in the former Peter Pan site resulted in a privately-owned industrial storage lot for fishing vessels and Alternative 3 would eventually result in a similar use of the material. Dewatered material is suitable for inland fill, but is not suitable for beach nourishment because of its high silt content. Opportunities for development of salt marshes or other wildlife habitat with the material are not available.

10.0 NEPA Considerations

Dredging and disposal activities are currently being conducted through approval of the State of Alaska Departments of Natural Resources, Fish and Game, and Environmental Conservation after public and agency review of an Environmental Assessment (EA), Finding of No Significant Impact (FONSI) and Clean Water Act Section 404(b) analysis (Alaska District 2005a). In-water disposal was approved for the years 2006, 2007 and 2008 in anticipation of a 20-year Dredged Material Management Plan (DMMP) in 2009. The interim in-water disposal plan was determined to have complied with the enforceable and administrative policies of the Alaska Coastal Management Program (ACMP).

A DMMP will not be written for this disposal because in-water disposal provides unlimited disposal capacity in excess of 20 years. An EA and 404(b)(1) evaluation of dredging and in-water disposal at Dillingham will be written to prepare for and acquire permits for long-term maintenance dredging and disposal of dredged materials into the Nushagak River estuary. Disposal is estimated to average 90,000 yd^3 annually for the 20-year life of the project. The disposal program would be reassessed after10 years or sooner if unexpected adverse environmental impact was discovered. This DMMP preliminary assessment, the EA and the FONSI will be released for public and agency review by summer 2008.

11.0 Cultural and Historical Resource Considerations

The NEPA process that would result from this PA would be coordinated with the State Historical and Preservation Office (SHPO) of the Department of Natural Resources in compliance with Section 106 of the National Historic Preservation Act. SHPO coordination was conducted for each of the trial and interim in-water disposal actions that preceded the action described in this PA (Alaska District 2003, 2005a). Significant adverse impacts to cultural or historical resources are not expected as a result of this project.

12.0 Real Estate Considerations

Land that would be used for Alternative 2 and 3 is privately owned in part by the Bristol Alliance/Express Fuel Company of Dillingham and the Native Village Corporation, Choggiung, Limited of Dillingham. The City of Dillingham has not indicated a willingness to acquire and provide this land to the Corps for Alternative 2 or 3, and the Bristol Alliance Fuel Company requested in writing that the Corps and City of Dillingham not enter on their land (Appendix A, Correspondence).

Inlands used for Alternative 4 are owned by the City of Dillingham. Tidelands out to 0 feet MLLW are owned by the City of Dillingham. Two separate State-owned tideland parcels would also be used. One parcel includes the entrance channel and basin (Scandinavian Creek) and the other submerged lands under the disposal area that are deeper than 0 feet MLLW. The entrance channel and basin are dredged under a perpetual easement, and the disposal area deeper than 0 MLLW is used under the Federal Doctrine of Navigational Servitude.

13.0 Permits and Approvals Required

All current permits and approvals for the interim in-water disposal will expire upon conclusion of the 2008 dredging season and must be renewed prior to the start of the 2009 dredging season. Permits, approvals, and concurrences required for this dredging and disposal action are:

(1) ACMP concurrence by the Alaska Department of Natural Resources/ACMP.
(2) ACMP concurrence by the Bristol Bay Coastal Resources Service Area (BBCRSA) representative.
(3) Clean Water Act Section 404(b) concurrence by the Corps of Engineers, Alaska District Regulatory Branch.
(4) Clean Water Act Section 401 certification by the Alaska Department of Environmental Conservation.
(5) Anadromous Fish Habitat permit issued by the Alaska Department of Natural Resources, Office of Habitat Management and Permitting.
(6) National Historic Preservation Act Section 106 concurrence by the SHPO.
(7) Endangered Species Act informal consultation with Federal resource agencies.
(8) Rivers and Harbors Act Section 10 concurrence by the Corps of Engineers Regulatory Branch.

Submerged land deeper than 0 MLLW owned by the State of Alaska would be used by the Corps for disposal of sediment under the doctrine of Navigational Servitude as described by the Commerce Clause of the Rivers and Harbors Act 1899 and reiterated in the Submerged Lands Act of 1953.

14.0 NED Benefit Analysis

The economic assessment for this PA was prepared by the Corps of Engineers Portland District Civil Works Branch Economics Section.

14.1 Scope of Economic Assessment.

The purpose of this economic assessment of the Dillingham Boat Harbor is to determine if continued maintenance of the harbor can be justified economically. Dredged material from the harbor has historically been disposed of inland on adjacent lands. These facilities reached full capacity in 2003. Starting in 2004 open water disposal has been used, and is permitted through the 2008 dredging season.

The guidance for the preliminary assessment recommends that continued maintenance of the Dillingham harbor be evaluated based on indicators of current economic conditions relative to the least cost alternative disposal option identified in the most recent study. The long-term dredged material disposal plan is the focus of this economic assessment.

The 1958 authorizing legislation described the justified project. In the mid-1950s about 600 people lived in the village of Dillingham. Salmon fishing and canning were developed industries. Lack of a boat harbor required vessels at that time to be moored along the waterways throughout Dillingham. The initial cost to construct the small boat harbor was $388,000 with total average annual costs estimated to equal $24,100 (1954 dollars). The economic analysis of this proposed boat harbor determined the facility would eventually serve about 100 commercial fishing vessels. Benefits attributable to construction of the boat harbor included reduced loss of boats, reduced boat damages and repairs, reduced loss and handling costs of cargo. In addition, the study acknowledged the benefits to the region in establishing a safe harbor for commercial and non-commercial vessels. Total average annual benefits were estimated to equal $32,150 (or $322 per vessel), and the benefit to cost ratio was 1.3 to 1. The Corps of Engineers initiated construction of the 13-acre Dillingham boat harbor in 1960 and completed work in 1961.

In 1983, the City of Dillingham installed a dock that includes 750 feet of moorage space at the boat harbor. The city dock was designed to accommodate an additional 150 vessels.

The Federal project provides for access through the entrance channel to moorage within the boat harbor. Annual dredging is necessary in order to maintain the operability of Dillingham Harbor. The annual dredging to +2 feet MLLW is required to prevent excessive sedimentation that would strand vessels in the harbor. Seven to 9 feet of fine sediment accumulates annually[i].

14.2 Economic Activities Used to Justify Project.
Historical economic activity data presented in this section is compared to current statistics later in this report to show how Dillingham Harbor economic activity has changed over the years.

The Bristol Bay fishing fleet has historically fished a variety of salmon species including sockeye, Chinook, chum, pink and coho. In addition, crab, herring, and halibut are harvested. Table 3 below shows the historical commercial fish catch statistics for Dillingham resident fishermen compared with the Bristol Bay region for the period 1980 to 1984. Data from the 1980 to 1984 period were used for the historical economic assessment due to the lack of older consistent data sources. Dillingham resident fishermen represent a significant proportion of the total fishing in the region, accounting for 31 percent of all fishermen in Bristol Bay and harvesting over 39 percent of the total pounds landed.

Table 3. Historical Commercial Salmon, Halibut, Herring, Crab Fishermen Numbers and Catch for Dillingham and nearby communities.

Year	Dillingham			Nearby Communities		
	Permit Holders	Fishermen Who Fished	Total Pounds Landed	Permit Holders	Fishermen Who Fished	Total Pounds Landed
1980	461	285	14,738,167	1,373	907	38,737,477
1981	380	294	20,374,671	1,150	934	46,913,182
1982	359	285	13,820,028	1,156	924	33,454,745
1983	344	298	19,522,134	1,123	923	50,603,117
1984	387	295	15,860,098	1,292	964	44,351,035
5-Year Average	386	291	16,863,020	1,219	930	42,811,911

Source: www.cfec.state.ak.us/gpbycen. Table includes permit holders with addresses in Dillingham and communities near Dillingham that are likely to use harbor facilities in Dillingham. Dollars reported are not adjusted for inflation.

The commercial fishing estimated gross earnings of the Dillingham and Bristol Bay region as a whole has historically been significant. Table 4 shows the historical commercial fishing estimated gross earnings associated with Dillingham and Bristol Bay, and the relative significance of Dillingham Harbor.

Table 4. Historical Commercial Fishing Gross Estimated Earnings, Dillingham and Nearby Communities.

Years	Dillingham	Nearby Communities	Estimated Gross Earnings of Nearby Communities
1980	$7,497,587	$20,034,807	37%
1981	$14,564,857	$33,797,194	43%
1982	$8,126,918	$20,015,019	41%
1983	$10,860,988	$28,984,560	37%
1984	$7,421,802	$22,652,855	33%
5-Year Average	$9,694,430	$25,096,887	39%

Source: www.cfec.state.ak.us/gpbycen. Table includes permit holders with addresses in Dillingham and communities near Dillingham that are likely to use harbor facilities in Dillingham. Dollars reported are not adjusted for inflation.

According to the authorizing legislation, the description of the Dillingham Harbor boat basin was anticipated to eventually serve more than 100 commercial fishing vessels and provide moorage facilities for non-commercial vessels. A significant portion of the benefits of the project were attributed to reduced loss of boats, reduced boat damages and repairs, reduced loss and handling of cargo, as well as establishing a safe harbor in the region for commercial and non-commercial vessels. Total average annual reduced costs and damages were estimated to equal $32,150 per year or $322 per vessel (1954 dollars).

14.3 Current Economic Activities

Dillingham Harbor continues to be heavily utilized by the commercial fishing industry with docks, a barge landing, boat launch, and boat haul out facilities. If Dillingham Harbor filled with sediment and became unusable, damages to vessels rafted from shore, vessel delays, and loss of harbor infrastructure would result in an estimated annual cost of $390,600 or a total value of more than $13 million over the 20-year project horizon (based on the recent Economic Analysis for City of Dillingham Shoreline Emergency Bank Stabilization report and using the FY 2007 discount rate of 4 7/8%). The following series of tables show the most recent economic activities. This information is compared with historical data.

Table 5 below shows the most recent fish catch statistics for Dillingham resident fishermen compared with the Bristol Bay region for the period 2001 to 2005. Dillingham resident fishermen continue to represent a significant proportion of total fishing in the Bristol Bay region. In recent years, Dillingham fishermen have accounted for more than 31 percent of all fishermen in Bristol Bay and harvested more than 41 percent of the average total pounds landed.

Table 5. Most Recent Commercial Salmon, Halibut, Herring, Crab Fishermen Numbers and Catch, Dillingham nearby communities.

Year	Dillingham			Nearby Communities		
	Permit Holders	Fishermen Who Fished	Total Pounds Landed	Permit Holders	Fishermen Who Fished	Total Pounds Landed
2001	272	202	9,075,561	910	651	26,960,995
2002	265	162	5,283,988	905	556	12,946,188
2003	359	285	13,820,028	894	606	26,484,216
2004	237	164	12,137,370	839	558	27,946,131
2005	239	172	12,391,499	824	563	31,464,401
5-Year Average	274	197	10,541,689	874	586	25,160,386

Source: www.cfec.state.ak.us/gpbycen; Table includes permit holders with addresses in Dillingham and communities near Dillingham that are likely to use harbor facilities in Dillingham. Dollars reported are not adjusted for inflation.

The most recent commercial fishing estimated gross earnings of the Dillingham and Bristol Bay region continues to be significant. Table 6 shows the most recent commercial fishing estimated gross earnings associated with Dillingham and Bristol Bay, and the relative significance of Dillingham Harbor.

Table 6. 2001- 2005 Commercial Fishing, Estimated Gross Earnings, Dillingham and nearby communities.

Years	Dillingham	Nearby Communities	Estimated Gross Earnings of Nearby Communities
2001	$2,957,233	$9,381,807	32%
2002	$1,992,680	$5,130,426	39%
2003	$4,584,679	$11,472,527	40%
2004	$5,117,410	$12,275,567	42%
2005	$5,883,773	$15,854,993	37%
5-Year Average	$4,107,155	$10,823,064	38%

Source: www.cfec.state.ak.us/gpbycen. Table includes permit holders with addresses in Dillingham and communities near Dillingham that are likely to use harbor facilities in Dillingham. Dollars reported are not adjusted for inflation.

The existing Dillingham Harbor is used to its capacity during fishing season. In 2004 about 750 vessels utilized Dillingham Harbor. The peak number of vessels that used the harbor at any one time was about 450 during a salmon fishing closure. The typical number of vessels using the harbor at any one time during the season is between 250 and 300. To accommodate harbor demand, vessels are rafted 15 to 20 deep at the dock and reach 30 deep during peak periods. The majority of fishing vessels are 32-foot gill net harvesters.

Between 400 and 500 smaller vessels for recreation and subsistence-harvesting activities also use the harbor annually from August through September. During this period, 15 to 25 of these smaller vessels may be in the harbor at any one time. The majority of these smaller vessels are less than 25 feet in length.

Sport fishing in the Nushagak area is another activity that takes advantage of Dillingham Harbor and its facilities. The Nushagak area includes all lakes and tributaries of the Nushagak River drainage, including the Mulchatna River, Wood River, Tikchik Lake systems, and waters westward to Cape Newenham. Table 7 shows the number of anglers, trips, and days fished in recent years.

Table 7. Nushagak Area Sport Fishing Activity, Recent Years

Year	Anglers	Trips	Days Fished
2000	8,093	16,760	43,512
2001	8,123	20,168	43,519
2002	6,133	15,104	32,618
2003	7,275	15,542	40,987
2004	7,539	21,496	46,011
5-Year Average	7,433	17,814	41,329

Source: www.sf.adfg.state.ak.us. Sport Fish Division, Fish Harvest Survey Information, various years.

In addition to commercial and sport fishing activities, transportation of freight through the Dillingham Harbor facilities to the communities in the region is important. Dillingham serves as the entry point for freight and fuel shipments to the smaller communities in the Bristol Bay region. Table 8 summarizes Dillingham freight shipments and number of trips in recent years.

Table 8. Dillingham Freight Shipments (tons) & Trips (inbound/outbound)

Year	Freight (tons)	Trips
2000	33,000	112
2001	24,000	181
2002	41,000	254
2003	48,000	116
2004	27,000	95
5-Year Average	34,600	152

Source: U.S. Corps of Engineers, Waterborne Commerce Statistics, various years.

Dillingham Harbor continues to serve as an important regional harbor of refuge during storm conditions.

14.4 Inland Disposal Costs

Unless Alternative 2 or 3 is developed, Dillingham Harbor lacks inland disposal storage capacity necessary to maintain the harbor over the next 20 years. The primary inland disposal area (Peter Pan site) was filled to capacity in 2003. Disposal has been in-water since 2004.

Table 9 summarizes dredging data for Dillingham Harbor for the most recent 5-year period of inland disposal (1999-2003). Recent annual volumes of dredged material removed from the harbor and disposed of at the inland site have ranged from about 72,000 to 103,000 yd^3, with a 5-year average of 85,545 yd^3.

Table 9. Dillingham Harbor Dredging Volumes and Cost (Inland Disposal)

Fiscal Year	Quantity (cubic yards)	Contract Cost (unadjusted dollars)	Contract Cost (Adjusted dollars, 2005)	Cost per Cubic Yard (Adjusted dollars, 2005)
1999	72,769	$299,199	$350,063	$4.81
2000	76,475	$274,418	$310,092	$4.05
2001	101,076	$320,308	$352,339	$3.49
2002	74,104	$551,605	$601,249	$8.11
2003	103,299	$409,261	$433,817	$4.20
5-year Avg.	85,545	$370,958	$409,512	$4.79

Source: U.S. Army Corps of Engineers, Alaska District, Construction-Operations Division, Operations & Readiness Branch.

14.5 In-water Disposal Costs

During the 2-year in-water disposal periods of 2004 and 2005, an average 90,000 yd^3 were dredged for $440,081 per year ($4.90 per cubic yard). These costs are adjusted to 2005 dollars based on the consumer price indices. The least cost long-term disposal alternative to replace inland disposal is to continue in-water disposal. Therefore, this least cost disposal alternative is selected for purposes of comparing the economic activities used to justify dredging of the Dillingham boat basin with most recent economic activities. Assuming an average volume of 90,000 yd^3 of sediment needs to be dredged, 1,800,000 yd^3 of sediment would be discharged over the 20-year life of a DMMP.

