HDR

Application for a Marine Mammal Protection Act Incidental Harassment Authorization

Sand Point City Dock Replacement Project

State Project # SFHWY00006

Submitted to:
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Acronyms and Abbreviations

AMHS	Alaska Marine Highway System
CFR	Code of Federal Regulations
CI	confidence interval
CV	coefficient of variation
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DOT&PF	Alaska Department of Transportation and Public Facilities
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FR	Federal Register
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
km^2	square kilometers
LOA	Letter of Authorization
µPa	microPascals
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
M/V	Marine Vessel
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Pa	Pascals
PSO	protected species observer
PTS	permanent threshold shift
rms	root mean square
SEL	sound exposure levels
SEL_{cum}	cumulative Single Strike Equivalent

SPL	sound pressure levels
SSL	sound source level
SSV	sound source verification
TL	transmission loss
TTS	temporary threshold shift
USACE	U.S. Army Corps of Engineers
USC	United States Code
wDPS	western Distinct Population Segment

1 DESCRIPTION OF ACTIVITIES

1.1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) requests an Incidental Harassment Authorization (IHA) for the take of small numbers of marine mammals, incidental to construction of a new city dock in Sand Point, Alaska, referred to as the Sand Point City Dock Replacement Project (Project; State Project Number SFHWY00006). The DOT&PF requests that the IHA be valid for 1 year, from 01 August 2018 through 31 July 2019.

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) regulations governing the issuance of IHAs and Letters of Authorization (LOAs) permitting the incidental, but not intentional, take of marine mammals under certain circumstances are codified in 50 Code of Federal Regulations (CFR) Part 216, Subpart I (Sections 216.101–216.108). The Marine Mammal Protection Act (MMPA) defines “take” to mean “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal” (16 United States Code [USC] Chapter 31, Section 1362 (13)). Section 216.104 sets out 14 specific items that must be addressed in requests for rulemaking and renewal of regulations pursuant to Section 101(a)(5) of the MMPA. The 14 items are addressed in Sections 1 through 14 of this Application for an IHA, and include the following:

1. Description of Specified Activity
2. Dates and Duration, Specified Geographic Region
3. Species and Numbers of Marine Mammals
4. Affected Species Status and Distribution
5. Types of Incidental Taking Authorization Requested
6. Take Estimates for Marine Mammals
7. Description of Potential Impacts of the Activity
8. Description of Potential Impacts on Subsistence Uses
9. Description of Potential Impacts on Habitat
10. Description of Potential Effects of Habitat Impacts on Marine Mammals
11. Mitigation Measures
12. Arctic Subsistence Plan of Cooperation
13. Monitoring and Reporting
14. Suggested Means of Coordination

This application was prepared on behalf of the DOT&PF by HDR, Inc.

1.2 Project Purpose and Description

The Sand Point City Dock is located in the City of Sand Point, Alaska, on the northwest shore of Popof Island, in the Shumagin Islands of the western Gulf of Alaska (**Figure 1-1**). The facility is a multi-function dock and active ferry terminal located in Humboldt Harbor, on the southwest

side of the City of Sand Point (**Figure 1-2** and **Figure 1-3**). The existing City Dock was built in 1984 and is in need of replacement, as it is nearing the end of its operational life due to corrosion and wear. The purpose of the Project is to replace the existing dock with a new dock of similar size, designed to provide improved performance under both high amounts of service and extreme loads. The new dock would be located about 150 feet (46 meters) southwest of the existing dock, along the existing breakwater (**Figure 1-4**, **Section 1.3**). The new city dock would be designed to serve as the Alaska Marine Highway System (AMHS) ferry terminal and would also support shipping and receiving of commercial and service-industry goods.

The Project includes the installation of steel piles to support a concrete dock platform, fenders, a catwalk with dolphin, an electrical generator building, and electrical infrastructure. The Project also includes the deposition of fill and armor rock to create additional uplands adjacent to and below the new dock. No dredging is proposed as part of this Project, and the existing dock would not be removed. Modification to the existing dock's dolphin to connect a new catwalk would occur as part of the Project; however, no pile installation would occur with this modification and no other modifications to the existing dock are proposed at this time.

The Sand Point City Dock was constructed in 1984 as a pile-supported structure. It currently rests on the western side of the New Harbor breakwater. The City Dock currently serves as a multi-function dock, acting first and foremost as a shipping and receiving terminal for commercial goods, services, and industry, as well as a service terminal for the Marine Vessel (M/V) *Tustumena* ferry. The dock receives barge service from Seattle weekly throughout the year. The dock also regularly handles processed seafood via shipping container vans. Given the lack of road access to Sand Point, the City Dock is an essential component of infrastructure providing critical access between Sand Point and the Pacific Northwest region.

The purpose of the Project is to replace the existing City Dock with an updated, modern structure. Proposed activities included as part of the Project with potential to affect marine mammals include vibratory and impact pile installation operations and vibratory removal of temporary piles. Such in-water activities could result in harassment to marine mammals as defined under the MMPA of 1972, as amended in 2007 (16 USC 31). Proposed Project activities are described in detail in the following sections.

In this IHA application, the units of measure reported for construction activities are Imperial units, which are typically used in construction. Units of measure for scientific information, including acoustics, are metric. When appropriate, units are reported as both Imperial and metric.

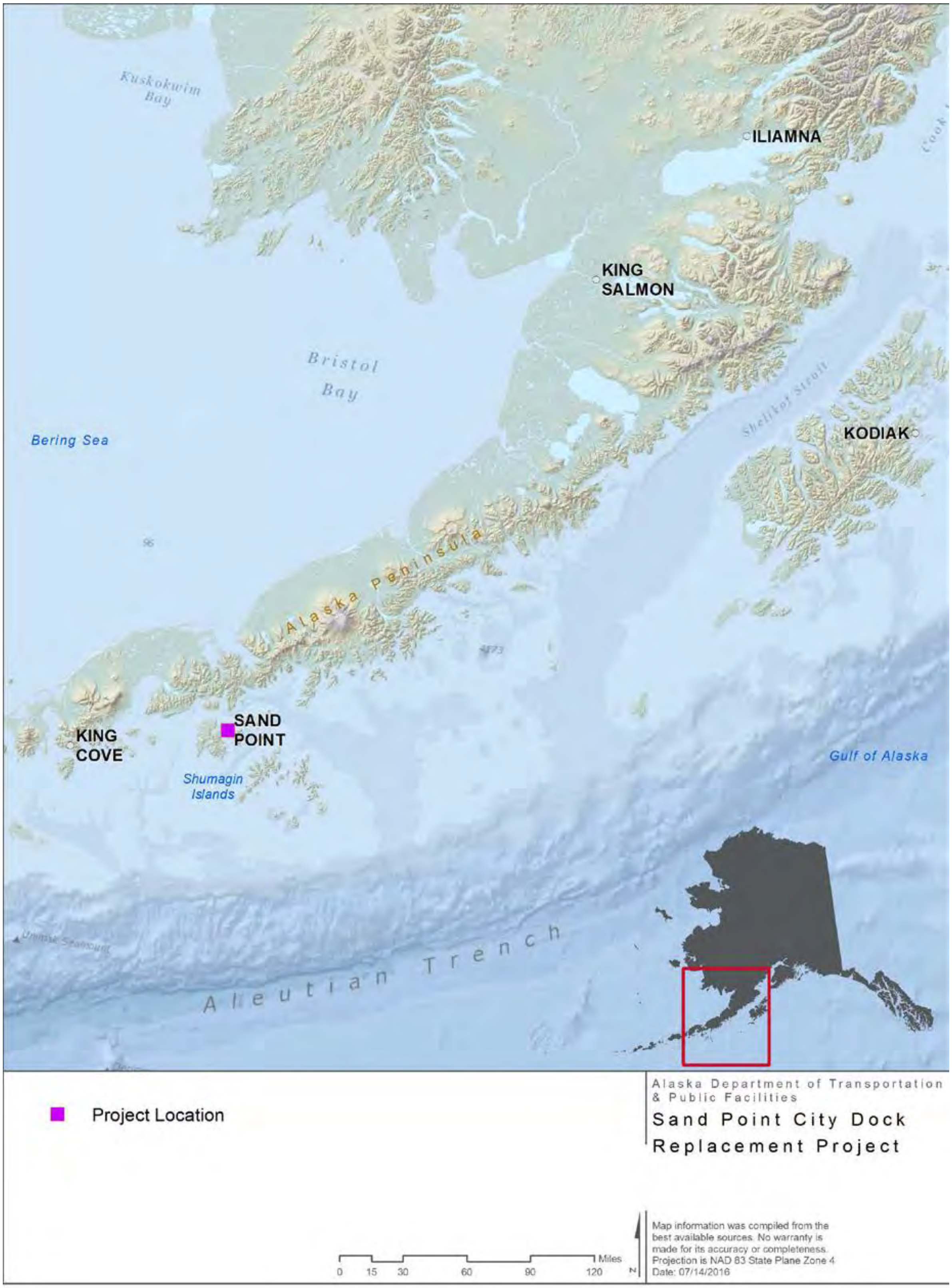

Figure 1-1. Site location and vicinity

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Figure 1-2. Sand Point and Humboldt Harbor area

