Appendix A: 404(b)(1) CWA

Port of Nome Modification Feasibility Study

Nome, Alaska

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US Army Corps of Engineers
Alaska District

EVALUATION UNDER
SECTION 404(b)(1) CLEAN WATER ACT 40 CFR PART 230
Port of Nome Modification
Nome, Alaska

I. Project Description

The recommended plan for this project is Alternative 8b, with Deep Water Basin depths of -30 to -40 feet MLLW (figure 1). The proposed project description and considered alternatives are described in detail within the accompanying Integrated Feasibility Report/Environmental Assessment (IFR/EA).

The Port of Nome modifications include removing the east breakwater and replacing it with a causeway located further to the east, adding docks, and deepening the Outer Basin through dredging. These modification increase the Outer Basin area and the entrance channel for improved vessel access and maneuvering. A new Deep Water Basin is created by extending the existing west causeway to deeper water, approximately -40 ft MLLW, adding utilities and docks. By extending the causeway to deeper water, the dredge volume is reduced to accommodate the deep-draft vessels. The “L”-shape of the causeway provides protection for the Deep Water Basin and the entrance to the Outer Basin from the predominant wind direction (south) in the summer. Dredged material would be placed for beach nourishment within the littoral closing line along the Nome seawall, just east of the project area.

A. Authority

The feasibility study for this project is being conducted under authority granted by Section 204 of the Flood Control Act of 1948, which authorizes a study of the feasibility for development of navigation improvements in various harbors and rivers in Alaska. The study is also using the authority of Section 2006, Remote and Subsistence Harbors, of the Water Resources Development Act of 2007 (WRDA 2007, P.L. 110-114), as modified by Section 2104 of the Water Resources Reform and Development Act of 2014 (WRRDA 2014) and further modified by Section 1105 of the Water Infrastructure Improvements for the Nation Act of 2016 (WRDA 2016, P.L. 114-322).