14.6 Comparisons of Most recent and Previous Dredging Volume/Cost Indicators and Benefit Indicators.

Continued dredging of Dillingham Harbor is necessary to maintain the commercial fishing industry in the region. Guidance for the preliminary assessment recommends that continued maintenance of the Dillingham Boat Harbor be evaluated based on indicators of most recent economic conditions relative to the most recent study in the area. Based on a comparison of historical benefits and dredging maintenance costs estimated for the authorized project compared with most recent conditions, continued maintenance of the harbor is recommended. Table 10 summarizes the economic characteristics and the relatively stable cost to maintain access to Dillingham Harbor.

Demand for moorage space at Dillingham far exceeds original project expectations. As Dillingham grows in population, commercial diversification will likely offset any year-to-year volatility of fishing industry use of the harbor. A likely stable or increasing demand for harbor services will continue the need for dredging and disposal of harbor sediments.

Dillingham continues to be an active and important boat harbor in Bristol Bay, currently serving on average 750 commercial fishing vessels each year, compared with the original study expectation of 100 vessels. The harbor is also an important freight distribution center for the Bristol Bay region.

Dillingham Harbor continues to serve as an important regional harbor of refuge for commercial and non-commercial vessels during storm conditions. The availability of this harbor of refuge likely reduces the amount of vessel and equipment damage due to storms. If the Dillingham entrance channel and harbor basin were not dredged, they would fill with sediment and become unusable to the commercial fleet within 1 to 2 years (Evert 1976). Smaller vessels that include the commercial fishing fleet would be required to moor in exposed areas where they would risk damage from storm waves or undergo the time and expense of leaving the Dillingham area when storms are forecast. The annual economic cost to the fleet is estimated at $390,600 and the total cost over the 20 year project life is estimated at more than $13 million (Section 14.3).

Although the Dillingham commercial fish harvest and value is lower today compared with the 1980's, it continues to be significant, particularly when compared with Bristol Bay region statistics. Over 41 percent of the total average commercial harvest (in pounds) from Bristol Bay communities near Dillingham is associated with Dillingham fishermen that are residents of Dillingham.

15.0 Recommendations

Based on the findings in this PA, it is recommended that:

(1) Dredging of the Dillingham Small Boat Harbor be continued.
(2) Disposal of the sediments dredged from the harbor be discharged in-water as is currently being discharged under the interim disposal EA (Alaska District 2005a).
(3) Alternative 6 (in-water disposal) be adopted as the Corps' base plan.

A Project Cooperation Agreement (PCA) is not required for the recommended alternative because construction of facilities is not required and operations are 100 percent federal costs.

The details of this alternative, as it currently exists, are described in the Alaska District Environmental Assessment titled, "Interim Dredging and In-water Disposal, Dillingham Small Boat Harbor, Dillingham, Alaska" (Alaska District 2005a). The storage capacity of in-water discharge (Alternative 6) is unlimited and exceeds the 20-year life of this PA.

It is further recommended that:

(1) The term of discharge be for 20 years from 2009 through 2029.
(2) The timing of dredging be from May 15 through July 15 with a preference to complete dredging and disposal by 30 June annually.
(3) Coordination with State of Alaska resource agencies be continued for implementation of appropriate mitigation measures as described in Section 4.8 of this PA.
(4) Technical and environmental aspects of the discharge be reviewed in 10 years (2019) to guarantee incorporation of lessons learned during the preceding period.
(5) A public meeting be held in Dillingham every 5 years (year 5, 10 and 15) to gather and consider incorporation of public findings in refinement of the dredging and discharge methods.

The recommendations for implementation of navigation improvements at Dillingham, Alaska, reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect the program and budgeting priorities inherent in local and State programs or the formulation of a national civil works water resources program. Consequently, the recommendations may be changed at higher review levels of the executive branch outside Alaska before they are used to support funding.

Date:__________________

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Kevin J. Wilson
Colonel, Corps of Engineers
District Engineer

Table 10. Assessment of Benefits and Costs over time for the Dillingham Small Boat Harbor, Dillingham, AK.

Statistics	1958 Authorized Boat Harbor Project, Inland Disposal	Current Boat Harbor Project, Inwater Disposal	Trend (+,0,-)	Remarks
Port Characteristics	13-acre Basin	13-acre Basin		
	Depth of +2 feet MLLW	Depth of +2 feet MLLW		
	Entrance Channel 1,100 feet	Entrance Channel 1,100 feet		
	Sheetpile sill across basin outlet	Sheetpile sill at outlet removed 1999		
		City Constructed Dock in 1983		
		Barge Landing		
		Boat Launch and Haul Facilities		
Vessel Characteristics				
Number of Vessels Annually (Historical reports)	About 100 commercial/non-commercial fishing vessels projected in original authorized project study.	2004: 750 commercial fishing vessels & 400 non-commercial vessels	+	Significant increase in use
Freight Vessel Tons & Trips (inbound/outbound) (Waterborne Commerce of U.S.)	Specifics unknown, but limited traffic	2000-2004 5-year average: 34,600 tons & 152 trips. WBC drafts ranging up to 21 feet.	+	Increasing Freight Traffic
Economic Benefit Indicators				
Permits, Fishermen who Fished				
Bristol Bay Region:	1980-1984 Average: 930	2001-2005 Average: 586	-	Decrease reflects overall consolidation in industry
Dillingham Harbor:	1980-1984 Average: 291	2001-2005 Average: 197	-	
Alaska:	1980: 13,742	2005: 9,323	-	
Commercial Fishing (Pounds, All Fish Harvest)				
Bristol Bay Region:	1980-1984 Average: 42,811,911	2001-2005 Average: 25,160,386	-	
Dillingham Harbor:	1980-1984 Average: 16,863,020	2001-2005 Average: 10,541,689	-	
Commercial Estimated Gross Earnings (All Harvest)				
Bristol Bay Region:	1980-1984 Average: $25,096,887	2001-2005 Average: $10,823,064	-	
Dillingham Harbor:	1980-1984 Average: $9,694,430	2001-2005 Average: $4,107,155	-	
Percent of Total Bristol Bay Commercial Estimated Gross Salmon Earnings from Dillingham Harbor	1980-1984 Average: 39%	2001-2005 Average: 38%	0	Stable proportion
Harbor of Refuge	Yes	Yes-Increased capacity with city dock	+	More vessels that will potentially need to use harbor

Table 10. Continued.

Statistics	1958 Authorized Boat Harbor Project, Inland Disposal	Current Boat Harbor Project, Inwater Disposal	Trend (+,0,-)	Remarks
Storm Damages to Vessels Reduced with Harbor Access	Yes-Original 1954 study estimated $322/vessel reduced damages ($32,150/year for 100 vessels)	Yes-Assume with many more vessels total reduced damages also increased.	+	More benefits due to increased number of vessels using harbor
Dredging Cost Indicators				
Dredging Cycle	Annual, Inland Disposal	Annual, Inwater Disposal		
Anticipated Dredging Volume	90,000 CY	90,000 CY	0	Stable
Dredging Quantities	1999-2003 Avg: 85,545 CY	2004, 2005 Avg: 90,000 CY	+	Slightly higher
Dredging Cost (2005 $)	1999-2003 Avg: $409,512/year	2004, 2005 Avg: $440,081/year	+	Slightly higher
$/CY (2005 $)	1999-2003 Avg: $4.79/CY	2004, 2005 Avg: $4.90/CY	+	Slightly higher

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Appendix A

Correspondence

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

OCT 13 2006

Operations Branch

Mr. John Fulton, Manager
City of Dillingham
P.O. Box 889
Dillingham, AK 99576

Dear Mr. Fulton,

The U.S. Army Corps of Engineers, Alaska District, has been working to draft a 20-year Dredged Material Management Plan (DMMP) to manage sediment dredged annually from the Dillingham Small Boat Harbor. Corps policy requires the DMMP to evaluate a variety of disposal alternatives based on economic and environmental factors and identify the least cost (base) plan.

A base plan that includes site preparation and construction for disposal or dewatering of dredged sediment must be cost shared by the non-Federal sponsor at the rate of 10 percent during initial construction and an additional 10 percent payable over 30 years after construction. The non-Federal sponsor can receive credit for the value of lands, easements, rights of way, and relocations (LERR) to offset the additional 10 percent cost. Costs for land creation and some beneficial uses of dredged materials are shared at varying rates according to the Water Resources Development Act of 1986 and 1996, Corps policy guidance letters, and subsequent engineering regulations. The cost of dredging and transportation of dredged materials is funded 100 percent by the Federal government.

Sometimes a non-Federal sponsor may prefer a beneficial use or disposal alternative that exceeds the cost of the Corps derived base plan be constructed. This plan would be known as the "Locally Preferred Plan" (LPP). In these cases, the non-Federal sponsor would be required to pay 100 percent of LPP costs that exceed those of the base plan.

Two general concepts of disposal are currently feasible for Dillingham: (1) in-water as is currently done on an interim basis through 2008, and (2) upland in a to-be-constructed CDF on the wetland west of the Scandinavian Creek Road west of the harbor. If construction on the wetland was selected as the base plan, it would require significant funding from the City of Dillingham. Disposal in-water as is currently being done would be a 100 percent Federal cost with no cost to the City of Dillingham.

There are currently several alternatives for disposal of dredged sediment on the wetland west of Scandinavian Creek Road. They are: (1) let the sediment and its carrier water run free across the wetland with no confinement, (2) construct gravel berms for confinement, (3) construct hay-bale berms for confinement, and (4) below surface injection. The Corps has

Phillip J. Baumgartner
4141 B St., Suite #207
Anchorage, AK 99503
June 27, 2006

BRISTOLALLIANCE
FUELS

To Whom It May Concern:

This letter serves as written notice to any and all interested parties that neither the Army Corps of Engineers, the City of Dillingham, nor their agents have permission to access Scandinavian Beach or the Dillingham Small Boart Harbor via the property owned by Bristol Express Fuels.

Any questions regarding this matter may be directed to Robert Baumgartner; President, Bristol Express Fuels at the following telephone number: 907-227-4122.

Sincerely,

Phil Baumgartner
Project Manager

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, as amended, the U.S. Army Corps of Engineers, Alaska District, has assessed the environmental impacts of the following action:

Maintenance Dredging and In-water Disposal
Dillingham Small Boat Harbor
Dillingham, Alaska

The U.S. Army Corps of Engineers, Alaska District, proposes to continue dredging the Dillingham Small Boat Harbor from 2009 through 2029 (20 years). Dredged materials will be disposed of directly into the Nushagak estuary through a 12-inch discharge pipe ending in a 1.72-acre discharge area with depth to –26 feet mean lower low water (MLLW) and approximately 800 feet offshore from the sheet-pile shoreline protection fronting the harbor. About 90,000 cubic yards (yd^3) of sediment originating from the Nushagak River would be reintroduced to the river by in-water disposal between 15 May and 15 July during the 20-year dredging period. The Corps of Engineers drafted in August 2007 a Dredged Material Management Preliminary Assessment for this disposal that justified continued dredging and identified more than 20 years of disposal capacity in the Nushagak River estuary with no adverse environmental impacts.

A temporary turbidity plume in the Nushagak River estuary is expected to result from this disposal. Strong tidal currents are expected to quickly dissipate the plume and mix it with the natural high turbidity of the Nushagak River estuary. Long-term shoaling in the river channel or deposition of sediments on subsistence fishing beaches is not expected from this disposal action. The Alaska Department of Environmental Conservation will determine a mixing zone for the dispersion of turbidity resulting from this action.

Adult and juvenile Pacific salmon are expected to temporarily avoid the area surrounding the immediate end of the discharge pipe and no long-term adverse effects that will jeopardize the salmon populations or their migration timing are expected from this action. The end of the discharge pipe will be suspended 10 feet under the surface to avoid or mitigate contact of the discharge with out-migrating sockeye salmon smolt.

The Corps of Engineers and Alaska departments of Natural Resources, Environmental Conservation, and Fish and Game will reevaluate the disposal action for adverse environmental impacts after 10 years (2019), or sooner if major changes in disposal methods or unexpected environmental impacts occur. Public comment will be scoped prior to reevaluation through a public meeting held in Dillingham, Alaska.

The disposal action will have no effect on threatened or endangered species or their critical habitat. The project is not expected to have long-term effects on essential fish habitat. The project will not have any effect on any known cultural or archeological resources eligible for inclusion in the National Register of Historic Places.

This action was coordinated with the U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, the Alaska Department of Natural Resources Office of Project Management and Permitting, Office of Habitat Management and Permitting, and the State Historic Preservation Officer; the Alaska Department of Environmental Conservation, the Alaska Department of Fish and Game Division of Commercial Fisheries, the Bristol Bay Native Corporation, and the City of Dillingham.

This work is consistent with the Bristol Bay CRSA Coastal Management District coastal management standards to the maximum extent practicable. The accompanying environmental assessment supports the conclusion that this project will not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, an environmental impact statement is not necessary for the in-water disposal of dredged material from the Dillingham Small Boat Harbor for the years 2009 through 2029.

Kevin J. Wilson
Colonel, Corps of Engineers
District Commander

18 April 2008
Date

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Appendix

Acronyms

°F	Degrees Fahrenheit
ACMP	Alaska Coastal Management Program
ADFG	Alaska Department of Fish and Game
BEG	Biological Escapement Goal
CRSA	Coastal Resources Service Area
CY^3	Cubic Yard
DEC	Alaska Department of Environmental Conservation
DMMP	Dredged Material Management Plan
DMMPA	Dredged Material Management Preliminary Assessment
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act

FONSI	Finding Of No Significant Impact
Ft^2	Square Foot
IUD	Interim Upland Disposal
LGP	Low Ground Pressure
Mg/l	Milligrams Per Liter
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
PND	Peratrovich, Nottingham, and Drage
PPS	Peter Pan Site
Ppt	Parts Per Thousand
UD	Upland Disposal
USFWS	U.S. Fish And Wildlife Service
Yd^3	Cubic Yard

Maintenance Dredging and Inwater Disposal

Dillingham Small Boat Harbor
Dillingham, Alaska

1.0 Purpose and Need

1.1 Introduction

Dillingham (population 2,500) is a southwestern Alaska city in northern Bristol Bay at the extreme north end of Nushagak Bay near the confluence of the Wood and Nushagak rivers (figure 1). It is approximately 327 miles southwest of Anchorage at about 59°02' N Latitude and 158° 27' W Longitude.

Construction of the Dillingham Small Boat Harbor was completed in 1961 (Alaska District 2001a). The harbor basin is approximately 13 acres, excluding the 1,100-foot-long entrance channel, and has a basin depth of approximately +2 feet at mean low lower water (MLLW). The harbor basin essentially goes dry at low tide but can accommodate about 320 boats with many of them being 32-foot-long "Bristol Bay gill netters" (Alaska District 1985). Smaller craft used in subsistence set net fisheries and small barge and landing craft used in salmon tendering and cargo transportation also use the harbor (Alaska District 1985). The harbor is vital to the economy of the Dillingham area.

1.2 Purpose of Action

The Nushagak River estuary is turbid, ranging from about 3,300 milligrams per liter (mg/l) suspended solid near the bottom to 136 mg/l at the surface (PND 1988). Some of this sediment is carried to the estuary by the Nushagak and Wood rivers that join a short distance upstream from the harbor, but the main source of the sediment is from the erosion of beaches and bluffs that line the 45-mile-long estuary (Alaska District 1974). Waves attack the bluffs during high storm tides, and sediment from the bluffs is carried back and forth on strong tidal currents.