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Figure 1-3. City Dock location, Humboldt Harbor, and Sand Point

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Figure 1-4. Existing Sand Point City Dock located on the seaward side of the "New Harbor" causeway. The replacement city dock would be located to the right of the existing City Dock from this view point, in the center bottom of the photograph. (Source: ShoreZone, NOAA Alaska Fisheries)

1.3 Project Activities

The proposed action for this IHA request includes pile installation for the new city dock and the deposition of shot rock fill adjacent to the existing causeway (**Figure 1-5**). There is no mapped high tide line at Sand Point, and, therefore, engineers will use Mean Higher High Water (MHHW) to determine the placement of fill. This fill would be placed above and below MHHW to increase the causeway's areal extent and would be stabilized through the use of new and salvaged armor rock protection (**Figure 1-6**). Approximately 38,600 square feet of fill and 28,500 square feet of armor rock would be required for breakwater expansion (**Section 1.3.2**). Following deposition of fill and prior to placement of armor rock, round steel piles would be installed to support the new city dock foundation and mooring dolphins. Each of these activities is described in detail in the following sections.

1.3.1 Installation and Removal of Piles

The new dock would be supported by approximately 52 round, 30-inch-diameter, 100-foot-long permanent steel pipe piles. Fender piles at the dock face would be installed using 8 round, 24-inch-diameter, 80-foot-long permanent steel pipe piles. The mooring dolphin would consist of 3 round, 24-inch-diameter, 120-foot-long permanent battered pipe piles. This equates to a total of 63 permanent piles (**Table 1-1**). It is anticipated that an ICE 44B or APE 200-6 model vibratory driver or equivalent and a Delmag D62 diesel impact hammer or equivalent would be used to install the piles. Project design engineers anticipate an impact strike rate of approximately 40

strikes per minute, based on substrate density, pile types, and hammer type, which equates to approximately 1,000 strikes per 30-inch dock support pile, 400 strikes per dolphin pile, and 120 strikes per fender pile (C. Courtright, pers. comm.).

Two or more temporary piles would be used to support a template to facilitate installation of two to four permanent dock support piles. Template configuration, including the number of permanent piles that could be installed at once and the number of temporary piles required to support the template, would be determined by the contractor. Four additional temporary piles would support the template for the dolphin. In all, up to 90 temporary piles would be installed and removed during construction of the dock and dolphin (**Table 1-1**). Temporary piles would be either H-piles or pipe piles with a diameter of less than 24 inches (C. Courtright, pers. comm.).

Temporary Piles

Temporary piles would be installed and removed during construction of the dock by vibratory methods only. Removal and installation of the temporary piles that support the template typically occur within the same day, with additional time required for installation of the template structure, which would include welding, surveying the location, and other activities. Each temporary pile would be installed in approximately 15 minutes and removed in approximately 15 minutes. Up to six temporary piles would be installed and removed per day, for a total of up to 180 minutes of vibratory installation and removal per day (C. Courtright, pers. comm.). Installation of temporary piles, including those required to support construction of the dolphin, would require about 15 days of effort (90 temporary piles / 6 temporary piles per day = 15 days; **Table 1-1**).

Permanent Piles

Permanent dock support piles would be installed using both vibratory and impact hammers; both methods of installation typically occur within the same day. Permanent piles are first installed with a vibratory hammer for approximately 45 minutes to insert the pile through the overburden sediment layer and into the bearing layer (**Table 1-1**). The vibratory hammer is then replaced with the impact hammer, which is used to install the pile for the last 15 to 20 feet (approximately 20 minutes). Up to four permanent piles would be installed per day, for a total of 180 minutes of vibratory and 80 minutes of impact installation per day. Installation of permanent piles would require about 13 days of effort (52 permanent piles / 4 permanent piles per day = 13 days; **Table 1-1**).

Fender Piles

Installation of the eight fender piles is anticipated to occur over 2 days (after installation of all dock support piles), at a production rate of four fender piles per day (8 fender piles / 4 fender piles per day = 2 days; **Table 1-1**). Each fender pile would require 30 minutes of vibratory installation and 10 minutes of impact installation, for a total of 120 minutes of vibratory and 40 minutes of impact installation each day. No temporary piles would be required for fender pile installation because they would be installed along the completed dock face.

Dolphin Piles

Installation of three 24-inch permanent battered pipe piles for the dolphin would also require the installation and removal of four temporary piles (either <24 inch diameter or H-piles) to support the template. Installation of the dolphin piles is anticipated to occur over 2 days, with one or two dolphin piles installed per day (3 dolphin piles / 1 or 2 dolphin piles per day = 2 days; **Table 1-1)**. Thirty minutes of vibratory installation and 20 minutes of impact installation are anticipated per permanent dolphin pile, for a total of no more than 60 minutes of vibratory installation and

40 minutes of impact installation per day. Installation and removal of the temporary piles for the dolphin are included in the calculations for temporary piles above.

Pile Clearing

Following initial pile installation of permanent dock support piles, the mud accumulation on the inside of each pile would be augured out and the piles filled with concrete to provide additional moment capacity and corrosion resistance. An auger with a crane-mounted rotary head (Numa, Paco, or APE or equivalent) would be used for pile clearing. Clearing of the 52 permanent 30-inch piles is anticipated to occur on 13 days overall, with about 2 hours of clearing activity required to clear four piles per day (about 30 minutes per pile; **Table 1-1**).

Table 1-1. Pile details and estimated effort required for pile installation

Pile Type	Diameter	Number of piles	Piles per day	Hours per day	Estimated minutes per pile	Anticipated days of effort
Vibratory Installation or Removal						
Permanent support pile	30”	52	4	3	45	13
Permanent dolphin pile	24”	3	2	1	30	2
Permanent fender pile	24”	8	4	1	30	2
Installation, temporary support pile	<24” or H-pile	90	6	1.5	15	15
Removal, temporary support pile	<24” or H-pile	90	6	1.5	15	15
Impact Installation						
Permanent support pile	30”	52	4	1.33	20	13
Permanent dolphin pile	24”	3	2	0.67	20	2
Permanent fender pile	24”	8	4	0.33	10	2
Drilling / Pile Clearing						
Permanent support pile	30”	52	4	2	30	13

Note: Durations are estimated and may vary based on the Contractor’s means and methods.

Construction Support

The contractor is expected to mobilize a crane and one or two floating barges, which would be moved into location with a tugboat. Pile installation would be conducted primarily from the existing causeway, and the deck would be constructed in an outward direction, allowing installation to occur from the newly constructed portions of the dock rather than from a barge. Installation of the batter piles for the dolphin would be conducted from a barge. The new deck would measure approximately 66 feet (20.1 meters) wide by 222 feet (67.7 meters) long and contain an electric generator building and light poles. The barge(s) and tug are anticipated to remain on-site until pile and deck installation are complete.

1.3.2 Placement of Fill

New shot rock fill would be placed on the seaward side of the existing causeway to expand the above- and below-water portions of the existing causeway and create an additional upland area for safe passenger staging and maneuvering of equipment once completed (**Figure 1-5** and **Figure 1-6**). The fill would be placed both above and below MHHW. At this time in the design, DOT&PF anticipates approximately 19,500 cubic yards of shot rock fill would be required, and 9,800 cubic yards of this would be located below MHHW. In addition, approximately 2,200

cubic yards of Type B filter rock and 6,200 cubic yards of Type A armor rock would be required. Of this, 2,100 cubic yards of filter rock and 5,100 cubic yards of armor rock would be placed below MHHW. It is anticipated that fill material for augmenting the causeway would be procured from a material source site in Sand Point. If this is not possible, a material supply barge may be employed and present at the Project site; however, this is considered unlikely. The placement of fill is not anticipated to result in incidental take of marine mammals; therefore, this IHA application does not request incidental take for fill placement and the activity is not discussed further in this document.

1.4 Project Schedule

Pile installation and removal associated with the Project would begin no sooner than 01 August 2018 and is anticipated to be completed prior to 31 December 2018. However, given the possibility of schedule delays and other unforeseen circumstances, an IHA is being requested for a full year, from 01 August 2018 through 31 July 2019.

