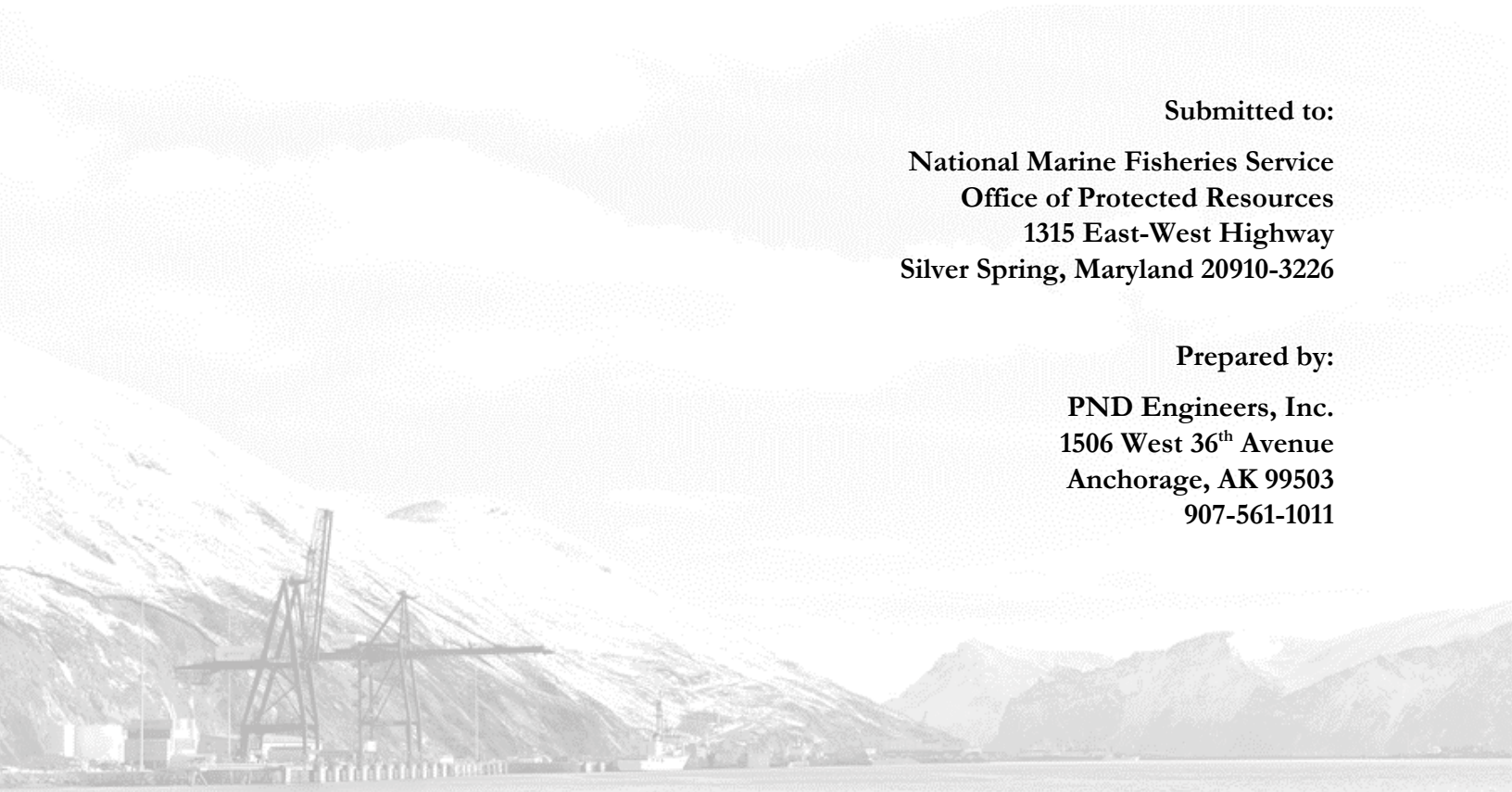
Request for an Incidental Harassment Authorization
Under the Marine Mammal Protection Act
For the

Unalaska Marine Center Dock Positions III and IV Replacement Project

City of Unalaska

Revised 9/30/16



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ACRONYMS AND ABBREVIATIONS

- ADEC Alaska Department of Environmental Conservation
- ADF&G Alaska Department of Fish and Game
- APE American Piledriving Equipment, Inc.
- BMP best management practice
- CFR Code of Federal Regulations
- COU City of Unalaska
- CWA Clean Water Act
- dB decibel
- DPS distinct population segment
- EHW Explosive Handling Wharf
- ESA Endangered Species Act
- FRP fiber-reinforced polymer
- GPS global positioning system
- HPSI Hydraulic Power Systems, Inc.
- HTL high tide line
- Hz hertz
- ICE International Construction Equipment, Inc.
- IHA Incidental Harassment Authorization
- MHW mean high water
- MMMP Marine Mammal Monitoring Plan
- MMPA Marine Mammal Protection Act
- NMFS National Marine Fisheries Service
- NOAA National Oceanic and Atmospheric Administration
- OCSP OPEN CELL SHEET PILE™
- PND PND Engineers, Inc.
- POC plan of cooperation
- PTS permanent threshold shift
- RMS root mean square
- SPL sound pressure level
- TTS temporary threshold shift
- UMC Unalaska Marine Center
- USACE United States Army Corps of Engineers
- USCG United States Coast Guard
- USFWS United States Fish and Wildlife Service
- WSDOT Washington State Department of Transportation

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1 Description of the Activity

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction

The City of Unalaska (COU) proposes to expand their existing Unalaska Marine Center (UMC) Dock in order to provide service to multiple and larger vessels and to adapt to the changing needs of the shipping industry. The proposed expansion will replace the existing pile-supported docks located at UMC Dock Positions III and IV with a modern high-capacity sheet pile bulkhead dock extending from Dock Position V to the U.S. Coast Guard (USCG) Dock.

The proposed project will occur in marine waters that support several marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101(a)(5)(D) of the MMPA allows for the issuance of an Incidental Harassment Authorization (IHA), provided an activity results in negligible impacts to marine mammals and would not adversely affect subsistence use of these animals.

The project timing, along with the duration of pile removal and installation activities, may result in marine mammals protected under the MMPA being exposed to sound levels above allowable noise harassment thresholds.

Figure 1. Project location within Dutch Harbor, AK

1.2 Project Purpose and Need

In order to meet the increasing needs of the international shipping industry and increase vessel berthing capacity, a substantial upgrade of aging UMC facilities is necessary. The proposed project will replace the existing pile supported docks located at UMC Dock Positions III and IV with a modern high-capacity sheet pile bulkhead dock that extends from the existing bulkhead dock at Position V to the USCG Dock.

COU port operations saw numerous factory trawler offloads occurring at Dock Positions III and IV in 2013. These operations require more length at the face of the dock and greater uplands area than is available with the current infrastructure. The existing pile-supported docks are aging structures in shallower water that no longer meet the needs of the Port and require increasing levels of maintenance and monitoring costs. Both docks are also severely constrained by the limited uplands area available for offloading and loading operations.

Dock Position III is a timber pile-supported dock with approximately 160 feet of dock face that was constructed in the 1960's by the U.S. Army Corps of Engineers (USACE). This dock has been used for the Alaska Marine Highway System, vessel moorage, and factory trawler offloads. However, use of this structure is severely limited due to the low load-carrying capacity of the dock. The bullrails, deck surface, and bollards have deteriorated with age and the entire structure is in need of replacement or extensive renovations.

Dock Position IV is a steel-pile-supported, concrete deck structure with an approximate length of 200 feet that was constructed in the 1980s by the State of Alaska. Similar to Dock Position III, use of this dock is limited due to the low load capacity of the structure. Erosion has damaged an abutment underneath the dock, which is very difficult to repair and has the potential for further damage to adjacent portions of the dock.

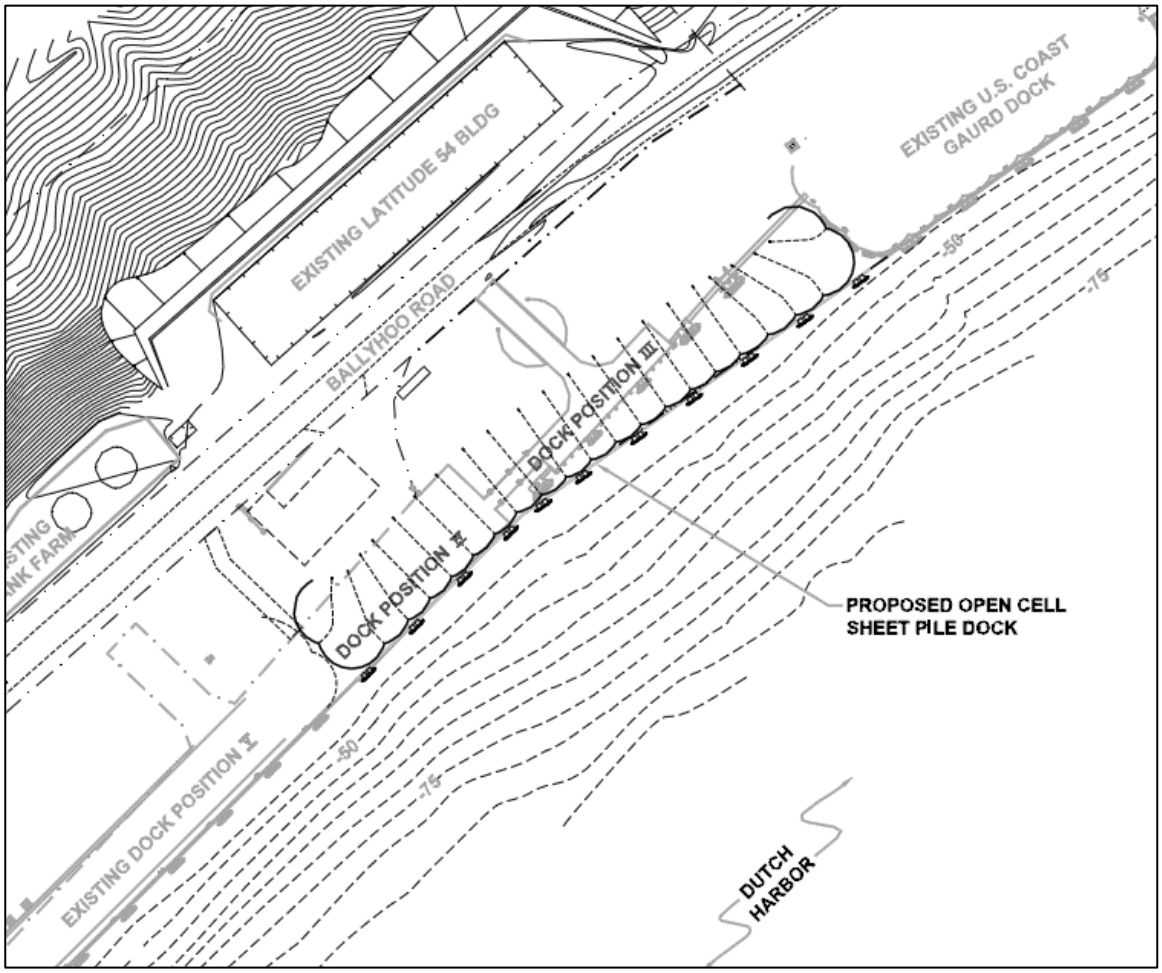

Figure 2. Proposed dock simplified plan view drawing

The dock face of Dock Positions III and IV does not align with the larger sections of the UMC facility, significantly limiting overall usable moorage space. The proposed project aligns the new dock structures with the adjacent facilities, eliminates two angle breaks, provides substantially more usable moorage, and provides

much deeper water at the dock face. The sheet pile dock will encompass the area between Dock Position V and the adjacent USCG Dock, providing maximum use of the available berthing area and upland storage space. The new dock alignment will allow larger, deeper vessels as well as simultaneous use of the other UMC facilities.

1.3 Project Description

COU proposes to install an OPEN CELL SHEET PILE™ (OCSP) dock at UMC Dock Position III and IV, replacing the existing pile-supported structure and providing a smooth transition between the UMC facility and the USCG dock. The OCSP dock will be constructed of PS31 flat sheet piles (web thickness of 0.5 inches and width between interlocks of 19.69 inches). In order to replace the existing timber pile-supported dock, the dock construction would include installation of the following:

- Approximately forty (40) 30-inch diameter steel fender and transition platform support piles;
- Approximately thirty (30) 30-inch diameter miscellaneous steel support piles
- Approximately one hundred fifty (150) 30-inch diameter steel crane rail support piles (approximately 25 of which are above the high tide line (HTL));
- Approximately two hundred (200) 18-inch steel piles (H or round) used for temporary support of the sheet pile during construction (to be removed prior to completion);
- Approximately 1,800 PS31 flat sheet piles (approximately 100 of which are above the HTL); and
- Placement of approximately 110,000 cubic yards of clean fill.

The anticipated project quantities are shown in Table 1.

Concurrent with the dock construction, a material source will be developed in the hillside adjacent to Dock Position VII. The quarry will provide material for dock fill and other future projects, and the cleared area will be used for COU port offices and associated parking after the quarry is completed. The quarry will be developed through blasting benches in the rock face, with each bench being approximately 25 feet high, with the total height being approximately 125 feet. Quarry materials will be transported the short distance to the adjacent project site using heavy equipment.

Table 1. Total project quantities.

Item	Size and Type, Location	Below MHW (El. = 3.4)	Below HTL (El. = 4.7)	Total
Surface Area of Dock (Acres)	-	2.1	2.3	**3.1**
Surface Area of Water Filled (Acres)	-	2.1	2.8	**2.8**
Gravel Fill (Cubic Yards)	Clean Fill; Within dock	74,000	80,000	**110,000**
Piles to be Removed (Each)	Steel	195	195	**195**
	Timber	55	55	**55**
Estimated Temporary Piles (Each)	18" Steel Pile; Within dock	200	200	**200**
Steel Piles - Fender and Platform Support (Each)	30" Steel; In front of bulkhead	40	40	**40**

Item	Size and Type, Location	Below MHW (El. = 3.4)	Below HTL (El. = 4.7)	Total
Miscellaneous Support Piles (Each)	30" Steel; Within dock	30	30	**30**
Crane Rail Support Piles (Each)	30" Steel; Within dock	125	125	**150**
Proposed Sheet Piles (Each)	PS31 Sheet Pile; Dock face	1,400	1,700	**1,800**

The existing structure will be demolished by removing the concrete deck, steel superstructure, and attached appurtenances and structures and then extracting the existing steel support piles with a vibratory hammer. Sheet pile will also be installed (likely three piles concurrently) with a vibratory hammer. Pile driving may occur from shore or from a stationary barge platform, depending on the Contractor's selected methods. After cells are completely enclosed, they will be incrementally filled with clean material using bulldozers and wheel loaders. Fill will be placed primarily from shore, but some may be placed from the barge if needed. Fill will be compacted using vibratory compaction methods, described below. After all the sheet piles are installed and the cells are filled and compacted, fender piles, crane rail piles, mooring cleats, concrete surfacing, and other appurtenances will be installed.

As described, the project requires the removal and installation of various types and sizes of piles with the use of a vibratory hammer, impact hammer, and drilling equipment. These activities have the potential to result in Level B harassment (behavioral disruption) only, as a monitoring plan will be implemented to reduce the potential for exposure to Level A harassment (harassment resulting in injury). The rest of the in-water components of the project are provided here for completeness. Note that many of the support piles will be installed to an elevation below MHW or HTL; however, they will be installed within the enclosed fill of the sheet pile dock rather than in the water.

Utilities will be installed during Phase II, and include addition/extension of water, sewer, fuel, electrical, and storm drain. Authorization to construct the sewer and storm drain extension, as well as a letter of non-objection for the storm drain, will be obtained from the State of Alaska Department of Environmental Conservation (ADEC).

Each element is further described below.

1.3.1.1 Demolition of Existing Infrastructure

Demolition of the existing dock and removal of any existing riprap or obstructions will be performed with track excavators, loaders, cranes, barges, cutting equipment, a vibratory hammer (for pile extraction), and labor forces. The existing dock (consisting of steel support piles, steel superstructure, and concrete deck) will be completely removed for construction of the new dock.

Vibratory pile removal will generally consist of clamping the vibratory hammer to the pile and vibrating the hammer while extracting to a point where the pile is temporarily secured and removal can be completed with crane line rigging under tension. The pile is then completely removed from the water by hoisting with crane line rigging and placing on the ground or deck of the barge.

The contractor will be required to dispose of (or salvage) demolished items in accordance with all federal, state, and local regulations. Dewatering will not be required, as all extraction will take place from the existing dock, from shore, and/or from a work barge.

1.3.1.2 Quarry Development

Concurrent with dock construction, a material source will be developed in the hillside adjacent to the UMC facility. The quarry will provide fill material for the dock and future projects. Material will be extracted from the quarry in a configuration that provides additional upland space for port operations. Flat uplands area will be used for COU port offices after the quarry is completed. The quarry will be developed through blasting benches in the rock face, with each bench approximately 25 feet high and the total height approximately 125 feet.

1.3.1.3 Temporary Support Piles

Temporary support piles for pile driving template structures will be installed to aid with construction and will be removed after the permanent sheet piles or support piles have been installed. Figure 3 shows temporary support piles and templates being used during pile installation. Temporary support piles will likely be steel H-piles (18-inch or smaller) or steel round piles (18-inch diameter or smaller). It is estimated that up to ten (10) temporary support piles will be used per cell during construction of the sheet pile structure. (While an estimated maximum number of temporary piles is provided, the actual quantity will be determined by the Contractor's means and methods, and a Contractor is yet to be selected.) Installation methods for the temporary support piles will be similar to the fender support piles (described in Section 1.3.1.6).

1.3.1.4 Sheet Pile Installation

The new sheet pile bulkhead dock consists of twenty-two (22) OCSP cells. The sheet pile structures will be installed utilizing a crane and vibratory hammer. It is anticipated that the largest size vibratory hammer used for the project will be an APE 200-6 (eccentric moment of 6,600 inch-pounds) or comparable vibratory hammer from another manufacturer such as ICE or HPSI. Figure 3 shows an HPSI 300, with eccentric moment of 3,000 inch-pounds, installing sheet pile on another OCSP dock project in Dutch Harbor, AK. After all the piles for a sheet pile cell have been installed, clean rock fill will be placed within the cell. This process will continue sequentially until all of the sheet pile cells are installed and backfilled.

Figure 3. Installing sheet piles with a vibratory hammer.

1.3.1.5 Dock Fill Placement

Fill will be transported from the adjacent quarry to the project site using loaders, dump trucks, and dozers and may be temporarily stockpiled within the project footprint as needed. It will be placed within the cells from the shore (or occasionally a barge) using the same equipment and will be finished using roller compactors, graders, or vibracompaction. Vibracompaction would be achieved through the repeated insertion and removal through vibratory hammering of an H-pile probe, causing fill materials to settle into place.

1.3.1.6 Fender and Platform Support Piles

Fender support piles will be installed adjacent to (and offshore of) the sheet pile cells and cut to elevation. The fender piles will first be driven with a vibratory hammer and, if capacity/embedment is not achieved, finally driven with an impact hammer until proper embedment and capacity is reached (likely 20-foot embedment). Pre-assembled fender systems (energy absorbers, sleeve piles, steel framing, and fender panels) will be lifted and installed onto fender support piles via crane.

Figure 4. Existing UMC Dock Positions V-VII Fenders.

In addition to the fender supports, miscellaneous support piles needed to support the suspended concrete platform at the transitions between Position II/III and IV/V will be installed and cut to elevation. Installation methods for the miscellaneous support piles will be similar to the fender support piles. Approximately forty (40) 30-inch steel piles will be driven for the fenders and transition platform.

1.3.1.7 Miscellaneous Support Piles

Support piles for upland utilities and other structures will be driven after sheet pile cells are completed. Though the piles will be driven beyond the current MHW line, the cells will be filled and compacted at the time of placement, making this upland pile driving. Approximately thirty (30) steel support piles are needed for dock infrastructure.

1.3.1.8 Crane Rail Support Piles

Approximately one hundred fifty (150) steel support piles will be driven to support the weight of a new crane rail and dock crane. Pile driving will be performed primarily within the completely filled and compacted sheet pile cells. A few of the support piles may be driven in the water at the transition areas.

1.3.1.9 Dock Surfacing and Other Concrete Elements

The new dock uplands area will be surfaced with concrete pavement. The crane rail beam and utility vaults will be constructed from cast-in-place concrete. The surfacing and structures will be installed using forms and reinforcement steel. This work will take place at or near the surface of the dock and will be above water.

1.3.1.10 Utilities

Temporary utilities will be installed to provide functional dock capability for the 2017/2018 season. Typical utility installation equipment such as track excavators, wheel loaders, and compaction equipment will be used.

Permanent electrical, water, and storm drainage utilities will be installed during Phase 2 to provide full dock capability. Installation methods will require equipment similar to that used to install the temporary utilities. All storm water (and any other wastewater) from the dock will be processed through the COU stormwater system and necessary separator devices.

2 Dates, Duration, and Region of Activity

The date(s) and duration of such activity and the specific geographical region where it will occur.

2.1 Dates

In-water and over-water construction of Phase 1 (all sheet pile installation, all in-water pipe pile installation, most upland pipe pile installation, and fill placement) is planned to occur between approximately March 1, 2017 and November 1, 2017. Phase 2 is planned to occur between approximately May 1, 2018 and October 1, 2018. Some of the upland pipe pile for utilities may be driven in upland fill away from the dock face during Phase 2.

COU proposes to use the following general construction sequence, subject to adjustment by the construction contractor's means and methods:

Construction Phase 1 (2017):

- Mobilization of equipment and demolition of the existing dock Positions III and IV and removal of any existing riprap/obstructions (March – May 2017).
- Development of the quarry for materials.
- Installation (and later removal) of temporary support piles for Contractor's template structures and barge support.
- Installation of the new sheet pile bulkhead dock. This includes driving sheet piles, placing fill within the cell to grade, and compaction of fill
- Installation of fender and platform support piles in the water adjacent to the dock and miscellaneous support piles within the completed sheet pile cells.
- Installation of pre-assembled fender systems (energy absorbers, sleeve piles, steel framing, and fender panels).
- Installation of the crane support piles
- Installation of temporary utilities and gravel surface to provide functional dock capability for the 2017/2018 season.

Construction Phase 2 (2018):

- Installation of concrete grade beam for crane rails, utility vaults, and dock surfacing.
- Installation of electrical, sewer, fuel, water, and storm drainage utilities.

2.2 Duration

Pile removal and pile driving is expected to occur between March 1 and November 1, 2017. In the summer months (April – September), 12-hour workdays in extended daylight will likely be used. In winter months (October – March), shorter 8-hour to 10-hour workdays in available daylight will likely be achievable. Work windows may be extended or shortened electrical lighting is used. The daily construction window for pile driving or removal will begin no sooner than 30 minutes after sunrise to allow for initial marine mammal monitoring to take place, and will end 30 minutes before sunset to allow for pre-activity monitoring. (These protocols are discussed in detail in Section 11.2)

It is assumed that sound associated with the pile driving and removal activities will be put into the water approximately 50 percent of the total estimated project duration of 245 days (2,940 hours for 12-hour workdays). The remaining 50 percent of the project duration will be spent on activities that provide distinct periods without noise from pile driving or drilling such as installing templates and braces, moving equipment, threading sheet

piles, pulling piles (without vibration), etc. During this time, a much smaller area will be monitored to ensure that animals are not injured by equipment or materials.

2.3 Region of Activity

The UMC Dock is located in Dutch Harbor in the City of Unalaska, on Amaknak Island. Dutch Harbor is separated from the adjacent Iliuliuk Bay by a spit. The dock is located in Section 35, Township 72 South, Range 118 West, of the Seward Meridian. Tidelands in this vicinity are owned by COU. Some of the adjacent uplands are owned by COU and some are leased by COU from Ounalashka Corporation. Adjacent infrastructure includes Ballyhoo Road and the Latitude 54 Building in which COU Department of Ports and Harbors offices and facilities are currently housed. Neighboring docks include the USCG Dock and the existing UMC OCSP dock positions.

Other marine facilities within Dutch Harbor include Delta Western Fuel, the Resolve-Magone Dock, North Pacific Fuel, the Kloosterboer Dock, and COU's Light Cargo Dock and Spit Dock facilities, as shown in Figure 5. APL Limited is located within Iliuliuk Bay, and the entrance channel to Iliuliuk Harbor is south of Dutch Harbor.

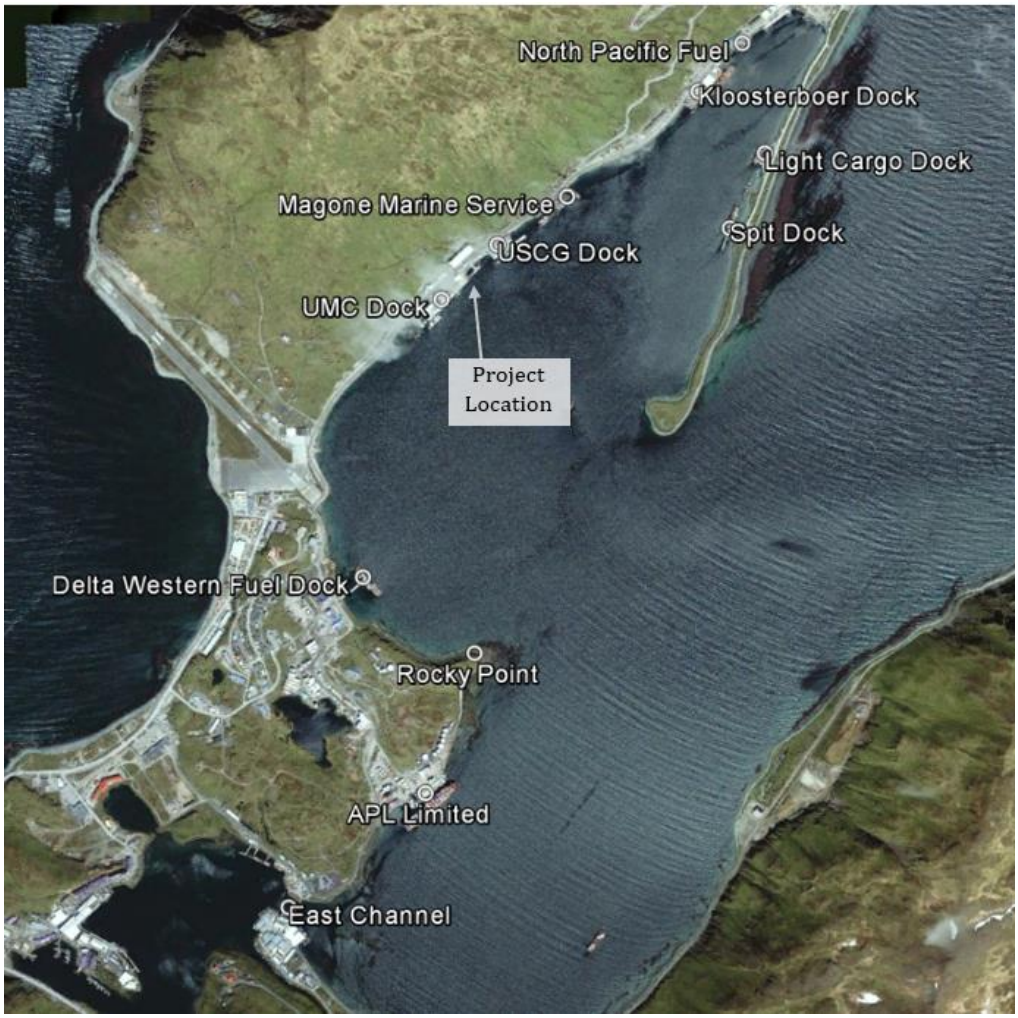

Figure 5. Vicinity map of project area.

3 Species and Number of Marine Mammals in the Area

The species and numbers of marine mammals likely to be found within the activity area.

Known distribution ranges of number of marine mammal species, subspecies, or distinct population segments (DPSs) encompass the portion of Dutch Harbor in which the proposed project will occur. The species are listed in Table 2, along with their stock or population, their occurrence in the project area, and their estimated abundance. It is highly unlikely that the majority of these species will be observed in the project area due to the high volume of vessel traffic in and around Dutch Harbor.

Due to the low likelihood of sightings of many of the species listed in Table 2, the Steller sea lion, the harbor seal, the humpback whale, and the killer whale are the only species of concern within National Marine Fisheries Service (NMFS) jurisdiction that are included in this request. No further descriptions of the other marine mammals are included in this IHA application. Descriptions of the Steller sea lion, the harbor seal, the humpback whale, and the killer whale are provided in Section 4.

Table 2. Species with ranges extending into the project site.

Species	Population/ Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance
Baird's beaked whale (*Berardius bairdii*)[b]	Alaska	Protected	-	Unknown	Summer, Fall	Unknown
Blue whale (*Balaenoptera musculus*)[c]	Central North Pacific	Depleted, Strategic	Endangered	Rare	Summer	38
Blue whale (*Balaenoptera musculus*)[c]	Eastern North Pacific	Depleted, Strategic	Endangered	Rare	Summer	1,551
Dall's porpoise (*Phocoenoides dalli*)[a]	Alaska	Protected	-	Rare	Year-round	83,400 (estimated)
Fin whale (*Balaenoptera physalus*)[c]	Northeast Pacific	Depleted	Endangered	Rare	Spring, Summer	Unknown
Gray whale (*Eschrichtius robustus*)[d]	Western North Pacific	Depleted, Strategic	Delisted 1994	Rare	Summer, Early Fall	135
Harbor porpoise (*Phocoena phocoena*)[c]	Bering Sea	Protected	-	Rare	Year-round	40,039
Harbor seal (*Phoca vitulina richardsi*)[a]	Aleutian Islands	Protected	-	Common	Year-round	3,313
Humpback whale (*Megaptera novaeangliae*)[c]	Central North Pacific	Depleted, Strategic	Endangered	Seasonal	Summer	7,890
Humpback whale (*Megaptera novaeangliae*)[c]	Western North Pacific	Depleted, Strategic	Endangered	Seasonal	Summer	865

Species	Population/ Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance
Killer whale (*Orcinus orca*)[b]	Eastern North Pacific, Alaska Resident	Protected	-	Unknown	Summer, Fall	2,347
Killer whale (*Orcinus orca*)[b]	Gulf of Alaska, Aleutian Islands, and Bering Sea Transient	Protected	-	Unknown	Year-round	587
Minke whale (*Balaenoptera acutorostrata)*[a]	Alaska	Protected	-	Rare	Year-round	Unknown
Northern fur seal (*Callorhinus ursinus*)[c]	Eastern Pacific	Depleted, Strategic	-	Rare	Summer, Early Fall	548,919
North Pacific right whale (*Eubalaena japonica*)[c]	Eastern	Depleted, Strategic	Endangered	Rare	Spring, Summer	25.7
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)[a]	North Pacific	Protected	-	Rare	Year-round	26,880 (estimated)
Ribbon seal (*Histriophoca fasciata*)[c]	Alaska	Protected	-	Rare	Unknown	61,100 (provisional estimate)
Sperm whale (*Physeter macrocephalus*)[c]	North Pacific	Depleted	Endangered	Rare	Summer	Unknown
Stejneger's beaked whale (*Mesoplodon densirostris*)[b]	Alaska	Protected	-	Rare	Rare	Unknown
Steller sea lion (*Eumetopias jubatus*)[c]	Western Distinct Population Segment	Depleted, Strategic	Endangered	Common	Year-round	48,676

([a]Allen and Angliss, 2012; [b]Allen and Angliss, 2013; [c]Allen and Angliss, 2014; [d]Muto and Angliss, 2015)

4 Status and Description of Affected Species or Stocks

A description of the status and distribution, including seasonal distribution (when applicable), of the affected species or stocks of marine mammals likely to be affected by such activities.

4.1 Steller Sea Lion (*Eumetopias jubatus*)

Steller sea lions are the largest eared seal, with males weighing an average of 566 kg and females weighing an average of 263 kg. Their range extends around the North Pacific Ocean rim, with most sea lions occupying either rookeries or haulouts, depending on the season. Male sea lions are more likely to disperse beyond their typical habitat, but this primarily occurs after the breeding season (NMFS, 2008). Sea lions eat a variety of fish and cephalopods and have also been known to prey on seals.

Steller sea lions occur in two DPSs in Alaska: an Eastern U.S. DPS (which includes animals east of Cape Suckling, Alaska (144°W)) and a Western U.S. DPS (including animals at and west of Cape Suckling and within the project area in Dutch Harbor)). The Eastern U.S. DPS was recently delisted under the ESA, while the Western U.S. DPS remains listed as endangered (62 CFR 30772; Allen and Angliss, 2010). The centers of abundance and distribution for the Western DPS are located in the Gulf of Alaska and Aleutian Islands. Members of this species are not known to migrate, but individuals disperse widely outside of the breeding season (late May to early July). At sea, Steller sea lions commonly occur near the 656-foot (200-meter) depth contour, but have been found from nearshore to well beyond the continental shelf (Kajimura and Loughlin, 1988). Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods (Pitcher, 1981; Merrick et al., 1997). On rare occasions, Steller sea lions prey on seals, and possibly sea otter pups.

About three-fourths of all Steller sea lions haul out on and pup in U.S. territory (Marine Mammal Commission, 2000). Pups are born from late May through early July, with peak birthing during the second or third week of June. Females stay with their pups for about 9 days before initiating routine foraging trips to sea. Females mate 11 to 14 days after giving birth with implantation occurring 3-4 months later in late September or early October. Weaning is not narrowly defined as it is for most other pinniped species, but probably takes place gradually during winter and spring prior to the breeding season.