Dillingham Small Boat Harbor fills with mostly fine sediment from the Nushagak River estuary (Alaska District 1974, Everts 1976a, 1976b). Sediment enters the harbor basin on high tides, settles out and fills the basin. Sedimentation is so rapid the harbor would be unusable to the commercial fishing fleet within 1 or 2 years without dredging. Annual dredging of the harbor is vital to the economy of Dillingham. A recent economic report and justification for continued dredging is in the Dredged Material Management Plan Preliminary Assessment of which this environmental assessment (EA) is part. An average of 90,000 cubic yards (yd^3) of sediment has been dredged from the entrance channel and harbor basin annually since 1962 (Alaska District 2006). The purpose of this action is maintenance dredging to provide the Dillingham commercial fishing fleet the protection of a small boat harbor.

In water disposal of harbor sediments was suggested in 1979 (Alaska District 1979), but was not initiated until 2005 when the Corps of Engineers conducted a trial in-water disposal. The trial disposal was followed by in-water disposal in 2006, 2007 and 2008 as an interim measure for 4 years between the trial in-water disposal in 2005 and implementation of a Dredged Material Management Plan (DMMP) of 20-years duration in 2009 (Alaska District 2005a). A need for a DMMP is based on a determination the capacity of a confined disposal facility will contain dredged sediment for at least 20 years with management. Both in-water and upland disposal were initially considered in the Preliminary Assessment of Dredged Material Management for disposal of sediments from the harbor. Upland disposal was determined to be impractical because of cost and land issues that are explained in later sections of this EA. The 20-year Dredged Material Management Plan Preliminary Assessment for the disposal of sediments dredged from the Dillingham Harbor, which precedes this EA, determined that the Nushagak River estuary has 20 years capacity for the disposal of sediment dredged from the Dillingham Small Boat Harbor. Consequently, A DMMP will not be written for the disposal portion of this action.

1.3 Need for Action

Annual maintenance dredging of the basin and the disposal of dredged material is essential for the continued operation of the harbor. The Corps estimates that the harbor would fill with sediment and become unusable within 1 or 2 years if it was not dredged (Alaska District 1974). If the harbor were allowed to fill, the Dillingham fishing fleet would not have a harbor of refuge and would suffer damage from storms or additional costs to seek temporary moorage at other ports in southwest Alaska.

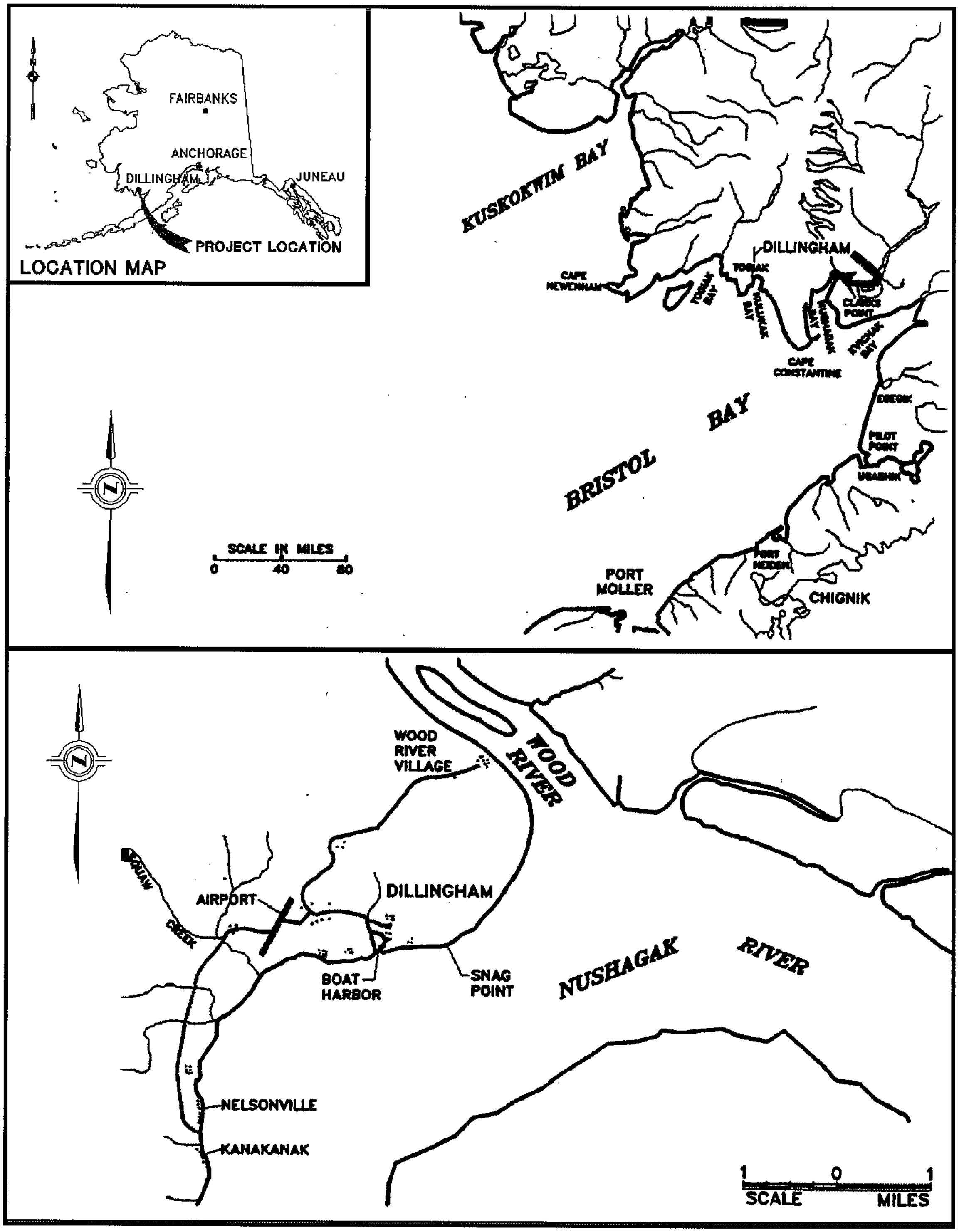

Figure 1. Location of Dillingham in Alaska and the location of the boat harbor in Dillingham.

1.4 Dredging and Disposal Methods

A hydraulic pipeline cutterhead dredge is normally used for maintenance dredging of the Dillingham Small Boat Harbor (figure 2). This type of dredge pumps a mixture of water and sediment as slurry through a pipe to a disposal site. Dillingham Harbor is dredged annually to +2 feet MLLW to prevent excessive shoaling of sediment that would strand boats in the harbor-mooring basin (Alaska District 2006). Studies indicate that from 80 to 90 percent of the sediments entering the harbor settle in the harbor (Alaska District 1985).

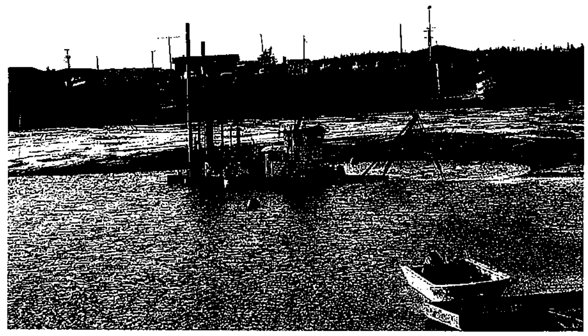

Figure 2. Dredge in Dillingham harbor. Accumulation of sediment is visible behind the dredge.

Dredging in the harbor is timed to result in the least interference as possible with the fishing fleet and is normally dredged between May 1 and June30, although the window of dredging opportunity is from May 15 through July 15. The material inside the harbor is composed of 7 percent sand, 25 percent clay, 32 percent fine silt, and 37 percent course silt (Teeter 2003). Volumes typically dredged range from about 75,000 to 110,000 yd^3 and averages about 90,000 yd^3. This volume of dredged materials would weigh about 60,000 tons at approximately 1.5 yd^3 per ton.

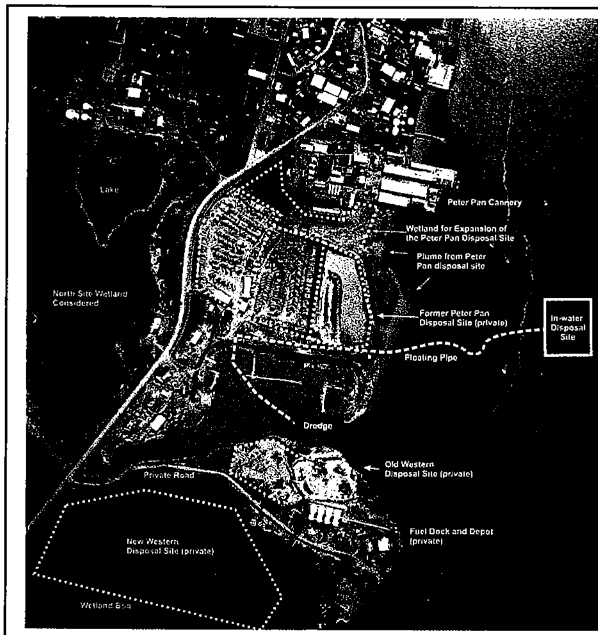

Figure 3. Aerial view of the Dillingham harbor during dredging. Locations of the pipeline and disposal sites are approximated.

Sediments from the Dillingham Harbor had traditionally been disposed of in upland sites. The most recently used upland site was east of the harbor on land owned by Peter Pan Seafood Company (figure 3). This site is referred to as the Peter Pan site (PPS) and was full in 2004 when roughly 90 percent of the material dredged from the harbor returned to the river as suspended silt. The Corps did not have an Alaska Department of Environmental Conservation (ADEC) permit to dispose of sediment in-water at the shoreline and disposal at the site was stopped in 2004. An aerial photograph of the harbor shows that this suspended material moves along the shoreline and could reenter the harbor (figure 3). Erosion of shoreline berms also contributed to closing the site.

In-water disposal proposed in this EA is based on the success of the in-water disposals in 2005, 2006 and 2007. Interim in-water disposal will be in effect through the 2008 dredging season, and results similar to the 2005 through 2007 seasons are expected in 2008. A trial in-water disposal was conducted in 2005 as a test of in-water disposal because, although used in many places through the world, in-water disposal had not been successfully tested at Dillingham. In-water disposal was further refined during the interim disposal years of 2006 and 2007. The 2008 season will not be used to formulate this assessment, but will be used to fine tune in-water disposal methodology if necessary.

In-water disposal at Dillingham currently consists of a 12-inch floating discharge pipe terminating over a designated discharge area where there is sufficient depth and current to adequately dissipate the plume and bedload sediments (figure 3). Discharge velocity is approximately 12 cubic feet per second and is directed downward at a 45-degree angle starting 10 feet below the surface. Ten feet was selected as a compromise to protect surface-oriented outmigrating sockeye smolt and the physical ability to hold the equipment in position during exposure to currents that average about 3 knots on flood tides.

2.0 Public Concerns Over In-water Disposal at Dillingham

Principal public and agency concerns scoped prior to in-water disposal in 2005 were as follows:

- In-water disposal would kill fish.
- In-water disposal would foul subsistence beaches making them unusable for subsistence fishing.
- In-water disposal would prevent adult salmon from migrating upriver or cause them to avoid subsistence gill nets set on three main subsistence beaches (figure 4).
- In-water disposal would form bars and make the river shallow (i.e. result in shoaling).
- In-water disposal would be a navigation hazard.

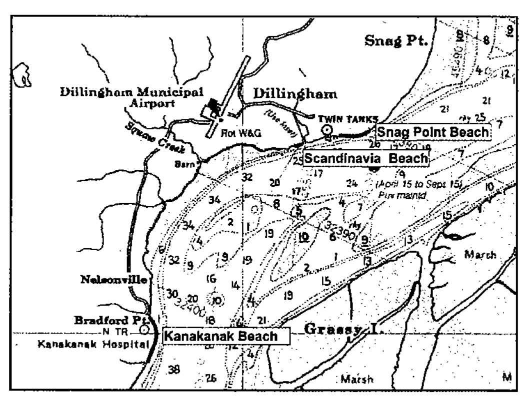

Figure 4. Three main subsistence fishing beaches near Dillingham.

Public comments also focused on the timing of dredging. The Dillingham public is accustomed to the harbor being dredged from late May through June, and dredging is traditionally timed to result in minimal conflict with the commercial fishing fleet.

None of the above concerns scoped prior to the in-water disposal came to pass during 2005, 2006, and 2007.

- No fish were known killed as a result of in-water disposal.
- In-water disposal did not foul subsistence-fishing beaches.
- In-water disposal did not prevent adult salmon from migrating upriver.
- In-water disposal did not cause returning adult salmon to avoid subsistence nets.
- In-water disposal did not result in permanent shoaling.
- The floating in-water disposal pipeline was well marked and was not a navigational hazard.

The Corps took these concerns seriously and instituted environmental monitoring during the 2005 and 2006 dredging seasons. Public and local officials also observed the disposal during these years. Pre and post disposal bathymetric surveys would continue as part of the monitoring program.

The Corps also conducted an accretion study of the three subsistence beaches (figure 4) in 2004 (Alaska District 2005b). This study determined that these beaches were eroding during the study period. Conversations with local residents engaged in subsistence fishing on the beaches during the study suggest there is an annual cycle of deposition and erosion on these beaches. The annual cycle as related by these users is minor accretion during winter followed by erosion during summer with the overall net result favoring erosion and loss of shoreline. Details on the loss of shoreline in the harbor area can be found in the pending Corp of Engineers Draft Letter Report and Environmental Assessment titled, "Dillingham Emergency Bank Stabilization West Harbor Entrance Protection Draft Letter Report and Environmental Assessment" (Alaska District 2003a).

3.0 Alternatives

Six base alternatives were considered for disposal of sediments from the Dillingham Harbor during the 20-year disposal period (2009 through 2029). Alternatives considered are summarized below and are discussed in more detail in the following sections.

- Alternative 1. No action. Dispose of sediments on the Peter Pan site without restoration or refurbishment.
- Alternative 2. Reinstate upland disposal at the Peter Pan site and annually haul ±90,000 yd^3 of sediment from the site to maintain capacity.
- Alternative 3. Develop a 60-acre upland disposal facility on wetlands within pumping distance of the harbor without using booster pumps.
- Alternative 4. Dispose of sediments on wetland without benefit of confinement.
- Alternative 5. Dispose of sediments under vegetation mat on wetland by injection.
- Alternative 6. Dispose of sediments in the Nushagak River estuary (in-water disposal).

3.1 Alternative 1 - No-Action Alternative

Under a No-Action alternative, sediment dredged from the harbor would continue to be discharged into the privately owned Peter Pan disposal site without restoration or refurbishment. The No-Action alternative was eliminated from consideration partly because the Peter Pan disposal Site reached capacity in 2003 and the berms confining the dredged sediment have been weakened by wave erosion from the Nushagak River. Retention time is insufficient and effluent flowing from the CDF would not meet State water quality standards for discharge in fresh water (DEC 2003).

3.2 Alternative 2 – Disposal at the Peter Pan Site with Maintenance Hauling

Alternative 2 would reinstate dewatering dredged sediment in the privately owned PPS (figure 3) and disposal by trucking it to another location. Approximately 90,000 yd^3 of dewatered sediment would be removed annually to an unknown location, and the berms rebuilt annually to prepare the site for dewatering.

The capacity of the PPS could be enlarged by constructing a 3,300-foot berm around a 6-acre wetland adjoining the east side of the existing site (figure 3). Increasing dewatering capacity from this expansion would require 975 feet of 36-inch CMP for drainage. The wetland would begin to fill up in 2 to 3 years and would not meet a DMMP requirement of 20 years capacity in a CDF. This alternative has potential to damage the historic Peter Pan Cannery because the berm would be adjacent to the cannery.

The PPS is private property owned by the Peter Pan Seafood Company of Seattle, Washington, and the Corps of Engineers does not currently have the authority to reinstate disposal on this site. Disposal into the PPS is not recommended because of the mentioned problems and risks.