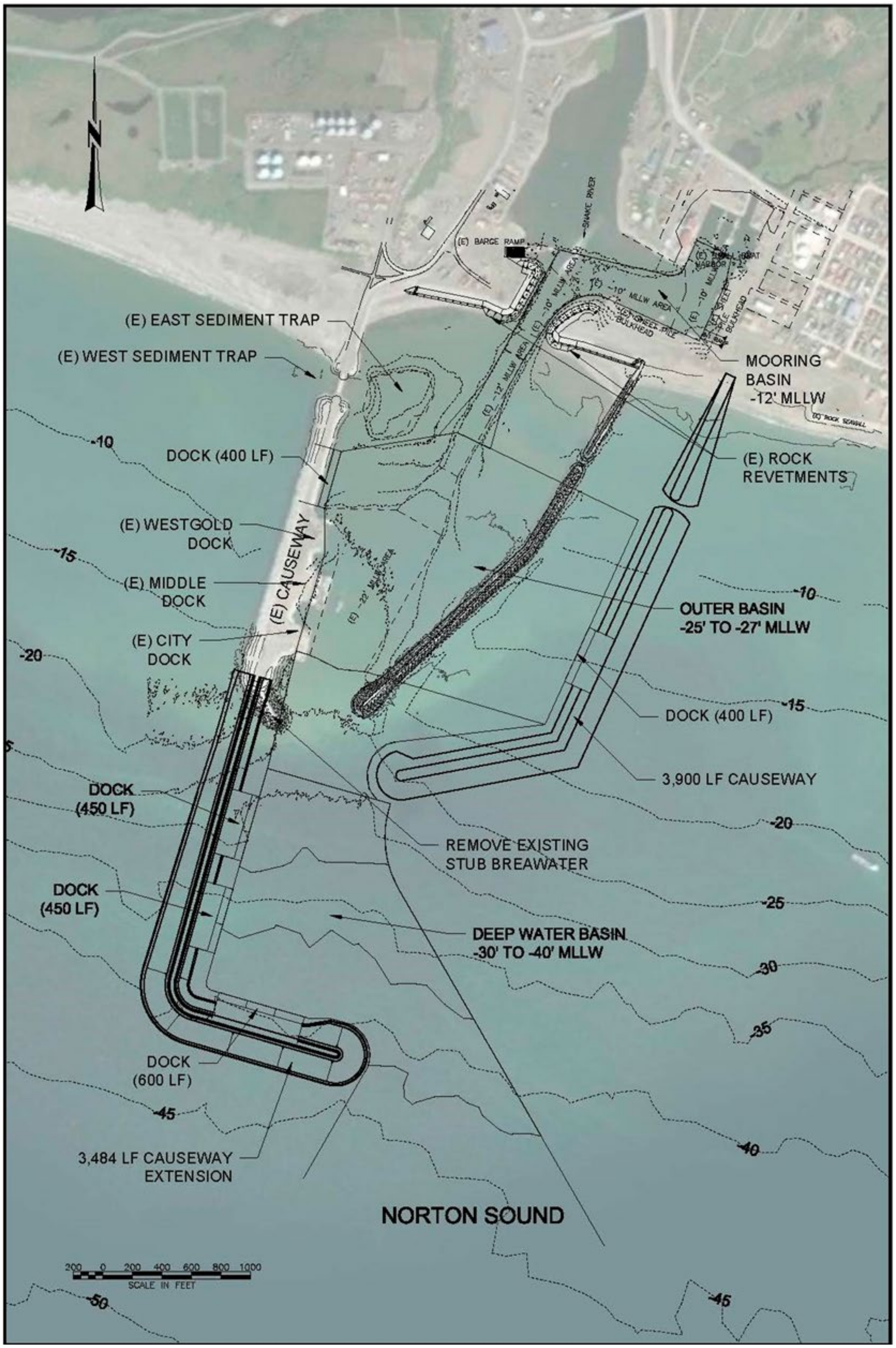

Figure 1. The recommended plan (Alternative 8b).

B. General Description of Dredged or Fill Material

The primary discharges to waters of the U.S. would be:

- Placement of construction dredged material for beach nourishment;
- Placement of rock material for construction of the rubble mound west causeway extension and the new east causeway.

The recommended plan (Alternative 8b) is shown in Figure 1; the other structural alternatives are discussed in the main report.

Up to roughly 2,000,000 cubic yards of seafloor material will be dredged from the project area to deepen the outer and Deep Water Basins, and to prepare the seafloor for the placement of new rubble mound structures. The dredged material is expected to be mostly gravelly silty sand, a deposit of glacial till originating from inland.

Rock material for the rubble mound structures will presumably come from the active quarry at Cape Nome; to the extent practicable, rock from the disassembled east breakwater will be reused. Armor stone (A1 rock) with a range of sizes from 27-ton maximum weight, 22-ton average weight to 19-ton minimum weight would be used on the seaward face of the causeway extension. Secondary stone (B2 rock) would range from 7,500-pound maximum weight, 4,000-pound average weight to 3,000-pound minimum weight. Core stone (C1 rock) would range from 1,000-pound maximum weight, 300-pound average weight to 150-pound minimum weight. Filter stone (D rock) would be well graded gravel with a gradation of maximum 5 percent greater than 6 inches, and maximum of 15 percent passing the ¾-inch sieve. Sea-side armor stone thickness would be 15 feet, and secondary stone thickness would be 7 feet. Core stone (C2 rock) would range from 150-pound maximum weight, 80-pound average weight to 15-pound minimum weight. “F” fill material would be classified fill 3-inch maximum and non-frost-susceptible. “E” fill material would be unclassified fill and could be derived from the various gold dredge tailings sites in Nome.

C. Descriptions of the Proposed Discharge Sites

The inshore benthic environment (within 1 nautical mile or so) at Nome is highly dynamic, subject to frequent disruption from currents, storms, ice, and gold-dredging. Littoral transport moves such volumes of fine sediment along the shoreline that Nome Harbor must be dredged annually. During ice-free months, frequent storms can cause substantial redistribution of bottom sediments and disruption of benthic habitat at depths of 60 feet or greater. Shore-fast ice extends to the seabed within the 8- to 10-foot depth contour, and the movement of this nearshore ice during spring break up scours bottom sediments out to roughly the 20-foot depth contour. The recurring disruption of benthic sediments in this zone limits its use primarily to organisms adapted to loose, mobile substrates, such as polychaetes and amphipods. The frequency and severity of benthic disruption decreases farther offshore with increasing water depth. Beginning at approximately the 30-foot depth contour, littoral transport of fine sediments tapers off, and the seafloor becomes a mosaic of sand and cobble habitats, periodically re-arranged by stronger storm surges. Where left undisturbed for several years, the cobble becomes encrusted with bryozoans and other marine organisms