The population of the Western U.S. DPS declined about 75 percent between 1976 and 1990 and is currently estimated at over 41,000 animals (Allen and Angliss, 2010). Factors contributing to the decline of the stock include incidental take in fisheries, illegal and legal shooting, predation or certain diseases, climate change, and contaminants. Counts of non-pup Steller sea lions at trend sites for the Western U.S. DPS increased 5.5 percent from 2000 to 2002, and at a similar rate between 2002 and 2004. These were the first region-wide increases for the western stock since standardized surveys began in the 1970s. Although some trend sites were not surveyed in 2006 and 2007, available data indicated that the sizes of the adult and juvenile portions of the western Steller sea lion population remained largely unchanged between 2004 (N=23,107) and 2007 (N=23, 118) throughout much of its range (Cape St. Elias to Tanaga Island, 145°-178° W)(Fritz et al., 2008a). Results of the most recent aerial survey conducted in 2008 (Fritz et al., 2008b) confirmed that the recent (2004-2008) overall trend in the western population of adult and juvenile Steller sea lions in Alaska is stable or possibly declining slightly (Allen and Angliss, 2010).

4.1.1 Steller Sea Lion Hearing Ability

Steller sea lions hearing sensitivity is similar to that of other otariids. Steller sea lion aerial hearing ability ranges from approximately 0.25-30 kHz; however, hearing of one individual was found to be most sensitive to noise from 5-14.1 kHz (Muslow and Reichmuth, 2010). Underwater, Steller sea lion best hearing range has been measured at from 1-16 kHz in a male individual and maximum hearing sensitivity of a female individual at 25

kHz, showing a marked sexual dimorphism (though hearing characteristics may also vary based on age or size of the individual). Steller sea lions use both aerial and underwater vocalizations during breading, territorial disputes, and rearing of pups (Kastelein et al., 2005).

4.1.2 Steller Sea Lion Critical Habitat

Sea lion rookeries in Alaska are located in the Pribilof Islands, on Amak Island north of the Alaska Peninsula, throughout the Aleutian Islands and western Gulf of Alaska to Prince William Sound, and on several islands in southeastern Alaska. Haul-outs and rookery sites are numerous throughout the breeding range, and those located in the region of the project area are shown on Figure 6. The project area occurs within critical habitat for three major haul-outs and one rookery; NMFS defines Steller sea lion critical habitat by a 20-nautical mile (nm) radius (straight-line distance) encircling a major haul-out or rookery. The three haul-outs (Old Man Rocks, Unalaska/Cape Sedanka, and Akutan/Reef-Lava) within the 20-nm radius are located between approximately 15 and 19nm (straight-line distance) from the project area. The closest rookery is Akutan/Cape Morgan, which is about 19 nm from the project area using straight-line distance over the mountains. Recent usage data from all of these sites is presented in Table 3 below.

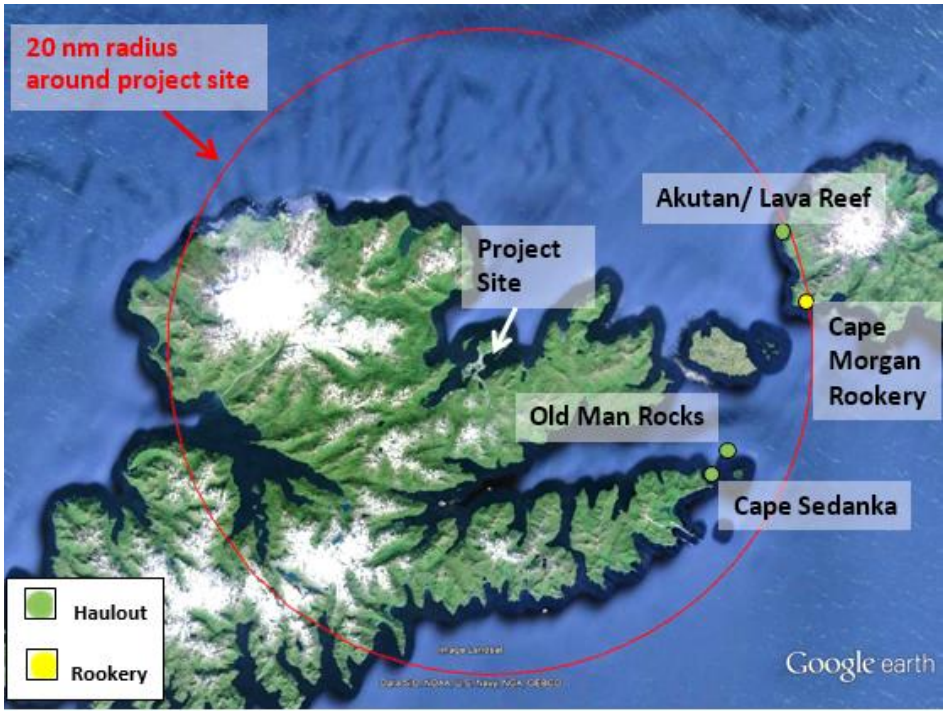

Figure 6. Nearby Steller sea lion haulouts and rookery.

Table 3. 2008 summer Steller sea lion count.

Site Name	Adults and Juveniles	Rookery
Akutan/Cape Morgan	1131	yes
Akutan/Reef-Lava	128	no
Old Man Rocks	89	no
Unalaska/Cape Sedanka	0	no

(Fritz et al., 2008a)

In addition to major haul-outs and rookeries, three special foraging areas in Alaska have also been designated critical habitat for Steller sea lions, including the Bogoslof area on the Bering Sea shelf, the Seguam Pass area in the central Aleutian Islands, and the Shelikof Strait area near Kodiak Island (62 CFR 30772). There are no special foraging areas within the project area.

4.2 Harbor Seals (*Phoca vitulina richardsi*)

Harbor seals are an earless seal covered with hair. They are often considered a "true seal" because of these traits. Adult males can grow up to 180 kg and typically reach the age of 26. Adult females typically reach the age of 35 and can grow up to 145 kg (Sease, 1992; Kinkhart et al., 2008). In the pacific, their range extends from Baja California to the Aleutians and North to Cape Newman and the Pribilof Islands (Allen and Angliss, 2014). Food sources for harbor seals include fishes and small cephalopods (Pitcher and Calkins, 1979).

Harbor seals often inhabit nearshore coastal waters, but they have been found up to 100 km from the shore. Harbor seal movement is highly variable, with no seasonal patterns identified. They commonly dive to depths that are less than 20 meters but are capable of reaching depths of up to 500 meters. Up to 44% of their time is spent hauled out, with most hauling out occurring during the summer (Pitcher and Calkins, 1979; Kinkhart et al., 2008). Harbor seals haulout in groups of 30 or less, but have been known to rarely haulout in numbers of several hundred. There are no defined haulout locations for harbor seals similar to those for sea lions and other pinnipeds, as harbor seals will haulout where conditions are preferable to rest, give birth, and/or molt (Sease, 1992). Common haulout locations include reefs; sand and gravel beaches; sand and mud bars; and glacial, pan, and sea ice (Kinkhart et al., 2008). Pupping, weaning, and molting often coincide with the summer haulout. The weaning process is completed by July, while molting can take up to 6 months (Sease, 1992). Harbor seals commonly eat walleye pollock (*Theragra chalcogramma*), octopus (*Octopus spp.*), capelin (*Mallotus villosus*), herring (*Clupea pallasii*), and pacific cod (*Gadus macrocephalus*). Pups usually eat small fishes (Pitcher and Galkins, 1979). Killer whales (*Orcinus orca*) are the primary predator of harbor seals (Kinkhart et al., 2008).

Twelve stocks of harbor seals have been identified by NMFS (Allen and Angliss, 2014). The Aleutians Islands stock, which has the largest extent, occurs within the project area (Small et al., 2008). The most recent survey estimated the abundance of harbor seals within this stock at 3,313 individuals (Allen and Angliss, 2014). Very little information is known about the Aleutian stock due to the limited amount of surveys that have been completed in the remote Aleutian Islands. The population trend of harbor seals occurring within this stock is unknown (Allen and Angliss, 2014); however, harbor seals are not currently listed as threatened or endangered under the ESA or considered depleted under the MMPA.

4.2.1 Harbor Seal Hearing Ability

Outwardly, phocids like harbor seals lack pinna, the outer ear portion consisting of folds of skin that is common with many animals. The portion of the ear canal that is visible is "long, narrow, and filled with cerumen and hairs" (Kastak and Schusterman, 1998). This canal is closed by muscular attachments when seals are underwater (Kastak and Schusterman, 1998). The hearing range of harbor seals extends above 60 kHz (Jacobs and Terhune, 2002), with the best sensitivity occurring at 11 kHz, according to Schusterman (1975). Harbor seals are more sensitive to lower frequency sounds (Schusterman, 1975).

4.3 Humpback Whales (*Megaptera novaeangliae*)

Humpback whales are a large baleen whale (also known as Mysticetes). They are found in all oceans, in both warm and cold waters (50 CFR 22304). Humpback whales are known for their long pectoral fins, which are white on their underside and dark in color (similar to their bodies) on the top. The distinct coloring on the flukes, or tails, of humpback whales is used for identification purposes. Adult male humpback whales are smaller than

adult females, with both reaching lengths up to 60 feet and weighing up to 36,000 kg (approximately 40 tons). Newborns weigh about 900 kg and are up to 15 feet long.

Humpback whales generally summer in Alaska, feeding in coastal and inland waters (Allen & Angliss, 2013) and preparing for their winter migration to warmer, tropical waters where they "congregate and engage in mating activities" (NMFS, 2015a). Two stocks of humpback whales occur within the project area: the Western North Pacific DPS and the Central North Pacific DPS (also known as the Hawaii DPS). The Western North Pacific stock migrates from waters near Japan. The Central North Pacific stock winters in waters around the Hawaiian Islands (NMFS, 2015a). The migration route of humpback whales within the Central North Pacific stock is approximately 3,000 miles (50 CFR 22304). Humpback whales are occasionally found inside of Dutch Harbor and in the nearby Iliuliuk Bay during the summer months, with larger numbers occurring along the north side of Unalaska Island (Allen & Angliss, 2013). Humpback whales use a unique form of corralling their prey called bubble netting in which they gather in groups and use bubbles to force their prey to the surface of the water (NMFS, 2015a).

The humpback whale was listed as endangered in December 1970 after two centuries of whaling decimated this population of baleen whales. NMFS recently proposed to divide listed humpback whales into fourteen DPSs to provide "a more tailored conservation approach for U.S. Fisheries managers" (Lyons, 2015). The Western North Pacific DPS is proposed to be re-listed as threatened and the Central North Pacific (Hawaiian) DPS is proposed to be delisted; however, this process is unfinished at the time of this application's submittal. As such, the listing statuses of these DPSs (listed in Table 2 and described above) are reflective of current status.

4.3.1 Humpback Whale Hearing Ability

Humpback whales use singing as a form of underwater communication at their wintering grounds for mating and seasonally at feeding grounds, like the Aleutian Islands (NMFS, 2015; Fleming and Jackson, 2011). Loud underwater noises, such as those from seismic surveys and pile driving, can result in humpback whales adjusting their acoustic behavior in ways like altered song length (Fleming and Jackson, 2011). Humpback whales are part of the low-frequency cetacean functional hearing group, with their estimated auditory bandwidth between 7 Hz and 22 kHz (Southall et al., 2007).

4.4 Killer Whales (*Orcinus orca*)

Killer whales, part of the Delphinidae family, are part of a large group of toothed whales (also known as Odontocetes). According to Leatherwood and Dahlheim, killer whales are the most widely distributed marine mammal and can be found in all oceans (as cited in Allen and Angliss, 2014). Killer whales show signs of sexual dimorphism, with males reaching up to 32 feet and weighing up to 10,000 kg and females reaching up to 28 feet and weighing up to 7,500 kg. Three ecotypes of killer whales occur within the North Pacific Ocean – resident, transient (also known as Bigg's), and offshore. Two stocks of killer whale species occur within the project area – the Eastern North Pacific Alaska Resident Stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock. Neither stock is listed as depleted under the MMPA or as threatened or endangered under the ESA.

Killer whales have no natural predators and are known as the top carnivores currently living on the Earth (Pitman, 2011). Resident killer whales typically eat fish, particularly salmon and Atka mackerel (Parsons et al, 2013), and have a rounded dorsal fin. Transient killer whales feed on other marine mammals including Steller sea lions, harbor seals, and various species of pinnipeds and cetaceans. Transient killer whales near Unimak Island have been observed foraging on migrating gray whales, while resident killer whales primarily feed on salmon and other fish (Barrett-Lennard et al., 2011). Transients typically have smaller, less matrilineal groupings than resident killer whales. They are also more likely to rely on stealth, making less frequent and less conspicuous

calls and skirting "along shorelines and around headlands" in order to hunt their prey in highly coordinated attacks (Barrett-Lennard et al., 2011). Residents often travel in much larger and closer groups with which they share any fish they catch.

Little is known about killer whales that inhabit waters near Unalaska (Parsons et al., 2013). While it is likely that killer whales may appear in Dutch Harbor, given their known range and the availability of food, the 2015 surveys, further described in Section 4.5, saw only a small number of marine mammals that were suspected to be killer whales. There are differences in the physical appearance of transient and resident killer whales; however, in the surveys no distinction was notated.

4.4.1 Killer Whale Hearing Ability

Killer whales rely on underwater sound for a variety of reasons including orientation, feeding, and communication. Killer whales use echolocation to assist with food gathering — transient killer whales use it rarely and most likely for hunting, while resident whales use it to locate salmon (Au et al., 2004). Killer whale social signals resemble the sound of mid-range tactical sonar (Southall et al., 2007), with signals commonly occurring as pulsed calls, whistles, and clicks (Szymanski et al., 1999). Increases in noise levels near killer whale habitat, like that associated with increasing vessel traffic, have been found to result in an increase in the duration of killer whale calls (Foote et al., 2004 as cited in Southall et al., 2007). Killer whales are part of the mid-frequency cetacean functional hearing group, with their estimated auditory bandwidth between 150 Hz and 160 kHz (Southall et al., 2007).

4.5 Survey Information

Specific data regarding frequency of occurrence of the affected species is available from two sources; Steller sea lion surveys conducted jointly by the USACE and the U.S. Fish and Wildlife Service and sighting data collected by COU in 2015 and 2016. This information is summarized below.

4.5.1 Steller Sea Lion Surveys

Steller sea lion surveys were conducted in Unalaska from November through March of 2003 to 2013 (Table 4; Figure 7) to coincide with surveys of overwintering Steller's eider. These surveys focused on assessing eiders, but also noted a count of sea lions within the survey areas. A maximum of two Steller sea lions were seen in a single survey within Dutch Harbor (Sectors 14-17). Surveys from areas within the projected Level B harassment zone (Sectors 14-18, 20a, 20b, and 21) are included in Table 4; other areas have been excluded for brevity. (Chris Hoffman, unpub. data)

Table 4. Summary of 2003-2013 Steller sea lion surveys.

Sector #	Total sea lions	No. of surveys	Mean sea lions per survey	Max. sea lions per survey	km of coast	Mean sea lions per km
14	0	21	0	0	1.33	0.00
15	0	21	0	0	0.91	0.00
16	5	21	0.24	1	3.07	0.08
17	1	21	0.05	1	0.83	0.06
18	6	21	0.29	2	0.71	0.41
20a	1	21	0.05	1	1.32	0.04
20b	3	21	0.14	2	1.54	0.09

Sector #	Total sea lions	No. of surveys	Mean sea lions per survey	Max. sea lions per survey	km of coast	Mean sea lions per km
21	0	21	0	0	0.77	0.00

Data from 2003 - 2013 surveys. The proposed project is located in sector 15. Sectors 14, 16, 17, 18, 20a, 20b, and 21 are within the Level B harassment zone.

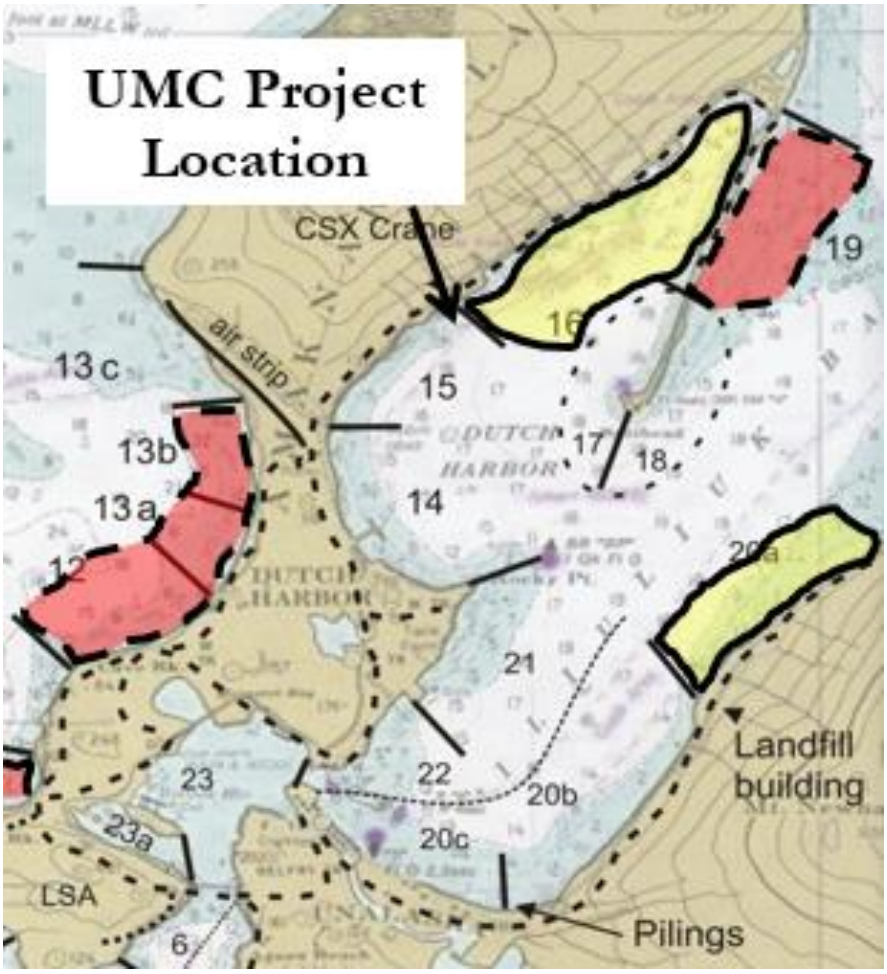

Figure 7. Steller sea lion 2003-2013 survey sectors.

4.5.2 COU Protected Species Surveys

Between April 2015 and July 2016, UMC personnel conducted surveys within Dutch Harbor under the direction of an ecological consultant. The consultant visited the site periodically to guide data collection. Observers monitored for a variety of marine animals, including Steller sea lions, whales, and harbor seals. Several observation locations from various vantage points were selected for the surveys. Observations took place for approximately 15 minutes from each point and included only marine mammals that were inside Dutch Harbor. Periodic observations performed by trained observers occurred for longer durations (up to 12 hours) and covered the full project influence area. The survey recorded the types of species observed, the number and initial location of animals, the primary activity of the animals, and any applicable notes.

Data from the surveys was used to calculate take estimates and to analyze potential for project delays. Experiences from trained observers conducting these observations within the project area provided practical considerations for development of the MMMP.

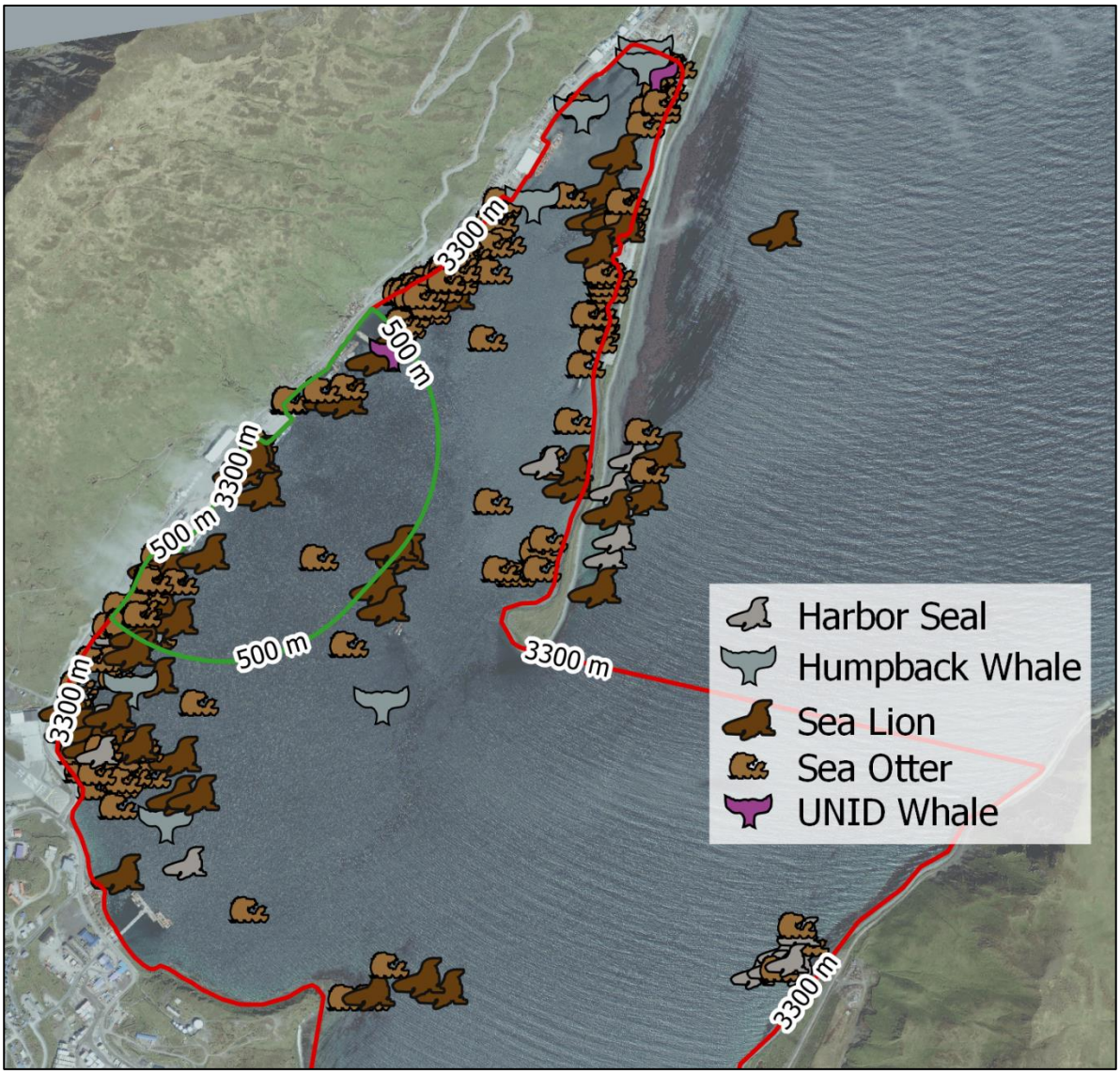

Figure 8. Protected species sightings from 2015 – 2016 surveys.

5 Type of Incidental Take Authorization Requested

The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury, and/or death) and the method of incidental taking.

On August 3, 2016, NMFS published new technical guidance on assessing the effects of anthropogenic sound on marine mammals. This section has been updated accordingly.

5.1 Incidental Take Authorization Request

Under Section 101(a)(5)(D) of the MMPA, COU requests an IHA for takes by Level B harassment during pile driving operations associated with the construction of the proposed project. COU requests an IHA for incidental take of marine mammals described within this application for 1 year with an effective date of March 1, 2017. If further work is required at the end of that time to complete the proposed project, COU will request an IHA renewal.

The activities outlined in Section 1 have the potential to take marine mammals by Level B harassment. Take will potentially result from the noise created by the impact and vibratory pile driving required for the removal and installation of various types of piles.

A Level A harassment zone will be incorporated into the project to minimize the potential for injury. If any marine mammals appears about to enter the Level A harassment zone, all pile driving will shut down immediately, until the animal has voluntarily left the Level A harassment zone. Similarly, pile driving will shut down immediately if any non-permitted marine mammal species is observed about to enter the Level B harassment zone, as take has not been requested for these species. Any permitted species observed within the Level B harassment zone will be recorded as a take. The harassment zones as well as the noise levels that are expected to result from the construction of this project are described in detail in Sections 5.2.5 through 5.2.9. Protocols for observations and mitigation methods are discussed in detail in Section 11.

5.2 Method of Incidental Taking

This project entails the installation of an OCSP dock structure as described in Section 1.3. Planned construction methodologies will temporarily increase the underwater and airborne noise within the project area.

This increase in noise has the potential to result in the Level B harassment of marine mammals in the vicinity of the construction project. Level A harassment is not expected to occur as a result of the proposed project, as the monitoring protocols further described in the Marine Mammal Monitoring Plan (MMMP) in Appendix D will reduce the potential for exposure to levels of underwater and terrestrial noise above the various thresholds established by NMFS.

5.2.1 Updated Sound Threshold Guidance

The threshold for Level A harassment caused by acoustic energy is first encountered at the onset of permanent threshold shift (PTS). Unless otherwise noted, the following notations will be used to express thresholds:

- Peak Sound Pressure Level (SPL_{PEAK}): The maximum absolute value of the instantaneous sound pressure that occurs during a specified time interval, measured in dB re: 1 µPa (e.g., 198 dB_{PEAK}). (Caltrans 2015)
- Average Root Mean Square Sound Pressure Level (SPL_{RMS}): A decibel measure of the square root of mean square pressure. For pulses, the average of the squared pressures over the time that comprises

that portion of the wave form containing 90 percent of the sound energy of the impulse in dB re: 1 µPa (for underwater) and in dB re: 20 µPa is used (e.g., 185 dB_{RMS}). (Caltrans 2015)

- Sound Exposure Level (SEL): The integral over time of the squared pressure of a transient waveform, in dB re: 1 μPa^2–sec. (e.g., 173 dB_{SEL}). This approximates sound energy in the pulse. (Caltrans 2015)
- Cumulative Sound Exposure Level (SEL_{CUM}): Cumulative exposure over the duration of the activity within a 24-h period. (NOAA 2016)

Determination of the cumulative sound exposure levels (SEL_{CUM}) required to cause permanent threshold shift (PTS) in marine mammals within the project area was made based on the technical guidelines published by NMFS on August 03, 2016 (NMFS, 2016). This guidance considers the duration of the activity, the sound exposure level produced by the source during one working day, and the effective hearing range of the receiving species. Regulatory thresholds for the onset of PTS, measured in one-day SEL_{CUM}, are shown in Table 5.

Table 5. NMFS PTS Onset Acoustic Thresholds (Received Level). (NMFS, 2016)

	PTS Onset Acoustic Thresholds			
	Underwater (dB re: 1 µPa)			
Source	**Low-Frequency (LF) Cetaceans**	**Mid-Frequency (MF) Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
Vibratory Pile Driving (Non-pulse Noise)	199	198	201	219
Impact Pile Driving (Impulsive Noise)	183	185	185	203

Calculation of the harassment zones under the new guidance utilized the methods presented in Appendix D of the new Technical Guidance and the accompanying Optional User Spreadsheet. The spreadsheet accounts for effective hearing ranges using Weighting Factor Adjustments (WFAs), and this application uses the recommended values for vibratory and impact driving therein. Durations were estimated based on similar project experience.

5.2.2 Peak Sound Threshold Guidance

In addition to thresholds for cumulative noise exposure, a threshold for peak sound pressures must be considered for impact pile driving. Peak sound pressure level (SPL_{PEAK}) is defined as "the greatest absolute instantaneous sound pressure within a specified time interval and frequency band"(NMFS, 2016).

Table 6. NMFS peak sound pressure thresholds. (NMFS, 2016)

Peak Sound Pressure Thresholds				
Underwater (dB re: 1 µPa)				
Source	**Low-Frequency (LF) Cetaceans**	**Mid-Frequency (MF) Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
Impact Pile Driving (Impulsive Noise)	219	230	202	232

5.2.3 Interim Sound Threshold Guidance

The updated guidance does not address level B harassment, nor airborne noise harassment. The interim sound threshold guidance previously published by NMFS will be used for exposure to airborne and underwater sound pressure levels for Level B Harassment (behavioral disturbance) (NMFS 2015b).

Table 7. NMFS interim sound threshold guidance. (NMFS, 2015b)

Level B Harassment Threshold		
Underwater (dB re: 1 µPa)		
Source	**Cetaceans**	**Pinnipeds**
Vibratory Pile Driving (Non-pulse Noise)	120	120
Impact Pile Driving (Impulsive Noise)	160	160
Airborne (dB re: 20 µPa)		
Source	**Harbor Seals**	**Other Pinnipeds**
All Source Types	90	100

A formula for calculating the practical spreading loss was used to determine the zones in which pinnipeds and cetaceans have the potential to face disturbance.

The formula for calculating practical spreading loss in underwater noise is:

$$TL = GL \times \log \frac{R_2}{R_1}$$

where:
TL = Transmission loss (dB)
GL = Geometric Loss Coefficient (15 for the practical spreading model)
R_1 = Range of the sound pressure level (m)
R_2 = Distance from the source of the initial measurement (m)

5.2.4 Underwater Background Noise

Dutch Harbor is a fairly noisy body of water. Underwater sounds from industrial sources originate from vessel engines, vehicle traffic, airport traffic, and machinery. Between March 17 and March 19, 2015, PND Engineers, Inc., (PND) visited Dutch Harbor in Unalaska to collect hydroacoustic measurements of underwater sound pressure levels (SPLs) in the vicinity of the UMC Dock for the UMC Dock Positions III & IV Replacement Project. The average SPL values were calculated over two frequency ranges: the entire frequency band ("broad band SPL" from 0 Hz – 24.5 kHz) as well as over specified background frequency range (from 75 Hz – 20 kHz). These ranges were selected based on pinniped criteria described in a NMFS 2012 guidance document on data collection methods for background noise (NMFS, 2012).

The ambient pinniped frequency (75Hz – 20kHz) SPL varied from 112.5 dB $RMS_{10\ min}$ recorded at UMC Dock at 1 meter depth during calm weather conditions to 143.8 dB $RMS_{10\ min}$ recorded immediately in front of the Light Cargo Dock on March 18. The average of all sound levels recorded during this survey was 128.7 dB $RMS_{10\ min}$ (75 Hz – 20 kHz).

A variety of unidentified periodic mechanical sounds from unknown sources dominated some recorded data. These sounds were characterized as noise from engines, motors, and pumps. Vessel propulsion and mechanical sounds dominated recorded sound pressure levels in close proximity to the docks. A full description of the methodology and results of this survey can be found in Appendix A.

5.2.5 Underwater Noise

During the installation of piles, the project has the potential to increase underwater noise levels. This could result in disturbance to pinnipeds and cetaceans that occur within the Level B harassment zone.

According to studies by the California Department of Transportation, the installation of steel sheet piles using a vibratory hammer can result in underwater noise levels reaching 163 dB_{RMS} or 162 dB_{SEL} at 10 meters. Frequencies for steel sheet pile driving were relatively broadband, between 400 Hz and and 2.5 kHz (Caltrans, 2015, Port of Oakland). This frequency range, though relatively broadband, is still within the applicable frequency range for weighting factor adjustments (NMFS, 2016).

PND performed acoustic measurements during sheet pile driving at a similar construction project in Unalaska, AK, and found average SPLs of 160.7 dB_{RMS}. This lower value was used to calculate hazard radii for vibratory pile driving and is discussed further in Appendix A.

Underwater noise levels during the vibratory removal and installation of 18-inch steel pile can reach 158 dB_{RMS} or 158 dB_{SEL} at 10 meters (Caltrans, 2015, Prichard Lake). Because there was little information on the underwater noise levels of the removal of timber piles, the levels used for analysis (162 dB_{RMS} at 10 meters) were taken from the installation of timber piles (Caltrans, 2015, Norfolk Naval Station). Underwater noise levels during the impact pile driving of a 30-inch steel pile can reach 185 dB_{RMS} (172 dB_{SEL}, 196 dB_{PEAK}) at 10 meters (Caltrans, 2015, SR520 Test Pile Project); whereas the underwater noise from the vibratory driving of 30-inch steel pile can result in noise levels of 159 dB_{RMS} (159 dB_{SEL}) at 10 meters (Caltrans, 2015, Prichard Lake).

Topographic features impinge upon the calculated Level A and Level B harassment zones shown in Table 9. Effective Level A and Level B harassment zones are described following the calculated zones, and are shown in Table 8. The effective zones are adjusted for features like the spit and Unalaska Island, located to the west of the UMC Dock.

5.2.5.1 Level B Harassment Zones

Calculated underwater Level B harassment zones are summarized in Table 10. Landmasses in the project area will influence the monitoring distances. The effective Level B harassment zones summarized in Table 8 are adjusted for land features within Dutch Harbor and Iliuliuk Bay (see figures the Marine Mammal Monitoring Plan (MMMP)).

All permitted pinnipeds and cetaceans that come within the effective Level B harassment zone for pile driving activities will be recorded as potential exposures. If a non-permitted marine mammal is observed approaching the Level B harassment zone, pile driving will shut down.

5.2.5.2 Level A Harassment Zones

Based on the updated Technical Guidance, the calculated underwater Level A harassment zones for various species and activities are detailed in Table 8.

To provide a more conservative and consistent observation area for vibratory pile driving than the calculated zones, the effective Level A harassment zone for pinnipeds will extend out 10 meters from the proposed project site during all vibratory pile removal and installation activities.

During impact pile driving, a conservative shutdown zone for peak sound thresholds will extend out 10 meters from the proposed project site. Impact pile driving would cease if an animal appeared to approach or was about to enter the 10-meter zone.

Impact pile driving is performed only to complete the driving sequence of any given pile, following vibratory driving. For that reason, individual impact pile-driving events are spaced throughout the day with time in-between for animals to recover. To prevent injury from cumulative effects of multiple pile driving cycles, impact driving will not resume on a new if any animal remains, or appears likely to remain, for one impact pile driving cycle or longer within a larger "cumulative effects" radius designed to prevent ill effects of prolonged exposure. Impact driving of a single pile will continue as long as the animal does not enter the peak sound threshold zone of 10 meters.