Vibratory and impact installation of piles is expected to take place over a total of approximately 32 working days within a 5-month window beginning 01 August 2018 (**Table 1-2**). The IHA application requests authorization for up to 1 year of construction activities in case unforeseen delays occur. It is important to note that different types of pile installation may take place on the same day, and, therefore, take estimates in **Section 6** assume that the loudest activities would occur at some point during each day of construction. Pile installation would be intermittent and staggered over an estimated 5-month period, depending on weather, construction and mechanical delays, marine mammal shutdowns, and other potential delays and logistical constraints. With a 25 percent contingency added to these time estimates to account for delays, the total number of expected days of pile installation and removal is 40 (**Table 1-2**).

Table 1-2. Estimated number of days required for pile installation and removal

Activity	Number of Piles	Days Required
Support pile installation	52	13
Temporary pile installation and removal	90	15
Dolphin pile installation	3	2
Fender pile installation	8	2
Total Days		**32**
Total Days With 25% Contingency		**40**

1.5 Applicable Permits/Authorizations

The following permits/authorizations are applicable to in-water work addressed by this application:

- United States Army Corps of Engineers (USACE) Section 10 of the Rivers and Harbors Act of 1899
- USACE Section 404 of the Clean Water Act (CWA)

- Section 401 of the CWA
- NMFS Endangered Species Act (ESA) Section 7 Consultation

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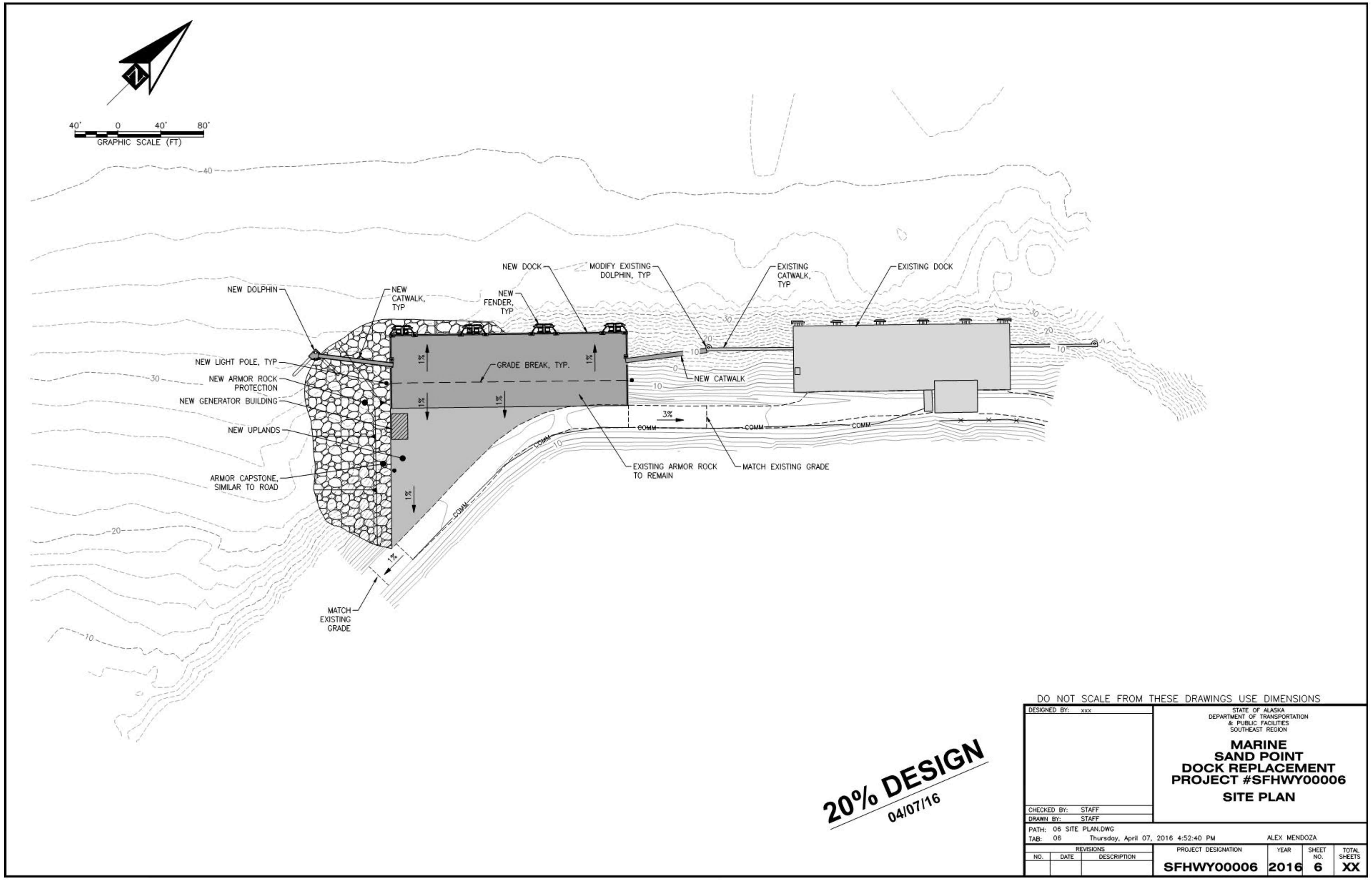

Figure 1-5. Sand Point City Dock Replacement design drawing, aerial view

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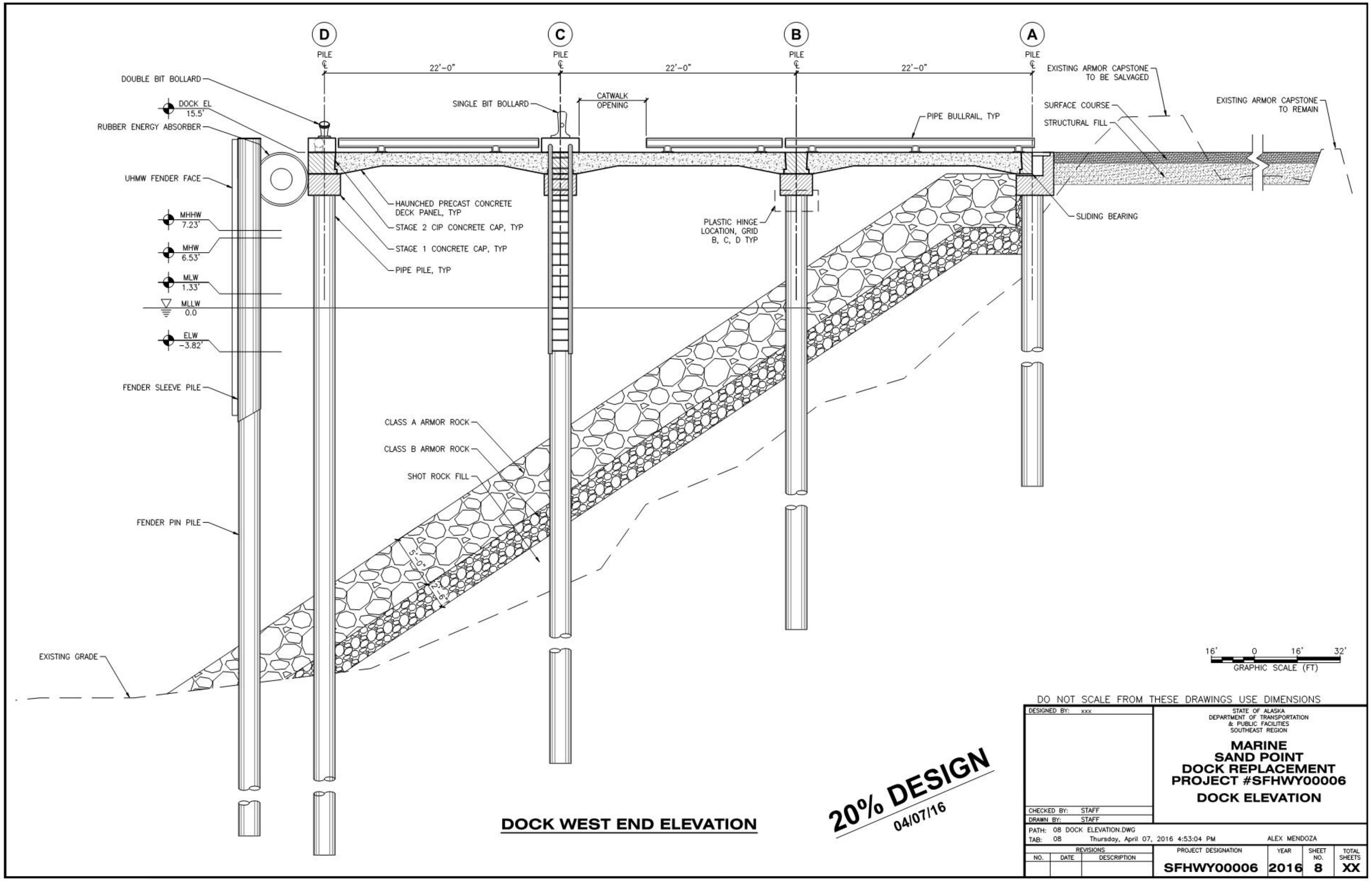

Figure 1-6. Sand Point City Dock Replacement design drawing, side view

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2 DATES, DURATION, AND GEOGRAPHICAL REGION OF ACTIVITIES

2.1 Dates and Durations of Activities

In-water work associated with the Project will begin on or after 01 August 2018 or immediately after authorization under the MMPA is granted. It is critical to DOT&PF that authorization for this Project is granted in an expedient manner to meet Project deadlines and avoid delays/interruptions in ferry and commercial services to Sand Point. In-water work will be completed no later than 31 July 2019 (1 year following IHA issuance).