D. Descriptions of Discharge Methods

Dredged material from the annual maintenance dredging is currently placed for beach nourishment at the west end of the City of Nome seawall. This placement method has been successful at building up a beach along a portion of the seawall toe, and the intent is to use dredged material from the construction project toward the same end. The seafloor material to be dredged is expected to be too dense to be removed via a cutter-head suction dredge, so mechanical dredging will be needed to reach design depths. A scow would be loaded and used to deliver the dredged material to the nearshore environment east of the port inside of the zone of closure (within approximately the 30- to 35-foot depth profile) so the materials are carried to the beach through wave action.

Rock material for construction will be delivered to the project site by barge or scow. Core material may be dumped into place; large stone will be placed selectively by excavators working from the causeway or from a barge.

II. Factual Determinations

A. Physical Substrate Determinations

The placement of dredged material along the Nome waterfront would greatly increase the amount of material placed for beach nourishment relative to the current annual maintenance dredging quantities; this is true of both short term construction dredging, and of future maintenance dredging of an enlarged Outer Basin. The construction dredging is likely to place a more varied mix of fine sand, coarse sand, and gravel along the Nome waterfront than the fine silty sand currently discharged during annual maintenance dredging, but the material placed during future maintenance dredging should more closely resemble the current maintenance dredging material. This may result in a more complex and continually changing patchwork of coarse and fine materials in that area than exists now, as littoral currents and storm surge separate fine materials from less-mobile gravels.

The enlarged and new rubble mound structures would permanently replace about 57.3 acres of existing sand and cobble benthic habitat with rocky, high-relief substrate, a habitat that is uncommon in the Nome area. Removal of the existing breakwater would allow about 6.9 acres currently occupied by the breakwater to return to a primarily sand substrate.

B. Water Circulation, Fluctuations, and Salinity Determinations

The proposed project may affect nearshore currents in minor, localized ways. The finished project will not affect tidal fluctuations or salinity in any detectable way during open-water season. The enlarged Outer Basin will continue to exhibit the salinity stratification observed when it is covered with ice.

C. Suspended Particulate/Turbidity Determinations

Much of Norton Sound experiences high turbidity during the open-water season, due to its shallow depth, energetic wave environment, high sediment load discharged by the Yukon and other rivers, and disturbance of the sea floor by gray whales, beluga whales, walruses, and other benthic feeders. Background turbidity can exceed 100 nephelometric turbidity units (NTUs), and sustained background turbidity can remain above 25 NTUs up to 74% of the time during a two-week period (RJW 2013).

The dredging is expected to be performed with a mechanical clamshell dredge, operated from a crane stationed on a barge, and depositing the dredging spoils into an adjacent scow. Alternatively, a cutter-head suction dredge (similar to what is used for annual maintenance dredging at Nome) may be used for a portion of the dredging work. In mechanical dredging, sediment becomes suspended into the water by:

a) the impact of the dredge with the seafloor,
b) fallback of sediment as the dredge is raised to the surface,
c) dewatering of the sediment as it is stockpiled on the scow, and
d) discharge of the sediment from the scow at the placement site.

Suction dredging tends to loft less sediment into the water column at the dredging site, but creates a slurry of water and dredged material that more thoroughly intermixes the sediment and water. This may cause more suspended solids to be discharged at the placement site. The dredged material may be expected to consist of roughly 20% to 45% very fine particles such as silt, with the rest being coarser sand and gravel. Silts are more easily suspended in water than sand or gravel, and tend to stay suspended in the water column longer and be transported farther by currents.

The dredged material would be placed within the active littoral zone, which experiences high turbidity as a routine condition.

Placement of rock for the rubble mound structures will also briefly loft sediment into the water column. Dust on the surface of the quarried rock material may also contribute in a minor way to turbidity as the rock is placed into the water.

D. Contaminant Determinations

The potential for man-made contaminants in the project dredged material is very low, but the construction dredging may disturb offshore sediments rich in arsenic or other metals. The most applicable study of the potential effects of project dredging on water quality was performed in 1989 during operation of the Bima gold dredge near Nome (MMS 1990). Seawater concentrations of several metals, including arsenic, were measured up-current and down-current of the Bima while it was in operation offshore of Nome; the study also collected regional background samples of seawater. Table summarizes the arsenic concentrations in unfiltered and filtered seawater samples collected in September 1989. The arsenic concentrations reported in unfiltered samples include dissolved arsenic plus arsenic contained in suspended sediment collected with the water sample; the arsenic concentrations reported in filtered samples include only the dissolved arsenic (filtering also removes any metal-water colloids, which should be regarded as part of the dissolved phase).