3.3 Alternative 3 - Confined Disposal Facility on the Wetland

An alternative to in-water disposal would be to construct a new upland CDF somewhere within distance of the harbor that would not require booster pumps to move the sediment to the CDF. The obvious location of a CDF would be on one of the wetlands west or north of the harbor (figure 3).

A wetland north of the harbor (figure 3) was eliminated from consideration early in the decision-making process because: (1) it is on the opposite side of the only highway between Dillingham and the airport and hospital and (2) it contains a lake that would make construction difficult and impose unacceptable environmental risks.

A wetland west of the harbor (figure 3) was also considered. This wetland, known as the New Western site in Corps reports, is across a private road leading from the main highway to a fuel tank farm, fuel distribution center, and fuel barge dock. This site could provide up to about 60 acres of disposal area if technical, land ownership, financial, and environmental concerns and problems could be overcome.

The Corps conducted settlement and probe tests on the New Western site from 2003 through 2004 and found a major portion of the New Western site is a bog lake almost 40 feet deep and covered by a 3-foot thick mat of floating vegetation (Alaska District 2005).

To construct berms on the New Western site, gravel or crushed rock from a local quarry would be loaded on the wetland while it was frozen. Up to 14,500 linear feet of the floating vegetation mat parallel to the fill would be cut to allow the material to settle to the bottom evenly after the wetland thawed in spring. Successive layers of fill would be applied until the fill reached the water surface. The base layer of berms is estimated to be 90 feet wide and up to 31 feet tall with 2H on 1V slopes. Corps engineers estimate that it would take 795,000 yd^3 of gravel or rock to build the base of the berms. After the base layer had stabilized, 56,000 yd^3 of impervious sediment stripped from the Old Western disposal site would be needed to build the top 9 feet of the berms. This impervious sediment material is what would contain sediment dredged from the harbor while it dewatered into the wetland. Overflow would be decanted to the wetland through a weir and allowed to flow to the Nushagak River across the wetland. Some filtering of the effluent by the wetland would result from this action. A trench would be excavated in the wetland at its south end to allow water from the wetland to flow to the estuary. Corps engineers estimate it would take a total of 851,000 yd^3 of material to build a CDF on this site at an estimated cost of approximately $17,020,000 at $20/$yd^3$ to acquire and haul fill material to the site.

A CDF on the New Western site would need a 4-foot crest width corrugated metal pipe (CMP) weir 10 inches in diameter to drain effluent from the CDF should it be necessary. This weir would need to be extended by 1 foot every year and replaced every 10 years.

A 15 by 15-foot rock splash apron would be constructed at the outlet of the weir to prevent erosion and re-entrainment of sediment. The footprint of the apron would be excavated (28 yd^3) and a 10-inch thick layer of 3-inch minus rock (7yd^3) would be placed in the excavation. A 30-inch thick layer (21yd^3) of d50=900#.rock would then be placed on top the 3-inch minus rock to complete the splash apron.

Engineers estimate that alternative 3 would require the private road leading from the main highway to the fuel loading and storage facility be fitted with four 24-inch diameter drainage culverts, one 36-inch diameter culvert to pass the discharge pipe under the road, and elevated 3 feet by capping it with an estimated 5,000 yd^3 of non-frost susceptible material. The material needed for this construction is in addition to the material needed for construction of the berms on the wetland. The City of Dillingham or the Corps of Engineers does not currently have authority to improve or use this private road for construction hauling.

There is 1,550 linear feet of power and telephone lines running through the New Western site that would need to be relocated before construction of a CDF on the site. Relocation to the east side of the private road would increase the length of the run to 1,825 feet and require an additional pole.

The New Western (the construction site) and the Old Western (source of sediment material) sites are on private land that has not been acquired by the local sponsor, the City of Dillingham. The City of Dillingham would be required to acquire the land and could be required to fund 100 percent of construction costs at the New Western site because a more economical disposal plan that does not require construction exists (in-water disposal). The city would be required to fund 10 percent of initial construction costs plus an addition 10 percent if in-water disposal did not exist and construction at the New Western site were the only reasonable alternative. The second 10 percent could be reduced equivalent to the cost of lands, easements, relocations and right-of ways (LERR) acquired by the city for the project.

Other construction methods on this site, including a CDF constructed with sheet pile or straw bales was considered and eliminated for legal and technical reasons.

Alternative 3 and its variances was eliminated from consideration because: (1) the project could not be justified due to the quantity and costs of materials that would be needed for construction of berms on a deep, wetland bog (compared with in-water disposal not requiring construction); (2) cost, technical and structural problems related to alternate construction methods (i.e. sheet pile, straw bales, timber bulkheads, etc.); and (3) environmental problems including potential damage to public and private roads that could result from allowing the sediment to run free or by injecting it beneath the floating vegetative mat of the wetland. This alternative is not recommended because of the above problems and risks.

3.4 Alternative 4 – Wetland Disposal without Confinement

Alternative 4 would allow the sediment and its carrier water to run free across the wetland described in Alternative 3. This alternative was eliminated from consideration because:

(1) The hydraulic characteristics of the wetland bog are unknown.
(2) Alternative 4 would be located on private land and the City of Dillingham (the local sponsor) has not indicated a willingness to provide this land for a disposal site.

Alternative 4 could affect the integrity of the main Dillingham highway and a private road leading to a fuel distribution facility and tank farm resulting in maintenance to these roads for the life of the project. Alternative 4 was eliminated from consideration because of legal, technical, and environmental problems.

3.5 Alternative 5 - Wetland Disposal by Injection

Alternative 5 would inject the sediment and its carrier effluent under the surface vegetation of the wetland bog described in Alternative 3. This alternative was eliminated from consideration for the same reasons that Alternative 4 was eliminated.

3.6 Alternative 6 - In-water Disposal

A potential alternative to upland disposal is in-water disposal. In-water disposal does not require construction and uses a cutterhead suction dredge to dredge the harbor. The sediment and water mixture is pumped through a 12-inch plastic pipe to a 75,000 ft^2 (1.72 acre) disposal area in 26 feet of water at 0 MLLW (-26 MLLW) about 800 feet offshore and slightly east of the harbor entrance (figure 3). The end of the pipe would be marked with a buoy and be tended by a dredge support vessel anchored near the site. The pipe from shore to the disposal area would occupy approximately 0.02 acre of tide flat when resting on the mud at low tide. The total marine area used for in-water disposal could be reasonably rounded up to 1.75 acres that would be used from 21 to 30 days each year for 20 years.

Criteria for selection of a disposal site were: (1) over water deep enough to contain the heavier particles (gravel, and possibly lumps of clay), (2) in an area with strong currents that would disperse the heavier particles, (3) in an area that would not inhibit access to the harbor or businesses on either side of the harbor, and (4) in an area that was within a reasonable distance of the harbor where disposal would be technically and economically feasible. The proposed disposal site meets these four basic requirements.

A low riverbank a few feet high forms where the pipe would transition from land to the tide flats. A bank stabilization project with that would protect eroding shoreline east of the harbor is in the final stages of design (Alaska District 2003b). Construction of this project is anticipated to start in 2008. The rock revetment of this project would include an access ramp to the beach adjacent to the existing sheet pile that protects the harbor. A small low ground pressure (LGP) dozer or loader would be used to access the mud flats from this ramp. Once on the flats the dozer or loader would assist with positioning the pipe and anchors. Tracks from this operation would not be visible after several changes in tide.

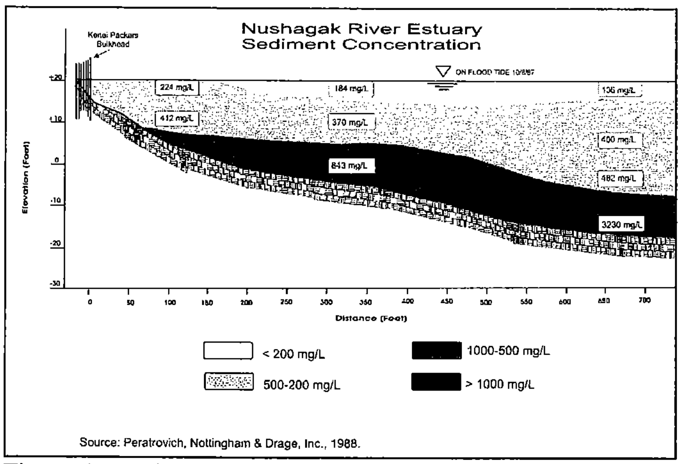

Figure 5. Typical sediment concentrations in the Nushagak River at Dillingham (PND 1988).

The end of the discharge pipe is currently positioned at a 45-degree angle 10 feet beneath the water surface to avoid or mitigate contact with surface-oriented out migrating sockeye salmon smolt. Sediment exits the pipe at about 12 feet per second and dissipates to ambient velocity within about 5 feet from the end of the pipe. Heavier particles fall to the bottom while the finer particles mix with the naturally suspended sediment in the river.

Suspended sediments in the Nushagak naturally stratify in the water column with very high bedload concentrations near the bottom (PND 1988, Figure 5). A bathymetric survey of the disposal area before and after disposal shows that heavier particles discharged during disposal are moved about the bottom on strong tidal currents and eventually mix with the natural bedload. The bathymetric surveys indicate that long-term shoaling in the disposal area does not occur.

The higher quality water in which sockeye salmon smolt would tend to migrate is offshore and very near the surface (figure 5). When dispersed 10 feet below the surface, the finer particles (silt) would tend to disperse lower in the water column where higher concentrations of sediment are naturally present and where sockeye smolt would tend to avoid.

It takes 3 to 4 weeks to dredge the Dillingham harbor, and it would be dredged annually between May 15 and July 15 from 2009 through 2029. Disposal in the designated disposal area (figure 3) would coincide with the dredging operations. Monitoring during 2005 and 2006 shows that a turbidity plume is detectible for about 50 meters (164 feet) up or down from the discharge pipe depending on which way the tide was running. Although measurable with sensitive instruments, this turbidity plume is often indistinguishable from ambient turbidity. A similar plume would be expected during the 20-year life of the disposal plan.

3.6 Environmentally Preferred and Recommended Alternative.

Alternative 6, in-water disposal is the environmentally preferred alternative and recommended by the Corps of Engineers. It is presented as the base plan in the Dredged Material Management Plan Preliminary Assessment in which this EA is included. Existing in-water disposal indicates that this disposal method is technically feasible and environmentally safe.

3.7 Safety and Monitoring

Protection of the floating pipeline from damage by predictable situations such as storms might be employed by retracting the pipeline to shore if a storm that exceeds the estimated ability of the pipe to hold its position was forecast. A trigger point for retraction might be linked to forecast wind velocity or wave height. The pipe might be disconnected near the shoreline and the floating portion pulled onshore to wait out the event. The LGP equipment would be required to operate on the mudflats during this operation.

Dredging is conducted during summer when there are approximately 22 hours of daylight and 2 hours of twilight. Although the floating pipeline is naturally visible, it would be well marked with fluorescent buoys. The dredge transport vessel (cover photo) is typically anchored near the terminus of the discharge pipe, but the terminus might also be marked with a portable strobe light. The U.S. Coast Guard would be notified of the floating pipeline before each dredging season, and the harbor master would post a notice of dredging and disposal in the harbor master's office

The Corps of Engineers and Alaska Departments of Natural Resources, Environmental Conservation, and Fish and Game will reevaluate the disposal action for adverse environmental impacts after 10 years (2019) or sooner if major changes in disposal methods or unexpected environmental impacts occur.

The Alaska Department of Fish and Game, Commercial Fish Division monitors the subsistence catch of Chinook salmon on public beaches in Dillingham almost daily while dredging is active. This monitoring effort is expected to alert the area commercial fish biologist of any problems that could be related to in-water disposal. Technicians monitoring the subsistence catch would be alert to unusually large numbers of dead salmon smolt or unusually high depositions of sediment on public beaches. If either of these conditions occurred, local fishery managers would alert the Corps of Engineers to suspend dredging while the cause of the incident was investigated. If the incident was determined to be directly related to in-water disposal, in-water disposal would remain suspended until fishery managers approved a restart.

The Corps would consider public input on in-water disposal prior to in-water disposal reevaluation discussions with the resource agencies. A public meeting would be held in Dillingham in the month prior to reevaluation of in-water disposal.

Based on the most recent findings, adverse environmental impacts related to in-water disposal are not probable. However, should investigations during disposal prove adverse environmental impacts are resulting from in-water disposal, three possible actions could result: (1) dredging and in-water disposal would stop and the harbor be allowed to fill with sediment, or (2) annual in-water disposal would continue until a time when the Corps of Engineers and City of Dillingham could acquire land and construct an upland confined disposal facility near the harbor regardless of cost and technical difficulty, potential damage to nearby infrastructure (mainly roads), and adverse environmental impacts to wetland, or (3) the disposal site would be moved if adverse impacts involved excessive shoaling.

Any major change in disposal methods during the 20-year life of this disposal plan would trigger a reevaluation of the disposal regardless of date.

4.0 Existing Conditions

4.1 General

Dillingham is a major regional fishing community in the Bristol Bay area at the confluence of the Wood and Nushagak rivers at Nushagak Bay. Several wildlife refuges, parks, and critical habitat areas are found in this area of western Alaska. The Togiak National Wildlife Refuge (TNWR) is immediately west of Dillingham. The Walrus Island State Game Sanctuary is south of the TNWR. The Wood-Tikchik State Park is about 40 miles north of Dillingham, and the Alaska National Maritime Wildlife Refuge (ANMWR) occupies offshore waters in a large area of Bristol Bay.

Dillingham is in the southwestern region of the Nushagak Bristol Bay Lowlands. The Ahlakum Mountains to the west, the Aleutian Range to the east, and the Nushagak Big River Hills to the north contain the lowlands. The land surrounding Dillingham is gently rolling with local relief of 50 to 200 feet, and has wide expanses of muskeg, lakes, and rivers. Nushagak Bay is a brackish estuary and migratory route for five species of Pacific salmon.

4.2 Climate

The climate in Dillingham is transitional between continental and maritime climates. Mean annual air temperature is 34 °F with average summer temperatures around 55 °F and average winter temperatures about 15 °F. Annual precipitation is approximately 25 inches, including snow to about 65 inches deep. Freeze-up usually occurs about early November and breakup from early May to June.

4.3 Sediments and Water Quality

The Nushagak River estuary at Dillingham, including the in-water disposal site, is slightly brackish, but essentially freshwater. The Alaska Department of Environmental Conservation considers the Nushagak River estuary at Dillingham freshwater and Alaska Water Quality Standards (18 AAC 70) for freshwater apply (A. Kukla personal communication). The estuary is about 2.5 miles wide at Dillingham. Sediments in the estuary, including the harbor and disposal site, originate partly from upriver but principally from erosion of lowland sea cliffs and riverbanks (Alaska District 1974).

The engineering and consulting firm Peratrovich, Nottingham, and Drage (PND) studied sediment and water quality of the Nushagak River near the Dillingham boat harbor in October 1987 (PND 1988). They reported salinity as 0 parts per thousand (ppt) at low tide and about 3 ppt at high tide. Mean water temperature increased moderately from 6.3 °C during low tide to 7.0 °C at high tide during their study.

The Nushagak River off Dillingham is an estuary with wide fluctuations in suspended sediment that stratifies in the water column (PND 1988, Figure 5). Less turbid water is at the surface and suspended sediments are higher near the surface in near-shore areas. Suspended sediments ranged from 224 mg/l at the surface near the harbor to 3,230 mg/l offshore where the water is approximately 30 feet deep (figure 5). Bedload sediments consisted of sandy gravels at the 0 foot level, while sandy silt predominated at the +10 foot level. Suspended sediment within the deep disposal area would likely be similar to those found by PND. The substrate on the disposal site likely consists of sandy gravels overlain with silt.