A 25 percent contingency has been added to the estimated number of pile installation days (32) to account for unknown substrate conditions and potential schedule delays (e.g., weather). Therefore, the Project may require approximately 40 days of pile installation over a period of 5 months. This IHA requests authorization for up to 1 year of construction activities in case unforeseen construction delays occur. Pile installation would occur intermittently over the work period, for anything from minutes to hours at a time. Timing in both instances would vary based on weather delays, substrate type (the substrate is layered and is of varying hardness across the site, so some piles may take longer to install than others), and other factors. A production rate of one to three piles per day, on days when pile installation occurs, is considered typical for a project of this type. The take estimates provided in **Section 6** are based upon the contingency-added estimates of days required for pile installation.

2.2 Geographical Setting

The Sand Point City Dock is located in the City of Sand Point, Alaska, at 55˚20'06.6"N, 160˚30'05.9"W, on the northwest side of Popof Island, in the western Gulf of Alaska (**Figure 1-1** and **Figure 1-2**). Sand Point is part of the Aleutians East Borough and is located approximately 10 miles (16 kilometers) south of the Alaska Peninsula. Popof Island is one of the Shumagin Islands in the western Gulf of Alaska (**Figure 1-1**). Popof Island is approximately 16 kilometers (10 miles) long and 8 kilometers (5 miles) wide and covers 93.7 square kilometers (36.2 square miles). It is located immediately east of the much larger Unga Island, and Popof Strait separates the two islands. The City of Sand Point is the largest community in the Shumagin Islands.

The Sand Point City Dock is located in Humboldt Harbor, on the southwest side of the City of Sand Point. The existing City Dock is located on the causeway of Sand Point's "New Harbor" at the end of Boat Harbor Road, and the proposed replacement dock is proposed to be located immediately adjacent to (southwest of) the existing City Dock along the causeway, which also serves as the breakwater for the New Harbor (**Figure 1-2**).

2.2.1 Physical Environment

The City of Sand Point maintains two marinas, the Robert E. Galovin small boat harbor and the "New Harbor" (**Figure 1-3**). The small boat harbor encompasses 25 acres at the head of Humboldt Harbor. The "New Harbor" was constructed in 2009 by modifying the existing causeway and creating a new causeway to the southwest. The "New Harbor" has a loading/offloading ramp on the east wall and a simple float structure. The Sand Point City Dock is located on the outside of the "New Harbor's" west causeway, and the replacement dock would also be constructed there. Large vessels, including the AMHS ferry M/V *Tustumena*, commercial barges, and container ships, use the City Dock.

A seafood processing facility is located on the north side of Humboldt Harbor (**Figure 1-3**). During open fishing seasons, the facility receives numerous commercial fishing vessels daily for offloading and processing of catch.

In the Project footprint, the shoreline along the causeway and in the vicinity on the mainland is heavily armored with riprap. The shoreline west of the Project becomes natural until it reaches the airport, where armor rock begins again. The substrate in the Project footprint is generally silty, to a depth of 15 feet (4.6 meters), with layers of gravel. Below this layer is a dense and very thick layer of silty clay.

2.2.2 Acoustical Environment

Baseline background (ambient) sound levels in the Humboldt Harbor area are unknown. The areas around the City Dock and Humboldt Harbor are frequented by fishing vessels and tenders; the M/V *Tustumena*, barges, and tugboats; and other commercial and recreational vessels that use the small-boat harbor, City Dock, seafood processing plant, and other commercial facilities. At the seafood processing facility, located north of the City Dock, fish are offloaded into the processing plant from the vessels' holds. The small boat harbor houses the largest fishing fleet in the Aleutian Islands in addition to other vessels. **Section 6.3.3** further discusses estimated vessel and ambient noise levels within the Project area.

3 SPECIES AND ABUNDANCE OF MARINE MAMMALS

The marine waters of the Shumagin Islands support many species of marine mammals, including pinnipeds and cetaceans; however, the number of species regularly occurring near the Project area is limited (**Table 3-1**). Steller sea lions (*Eumetopias jubatus*) are the most common marine mammals in the Project area, and are part of the western Distinct Population Segment (wDPS), which is listed as endangered under the ESA. Humpback whales (*Megaptera novaeangliae*), including the ESA-listed Western North Pacific DPS (endangered) and Mexico DPS (threatened), as well as ESA-listed fin whales (*Balaenoptera physalus*; endangered), may also occur in the Project area, but far less frequently and in lower abundance than Steller sea lions. Harbor seals (*Phoca vitulina*) and harbor porpoises (*Phocoena phocoena*) may occur in the Project area. Gray whales (*Eschrichtius robustus*), minke whales (*Balaenoptera acutorostrata*), killer whales (*Orcinus orca*), and Dall's porpoises (*Phocoenoides dalli)* also have the potential to occur in or near the Project area, although the likelihood of this is quite low.

North Pacific right whales (*Eubalaena japonica*) and blue whales (*Balaenoptera musculus*) are very rare in general and are extremely unlikely to occur within the Project area; therefore, take will not be requested for these two species and they will not be discussed further in this application.

This IHA application is requesting incidental take for potential underwater acoustic harassment from pile installation activities for Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales, humpback whales, fin whales, gray whales, and minke whales (**Table 3-1**).

Table 3-1. Marine mammals in or near the Project area

Species	Abundance (Population/Stock)	MMPA Designation	ESA Listing	Occurrence in Project Area
Steller sea lion	49,497 (Western DPS)	Depleted & Strategic	Endangered (wDPS[a])	Very common
Harbor seal	27,386 (Cook Inlet/Shelikof Strait)	None	None	May occur occasionally
Harbor porpoise	31,046 (Gulf of Alaska)	Strategic	None	Uncommon
Dall's Porpoise	83,400 (Alaska)	None	None	Rare; may occur in deeper waters among Shumagin Islands
Killer whale (Orca)	2,347 (Eastern North Pacific Alaska Resident) 587 (Gulf of Alaska, Aleutian Islands, & Bering Sea Transient)	None None	None None	Uncommon
Humpback whale	1,059 (Western North Pacific) 3,264 (Mexico) 11,398 (Hawaii)	Depleted & Strategic Depleted & Strategic Depleted & Strategic	Endangered (Western North Pacific DPS[b]) Threatened (Mexico DPS[b]) None (Hawaii DPS[b])	May occur occasionally; common in deeper waters among Shumagin Islands
Fin whale	N/A (Northeast Pacific)	Depleted & Strategic	Endangered (Species[c])	Uncommon in deeper waters among Shumagin Islands
Gray whale	20,990 (Eastern North Pacific)	None	None	Rare migrant during May and November
Minke whale	N/A (Alaska)	None	None	Rare

[a] The ESA-listed entity is the western Distinct Population Segment (wDPS).
[b] The ESA-listed entities are the Western North Pacific DPS and the Mexico DPS. The Hawaii DPS is not listed under the ESA.
[c] Currently listed under the ESA at the species level.
Source for humpback whale population estimates: Wade et al. 2016; all other population estimates: Muto et al. 2016.
Note: ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

4.1 Steller Sea Lion

4.1.1 Status and Distribution

Steller sea lions are found throughout the northern Pacific Ocean, including coastal and inland waters from Russia (Kuril Islands and the Sea of Okhotsk), east to Alaska, and south to central California (Año Nuevo Island). Steller sea lions were listed as threatened range-wide under the ESA on November 26, 1990 (55 *Federal Register* [FR] 49204). Steller sea lions were subsequently partitioned into the western and eastern DPSs in 1997 (Allen and Angliss 2010). The eastern DPS remained classified as threatened (62 FR 24345) until it was delisted in November 2013. The wDPS (those individuals west of 144° W longitude or Cape Suckling, Alaska) was upgraded to endangered status following separation of the DPSs, and it remains endangered today. Only the wDPS is considered in this application because the range of the eastern DPS is not known to include the Project area.

The wDPS of Steller sea lions declined approximately 75 percent from 1976 to 1990. Population declines in the Aleutian Islands and western Gulf of Alaska began in the early to mid-1980s and continued at a rate of about 15 percent per year. Factors that may have contributed to this decline include (1) incidental take in fisheries, (2) legal and illegal shooting, (3) predation, (4) contaminants, (5) disease, and (6) climate change.