Dissolved metals are far more bioavailable than metals that are incorporated within suspended solid particles. The 1989 arsenic results summarized in table 9 show that total arsenic concentrations in the down-current sediment plume are elevated over up-current or background, especially lower in the water column. However, when the suspended sediment is filtered from the water samples, the arsenic concentrations are comparable to those of *unfiltered* background water samples.

Table 1. Summary of results from the 1989 study of the Bima dredge turbidity plume (MMS 1990).

Sampling Location	Position in water column	Arsenic in seawater (µg/l, unfiltered)	Arsenic in seawater (µg/l, filtered)
Regional background (2 stations)	Surface	0.73 – 1.31	*not available*
	Bottom	1.10 – 1.21	*not available*
2000 meters up-current of Bima	Surface	1.12	*not available*
	Middle	1.17	*not available*
	Bottom	1.30	0.93
100 meters down-current of Bima	Surface	1.47	1.00
	Middle	14.08	0.90
	Bottom	23.18	0.78

As points of comparison, federal and State of Alaska water quality criteria (ADEC 2018b; ADEC 2008) allow the following maximum dissolved arsenic concentrations in marine water used by aquatic life:

- Acute (1-hour average): 69 µg/l dissolved arsenic.
- Chronic (4-day average): 36 µg/l dissolved arsenic.

The 1989 study (MMS 1990) also attempted a laboratory elutriate test, in which 4 parts seawater and 1 part wet sediment (by volume) was mixed in an open beaker for 30 minutes, presumably at room temperature. When this test was performed with sediment containing 67 µg/g (ppm) of total arsenic, the filtered seawater elutriate was found to contain 18 µg/l of dissolved arsenic. The elutriate was found to be slightly more acidic than the source water, which may have had more to do with the test conditions than with water-sediment interactions, and which may have encouraged the dissolution of arsenic in the sediment.

Another study conducted during Bima operations looked at the potential uptake of metals by red king crab (Jewett and Naidu 2000). Concentrations of arsenic, mercury, lead, and other metals were monitored in crabs during offshore mining in 1987 through 1990. The study concluded that the gold-dredging and its attendant disturbance of sediments did not result in elevated concentrations of metals in crab tissues.

E. Aquatic Ecosystems and Organism Determinations

Effects on the aquatic ecosystem would be highly localized. Dredging would disrupt benthic habitat in the short term, although dredged areas in water depths of 30 feet are in the influence of littoral sediment transport, and would very quickly be resurfaced in the highly-mobile sand and silt that characterize that zone. Dredging in deeper waters would remove an undetermined area of cobble habitat, but it is probable that the dredging would expose a new seafloor of a similar cobble, gravel, and sand mix. Placement of the dredged material within the dynamic littoral transport zone would minimize impacts to more stable benthic habitats.

A limited amount of high-mobility sand benthic habitat, and a smaller amount of cobble habitat would be replaced with rubble mound structures. The replacement of habitat may provide opportunities for species not currently common in the nearshore area, but is unlikely to alter the overall composition of species in the long term, as the existing benthic habitat types would remain abundant in the immediate vicinity. Direct impacts to red king crab would be minimal, as construction would occur during the ice-free period when most crab have migrated to deeper offshore waters; an exception is the potential loss of cobble settling habitat for juvenile crab. Fishes in the immediate nearshore area may be displaced in the short term by construction-related disturbances.

F. Proposed Discharge Site Determinations

The six structural alternatives brought forward for analysis are, from an aquatic environment perspective, quite similar to one another. The alternatives would each impact the same environmental location and resources, in the same manner, differing incrementally in the magnitude, extent, and duration of those impacts. Each structural alternative is water-dependent, and none affect a special aquatic site.

Tables 2 and 3 provide a comparison of the direct impacts from the “discharges” required for each alternative: the areas occupied by the placement of rock for the new rubble mound structures, and the volumes of dredged material that would require placement during construction. The larger alternatives (e.g., Alternatives 8a and 8b) have substantially greater direct impacts than the smaller alternatives (e.g., Alternatives 3b and 3c), in terms of the area of sandy benthic habitat that would be covered by rubble mound structures, and the volume of dredged material that will be need to be managed.