Scandinavia Creek is a small drainage that empties into the harbor basin. The creek contributes essentially no sediment to the harbor basin, and the silt that collects in the boat harbor basin is brought in from the Nushagak River by tidal action (Alaska District 1968). Turbidity is generally at maximum during the summer months (Everts 1976). The sediment that collects in the basin is in the basin up to 1 year before being dredged and does not have time to assimilate significant pollutants from normal harbor activities. Sediments from the harbor basin were analyzed in 1992 and in 2001(Alaska District 2001a, 2001b). No contaminants with concentrations above standards set by the State of Alaska, Department of Environmental Conservation (DEC) and the Federal Environmental Protection Agency (EPA) were found (Alaska District 2001a, Alaska

District 2001b). Sediments discharged to the in-water disposal area (figure 3) would not be contaminated.

4.4 Tides and Currents

Tidal and riverine currents contribute to bedload movement in Nushagak Bay. Tides at Dillingham are semi diurnal with two highs and two lows daily. The mean range of tide is 15.9 feet with extreme ranges from 24.5 feet to -4.2 feet MLLW. Tidal currents are swifter on the flood tide than on the ebb tide (Teeter 2003, PND 1988). Currents on the flood tide are about 6.0 feet/second (3.5 knots), but currents as high as 12.7 feet/second (7.5 knots) have been measured in the project area (Alaska District 2003b). Currents within the disposal area are expected to be similar to those found during the above referenced studies.

4.5 Soils and Vegetation

Non-mineral soils in the region are generally peat composed of decomposing sphagnum moss and sedges. Glacial till, outwash deposits or silty alluvium occur under the peat layers.

The former Old Western site and the PPS (figure 3) have received dredged sediments for more than 30 years. The sites consist of previously dredged sediments contained by berms. Older filled areas of the PPS are being used for industrial storage, mainly commercial fishing boats. A few scrub willows grow along the bases of the older berms. The former PPS had a drainage outlet through a wet swale to the river (figure 3). Much of the silt pumped from the harbor to the PPS returned to the Nushagak River through this swale, but some was captured by vegetation in the swale. Dwarf scrub willow, beach rye, and herbaceous wetland plant communities growing in the swale emerged through this silt. This vegetation captured more and more silt as it grew in size and abundance. The swale is now thickly vegetated during the summer growing season.

The former Old Western disposal site (figure 3) is covered with grasses and tall shrub vegetation while most of the New Western site is covered with a relatively thin layer of low-shrub and moss wetland vegetation typical to southwest Alaska. Tall shrub vegetation grows on the higher and dryer places of this wetland.

Soils on the tide flats are mostly clay overlain with silt. There is no vegetation on the tide flats except for a thin summer growth of green algae (*Vaucheria sp.*) near the high tide line.

4.6 Fish and Wildlife

4.6.1 Invertebrates

Populations of benthic invertebrates in the Nushagak River estuary might include amphipods, isopods, shrimp, and clams, but populations are believed to be low because of ice scouring, extreme tides, high bedload movement, and heavy silt loads from Nushagak Bay (Malick et al. 1971).

No invertebrates other than transitory zooplankton are expected to be in the harbor or in-water disposal area (figure 3). The tide flats under the floating pipe might have low numbers of marine worms and copepods living in the mud.

4.6.2 Freshwater Fish

Rainbow trout (*Oncorhynchus mykiss*), Dolly Varden (*Salvelinus malma*), Arctic char (*S. alpinus*), lake trout (S. *namaycush*), Arctic grayling (*Thymallus arcticus*), round whitefish (*Prosopium pidschian*), burbot (*Lota lota*), and northern pike (*Esox lucius*) are the principal species that inhabit the freshwater reaches of the Nushagak and Wood rivers and Wood River lakes upstream of the project area. Whitefish are the only freshwater species expected to have a significant presence in the harbor or in-water disposal area (figure 3).

4.6.3 Marine Fish

Marine species that can tolerate brackish water are likely to be found in the Nushagak River estuary at least seasonally. Marine fish in the project area could include species such as the starry (*Platichthys stellatus*) and Arctic (*Liopsetta glacialis*) flounders (Morrow 1980, Mecklenburg et al. 2002), and several species of mostly marine sculpin and several species of cod. Any of these marine species could enter the harbor basin or disposal area, but they are not expected to be present in significant numbers because of the high natural bedload sediments in the estuary.

4.6.4 Anadromous Fish

Commercial and subsistence fisheries are the principal anadromous fish concerns in the project area. The juveniles and adults of five North Pacific Ocean salmon species (*Oncorhynchus sp.*) that spawn in North America are present at least seasonally in the project area. The adults pass the disposal site on upstream spawning runs from late May through about October depending on the species. Juvenile sockeye, coho, pink, and chum salmon can be found during mostly May, June, and July, while juvenile king (Chinook) salmon are likely to be present most of the year. The juveniles of any of the five salmon species could be in the project area during dredging and disposal, but most juveniles passing through the disposal area during disposal would be sockeye salmon smolt. Because of their importance to the subsistence and commercial economy of the Dillingham area, a detailed discussion of adult and juvenile salmon follows in Sections 4.6.5 and 4.6.6.

Several species of anadromous or brackish-water smelt and whitefish) range in the project area (Mecklenburg et al. 2002). These species include pond smelt (*Hypomesus olidus*), rainbow smelt (*Osmerus mordax*), stickleback (*Gasterosteus and Pungitius spp.*) eulachon (*Thaleichthys pacificus*), least cisco (*Coregonus sardinella*), Bering cisco (*C. laurettae*), and humpback whitefish (*C. pidschian*). Pacific (*Entosphemus tridentatus*) and Arctic (*Lampetra japonica*) lampreys also range into the project area (Malick et al. 1971, Morrow 1980, Mecklenburg et al. 2002).

4.6.5 Adult Pacific Salmon

Adult salmon return estimates and timing for the five Pacific salmon species present in the project area are in table 1.

Table 1. Estimated returns of adult Pacific salmon to the Nushagak-Wood River drainage near Dillingham, Alaska

Species	Return [a]	Range	Timing
Chinook	101,716	68,432-126,512	June-July
Coho	131,744	43,427-282,312	August-September
Sockeye	6,790,888	4,538,394-8,545,076	July-August
Chum	682,068	252,227-1,103,340	July-August
Pink [b]	245,282	172,668-317,895	July-August

[a] Average of years 2000, 2001, 2002 from the ADFG, Commercial Fish Management and Development (CFMD) Division web page.
[b.] Even years, 2000 and 2002 only.

Commercial fisheries and biological escapement goals (BEG) necessary to perpetuate returns on a sustainable yield basis are managed by the Alaska Department of Fish and Game (ADFG). Chinook salmon fisheries in the Nushagak River drainage are guided by the Nushagak-Mulchatna River Chinook Salmon Management Plan (05AAC 06.361). The plan addresses how the subsistence, commercial, and sport fisheries are operated at various escapement levels. The purpose of the plan is to ensure biological spawning escapement requirements of Chinook salmon into the Nushagak-Mulchatna rivers. The BEG for the Nushagak River upstream of the ADFG sonar counter (river mile 25) is 65,000 Chinook salmon.

Coho salmon fisheries in the Nushagak River drainage are guided by the Nushagak River Coho Salmon Management Plan (05 AAC 06.368). The purpose of the plan is to ensure adequate escapement of coho salmon into the Nushagak River system. The ADFG escapement goal is 90,000 coho salmon upstream of the sonar counter by August 25. The Wood River Sockeye Salmon Special Harvest Area Management Plan (05 AAC 06.358) also guides coho salmon escapement in the Wood River system. The goal of this plan is to achieve Nushagak River coho salmon spawning escapement while providing opportunities to harvest Wood River sockeye salmon stocks that are in excess of spawning goals.

Sockeye salmon are the most abundant species in the Nushagak-Wood River drainage. Chapter 6 (Bristol Bay Area) of the Alaska Administrative Code (05 AAC 06) guides the commercial harvest of sockeye in Bristol Bay including the Nushagak-Wood River drainages. The commercial harvest of sockeye salmon in the Nushagak District is guided by the Nushagak District Commercial Set and Drift Gillnet Sockeye Salmon Fisheries Management and Allocation Plan (05 AAC 06.367) and the Nushagak-Mulchatna River Chinook Salmon Management Plan (05 AAC 06.361).

Runs of pink salmon have been decreasing steadily since the 1970's and are only abundant during even numbered years (Alaska District 1979). Pink salmon returns to the Nushagak River are managed by the ADFG and guided by the Nushagak River Coho Salmon Management Plan (05 AAC 06.368). The plan specifies that during even-numbered years, the pink salmon commercial fishery be managed to achieve a pink salmon escapement range of 1.2 to 2.4 million fish (0.3 to 1.5 million fish above the biological escapement goal), and the pink salmon commercial fishery be closed no later than 12:00 midnight, August 1 (05AAC 06.368 (c) (1)). Only several hundred pink salmon return to the Nushagak River drainage during odd-numbered years.

Chinook salmon would be the principal salmon species present within the in-water disposal area during the annual May 15 through July 15 dredging window. Low numbers of sockeye salmon would be present in early July and would increase in number if dredging were extended past mid-July. Only small numbers of pink or chum salmon would be expected within the disposal area during the annual dredging window.

4.6.6 Juvenile Pacific Salmon

The juveniles of five North American salmon species: Chinook, sockeye, pink, chum, and coho are at least seasonally present in the project area.

Sockeye salmon smolts migrate to sea after 2 to 4 years rearing in freshwater lakes. Sockeye smolts are plankton feeders and migrate directly to the open sea by way of the swiftest river channels. They generally migrate near the surface and spend little time in turbid estuaries. This is the dominant species in the Nushagak and Wood River drainages. Sockeye smolts typically migrate to sea from late May though early July. Large numbers of sockeye smolts are expected to be outmigrating during dredging and disposal.

Out migrating sockeye smolt are not expected to be evenly distributed across the 2½-mile-wide estuary fronting Dillingham but are expected to migrate in higher number along the swift-flowing side of the river that fronts Dillingham. Although thousands of sockeye smolts are expected to migrate directly through the disposal area, this number is small relative to the total out migration that would typically number in millions of smolt. Sockeye smolt are surface oriented and would typically migrate through the disposal area very near the surface.

Coho salmon typically rear from 1 to 2 years in freshwater where they mostly inhabit upper-river sloughs and side channels during the winter. Coho salmon smolts are predatory and their migration downriver is timed to coincide with the timing of pink and chum salmon fry out migrations. They may spend a considerable amount of time in estuaries when food resources are available. There would be few if any coho salmon within the disposal area, but there might be small numbers of rearing coho present on tide flats where the floating pipeline would be anchored. Small numbers of juvenile coho salmon could also enter the harbor basin on incoming tides.

Chinook salmon rear from 0 to 1 or 2 years in freshwater, depending on the river system of origin. Chinook salmon smolts sometimes spend a considerable amount of time in the tidal reaches of large rivers where they hatched. Like coho smolts, Chinook smolts are piscivorous and consume quantities of pink and chum salmon fry in addition to other small fish, shrimp, amphipods, and crustacean zoea. Chinook salmon are the species likely to be present in the Nushagak River estuary, including the project area, as juveniles year round.

Juvenile chum salmon and pink salmon emerge from the spawning gravel and migrate downstream almost immediately. Mass migrations are typical during hours of darkness and they frequently form large schools in estuaries where they feed on zooplankton. In larger drainages such as the Nushagak River, some chum fry may take a few weeks to reach the estuary. Although they are sometimes found on the surface and mixed with schools of pink salmon, juvenile chums are principally benthic feeders and consume quantities of harpacticoid copepods on tidal flats during their outmigration through the estuaries. Because pink salmon feed on zooplankton mostly by sight, they may tend to move rather quickly through very turbid water, but relatively small numbers of pink and chum salmon fry could be present near the harbor and disposal area. It is unlikely that significant numbers of pink or chum salmon would be found in the disposal area, but pink and chum salmon could be present on the tide flats where the floating pipeline is anchored. Small number of pink and chum salmon could also enter the harbor basin on incoming tides.

4.6.7 Marine Mammals

Marine mammals present in Bristol Bay include but are not limited to Steller sea lions, Pacific walrus, harbor seals, fur seals, bearded seals, harbor porpoise, beluga whales, orca whales, right whales, gray whales, finback whales, minke whales, and bowhead whales. Of these species, beluga whales, harbor seals, and occasionally harbor porpoise would be expected to visit the project area. These species of marine mammals enter the Nushagak River and feed on returning adult salmon and out migrating smolt. Harbor seals are not likely to use the beach areas at the project area because good haul-out habitat is not available, but they would likely be occasionally present in the aquatic habitat. Steller sea lions may occasionally enter the Nushagak River as far upstream as Dillingham, but they are not common in the project area and would likely not be present on the disposal area during disposal.

Beluga whales of the Bristol Bay stock (Ferrero et al. 2000) frequent the Nushagak River estuary and are seen from the Dillingham waterfront in summer and late fall before freeze up and have been reported being seen inside the Dillingham boat harbor (Krieg and Schwanke personal communication). Juvenile gray whales are known to enter rivers on other parts of their range, and gray whales have been seen in lower Nushagak Bay (Krieg personal communication) but have not been reported as far upriver as Dillingham (Schwanke personal communication). Killer whales are seen from the Dillingham waterfront at least one time per year (Krieg personal communication). Beluga or killer whales would not likely be present in the project area or on the disposal area during disposal.

4.6.8 Birds

Bird use of the project area is considered low because of the proximity of developed land and activities associated with the commercial fishing industry in the harbor. Common birds that may use the grass and shrub habitats on the riverbanks are golden-crowned sparrow, savannah sparrow, fox sparrow, common redpoll, and yellow warbler. Common shorebirds that may use the mudflats and beaches are western sandpiper, least sandpiper, dunlin, and turnstones. Bald eagles also occur in suitable habitat in the surrounding area. There are no known bald eagle nests in the immediate project vicinity. Ospreys, a fish-eating raptor is uncommon in western Alaska, but nests as far north as the Seward Peninsula and more commonly around Bristol Bay. Ospreys may be present in the Dillingham area, but are not known to nest in the project area. The peregrine falcon, a formally endangered species, is also found in the general Dillingham Area.

During planning and engineering visits to Dillingham, waterfowl were common. Species using lakes and ponds and the Nushagak River estuary include surface feeding ducks such as the mallard, pintail, widgeons, shovelers, gadwalls, and green winged teal. Bay ducks would likely include scaups, Barrow's and common golden eyes, buffleheads, and rarely canvasbacks. The red-breasted mergansers, a fish-eating duck, would also be relatively common in the general locality, as would red throated and Pacific loons. Marine ducks including oldsquaws, black, surf and white-winged scoters, harlequin ducks, common and king eiders, spectacled eiders and Steller's eiders are found in Bristol Bay, but are unlikely to be found in the project area or on the disposal area. Surface feeding ducks might be found along the shoreline while diving ducks might be found offshore, but ducks of any species are not expected to occupy the disposal area during disposal.

Geese, including various species of Canada geese and black brant, might be found seasonally in the surrounding area, but would not be common in the immediate project area. Sandhill cranes and tundra swans would also be present in the general Dillingham area, but not the immediate project area.

Birds likely to be found in the harbor, along the floating pipe route, or in the disposal area are mew and glaucous winged gulls, and occasionally Arctic terns. Mew and glaucous-winged gulls were noted to rest in the slack water created by the floating pipe during 2005, 2006, and 2007. It is expected that these gulls would continue to occupy this habitat.

Because juvenile salmon would tend to outmigrate near the surface through water with the lowest turbidity in highly turbid waters like the Nushagak River estuary (figure 5), Arctic terns and gulls might occasionally take small salmon from the surface of the disposal area.

4.6.9 Small Terrestrial Mammals

Small terrestrial mammals in the Dillingham area include voles, shrews, and weasels, but few small mammals are expected to use the pipeline route because it lacks extensive areas of vegetation. The disposal area is water-related and no terrestrial mammals are found there.

4.7 Endangered and Threatened Species

A presence of threatened and endangered species may be part of the existing conditions within the general Nushagak Bay area, but not in the disposal area.