From 2000–2004, non-pup Steller sea lion counts at trend sites in the wDPS increased 11 percent. These counts suggested the first region-wide increases for the wDPS since standardized surveys began in the 1970s, and were attributed to increased survey efforts in all regions except the western Aleutian Islands. Annual surveys of haulouts and rookeries in the western Gulf of Alaska since 1985 indicate a 16 percent increase in non-pup counts and 38 percent reduction in pup counts over the 30-year period. However, since 2003, these counts have increased by 58 percent for non-pups and 53 percent for pups (Fritz et al. 2016a, 2016b). Annual increases for the western Gulf of Alaska range between 3.4 and 3.8 percent for non-pup and pup counts since the early 2000s (Muto et al. 2016; Fritz et al. 2016a, 2016b). The most recent comprehensive estimate (pups and non-pups) for abundance of the wDPS in Alaska is 52,009 sea lions, based on aerial and ship surveys of pups and non-pups conducted in June and July 2013–2015 (Fritz et al. 2016a, 2016b).

The wDPS breeds on rookeries in Alaska from Prince William Sound west through the Aleutian Islands. Steller sea lions use 38 rookeries and hundreds of haulouts within their range in western Alaska (Allen and Angliss 2013). Steller sea lions are not known to migrate, but individuals may disperse widely outside the breeding season (late May to early July). At sea, Steller sea lions are commonly found from nearshore habitats to the continental shelf and slope (Jefferson et al. 2008).

4.1.2 Critical Habitat

On 27 August 1993, NMFS published a final rule designating critical habitat for the Steller sea lion. The essential features that were used to determine Steller sea lion critical habitat include the physical and biological features that support reproduction, foraging, rest, and refuge. In Alaska, designated critical habitat includes all major Steller sea lion rookeries and major haulouts identified in the listing notice (58 FR 45269) and associated terrestrial, air, and aquatic zones. Critical habitat includes a terrestrial zone that extends 0.9 kilometer (3,000 feet)

landward from each major rookery and major haulout, and an air zone that extends 0.9 kilometer (3,000 feet) above the terrestrial zone of each major rookery and major haulout. For each major rookery and major haulout located west of 144° W. longitude (i.e., the Project area), critical habitat includes an aquatic zone (or buffer) that extends 37 kilometers (20 nautical miles) seaward in all directions. Critical habitat also includes three large offshore foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area (58 FR 45269).

The Project is located within the aquatic zones (i.e., designated critical habitat) of two designated major haulouts: Sea Lion Rocks (Shumagins) and The Whaleback. The estimated Level B underwater harassment zone related to implementation of the proposed Project (see **Section 6.4.1**) overlaps with a third designated major haulout on Jude Island (**Figure 4-1**). No terrestrial or in-air critical habitat of any major haulout overlaps with the Project area. The major haulout at Sea Lion Rocks (Shumagins) is located approximately 28 kilometers (15.1 nautical miles) south of the Project site. The major haulout at The Whaleback is located approximately 27.4 kilometers (14.8 nautical miles) east of Sand Point. The major haulout at Jude Island is located 39.6 kilometers (21.4 nautical miles) west of Sand Point.

The Project area does not overlap with the aquatic zone of any major rookery, nor does it overlap with the three designated offshore foraging areas. The closest designated major rookery is on the east side of Atkins Island, which is approximately 83.3 kilometers (45 nautical miles) southeast of Sand Point. Another major rookery is located about 85.2 kilometers (46 nautical miles) south of Sand Point on the southwest point of Chernabura Island (Fritz et al. 2016c; **Figure 4-1**).

4.1.3 Presence in Project Area

Steller sea lions are the most obvious and abundant marine mammal in the Project area, and their abundance is highly correlated with seasonal fishing activity. Sea lions tend to congregate at the seafood processing facility (**Figure 1-3** and **Figure 1-4**) during the walleye pollock (*Gadus chalcogramma*) fishing seasons (R. Kochuten, pers. comm.; A. Audette, pers. comm). There are four official pollock fishing seasons: the “A” season starts on January 20, the “B” season starts on March 10, the “C” season starts on August 25, and the “D” season starts on October 1 (A. Audette, pers. comm.). The end dates of these seasons are variable. Outside of the pollock seasons, there are few sea lions in the harbor. It is suspected that sea lions are feeding on salmon during the summer salmon runs, and are not present in high numbers around Sand Point (R. Kochuten, pers. comm.).

The closest Steller sea lion haulout to the Project area is located on Egg Island, which is approximately 6 kilometers (3.7 nautical miles) from the Project. Recent counts have not recorded any Steller sea lions at this haulout (Fritz et al. 2016a, 2016b; L. Fritz, pers. comm.), however, local anecdotal reports suggest that the haulout does experience some use (R. Kochuten, pers. comm.). Researchers have noted as many as 10 sea lions at this haulout in May, although these observations are not part of systematic counts (L. Fritz, pers. comm.). There are six other haulouts within 37 kilometers (20 nautical miles) of Sand Point. Annual counts from the last 5 years of surveys at the nearby haulouts indicate that at least 300 to 500 sea lions are hauled out each year (**Table 4-1**). The closest rookery is located on Jude Island, approximately 38.9 kilometers (21 nautical miles) west of Sand Point, and had average annual counts of 214 sea lion pups from 2009–2014 (Fritz et al. 2016a).

Table 4-1. Steller sea lion non-pup counts at seven haulouts within 20 nautical miles of Sand Point in 2008, 2009, 2011, 2013, and 2014

Location	Distance from Project; nm (km)	Year				
		2008	2009	2011	2013	2014
Egg (Sand Point)	3.7 (6)	0	NA	NA	NA	0
Unga/Acheredin Pt.	16.4 (30.4)	202*	NA	103*	9	107*
Unga/Cape Unga	12.2 (22.6)	0	NA	NA	NA	0
Sea Lion Rocks[a] (Shumagins)	15.1 (28)	54*	NA	169*	46*	97*
The Whaleback[a]	14.8 (27.4)	102*	103	123*	186*	190*
The Haystacks	15.8 (29.3)	9	NA	NA	72*	137*
Nagai/Rock West of Cape Wedge	19.5 (36.1)	0	NA	NA	NA	0

[a] Denotes a major haulout as designated by National Marine Fisheries Service (58 Federal Register 45269)
Source: Fritz et al. 2016b
Notes: NA = no counts completed; * = average of two counts completed in that year; nm = nautical miles; km = kilometers

Abundant and predictable sources of food for sea lions in the Sand Point area include fishing gear, fishing boats and tenders, and seafood processing facilities that accept transfers of fish from offloading vessels. Sea lions have become accustomed to depredating fishing gear and raiding fishing vessels during fishing and offloading, and they follow potential sources of food in and around the harbor, waiting for opportunities to feed. The number of sea lions in the waters near Sand Point varies depending on the season and presence of commercial fishing vessels unloading their catch at the seafood processing facility. The Sand Point harbormaster and seafood processing plant foreman are the best available sources for information on sea lion abundance at Sand Point. Information from these individuals suggests that the highest numbers of sea lions are present during the pollock fishing seasons. Average counts at the seafood processing facility range from 4 to 12, but can occasionally reach as many as 20 sea lions. There are no notable differences in abundance between the four pollock seasons. Outside of the pollock seasons, sea lions may be present, but in small numbers (i.e., 1 or 2 individuals). Sea lions also regularly visit other parts of Humboldt Harbor in search of opportunistic food sources, including the small boat harbor, the New Harbor, and City Dock (R. Kochuten, pers. comm.; A. Audette, pers. comm.).

Steller sea lions do not generally eat every day, but tend to forage every 1 to 2 days and return to haulouts to rest between foraging trips (Merrick and Loughlin 1997; Rehburg et al. 2009). The foraging habits of sea lions using the haulouts near Sand Point and throughout the Shumagin Islands are not well known, but it is reasonable to assume that given the abundance of readily available food, not every sea lion in the area visits the adjacent seafood processing facility every day. Based on numbers at the seafood processing facility, it is estimated conservatively that about 12 unique individual sea lions likely occur in Humboldt Harbor each day during the pollock fishing seasons (R. Kochuten, pers. comm.; A. Audette, pers. comm.; **Section 6.5.1**).