5.2.6 Sound Source and Attenuation Verification

The City may elect to verify the values used for source levels and sound attenuation in the various hazard and observation radii calculations. This would be achieved using similar techniques and equipment to the sound source verification mentioned above (and further discussed in Appendix A). Sound levels would be measured at the earliest possibility during impact pile driving at 10, 100, 300, and 500 meters from the sound source. These values would be plotted and a logarithmic line of best fit used to model the attenuation rates experienced at the construction site. If these values are higher than the typically-used value of 15, the observation and hazard radii will be revised according to the methods used to calculate the current values. The City may elect not to exercise this option, if the cost of shutdown during impact pile driving is not anticipated to warrant additional research.

5.2.7 Effective Underwater Harassment Zones

Table 8. Effective Level A and Level B Harassment Zones.

Underwater Noise						
Source	**Level A Harassment Zone (m)**				**Level B Harassment Zone (m)**	
	(LF) Low-Frequency Cetaceans	**(MF) Mid-Frequency Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**	**Cetaceans**	**Pinnipeds**
Vibratory Installation / Removal	10	10	10	10	3300	3300
Impact Installation 30" (1 Pile per day)	65	10	35	10	500	500
Impact Installation 30" (2 Piles per day)	100	10	55	10	500	500
Impact Installation 30" (3 Piles per day)	135	10	70	10	500	500
Impact Installation 30" (4 Piles per day)	160	10	85	10	500	500
Impact Installation 30" (5 Piles per day)	185	10	100	10	500	500
Impact Installation 30" (10 Piles per day)	295	15	160	15	500	500

Underwater Noise						
Source	**Level A Harassment Zone (m)**				**Level B Harassment Zone (m)**	
	(LF) Low-Frequency Cetaceans	**(MF) Mid-Frequency Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**	**Cetaceans**	**Pinnipeds**
Impact Installation 30" (20 Piles per day)	465	20	250	20	500	500
Impact Installation 30" (PEAK Calc)	10	10	10	10	500	500

Underwater Level B Harassment zones adjusted for land features (see figures in MMMP).

5.2.8 Airborne Noise

During the installation of piles and blasting activities at the quarry, the project has the potential to increase airborne noise levels. This could result in disturbance to pinnipeds at the surface of the water or hauled out along the shoreline of Iliuliuk Bay or the Dutch Harbor spit; however, we do not expect animals to haul out frequently within Dutch Harbor or the spit due to the amount of activity within the area.

The formula for calculating spherical spreading loss in airborne noise is:

$$TL = GL \times \log \frac{R_2}{R_1}$$

where:
TL = Transmission loss (dB)
GL = Geometric Loss Coefficient (20 for spherical spreading in airborne noise)
R_1 = Range of the sound pressure level (m)
R_2 = Distance from the source of the initial measurement (m)

Noise levels used to calculate airborne hazard radii are summarized in Table 9. Data for vibratory driving from Laughlin (2010) is presented in dB_{L5EQ}, or the 5-minute average continuous sound level. In this case dB_{RMS} values would be calculated in a similar fashion, so these dB_{L5EQ} were considered equivalent to the standard dB_{RMS}. Impact driving noise levels were taken from a recent Washington State Department of Transportation IHA application citing data collected by Laughlin (2013). A report was not available for this data, but it is assumed to be provided in dB_{RMS}. Only A-weighted airborne noise levels were available for quarry plasting (Giroux, 2009), so a conservative maximum level was selected, dBA_{LMAX}.

Based on the spherical spreading loss equation, the calculated airborne Level B harassment zones would extend out to the following distances:

- For the vibratory installation of 18-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 11.4 meters; for Steller sea lions, the distance is 3.6 meters;
- For the vibratory installation of 30-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 31.9 meters; for Steller sea lions, the distance is 10.1 meters;
- For the impact installation of 24-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 152.4 meters; for Steller sea lions, the distance is 48.2 meters; and

- For quarry blasting, the calculated Level B harassment zone for harbor seals extends to 38.5 meters and 12.2 meters for Steller sea lions.

Vibratory installation of sheet piles is assumed to create lower noise levels than installation of 30-inch round piles, so these values will be used for sheet pile driving. Similarly, vibratory removal of steel or wooden piles will observe the same hazard radii. For the purposes of this analysis, impact installation of 30-inch steel piles is assumed to generate similar sound levels to the installation of 24-inch piles, as no unweighted data was available for the 30-inch piles.

Since the in-water area encompassed within the above areas is located entirely within the underwater Level B harassment zone, the pinnipeds that come within these areas will already be recorded as a take based on Level B harassment threshold for underwater noise. It is not anticipated that any pinnipeds will haul out within the airborne harassment zone. However, piles driven entirely within fill (e.g. support piles within completed sheet pile cells) will produce primarily airborne noise, and so upland construction activities will be monitored within the airborne Level B harassment zones only. Airborne noise thresholds have not been established for cetaceans (NOAA, 2015b), and no adverse impacts are anticipated.

Distance from the quarry bottom to the shoreline is an average of 70 – 80 meters, so exposure to even Level B harassment from blasting noise is unlikely.

5.2.9 Effective Airborne Harassment Zones

Table 9. Effective Level B Airborne Harassment Zones.

Airborne Noise				
Source	**Source Level**	**Level A Harassment Zone (m)**	**Level B Harassment Zone (m)**	
			Harbor Seals	**Other Pinnipeds**
Vibratory Installation Sheet	96.4 dB_{L5EQ} at 15 meters[a]	N/A	35	10
Vibratory Installation 18"	87.5 dB_{L5EQ} at 15 meters[a]	N/A	15	10
Vibratory Installation 30"	96.4 dB_{L5EQ} at 15 meters[a]	N/A	35	10
Vibratory Removal Steel	96.4 dB_{L5EQ} at 15 meters[a]	N/A	35	10
Vibratory Removal Timber	96.4 dB_{L5EQ} at 15 meters[a]	N/A	35	10
Impact Installation 30"	110 dB_{RMS} at 15 meters[b]	N/A	150	50
Quarry Blasting	66 dBA_{LMAX} at 609.6 meters[c]	N/A	40	15

([a]Laughlin, 2010, Keystone & Wahkiakum; [b]Laughlin, 2013; [c]Giroux, 2009)

Table 10. Calculated Harassment Radii.

Source						Estimated Duration				Level A Harassment Zone (m) (New Guidance)				Level A Harassment Zone (m) (Interim Guidance)		Level B Harassment Zone (m) (Interim Guidance)	
	RMS Sound Pressure Level (at 10 m)	Peak Sound Level (at 10 m)	Sound Exposure Level (1 min at 10 m)	Bandwidth	Recommended Weighting Factor Adjustment	Number of Piles	Piles Driven per Day	Hours per Day	Anticipated Days of Effort	LF Cetaceans	MF Cetaceans	PW Pinnipeds	OW Pinnipeds	Cetaceans	Pinnipeds	Cetaceans	Pinnipeds
Vibratory Installation Sheet	160.7 dB_{RMS}[a]	n/a	n/a	400 Hz - 2.5 kHz[a]	2.5 kHz	1400	15	0.5	95	4.1	0.4	2.5	0.2	0.7	0.2	5168.1	5168.1
Vibratory Installation 18"	158 dB_{RMS}[b]	n/a	158 dB_{SEL}[b]	not avail.	2.5 kHz	150 (temporary)	10	1.25	15	5.0	0.4	3.0	0.2	0.3	0.1	3414.5	3414.5
Vibratory Installation 30"	159 dB_{RMS}[b]	n/a	159 dB_{SEL}[b]	not avail.	2.5 kHz	40 (fender and platform)	5	1	8	5.0	0.4	3.1	0.2	0.4	0.1	3981.1	3981.1
Vibratory Installation 30"	159 dB_{RMS}[b]	n/a	159 dB_{SEL}[b]	not avail.	2.5 kHz	30 (miscellaneous)	5	1	6	5.0	0.4	3.1	0.2	0.4	0.1	3981.1	3981.1
Vibratory Installation 30"	159 dB_{RMS}[b]	n/a	159 dB_{SEL}[b]	not avail.	2.5 kHz	125 (crane rail support)	5	2	25	8.0	0.7	4.8	0.3	0.4	0.1	3981.1	3981.1
Vibratory Removal Steel 18"	159 dB_{RMS}[b]	n/a	158 dB_{SEL}[b]	not avail.	2.5 kHz	195	10	1.25	35	5.0	0.4	3.0	0.2	0.3	0.1	3414.5	3414.5
Vibratory Removal Steel 18"	159 dB_{RMS}[b]	n/a	158 dB_{SEL}[b]	not avail.	2.5 kHz	150 (temp)	10	1.25	35	5.0	0.4	3.0	0.2	0.3	0.1	3414.5	3414.5
Vibratory Removal Timber	162 dB_{RMS}[c]	n/a	not avail	not avail.	2.5 kHz	55	10	1.25	5.5	9.2	0.8	5.6	0.4	0.6	0.1	6309.6	6309.6
	RMS Sound Pressure Level (at 10 m)	**Peak Sound Level (at 10 m)**	**Sound Exposure Level (1 min at 10 m)**	**Pulse Length (s)**	**Recommended Weighting Factor Adjustment**	**Number of Piles**	**Piles Driven per Day***	**Strikes per Pile**	**Anticipated Days of Effort**	**LF Cetaceans**	**MF Cetaceans**	**PW Pinnipeds**	**OW Pinnipeds**	**Cetaceans**	**Pinnipeds**	**Cetaceans**	**Pinnipeds**
Impact Installation 30" (1 Pile)	185 dB_{RMS}d	n/a	n/a	0.05d	2 kHz	195	1	200	39	63.0	2.2	33.7	2.5	21.5	4.6	464.2	464.2
Impact Installation 30" (5 Piles)	185 dB_{RMS}d	n/a	n/a	0.05d	2 kHz	195	5	200	39	184.2	6.6	98.6	7.2	21.5	4.6	464.2	464.2
Impact Installation 30" (10 Piles)	185 dB_{RMS}d	n/a	n/a	0.05d	2 kHz	195	10	200	39	292.5	10.4	156.5	11.4	21.5	4.6	464.2	464.2
Impact Installation 30" (20 Piles)	185 dB_{RMS}d	n/a	n/a	0.05d	2 kHz	195	20	200	39	464.3	16.5	248.4	18.1	21.5	4.6	464.2	464.2
Impact Installation 30" (PEAK Calc)	n/a	196 dB_{PEAK}[d]	n/a	n/a	2 kHz	195	5	200	39	0.3	0.1	0.3	0.0	21.5	4.6	464.2	464.2

6 Number of Marine Mammals that May Be Affected

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.

6.1 Estimated Exposures

The number of marine mammals that may be exposed to Level B harassment thresholds is calculated by estimating the likelihood of a marine mammal being present within a Level B harassment zone during active pile removal/driving. Expected marine mammal presence is determined by past observations and general abundance near the proposed project area during construction.

The following equations were used to determine the exposure estimate and number of marine mammals exposed to sound levels associated with Level B Harassment using the 2015-2016 survey data:

$$Observation\ Rate\ (OR) = \frac{No.of\ animals\ observed}{Hours\ of\ observation} \quad \text{(Equation 6-1)}$$

$$Exposure\ Rate\ (XR) = \mu_{OR} + CI_{95} \quad \text{(Equation 6-2)}$$

where: $\mu_{OR} = Average\ of\ Monthly\ Observation\ Rates$

$CI_{95} = 95\%\ Confidence\ Interval\ (Normal\ Distribution)$

$$Estimated\ Exposures = XR \times Duration\ (hours) \quad \text{(Equation 6-3)}$$

For calculation of the Exposure Rate, the upper bound of the 95% Confidence Interval (above the average monthly Observation Rate**)** is used to account for variability of the small data set. A Duration of 1,470 hours for pile driving/removal activities when noise is actually being generated from a vibratory or impact hammer (including temporary piles for templating and soft-start procedures) of approximately 50 percent of the total estimated duration of 245 days (2,940 hours for 12-hour work days) is considered to be reasonable for the purpose of exposure estimate. The other 50 percent of the time during pile driving/removal activities is spent installing templating and bracing, moving equipment, threading sheet piles, pulling piles, etc. without noise being generated from a hammer. Exposures from blasting noise are considered unlikely because of the distance from the quarry to shore, so quarry operations are not factored into this estimate.

The estimated exposures below were calculated using the survey data from April 2015 through July 2016. Refer to Appendix F for statistical analysis of the observation data from the 2015-2016 surveys and calculation of estimated exposures.

6.2 Steller Sea Lion

Based upon the estimated Level B harassment zones provided in Table 8 and the protected species surveys outlined in Section 4.5.2, the following exposure estimate was calculated:

μOR = 0.40 animals/hour
$CI95$ = 0.23 animals/hour
XR = 0.63 animals/hour

Estimated Exposures = 0.63 animals/hour * 1,470 hours = 923 exposures

Therefore, COU is requesting authorization for Level B harassment take of **923** Steller sea lions. The minimum population estimate of the western DPS of the Steller sea lion is 48,676 (Allen and Angliss, 2014). The total potential take requested is 1.9% of the western DPS of the Steller sea lion.

6.3 Harbor Seal

Based upon the estimated Level B harassment zones provided in Table 8 and the protected species surveys outlined in Section 4.5.2, the following exposure estimate was calculated:

μ_{OR} = 0.16 animals/hour
CI_{95} = 0.16 animals/hour
XR = 0.32 animals/hour

Estimated Exposures = 0.32 animals/hour * 1,470 hours = 465 exposures

Therefore, COU is requesting authorization for Level B harassment take of **465** harbor seals. The minimum population estimate of the Aleutian Islands stock of the harbor seal is 3,313 (Allen and Angliss 2012). The total potential take requested is 14.0% of the Aleutian Islands stock of the harbor seal.

6.4 Humpback Whale

Based upon the estimated Level B harassment zones provided in Table 8 and the protected species surveys outlined in Section 4.5.2, the following exposure estimate was calculated:

μOR = 0.06 animals/hour
$CI95$ = 0.06 animals/hour
XR = 0.12 animals/hour

Estimated exposures = 0.12 animals/hour * 1,470 hours = 176 exposures

Therefore, COU is requesting authorization for Level B Harassment take of **176** humpback whales. The minimum population estimate of the Central North Pacific and Western North Pacific Stocks of the humpback whale is 8,755 (Allen and Angliss, 2014). The total potential take requested in 2.0% of the combined Central North Pacific and Western North Pacific Stocks of the humpback whale.

6.5 Killer Whale

Based upon the estimated Level B harassment zones provided in Table 8 and the protected species surveys outlined in Section 4.5.2, the following exposure estimate was calculated:

μ_{OR} = 0.02 animals/hour
CI_{95} = 0.04 animals/hour
XR = 0.05 animals/hour

Estimated exposures = 0.05 animals/hour * 1,470 hours = 81 exposures

Therefore, COU is requesting authorization for Level B Harassment take of **81** killer whales. The minimum population estimate of the Eastern North Pacific Alaska Resident and Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stocks of the killer whale is 2,934 (Allen and Angliss, 2013). The total potential take requested is 2.7% of the combined Eastern North Pacific Alaska Resident and Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stocks of the killer whale. Because there were no discerning characteristics recorded during the observations, killer whales seen during the observation could be from either stock.

7 Anticipated Impact on Species or Stocks

The anticipated impact of the activity to the species or stock of marine mammal.

The proposed project has the potential to impact marine mammals (primarily Steller sea lions, harbor seals, humpback whales, and killer whales) by increasing noise in Dutch Harbor and Iliuliuk Bay to levels above the Level B harassment threshold. The applicant will use heavy equipment to drive piles and face sheets into the sea bottom and to compact the fill material, which would cause airborne noise and underwater noise. The project also has the potential to increase the likelihood of vessel interactions with marine mammals.

7.1 Noise

Increases in noise levels from in-water activities like pile driving can reduce a marine mammal's capability to hear other noises, like background noise and noise created by their prey and predators (Southall et al., 2007). Marine mammals can also experience changes in sensitivity to sounds after exposure to intense sounds for long periods. These changes, called threshold shifts, can occur on a temporary or permanent level, depending on the intensity of the sound and length of time to which the animal is exposed to the sound. Typically, temporary threshold shifts (TTS) include impacts to middle-ear muscular activity, increased blood flow, and general auditory fatigue (Southall et al., 2007). At the TTS level, the animals do not experience a permanent change in hearing sensitivity and exhibit no signs of physical injury. A permanent threshold shift (PTS) would occur if the animal subjected to the increased sound level did not return to pre-exposure conditions within an order of weeks or if the animal exhibited physical injuries (Southall et al., 2007).

Pinnipeds and cetaceans are sensitive to underwater and airborne noise. Recent studies have shown that even moderate levels of underwater noise can cause a temporary loss in hearing sensitivity in some marine mammals (Kastak et al., 2005). The proposed project will have the possibility to result in the Level B harassment of pinnipeds and cetaceans due to increases in noise levels associated with pile removal and installation. Level B harassment is temporary in nature, and the impacts associated with the potential harassment resulting from this project will be temporary. Mitigation measures discussed in Section 11, such as soft start procedures, will be incorporated into the project to prevent Level A harassment, or PTS.

7.2 Vessel Interactions

Dutch Harbor is an industrial area, with several marine docks, a nearby small boat harbor, and other docking facilities. The proposed project has the potential to increase temporarily the number of vessels using Dutch Harbor. Because the adjacent dock facilities must remain in operation while construction of the proposed project takes place, working from a barge located within the harbor may allow for more space for the users of the sites. Additional support vessels may be used during the course of construction. The increase in the likelihood of vessel interactions will be temporary and occur only during construction. The new UMC dock is not likely to result in a permanent increase in vessel traffic; however, it may result in larger vessels accessing the site.

8 Anticipated Impact on Subsistence

The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.

Subsistence hunting and fishing has remained important part of the history and culture of Unalaska Island for thousands of years. Sea lions and harbor seals have been of particular importance to the Unangan people who have inhabited Unalaska since the pre-contact period. Historically, hunting during the winter occurred in Unalaska Bay. In other seasons, hunting occurred at Bishop Point, Winslow Island, Unalga Island, Beaver Point, and points between those areas (Haynes and Mishler, 1991). There are no relevant subsistence uses of marine mammals impacted by the proposed project. Dutch Harbor is not typically used for subsistence hunting or fishing due to its industrial nature.

8.1 Steller Sea Lion Subsistence Hunting in Unalaska

In 2008, the most recent year for published Alaska Department of Fish and Game (ADF&G) reports on subsistence harvests, 28.6% of native households in Unalaska used sea lions (Wolfe et al., 2009). The amount of individual sea lions harvested in Unalaska has decreased from 1994 through 2008 (Table 11). Data from most communities that previously participated in Steller sea lion harvests, including Unalaska, was no longer collected as of 2009.

Table 11. Estimated Steller sea lion harvest in Unalaska from 1994-2008.

Year	Estimated Harvest (in Individuals)	Estimated Pounds
1994	72	14423
1995	39	7791
1996	15	3046
1997	29	5811
1998	7	1455
2000	49	9842
2001	23	4620
2002	10	2000
2003	10	2000
2004	11	2286
2005	12	2400
2006	9	1800
2007	9	1800
2008	3	514

(Wolfe, et al., 2009)

8.2 Harbor Seal Subsistence Hunting in Unalaska

A subsistence harvest of harbor seals did not occur in Unalaska in 2008 (Wolfe et al., 2009). The last recorded harvest in 2007 resulted in the harvest of 11 harbor seals. The harvest numbers have been decreasing since recording started in 1994. As of 2009, data from most communities that previously participated in harbor seal harvests, including Unalaska, was no longer collected.

Table 12. Estimated harbor seal harvest in Unalaska from 1994-2008.

Year	Estimated Harvest (in Individuals)	Estimated Pounds
1994	54	3003
1995	37	2094
1996	20	1137
1997	27	1485
1998	13	713
2000	34	1920
2001	38	2117
2002	14	800
2003	14	800
2004	29	1600
2005	30	1680
2006	9	504
2007	11	605
2008	0	0

(Wolfe, et al., 2009)

8.3 Whale Subsistence Hunting in Unalaska

Subsistence hunting for humpback whales and killer whales does not occur in Unalaska.

8.4 Impact on Subsistence Hunting

The proposed project will not result in the death or serious injury of any marine mammal. The project has the potential to expose pinnipeds and cetaceans to sound levels above the Level B harassment threshold. The project is likely to result only in short-term, temporary impacts to pinnipeds. The proposed project is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes.

While subsistence fishing occurs in nearby Captains Bay, subsistence fishing is not common within Dutch Harbor nor Iliuliuk Bay.

9 Anticipated Impact on Habitat

The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.

9.1 Animal Avoidance or Abandonment

The anticipated increase in noise levels from the removal and installation of piles that will occur with this project could cause animals to avoid the area during pile installation activities. The primary reason that animals would leave the project area would be due to elevated noise levels. The background noise levels within the project area are already elevated above the Level B harassment level, but pile driving has the potential to increase noise levels even higher, as discussed in Sections 5.2.5 and 5.2.8.

While it is possible that pinnipeds and cetaceans may avoid the project area during pile driving, they are not likely to abandon the site altogether. Despite background noise levels and facility activities, nearby dock facilities often attract pinnipeds and other marine mammals to Dutch Harbor due to the availability of prey. It is also not uncommon for commercial, subsistence, and sport fishermen to clean fish out of their nets within the marine waters around Unalaska.

9.2 Impacts to Physical Habitat

Approximately 2.8 acres of intertidal habitat will be filled as a result of the proposed project. The intertidal habitat is commonly used by marine mammals, like Northern sea otters, and sea birds, like Steller's eiders. The habitat that is used by pinnipeds and cetaceans does not typically include the project fill area, although Steller sea lions and harbor seals could occur within the area. The intertidal habitat of the project site was surveyed in April 2014 via a remotely operated vehicle by High Tide Environmental. The survey noted various organisms including anemones, urchins, kelp, and sea stars as described below (Hoffman, 2014). Based on video accounts of other similar dock structures, it is likely that the organisms will regrow along the face of the new structure.

Figure 9. Painted anemone on riprap surrounded by sieve kelp in 15 feet of water.

Throughout the action area, the habitat has characteristics that change with depth, forming distinct 'bio-bands'. The nearshore intertidal and subtidal zone to approximately 15 feet deep is covered in riprap. This riprap is covered by a narrow band of sparse rockweed (*Fucus distichus* subsp. *Evanescens).* Below the band of rockweed, the remainder of the zone down to 15 feet is lightly covered (about 25 percent) with sieve kelp (*Agarum clathratum*). The sieve kelp has a patchy distribution throughout the zone. Invertebrates in this zone include numerous green sea urchins (*Strongylocentrotus droebachiensis*), sunflower sea stars (*Pycnopodia helianthoides*), and a few other sea stars (primarily *Pisaster* spp.). Figure 9 shows the habitat in this zone.

The next bio-band is from approximately 15 to 40 feet deep and is composed of gravel, shell litter, and coarse sand. Sieve kelp is patchy down to 30 feet and then is virtually absent. Green sea urchins are abundant in this zone, especially in the 15 to 30-foot portion. Sunflower sea stars are more common in this zone than the 0- to 15-foot zone, though they are still not abundant compared to other areas observed in Dutch Harbor. Short plumose anemones (*Metridium senile*) were abundant in this bio-band, particularly where larger attachment sources were present. Painted anemones (*Urticina crassicornis*) were observed, but far less frequently than plumose anemones. Figure 10 shows the habitat in this zone.

Figure 10. Large plumose anemones and a painted anemone in 22 feet of water.*

**Note the bottom composition of gravel and coarse sand.*

The deepest bio-band observed was from 40 to 60 feet of water. Portions of this zone are beyond the construction footprint and would not be impacted, but the zone is similar in composition throughout. This zone likely extends deeper before changing character, but deeper areas were not explored as part of this survey. The composition of this zone is gravel and shell litter that are covered by a thin layer of fine silt. Algae was absent at this depth and giant plumose anemones (*Metridium farcimen*) were observed in addition to numerous short plumose anemones. Painted anemones were observed, but were less common in this zone compared to the 15- to 40-foot zone. Sea stars were rare in the 40- to 60-foot zone.

With the exception of the 2.8 acres of intertidal habitat that will be filled by the installation of the sheet pile bulkhead dock, no long-term permanent impacts are expected to occur as a result of this project. To mitigate the loss of intertidal habitat, COU will remove marine debris from another beach near the project site (see plan

in Appendix C). The removal of this debris will improve the intertidal habitat and reduce the risk of entanglement for marine mammals that occur within the vicinity of the project.

Sediment quality in Dutch Harbor was found to be impaired by ADEC in the 2010 report on total maximum daily loads of petroleum hydrocarbons in Dutch Harbor (ADEC, 2010). The report found that the Dutch Harbor was among the most impacted areas within the areas reported in Unalaska, with contamination more likely to occur around active docks. Dredging is not proposed as part of this project. Very minimal sediment may enter the water column during pile removal, but it is not expected to exacerbate existing sediment or water quality issues.

The proposed project also has minimal potential to impair the water quality in Dutch Harbor. The coastline waters of the harbor were identified as impacted during a 2006 assessment by ADEC (2010). The potential sources of this contamination include several previously contaminated sites nearby as well as many industrial sources that currently operate within the harbor area. For this project, only clean fill will be placed below HTL. Fill will be placed in each cell after the installation of the sheet piles. The sheet piles will act as a silt curtain, keeping sediment contained behind each cell. The proposed project will incorporate best management practices and minimization measures to prevent any deleterious impacts to water and sediment quality within Dutch Harbor. The existing facilities are required to comply with ADEC regulations for water quality.

10 Anticipated Impact of Loss or Modification of Habitat

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The proposed project is not likely to result in the loss or modification of Steller sea lion, harbor seal, humpback whale, or killer whale habitat. Steller sea lion critical habitat is unlikely to be impacted by this project, as approximately 10 miles of rough, mountainous terrain occurs between the project site and the closest haulouts (Cape Sedanka and Old Man Rocks). No significant foraging areas for Steller sea lions will be impacted by this project. Foraging and dispersal habitat for Steller sea lions will be temporarily impacted by the increase in underwater and airborne noise, but it is not anticipated that the project will result in permanent impacts. There will be no loss of permanent habitat for Steller sea lions, harbor seals, humpback whales, or killer whales as a result of this project.

11 Mitigation Measures

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

11.1 All Construction Activities

The proposed project avoids impacts as much as practicable, but impacts could not be avoided entirely as this project is dependent on maritime access by nature. The proposed project replaces two existing dilapidated marine structures. Dock components added as part of this modification were minimized to the extent possible to provide a safe and functional dock without causing interference with adjacent facilities and navigation. Several alternatives were considered for this project, but none provided the same level of protection from vessel impacts, required maintenance, and new upland space that are essential for the existing facility.

The following measures will be incorporated by the applicant in order to minimize potential impacts:

- Fill will be placed after the installation of the sheet piles is completed for each cell. The sheet piles will act as a silt curtain and contain rocks and sediment.
- The dock will be maintained in a manner that does not introduce any pollutants or debris into the harbor or cause a migration barrier for fish.
- Fuels, lubricants, and other hazardous substances will not be stored below the ordinary high water mark.
- Properly sized equipment will be used to drive piles.
- Oil booms will be readily available for containment should any releases occur.
- The contractor will check for leaks regularly on any equipment, hoses, and fuel storage that occur at the project site.
- All chemicals and petroleum products will be properly stored to prevent spills.
- No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.

11.2 Pile Driving and Removal Activities

COU has established Level A harassment zones to delineate areas in which marine mammals may be exposed to injurious underwater sound levels due to pile driving. Work which could cause noise levels to reach those above the Level A Harassment thresholds will shut down if marine mammals are approaching the Level A harassment zones. Marine mammal monitoring will also occur in in areas where animals could be subjected to noise levels above the Level B harassment thresholds. The Level A and Level B harassment zones are discussed below, summarized in Table 8 and shown in the MMMP.

11.2.1 Level A and Level B Harassment Zones

- During impact pile driving and vibratory pile driving/removal, a shutdown zone shall include the Level A harassment thresholds described in Section 5.2 or where the Level B harassment threshold would be exceeded for a marine mammal not included in the IHA.
- During impact pile driving, the monitoring zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level B harassment thresholds for permitted marine mammals during impact pile driving (160 dB isopleth).

- During vibratory pile driving and removal, the monitoring zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level B harassment thresholds for permitted marine mammals during vibratory pile driving (120 dB isopleth).
- During upland vibratory pile driving and vibratory compaction, the monitoring zone shall include all areas where the SPLs are anticipated to equal or exceed the Level B harassment thresholds for airborne activities for harbor seals (90 dB isopleth) and Steller sea lions (100 dB isopleth).
- The harassment zones will be monitored throughout the time required to drive or remove a pile.
    - If a marine mammal enters the monitoring zone, an exposure will be recorded and animal behaviors documented. However, pile driving would continue without cessation, unless the animal approaches or enters the shutdown zone.
    - If a marine mammal approaches or enters the shutdown zone, all pile driving/removal activities will be immediately halted.
- Take of marine mammals other than Steller sea lions, harbor seals, humpback whales, or killer whales, in the form of Level A or Level B harassment, is not authorized and will be avoided by shutting down pile driving/removal activities before individuals of these species enter the Level B harassment zone.

11.2.2 Marine Mammal Monitoring

Qualified observers will be on site before, during, and after all pile-driving activities. The observers will be authorized to shut down activity if pinnipeds or cetaceans are observed approaching or within the shutdown zone of any construction activities. These areas have been determined to be shutdown zones, as animals that enter this area may be exposed to Level A harassment or animals not included in the IHA may be exposed to unauthorized Level B harassment.

Observers will follow observer protocols, meet training requirements, fill out data forms and report findings in accordance with protocols reviewed and approved by NMFS. A detailed MMMP is found in Appendix D.

If marine mammals are observed approaching or within the shutdown zone, shutdown procedures will be implemented to prevent unauthorized exposure. If marine mammals are observed within the monitoring zone, the sighting will be documented as a potential Level B take. If the number of marine mammals exposed to Level B harassment approaches the number of takes allowed by the IHA, COU will notify NMFS and seek further consultation. If any marine mammal species are encountered that are not authorized by the IHA and are likely to be exposed to sound pressure levels greater than or equal to the Level B harassment thresholds, then the COU will shut down in-water activity to avoid take of those species.

11.2.3 Shutdown and Monitoring Zones

The proposed Level A and Level B harassment zones for underwater noise will be monitored before, during, and after all in-water construction activity. The Level B harassment zones for airborne noise will be monitored before, during, and after all upland construction activity. Effective harassment zones that will be utilized for this project are listed in Section 11.2.1, summarized in Table 8, and shown in the MMMP. If any of the species listed in the IHA are about to enter the Level A harassment zone or any marine mammals not included in the application are seen about to enter the Level B harassment zone, the observers will have the authority to stop work immediately and until the animal(s) voluntarily leave the area.

11.2.4 Pre-Activity Monitoring

Prior to the start of daily in-water construction activity, or whenever a break in pile driving of 30 minutes or longer occurs, the observer will observe the shutdown and monitoring zones for a period of 30 minutes. The

shutdown zone will be cleared when a marine mammal has not been observed within zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start (described in Section 11.2.5) cannot proceed until the marine mammal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans). If the Level B harassment zone has been observed for 30 minutes and non-permitted species are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B zone. If the Level B zone is not visible while work continues, exposures will be recorded at the estimated exposure rate for each permitted species. If work ceases for more than 30 minutes, the pre-activity monitoring of both zones must recommence.

11.2.5 Soft Start Procedures

Soft start procedures will be used prior to pile removal, pile installation, and in-water fill placement to allow marine mammals to leave the area prior to exposure to maximum noise levels. For vibratory hammers, the soft start technique will initiate noise from the hammer for short periods at a reduced energy level, followed by a brief waiting period and repeating the procedure two additional times. For impact hammers, the soft start technique will initiate several strikes at a reduced energy level, followed by a brief waiting period. This procedure would also be repeated two additional times. Equipment used for fill placement will be idled near the waterside edge of the fill area for 15 minutes prior to performing in-water fill placement.

11.2.6 Shutdown Procedures

A shutdown will occur prior to a marine mammal entering a shutdown zone appropriate for that species and the concurrent work activity. Activity will cease until the observer is confident that the animal is clear of the shutdown zone: The animal will be considered clear if:

- It has been observed leaving the shutdown zone; or
- It has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.

If shutdown lasts for more than 30 minutes, pre-activity monitoring must recommence.

11.3 In-Water or Over-Water Construction Activities

During in-water or over-water construction activities having the potential to affect marine mammals, but not involving a pile driver, a shutdown zone of 10 meters will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the removal of the pile from the water column/substrate via a crane ("deadpull"), or the slinging of construction materials via crane.

11.4 Vessel Interactions

To minimize impacts from vessels interactions with marine mammals, the crews aboard project vessels will follow NMFS's marine mammal viewing guidelines and regulations as practicable. (https://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm).

11.5 Compensatory Habitat Mitigation

COU has received a permit for the proposed UMC Dock Positions III and IV Replacement Project under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act from the USACE (POA-1989-324).

To receive that permit, COU agreed to comply with current regulations requiring applicants to compensate for losses to aquatic resources. To mitigate the loss of 2.8 acres intertidal habitat that will result from the construction of the proposed project, COU will remove either 2.8 acres or 2 tons of marine debris from beach areas within the vicinity of the project (figure in Appendix C). The removal of this debris will improve intertidal habitat and reduce the risk of entanglement for marine mammals that occur within the vicinity of the project.

Upon receipt of the IHA, COU will modify their existing USACE permit to include any additional conditions included in the IHA, if necessary.

12 Arctic Subsistence Uses, Plan of Cooperation

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, you must submit either a plan of cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.

This section is not applicable to the proposed project. The project will take place on Unalaska Island, which is located in waters south of the 60° North latitude. No activities will take place in or near a traditional Arctic subsistence hunting area.

13 Monitoring and Reporting Plans

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Monitoring Plan

Monitoring measures for the potential impacts the project could have on marine mammals are discussed briefly in Section 11.2.2 above and at length in the MMMP (Appendix D).