The Corps considered the Northern right whale, finback whale, sei whale, bowhead whale, sperm whale, blue whale, humpback whale, Steller's sea lion, sea otter, spectacled eider, Steller's eider, Eskimo curlew, Aleutian shield fern, Snake River sockeye salmon, Snake River spring and summer Chinook salmon, Snake River fall Chinook salmon, lower Columbia River Chinook salmon, Puget Sound Chinook salmon, Upper Willamette River Chinook salmon, upper Columbia spring Chinook salmon, upper Columbia River steelhead, Snake River basin steelhead, lower Columbia River steelhead, upper Willamette River steelhead, and the middle Columbia River steelhead as endangered, threatened or candidate species because they are found in Alaska (USFWS 2002). Some of these species are found in the Bering Sea or nesting on Yukon-Kuskokwim Delta wetlands, but are not known to be present in the Dillingham and project areas.

The Alaska District requested from the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) updated lists of threatened, endangered, or candidate species that might be impacted by in-water disposal (Appendix A, Correspondence). The USFWS has previously noted that the spectacled eiders, a threatened sea duck, nests on the Kuskokwim River Delta Wildlife Refuge but not in the project area (Appendix A, Correspondence). The recommended in-water disposal does not differ significantly from the in-water disposal during 2005, 2006, 2007, and the disposal scheduled for 2008.

The USFWS also previously determined that anecdotal evidence suggests small numbers of Steller's eiders, a threatened sea duck can occur in near Dillingham during winter, but they are not likely found in the project area or when dredging and disposal would take place.

Sea otters are under the authority of the USFWS and the western population of sea otters was listed as threatened on August 9, 2005, but sea otters are not found on the disposal site or in the project area.

The NMFS does not often responded to requests for an updated informal consultation unless new information on species not previously identified is available. The NMFS was consulted in 2003 (Appendix A, Correspondence) and did not identify any listed species in the project area. No new species that would be found on the disposal site or in the project area and under NMFS authority has been listed since the 2003 NMFS species determination.

The Corps considered the Northern sea lion as a species that on rare occasions might be seen near the project area because of their presence in the Bering Sea and the possibility they might ascend the Nushagak River. Northern Steller sea lions are a federally listed endangered species managed by the NMFS. Steller sea lions range around the North Pacific rim from the Channel Islands off Southern California to northern Hokkaido, Japan. Their center of distribution is the Gulf of Alaska and the Aleutian Islands. The world population is divided between two stocks at 144 degrees W (Cape Suckling, East Prince William Sound). No major rookeries or haulout areas are near or adjacent to the proposed project area.

4.8 Essential Fish Habitat

The NMFS maintains a web site where interested parties can determine the presence of essential fish habitat (EFH) in specific geographical areas of Alaska. The Corps consulted this web site for a list of species for which EFH has been designated in the Dillingham area. Waters at Dillingham are not designated EFH for any species other than Pacific salmon. Waters in outer Nushagak Bay are designated EFH for red king crab, Alaska plaice, and sculpin, but these waters are a considerable distance from the disposal area and would not be impacted by disposal.

Pacific salmon are important in regional commercial fisheries in the Dillingham area (ACMP 2001). The Bristol Bay area including the Nushagak and Wood River systems, are highly productive salmon areas. Sockeye, Chinook, coho, chum, and pink salmon are present in Nushagak Bay and rivers at various times of the year (FWS 1995). The Nushagak River at Dillingham serves primarily as a migration route for salmon between rearing areas in Nushagak and Bristol Bays and spawning, egg incubation, and early rearing in freshwater habitats farther upstream. Juvenile salmon migrating downstream to saltwater are found in the project area from about mid- May through July. Juvenile Chinook salmon might be present on the tide flats of the Nushagak River estuary, including the project area, year round. Adult salmon occur in the Nushagak River off Dillingham from late May to late August during their migration to spawning habitat farther upstream (FWS 1995).

5.0 Coastal Zone Management

The recommended disposal site is within the boundaries of Alaska's coastal zone and within in the Bristol Bay Coastal Resource Service Area (CRSA). The annual maintenance dredging and disposal portion of the proposed project has been found to be consistent to the maximum extent practicable with Sections 1.3, 1.4, and 12.1 of the Enforceable and Administrative Policies of the Bristol Bay Coastal Management Plan (CRSA 1987).

A guide for preparing an Alaska Coastal Management Program (ACMP) consistency determination for Federal activities was completed for this dredging and disposal action. This guide helps evaluate Federal actions for compliance with local administrative and enforceable ACMP policies. Consistency with local administrative policies of the ACMP would be reviewed at year 10 of this 20-year disposal plan.

6.0 Cultural Resources

Yupik Eskimos have occupied the Bristol Bay region for thousands of years, harvesting salmon and to a lesser degree other fish, seals, beluga whales, and terrestrial mammals

(Langdon 1993). Villages and fishing camps tended to be along rivers and shorelines where there was access to salmon runs (Alaska District 1985). The Native village of Choggiong underlies the Dillingham town site and was completely obliterated by the modern town (Alaska District 1997). Significant historic sites of the old Native villages of Kanakanak and Wood River are within about 6 to 10 miles of the project site (Alaska District 1985).

Captain James Cook was the first European to explore the Nushagak River and Bristol Bay in 1778 (Alaska District 2001c). Into the middle of the 19^{th} century Russians were exploring the area and established the Alexandrovski Redoubt and Russian Orthodox Church at the mouth of the Nushagak River. The U.S. Army Signal Corps established a meteorological station at Dillingham in 1881, and the American commercial salmon industry was established in the Dillingham area in 1884.

The Alaska District completed a historical survey of the project area in spring 2001 (Alaska District 2001c). The findings are that there are no historic properties affected by the recommended disposal action. The Peter Pan Cannery historic district is east of the Dillingham harbor and onshore slightly east of the recommended disposal site (figure 3). The Peter Pan Cannery was determined eligible for the National Register of Historic Places, but it would not be impacted by the proposed action (Alaska District 2001c).

The Kanakanak Hospital was established in 1913 on the north bank of the Nushagak River about 6 miles downriver from the recommended disposal site. The hospital site includes many unmarked graves, some of which are exposed because of riverbank erosion (Gay 2002).

7.0 Socio-economics

Information for this section was taken in part from ADCED (2001) and ADFG (2001).

7.1 Commercial Fishing

Commercial salmon fishing, fish processing, cold storage, and support for the fishing industry are primary activities in the region. The area's population nearly doubles during the fishing season. Sockeye salmon is the most important commercial fish species in Bristol Bay, averaging 90 percent of the total catch in the region. The Bristol Bay sockeye salmon fishery is the largest and most lucrative in the world. Salmon are mostly caught using drift or set gillnets in Nushagak and Bristol bays. Commercial salmon fishing generally occurs from June to September, with peak catches of sockeye salmon in July. The number of sockeye salmon harvested for the years 2000 through 2004, and their ex-vessel value, are shown in table 2. Ex-vessel value is the amount paid to commercial fishers.

Table 2. The number of sockeye salmon harvested in the Nushagak District commercial fishery, and their ex-vessel value for the years 2000 through 2004.

Year	Number Harvested	Ex-vessel Value (USD)
2004	6,725,074	19,401,837
2003	6,665,918	20,997,642
2002	2,815,875	7,729,577
2001	4,609,762	12,409,479
2000	6,428,234	25,136,966
Average [a]	4,540,810.5	14,279,250.17

[a] Average of years 2000, 2001, 2002 from the ADFG, Commercial Fish Management and Development (CFMD) Division web page.

7.2 Sport Fishing

Recreational fisheries in southwest Alaska, including the Nushagak-Wood River drainages, provide income to many Dillingham area residents. Studies by the University of Alaska placed the 1988 value of recreational fisheries in southwest Alaska at $50 million dollars (Ackley 1988 in Dunaway and Jaenicke 2000). The ADFG, Division of Sport Fish budgets over $500,000 annually to manage this $50,000,000 fishery. From 1993 through 1997 sport anglers in the central section of the southwest Alaska fished an average of 37,500 days per year (Dunaway and Jaenicke 2000).

7.3 Subsistence Activities

Many residents of the area are heavily involved in subsistence activities. About one-half of Dillingham's population depends to some extent on subsistence activities for food. Species commonly harvested include salmon, grayling, pike, Dolly Varden, rainbow trout, moose, bear, caribou, and ptarmigan. Most subsistence set net fishing for salmon in Dillingham is done from three beaches: Snag Point, Scandinavia, and Kanakanak Hospital beach (Alaska District 2003c). Scandinavia Beach is just west of the harbor entrance and closest to dredging operations. A prioritization of the beaches by order of public use and the number of nets that can be set on the beaches would be: Kanakanak Hospital Beach, Snag Point Beach, and Scandinavia Beach. Restricted access and a large sheet-pile dock for unloading fuel barges compromises public use of the Scandinavia Beach. The subsistence set net fishery starts about mid to late May and continues to about mid August. The peak catch is in mid July when the sockeye salmon are running.

Subsistence fishing in the Nushagak District is permissible by ADFG issued permit only (CFMD 2004). The Nushagak commercial district is open to subsistence fishing from Monday through Friday during May and September, and can be opened by emergency order during extended commercial closures. Subsistence fishing in Dillingham is normally open for several fishing periods per week during the peak of the sockeye run.

In 2004, 511 subsistence permits were issued for the Nushagak District. The number of subsistence salmon of all species harvested at Dillingham in 2004 was:

Sockeye	Chinook	Chum	Pink	Coho	Total
17,491	15,610	3,869	1,944	4,240	43,154

a. includes permits issued in Clarks Point and Ekuk about 20 miles downstream of Dillingham.
Source: Appendix table 30, CFMD 2004.

Based on data for the entire Nushagak District (CFMD 2004), the likely descending order of species harvested in 2004 was sockeye, Chinook, coho, chum, and pink. The principal species caught in subsistence nets during the May or June dredging window is Chinook salmon.

7.4 Chinook Salmon

Chinook salmon are an important species in the Nushagak River and the first species of the season that is available to commercial, subsistence, and sport users and is the species that would be present during dredging and in-water disposal. Harvest estimates for this species over the years from 1999 through 2003 are listed in the following table.

Table 3. Escapement and harvest statistics and of Chinook salmon to the Nushagak River from 1999 through 2004.

Year	Escapement	Commercial	Commercial Subsistence	Subsistence	Sport	Total
2004	116,400	93,414	No data	15,610	No data	No data
2003	No data	40,014	No data	No data	No data	No data
2002	No data	39,382	717	9,154	3,693	52,946
2001	No data	11,568	1078	9,498	5,899	28,043
2000	75,172	12,055	1,052	6,434	6,016	25,557
1999	79,973	10,893	927	7,365	4,237	23,422

Source: Alaska Department of Fish and Game.

8.0 ENVIRONMENTAL CONSEQUENCES

8.1 No Action (Alternative 1)

Under the No-Action alternative the Corps would dredge the harbor and discharge the sediments in the existing PPS without restoration or refurbishment. The No-Action alternative would result in violation of State water quality standards and may eventually result in the harbor not being dredged. Sediment accumulation inside the harbor averages about 4,055 yd^3 per month during winter (October-May) and about 7,065 yd^3 per month during summer (June-September) (Everts 1976). The harbor basin was not dredged from 1963 through 1965 and filled with sediment over 13 feet above MLLW in 2 years. Consequently, if the harbor were not dredged annually, it would most likely be usable to only small vessels with shallow drafts (skiffs) by the end of the second year. Larger fishing vessels would have to moor by rafting alongside one another at cannery docks or to buoys anchored in the river. A significant economic loss to individuals, the fishing industry, and the City of Dillingham would likely result if vessels were damaged or sunk by the frequent storms that sweep through the Dillingham area. A significant cost in fuel to vessel owners could result if fishing vessels were required to leave the Dillingham area or be removed from the water to escape the sometimes violent storms that lash the Dillingham waterfront.

8.2 Reinstate Disposal at the Peter Pan Site (Alternative 2)

Reinstating disposal at the PPS would affect the shoreline from the Peter Pan Cannery to the harbor entrance (figure 3). Assuming that 90,000 yd^3 are dredged and at best 9,000 yd^3 settle in the PPS, roughly 81,000 yd^3 of the sediment could enter Nushagak River at the shoreline. The amount of silt that could be captured by vegetation in the drainage swale along the eastern margin of the PPS is negligible to this volume. Continued discharge in this site would also result in roughly 90 percent of the dredged sediments discharging back into the river from the shoreline.

The CDF on the PPS is full, but the capacity could be conditioned to hold more heavy particles by hauling material from the facility. Hauling material from the facility, however, would not increase the retention time necessary to settle out the suspended silt and a plume along the shoreline would result (figure 3). Continued use of the PPS could increase the risk that the berms surrounding the site would fail and potentially damage the Nushagak River estuary shoreline.

The PPS could also be expanded by approximately 6 acres, but expansion would only be a temporary solution lasting from 2 to 3 years before filling. Expansion of the dewatering area adjacent to the historic Peter Pan Cannery (figure 3) could also result in damage to the cannery.

Continued use of the PPS as a disposal alternative is not recommended because of these problems and risks.

8.3 Confined Disposal Facility on Wetland (Alternative 3)

The only wetland that was considered in any detail for disposal was wetland on the New Western Site (figure 3). The Corps of Engineers conducted settling and probe investigations on this wetland in 2003 and 2004 and found it to be a wetland bog covered by a relatively thin and flexible layer of matted vegetation floating on the surface (Alaska District 2005). Subsidence tests resulted in the creation of several small pothole lakes while probe test indicate that the bog is almost 40 feet deep.

Corps hydrology engineers considered alternative confinement methods mentioned in Section 3.3 of this EA. Only construction of confinement berms on the wetland was predicted by the engineers to have a reasonable possibility of long-term success. Construction of a CDF on the wetland would completely destroy up to 60 acres of wetland and alter up to another estimated 50 acres due to drainage and other changes in the hydraulic functions of the wetland. Construction of a CDF and other requirement necessary to make the CDF function would have an adverse impact on the wetland vegetation and the hydraulic function of the wetland. It could also result in increased maintenance to the Dillingham Highway and the private road from the highway to the private fuel depot. Wildlife, mainly waterfowl, small birds and mammals that use the New Western site would be displaced. These impacts would be permanent.

An estimated 56,000 yd^3 of sediment would be stripped from the Old Western site for this alternative. Tall shrub and grass used by small birds and mammals, and occasionally moose during winter, has established on the Old Western site. Stripping this site for construction materials would remove the established vegetation and deny use of the Old Western site to this wildlife. Use of the Old Western site by wildlife may be temporary in any case because the land is private and developable, and may be used for industrial purposes in the future.

Minor and temporary impacts to local air quality due to the introduction of diesel particulates would also result from this alternative.

Although the New Western site is private land, local persons establish snowmachine trails across the wetland during winter. This activity would be displaced after construction of a CDF on the wetland.

A significant amount of fill material would be hauled to the New Western construction site. Trucks hauling this material would sometimes interfere with the flow of local traffic and could damage local roads due to weight.

8.4 In-water Disposal (Alternative 4)

In-water disposal is the Corps recommended alternative and base plan, and the consequences of this disposal method are discussed in the following sections. In-water disposal has been conducted at Dillingham since 2005 and would allow for the Dillingham Harbor to be dredged without serious consequences to the environment.

8.4.1 Sediment and Water Quality

Sediment accumulation in the harbor is principally the result of tide and wave actions (Alaska District 1974). The sediment that collects in the harbor is resident for a few months and does not have sufficient time to accrue contaminants above what would occur naturally. Testing of sediments indicated that there are no contaminants in the sediments above DEC and EPA screening levels (Alaska District 2001a, Alaska District 2001b). Reintroduction of sediments back into the river is not expected to add contaminants above background levels or in excess of threshold levels established by the State of Alaska DEC or the Federal EPA.