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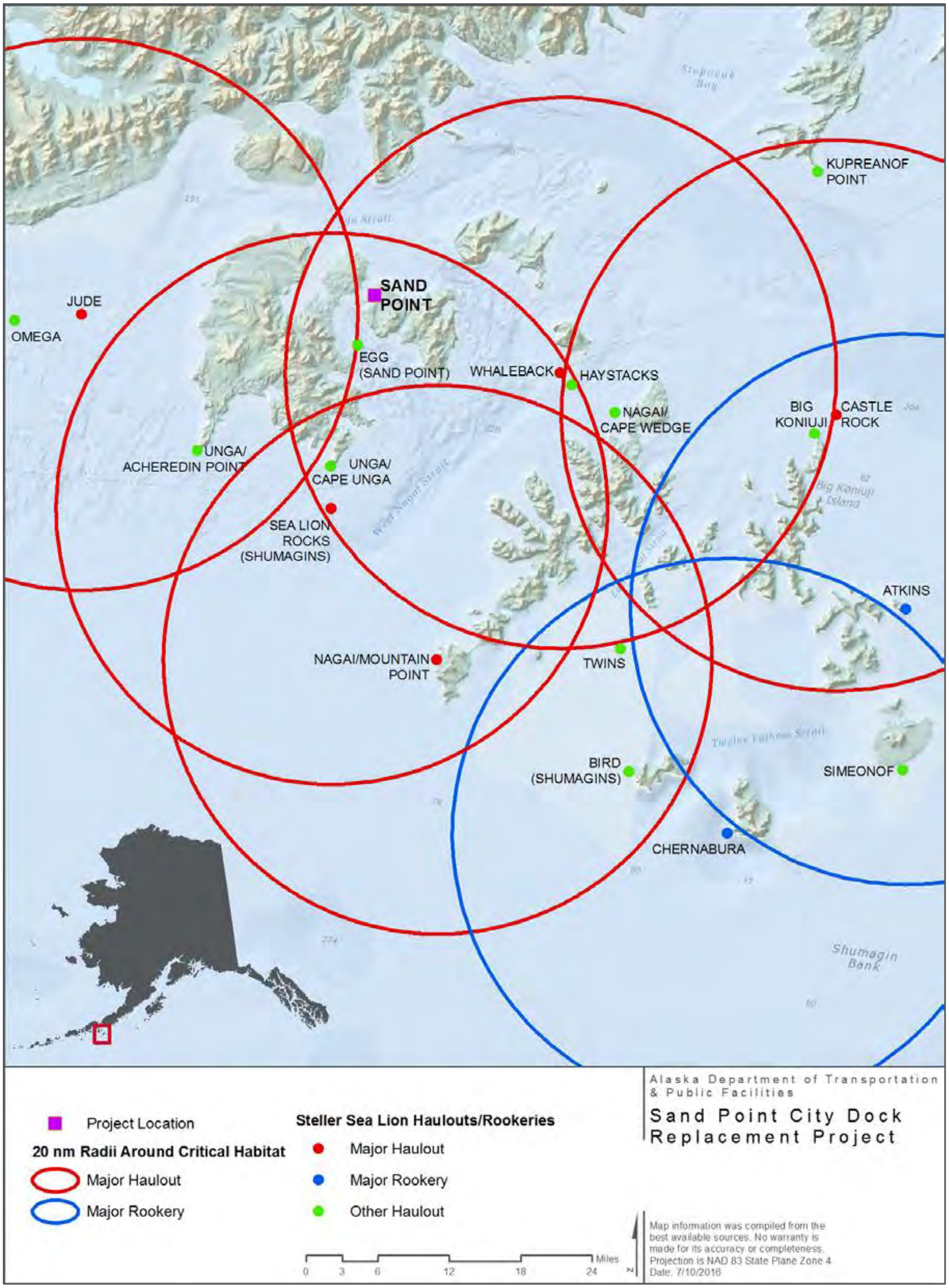

Figure 4-1. Steller sea lion haulouts, and designated major haulouts and major rookeries near Sand Point

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4.1.4 Life History

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods including Atka mackerel (*Pleurogrammus monopterygius*), Pacific herring (*Clupea pallasi*), walleye pollock, capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific cod (*Gadus macrocephalus*), salmon (*Oncorhynchus* spp.), and squid (*Teuthida* spp.) (Jefferson et al. 2008; Wynne et al. 2011).

Typically, females give birth to a single pup sometime between May and July (Wynne 2012). Females stay with their pups for about 1 week after birth. As the pups grow older, the females will stay with their pups during the day and forage at night. Mating occurs approximately 2 weeks after a female gives birth. Weaning occurs prior to the next year's breeding season (Loughlin 2009).

4.1.5 Acoustics

In-air and underwater hearing and communication play an important role in Steller sea lion reproduction, foraging, predator avoidance, and navigation. The hearing capability of Steller sea lions has been documented to be fairly similar to the hearing range of California sea lions, with slight variations in males and females (Kastelein et al. 2005; Mulsow and Reichmuth 2008). Kastelein et al. (2005) documented that the best in-water hearing range for Steller sea lions was 1 to 16 kilohertz (kHz).

4.2 Harbor Seal

4.2.1 Status and Distribution

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands. In 2010, harbor seals in Alaska were partitioned into 12 separate stocks based largely on genetic structure (Allen and Angliss 2010). Harbor seals in the Shumagin Islands are members of the Cook Inlet/Shelikof Strait stock. Distribution of the Cook Inlet/Shelikof Strait stock extends from the southwest shore of Unimak Island east along the southern coast of the Alaska Peninsula to Elizabeth Island off the southwest shore of the Kenai Peninsula, including Cook Inlet, Knik Arm, and Turnagain Arm (Muto et al. 2016).

Harbor seals are not designated as depleted under the MMPA and are not listed as threatened or endangered under the ESA. The status of all 12 stocks of harbor seals identified in Alaska relative to their Optimum Sustainable Population size is unknown. The current statewide abundance estimate for Alaskan harbor seals is 205,090, based on aerial survey data collected during 1998–2011 (Muto et al. 2016). The 2007 through 2011 abundance estimate for the Cook Inlet/Shelikof stock is 27,386 with a positive population trend of 313 seals per year and a probability of 0.38 that the stock will decrease (Muto et al. 2016).

4.2.2 Presence in Project Area

Survey data for the Shumagin Islands in 2011 indicate that two haulouts were used by harbor seals in the Project area during that year. One is located on the south shore of Popof Island and one is on the east shore of Unga Island, south of the airport (London et al. 2015). No known haulouts overlap within the Level B underwater harassment zones estimated for the Project (**Section 6.4**). Aerial haulout surveys conducted in 2011 estimate 15 harbor seals occupy the survey unit along the south coast of Popof Island, including the area around Sand Point. Abundance estimates at other survey units in the area ranged from 0 on the north shore

of Popof Island to 100 along the northeast coast of Unga Island. This information comes from a single year of surveys, and standard errors on these estimates are very high; therefore, confidence in these estimates is low (London et al. 2015).

Anecdotal observations indicate that harbor seals are uncommon in Humboldt Harbor proper (B. Witteveen, pers. comm.), but are occasionally observed near the airport (R. Kochuten, pers. comm.). Harbor seals are expected to occur occasionally in the Project area, although no data exist to quantify harbor seal occurrence. We conservatively estimate an average of two harbor seals may be present each day (**Section 6.5.2**).

4.2.3 Life History

Harbor seals forage on fish and invertebrates (Orr et al. 2004), including capelin, eulachon, cod, pollock, flatfish, shrimp, octopus, and squid (Wynne 2012). They are opportunistic feeders that forage in marine, estuarine, and, occasionally, freshwater habitat, adjusting their foraging behavior to take advantage of prey that is locally and seasonally abundant (Payne and Selzer 1989). Depending on prey availability, research has demonstrated that harbor seals conduct both shallow and deep dives during hunting (Tollit et al. 1997).

Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice (Allen and Angliss 2014). They are non-migratory; their local movements are associated with tides, weather, season, food availability, and reproduction, as well as sex and age class (Allen and Angliss 2014; Boveng et al. 2012; Lowry et al. 2001; Swain et al. 1996).

4.2.4 Acoustics

Harbor seals respond to underwater sounds from approximately 1 to 180 kHz, with the functional high-frequency limit around 60 kHz and peak sensitivity at about 32 kHz (Kastak and Schusterman 1995). Hearing ability in the air is greatly reduced (by 25 to 30 decibels [dB]); harbor seals respond to sounds from 1 to 22.5 kHz, with a peak sensitivity of 12 kHz (Kastak and Schusterman 1995).

4.3 Harbor Porpoise

4.3.1 Status and Distribution

In the eastern North Pacific Ocean, the harbor porpoise ranges from Point Barrow, along the Alaska coast, and down the west coast of North America to Point Conception, California. Harbor porpoises frequent primarily coastal waters in the Gulf of Alaska and Southeast Alaska (Dahlheim et al. 2000), and occur most frequently in waters less than 100 meters (328 feet) deep (Hobbs and Waite 2010). The Gulf of Alaska stock ranges from Cape Suckling to Unimak Pass (Muto et al. 2016).