13.2 Reporting

The procedures for reporting are listed below and also in the MMMP (Appendix D).

13.2.1 Annual Report

A comprehensive annual marine mammal monitoring report documenting marine mammal observations will be submitted to NMFS at the end of the in-water work season. The draft comprehensive marine mammal monitoring report will be submitted to NMFS within 90 calendar days of the end of the in-water work period. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during pile driving days. A final comprehensive report will be prepared and submitted to NMFS within 30 calendar days following resolution of comments on the draft report from NMFS.

The reports shall include at a minimum:

- General data:
  - Date and time of activity
  - Water conditions (e.g., sea-state)
  - Weather conditions (e.g., percent cover, percent glare, visibility)
- Specific pile driving data:
  - Description of the pile driving activity being conducted (pile locations, pile size and type), and times (onset and completion) when pile driving occurs.
  - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that pile driving times and strike counts are accurately recorded. The duration of soft start procedures should be noted as separate from the full power driving duration.
  - Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)
- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring
  - Times when pile driving or other in-water construction is delayed due to presence of marine mammals within shutdown zones.

- During-activity observational survey-specific data:
    - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
        - Distance from animal to pile driving sound source.
        - Reason why/why not shutdown implemented.
        - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
        - If a shutdown was implemented, the distance from animal to sound source at the time of the shutdown.
        - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
        - Distance to the animal from the sound source during soft start.

- Post-activity observational survey-specific data:
    - Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
    - Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

14 Coordinating Research to Reduce and Evaluate Incidental Take

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

The data recorded during marine mammal monitoring for the proposed project will be provided to NMFS in monitoring reports. These reports will provide information on the usage of the site by Steller sea lions, harbor seals, humpback whales, and killer whales in an area with very limited information. In addition, monitoring that is currently ongoing will be provided to NMFS for comparison of pre-project and during-project behaviors of pinnipeds and cetaceans. The monitoring data will inform NMFS and future permit applicants about the behavior and adaptability of pinnipeds and cetaceans for future projects of a similar nature.

15 Conclusion

For the reasons described in this document, COU has determined that the proposed project is likely to result in the Level B harassment of small numbers of Steller sea lions, harbor seals, humpback whales, and killer whales. This project has implemented impact minimization measures, including a Marine Mammal Monitoring Plan, to reduce the potential for Level A harassment.

While the Level B harassment has the potential to result in minor behavioral effects to any marine mammals present during pile driving activities, based on the analysis presented in this document, these temporary effects will have a negligible effect on the stocks of marine mammals described in this document or their habitats.

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Appendix A. Underwater Background & Construction Noise Surveys

Underwater Background Noise Survey Memo

Between March 17 and March 19, 2015, PND Engineers, Inc., (PND) visited Dutch Harbor in Unalaska to collect hydroacoustic measurements of underwater sound levels in the vicinity of the UMC Dock for the UMC Dock Positions III & IV Replacement Project.

All hydroacoustic data were collected from the existing docks in Dutch Harbor or some distance offshore using an aluminum work skiff. The measurements took place at various distances from the dock in depths ranging from 1 meter (3.3 feet) to 10 meters (33 feet).

Underwater sound levels were recorded using an omni-directional CR1 hydrophone with -198 dB (re: 1V/µPa) transducer sensitivity over a frequency range from 10 Hz to 20 kHz. The voltage from the hydrophone was amplified using VP2000 preamplifier manufactured by RESON (Model EC6081 – *Figure 1*). The signals from the preamplifier were fed into ST1400ENV Sound Level Monitor (SLM) manufactured by Sound Technology, Inc. (*Figure 2*). The VP2000 preamplifier offers low-noise performance and allows the measurements at frequency below 1Hz.

Figure 1. RESON Preamplifier - VP2000.

The SLM measures the un-weighted peak sound pressure levels over short periods (less than 10 milliseconds), as well as slow averaged (1,000 milliseconds exponential average) and fast averaged (125 milliseconds exponential average) Sound Pressure Levels (SPL). The ST1400ENV SLM has a frequency response of +/- 1 dB from 10 Hz to 48 kHz over anticipated measurement range of 120 to 220 dB linear peak re: 1 µPa. The capacitance of the CR1 hydrophone is documented during factory calibration and remains fixed as long as the cable is not altered. The CR1 hydrophone sensitivity is accurate to +/-2 dB, based on measurements made at the Naval Warfare Center Acoustic Test Facility.

Figure 2. Sound level monitor – ST1400ENV during data collection at drifting station.

Ambient underwater sound levels were collected for a minimum of 10 minutes for each location. In post-processing, the background sound levels were determined by root mean square averaging of 10 minutes of recorded data ($RMS_{10\ min}$). The values of SPLs shown below (*Table 2*) do not represent individual transient sound, but rather an average of existing background levels.

All recording stations were categorized as either "drift" or "fixed." For drift stations, the vessel was allowed to move with currents and wind with all engines turned off. The crew avoided unnecessary movements and activities in the vessel to minimize noise artifacts. Figure 3 shows the instrumentation during data collection for drifting station from the Kloosterboer dock. At the fixed locations, the hydrophone was lowered from the existing dock face to the desired depth.

Figure 3. Underwater sound recording from existing UMC Dock.

Daily recording conditions varied as follows:

- Sound levels for the first set of fixed locations were recorded during stormy weather on March 17 and March 18. Data collected on these days was affected by strong (30-40 MPH) winds, three-to-five-foot waves, and rain. These environmental conditions caused the hydrophone's cable to strum which generates artificial noise strong enough to overwhelm the spectral content in a narrow range of frequency between approximately 0 to 50Hz.
- On March 18, ambient sound level data were collected for drifting station various distances offshore using an aluminum skiff. The weather during this day was characterized by 10-15 MPH northeasterly winds and 1-2 foot waves. Slight strumming was noticed on the hydrophone's cable outside of Dutch Harbor at stations C8 and C14.
- Sound level recordings were re-collected for the several fixed locations (e.g. C5, C3, C2 and C9) on the morning of March 19 during calm weather conditions. No vessels were present in the vicinity of UMC Dock during these recordings, however three fishing vessels were loading/unloading at Spit Dock in the vicinity of station C9. Weather deteriorated on the late morning of March 19 during collection of the sound level data for drifting stations C12 and C13. Slight strumming was noticed in the signal during data collection for these stations.
- Higher noise levels were observed in close proximity to the UMC and Kloosterboer docks on March 17. A variety of periodic mechanical sounds dominated the recorded data. These sounds were

characterized as noise from engines, motors, and pumps generated by large vessels loading/unloading near recording locations.

The average SPL values were calculated over two frequency ranges: the entire frequency band ("broad band SPL" from 0 Hz – 24.5 kHz) as well as over specified background frequency range (from 75 Hz – 20 kHz). These ranges were selected based on pinniped criteria described in a NMFS 2012 guidance document on data collection methods for background noise (NMFS 2012). The guidance presented in the document recommends eliminating frequencies below the range of functional hearing of marine mammals (*Table 1*).

Table 1. Low and high limits for characterizing underwater background sound relevant to marine mammals (NMFS, 2012).

Functional hearing group	f-low	f-high
Low-frequency cetaceans	7 Hz	20 kHz
Mid-frequency cetaceans	150 Hz	20 kHz
High-frequency cetaceans	200 Hz	20 kHz
Pinnipeds	75 Hz	20 kHz

Figure 4 shows the SPLs in the order of collection, both covering the entire frequency (0 Hz – 24.5 kHz) as well as the pinnipeds hearing frequency band (75 Hz – 20 kHz). The ambient pinniped frequency (75Hz – 20kHz) SPL varied from 112.5 dB $RMS_{10\ min}$ recorded at UMC Dock at 1 meter depth during calm weather conditions to 143.8 dB $RMS_{10\ min}$ recorded immediately in front of the Light Cargo Dock on March 18.

The average of all sound levels recorded during this survey was 128.7 dB $RMS_{10\ min}$ (75 Hz – 20 kHz). Table 2 below summarizes the ambient sound pressure levels statistics in the order it was collected.

Table 2. UMC Dock underwater background noise monitoring data. Ambient noise recording period was 10 minutes for all measurements.

Site	Date	Time Start	Time End	Depth of Hydro-phone (meters)	Averaged Spectrum Power Over Whole (0Hz-24.5kHz) Frequency (dB RMS)	Averaged Spectrum Power 75Hz-20kHz Frequency (dB RMS)	Conditions
C5	3/17/15	11:01	11:11	10	140.6	136.6	Measuring from City Dock. Rain. 40-50 mph wind, 3-5 ft. waves. Tug and barge moored 100-200 feet from site loading/unloading at the dock.
C3	3/17/15	11:24	11:25	10	142.8	136.1	Measuring from City Dock. Rain. 40-50 mph wind, 3-5 ft. waves. "Deep Pacific" and "Lilly Ann" loading/unloading at the dock 50 feet from site. Forklift is working on the dock.
C2	3/17/15	11:47	11:57	10	142.3	141.0	Measuring from City Dock. Rain. 40-50 mph wind, 3-5 ft. waves. "Northern Glacier" and "Sikuliaq" loading/unloading at the dock 100 feet from site.

C7	3/17/15	12:34	12:44	5	136.1	133.0	Measuring from Magone Salvage barge. "Makushin Bay" moored next to the barge. Forklift is working on the barge.
C10	3/17/15	13:15	13:25	10	140.8	136.8	Measuring from Kloosterboer Dock. Rain, windy, waves. Three large ships unloading at the dock. Periodic mechanical sound dominating in recorded data.
C11	3/17/15	13:40	13:50	3	136.3	125.8	Measuring from Icicle Seafood Dock next to "Gordon Jensen" loading/unloading at the dock.
C9	3/17/15	14:07	14:17	5	141.0	132.2	Measuring from Spit Dock. Rain. 30-40 mph wind. Five vessels moored 100-200 feet from site loading/unloading at the dock.
L1	3/17/15	15:38	15:48	5	139.7	130.8	Measuring from Light Cargo Dock between two Open Cells. Windy, rain. No ships.
C14	3/18/15	15:38	15:48	10	143.1	121.4	Measuring from boat. Wind 10 mph, 2 feet swell breaking on skiff, rain.
C8	3/18/15	15:59	16:09	10	150.1	128.9	Measuring from boat. Wind 25 mph gusting 40 mph, 2 feet swell breaking on skiff, rain. Hydrophone is strumming. Large vessel passing 300 feet away.
C15	3/18/15	16:22	16:32	10	147.1	129.6	Measuring from boat. Wind 25 mph gusting 40 mph, small waves, rain. Hydrophone is strumming. Large vessels in proximity.
L4	3/18/15	16:42	16:52	10	148.6	141.5	Measuring from boat. Windy, small waves, rain. Large vessels in proximity.
L3	3/18/15	17:08	17:18	10	145.0	135.2	Measuring from boat in front of Spit Dock. Windy, small waves, rain. 3 large vessels moored @ Kloosterboer.
L2	3/18/15	17:33	17:43	5	147.9	143.8	Measuring from boat in front of Light Cargo Dock. Windy, small waves, rain. 8 small vessels moored @ Spit Dock.
C6	3/18/15	17:54	18:04	10	150.1	126.2	Measuring from boat. Windy. Rain. 1 ft. waves
C4	3/18/15	18:22	18:32	10	144.5	129.2	Measuring from boat. Windy. Rain. 1 ft. waves. Large vessel passing by.
C1	3/18/15	18:40	18:50	10	153.0	127.3	Measuring from boat. Windy. Rain. 1 ft. waves. Recording next to Sikuliaq vessel.
C5	3/19/15	8:56	9:07	10	125.8	117.7	Repeat measurements for the same point during calm weather conditions. Measuring from city dock. Light wind. Rain. Small waves. No ships in vicinity.
C5-5	3/19/15	9:08	9:18	5	130.4	116.6	Measuring from city dock. Hydrophone depth changed to 5 meters. Light wind. Rain. Small waves. No ships in vicinity.

C5-1	3/19/15	9:20	9:30	1	136.5	112.5	Measuring from city dock. Hydrophone depth changed to 1 meters. Same conditions.
C3	3/19/15	9:39	9:50	10	127.7	116.9	Repeat measurements for C3 site during calm weather conditions. Measuring from city dock. Light wind. Forklift working on dock.
C2	3/19/15	9:57	10:08	10	124.4	119.2	Repeat measurements for C2 site during calm weather conditions. Measuring from city dock. Light wind. R/V Sikuliaq in vicinity.
C9	3/19/15	10:17	10:28	5	132.7	130.6	Repeat measurements for C9 site during calm weather conditions. Measuring from city dock between three fishing vessels. Light wind.
C12	3/19/15	11:08	11:17	5	149.1	120.6	Measuring from boat. 20 mph wind. Rain. 1 ft. waves. Large vessel passing by. Hydrophone cable is strumming.
C13	3/19/15	11:29	11:39	10	150.1	127.2	Measuring from boat. 30 mph wind. Rain/Snow. 1-2 ft. waves. Large vessels passing by. Hydrophone cable is strumming.

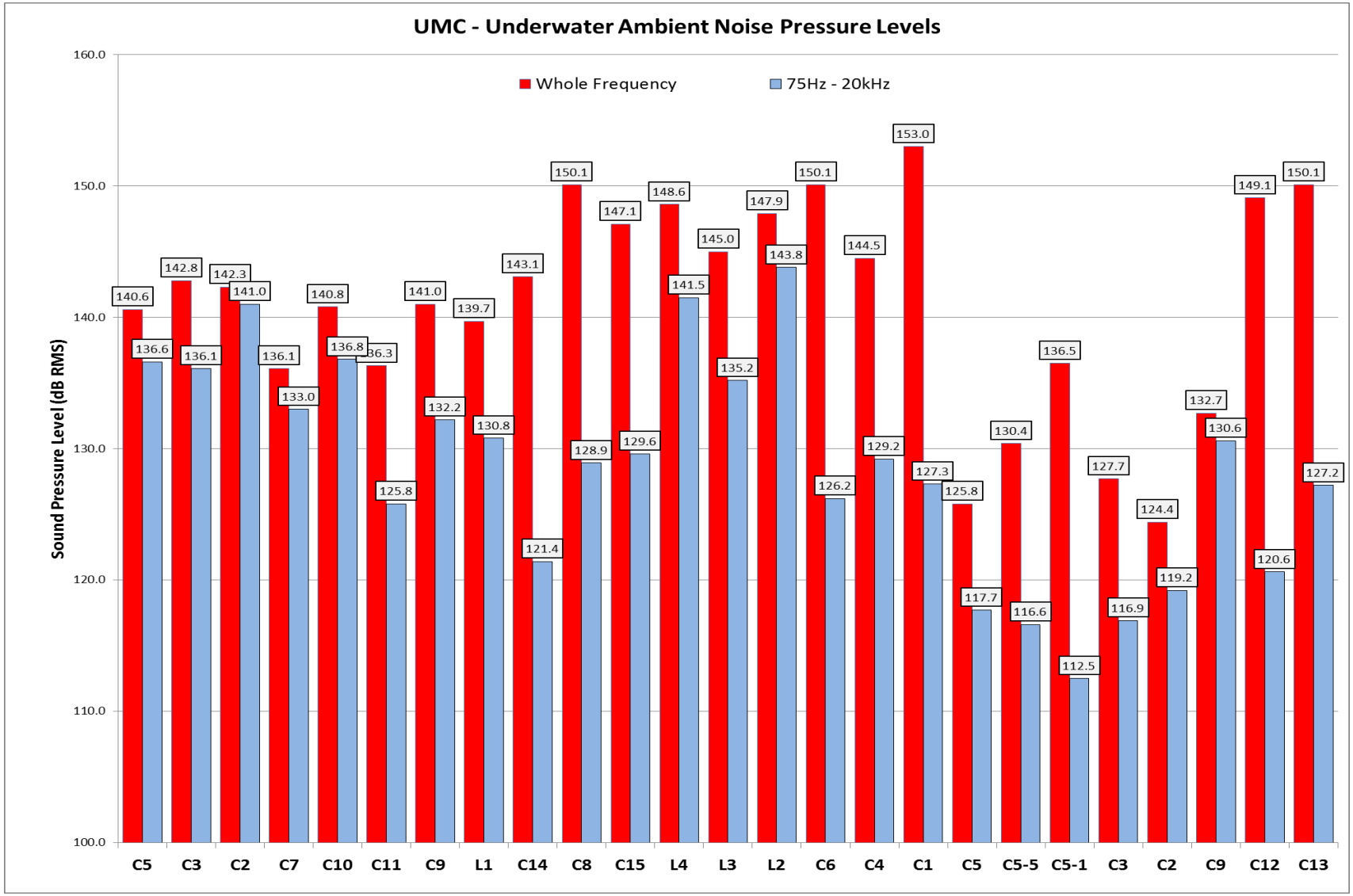


Figure 4. UMC background sound pressure levels.

The map of color-coded sound pressure levels recorded for every monitoring location is presented in Figure 5. Figure 6 shows the map of color-coded ambient sound pressure levels re-collected on March 19. Measurements taken while drifting are indicated with a color-coded line showing the area traversed during the drift. Measurements taken from fixed positions are indicated by a color-coded dot. Please note that during the data collection that occurred on March 19 the weather was calm and UMC Dock was free of vessels, though several fishing vessels were loading and unloading at the Spit Dock (Station C9). The sound pressure levels recorded at the Station C9 show comparable sound pressure values (slightly above 130 dB RMS) with the values recorded on March 17 and were characterized as the cyclic mechanical noise from the engines and pumps of several vessels.

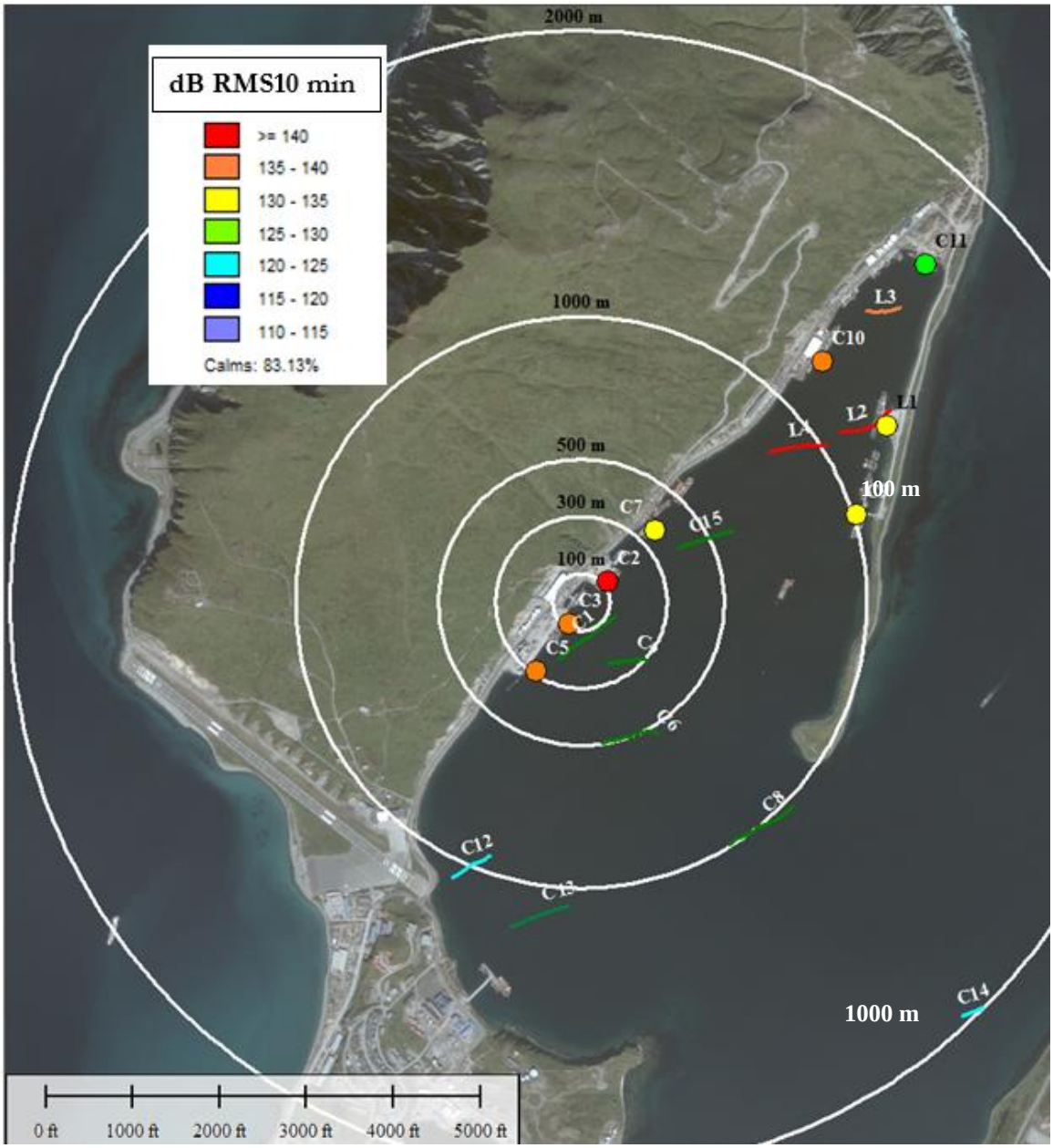


Figure 5. Map of background noise levels at various distances from the UMC dock

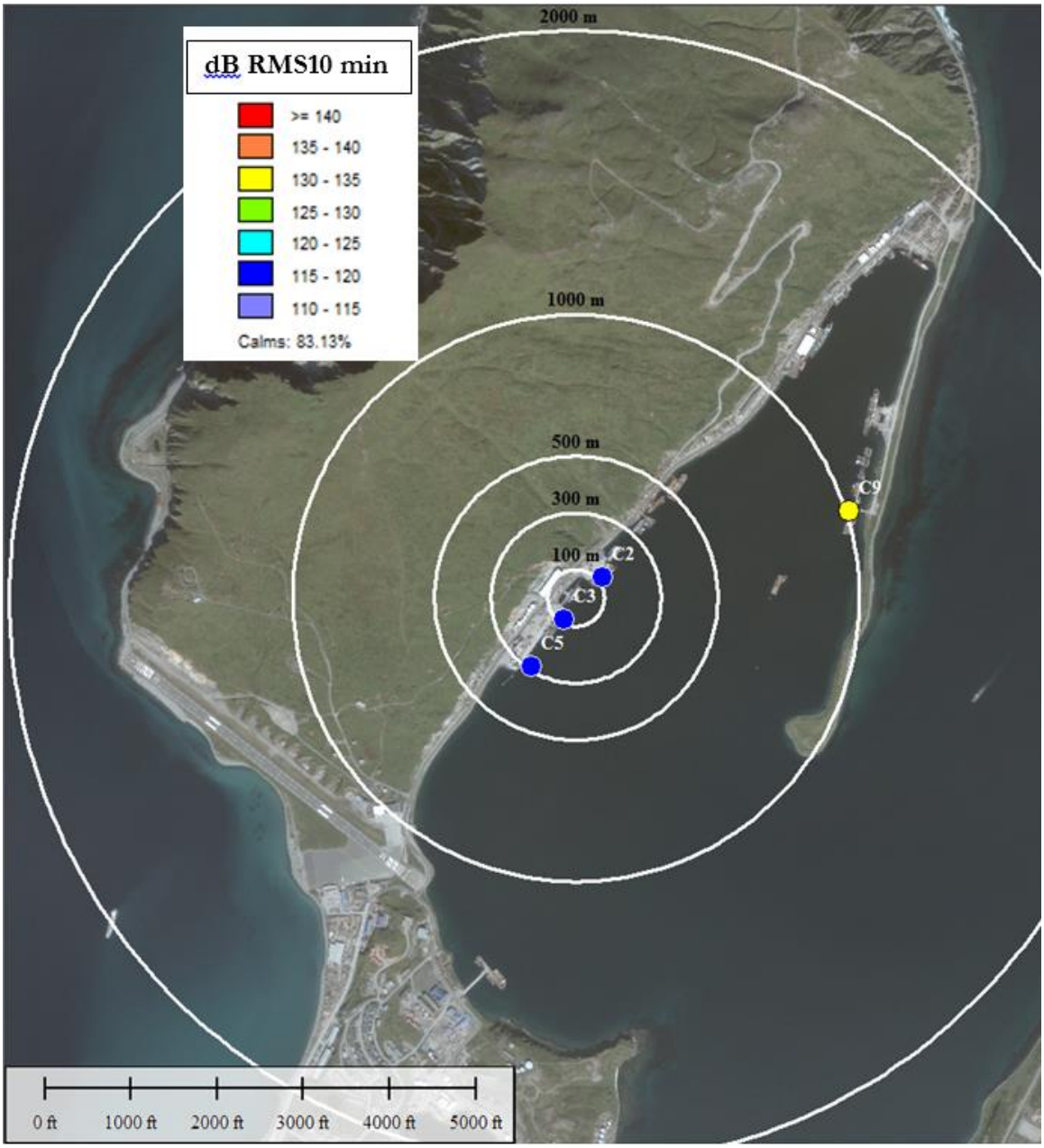


Figure 6. Map of background noise levels at the UMC Dock recorded on March 19.

Dutch Harbor is a fairly noisy body of water. Underwater sounds from industrial sources were easily detectable in most of the recorded data files. These sounds originated from vessel engines, vehicle traffic, airport traffic, and machinery. A variety of unidentified periodic mechanical sounds from unknown sources dominated some recorded data. These sounds were characterized as noise from engines, motors, and pumps. Vessel propulsion and mechanical sounds dominated recorded sound pressure levels in close proximity to the docks.

Underwater Construction Noise Preliminary Survey Memo

INTRODUCTION

On June 15, 2016, PND Engineers, Inc. completed hydroacoustic measurements in Iliuliuk Harbor during construction activities for the UniSea G1 Dock Replacement project. The purpose of the hydroacoustic monitoring was to collect real-time underwater sound levels during the installation of sheet pile cell wall sections.

This report describes the methods for data collection and characterizes the UniSea G1 Dock Replacement underwater construction sounds at various distances and depths offshore from the source.

Figure 1. UniSea G1 Dock construction in progress from Haystack Mtn.

PILE DRIVING OPERATION AND EQUIPMENT

The UniSea G1 Dock Replacement project includes removal of a portion of the existing pier, construction of a new OPEN CELL SHEET PILE™ (OCSP) dock face, and the placement of approximately 31,000 cubic yards of fill behind the sheet pile bulkhead. In order to complete the dock construction, an IHA authorization was sought to incidentally harass Steller's sea lions and harbor seals within Iliuliuk Harbor, and a full protected-species observer program was in effect, monitoring the impacts of construction noise on local wildlife. The construction effort also provided this opportunity to collect empirical measurements of sound levels to support permitting efforts for future construction projects.

The sheet piles were approximately 20 inches wide with 1-inch-thick walls and range from approximately 20 to 50 feet in length. Pile driving events measured were 20 feet from shore in water depths of approximately 30 feet.

The ICE-416 vibratory driver was used to drive sheet piles to bedrock. The model ICE-416 vibratory driver has a centrifugal force of 90 tons and an eccentric moment of 2,200 in-lbs.

Figure 2. Pile placement for UniSea G1 Dock sheet pile cells

HYDROACOUSTIC INSTRUMENTATION

All hydroacoustic data were collected using two methods (further described below):

1) Continuous recording at fixed locations using an autonomous acoustic buoy suspending four hydrophones at various depths. Figure 3 shows the acoustic buoy deployed about 10 meters in front of the OCSP.
2) Intermittent vessel-based recordings using one hydrophone at variable depths and distances from the dock. Figure 4 shows data collection aboard the project rover vessel using a roving hydrophone.

Measurements at fixed locations were made using four omni-directional HTI-96-MIN hydrophones over a frequency range from 3 Hz to 30 kHz. The signal from the hydrophones was fed into a BA-SDA14 Compact Real-time Hydrophone Buoy manufactured by RTSys. The BA-SDA14 buoy is equipped with a wireless connection that provides real-time access to an embedded interface via computer. Four hydrophones were simultaneously connected to the buoy system. The BA-SDA14 has the ability to measure the un-weighted peak sound pressure levels with an accuracy of 1/78125 samples, which corresponds to a rate of less than 12 microseconds. All hydrophones were calibrated and certified prior to arrival.

Figure 3. BA-SDA14 acoustic buoy with four hydrophones suspended at various depths

The vessel-based measurements were made from an aluminum skiff. Data was collected using an omni-directional 24-bit icListen-HF-X2 high frequency broadband digital Smart Hydrophone manufactured by OceanSonics, Ltd. The icListen hydrophone records acoustic signals in the range of 1 Hz to 204.8 kHz and can transmit processed data while storing waveform data internally. The icListen-HF-X2 has a frequency response of +/- 1 dB from 1 Hz to 20 kHz and +/- 3 dB up to 100 kHz over the anticipated measurement range of 80 to 210 dB re: 1 µPa linear peak. During operations, one icListen-HF-X2 hydrophone was suspended directly from the skiff. The measurements took place at various distances offshore in depths ranging from 2 meters to 9 meters with a clear acoustic line of sight between the pile and the hydrophone. The boat was anchored and the boat's engine was turned off during recordings. A laser rangefinder was used to determine the distance to the driven pile.

Figure 4. Vessel-based sound level monitoring with one hydrophone.

All collected data were backed up at the end of each day to a portable hard drive. All pertinent information (i.e., weather, tide, vessel and construction activities, etc.) for the duration of each data file was documented in field logs. Underwater sound levels referenced in this document are in decibels (dB) referenced to 1 micro-Pascal (re: 1 µPa). Ambient underwater sound levels were collected for at least one minute prior to, or immediately after, each pile-driving event to determine background sound levels.

UNDERWATER SOUND CONCEPTS AND TERMINOLOGY

Underwater sound is defined as a small disturbance in a fluid from ambient conditions, through which energy is transferred away from a source (i.e., the strike of a pile hammer). As energy travels, it compresses the molecules in the adjacent medium, creating a high-pressure region. The mathematical definition of a decibel is the "base 10 logarithmic function of the ratio of the pressure fluctuations to a reference pressure" (Caltrans, 2015).

Sound Pressure Level (SPL) = 10 $\log_{10}$ $(p/p_{ref})^2$ (dB re: 1 µPa) where **p_{ref}** for water is **1 µPa.**

Two common descriptors used to describe underwater sounds from pile installation projects are the peak and the root-mean-square (RMS) SPL. Continuous sounds (i.e., drilling, vibratory driving, and vibracompaction) are generally given in terms of the RMS SPL. The RMS amplitude is a type of average that is determined by squaring all the amplitudes over the period of interest, determining the mean of the squared values, and then taking the square root of the mean of the squared values.

All underwater sound pressure levels in this document are presented in 10-second average RMS values, unless otherwise specified. This is done by taking 10-second averages across the pile-driving event and then averaging

all of the 10-second periods. For ambient sound, 30-second RMS averages were used across a minimum five-minute period.

Sound Exposure Level (SEL) = SPL_{RMS} + 10 $\log_{10}$ T (dB re: 1 µPa² • s)

Sound exposure level is the constant sound level over one second that has the same amount of energy as the original event, calculated by summing the cumulative pressure squared over the time of the event. This presents the total energy of the event of a given length of noise event, rather than an instantaneous measurement.

RESULTS

Vibratory pile-driving SPLs were monitored from June 7 through June 15, 2016. Continuous underwater sound was recorded for forty-four driven sheet piles at various distances offshore in depths ranging from 2 meters to 9 meters. The vibratory time needed to drive a sheet pile to bedrock ranged from 15 minutes to 30 seconds. Twenty-eight representative sustained pile-driving events were selected to calculate 10-second RMS values. For the calculation of vibratory SPL, only the period when the driving hammer was on is used. Preliminary analysis found average ambient to be 158.8 dB (30-sec dB RMS re: 1 µPa). Incidental construction noise was present the majority of the time ambient or pile-driving noise was recorded, including skiff traffic, heavy equipment operations on adjacent cells, man lifts, and generators. Initial results found maximum SPL for the twenty-eight selected events to be 166.8 dB RMS and average SPL to be 160.7 dB RMS with standard deviation of 2.2. Vibratory pile driving statistics for the twenty-eight selected events are preliminarily offered in Table 1.

Table1. Vibratory sheet pile driving sound level statistics – *Preliminary Results*

Vessel-based sound level monitoring summary (PRELIMINARY)		
Distance from pile to hydrophone (meters)		10 m
Depth of hydrophone (meters)		2 m
Water Depth (meters)		12 m
Number of piles averaged		28
Average driving time (seconds)		180 s
Average ambient noise (30-sec dB RMS re: 1 µPa)		158.8 dB
SPL_{RMS}	Maximum (10-sec dB RMS re: 1 µPa)	166.8 dB
	Average (10-sec dB RMS re: 1 µPa)	160.7 dB
	Minimum (10-sec dB RMS re: 1 µPa)	158.4 dB
	Standard Deviation	2.2 dB
SEL	Maximum (2-sec dB re: 1 µPa² • s)	168.1 dB
	Average (2-sec dB re: 1 µPa² • s)	161.1 dB
	Minimum (2-sec dB re: 1 µPa² • s)	158.9 dB
	Standard Deviation	2.2 dB
SPL_{PEAK}	Maximum (dB re: 1 µPa)	187.8 dB
	Average (dB re: 1 µPa)	171.5 dB
	Minimum (dB re: 1 µPa)	163.0 dB
	Standard Deviation	5.6 dB

One long-lasting pile-driving event was selected to compare sound levels generated by sheet pile versus depth. Four HTI-96-MIN hydrophones of the same sensitivity were deployed 10 meters from the pile at 2-, 4-, 6- and 8-meter depth. Time-synchronized multichannel signal was fed into the BA-SDA14 hydrophone buoy. Average SPL at four depths ranged from 163.2 dB – 164.8 dB. Vibratory pile driving statistics for the fixed buoy are presented in Table 2.