Sediments in the Nushagak River estuary originate partly from upriver, but principally from erosion of lowland sea cliffs and riverbanks (Alaska District 1974). Large Alaska rivers such as the Yukon, Kuskokwim, and the Nushagak typically carry high-suspended sediment loads to sea. The Yukon River carries approximately 60 million tons of sediment annually (USGS 1996), and a river the size of the Nushagak would also carry millions of tons annually. In perspective, the mass of sediment reintroduced to the Nushagak River estuary by dredging the harbor (up to about 60,000 tons annually) would not be expected to result in significant change to the ecosystem.

Natural sediment loads in the Nushagak River estuary are as high as 3,230 mg/l near the river bottom (figure 5, PND 1988). In-water disposal of sediments dredged from the harbor is predicted to temporarily increase sediment loads near the end of the discharge pipe. The discharge plume was monitored in 2005, 2006, and 2007 can be detected up to about 164 feet (50 meters) down current from the discharge pipe, but is sometimes masked by ambient turbidity.

Some 1 inch minus gravel with an occasional cobble is washed into the entrance channel by strong tidal currents, and is dredged. This material forms a temporary mound under the discharge pipe in the disposal area. Before and after disposal, bathymetric surveys show that this mound eventually dissipates on strong tidal currents and that in-water disposal does not result in long-term shoaling.

8.4.2 Vegetation, Wetlands, and Tide Flats

In-water disposal in the designated area (figure 3) would not be expected to significantly impact aquatic vegetation or reduce the primary productivity of algae that might be present in the turbid waters of the Nushagak River estuary. A film of epiphytical green algae typically forms at the high-water line in brackish water estuaries during late summer, but the formation of this alga would not occur until after the dredging and disposal activities were completed and would not be affected.

A portion of the pipe would lie on the mudflats at low tide. Placement of the floating pipeline would result in some temporary LGP loader tracks on the mudflats. The pipe would be pulled back on land if it was necessary to temporarily retract the pipe onshore to wait out a storm. Low ground pressure equipment may be required to operate below the high tide line to retract the pipe. Based on experience during 2005, 2006, and 2007, tracks from the LGP equipment would be unrecognizable after several tide cycles, and long-term impact would not result from this operation.

8.4.3 Fish and Wildlife

The principal concern of reintroducing sediments from the harbor back into the Nushagak River during the in-water disposal are temporary and local increases of suspended sediment over the already high ambient levels (>3,000 mg/l) in the Nushagak River, and the potential effects of sediment increases on juvenile salmon. A significant amount of research has been devoted to the effects of turbidity and suspended solids on juvenile salmon, and is summarized in a comprehensive compilation by Bash et al. (2001). The impacts of high suspended solids on salmonids include mortality, reduced survival, reduced growth, reduced feeding, stress, disease, avoidance, displacement, change in body color, alerted behavior, and reduced tolerance to salt water (Loyd 1987 in Bash et al. 2001). The sediment conditions that can result in these effects include: (1) duration of exposure, (2) frequency of exposure, (3) toxicity, (4) temperature, (5) life stage of fish, (6) angularity of particle, (7) size of particle, (8) type of particle, (9) severity and magnitude of pulse, (10) natural background turbidity, (11) time of occurrence, (12) other stressors and general condition of biota, and (13) availability of and access to refugia.

Much of the research on juvenile salmonids and turbidity that is available was done in laboratory settings, and its applicability to field situations is suspect in many cases. Other research applies to headwaters and systems that are normally clear except for seasonal and infrequent anthropomorphic sources of sediment. Turbidity values reported by some research may not be a consistent and reliable tool for determining the effects of suspended solids on salmonids. Other factors such as life stage, time of year, size, and angularity of sediment, availability of off channel and tributary habitat, and the composition of sediment may be more telling in determining the effect of sediment on salmonids in northwest rivers (Bash et al. 2001). Bash et al. concluded that, "salmonids encounter naturally turbid conditions in estuaries and glacial streams," but that this does not necessarily mean that salmonids in general can tolerate increases of suspended sediments over time. Relatively low levels of anthropogenic turbidity may adversely affect salmonid populations that are not naturally exposed to relatively high levels of natural turbidity (Gregory 1992 in Bash et al. 2001). Bash et al. also noted that managers are interested in learning whether there is something inherent in "natural" turbidity sources that make them somehow less harmful to fish than are anthropomorphic sources of turbidity because it is apparent that salmonids are able to cope with some level of turbidity at certain life stages. Evidence of their ability to cope is illustrated by the presence of juvenile salmonids in turbid estuaries and local streams characterized by high natural levels of glacial silt (Gregory and Northcote 1993 in Bash et al. 2001).

Measured suspended solid levels in the Nushagak River ranged from 184 near the surface to 3,230 mg/L near the bottom in 1987 (figure 5, PND 1988), and maybe even higher during certain unmeasured conditions. Higher sediment loads near the bottom are due to the high bedload movement of heavier particles along the bottom. Salmon of all five species present have apparently adapted to these high-suspended sediments loads without adverse harm as evidenced by the range of return to the river in the face of a long-term and aggressive commercial fishery

Of the above impacts mentioned by Lloyd (1987), avoidance and displacement of juvenile salmon are likely to be the principal impacts of the in-water disposal. The sediments in the harbor are the same general size and angularity as sediments in the river, and are not toxic. The frequency of exposure is one time annually and the duration of exposure is for a relatively short period during the out migration. Sediment concentrations would be higher than ambient conditions near the outlet of the pipe, but on the flood and ebb tide they are estimated to be similar to ambient conditions within about 5 feet of the pipe. Slack tides in the Nushagak River are very brief.

The pipe end is positioned to discharge 10 feet beneath the surface to avoid surface oriented sockeye smolt, and the discharge is not expected to have significant adverse effects on juvenile salmon. Small numbers of late migrating pink and chum salmon fry could be disrupted by the pipe, but the main migration for these species would be past prior to placement of the pipe. Mew and glaucous-winged gulls appear to be attracted to the floating pipe, and their increased presence may result in temporary and minor increases in opportunistic predation on juvenile salmon.

The distribution of adult salmon in a tidal estuary is somewhat dependant on the tidal period and stage. During flood and high slack tides when the entire estuary is flooded, adult salmon tend to distribute more evenly than they do during ebb or low tidal periods. During low tides or when salmon are subject to the full river current, some species orient to the riverbanks. Horizontal distribution data from sonar counters on large rivers such as the Kenai River and the Susitna River show that Chinook salmon are capable of swimming upstream in strong mid-channel currents while sockeye, chum, and pink salmon tend to orient to weaker currents near the river banks. The principal species of adult salmon present during dredging would be Chinook salmon followed by sockeye salmon.

Although adult salmon would be expected to avoid the immediate area of the pipe outlet, the homing instinct of adult salmon is not affected by turbidity, and no significant delay in timing would be expected as a result of in-water disposal. No significant effects on salmon in any life phase or other species of fish is expected as a result of in-water disposal.

Most marine mammals would be expected to avoid the Dillingham waterfront area regardless of in-water discharge because of the high volume of boat traffic that is typical in the area at that time. Marine mammals, specifically harbor seals or beluga whales that could use upper Nushagak Bay and the lower Nushagak River during the dredging and disposal period, might be temporarily inhibited from feeding on juvenile and adult salmon in the immediate area of the discharge pipe outlet if they were present, but no adverse impact to either of these species is expected to result from in-water disposal. Other marine mammals that typically occupy Bristol Bay and the outer margins of Nushagak Bay are seldom or never seen in the harbor area.

Glaucous winged and mew gulls and Arctic terns are expected to use the harbor, pipeline route, and disposal area, but no adverse impact on any species of bird is expected from this dredging and disposal operation.

There are few if any benthic invertebrates living on the mudflats in the project vicinity because of the freezing, desiccation, and ice gouging that prevail to below the lowest tide levels during winter. In-water disposal is not expected to adversely impact benthic invertebrates that might be present in the project area.

8.3.4 Endangered and Threatened Species

The proposed action would not adversely affect threatened or endangered species or their habitats. Spectacled eiders are reported to nest on the Kuskokwim River Delta Wildlife Refuge west of Dillingham, but not in the project area. Steller's eiders could be present in Nushagak Bay from November through March, but the proposed dredging and disposal periods are from May 15 through July 5 and Steller's eiders would not be affected by in-water disposal.

Steller sea lions may enter the Nushagak River during in-water disposal to feed on migrating adult salmon, but if they did, they would likely avoid the area during dredging and would not be affected. No rookeries or haulout areas are near or adjacent to the proposed project area.

Several species of endangered whales and the recently listed sea otter are found in Bristol Bay and the Bering Sea, but are not expected to use the estuary near the project area and would not be impacted by in-water disposal.

8.3.5 Essential Fish Habitat

The reintroduction of sediments to the Nushagak River during in-water disposal is not expected to adversely impact essential fish habitat (EFH). The disposal site is not within designated EFH for any species other than Pacific salmon. The Nushagak River estuary is characterized as a highly turbid ecosystem with high and variable suspended sediment concentrations and mobile soft bottom sediments that shift significantly with each tidal change. Pacific salmon and other EFH species that might be in the area have adapted to conditions of high-suspended sediments and would likely avoid the immediate area near the discharge pipe end without suffering adverse impacts. In-water disposal could result in a temporary gravel mound at –26 feet MLLW, but any mound formed would be expected to dissipate within weeks following annual in-water disposal periods.

8.4.6 Cultural Resources

Reintroducing the sediments from the harbor back into the Nushagak River during in-water disposal would not affect cultural or historical resources in the Dillingham area. The Peter Pan Cannery historic district is upstream of the disposal site and would not be impacted during dredging or in-water disposal. No erosion or shoaling is expected from in-water disposal. In-water disposal is not expected to contribute to exposure of gravesites by riverbank erosion near the Kanakanak Hospital, about 6 miles downriver from the project site.

8.4.7 Socio-economics

8.3.7.1 Commercial Fishing

Dillingham is a major salmon fishing port and in-water disposal would benefit commercial fishing by providing a harbor for fishing vessels for another 20 years. Adverse impacts to commercial fish species by either the in-water or the upland disposal alternatives are not expected. In-water disposal would be timed to result in minimal interference with boat traffic through the harbor entrance. No shoaling that would ground fishing boats is expected. The floating pipe would be well marked and the appropriate notices to mariners released. Placement of the floating pipe is authorized by the Chief of Engineers through the District Commander in accordance with Section 10 of the Rivers and Harbors Act of 1899 (33 USC. 403). An adverse hazard to navigation would not result from temporarily anchoring a floating pipe in the Nushagak River estuary for in-water disposal.

8.4.7.2 Subsistence

Subsistence users would benefit from in-water disposal because they would continue to have access to the boat harbor for an additional 20 years. No adverse impacts to fish and wildlife populations important to subsistence hunting and fishing practices or to subsistence fishing or hunting areas are expected to result from in-water disposal. Monitoring during the 2004, 2005, 2006, and 2007 in-water disposal supports that in-water disposal would not foul subsistence beaches. Monitoring of beaches would continue during the 20-year life of this disposal plan.

8.4.7.3 Environmental Justice

In-water disposal of dredged sediments is not expected to cause disproportionate impacts to low-income people. Benefits to local low-income people are expected by providing safe moorage of boats used for income producing and subsistence gathering activities.

8.4.7.4 Protection of Children

In-water disposal of dredged sediments is not expected to disproportionately affect children. The nearest school is about 1 mile from the project. Local children would benefit because continued maintenance dredging of the harbor would allow their parents safer access to subsistence resources and enhance their ability to provide beneficial monetary income through commercial fishing. Children are sometimes present on an open area between a sheet-pile bulkhead protecting the harbor and the road to the harbor. In-water disposal would not affect their use of this area.

8.5 Mitigation

Mitigation measures would be implemented during in-water disposal. The turbidity plume would be monitored at the 10-year mark of the 20-year disposal plan life if required. Subsistence fishing beaches would be visited annually by ADF&G during their routine monitoring of the subsistence fishery. If fouling were seen on the beaches, dredging would stop and an investigation into the source of the fouling would be made. The end of the discharge pipe would be suspended 10 feet below the surface and pointed downward at a 45-degree angle to avoid or mitigate contact with outmigrating sockeye salmon smolt. The end of the discharge pipe is expected to be at least 10 feet of above the river bottom at the lowest tide levels.

The disposal plan would be implemented in 2009 and be reevaluated as a mitigation measure in 2019 or sooner if major changes in disposal methods or unexpected environmental impacts should occur as mentioned in Section 3.6 Safety and Monitoring.

9.0 CONCLUSION

The Alaska District, U.S. Army Corps of Engineers concludes that in-water disposal, as discussed in this EA, would not cause long-term or adverse impacts to the environment. In-water disposal would result in increased turbidity within about 165 feet on the downcurrent end of the discharge pipe for 2 or 3 weeks between May 15 and July 15 from 2009 through 2029. Migrating fish and marine mammals may avoid the immediate area of discharge, but would not otherwise be harmed. A low gravel mound might temporarily form under the end of the discharge pipe, but is expected to completely disperse before the next disposal period. Long-term shoaling is not expected to result from this disposal. This disposal is not expected to cause adverse harm to the subsistence fishery by deposition of sediments on the beaches or by causing long-term changes in fish or wildlife behavior. Cultural and historical sites would not be harmed by in-water disposal.

A Finding of No Significant Impact (FONSI) will be prepared for in-water of sediments from the Dillingham Small Boat Harbor for the 20 years (2009 through 2029). An unsigned draft of the FONSI accompanies this EA.

10.0 REQUIRED PERMITS AND AUTHORIZATIONS

The following permits, concurrences, certificates and evaluations are required for this action:

Title	Type	Issuing Agency
Section 401, Clean Water Act	Certificate of Reasonable Assurance	Alaska Department of Environmental Conservation
Coastal Zone Consistency Determination	Concurrence	Alaska Department of Natural Resources
Anadromous Fish Permit	Permit	Alaska Department of Natural Resources

These authorizations or permits would be sought for a 20-year period spanning 2009 through 2029. The Corps of Engineers and Alaska Departments of Natural Resources, Environmental Conservation, and Fish and Game will reevaluate the disposal action for adverse environmental impacts after 10 years (2019), or sooner if major changes in disposal methods or unexpected environmental impacts should occur. The dredging window for this disposal plan is between May 15 and July15.

Authorization for the discharge of sediments into waters of the United States would be satisfied through evaluation of this Federal action under Section 404(b)(1) of the Clean Water Act (Appendix B). Authorization for the temporary placement of the floating pipeline under Section 10 of the Rivers and Harbor Act of 1899 (33 U.S.C. 403) annually into navigable waters of the United States is authorized for this Federal action by the Chief of Engineers through the Alaska District Commander.

11.0 PREPARER

The U.S. Army Corps of Engineers Alaska District, Environmental Resources Section staff biologist Larry Bartlett prepared this environmental assessment. The document was edited and formatted by Diane Walters, writer-editor.

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APPENDIX A

Correspondence

2007-I-0111

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish & Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

in reply refer to
AFWFO

April 23, 2007

Guy McConnell
Department of the Army
U.S. Army Engineer District, Alaska
P.O. Box 898
Anchorage, Alaska 99506-0898

Re: Dillingham Small Boat Harbor IWD Of Sediments (*consultation number 2007-I 0111*)

Dear Mr. McConnell,

On April 16, 2007, we received your letter requesting concurrence with the determination that in water disposal of sediments dredged from the Dillingham small boat harbor, will have no affect on threatened and endangered species and their critical habitat protected under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; Act). This sediment disposal project will result in an estimated 90,000 cubic yards of sediment annually piped into the Nushagak River estuary during the summer months.

Our records indicate that Steller's eiders (*Polysticta stelleri*) listed as threatened under that Act in 1997, are commonly observed near Hagmeister Island during spring aerial surveys, but are not expected to occur near the head of Togiak Bay. Therefore, we concur with your determination that there will be no effect to species protected under the Act.

This letter relates only to federally listed or proposed species and/or designated or proposed critical habitat under our jurisdiction. It does not address species under the jurisdiction of National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act.