In Alaska, harbor porpoises are currently divided into three stocks, based primarily on geography: the Bering Sea stock, the Southeast Alaska stock, and the Gulf of Alaska stock. In areas outside Alaska, studies have shown that stock structure is more finely scaled than is reflected in the Alaska Stock Assessment Reports. However, no data are yet available to define stock structure for harbor porpoises on a finer scale in Alaska (Allen and Angliss 2014). Only the Gulf of Alaska stock is considered in this application because the other stocks occur outside the geographic area under consideration.

Harbor porpoises are neither designated as depleted under the MMPA nor listed as threatened or endangered under the ESA. Because the most recent abundance estimate is more than 8 years old and information on incidental harbor porpoise mortality in commercial fisheries is not

well understood, the Gulf of Alaska stock of harbor porpoises is classified as strategic. Population trends and status of this stock relative to optimum sustainable population size are currently unknown.

The number of harbor porpoises in the Gulf of Alaska stock was last estimated in 1998. The current minimum population estimate for harbor porpoises in the Gulf of Alaska, calculated using the potential biological removal guidelines, is 25,987 individuals (Muto et al. 2016). No reliable information is available to determine trends in abundance.

4.3.2 Presence in Project Area

Survey data for the Shumagin Islands are not available. Anecdotal observations indicate that harbor porpoises are uncommon in Humboldt Harbor proper (R. Kochuten, pers. comm.). Harbor porpoises are expected to be encountered rarely in the Project area, although no data exist to quantify harbor porpoise attendance. We conservatively estimate an average of one harbor porpoise may visit the Project area every day (**Section 6.5.3**).

4.3.3 Life History

Harbor porpoises forage in waters less than 200 meters (656 feet) to bottom depth on small pelagic schooling fish such as herring, cod, pollock, octopus, smelt, and bottom-dwelling fish, occasionally feeding on squid and crustaceans (Bjørge and Tolley 2009; Wynne et al. 2011).

Calving occurs from May to August; however, this can vary by region. Harbor porpoises mate approximately 1.5 months after calving, with a gestation period of 10.5 months. Calves begin to forage on solid food within a few months of birth and are weaned before they are a year old (Bjørge and Tolley 2009).

4.3.4 Acoustics

The harbor porpoise has the highest upper-frequency limit of all odontocetes investigated. Kastelein et al. (2002) found that the range of best hearing was from 16 to 140 kHz, with a reduced sensitivity around 64 kHz. Maximum sensitivity (about 33 db referenced to 1 micropascal [dB re 1 µPa]) occurred between 100 and 140 kHz. This maximum sensitivity range corresponds with the peak frequency of echolocation pulses produced by harbor porpoises (120–130 kHz) (Kastelein et al. 2002).

4.4 Dall's Porpoise

4.4.1 Status and Distribution

Dall's porpoises are found throughout the North Pacific, from southern Japan to southern California north to the Bering Sea. All Dall's porpoises found in Alaska are members of the Alaska stock; those found off California, Oregon, and Washington are part of a separate stock. This species can be found in offshore, inshore, and nearshore habitat, but prefer waters more than 180 meters (600 feet) deep (Jefferson 2009).

Dall's porpoises, like all marine mammals, are protected under the MMPA, but they are not listed under the ESA. Insufficient data are available to estimate current population trends, but the species is considered reasonably abundant. The current population estimate for the species is 1.2 million, and the Alaska stock was last estimated at 83,400 individuals in 1993 (Muto et al. 2016).

4.4.2 Presence in Project Area

There currently is no information on the presence or abundance of Dall's porpoises in the Shumagin Islands. No sightings of Dall's porpoises have been documented in Humboldt Harbor and they are not expected to occur there (B. Witteveen, pers. comm.). Individuals may occur in the deeper waters north of Popof Island or in Popof Strait, south of the Sand Point Airport, but this would be quite rare. We estimate conservatively that an average of one pod sighting with up to four individuals could be observed within the Project area over the course of the Project (**Section 6.5.4**).

4.4.3 Life History

Dall's porpoises generally occur in groups of 2 to 20 individuals, but have also been recorded in groups numbering in the hundreds. In Alaska, the average group size ranges from 2.7 to 3.7 individuals (Wade et al. 2003). They are commonly observed bowriding vessels or large cetaceans. Common prey includes a variety of small schooling fishes (such as herrings, anchovies, mackerels, and sauries) and cephalopods. Dall's porpoises may migrate between inshore and offshore areas, make latitudinal movements, or make short seasonal migrations, but these movements are generally not consistent (Jefferson 2009). Dall's porpoises are susceptible to incidental bycatch in fishing gear such as drift nets, gillnets, and trawls. Various contaminants and pollutants can accumulate in Dall's porpoises as they pass up the food chain (NMFS 2012).

4.4.4 Acoustics

Dall's porpoises are considered a high-frequency cetacean with an estimated functional hearing frequency range between 200 Hz and 180 kHz (Southall et al. 2007). Dall's porpoises emit high-frequency clicks that are used for echolocation. Most peak frequencies were recorded between 117 and 160 kHz, but were also recorded as high as 198 kHz. The source level of echolocation clicks can reach 175 dB (Bassett et al. 2009).

4.5 Killer Whale

4.5.1 Status and Distribution

Killer whales have been observed in all the world's oceans, but the highest densities occur in colder and more productive waters found at high latitudes (NMFS 2016b). Killer whales occur along the entire Alaska coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (NMFS 2016b).

Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized within the Pacific U.S. Exclusive Economic Zone, seven of which occur in Alaska: (1) the Alaska Resident stock; (2) the Northern Resident stock; (3) the Southern Resident stock; (4) the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock; (5) the AT1 Transient stock; (6) the West Coast transient stock, occurring from California through southeastern Alaska; and (7) the Offshore stock (Muto et al. 2016; NMFS 2016b). Only the Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock are considered in this application because other stocks occur outside the geographic area under consideration. Neither of these stocks of killer whales is designated as depleted or strategic under the MMPA or listed as threatened or endangered under the ESA.

The Alaska Resident stock occurs from southeastern Alaska to the Aleutian Islands and Bering Sea. Although the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock occupies a range that includes all of the U.S. Exclusive Economic Zone in Alaska, few individuals have

been seen in southeastern Alaska. The transient stock occurs primarily from Prince William Sound through the Aleutian Islands and Bering Sea.

The abundance of the Alaska Resident stock of killer whales is currently estimated at 2,347 individuals, and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock is estimated at 587 individuals. The Gulf of Alaska component of the transient stock is estimated to include 136 of the 587 individuals (Muto et al. 2016). The abundance of the Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Gulf of Alaska and western Alaska waters. At present, reliable data on trends in population abundance for both stocks are unavailable.

4.5.2 Presence in Project Area

Line transect surveys conducted in the Shumagin Islands between 2001 and 2003 did not record any resident killer whales, but did record a relatively high abundance of transient killer whales (Zerbini et al. 2007). The same study estimated a density of approximately 0.002 killer whales per square kilometer (km^2) in the Shumagin Islands (Zerbini et al. 2007). The population trend of the transient stock of killer whales in Alaska has remained stable since the 1980s (Muto et al. 2016). Anecdotal observations indicate that killer whales are not often seen in the vicinity of Sand Point, including Popof Strait (B. Witteveen, pers. comm.). Killer whales are expected to be uncommon in the Project area; however, we use the density estimate of 0.002 per km^2 to determine the number of killer whales potentially observed within the Project area (**Section 6.5.5**).

4.5.3 Life History

Distinct ecotypes of killer whales include transients that hunt and feed primarily on marine mammals and residents that forage primarily on fish. Transient killer whales feed primarily on harbor seals, Dall's porpoises, harbor porpoises, and sea lions. Resident killer whale populations in the eastern North Pacific feed mainly on salmonids, showing a strong preference for Chinook salmon (NMFS 2016b).

Transient whales are often found in long-term stable social units (pods) of fewer than 10 whales, which are generally smaller than resident social groups. Resident-type killer whales occur in larger pods of whales that are seen in association with one another more than 50 percent of the time (NMFS 2016b).

4.5.4 Acoustics

The hearing of killer whales is well developed. Szymanski et al. (1999) found that they responded to tones between 1 and 120 kHz, with the most sensitive range between 18 and 42 kHz. Their greatest sensitivity was at 20 kHz, which is lower than the greatest sensitivity of many other odontocetes, but it matches peak spectral energy reported for killer whale echolocation clicks. Killer whales of different populations have distinct calls and whistles. In resident killer whales of the eastern North Pacific, each pod possesses a unique repertoire of discrete calls that is learned and culturally transmitted among individuals. These calls are used to maintain group cohesion.

4.6 Humpback Whale

4.6.1 Status and Distribution

Humpback whales worldwide were designated as "endangered" under the Endangered Species Conservation Act in 1970, and were listed under the ESA from its inception in 1973 until 2016.