Table 2. Vibratory Driving Sound Levels vs. Depth – *Preliminary Results*

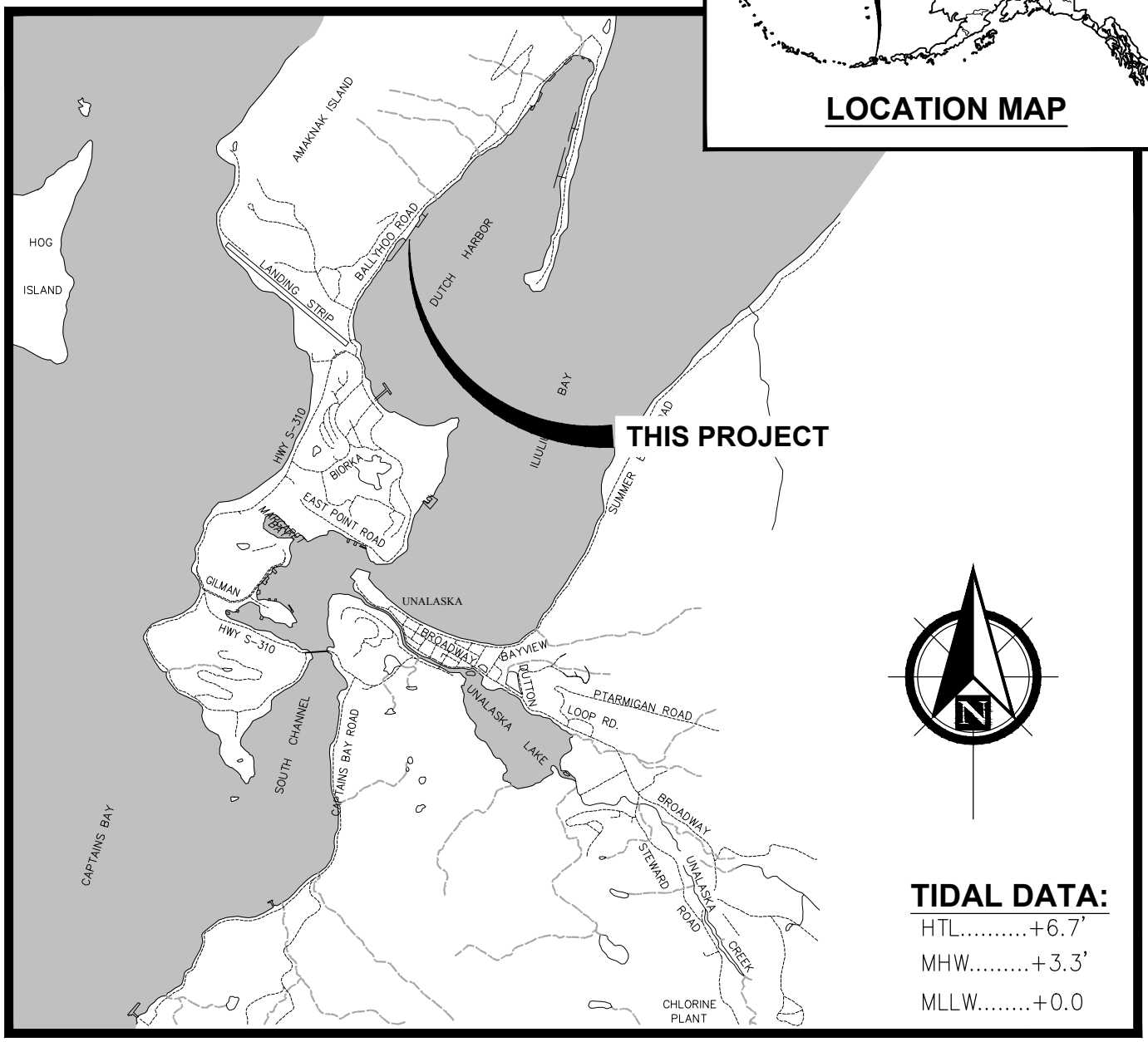
Channel No	**Distance from pile to hydrophone (meters)**	**Depth of hydrophone (meters)**	**Driving Time (sec.)**	**SPL (10-sec dB RMS re: 1 µPa)**		
				Max	Average	Min
A	10	2	370	166.8	164.5	162.2
B		4		166.3	163.2	159.5
C		6		167.5	164.8	162.5
D		8		166.5	163.8	161.8

REFERENCES

Caltrans. 2015. D. Buehler, R. Oestman, J. Reyff, K. Pommerenck, and B. Mitchell. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Technical report prepared by ICF International and Illingworth & Rodkin, Inc., for the California Department of Transportation, Sacramento CA. November 2015. CTHWANP-RT-15-306.01.01. http://www.dot.ca.gov/hq/env/bio/files/bio_tech_guidance_hydroacoustic_effects_110215.pdf.

Popper, A., Carlson, T., Hawkins, A., Southall, B., and Gentry, R. 2006. Interim Criteria for Injury of Fish Exposed to Pile Driving Operations. White paper submitted to Fisheries Hydroacoustic Working Group. http://www.dot.ca.gov/hq/env/bio/files/piledrivinginterimcriteria_13may06.pdf

Appendix B. Project Permit Drawings



PURPOSE:
TO PLACE FILL FOR STORAGE AREA AND ADD ADDT'L PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

VICINITY MAP

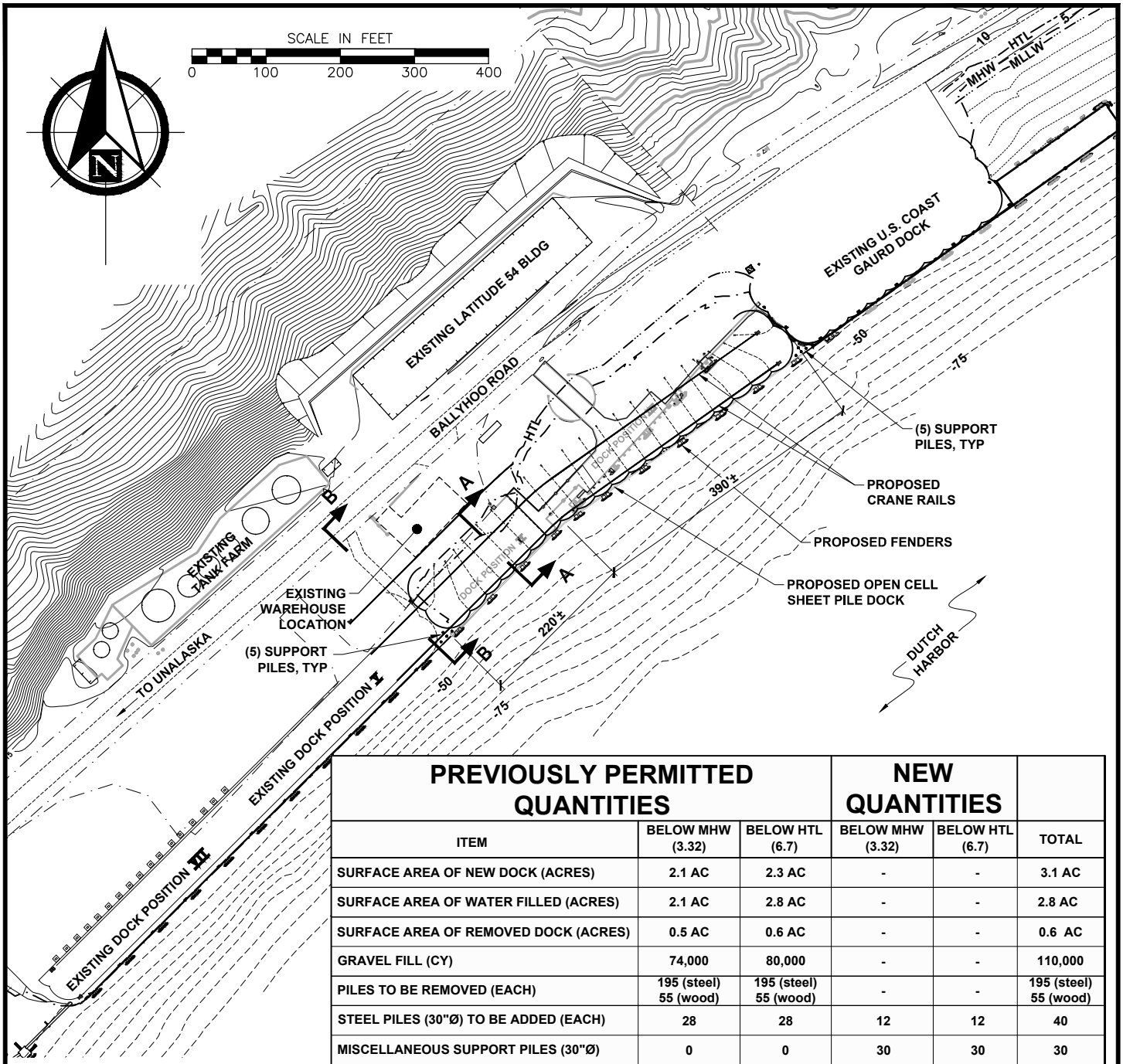
CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M8

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

5/18/16



PREVIOUSLY PERMITTED QUANTITIES			NEW QUANTITIES		
ITEM	BELOW MHW (3.32)	BELOW HTL (6.7)	BELOW MHW (3.32)	BELOW HTL (6.7)	TOTAL
SURFACE AREA OF NEW DOCK (ACRES)	2.1 AC	2.3 AC	-	-	3.1 AC
SURFACE AREA OF WATER FILLED (ACRES)	2.1 AC	2.8 AC	-	-	2.8 AC
SURFACE AREA OF REMOVED DOCK (ACRES)	0.5 AC	0.6 AC	-	-	0.6 AC
GRAVEL FILL (CY)	74,000	80,000	-	-	110,000
PILES TO BE REMOVED (EACH)	195 (steel) 55 (wood)	195 (steel) 55 (wood)	-	-	195 (steel) 55 (wood)
STEEL PILES (30"Ø) TO BE ADDED (EACH)	28	28	12	12	40
MISCELLANEOUS SUPPORT PILES (30"Ø)	0	0	30	30	30
CRANE RAIL SUPPORT STEEL PILES (EACH)	125 (within dock)	125 (within dock)	-	-	150 (within dock)
SHEET PILES TO BE ADDED (EACH)	1400	1700	-	-	1800

NOTES:
1. STEEL PILES 30"Ø x 0.5"t
2. FOOTPRINT INCLUDES GRAVEL FILL AND STEEL FENDER PILES

PURPOSE:
TO PLACE FILL FOR STORAGE AREA AND ADD ADDT'L PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

PROPOSED ADD'L PILES PLAN

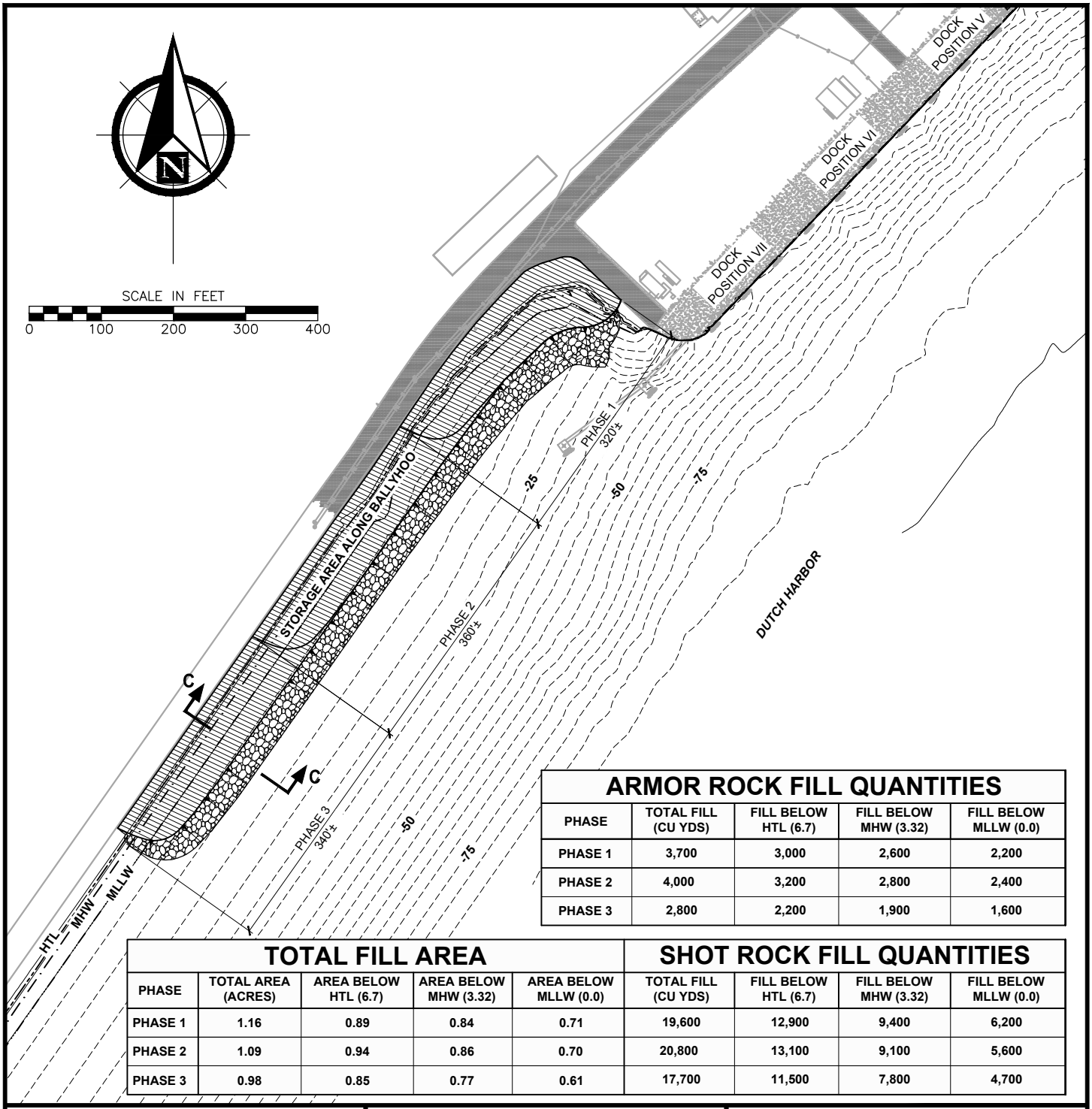
CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M8

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

5/18/16



ARMOR ROCK FILL QUANTITIES

PHASE	TOTAL FILL (CU YDS)	FILL BELOW HTL (6.7)	FILL BELOW MHW (3.32)	FILL BELOW MLLW (0.0)
PHASE 1	3,700	3,000	2,600	2,200
PHASE 2	4,000	3,200	2,800	2,400
PHASE 3	2,800	2,200	1,900	1,600

TOTAL FILL AREA

PHASE	TOTAL AREA (ACRES)	AREA BELOW HTL (6.7)	AREA BELOW MHW (3.32)	AREA BELOW MLLW (0.0)
PHASE 1	1.16	0.89	0.84	0.71
PHASE 2	1.09	0.94	0.86	0.70
PHASE 3	0.98	0.85	0.77	0.61

SHOT ROCK FILL QUANTITIES

TOTAL FILL (CU YDS)	FILL BELOW HTL (6.7)	FILL BELOW MHW (3.32)	FILL BELOW MLLW (0.0)
19,600	12,900	9,400	6,200
20,800	13,100	9,100	5,600
17,700	11,500	7,800	4,700

PURPOSE:
TO PLACE FILL FOR STORAGE AREA AND ADD ADDT'L PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

STORAGE AREA PLAN

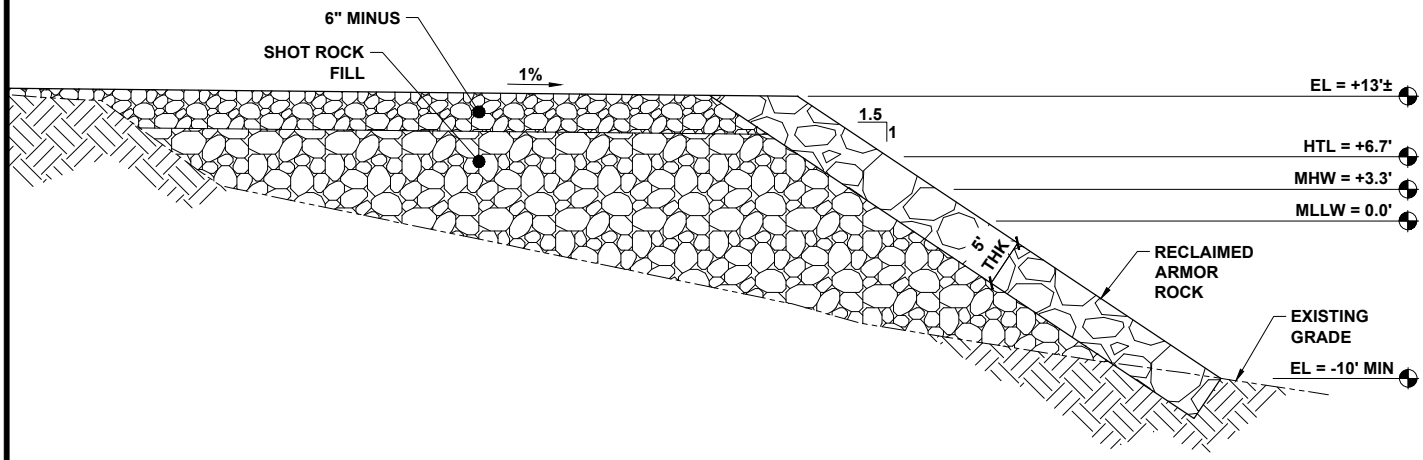
CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M8

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

5/18/16



SECTION C-C

NTS

PURPOSE:
TO PLACE FILL FOR STORAGE AREA AND ADD ADDT'L PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

SECTION

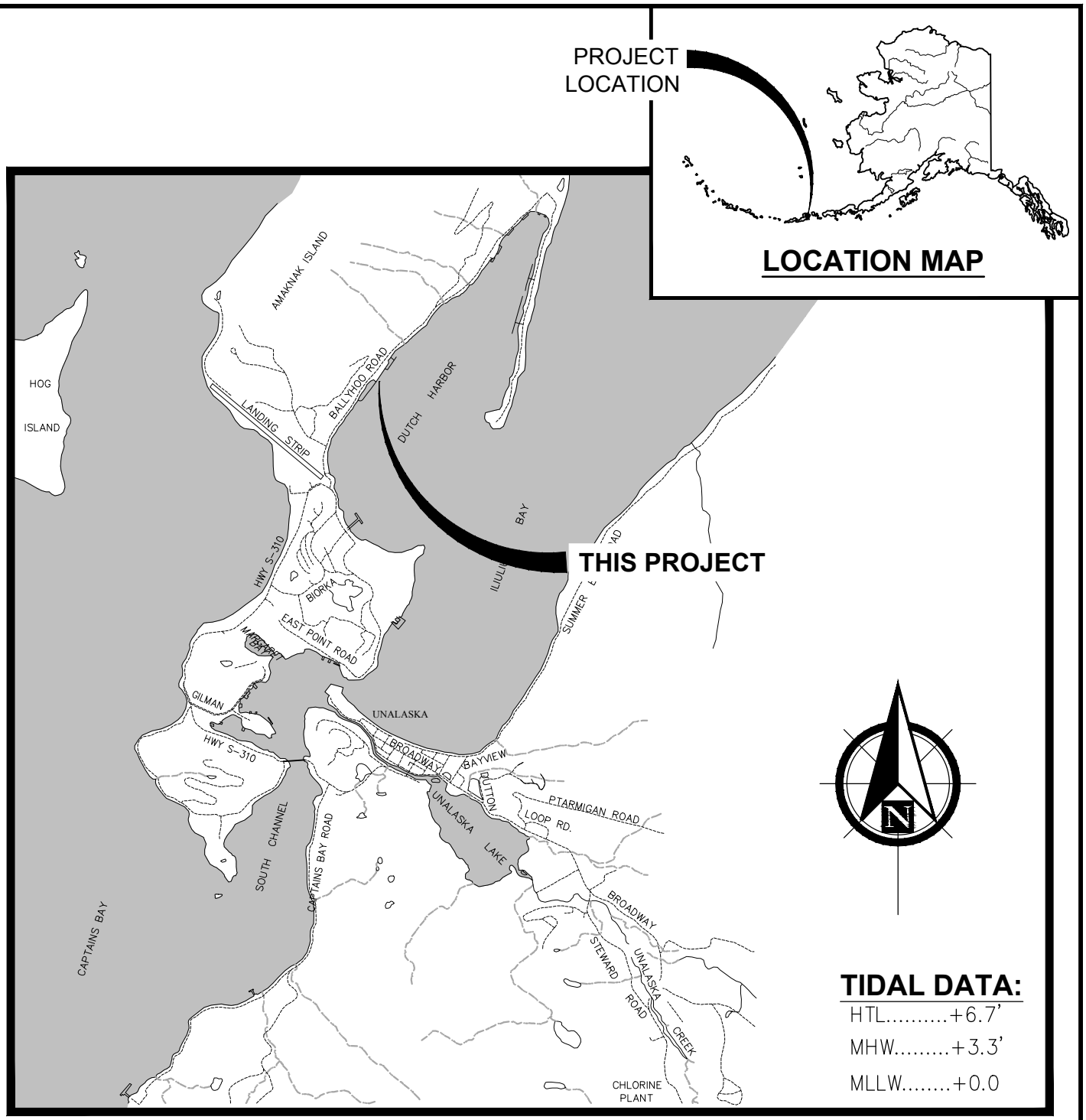
CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M8

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

5/18/16



PURPOSE:
ADD ADDITIONAL PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

VICINITY MAP

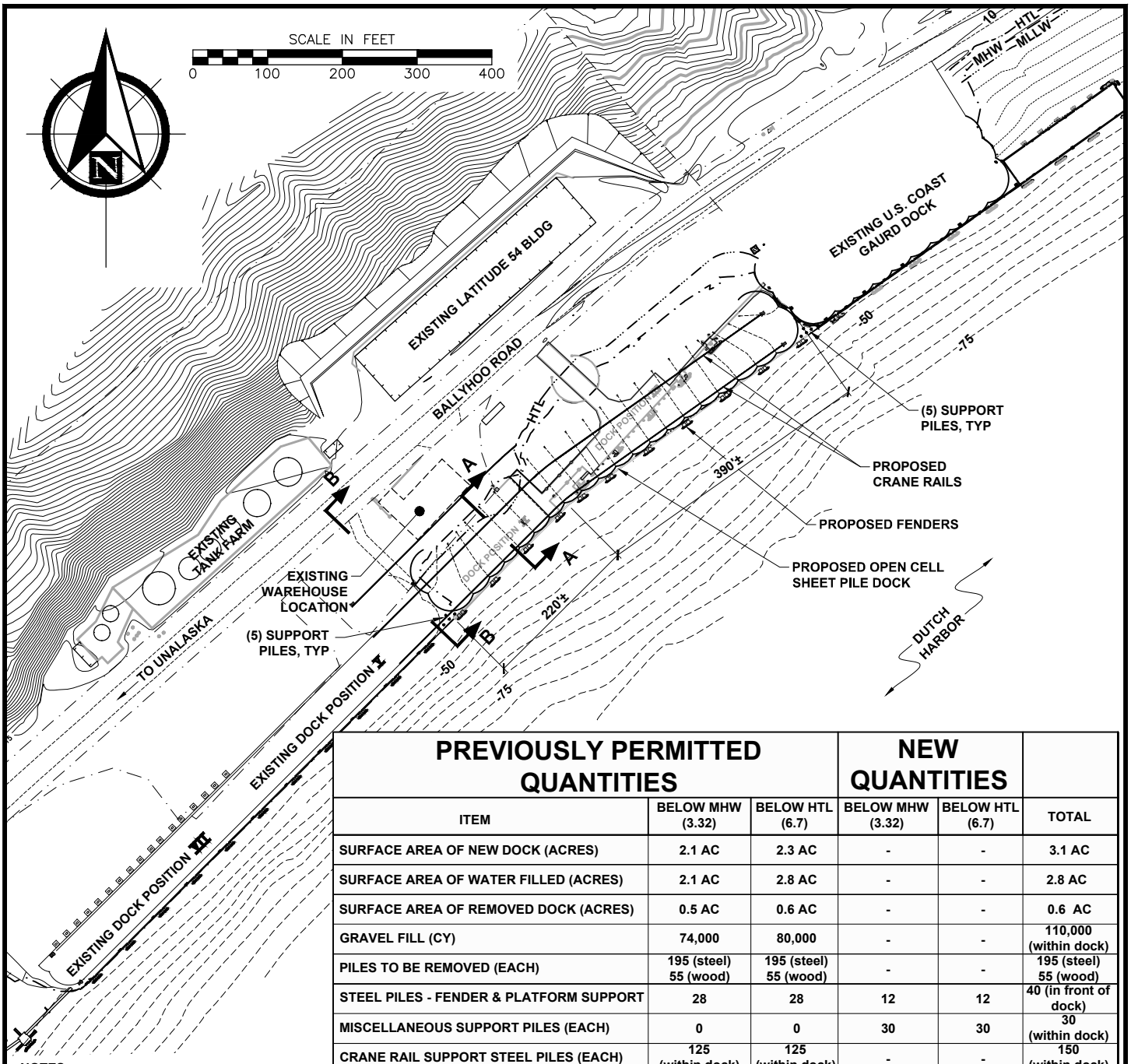
CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M9

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

08/01/16



PREVIOUSLY PERMITTED QUANTITIES			NEW QUANTITIES		
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SURFACE AREA OF NEW DOCK (ACRES)	2.1 AC	2.3 AC	-	-	3.1 AC
SURFACE AREA OF WATER FILLED (ACRES)	2.1 AC	2.8 AC	-	-	2.8 AC
SURFACE AREA OF REMOVED DOCK (ACRES)	0.5 AC	0.6 AC	-	-	0.6 AC
GRAVEL FILL (CY)	74,000	80,000	-	-	110,000 (within dock)
PILES TO BE REMOVED (EACH)	195 (steel) 55 (wood)	195 (steel) 55 (wood)	-	-	195 (steel) 55 (wood)
STEEL PILES - FENDER & PLATFORM SUPPORT	28	28	12	12	40 (in front of dock)
MISCELLANEOUS SUPPORT PILES (EACH)	0	0	30	30	30 (within dock)
CRANE RAIL SUPPORT STEEL PILES (EACH)	125 (within dock)	125 (within dock)	-	-	150 (within dock)
ESTIMATED TEMPORARY PILES (18")	0	0	200	200	200 (within dock)
SHEET PILES TO BE ADDED (EACH)	1400	1700	-	-	1800

NOTES:
1. STEEL PILES 30"Ø x 0.5"t (unless noted otherwise)
2. FOOTPRINT INCLUDES GRAVEL FILL AND STEEL FENDER PILES

PURPOSE:
ADD ADDITIONAL PILES TO POSITION III & IV PLAN

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030° N
−166.5270° W

PROPOSED ADD'L PILES PLAN

CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT

POA−1989−324−M9

ON: AMAKNAK ISLAND
IN: DUTCH HARBOR

08/01/16

Appendix C. Marine Debris Mitigation Project Plan

Compensatory Mitigation Plan
UMC Dock Positions III & IV Replacement

POA-1989-324-M7

City of Unalaska

Submitted October 21, 2015

Submitted to:
US Army Corps of Engineers
Regulatory Division
Kenai Field Office
44669 Sterling Highway, Suite B
Soldotna, Alaska 99669

Prepared by:
PND Engineers, Inc.
1506 West 36th Avenue
Anchorage, AK 99503

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1 Objectives

The City of Unalaska (COU) proposes to clean either 2 tons of marine debris from a local shoreline or clean debris from 2.8 acres of marine intertidal habitat located in Unalaska to compensate for unavoidable impacts to 2.8 acres of waters of the United States associated with the proposed Unalaska Marine Center (UMC) Dock Positions III & IV Replacement Project.

The proposed impact project is located between the existing USCG Dock and the existing UMC Dock. The proposed project provides 610 feet of new dock face with a minimum water depth of approximately 45 feet. The project will align approximately 390 feet of the new dock face with the current U.S. Coast Guard dock creating a total face length of approximately 730 feet, for this section of the facility. The project will also provide approximately 220 feet of dock aligned with existing UMC Positions V through VII creating the added length needed for modern container ships that use the Port of Dutch Harbor. The proposed dock has the added benefit of creating over 1.8 acres of new uplands area that can be utilized for container storage or other critical port activities.

Dutch Harbor is currently listed as impaired by the Alaska Department of Environmental Conservation (ADEC) due to the presence of petroleum hydrocarbons. The coastline waters of the harbor were identified as impacted during a 2006 assessment by ADEC. The potential sources of this contamination include several nearby contaminated sites as well as many industrial sources that currently operate within the harbor area.

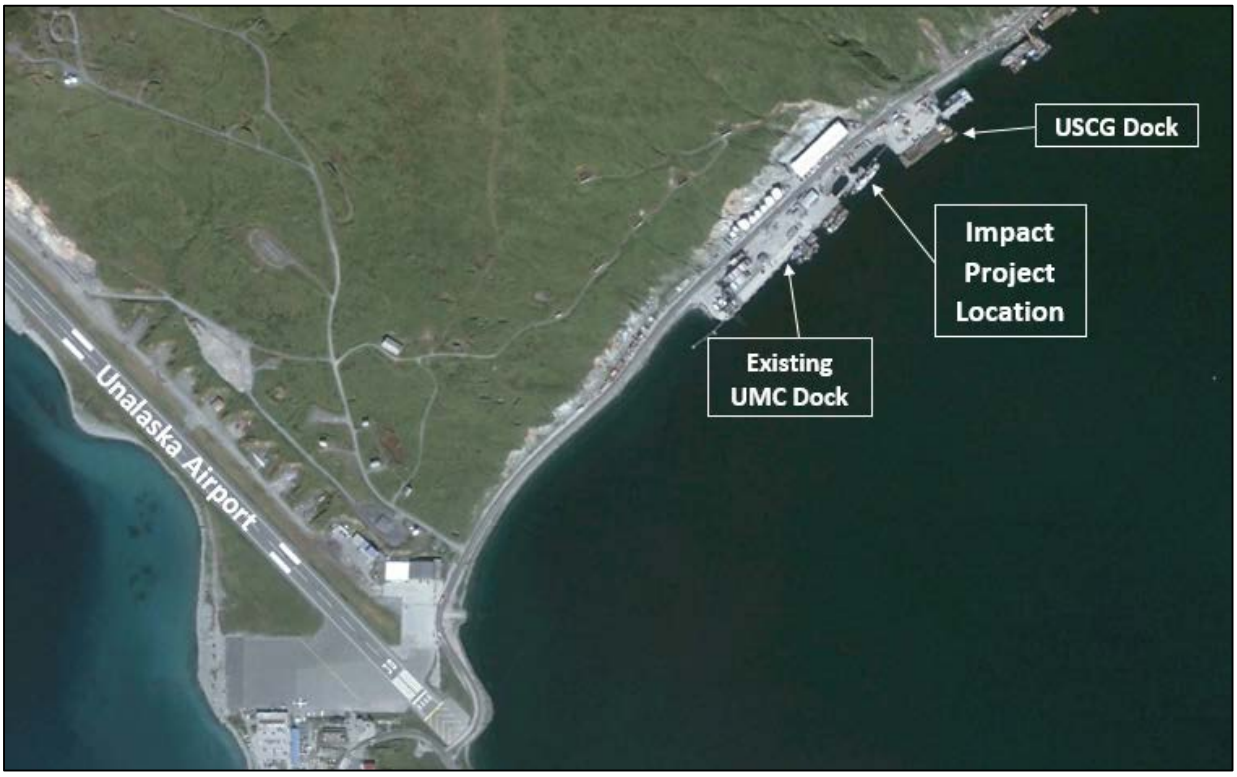

Figure 1. *Impact project location.*

2 Site Selection Criteria

The City of Unalaska proposes to restore an area of local marine intertidal to its natural condition by removing marine debris that has accumulated along the shoreline. Either 2 tons of marine debris will be removed or an area of 2.8 acres of shoreline will be cleaned. Upon completion of the debris removal, there will be a lowered entanglement risk to marine mammals that reside in the area. Additionally, the watershed could benefit greatly from the removal of debris, which may include large metal items. Debris above HTL may be removed to prevent it from being displaced from the shoreline during storm events.

Several possible mitigation sites are currently being considered by the City. The City will select a site (or sites) that meet(s) the objectives of this plan from the sites listed in Table 1 and shown in Figure 2. Site 1, located within the Spit, was selected based on its proximity to the impact project site. It is located within the same waterbody, which is frequented by both fishing vessels and a variety of marine mammals. Site 2, located north of the Airport, is also located close to the project site, but it is located in a different waterbody. Both sites were selected because they have impaired waters (see section 4.2).

The removal of marine debris before if enters the waterbody will protect the water quality at the site from worsening. The debris, which is composed of various materials and compounds, will be prevented from entering the waterbody. Marine debris is also considered to be a cause of adverse impacts to marine mammals, sea turtles, and seabirds through entanglement and ingestion by the National Oceanic and Atmospheric Administration. Several types of seabirds and marine mammals are common within the waters around Unalaska Island. The proposed mitigation project was selected as it will be beneficial to the community and local animals.

Table 1. *Proposed mitigation sites.*

Site Number	Site Name	Approximate Distance to Impact Site (mi)
1	Spit	0.65
2	Airport	1.0

3 Site Protection Instrument

Most of the work will occur within tidelands that were conveyed to the City of Unalaska by the State of Alaska. COU will work with additional property owners to ensure that the necessary approval is received prior to starting the project. No easements or transfers of property ownership are proposed.

4 Baseline Information

4.1 Impact Site

The impact site is located at the existing UMC Dock (Figure 1) within Dutch Harbor in Unalaska, Alaska (53.9030°N, -166.5273° W) Township 72S, Range 117W, Section 35, of the Seward Meridian as found on USGS Quad Map Unalaska C-2. Under the Cowardin Classification, this site is considered to be an unconsolidated intertidal area. The mitigation site is part of an existing dock pile supported dock.