Alternative 3c with a Deep Water Basin dredged to -32 feet MLLW is the alternative with the least direct impacts to the aquatic environment, both in terms of the area of sea floor occupied by the rubble mound structures, and the volume of dredged material needed to be discharged. However, as evaluated in Section 6 of the IFR/EA, Alternatives 3a through 3c did not provide adequate

Table 2. Comparison of alternatives – magnitude of rock placement/removal.

Alt #	Area of New Rock Placement Below MHHW (acres)	Area Vacated by Breakwater Removal (acres)	Net Area Occupied by New Rock Placement (acres)
3a	20.3	1.5	18.8
3b	19.8	1.5	18.3
3c	19.2	1.5	17.7
4a	35.3	3.5	34.0
8a	61.8	6.9	54.9
8b	**57.3**	**6.9**	**50.4**

Table 3. Comparison of alternatives – magnitude of dredging.

Alt #	Outer Basin Dredge Depth (max pay)*	Deep Water Basin Dredge Depth (max pay)*	Total Volume of Construction Dredging (cubic yards)	Total Area of Construction Dredging (acres)
3a	-29 ft	-32 ft	662,000	71
		-37 ft	942,000	90
		- 42 ft	1,545,000	124
3b	-29 ft	-32 ft	499,000	61
		-37 ft	779,000	80
		- 42 ft	1,382,000	114
3c	-29 ft	-32 ft	469,000	61
		-37 ft	749,000	80
		- 42 ft	1,352,000	114
4a	-29 ft	-32 ft	1,093,000	83
		-37 ft	1,373,000	101
		- 42 ft	1,976,000	136
8a	-29 ft	-32 ft	1,616,000	99
		-37 ft	1,726,000	109
		- 42 ft	2,065,000	134
8b	**-29 ft**	-32 ft	1,611,000	99
		-37 ft	1,767,000	117
		-42 ft	**2,163,000**	**144**

*Note: The “max pay” represents the project depths plus an over dredging allowance.

maneuvering room in the Outer Basin. The medium-sized Alternative 4a was carried forward for consideration with Alternatives 8a and 8b, but was screened out upon further study of the maneuvering needs of large ships. Alternative 8b was ultimately selected over the slightly larger 8a as being somewhat more cost-effective.

The recommended plan, Alternative 8b, would permanently replace about 57.3 acres of existing sand and cobble benthic habitat with rocky, high-relief substrate (i.e., the new rubble mound structures). Removal of the existing breakwater would allow about 6.9 acres currently occupied by the breakwater to return to a primarily sand substrate.

The placement of dredged material along the Nome waterfront would greatly increase the amount of material placed for beach nourishment relative to the current annual maintenance dredging quantities; this is true of both short term construction dredging, and of future maintenance dredging of an enlarged Outer Basin. The construction dredging is likely to place a more varied mix of fine sand, coarse sand, and gravel along the Nome waterfront than the fine silty sand currently discharged during annual maintenance dredging, but the material placed during future maintenance dredging should more closely resemble the current maintenance dredging material. This may result in a more complex and continually changing patchwork of coarse and fine materials in that area than exists now, as littoral currents and storm surge separate fine materials from less-mobile gravels.

G. Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem

After construction, the expanded port facilities may result in secondary effects on the aquatic ecosystem, including increased maintenance dredging, and an increase in the size and number of vessels using the port. The intent of the completed project is to relieve congestion in the Port of Nome, allow larger vessels to dock at Nome, and improve emergency response for marine spills and vessels in distress. The observed and anticipated increase in shipping through the Bering Strait has been a cause of considerable environmental concern in the region. The proposed project is in part a response to the increasing Bering Strait shipping traffic, and the risks and opportunities it represents. In of itself, an expanded Port of Nome is not expected to create a significant further increase in shipping traffic from the Arctic Ocean; the ability to berth larger ships is likely to attract only a handful of additional large ships through the Bering Strait each year, primarily cruise ships and vessels in distress. An expanded Port of Nome is more likely to change the size and number of vessels traveling between Nome and other Alaskan ports, using established sea lanes. Larger vessels at Nome pose a risk of larger fuel spills and improper discharges; on the other hand, larger vessels may mean fewer vessel transits to deliver the same amount of goods. A specific aim of the port modification is to allow fuel tankers to moor while transferring fuel, and reduce the current risky practice of off-shore fuel transfers. A reduction in vessel congestion within the harbor during the busy ice-free season, and the improved and more orderly moorage that the project would allow, should reduce the risk of spills and improve enforcement of discharge regulations.