This concludes section 7 consultation on the Dillingham Small Boat Harbor IWD Of Sediments Project. Thank you for your cooperation in meeting our joint responsibilities under section 7 of the Endangered Species Act. If you have any questions, please contact me at (907) 271-1467. In future correspondences regarding this consultation please refer to consultation number 2007-I-0111.

Sincerely,

Ellen Lance
Endangered Species Biologist

T:\s7\2007 sec 7\2007-I-0111_DillinghamIWD_ACOE.doc

Re ESA update for Dillingham

From: Brad Smith [Brad.Smith@noaa.gov]
Sent: Monday, September 17, 2007 2:05 PM
To: Bartlett, Larry D POA
Subject: Re: ESA update for Dillingham

Larry, I have reviewed the request and maps and agree that any listed species for which NMFS is responsible would be unlikely to occur in the project area.

Bartlett, Larry D POA wrote:
> Brad,
>
> I have no record of NMFS responding to the attached request for an ESA
> update for dredging and inwater disposal at Dillingham. It's the same
> project we have been doing under interim permit for past 3 years, but
> we are now ready to extend it out to 20 years with a 10 year review.
> This project would not have any adverse impacts to marine mammals, but
> requires an ESA update just the same. A brief e-mail response this week will do.
>
>
> Thanks
>
> Larry B.
>

APPENDIX B

Section 404 (b)(1) EVALUATION

Federal Guidelines

Evaluation Under Section 404(b)(1)
of the
Clean Walter Act
for the
Maintenance Dredging and Inwater Disposal

Dillingham Small Boat Harbor
Dillingham, Alaska

I. Project Description

The Alaska District, U.S. Army Corps of Engineers proposes to dispose of dredged sediment from the Dillingham Small Boat Harbor directly into the Nushagak River estuary from 2009 through 2029. This disposal is predicated on the success of in-water disposal in 2005, 2006, and 2007. Prior to the in-water disposal, dredged material was deposited on an upland site owned by Peter Pan Seafood Company and an upland site owned by Bristol Express Fuel Company (figure A-1).

These disposal sites are known as the Peter Pan site (PPS) and Old Western Disposal site (OWD). Neither of these sites is currently available for disposal, but the PPS was considered as an alternative in the environmental assessment that precedes this 404 (b)(1) evaluation. Continued discharge in the PPS would result in roughly 90 percent of the dredged sediments discharging into the Nushagak River at the shoreline (figure A-1).

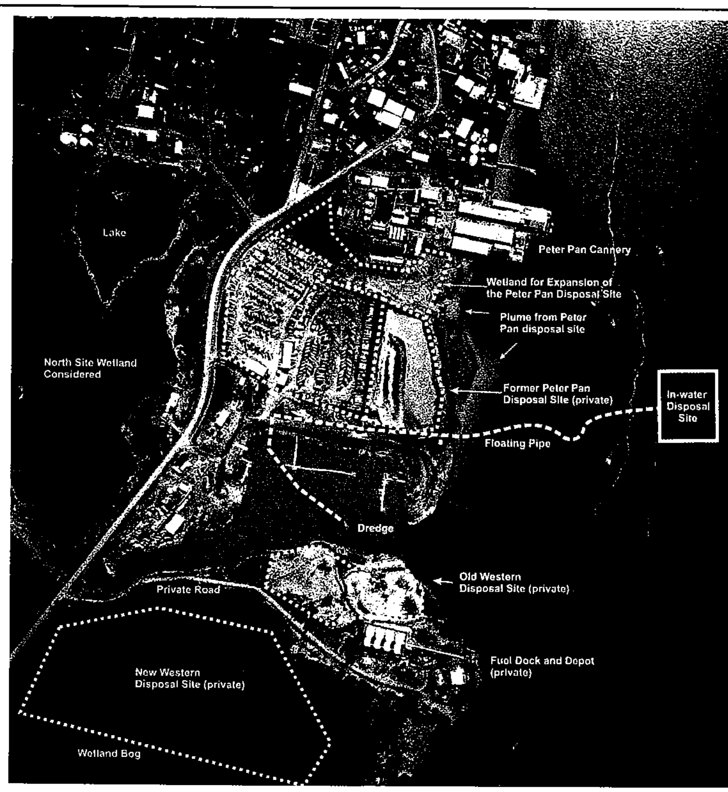


Figure A-1. Dillingham harbor and the relative locations of features mentioned in this 404(b) evaluation.

Approximately 90,000 cubic yards (yd^3) of sand, gravel, and silt would be dredged from the harbor with a hydraulic cutterhead and pipeline suction dredge, and pumped as slurry through a floating 12-inch pipe to a 75,000 square-foot (ft^2) (1.72-acre) disposal area about 800 feet offshore of the sheet-pile protection fronting the harbor. The floating pipe would occupy another 0.03 acre of tide flat for anchors and when resting on the mud during low tide. An estimated 90,000 yd^3 of sand, gravel and silt would be discharged within the 1.72-acre disposal area annually between May 15 and July 15 for 20 years beginning in 2009. The disposal would be re-evaluated in 2019 or sooner if unexpected environmental impacts were to occur. Dredging and disposal would take place from between 18 to 20 hours each day and across all tide cycles.

The end of the pipe would be supported with a float or buoy and submerged 10 feet beneath the surface to avoid or mitigate contact with outmigrating sockeye salmon smolt, and to maintain at least 10 feet of clearance above the river bottom during extreme low tides. Disposal would be over the –26-foot MLLW bathymetry and, during extreme low tide, would be in water about 23 feet deep.

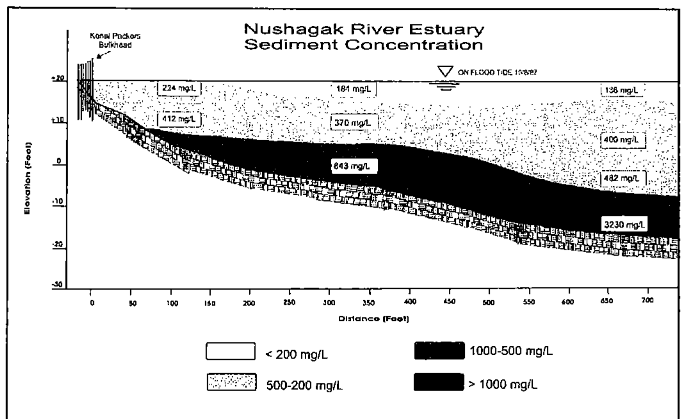
II. Physical and Biological Conditions

Sediments

Tidal and riverine currents contribute to a high bedload movement in the Nushagak River. Bottom sediments consist of sandy gravels at 0 MLLW and sandy silt at +10 MLLW. Harbor sediments that originate from the Nushagak River are composed of 7 percent sand, 25 percent clay, 32 percent fine silt, and 36 percent course silt, but a few thousand yd^3 of 1 inch minus gravel is sometimes dredged from the entrance channel. Substrate within the disposal area is mostly sandy gravel overlain with silt.

Suspended Sediments and Turbidity

Peratrovich, Nottingham, and Drage, Inc. (1988) mapped suspended sediments along a transect extending into the Nushagak River estuary near the small boat harbor (figure A-2). Bottom sediments in the Nushagak River tend to increase with depth and distance from the shoreline while surface sediments tend to improve with distance. Suspended sediment concentrations near the harbor ranged from 136 mg/l near the water's surface offshore to 3,230 mg/l near the bottom in about 30 feet of water. Sediments in the 1.72-acre disposal area would be similar to those in Figure A-2.



Source: Peratrovich, Nottingham & Drage, Inc., 1988.

Figure A-2. Typical sediment concentrations in the Nushagak River at Dillingham (PND 1988).

Suspended sediments in the immediate vicinity of the discharge pipe would be higher than the surrounding water. The Alaska Department of Environmental Conservation (ADEC) is expected to designate a mixing zone for this disposal. Turbidity monitoring during 2005, 2006, and 2007 showed that turbidity can be detected with instruments 165 feet down current of the discharge, but turbidity from the discharge is sometimes masked by the high ambient turbidity. A temporary gravel mound may form near the end of the discharge pipe, but bathymetric surveys before and after the 2005, 2006, and 2007 disposals show that the mound that is formed disperses on strong tidal currents, and shoaling does not occur. Inspection of the main subsistence beaches at Dillingham during the 2005, 2006, and 2007 disposals show that fouling of the beaches does not occur.

Water Quality, Salinity, and Circulation

Trends in the water quality of the Nushagak River at Dillingham are typical of turbid estuarine environments found in Alaska. Natural turbidity ranges from about 136 mg/l to about 3,230 mg/l (figure 5). Salinity has been reported near 0 at low tide and about 3 parts per thousand at high tide. Water circulation is good in the project area because of flow of the Nushagak River and extreme tidal exchange, which is typical of the region. Water velocity ranges from 0.5 foot per second near shore at high tide to as fast as 12 feet per second at mid-tide offshore. The disposal action would not result in long-term adverse affects to water quality, water fluctuations, salinity, or circulation in the area. .

Contaminants

Sediments from the Dillingham Harbor are considered suitable for aquatic disposal because of low concentrations of contaminants (COE 2003). In-water disposal would not increase levels of contaminants in the aquatic ecosystem.

Aquatic Ecosystems

In-water disposal is expected to have only short-term and minor impacts related to localized turbidity on riverine biota. The Nushagak River ecosystem would not be significantly impacted. Sediment inputs to the Nushagak River from the harbor originate in the river and are of the same specific gravity, angularity, and chemical composition as other sediments in the river. Impacts that would result from the reintroduction of sediment from the harbor back into the river would be temporary, and there would be minor increases in local turbidity and bedload. In-water disposal would not degrade the overall marine ecosystem or food base for sea birds, marine mammals, and fishes.

Adult Chinook and sockeye salmon are the dominant species returning to the Nushagak River during the dredging window and would likely avoid the immediate vicinity of the discharge pipe due to higher than ambient velocity and turbidity. Discharge is at about 12 feet per second, but would reach ambient velocity during flood tide within 5 feet of the pipe end. In-water disposal would not significantly affect the migration paths or homing instinct of adult salmon.

The pipe end would be submerged 10 feet below the surface at all tide levels to avoid or mitigate contact with outmigrating salmon smolt. Outmigrating juvenile salmon are expected to avoid an area of higher turbidity and velocity near the end of the pipe and quickly transit the mixing zone. In-water disposal is not expected to result in short or long-term, adverse impacts to juvenile salmon.

There are few if any invertebrates within the designated disposal area because of the high bedload. A shallow mound of sand and gravel would form temporarily on the river bottom, but this mound is expected to dissipate on tidal currents shortly after dredging is stopped for the season. In-water disposal would not have an adverse impact on benthic invertebrates.

In-water disposal would not have any effect on marine vegetation because there are no marine plants in the disposal area.

Operation of low ground pressure (LGP) equipment on the tide flats would not result in any long-term impacts to the tide flats. There are no significant populations of invertebrates present on the tide flats, and experience during in-water disposal during 2005, 2006, and 2007 shows that the tracks made by LGP equipment heal within a few tide cycles.

Subsistence Fishing

Chinook and sockeye salmon are the principal species sought during the May15 through July 15 dredging window. Subsistence fishing is conducted by stretching 60-foot-long gillnets perpendicular to the shore along beaches. Most subsistence nets are set at three main beaches in the Dillingham area. The beach where most nets are set is 6 miles downriver from the harbor. The second most used beach is about 1 mile upriver from the harbor, while a third beach is immediately downstream from the harbor. Use of the beach immediately downstream from the harbor is limited because it is on private property and is an active barge landing point. Sediment plume analysis indicates that deposit of sediments on these beaches would not occur as a result of dredging and in-water disposal.

The Nushagak River is about 2.5 miles wide in front of the harbor. Chinook salmon naturally tend to migrate near the center of large rivers and only a small portion of the total number of returning Chinook salmon is expected to migrate through he disposal area. Sockeye salmon are known to migrate relatively close to shore. Chinook and sockeye salmon that migrate along shore near the harbor may avoid the higher than ambient suspended sediment load within several feet of the discharge pipe end.

Other Determinations

In-water disposal would have no appreciable detrimental effects on any of the following:

- Municipal and private water supplies;
- Recreational or commercial fisheries;
- Water-related recreation;
- Aesthetics.

The action would not have an effect on cultural or historic resources. The Peter Pan Cannery historic district would not be impacted by the disposal action, nor is the action expected to contribute to riverbank erosion and the exposure of graves near the Kanakanak Hospital 6 miles downstream from the harbor.

No parks, national seashores, wilderness areas, or research sites are located in the area. Wildlife refuges in the area would not be affected because effects would be localized within the Nushagak River fronting the small boat harbor.

Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem

No significant cumulative or secondary effects on the aquatic ecosystem are expected because of the disposal action.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

Adaptation of the Section 404 (b)(1) Guidelines to this Evaluation

The proposed disposal complies with the requirements set forth in the Environmental Protection Agency's Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site, Which Would Have Less Adverse Impact on the Aquatic Ecosystem

There are no practical alternatives to the recommended disposal site. The PPS site is full and continued disposal in this site would result in discharge of up about 90 percent of the dredged material into the Nushagak River, mostly as silt along the shoreline. This evaluation considers in-water disposal from 2009 through 2029 with reevaluation after 10 years of disposal or sooner if unexpected environmental impacts are evident.

Several criteria were considered during selection of the recommended in-water disposal site. Criteria for selection of a disposal site were: (1) over water deep enough to contain the heavier particles (gravel, and possibly lumps of clay), (2) in an area with strong currents that would disperse the heavier particles, (3) in an area that would not inhibit access to the harbor or businesses on either side of the harbor, and (4) in an area that was within a reasonable distance of the harbor where disposal would be technically and economically feasible. The disposal site used in 2005, 2006, and 2007 (figure A-1) meets these four basic requirements.

From a fisheries perspective, the ideal situation is to discharge at least 10 feet below the surface to avoid or mitigate contact with outmigrating sockeye smolt that use the less turbid water near the river surface (figure A-2). Because the discharge would be 10 feet below the surface at all tide levels, there would not be any significant advantage from a fisheries perspective in selecting one site over another.

State Water Quality Standards

In-water disposal is not expected to have an appreciable adverse effect on water supplies and recreation. The disposal would not introduce significant petroleum hydrocarbons, radioactive materials, residues, or other pollutants into wetlands and other waters. A temporary increase in turbidity would result from the disposal action. A mixing zone would be required for the discharge to comply with State water quality turbidity standards.

Toxic Effluent Standards or Prohibition Under Section 307 of the Clean Water Act

Sediments from the Dillingham Harbor are considered suitable for upland or aquatic disposal because of low concentrations of contaminants. The disposal action is not expected to increase levels of contaminants in the aquatic ecosystems. Measures would be taken to prevent contaminant release into the environment from heavy machinery operation associated with dredging and dredged material disposal.

Endangered Species Act of 1973

In-water disposal would not have an adverse effect on Steller's and spectacled eiders, Northern Steller sea lions, listed whale species, or other threatened and endangered species or their critical habitats. This determination has been coordinated with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, agencies responsible for management of protected species.

Essential Fish Habitat

In-water disposal would not adversely impact essential fish habitat (EFH) including salmon populations or their habitats. This determination has been coordinated with the National Marine Fisheries Service, which is responsible for managing EFH under the Magnuson-Stevens Fishery Conservation and Management Act.

Evaluation of Extent of Degradation of the Waters of the United States

There are no municipal water supplies in the area that could be negatively affected by in-water disposal. Recreation and commercial interests would not be adversely impacted. There would be no significant adverse impacts to plankton, fish, shellfish, wildlife, or special aquatic sites.

Appropriate and Practicable Steps Taken To Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

All appropriate and practicable steps would be taken to minimize potential adverse impacts of the disposal on the aquatic ecosystem. Disposal would be over deep water where the heavier particles would rapidly dissipate on strong tidal currents. Disposal would be 10 feet below the surface to avoid or mitigate contact with outmigrating sockeye smolt. Sediments would be discharged into the water column where higher sediment and bedload naturally exists (figure A-2). The recommended disposal action would comply with the requirements of Federal and State guidelines.