Dutch Harbor is currently listed as impaired by the Alaska Department of Environmental Conservation (ADEC) due to the presence of petroleum hydrocarbons. The coastline waters of the harbor were identified as impacted during a 2006 assessment by ADEC. The potential sources of this contamination include several nearby contaminated sites as well as many industrial sources that currently operate within the harbor area.

4.2 Mitigation Sites

Two possible mitigation sites are currently being considered by the City. The City will select a site (or multiple sites) that meet(s) the objective of this plan from the sites listed in Table 1 and described in the sections below. Debris at all sites consists of derelict fishing gear and various types of litter.

Figure 2. *Proposed mitigation project sites.*

4.2.1 Site 1 – Spit

The Spit site is located in Dutch Harbor within Township 72 South, Range 117 West, Sections 26 and 35 of the Seward Meridian as found on USGS Quad Map Unalaska C-2 (53.9054 N, -166.5102 W). At a distance of approximately 0.65 miles, it is the closest mitigation site to the proposed impact project. Under the Cowardin Classification, this site is considered to be an unconsolidated intertidal and subtidal area. The mitigation site is primarily made up of sand, gravel and, rock with algae occurring close to the water and grassy vegetation occurring near the road.

Dutch Harbor is currently listed as impaired by the Alaska Department of Environmental Conservation (ADEC) due to the presence of petroleum hydrocarbons. The coastline waters of the harbor were identified as impacted during a 2006 assessment by ADEC. The potential sources of this contamination include several nearby contaminated sites as well as many industrial sources that currently operate within the harbor area.

Figure 3. *Debris found at the Spit site.*

4.2.2 Site 2 – Airport

The Airport site is located along the shoreline north of the Unalaska Airport in South Unalaska Bay and Township 72 South, Range 117 West, Section 27 and 34 of the Seward Meridian as found on USGS Quad Map Unalaska C-2 (53.9084 N, -166.5494 W). Under the Cowardin Classification, this site is considered to be an unconsolidated intertidal and subtidal area. The mitigation site is primarily made up of sand, gravel, and rock, interspersed with areas of grass.

South Unalaska Bay which is currently listed by the ADEC as impaired due to the presence of settleable solid residues and low dissolved oxygen (biochemical oxygen demand). Discharges from seafood processing wastes from multiple facilities and sewage from the municipal wastewater treatment plant contribute to this impairment.

Figure 4. *Debris found at the Airport site.*

5 Determination of Credits

Credits were determined using the USACE guidance titled "Ratios for Compensatory Mitigation" dated May 1, 2014. A mitigation ratio of 1:1 was determined to be adequate for the proposed project and impacts. While the impact project site is located within an area that has been designated as critical habitat for marine mammals that are listed as threatened and/or endangered species, it is also within a highly developed area with waters that have been listed as impaired. A previous survey of the area determined that it is unlikely to provide valuable habitat for any listed species. Although the mitigation sites are also listed as impaired, either one of the sites are likely to be more preferential habitat for marine mammals due to the lower amount of vessel traffic and development.

The impact that the proposed project will have on 2.8 acres of waters of the U.S. will be mitigated through the proposed compensatory mitigation project. Using the mitigation ratio determined for the impact project, the proposed mitigation project will involve the removal of marine debris from 2.8 acres of shoreline or the removal of 2 tons of debris from an intertidal area.

6 Mitigation Work Plan

The removal of plastic, metal, glass, and rubber marine debris littering shorelines in Unalaska will restore the sites to their natural condition and provide beneficial habitat to many of the marine mammals and endangered species that inhabit the area. The removal of small plastic debris and abandoned fishing gear debris will prevent future entanglement and ingestion issues for many of these animals. In addition to returning the sites to their natural condition, the removal of large debris could reduce navigational hazards and improve water quality. The proposed mitigation project is also expected to raise community awareness about the impacts of marine debris. Similar projects that have occurred in Unalaska have resulted in the recovery of derelict fishing gear, as shown in Figure 5.

Figure 5. *Previous marine debris removal project completed in Unalaska.*

The two sites that have been selected (Figure 2) will be surveyed for debris. From these areas, either 2.8 acres or 2 tons of debris will be selected to be cleaned due to factors such as the amount of debris present, the distance between the debris and the water, and the ability to remove the debris. Laborers will utilize hand tools to gather the smaller pieces of debris into piles. Larger debris may be picked up using laborers that have the necessary equipment to complete the task (excavators, skiffs, etc.). Recovered debris will be taken to the local landfill for disposal, or may be barged offsite if necessary. Work is planned to occur during low tides and when site conditions will allow for work. Winter weather is notoriously bad in Unalaska, so it will likely occur outside of the winter months (March through October).

7 Maintenance Plan

The proposed mitigation project is a one-time cleanup effort to remove marine debris from the mitigation site. The applicant is not proposing any legal protection or long-term maintenance at the mitigation site.

8 Performance Standards

As outlined in the Mitigation Work Plan (Section 6), the proposed mitigation project will be considered a success when either 2.8 acres of shoreline have been cleared of marine debris or 2 tons of debris have been removed and the site is returned to its natural condition. The mitigation project will have a direct impact on marine mammals and other animals that are frequent within the Unalaska Island area. The mitigation effort may also reduce marine mammal entanglement. In addition to cleaning the shoreline, the proposed mitigation effort will raise awareness of marine debris within the community.

9 Monitoring Requirements

Upon completion of the mitigation clean-up work, the site(s) will be inspected by the applicant to see that the work conforms to the work plan as described above. The applicant will monitor the cleanup effort and compile a brief packet of pictures documenting the conditions of the site after the cleanup work is performed. The applicant will also provide a narrative and a map detailing the work that was done. The narrative will include an estimate of the volume of debris removed by the project.

10 Long-term Maintenance Plan

The proposed mitigation project is a one-time cleanup effort to remove marine debris from the mitigation site(s). The applicant is not proposing any legal protection or long-term maintenance at the mitigation site(s). After the initial clean-up has been completed, the site could easily be maintained through annual community sponsored efforts or by other entities.

11 Adaptive Management Plan

Due to the simplicity of this proposed mitigation plan, there are no perceived risks to the success of this project. The mitigation work plan accommodates all aspects of returning the site to its natural condition. The primary goal of the work is to remove the debris. Removing debris will be beneficial in many ways to the local community and marine mammals that are common within the waters around Unalaska Island, therefore there are no remedial measures to outline.

12 Financial Assurances

The COU will providing the funding for the project. Laborers will likely be COU personnel. Additional financial information can be provided by the applicant if requested.

Appendix D. Marine Mammal Monitoring Plan

Marine Mammal Monitoring Plan
For the

Unalaska Marine Center Dock Positions III and IV Replacement Project

City of Unalaska

Revised 9/26/16

Submitted to:

National Marine Fisheries Service
Office of Protected Resources
1315 East-West Highway
Silver Spring, Maryland 20910-3226

Prepared by:

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1506 West 36th Avenue
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907-561-1011

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1 Introduction

The purpose of this Marine Mammal Monitoring Plan (MMMP) is to provide a protocol for monitoring of affected species during the proposed construction of the Unalaska Marine Center (UMC) Dock Positions III and IV Replacement Project in Dutch Harbor, Unalaska. This plan was developed to support the Incidental Harassment Authorization (IHA) document for Marine Mammal Protection Act, Section 101(a)(5)(D) permitting. The IHA application provides a more in-depth discussion on the calculations for the project.

A marine mammal monitoring program will be implemented at the start of construction and will follow the protocols outlined in this MMMP. The primary goals of the monitoring program are:

- To monitor the proposed shutdown and monitoring zones, to estimate the number of marine mammals exposed to noise at established thresholds, and to document animal responses;
- To minimize impacts to the marine mammal species present in the project area by implementing mitigation measures including monitoring, clearing the zones, soft start, and shutdown procedures; and
- To collect data on the occurrence and behavior of marine mammal species in the project area and any potential impacts from the project.

Figure 1. Project location within Dutch Harbor, AK

2 Project Description

The City of Unalaska (COU) proposes to install an OPEN CELL SHEET PILE™ (OCSP) dock at UMC Dock Positions III and IV, replacing the existing pile-supported structure and providing a smooth transition between the current UMC facility and the U.S. Coast Guard dock. A complete description of the region, project tasks, project materials, dates and duration, affected species, and anticipated impacts are included in the IHA application to which this document is a companion. In general terms, the project will consist of demolition of the existing dock, installation of sheet pile cells and supporting round piles, and placement of fill within the completed cells.

The proposed project requires the removal and installation of various types and sizes of piles using a vibratory hammer, an impact hammer, and drilling equipment. These activities are anticipated to result in Level B harassment (behavioral disruption) only, as an MMMP will be implemented to reduce the potential for exposure to Level A harassment (harassment resulting in injury).

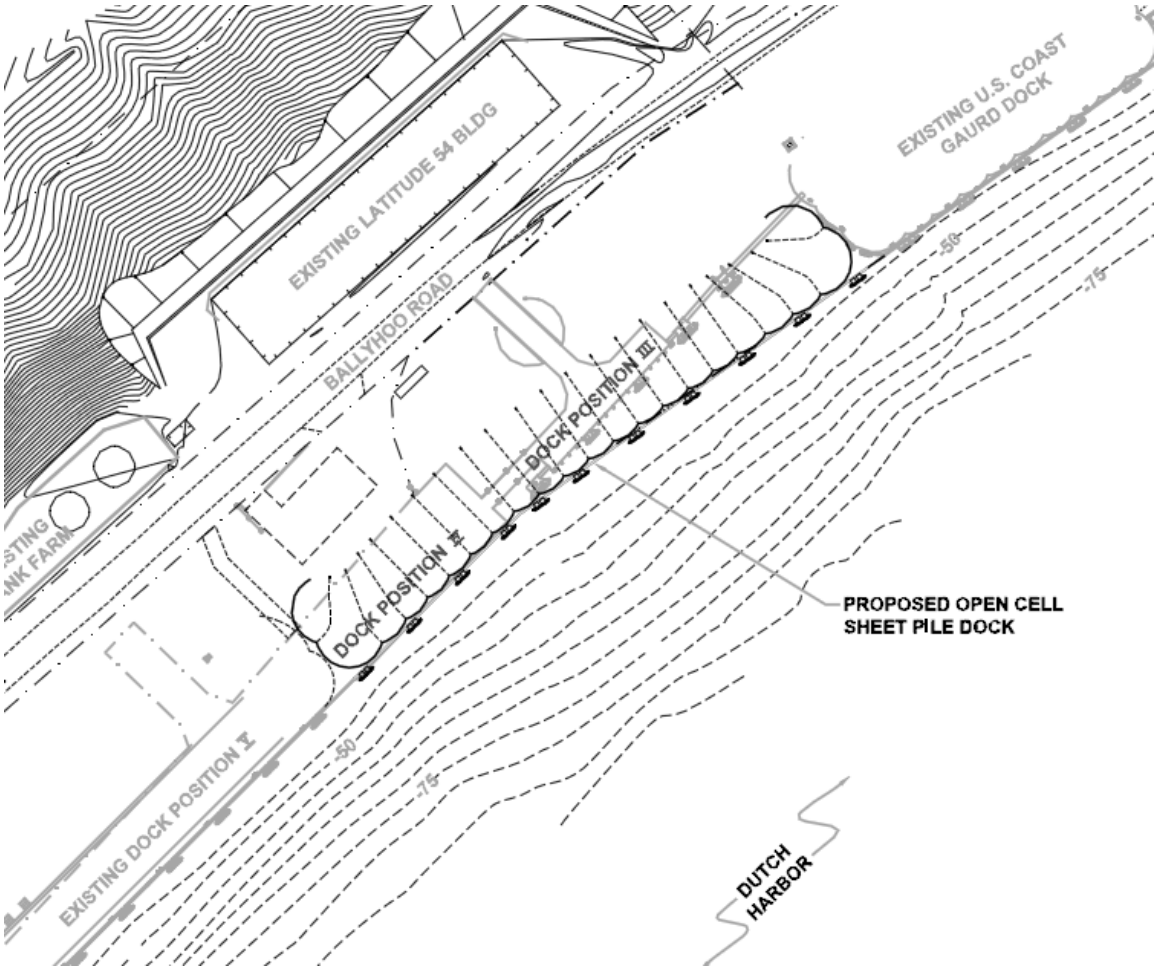

Figure 2. Proposed dock plan view

3 Methods

Land-based trained observers will be located on-site before, during, and after in-water construction activity at sites appropriate for monitoring marine mammals within and approaching the Level A and Level B harassment zones (Section 3.4).

During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye. Observers will work shifts of a maximum of four consecutive hours followed by an observer rotation or a 1-hour break and will work no more than 12 hours in any 24-hour period. Observers will collect data including, but not limited to, environmental conditions (*e.g.*, sea state, precipitation, glare, etc.), marine mammal sightings (e.g., species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures. Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this MMMP.

Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, clearing of the zones, and shutdown procedures. They will be in continuous contact with the construction personnel via two-way radio. A cellular phone will be use as back-up communications and for safety purposes.

An employee of the construction contractor will be identified as the main point of contact for observers at the start of each construction day. Observers will report directly to the monitoring coordinator when a shutdown is deemed necessary due to marine mammals approaching the relevant shutdown zones during a potentially hazardous construction activity.

3.1 Observer Qualifications

Monitoring will be conducted by qualified, trained marine mammal observers (hereafter, "observers"). In order for observers to be considered qualified, the following requirements must be met:

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance;
2. Physical capability of performing essential duties, including sitting or standing for periods of up to four hours, using binoculars or other field aid, and documenting observations;
3. Experience and ability to conduct field observations and collect data according to assigned protocols;
4. Experience or training in the field identification of marine mammals and marine mammal behavior, including the ability to accurately identify marine mammals in Alaskan waters to species;
5. Sufficient training, orientation or experience with the construction operation to provide for identification of concurrent activities and for personal safety during observations;
6. Writing skills sufficient to prepare reports of observations; and
7. Ability to communicate orally, by radio and in person, with project personnel to provide real-time information on marine mammals observed in the area and the appropriate mitigation response for the circumstances.

3.2 Data Collection

Observers will use a National Marine Fisheries Service (NMFS)-approved Observation Record (Appendix A) which will be completed by each observer for each survey day and location. Observation Records will be used by observers to record the following:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (e.g. percent cloud cover, percent glare, visibility) and sea state. (The Beaufort Wind Force Scale (Appendix C) will be used to determine sea-state.)
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

3.3 Equipment

The following equipment will be required to conduct observations for this project:

- Appropriate Personal Protective Equipment;
- Portable radios and headsets for the observers to communicate with the monitoring coordinator and other observers;
- Cellular phone for backup for radio communication
- Contact information for the other observers, monitoring coordinator, and NMFS point of contact;
- Daily tide tables for the project area;
- Watch or chronometer;
- Binoculars (quality 7 x 50 or better) with built-in rangefinder or reticles (rangefinder may be provided separately);
- Hand-held GPS unit, map and compass, or grid map to record locations of marine mammals;
- Copies of MMMP, IHA, and/or other relevant permit requirement specifications in sealed clear plastic cover; and
- Notebook with pre-standardized monitoring Observation Record forms on waterproof paper.

3.4 Level A and Level B Harassment Zones

COU has established zones to delineate areas in which marine mammals would experience Level A or Level B harassment due to exposure to underwater sound from construction activity. Shutdown of construction will occur where the underwater SPLs are anticipated to equal or exceed the Level A harassment thresholds for permitted pinnipeds or where the Level B harassment threshold would be exceeded for an animal not included in the IHA. Where underwater SPLs would exceed the Level B harassment thresholds for non-pulse (120dB isopleth) and impulsive (160 dB isopleth) sound sources, observers will monitor and record sightings and behavior of permitted species, but will not shut down.

Species with permitted "take" (Level B harassment) under the IHA include two cetacean species (Humpback whales (*Megaptera novaeangliae*) and killer whales (*Orcinus orca*)) and two pinniped species (Steller sea lion (*Eumetopias jubatus*) and harbor seals (*Phoca vitulina richardsi*). Take of any other marine mammal is not permitted under the IHA.

Determination of harassment radii is discussed fully in the revised Section 5, Update based on NOAA Technical Memorandum NMFS-OPR-55 of the project's IHA application. The radii are summarized in Table 1 below. If additional acoustic data collection determines that smaller radii are appropriate, the table(s) will be updated accordingly. This is discussed further in the revised Section 5.

Table 1. Effective Level A and Level B Harassment Zones.

Underwater Noise						
Source	**Level A Harassment Zone (m)**				**Level B Harassment Zone (m)**	
	Humpback Whales	**Killer Whales**	**Harbor Seals**	**Steller Sea Lions**	**Cetaceans**	**Pinnipeds**
Vibratory Installation / Removal	10	10	10	10	3300	3300

Underwater Noise						
Source	Level A Harassment Zone (m)				Level B Harassment Zone (m)	
	Humpback Whales	Killer Whales	Harbor Seals	Steller Sea Lions	Cetaceans	Pinnipeds
Impact Installation 30" (1 Pile)	65	10	35	10	500	500
Impact Installation 30" (2 Piles)	100	10	55	10	500	500
Impact Installation 30" (3 Piles)	135	10	70	10	500	500
Impact Installation 30" (4 Piles)	160	10	85	10	500	500
Impact Installation 30" (5 Piles)	185	10	100	10	500	500
Impact Installation 30" (10 Piles)	295	15	160	15	500	500
Impact Installation 30" (20 Piles)	465	20	250	20	500	500
Impact Installation 30" (PEAK Calc)	10	10	10	10	500	500

Airborne Noise		
Source	Level B Harassment Zone (m)	
	Harbor Seals	Other Pinnipeds
Vibratory Installation Sheet	35	10
Vibratory Installation 18"	15	10
Vibratory Installation 30"	35	10
Vibratory Removal Steel	35	10
Vibratory Removal Timber	35	10
Impact Installation 30"	150	50
Quarry Blasting	40	15

- During vibratory pile driving/removal, a shutdown zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level A harassment thresholds for permitted pinnipeds and cetaceans *or where the Level B harassment threshold would be exceeded for a marine mammal not included in the IHA.*

- During impact pile driving, a shutdown zone will be determined by the number of piles to be driven that day as follows: If five (5) piles are to be driven that day, shutdown during the first driven pile will occur if a permitted marine mammal enters the '5-Pile' radius. After the first pile is driven, if no marine mammals have been within the '5-Pile'radius, the '4-Pile' radius will become the shutdown radius. This

pattern will continue unless an animal is observed to remain outside the previous radius, at which time the most recent shutdown radius will remain in effect for the rest of the workday.

- During impact pile driving, immediate shutdown will occur if a marine mammal approaches the 10-meter Peak SPL threshold, regardless of how much cumulative exposure the animal has received. Immediate shutdown will also occur if the Level B threshold would be exceeded for animals not included in the IHA.
- During vibratory pile driving and removal, the monitoring zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level B harassment thresholds for *permitted* marine mammals during vibratory pile driving (120 dB isopleth).
- During impact pile driving, the monitoring zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level B harassment thresholds for *permitted* marine mammals during impact pile driving (160 dB isopleth).
- During *upland* vibratory pile driving and vibratory compaction, the monitoring zone shall include all areas where the SPLs are anticipated to equal or exceed the Level B harassment thresholds for airborne activities for harbor seals (90 dB isopleth) and Steller sea lions (100dB isopleth).
- The harassment zones will be monitored throughout the time required to drive or remove a pile.
    - If a marine mammal enters the monitoring zone, an exposure will be recorded and animal behaviors documented. However, pile driving would continue without cessation, unless the animal approaches or enters the shutdown zone.
    - If a marine mammal approaches or enters the shutdown zone, all pile driving/removal activities will be immediately halted.
- Take of marine mammals other than permitted species, in the form of Level A or Level B harassment, is not authorized and will be avoided by shutting down pile driving/removal activities before individuals of these species enter the Level B harassment zone.
- During in-water or over-water construction activities having the potential to affect marine mammals, but not involving a pile driver, a shutdown zone of 10 meters will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the removal of the pile from the water column/substrate via a crane ("deadpull"), or the slinging of construction materials via crane.

Table 2. Summary of shutdown and monitoring zones by species

	Species	Effective Shutdown Zones (m)				Effective Monitoring Zones (m)				
		In/ Over Water Work	Vibratory /Removal /Drilling	Impact	In/ Over Water Work	Vibratory /Removal /Drilling	Impact	Upland Vibratory	Upland Impact	Quarry Blasting
Cetaceans	**Humpback Whales**	10	10	65 - 500	10	3300	500	N/A	N/A	N/A
Cetaceans	**Killer Whales**	10	10	10 - 20	10	3300	500	N/A	N/A	N/A
Pinnipeds	**Steller sea lion**	10	10	10 - 20	10	3300	500	10	50	15
Pinnipeds	**Harbor seal**	10	10	35 - 500	10	3300	500	15 - 35	150	40
	Other NMFS mammals	10	3300	500	10	N/A*				

**Level B Harassment is not authorized for these species, so there are no monitoring zones.*

3.5 Observer Monitoring Locations

In order to monitor the Level A and Level B harassment zones effectively, marine mammal observers will be positioned at the best practicable vantage points, taking into consideration security, safety, access, and space limitations. Observers will be stationed at locations that provide adequate visual coverage for the Level A and Level B harassment zones. Potential observation locations are depicted in Figure 3.

One observer will be placed at a suitable location on or near the UMC facilities in order to observe the Level A harassment zones. This observer's monitoring will be primarily dedicated to observing Level A harassment zones; however, this observer will also record all marine mammal sightings beyond the radius of the Level A harassment zone, provided it does not interfere with their effectiveness at carrying out the shutdown procedures. If this observer is required to monitor beyond the Level A zone, a vantage point (tower or other perch) will be provided to facilitate full visibility of the observation zone.

An additional observer will be situated so as to provide complete visibility of the observation zone. If visibility does not allow for full clearance of the observation zone, additional stations or vantage point will be sought

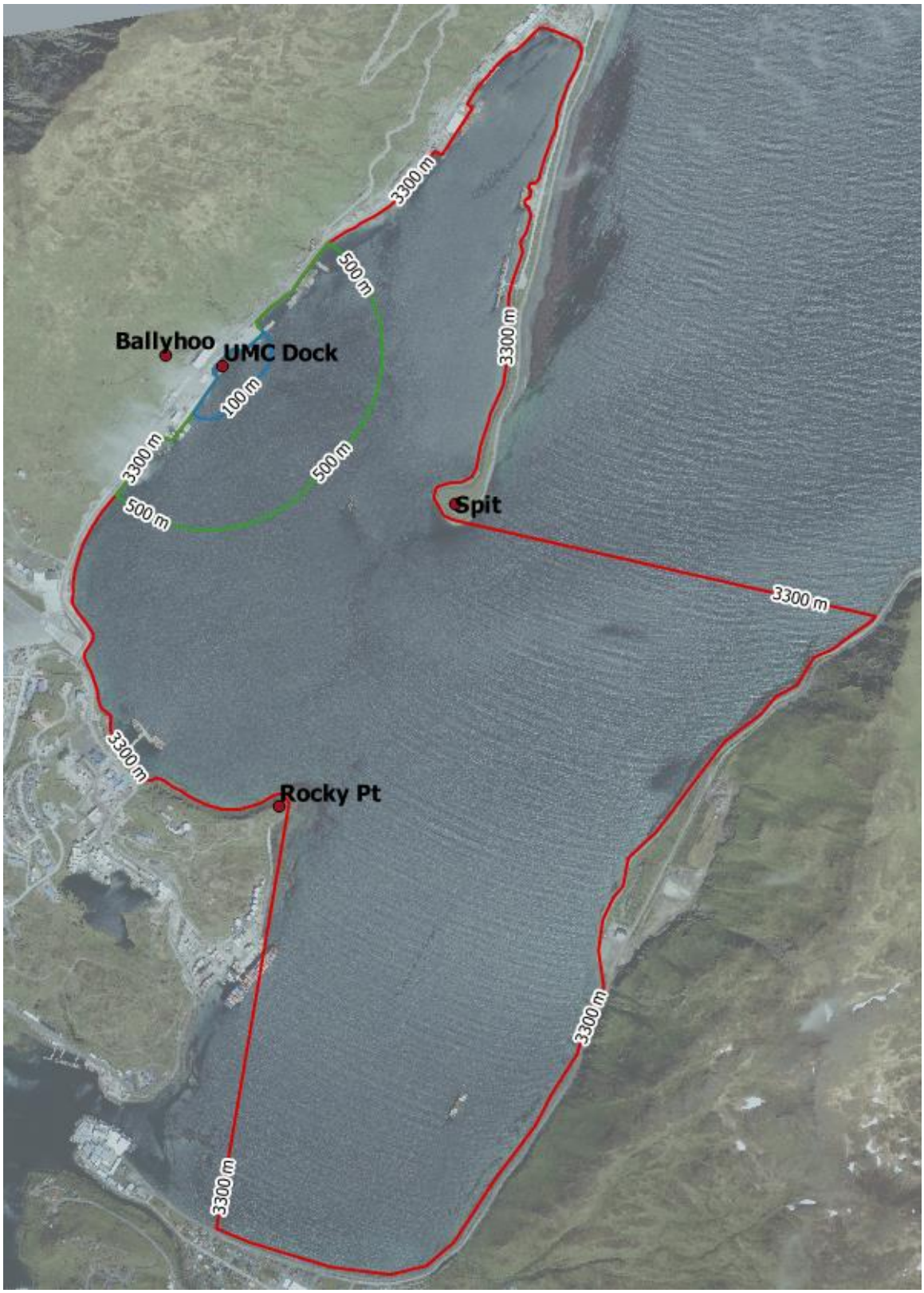

Figure 3. Potential observer monitoring locations.

3.6 Monitoring Techniques

COU will collect sighting data and behaviors of marine mammal species that are observed in the shutdown and monitoring zones during periods of construction. All observers will be qualified and trained in marine mammal identification and behaviors, as described in Section 3.1. NMFS requires that the observers have no other construction-related tasks while conducting monitoring. Observation necessitates that daylight is sufficient for observers to visualize the entirety of the monitoring zones, so observations will commence and complete during daylight hours. Monitoring of shutdown and observation zones will take place from 30 minutes prior to initiation through 30 minutes post-completion of all pile driving and removal activities.

3.6.1 Pre-Activity Monitoring

The following survey methodology will be implemented prior to commencing permitted activities:

- Prior to the start of permitted activities, observers will monitor the shutdown and monitoring zones for 30 minutes. They will ensure that no marine mammals are present within shutdown zone before permitted activities begin.
- The shutdown zone will be cleared when marine mammals have not been observed within zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans).
- When all applicable zones have been cleared, the observers will radio the monitoring coordinator. Permitted activities will not commence until the monitoring coordinator receives verbal confirmation the zones are clear.
- If permitted species are present within the monitoring zone, work will not be delayed, but observers will monitor and document the behavior of individuals that remain in the monitoring zone.
- In case of fog or reduced visibility, observers must be able to see the entirety of shutdown and monitoring zones before permitted activities can be initiated.

3.6.2 Soft Start Procedures

Soft start procedures will be used prior to periods of pile removal, pile installation, and in-water fill placement to allow marine mammals to leave the area prior to exposure to maximum noise levels.

- For vibratory hammers, the soft start technique will initiate noise from the hammer for short periods at a reduced energy level, followed by a brief waiting period and repeating the procedure two additional times.
- For impact hammers, the soft start technique will initiate several strikes at a reduced energy level, followed by a brief waiting period. This procedure would also be repeated two additional times.
- Equipment used for fill placement will be idled near the waterside edge of the fill area for 15 minutes prior to performing in-water fill placement.
- If work ceases for more than 30 minutes, soft start procedures must recommence prior to performing additional work.

3.6.3 During-Activity Monitoring

The following survey methodology will be implemented during permitted activities:

- If permitted species are observed within the monitoring zone during permitted activities, an exposure would be recorded and behaviors documented. Work will not stop unless an animal enters or appears likely to enter the shutdown zone.

- If the Level B harassment zone has been observed for the pre-activity period and non-permitted species are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B zone.
- If the Level B zone is not visible while work continues, exposures will be recorded at the estimated exposure rate for each permitted species. If work ceases for more than 30 minutes, the pre-activity monitoring of both zones must recommence.
- If the Level A zone is not fully visible, work cannot continue.

3.6.4 Shutdown

If a marine mammal enters or appears likely to enter the shutdown zone:

- The observers shall immediately radio or call to alert the monitoring coordinator.
- All permitted activities will be immediately halted.
- In the event of a shutdown of pile installation or removal operations, permitted activities may resume only when:
    - The animal(s) within or approaching the shutdown zone has been visually confirmed beyond the shutdown zone, or 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) have passed without re-detection of the animal;
    - Observers will then radio or call the monitoring coordinator that activities can re-commence.

3.6.5 Breaks in Work

During an in-water construction delay, the shutdown and monitoring zones will continue to be monitored. No exposures will be recorded for permitted species in the monitoring zone if there are no concurrent permitted construction activities.

If permitted activities cease for more than 30 minutes and monitoring has not continued, pre-activity monitoring and soft start procedures must recommence. This includes breaks due to scheduled or unforeseen construction practices or breaks due to permit-required shutdown. Following 30 minutes of monitoring, work can begin according to the pre-activity monitoring protocols. Work cannot begin if an animal is within the shutdown zone or if visibility is not clear throughout the shutdown and monitoring zones.

3.6.6 Post-Activity Monitoring

Monitoring of the shutdown and monitoring zones will continue for 30 minutes following completion of pile-driving activities. A post-monitoring period is not required for other in-water construction. These surveys will record observations and will focus on observing and reporting unusual or abnormal behavior of marine mammals. Observation Record forms will be used to document observed behavior.

4 Reporting

4.1 Modifications

In the event that COU needs to modify terms of this MMMP, the NMFS representative will be promptly contacted for discussion of the requested modification.

4.2 Unauthorized Exposure without Injury

If an unauthorized exposure without injury (as described below) occurs, observers will initiate shutdown, observe the animal leaving the shutdown zone, and resume work according to the directions in Section 3.6.4.

- A Level A exposure (without injury) in which a Steller sea lion or harbor seal entered a shutdown zone prior to shut-down during in-water or over-water work without the potential for noise, and/or
- A Level A or B exposure (without injury) in which any other ESA-listed species entered a shutdown zone prior to shut-down during in-water or over-water work without the potential for noise.

If this occurs, report of the exposure will be made to NMFS Alaska Region within one business day.

4.3 Injured or Dead Marine Mammal

If COU finds an injured, sick, or dead marine mammal, a COU representative will notify NMFS and provide the species or description of the animal(s), condition of the animal or carcass, location, date and time of first discovery, observed behaviors (if alive), and photo or video (if available).

- If marine mammal's condition is a direct result of the project, notification will be made and work will stop until NMFS is able to review the circumstances of the prohibited take.
- If the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), COU shall report the incident within 24 hours of the discovery. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death.
- If cause of death is unclear, COU shall immediately report the incident. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death. NMFS will work with UniSea to determine whether additional mitigation measures or modifications to the activities are appropriate.

Care should be taken in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In preservation of biological materials from a dead animal, the finder (i.e. marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

Reports will be made to the Office of Protected Resources and the Alaska Regional Stranding Coordinator.

4.4 Annual Report

A comprehensive annual marine mammal monitoring report documenting marine mammal observations will be submitted to NMFS at the end of the in-water work season. The draft comprehensive marine mammal monitoring report will be submitted to NMFS within 90 calendar days of the end of the in-water work period. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during pile driving days. A final comprehensive report will be prepared and submitted to NMFS within 30 calendar days following resolution of comments on the draft report from NMFS.

The reports shall include at a minimum:

- General data:
  - Date and time of activity
  - Water conditions (e.g., sea-state)
  - Weather conditions (e.g., percent cover, percent glare, visibility)
- Specific pile driving data:
  - Description of the pile driving activity being conducted (pile locations, pile size and type), and times (onset and completion) when pile driving occurs.

- The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that pile driving times and strike counts are accurately recorded. The duration of soft start procedures should be noted as separate from the full power driving duration.
- Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)

- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring
  - Times when pile driving or other in-water construction is delayed due to presence of marine mammals within shutdown zones.

- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
    - Distance from animal to pile driving sound source.
    - Reason why/why not shutdown implemented.
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
    - If a shutdown was implemented, the distance from animal to sound source at the time of the shutdown.
    - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
    - Distance to the animal from the sound source during soft start.