Another potential and indirect long-term effect of the finished project may be to provide a base for larger fishing and processing vessels. Such vessels would be able to exploit the changing Bering Sea and Arctic Ocean fisheries in new ways, and may have a negative and unpredictable impact on the aquatic ecosystem.

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

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

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

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

Beneficial-use placement of the construction dredged material within the littoral zone is considered the practicable alternative having the least adverse impact on the aquatic ecosystem. The recurring natural disruption of benthic sediments in this zone limits its use primarily to organisms adapted to loose, mobile substrates. The frequency and severity of benthic disruption decreases farther offshore with increasing water depth, and more complex and productive cobble-and-sand benthic communities are able to develop. Offshore ocean disposal would be a practicable alternative, but would have a greater adverse impact on the aquatic ecosystem than littoral placement; cobble-and-sand habitat disrupted by storm surge or human activity may take 5 to 6 undisturbed years to regain biological function and productivity. Upland disposal or placement of the dredged material would probably have the least impact on aquatic ecosystems (if not placed in wetlands), but is not considered practicable due to the large volume of dredged material that would have to be transported and managed on shore.

C. Compliance with Applicable State Water Quality Standards

The proposed project will not lead to exceedances of applicable State of Alaska water quality standards.

D. Compliance with Applicable Toxic Effluent Standards or Prohibition under Section 307 of the Clean Water Act

No toxic effluents that would affect water quality parameters are associated with the proposed project. Therefore, the project complies with toxic effluent standards of Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973

The USACE has been in informal consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), under Section 7 of the Endangered Species Act (ESA). The USACE has determined that the proposed project may affect, but not adversely affect, the following ESA-listed species or their critical habitat:

Table 2. ESA-Listed Species Potentially Affected by the Proposed Action

Species	Listed Population	ESA Status	Agency Jurisdiction
Ringed seal, *Pusa hisipida*	Arctic DPS	Threatened	NMFS
Bearded seal, *Erignathus barbatus*	Beringia DPS	Threatened	NMFS
Steller sea lion, *Eumetopias jubatus*	Western DPS	Endangered	NMFS
Bowhead whale, *Balaena mysticetus*	All	Endangered	NMFS
Humpback whale, *Megaptera novaeangliae*	W. Pacific DPS	Endangered	NMFS
	Mexico DPS	Threatened	
N. Pacific right whale, *Eubalaena japonica*	All	Endangered	NMFS
Gray whale, *Eschrichtius robustus*	Western North Pacific DPS	Endangered	NMFS
Sperm whale, *Physeter macrocephalus*	All	Endangered	NMFS
Fin whale, *Balaenoptera physalus*	All	Endangered	NMFS
Blue whale, *Balaenoptera musculus*	All	Endangered	NMFS
Beluga whale, *Delphinapterus leucas*	Cook Inlet DPS	Endangered	NMFS
Polar bear, *Ursus maritimus*	All	Threatened	USFWS
Spectacled eider, *Somateria fischeri*	All	Threatened	USFWS
Steller's eider, *Polysticta stelleri*	All	Threatened	USFWS

The USFWS has concurred with the USACE's determination for those species under that agency's jurisdiction. Concurrence from the NMFS on the USACE's determination is pending.

The USACE has determined that the proposed project will have no effect on the short-tailed albatross (*Phoebastria albatrus*) or northern sea otter (*Enhydra lutris kenyoni*).

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

The project would not cause or contribute to significant degradation of waters of the U.S. No discharges of pollutants are anticipated as a result of dredged material disposal or construction of the rubble mound structures. Therefore, no significantly adverse effects from the discharge of pollutants are expected on human health or welfare; aquatic life and other wildlife dependent on aquatic ecosystems; ecosystem diversity, productivity, and stability; or on recreational, aesthetic, and economic values.

IV. References

Alaska Department of Environmental Conservation (ADEC) 2018. Water Quality Standards, 18 AAC 70. Amended as of 6 April 2018.

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