- Post-activity observational survey-specific data:
  - Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
  - Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

Appendix A. Marine Mammal Observation Record

MARINE MAMMAL OBSERVATION RECORD

Project Name: UMC Dock Positions III and IV

Monitoring Location: ______

Date: ______

Time Effort Initiated: ______

Time Effort Completed: ______

Page ___ of ___

Time	Visibility	Glare	Weather Condition	Wave Height	BSS	Wind	Swell
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W
:	B – P – M – G – E	%	S – PC – L – R – F – OC – SN – HR	Lt/Mod/Hvy		N S E W	N S E W

Event Code	Sight # (1 or 1.1 if re-sight)	Time/Dur (Start/End time if cont.)	WP/ Grid #/ DIR of travel	Zone/ Radius/ Impact Pile #?	Obs.	Sighting Cue	Species	Group Size	Behavior Code (see code sheet)	Construction Type	Mitigation Type	Exposure? (Y/N)	Behavior Change/ Response to Activity/Comments/Human Activity/Vessel Hull # or Name/ Visibility Notes
E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
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E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
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E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		: :	______ Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:	Beh code(s): ______	SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		

Marine Mammal Observation Record – Sighting Codes

Behavior Codes

Code	Behavior	Definition
BR	Breaching	Leaps clear of water
CD	Change Direction	Suddenly changes direction of travel
CH	Chuff	Makes loud, forceful exhalation of air at surface
DI	Dive	Forward dives below surface
DE	Dead	Shows decomposition or is confirmed as dead by investigation
DS	Disorientation	An individual displaying multiple behaviors that have no clear direction or purpose
FI	Fight	Agonistic interactions between two or more individuals
FO	Foraging	Confirmed by food seen in mouth
MI	Milling	Moving slowly at surface, changing direction often, not moving in any particular direction
PL	Play	Behavior that does not seem to be directed towards a particular goal; may involve one, two or more individuals
PO	Porpoising	Moving rapidly with body breaking surface of water
SL	Slap	Vigorously slaps surface of water with body, flippers, tail etc.
SP	Spyhopping	Rises vertically in the water to "look" above the water
SW	Swimming	General progress in a direction. Note general direction of travel when last seen [Example: "SW (N)" for swimming north]
TR	Traveling	Traveling in an obvious direction. Note direction of travel when last seen [Example: "TR (N)" for traveling north]
UN	Unknown	Behavior of animal undetermined, does not fit into another behavior
AWA	Approach Work	
LWA	Leave Work Area	
Pinniped only		
EW	Enter Water (from haul out)	Enters water from a haul-out for no obvious reason
FL	Flush (from haul out)	Enters water in response to disturbance
HO	Haul out (from water)	Hauls out on land
RE	Resting	Resting onshore or on surface of water
LO	Look	Is upright in water "looking" in several directions or at a single focus
SI	Sink	Sinks out of sight below surface without obvious effort (usually from an upright position)
VO	Vocalizing	Animal emits barks, squeals, etc.
Cetacean only		
LG	Logging	Resting on surface of water with no obvious signs of movement

Sea State and Wave Height: Use Beaufort Sea State Scale for Sea State Code located in Appendix C. This refers to the surface layer and whether it is glassy in appearance or full of white caps. In the open ocean, it also takes into account the wave height or swell, but in inland waters the wave height (swells) may never reach the levels that correspond to the correct surface white cap number. Therefore, include wave height for clarity.

Glare: Percent glare should be the total glare of observers' area of responsibility. Determine if observer coverage is covering 90 degrees or 180 degrees and document daily. Then assess total glare for that area. This will provide needed information on what percentage of the field of view was poor due to glare.

Swell Direction: Swell direction should be where the swell is coming from (S for coming from the south). If possible, record direction relative to fixed location (pier). Choose this location at beginning of monitoring project.

Wind Direction: Wind direction should also be where the wind is coming from.

Event

Code	Activity Type
E ON	Effort On
E OFF	Effort Off
PRE	Pre-Construction Watch
POST	Post-Construction Watch
CON	Construction (see types)
S	Sighting
M	Mitigation (see types)
OR	Observer Rotation

Sighting Cues

Code	Distance Visible
BL	Blow
BO	Body
BR	Breach
DF	Dorsal Fin
SA	Surface Activity
OTHR	Other

Marine Mammal Species

Code	Marine Mammal Species
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPBK	Humpback Whale
OTT	Sea Otter
STEID	Steller's Eider
OTHR	Other

Construction Type

Code	Activity Type
V	Vibratory Pile Driving (installation and extraction)
I	Impact Pile Driving
DP	Dead pull
ST	Stabbing
DR	Drilling
OWC	Over-Water Construction
NOWC	No Over-Water Construction
NONE	No Construction

Mitigation Codes

Code	Activity Type
SS	Soft Start
BC	Bubble Curtain
DE	Delay onset of In-Water Work
SD	Shut down In-Water Work

Visibility

Code	Distance Visible
B	Bad (<0.5km)
P	Poor (0.5 – 0.9km)
M	Moderate (0.9 – 3km)
G	Good (3 - 10km)
E	Excellent (>10km)

Weather Conditions

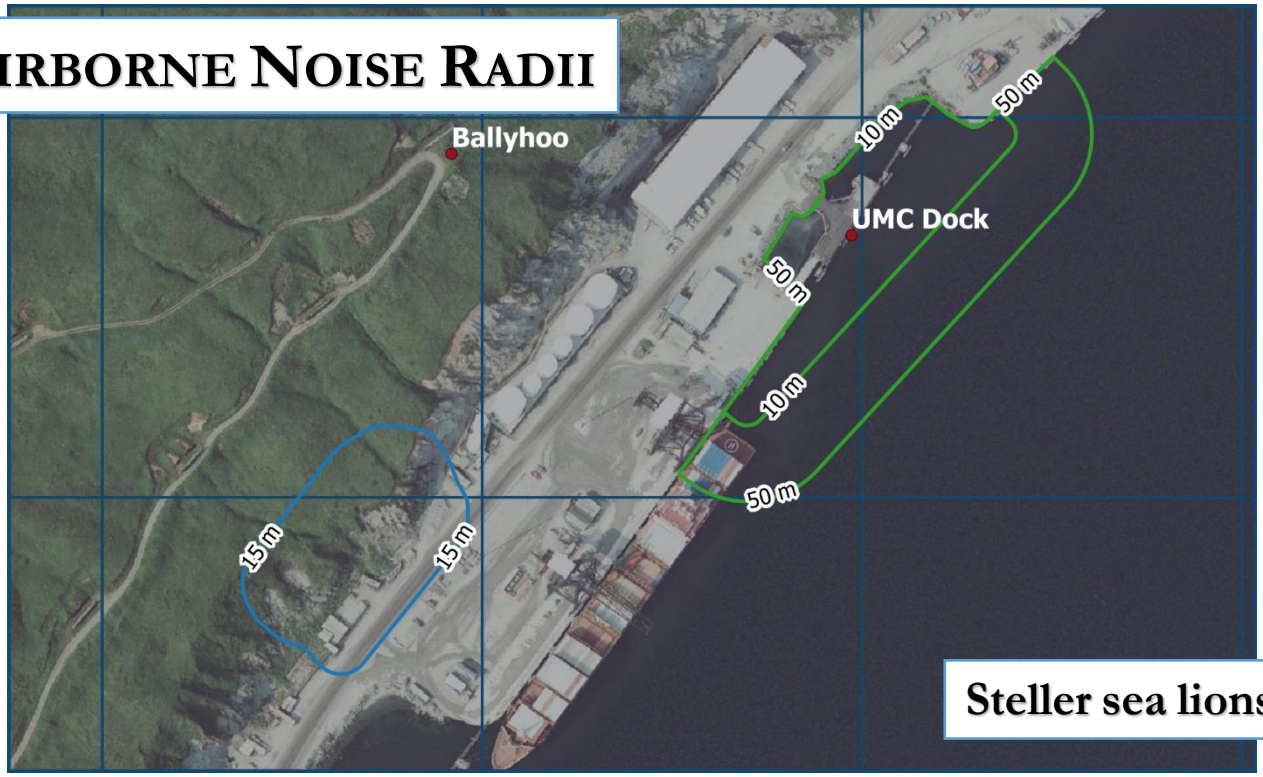
Code	Weather Condition
S	Sunny
PC	Partly Cloudy
L	Light Rain
R	Steady Rain
F	Fog
OC	Overcast
SN	Snow
HR	Heavy Rain

Wave Height

Code	Wave Height
Light	0 – 3 ft
Moderate	4 – 6 ft
Heavy	>6 ft

Appendix B. Level A and Level B Harassment Zones Figures

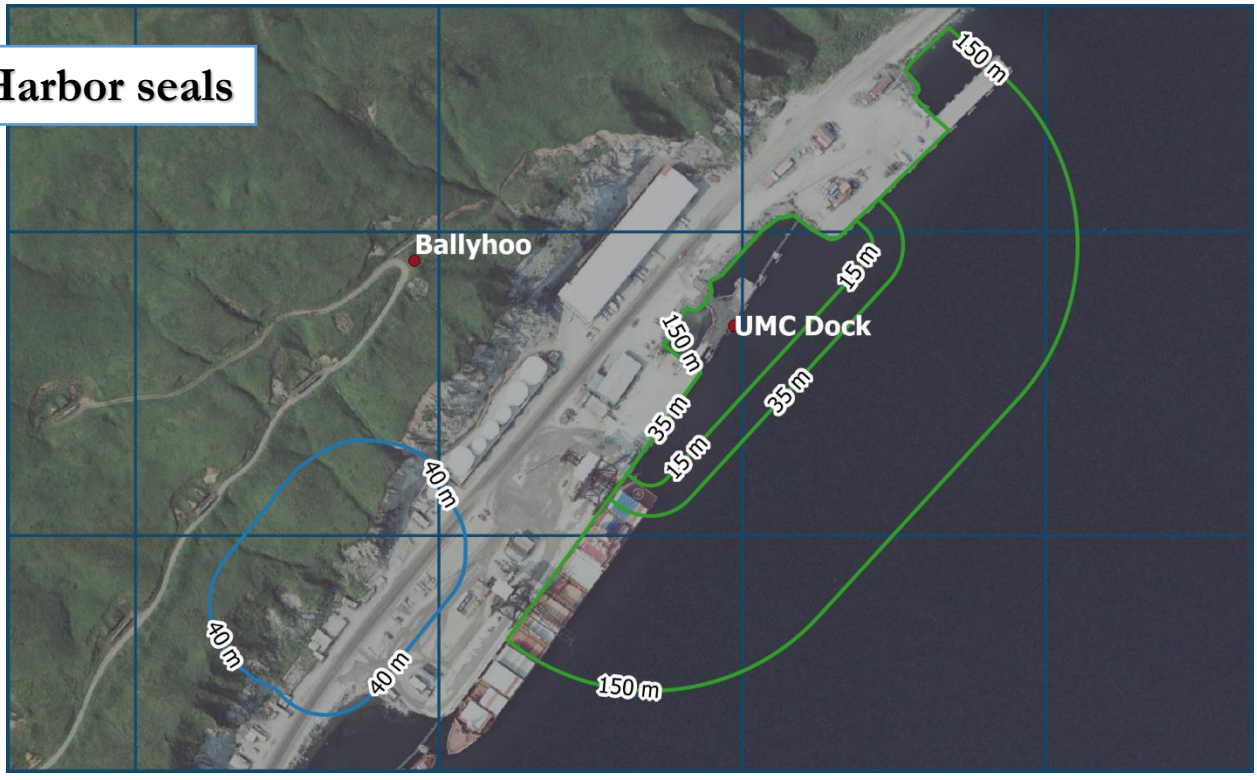
Airborne Noise Radii



Steller sea lions

Airborne Noise	Source	Level B Harassment Zone (m)	
		Harbor seals	Steller sea lions
	Vibratory Installation Sheet Pile	35	10
	Vibratory Installation 18" Pile	15	10
	Vibratory Installation 30" Pile	35	10
	Vibratory Pile Removal	35	10
	Impact Installation 30"	150	50
	Quarry Blasting	40	15

Harbor seals



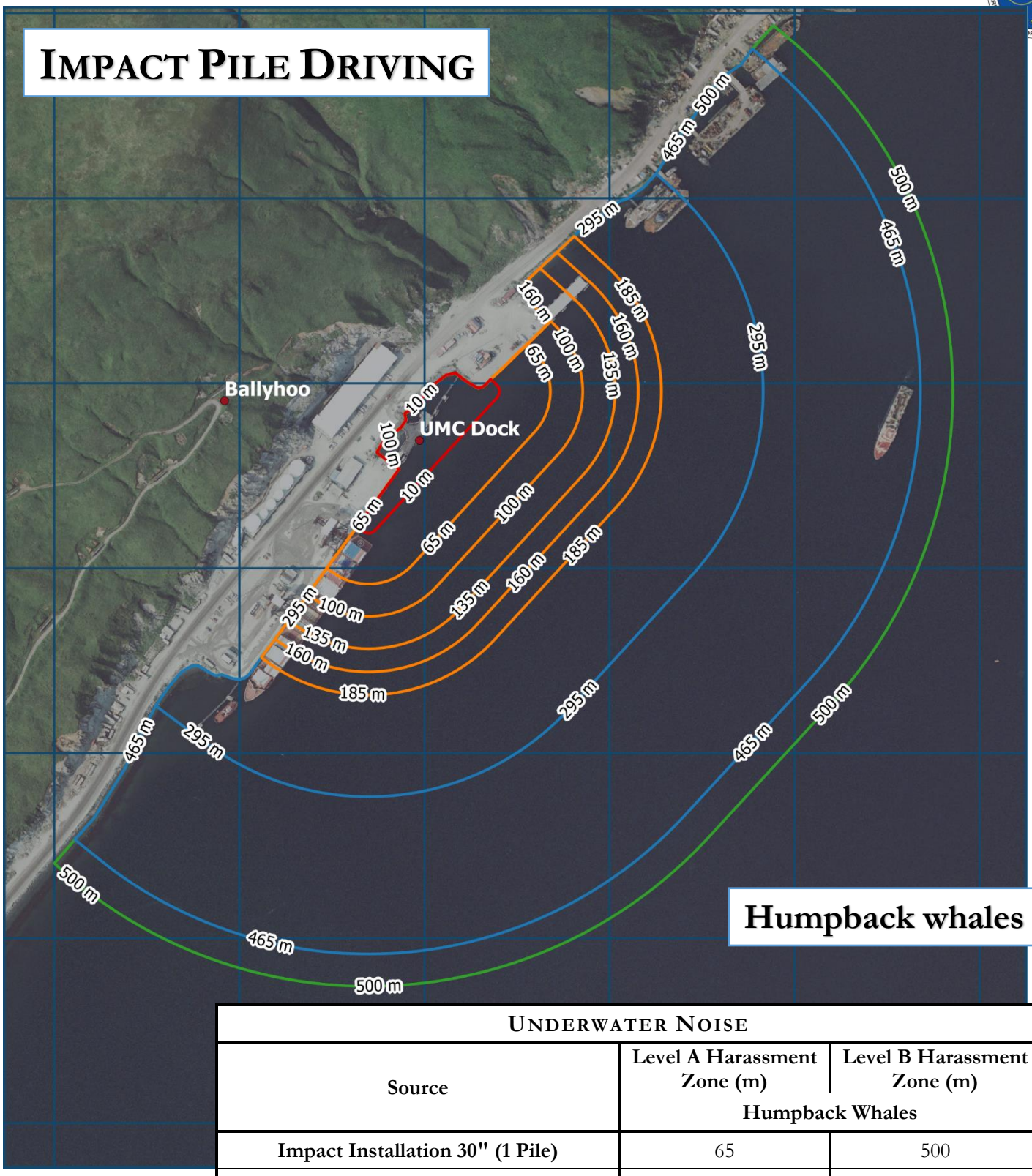
Underwater Noise						
Source	Level A Harassment Zone (m)				Level B Harassment Zone (m)	
	Humpback Whales	Killer Whales	Harbor Seals	Steller Sea Lions	Cetaceans	Pinnipeds
Vibratory Installation / Removal	10	10	10	10	3300	3300

Vibratory Installation& Removal

IMPACT DRIVING PEAK THRESHOLD

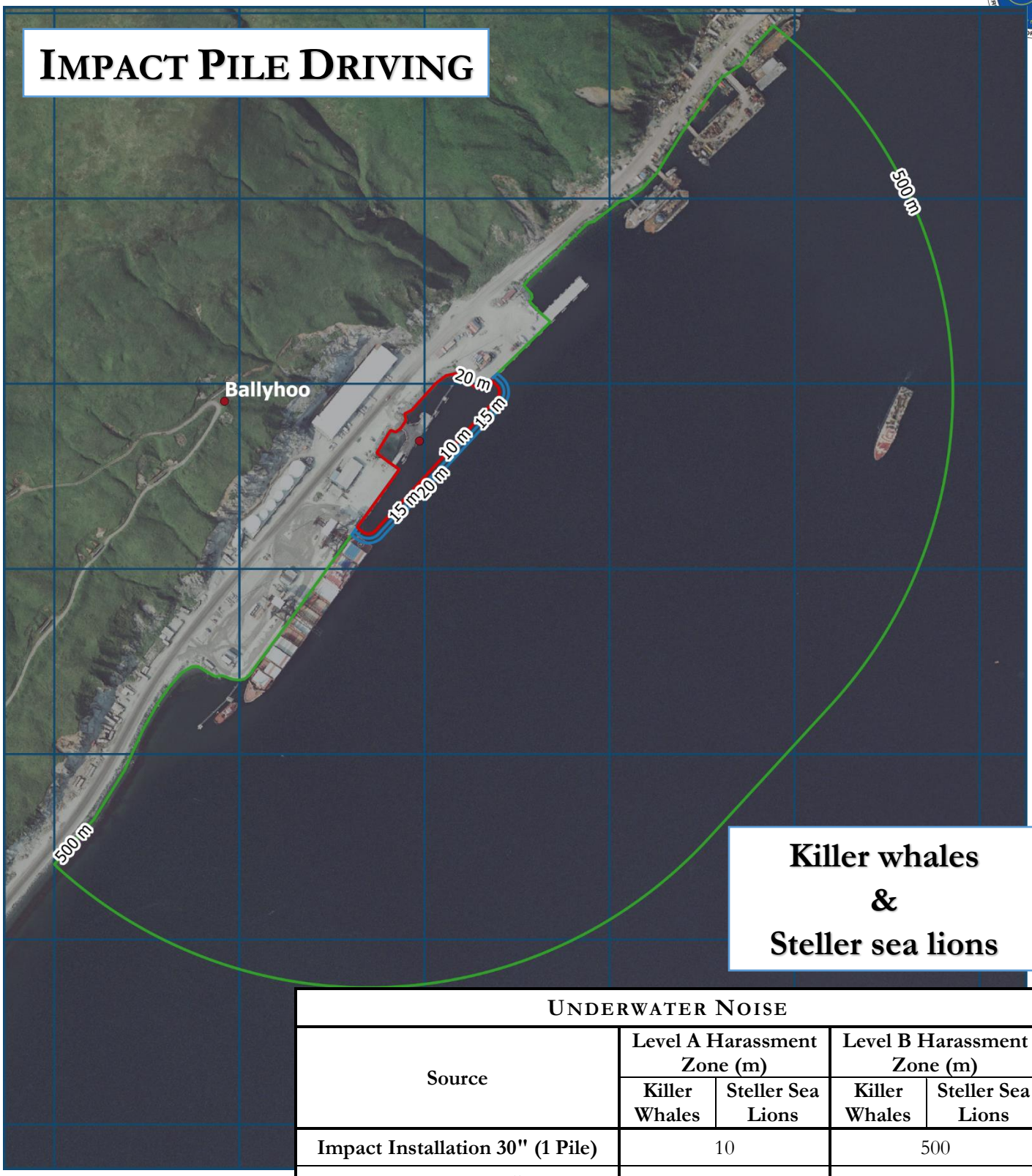
UNDERWATER NOISE	
Source	Level A Harassment Zone (m)
	All permitted species
Impact Installation 30" (PEAK Calc)	10

Impact Pile Driving



Underwater Noise		
Source	Level A Harassment Zone (m)	Level B Harassment Zone (m)
	Humpback Whales	
Impact Installation 30" (1 Pile)	65	500
Impact Installation 30" (2 Piles)	100	500
Impact Installation 30" (3 Piles)	135	500
Impact Installation 30" (4 Piles)	160	500
Impact Installation 30" (5 Piles)	185	500
Impact Installation 30" (10 Piles)	295	500
Impact Installation 30" (20 Piles)	465	500

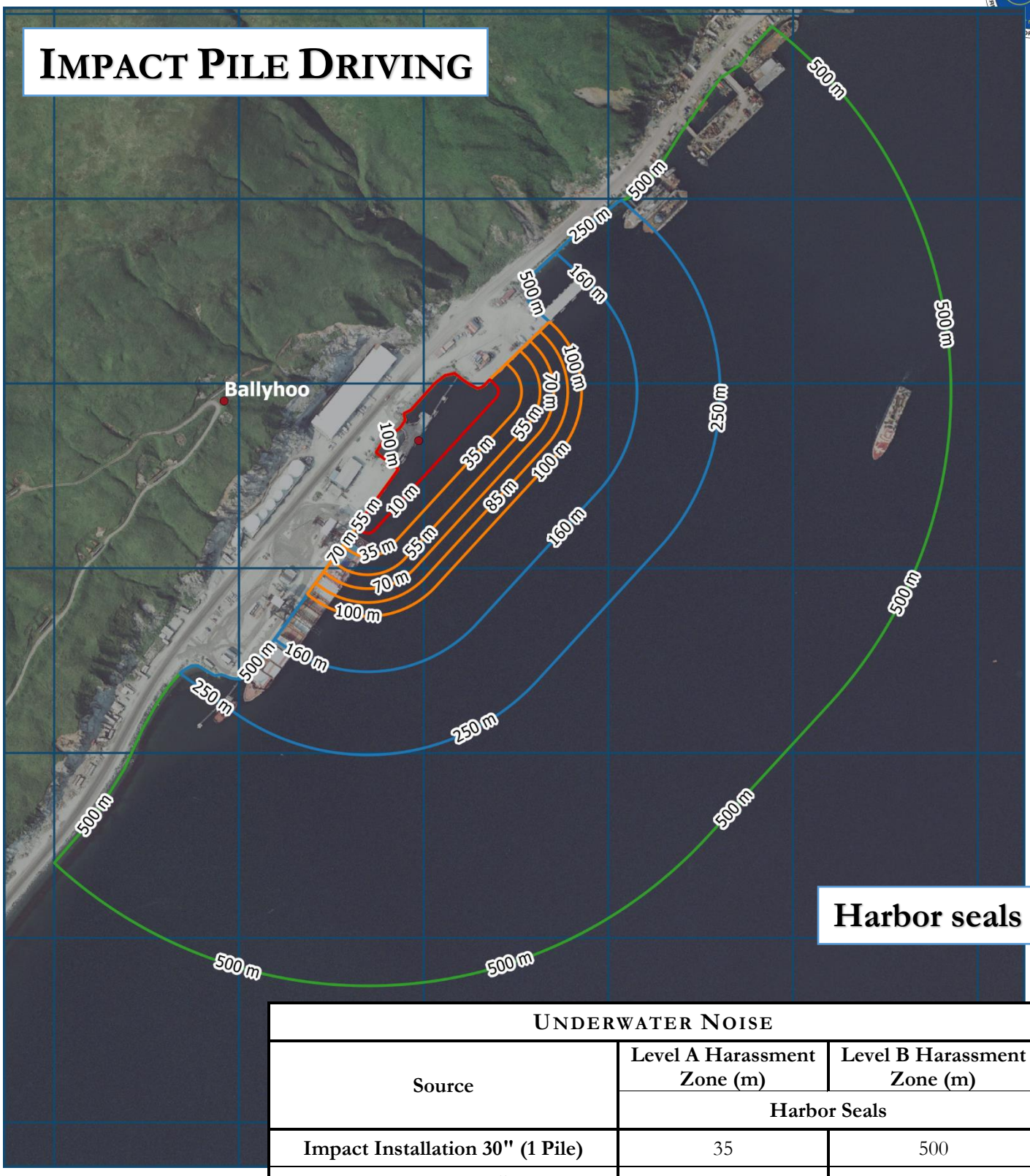
Impact Pile Driving



Killer whales & Steller sea lions

Underwater Noise				
Source	Level A Harassment Zone (m)		Level B Harassment Zone (m)	
	Killer Whales	Steller Sea Lions	Killer Whales	Steller Sea Lions
Impact Installation 30" (1 Pile)	10		500	
Impact Installation 30" (2 Piles)	10		500	
Impact Installation 30" (3 Piles)	10		500	
Impact Installation 30" (4 Piles)	10		500	
Impact Installation 30" (5 Piles)	10		500	
Impact Installation 30" (10 Piles)	15		500	
Impact Installation 30" (20 Piles)	20		500	

Impact Pile Driving

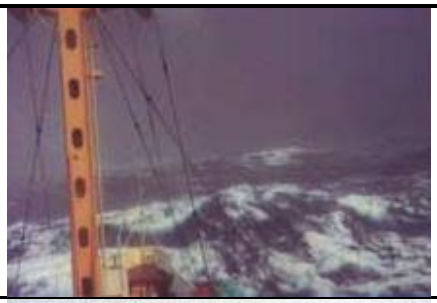


Underwater Noise		
Source	Level A Harassment Zone (m)	Level B Harassment Zone (m)
	Harbor Seals	
Impact Installation 30" (1 Pile)	35	500
Impact Installation 30" (2 Piles)	55	500
Impact Installation 30" (3 Piles)	70	500
Impact Installation 30" (4 Piles)	85	500
Impact Installation 30" (5 Piles)	100	500
Impact Installation 30" (10 Piles)	160	500
Impact Installation 30" (20 Piles)	250	500

Appendix C. Beaufort Wind Force Scale

Beaufort Number (Wind Force)	Wind Velocity (Knots)	Wind Description	Sea Conditions	Height of Waves (Feet)	Photographic examples of Beaufort Wind Force Scale
0	<1	Calm	Sea surface smooth and mirror like	0	
1	1-3	Light Air	Scaly ripples, no foam crests	0-1	
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	1-2	
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	2-3.5	
4	11-16	Moderate Breeze	Small waves, becoming longer, numerous whitecaps	1-4	

5	17-21	Fresh Breeze	Moderate waves, taking longer form, many whitecaps, some spray	4-8	
6	22-27	Strong Breeze	Larger waves, whitecaps common, more spray	8-13	
7	28-33	Near Gale	Sea heaps up, white foam streaks off breakers	13-19	
8	34-40	Gale	Moderately high, waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	18-25	
9	41-47	Strong Gale	High waves, sea begins to roll, dense streaks of foam, spray may reduce visibility	23-32	
10	48-55	Storm	Very high waves, with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	29-41	

11	56-63	Violent Storm	Exceptionally high waves, foam patches cover sea, visibility more reduced	37-52	
12	64+	Hurricane	Air filled with foam, sea completely white with driving spray, visibility greatly reduced	45+	

*Images from the National Weather Service, retrieved from Wikipedia Commons

Appendix E. Previous Section 7 Consultation Letters

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

October 14, 2015

Col. Michael Brooks
U.S. Army Corps of Engineers, Alaska District
P.O. Box 6898
JBER, Alaska 99506-0898

Re: Unalaska Marine Center Dock positions III and IV replacement POA-1989-324-M7, NMFS # AKR-2015-9482

Dear Colonel Brooks:

The National Marine Fisheries Service (NMFS) has completed informal consultation under section 7(a)(2) of the Endangered Species Act (ESA) regarding the proposed Unalaska Marine Center (UMC) Dock positions III and IV replacement project in Dutch Harbor, Unalaska, Alaska (see Figure 1). The U.S. Army Corps of Engineers (Corps) is proposing to authorize the City of Unalaska to replace and expand existing dock positions III and IV to accommodate larger container ships.

The Corps requested NMFS' concurrence that the proposed action may affect, but is not likely to adversely affect, the endangered humpback whale (*Megaptera novaengliae*), the endangered western Distinct Population Segment (DPS) of the Steller sea lion (*Eumetopias jubatus*), or Steller sea lion critical habitat. Based on our analysis of the information you provided to us and additional literature cited below, NMFS concurs with your determination. A complete administrative record of this consultation is on file in this office.

The Corps also determined that this project will have no effect on endangered blue (*Balaenoptera musculus*), fin (*B. physalus*), North Pacific right (*Eubalaena japonica*), sei (*B. borealis*), or sperm (*Physeter microcephalus*) whales.

Consultation History

NMFS received the Corps' request for concurrence and designation of non-federal representative City of Unalaska, as represented by PND Engineers, Inc. (PND), on April 7, 2015. On April 23, NMFS received PND's biological assessment and revised determination of effects. On May 8, NMFS provided recommendations for mitigation measures via email. PND provided, by email, additional information about the project and NMFS's recommended mitigation measures on June 22. NMFS reiterated on August 11, by email, our recommended mitigation measures and NMFS and PND representatives met on August 13 to further discuss mitigation measures. PND accepted our recommended mitigation measures, by email, on August 17.

Description of the Proposed Action and Action Area

The Corps is proposing to authorize the City of Unalaska to replace and expand portions of the existing UMC Dock. Figure 2, below, shows the existing and proposed dock facilities. The proposed 186 m (610 ft) of new dock face will be located between existing UMC dock position V and the U.S. Coast Guard dock. The proposed expansion will create 1.25 hectare (ha [3.1 acres (ac)]) of new dock and permanently fill 1.13 ha (2.8 ac) below high tide line.

Prior to construction of the new dock, 195 steel and 55 wood piles will be removed. To construct the bulkhead, 1,800 sheet piles (1,700 of which will be below HTL) will be driven with an APE 200-6 vibratory hammer (or similar). Fill consisting of shot rock and salvaged concrete from the existing dock (with rebar removed) will be placed behind the sheet pile bulkhead after the completion of each cell. Approximately 84,101 cubic meters (m^3 [110,000 cubic yards (yd^3)]) of fill material will be placed behind the sheet pile bulkhead.

Twenty-eight 76-cm (30-in) diameter steel fender support piles will also be driven with the vibratory hammer. After the bulkhead and backfill are installed, 150 76-cm diameter steel support crane rails will be installed with an APE 400 impact hammer (or similar) in the new deck area. Of the 150 piles, 125 will be installed below the HTL, but not in open water (i.e., behind the newly-constructed bulkhead).

This project is expected to be completed during the summer months (March to December) and take two construction seasons (two years) to complete. The first construction season, anticipated to occur in 2018, will include the demolition of the existing dock, installation of sheet pile bulkhead, the placement of fill behind the bulkhead, and other on-site work. Sheet pile installation is expected to take four months to complete. The second construction season, anticipated to occur in 2019, will include surfacing of the new dock, installation of utilities, installation of lighting, and installation of crane rails.

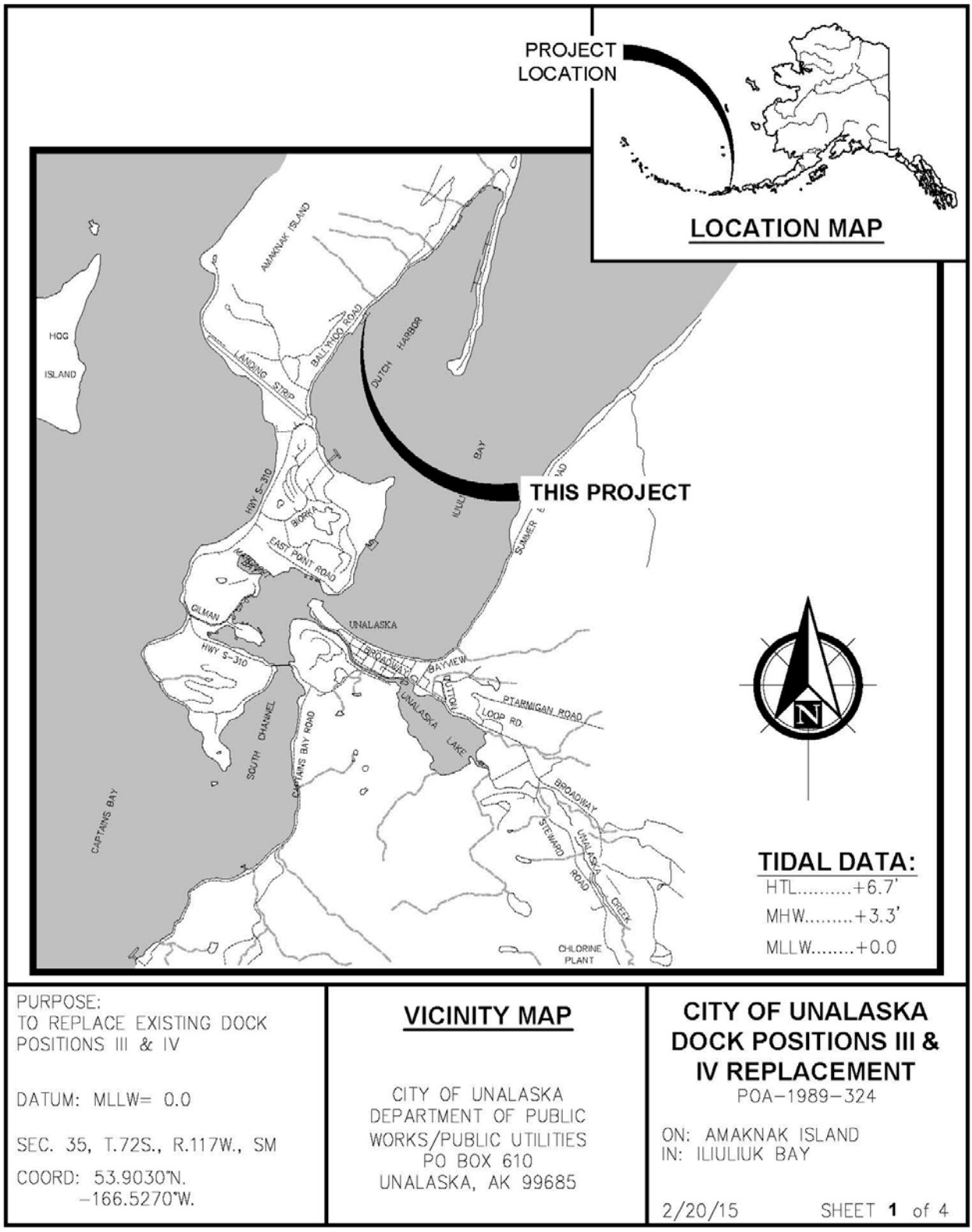
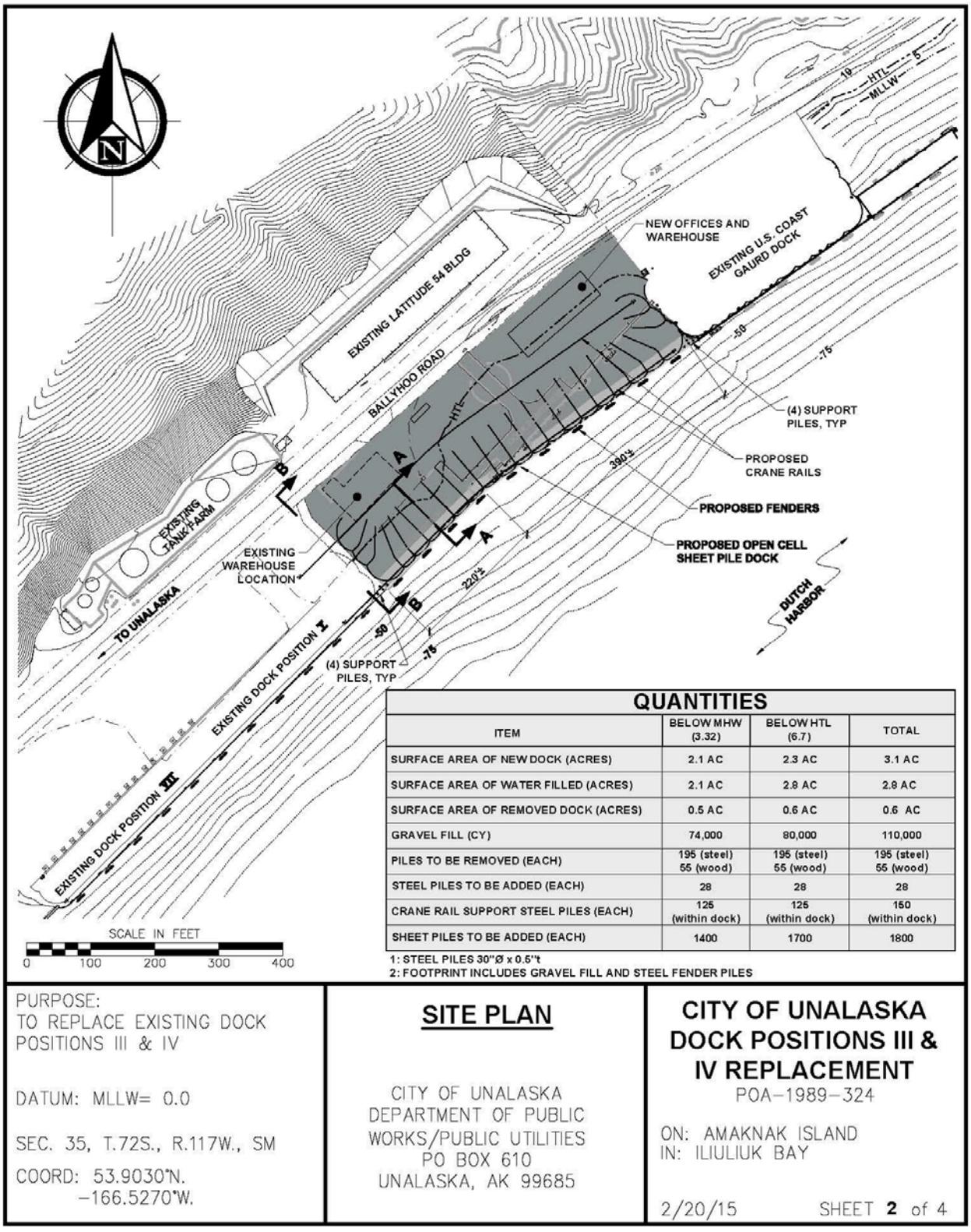


Figure 1. Project location, UMC Dock replacement project, Dutch Harbor, Alaska.



QUANTITIES

ITEM	BELOW MHW (3.32)	BELOW HTL (6.7)	TOTAL
SURFACE AREA OF NEW DOCK (ACRES)	2.1 AC	2.3 AC	3.1 AC
SURFACE AREA OF WATER FILLED (ACRES)	2.1 AC	2.8 AC	2.8 AC
SURFACE AREA OF REMOVED DOCK (ACRES)	0.5 AC	0.6 AC	0.6 AC
GRAVEL FILL (CY)	74,000	80,000	110,000
PILES TO BE REMOVED (EACH)	195 (steel) 55 (wood)	195 (steel) 55 (wood)	195 (steel) 55 (wood)
STEEL PILES TO BE ADDED (EACH)	28	28	28
CRANE RAIL SUPPORT STEEL PILES (EACH)	125 (within dock)	125 (within dock)	150 (within dock)
SHEET PILES TO BE ADDED (EACH)	1400	1700	1800

1: STEEL PILES 30"Ø x 0.5"t
2: FOOTPRINT INCLUDES GRAVEL FILL AND STEEL FENDER PILES

PURPOSE:
TO REPLACE EXISTING DOCK POSITIONS III & IV

DATUM: MLLW= 0.0

SEC. 35, T.72S., R.117W., SM

COORD: 53.9030°N.
−166.5270°W.

SITE PLAN

CITY OF UNALASKA
DEPARTMENT OF PUBLIC WORKS/PUBLIC UTILITIES
PO BOX 610
UNALASKA, AK 99685

CITY OF UNALASKA DOCK POSITIONS III & IV REPLACEMENT
POA−1989−324

ON: AMAKNAK ISLAND
IN: ILIULIUK BAY

2/20/15 SHEET **2** of 4

Figure 2. Existing and proposed UMC Dock facilities, Dutch Harbor, Alaska.

The action area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The action area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The action area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

Since 1997 NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater sounds that might result in impacts to marine mammals (70 FR 1871). NMFS is currently developing comprehensive guidance on sound levels likely to cause injury and behavioral disruption to marine mammals. However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels[1], expressed in root mean square[2] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA):

- impulsive sound: 160 dB re 1 μPa_{rms}
- continuous sound: 120 dB re 1 μPa_{rms}

NMFS uses the following conservative thresholds for underwater sound pressure levels from broadband sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA:

- 180 dB re 1 μPa_{rms} for whales
- 190 dB re 1 μPa_{rms} for pinnipeds (seals and sea lions)

NMFS defines the action area for this project as the area within which project-related noise levels are greater than 120 dB re 1 μPa_{rms} (i.e., the point where no measurable effect from the project would occur). Received sound levels associated with pile-driving activities are anticipated to diminish to less than 120 dB re 1 μPa_{rms} within 2,000 m of the source. To define the action area, we considered the diameter and type of piles, the pile-driving method, and empirical measurements of noise from similar projects (see Table 1 and Table 2 below) to estimate the area within which marine mammals are likely to be harassed or injured by noise. However, if the Corps, in coordination with NMFS, chooses to perform sound source verification to determine the actual area that would be ensonified to at least 120 dB re 1 μPa_{rms}, the size of the action area (and thus the area within which effects to listed species are expected) may be altered to reflect those site-specific measurements.

Mitigation Measures

PND informed NMFS that the project would incorporate the following mitigation measures to avoid impacts to marine mammals:

1. A marine mammal observer, able to accurately identify marine mammals in Alaskan waters to species, will be present before and during all in-water construction and

[1] Sound pressure is the sound force per unit micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 μPa, and the units for underwater sound pressure levels are decibels (dB) re 1 μPa.

[2] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

demolition activities.

2. Distance markers will be installed at 2,000 m from the sound source.
3. The observer will be positioned such that the entire 2,000-m radius zone is visible to them (e.g., situated on a platform, elevated promontory, or boat)
4. The Protected Species Observer (PSO) will have the following:
    a. binoculars
    b. range finder
    c. GPS
    d. compass
    e. two-way radio communication with construction foreman/superintendent
    f. a log book of all activities which will be made available to agencies upon reques
5. The PSO will have no other primary duty than to watch for and report on events related to marine mammals.
6. The PSO will work in shifts lasting no longer than 4 hours with at least a one hour break between shifts, and will not perform duties as an observer for more than 12 hours in a 24-hour period (to reduce observer fatigue).
7. The PSO will scan the zone for the presence of marine mammals for 30 minutes prior to the start of pile-driving and removal activities. If any marine mammals are present within the zone during this time, pile-driving and removal activities will not begin until the animal(s) has left the zone of its own accord, or no marine mammals have been observed in the zone for 15 minutes (for pinnipeds) or 30 minutes (for cetaceans).
8. Throughout all pile-driving activity, the observer will continuously scan the zone to ensure that marine mammals do not enter it. If any marine mammals enter or appear likely to enter the exclusion zone during pile-driving or removal activities, all pile-driving and removal activity will cease immediately. Pile-driving and removal activities may resume when the animal(s) has been observed leaving the area of its own accord. If the animal(s) is not observed leaving the area, pile-driving and removal activities may begin 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) after the animal is last observed in the area.
9. Once the zone has been cleared, ramp-up procedures will be applied prior to beginning pile-driving and removal activities each day and/or when pile-driving hammers have been idle for more than 30 minutes:
    a. For impact pile-driving, contractors will be required to provide an initial set of three strikes from the hammer at 40 percent energy, followed by a 30-second waiting period. This procedure shall be repeated two additional times.
    b. For vibratory pile-driving, the hammer will be operated for 15 seconds at reduced power (not to exceed 50 percent of full power), followed by a 1-minute waiting period. This procedure will be repeated two additional times.

In addition to measures for the protection of marine mammals, PND also informed NMFS that the project will include the following mitigation measures to reduce impacts to wetlands:

1. Fill placed in the tidelands will be clean blasted rock with relatively few fines to reduce turbidity and/or sedimentation.
2. The dock will be maintained in a manner that does not introduce any pollutants or debris into the harbor or cause a migration barrier for fish.

Listed Species and Critical Habitat

Western DPS Steller Sea Lions

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345); at that time the eastern DPS was listed as threatened and the western DPS was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66139). Information on Steller sea lion biology and habitat (including critical habitat) is available at: http://alaskafisheries.noaa.gov/protectedresources/stellers/default.htm

The project area is within designated Steller sea lion critical habitat (see Steller Sea Lion Critical Habitat section, below) and is located approximately 15 km from the Unalaska/Priest Rock haulout. We assume Steller sea lions may occasionally be present in Dutch Harbor for the following reasons:

- Steller sea lions are highly mobile and have large ranges.
- In June 2014, 105 non-pup Steller sea lions were counted at the Unalaska/Priest Rock haulout (Fritz et al. 2015), approximately 15 km (9.3 mi) from the project area.
- Potential prey sources are seasonally present near the project area:
    - The Iliuliuk River, a coho, pink, and sockeye salmon and Dolly Varden-bearing river, is approximately 3.5 km (2.2 mi) from the project area (ADF&G 2014).
    - The Icicle Seafoods Gordon Jensen Pacific cod processing vessel docks in Dutch Harbor approximately 1.6 km (1.0 mi) from the UMC Dock and several fish processing plants and fish processing outfalls are located in the small boat harbor adjacent to Dutch Harbor (ADEC 2014).

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group. As a group, it is estimated that otariid pinnipeds can hear frequencies between 0.1 and 48 kHz in water (NOAA 2015).

Steller Sea Lion Critical Habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). In Alaska, designated critical habitat includes: 1) a 37-km (23-mi) seaward buffer around all major haulouts and rookeries west of 144^{o} W longitude; 2) 0.9-km (0.6-mi) terrestrial, air, and aquatic zones around major haulouts and rookeries east of 144^{o} W longitude, and 3) three special aquatic foraging areas: the Shelikof Strait, Bogoslof, and Seguam Pass areas. The project area is within designated Steller sea lion critical habitat surrounding two haulouts (Old Man Rocks and Unalaska/Cape Sedanka) and a rookery (Akutan/Cape Morgan). It should be noted that the Priest Rock haulout is not in an area designated as critical habitat.

Humpback Whales

The humpback whale was listed as endangered under the Endangered Species Conservation Act (ESCA) on December 2, 1970 (35 FR 18319). Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered. NMFS recently conducted a

global status review and proposed changing the status of humpback whales under the ESA. Under this proposal, the Western North Pacific DPS (which includes whales found in the Aleutian Islands and Bering Sea) would be listed at threatened and the Hawaii DPS (which includes whales found in southeast Alaska) and Mexico DPS (which includes whales found in the northern and western Gulf of Alaska, Aleutian Islands, and Bering Sea) would not be listed (80 FR 22304; April 21, 2015). Information on humpback whale biology and habitat is available at: http://www.fisheries.noaa.gov/pr/species/mammals/whales/humpback-whale.html http://www.nmfs.noaa.gov/pr/sars/2013/ak2013_humpback-wnp.pdf

Unalaska Island is situated between Unimak and Umnak Passes, important humpback whale migration routes and feeding areas. Humpback whales have been tagged in Unalaska Bay during August and September (Kennedy et al. 2014). Given the documented presence of humpback whales in Unalaska Bay, we assume humpback whales may be present during the proposed project activities.

Humpback whales produce a variety of vocalizations ranging from 0.02 to 10 kHz (Winn et al. 1970, Tyack and Whitehead 1983, Payne and Payne 1985, Silber 1986, Thompson et al. 1986, Richardson et al. 1995, Au 2000, Frazer and Mercado III 2000, Erbe 2002, Au et al. 2006, Vu et al. 2012). NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group. As a group, it is estimated that low-frequency cetaceans can hear frequencies between 0.007 and 25 kHz (NOAA 2015).

Effects of the Action

For purposes of the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and are those that one would not be able to meaningfully measure, detect, or evaluate, and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Beneficial effects are contemporaneous positive effects without any adverse effects to the species.

The potential effects of the proposed action on listed species and critical habitat include in-water noise and habitat alteration.

Noise

Possible impacts to marine mammals exposed to loud sounds include disturbance and injury. Disturbance can range from mild (e.g., heads-up display, increased vocalizations) to severe (e.g., abandonment of vital habitat). In-water noise is the primary concern for potential effects of this project to Steller sea lions and humpback whales. Though proposed pile-driving will introduce both continuous and impulsive sounds into the water, the activities are not expected to adversely affect these species due to the nature of the operation and its mitigation measures.

Impact pile driving is expected to be the louder of the pile-driving activities of the proposed action. Impact pile driving can generate pulsed peak (0-p) sound pressure levels of 237 dB re 1

µPa at 1 m at frequencies between 0.1 and 1 kHz, though it is important to note that 0-p sound pressure levels are not directly comparable to RMS sound pressure levels (Hildebrand 2009). No specifics were given regarding the size and type of piles driven or depth of water at the Hildebrand (2009) site. Table 1 compares the proposed impact pile-driving activities in Dutch Harbor to pile-driving in other areas.

Vibratory pile driving generates lower peak sound pressure levels than impact pile driving, but the total energy imparted to the pile is somewhat comparable because the vibratory hammer operates continuously and the piles require more time to install (ICF Jones & Stokes and Illingworth and Rodkin Inc. 2012). Table 2 compares the proposed vibratory pile-driving activities and physical characteristics of Dutch Harbor to pile-driving activities in other areas.

Table 1. Comparison of proposed impact pile-driving activities and physical characteristics in Dutch Harbor, Alaska, to impact pile-driving activities in other areas.

Project/Location	Radius (m) of area ensonified to 160 dB re 1 μPa_{rms}	Pile Size (cm)	Pile Type	Approximate Water Depths (m) Around Project Area*	Similarities to Proposed Project	Differences from Proposed Project	Reference
Unalaska Marine Center Dock Positions III and IV Replacement, Dutch Harbor, Alaska	*UNKNOWN*	*76*	*Tubular*	*13-31*	*N/A*	*N/A*	*N/A*
Port of Anchorage Marine Terminal Development, Cook Inlet, Alaska	350	36	H	9-20	Similar water depth	Smaller, different pile type	URS 2007
Trident Support Facilities Explosive Handling Wharf, Hood Canal, Washington	350*	61	Tubular	10-90	Same pile type	Smaller pile size, Narrow, deeper body of water	Illingworth and Rodkin Inc. 2013
	1,000*	91				Larger pile size, Narrow, deeper body of water	
Test Pile Program, Hood Canal, Washington	425*						

* A bubble curtain was used during impact pile-driving, but provided inconsistent sound attenuation, from nearly 10 dB to no apparent attenuation.

Table 2. Comparison of proposed vibratory pile-driving activities and physical characteristics in Dutch Harbor, Alaska, to vibratory pile-driving activities in other areas.

Project/Location	Radius (m) of area ensonified to120 dB re 1 μPa_{rms}	Pile Size (cm)	Pile Type	Approximate Water Depths (m) Around Project Area*	Similarities to Proposed Project	Differences from Proposed Project	Reference
Unalaska Marine Center Dock Positions III and IV Replacement, Dutch Harbor, Alaska	*UNKNOWN*	*76*	*Tubular*	*13-31*	*N/A*	*N/A*	*N/A*
Port of Anchorage Marine Terminal Development, Cook Inlet, Alaska	800	36	H	9-20	Similar water depth	Smaller, different pile type	URS 2007
Trinidad Pier Reconstruction, Trinidad Harbor, California	Radius of area ensonified to 120 db re 1 μPa_{rms} not known; however: • measured sound pressure levels remained ≥ 120 dB re 1 µPa at **840** m • 0-p sound pressure level was ~155 dB re 1 µPa at **840** m	61	Tubular	<1-15	N/A	Smaller pile size Shallower water body Less protected (small harbor in Pacific Ocean)	ICF Jones & Stokes and Illingworth and Rodkin Inc. 2012
Vashon Ferry Terminal, Puget Sound, Washington	1,931	76	Tubular	1-120	Same pile size and type	Wider, deeper body of water	Laughlin 2010a, b
Trident Support Facilities Explosive Handling Wharf, Hood Canal, Washington	• **2,080** m for hydrophones in mid-water depths (between 3.7 and 13.7 m) • **3,275** m for hydrophones in deep-water depths (between 6.7 and 24.4 m)	61	Tubular	10-90	N/A	Smaller pile size Narrow, deeper body of water	Illingworth and Rodkin Inc. 2013
	• **9,465** m for hydrophones in mid-water depths (between 3.7 and 13.7 m) • **11,500** m for hydrophones in deep-water depths (between 6.7 and 24.4 m)	91				Larger pile size Narrow, deeper body of water	

Project/Location	Radius (m) of area ensonified to120 dB re 1 µPa$_{rms}$	Pile Size (cm)	Pile Type	Approximate Water Depths (m) Around Project Area*	Similarities to Proposed Project	Differences from Proposed Project	Reference
Test Pile Program, Hood Canal, Washington	• **4,664** m for hydrophones in mid-water depths (between 3.7 and 13.7 m) • **7,499** m for hydrophones in deep-water depths (between 6.7 and 24.4 m)	91	Tubular	10-90	N/A	Larger pile size Narrow, deeper body of water	Illingworth and Rodkin Inc. 2013

* Water depths estimated up to approximately 1,000 m around the project area.

Less information is available about the acoustic characteristics of impact and vibratory pile-driving of sheet pile. A vibratory hammer was used to install one visibly bent sheet pile at the Port of Anchorage (URS 2007). Measured near-source RMS sound pressure levels were similar to those for vibratory pile-driving of 36-cm (14-in) piles in the same project area, though it is not known if the bend in the sheet pile affected sound propagation. Average near-source RMS sound pressure levels recorded for sheet piles driven with both impact and vibratory hammers at the Port of Oakland, California (ICF Jones & Stokes and Illingworth and Rodkin Inc. 2012), were greater than those recorded for vibratory and impact pile-driving of 61-cm (24-in) piles and less than those recorded for vibratory and impact pile-driving of 91-cm (36-in) piles in Hood Canal, Washington (Illingworth & Rodkin Inc. 2013). It should be noted that the radius of areas ensonified to 120 and 160 dB re 1µPa_{rms} were not measured or calculated for sheet pile-driving activities at any of these sites.

Without site-specific sound source verification, we must use the best available information to assess effects to ESA-listed species. As shown in Table 2, the area ensonifed to at least 120 dB re 1 µPa_{rms} from vibratory hammer pile-driving for a project that used smaller, differently-shaped piles was 800 m (2,625 ft). Projects that used 61-cm diameter piles (similarly-shaped, but smaller piles than those proposed for use in this project) had ensonified areas from more than 840 to 3,275 m (2,756 to 10,745 ft); however, a project that used even larger diameter piles (76 cm; the same diameter as those proposed for use in this project) had an ensonified radius of only 1,931 m (6,335 ft). Table 1shows the area ensonifed to at least 160 dB re 1 µPa_{rms} was 350 m (1,150 ft) for projects that used a smaller piles (36- and 61-cm) and one pile type that was differently-shaped. A project that used 91-cm diameter piles (larger piles than those proposed for use in this project) had ensonified areas from 425 to 1,000 m (1,394 to 3,281 ft).

After considering similarities and differences between physical characteristics of the proposed project area and the projects shown in Table 1, Table 2, and in the sheet pile discussion above, we determined that the area likely to be ensonified to 120 dB re 1 µPa_{rms} from vibratory hammer pile-driving of sheet piles and 76-cm steel pipe piles is not greater than 2,000 m (6,561 ft). The area ensonified to 160 dB re 1 µPa_{rms} from the impact hammer pile-driving of the 76-cm dimeter steel pipe piles is expected to be less than 2,000 m; however, because this activity is a very small portion of the overall project, a separate zone was not calculated. Therefore, we have determined, based upon these previous studies, that it would be extremely unlikely for Steller sea lions or humpback whales to be exposed to continuous noise levels greater than 120 dB re 1 µPa_{rms} or impulsive noise levels greater than 160 dB re 1 µPa_{rms} if operations are shut down whenever marine mammals appear likely to approach the sound source within 2,000 m.

We do not anticipate that this project will expose Steller sea lions or humpback whales to sound pressure levels that reach Level A or B acoustic thresholds because: 1) we expect few Steller sea lions and humpback whales to be present in the area, and 2) the project incorporates monitoring and mitigation measures that include exclusion zones which minimize the risk of exposure for any individual that enters it. We expect that noise would occur at levels below which any observable effects would be likely, and mitigation measures would make exposure to sound levels in excess of Level A or Level B MMPA take thresholds extremely unlikely. Therefore, we conclude such effects are insignificant and discountable.

Habitat Alteration

The largest impact of the project on marine habitat will be the direct loss of habitat from placement of fill. Construction of the dock will result in the permanent loss of approximately 1.1 ha of marine habitat. Filling this habitat would not directly harm Steller sea lions or humpback whales because of the proposed mitigation and monitoring measures, and this work is not expected to have any measureable effects to these species. Therefore, we conclude such effects are insignificant.

The project has the potential to temporarily impact water quality and displace fish species that are prey for humpback whales and Steller sea lions by causing sedimentation from disturbance of the sea floor during pile-driving. Suspended sediment is not expected to persist in the area; therefore, this project is not expected to affect water quality or prey availability to any measurable degree. Effects to humpback whale habitat would not be measurable; therefore, we conclude such effects are insignificant.

Steller Sea Lion Critical Habitat

NMFS identified physical and biological features essential for conservation of Steller sea lions in the final rule to designate critical habitat (58 FR 45269; August 27, 1993). Construction of the proposed project will result in the direct loss of critical habitat and may impact Steller sea lion critical habitat by causing sedimentation from disturbance of the sea floor during pile-driving. We evaluate effects to each of the essential features below.

1. *Alaska rookeries, haulouts, and associated areas identified at 50 CFR §226.202(a), including terrestrial zones that extend 3,000 feet landward, air zones that extend 3,000 feet above the terrestrial zone, aquatic zones that extend 3,000 feet seaward from each major rookery and major haulout east of 144° W. longitude, and aquatic zones that extend 20 nm seaward from each major rookery and major haulout west of 144° W. longitude.*

   The project will result in the direct loss of 1.1 ha of critical habitat that is located 33.4 km (20.8 mi) from the nearest rookery designated as critical habitat (i.e., Akutan/Cape Morgan) and 29.5 km (18.3 mi) from the nearest haulout designated as critical habitat (i.e., Old Man Rocks); however, the area in which the loss will occur is an industrialized port (i.e., Dutch Harbor), an area which does not currently function as high quality Steller sea lion habitat due to ongoing disturbance. It is extremely unlikely that the loss of habitat in such an area will affect this essential feature to any measurable degree; therefore, we conclude such effects are insignificant and discountable.

   The project has the potential to temporarily impact water quality by causing sedimentation from disturbance of the sea floor during pile-driving. Suspended sediment is not expected to persist in the area; therefore, this project is not expected to affect water quality to any measurable degree. Therefore, we conclude such effects are insignificant.

2. *Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area, as specified at 50 CFR §226.202(c).*

The project is not located in or near any special aquatic foraging areas.

Conclusion

Based on this analysis, NMFS concurs with your determination that the proposed action may affect, but is not likely to adversely affect, humpback whales, western DPS Steller sea lions, or Steller sea lion critical habitat.

During an August 13, 2015, meeting, PND informed NMFS that it would be using a bubble curtain parallel to the area in which sheet piles will be installed. As this is an untested, though promising, method of sound attenuation, NMFS encourages PND to perform sound measurements during construction of the dock to document the bubble curtain's effectiveness. If such measurements are made, NMFS requests the information be made available to the agency so it can be determined if such a device could be considered as a mitigation measure in future consultations.

Reinitiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and if (1) take of listed species occurs, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter, or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct any questions regarding this letter to Bridget Crokus at bridget.crokus@noaa.gov or (907) 271-1937.

Sincerely,

for James W. Balsiger, Ph.D.
Administrator, Alaska Region

Cc:
Corps: Jen Martin (jen.l.martin@usace.army.mil)
Non-federal representative: Lisa Baughman (LBaughman@pndengineers.com)

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United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Field Office
4700 BLM Road
Anchorage, Alaska 99507

In Reply Refer To:
FWS/AFWFO

July 23, 2015

EMAILED TO:
Ms. Jen Martin
Regulatory Specialist
U.S. Army Corps of Engineers
Alaska District, Regulatory Division Kenai Field Office
44669 Sterling Highway, Suite B
Soldotna, Alaska 99669

Re: Unalaska Marine Center dock replacement (*Consultation number 2015-008*5)

Dear Ms. Martin:

Thank you for your April 7, 2015, request for consultation pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; ESA), regarding a proposed permit from the U.S. Army Corps of Engineers (Corps) to the City of Unalaska for a proposed dock replacement in Dutch Harbor, Alaska. The Corps has requested concurrence with the determination that the proposed dock replacement project for the Unalaska Marine Center (UMC) Dock Positions III and IV may affect, but is not likely to adversely affect species and critical habitat protected under the ESA.

The proposed replacement dock would be built to extend the face of the current UMC dock and provide additional berthing capacity, while ensuring the safe navigation of berthing vessels, and would include necessary appurtenances to meet the current and future needs of the Port of Dutch Harbor. The proposed project would provide 610 feet of new dock face with a minimum water depth of approximately 45 feet. The proposed project would align approximately 390 feet of the new dock face with the current U.S. Coast Guard dock creating a total face length of approximately 730 feet, for this section of the facility. The proposed project would also provide approximately 220 feet of dock aligned with existing UMC Positions V through VII creating the added length needed for modern container ships that use the Port of Dutch Harbor.

Heavy duty fenders, a concrete face beam, dock surface concrete paving, optional uplands paving, crane rail system, bullrails and heavy duty bollards are planned along the entire face of the proposed new structure. High mast lights, utilities (fuel, sewer and water service lines), drainage structures and dock anodes are also included. The proposed activities are planned to begin in 2017 and will continue for approximately one year.

The Corps has determined that the proposed dock replacement project may affect, but is not likely to adversely affect, the northern sea otter (*Enhydra lutris kenyoni*, listed as threatened in 2005), the Alaska breeding population of Steller's eiders (*Polysticta stelleri*, threatened), and sea otter critical habitat (federally designated in 2009). Furthermore, the Corps determined that the proposed project will have no effect on the short-tailed albatross (*Phoebastria albatrus*, listed as endangered in 2000).

Short-tailed albatrosses are not expected in the vicinity of the action area, even though they are frequently observed offshore near Unalaska Island. Therefore, the Service anticipates no adverse effects to this endangered seabird. Steller's eiders occur in nearshore waters of Unalaska Island, may be in the action area during fall, winter, and spring, and may be adversely affected by noise during construction. Bright lights are known to attract Steller's eiders, making them susceptible to striking vessels and on-land infrastructure. Exposure to contaminants, such as petroleum hydrocarbons, is known to impact Steller's eider survivorship. Sea otters may be present in the action area at any time of year and noise disturbance may adversely affect them, and like Steller's eiders, exposure to contaminants, such as petroleum hydrocarbons, is known to impact sea otter survivorship. The action area is within critical habitat designated for sea otters, however, this highly industrial area is considered low quality due to existing habitat degradation. The Service believes that the loss of critical habitat as a result of this proposed project is inconsequential to the survival and recovery of northern sea otters.

Potential adverse effects from the proposed action on listed species would primarily result from in-water and airborne noise from the use of heavy equipment to drive piles and face-sheets into the sea bottom and to compact the fill material. To address the potential for adverse effects to sea otters and Steller's eiders from construction activities and noise disturbance, the Corps will require compliance with the Service's Anchorage Fish and Wildlife Field Office *Observer Protocols for Pile Driving, Dredging and Placement of Fill* (Observer Protocols; Service 2012). A dedicated observer skilled in identification of marine mammals and sea ducks, with stop-work authority, will be onsite during project activities. Should sea otters or Steller's eiders be sighted within 328 feet of the work site during vibratory pile driving, or within 984 feet of the work site during impact pile driving, activities will be curtailed until the animal(s) voluntarily leave the work area. Compliance with the Observer Protocols will minimize the risk of disturbance from construction activities to sea otters and Steller's eiders.

High mast lights pose a concern to Steller's eiders, as well as other migratory birds. Birds may be attracted to lights on or near the coastline, especially at night or during periods of low visibility. The proposed high mast lights would have Light Emitting Diode light sources, which allow the lights to have less spread and produce less light pollution, thus reducing the projection of light across the horizon. As a way to further minimize the potential adverse effect of mast lights, the Corps has agreed to direct these lights downward to reduce the potential to attract birds in flight. Additionally, in accordance with Environmental Protection Agency and Alaska Department of Environmental Conservation oil spill guidance, spill plans will be in place and materials available for spill prevention and cleanup activities at the marine terminal, to limit potential contamination in the action area.

Because avoidance measures will be employed to reduce potential harm to Steller's eiders and

sea otters from noise disturbance during construction, collisions due to light attraction with downward shielding, and petroleum hydrocarbon contamination, with spill prevention and cleanup plans and materials will be in place, the Service concurs with the Corps' determination that the proposed UMC dock replacement project may effect, but is not likely to adversely affect listed species or their critical habitat.

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 responsibilities under the Migratory Bird Treaty Act, Marine Mammal Protection Act, Clean Water Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, Bald and Golden Eagle Protection Act, or other legislation.

In view of this, requirements of section 7(a)(2) of the ESA have been satisfied. However, obligations under section 7 of the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is determined that may be affected by the proposed action.

Thank you for your cooperation in meeting our joint responsibilities under the ESA. For more information or if you have any questions please contact Leah Kenney at 907-271-2440 or myself at 907-271-1467 and refer to consultation number 2015-0084.

Sincerely,

Ellen Lance
Chief, Ecological Services Branch

Literature Cited

U.S. Fish and Wildlife Service. 2012. Anchorage Fish and Wildlife Field Office Observer Protocols for Pile Driving, Dredging and Placement of Fill. Draft. August 7, 2012. 6 pp.

Appendix F. Calculations of Estimated Exposures

Calculations of Estimated Exposures - Preliminary

This section provides preliminary calculations for estimated exposures. These calculations will be following the completion of additional surveys, as described in Section 4.5.2 of the body of this application. The following equations are described further in Section 6.1.

$$Observation\ Rate\ (OR) = \frac{No.of\ animals\ observed}{Hours\ of\ observation} \quad \text{(Equation 6-1)}$$

$$Exposure\ Rate\ (XR) = \mu_{OR} + CI_{95} \quad \text{(Equation 6-2)}$$

where: $\mu_{OR} = Average\ of\ Monthly\ Observation\ Rates$

$CI_{95} = 95\%\ Confidence\ Interval\ (Normal\ Distribution)$

$$CI_{95} = 1.96 \cdot \left(\frac{standard\ deviation}{sample\ size}\right)$$

$$Estimated\ Exposures = XR \times Duration\ (hours) \quad \text{(Equation 6-3)}$$

****The data presented below are preliminary and subject to change following further review.****

Table 1. Preliminary estimated exposure details

Month	Hours of Observation	Individuals Observed				Monthly Observation Rates (OR)			
		Steller Sea Lion	Harbor Seal	Humpback Whale	Unidentified Whale	Steller Sea Lion	Harbor Seal	Humpback Whale	Unidentified Whale
Apr-15	8	0	1	0	0	0.000	0.125	0.000	0.000
May-15	8.5	1	1	0	0	0.118	0.118	0.000	0.000
Jun-15	13.5	2	0	0	0	0.148	0.000	0.000	0.000
Jul-15	11.25	1	2	0	0	0.089	0.178	0.000	0.000
Aug-15	6.75	9	0	2	2	1.333	0.000	0.296	0.296
Sep-15	10.25	9	1	2	0	0.878	0.098	0.195	0.000
Oct-15	3	1	4	0	0	0.333	1.333	0.000	0.000

Nov-15	4.5	0	0	0	0	0.000	0.000	0.000	0.000
Dec-15	3	4	0	0	0	1.333	0.000	0.000	0.000
Jan-16	2.25	0	0	0	0	0.000	0.000	0.000	0.000
Feb-16	2	0	0	0	0	0.000	0.000	0.000	0.000
Mar-16	1.5	1	0	0	0	0.667	0.000	0.000	0.000
Apr-16	37.25	13	6	0	0	0.349	0.161	0.000	0.000
May-16	21.25	13	5	0	0	0.612	0.235	0.000	0.000
Jun-16	17.25	0	4	7	0	0.000	0.232	0.406	0.000
Jul-16	30.75	18	1	1*	0	0.585	0.033	0.033	0.000
					Average of monthly observation rates (μOR)	**0.40**	**0.16**	**0.06**	**0.02**
					Standard Deviation	**0.46**	**0.33**	**0.13**	**0.07**
					95% Confidence Interval (Normal Distribution) (CI95)	**0.23**	**0.16**	**0.06**	**0.04**
					Exposure Rate (XR)	**0.63**	**0.32**	**0.12**	**0.05**
					Estimated Exposures (Preliminary)	**923**	**465**	**176**	**81**

Duration in hours for this project was estimated to be 1,470 hours of pile driving. For CI_{95}, sample size (n) is 16.

*A data point for two additional humpback whales viewed in July was rejected as it was both outside the project area and was recorded outside of any programmed observation period.


CITY OF UNALASKA
INTERNATIONAL PORT OF DUTCH HARBOR
53° 54' N 166° 32' W