On 08 September 2016, NMFS published a final decision which changed the status of humpback whales under the ESA (81 FR 62259), effective 11 October 2016. The decision recognized the existence of 14 DPSs based on distinct breeding areas in tropical and temperate waters. Five of the 14 DPSs were classified under the ESA (4 endangered and 1 threatened), while the other 9 DPSs were delisted. Humpback whales found in the Shumagin Islands are predominantly members of the Hawaii DPS, which are not listed under the ESA. However, based on a comprehensive photo-identification study, members of both the Western North Pacific DPS (ESA-listed as endangered) and Mexico DPS (ESA-listed as threatened) are known to occur in the Gulf of Alaska and Aleutian Islands. Members of different DPSs are known to intermix on feeding grounds; therefore, all waters off the coast of Alaska should be considered to have ESA-listed humpback whales. According to Wade et al. (2016), the probability of encountering a humpback whale from the Western North Pacific DPS in the Gulf of Alaska is 0.5 percent (CV [coefficient of variation]=0.001). The probability of encountering a humpback whale from the Mexico DPS is 10.5 percent (CV=0.16). The remaining 89 percent (CV=0.01) of individuals in the Gulf of Alaska are likely members of the Hawaii DPS (Wade et al. 2016).

The current abundance estimate for humpback whales in the Pacific Ocean is approximately 16,132 individuals. The Hawaii DPS is the largest stock, with approximately 11,398 individuals (95% confidence interval [CI]: 10,503–12,370), followed by the Mexico DPS (3,264 individuals [95% CI: 2,912–3,659]) and the Western North Pacific DPS (1,059 individuals [95% CI: 898-1,249]). Summer abundance of humpback whales in the Gulf of Alaska, from all DPSs, is estimated at 2,089 individuals (95% CI: 1,755–2,487; Wade et al. 2016).

Humpback whales experienced large population declines due to commercial whaling operations in the early twentieth century. Barlow (2003) estimated the population of humpback whales at approximately 1,200 animals in 1966. The population grew to between 6,000 and 8,000 by the mid-1990s in the North Pacific. Current threats to humpback whales include vessel strikes, spills, climate change, and commercial fishing operations (NMFS 2016a).

4.6.2 Critical Habitat

Critical habitat has not been designated for any humpback whale DPS.

4.6.3 Presence in Project Area

Surveys from 2001 to 2004 estimated humpback whale abundance in the Shumagin Islands at between 410 and 593 individuals during the summer feeding season (July–August; Witteveen et al. 2004; Zerbini et al. 2006). Annual vessel-based, photo-identification surveys in the Shumagin Islands from 1999 to 2015 identified 654 unique individual humpback whales between June and September (Witteveen and Wynne 2016). Humpback whale abundance in the Shumagin Islands increased 6 percent per year between 1987 and 2003 (Zerbini et al. 2006). Between 2001 and 2003, summer line transect surveys in the Shumagin Islands estimated the humpback whale density at 0.02 whales per km^2 (Zerbini et al. 2006). Given an approximate population increase of 6 percent each year since the early 2000s (Allen and Angliss 2012), we conservatively estimate the current density of humpback whales as about 0.04 whale per km^2 (0.02 whale/km^2 * [6% increase/year * 13 years]; **Section 6.5.6**).

Humpback whales are occasionally observed in Popof Strait between Popof Island and Unga Island (R. Kochuten, pers. comm.; A. Audette, pers. comm.) and are known to feed in the waters west of the airport (Witteveen and Wynne 2016; B. Witteveen, pers. comm.). They are unlikely to occur in the shallow waters of Humboldt Harbor proper (P. Osterback, pers. comm.). Humpbacks are found in the Shumagin Islands from April or May through October or November,

and peak feeding activity occurs between June and early September. It is unlikely that humpback whales would occur in the Project area between December and March.

4.6.4 Life History

Large aggregations of humpback whales spend the summer and fall in the nearshore areas of the Alaska Peninsula, Gulf of Alaska, and Aleutian Islands. The waters of the western Gulf of Alaska support feeding populations of humpback whales (Wynne and Witteveen 2005; Witteveen et al. 2007). The Shumagin Islands are considered a biologically important area for feeding humpback whales in July and August (Ellison et al. 2012). Most humpback whales migrate to other regions during the winter to breed, but rare events of over-wintering humpbacks have been noted near Sand Point (Joling 2016). In the western Gulf of Alaska and eastern Aleutians, known prey include euphausiids (*Thysanoessa spinifera*); walleye pollock; Pacific sand lance, herring (*Clupea pallasii*), eulachon (*Thaleichthys pacificus*), and capelin (Witteveen et al. 2012).

4.6.5 Acoustics

Detailed information regarding the hearing abilities of humpback whales is generally lacking; however, hearing sensitivities have been estimated based on behavioral responses to sounds at various frequencies, favored vocalization frequencies, body size, ambient noise levels at favored frequencies, and cochlear morphometry (Cranford and Krysl 2015). Southall et al. (2007) categorized humpback whales in the low-frequency cetacean functional hearing group, with an estimated auditory bandwidth of 7 Hz to 22 kHz.

4.7 Fin Whale

4.7.1 Status and Distribution

Fin whales are found in all of the major oceans. Four stocks of fin whales occur in U.S. waters: (1) Alaska (Northeast Pacific), (2) California/Washington/Oregon, (3) Hawaii, and (4) western North Atlantic (Aguilar 2009; Muto et al. 2016). Fin whales in the Shumagin Islands are from the Alaska (Northeast Pacific) stock (Muto et al. 2016). Currently, threats to the fin whale include collisions with vessels, entanglement in fishing gear, reduced prey abundance, habitat degradation, and disturbance from low-frequency noise (NMFS 2013a).

Fin whales (also, finback whales) were designated as "endangered" under the Endangered Species Conservation Act in 1970, and have been listed under the ESA since its inception in 1973. Commercial whaling operations in the twentieth century took more fin whales than any other species. Across the globe, about 30,000 individuals per year were being captured between 1935 and 1970 (Aguilar 2009; Reeves et al. 2002). Almost 50,000 fin whales were reported killed in the North Pacific between 1911 and 1985 (Muto et al. 2016). As whaling subsided, the fin whale populations stabilized and started to increase (Aguilar 2009). There are no reliable estimates of current or historic abundance for the entire North Pacific population of fin whales. Surveys in the Bering Sea, Aleutian Islands, and Gulf of Alaska estimated 5,700 whales. The population in this region is thought to be increasing at approximately 3.6 percent per year, but there is a high degree of variability in this estimate (Zerbini et al. 2006).

4.7.1 Critical Habitat

Critical habitat has not been designated for the fin whale.

4.7.2 Presence in Project Area

Vessel-based line-transect surveys of coastal waters between Resurrection Bay and the central Aleutian Islands were completed in July and August from 2001 to 2003. Large concentrations of fin whales were found in the Semidi Islands, located midway between the Shumagin Islands and Kodiak Island just south of the Alaska Peninsula. The abundance of fin whales in the Shumagin Islands ranged from a low estimate of 604 in 2003 to a high estimate of 1,113 in 2002. The estimated density of fin whales in the Shumagin Islands was 0.007 whale per km^2 and this is the density estimate assumed for the Project area (Zerbini et al. 2006). Fin whale density in the Shumagin Islands at other times of the year is unknown, and they are uncommon in Humboldt Harbor or Popof Strait (B. Witteveen, pers. comm.).

4.7.3 Life History

Fin whales are found in deep offshore waters as well as in shallow nearshore areas. Their migratory movements are complex and their abundance can fluctuate seasonally. Fin whales often congregate in groups of two to seven whales or in larger groups of other whale species, including humpback and minke whales (Muto et al. 2016). Fin whales feed on a wide variety of organisms and their diet may vary with season and locality. In Alaska, fin whales prey on coastal and pelagic concentrations of forage fish, including Pacific sand lance, capelin, Pacific herring, and juvenile walleye pollock, as well as zooplankton, including euphausiids and copepods (*Neocalanus* spp.; Witteveen et al. 2016).

4.7.4 Acoustics

Detailed information regarding the hearing abilities of fin whales is generally lacking; however, hearing sensitivities in baleen whales have been estimated based on (1) the vocalizations of various species, assuming that the species can hear the sounds they make, (2) the anatomical structure of the ear relative to other mammals with known hearing ranges, and (3) behavioral responses to sounds at various frequencies. The structure of the ear and bone conduction capabilities in fin whales govern their hearing range, which is optimized in the low frequencies (i.e., less than 10 kHz; Cranford and Krysl 2015). Southall et al. (2007) also categorized fin whales in the low-frequency cetacean functional hearing group, with an estimated auditory bandwidth of 7 Hz to 22 kHz. A study in California tested for behavioral changes in fin whales when exposed to low-frequency sounds in excess of 140 dB re 1 µPa. The researchers found that fin whale behavior was more strongly linked to prey abundance, and they appeared tolerant of the loud noises (Croll et al. 2000).

4.8 Gray Whale

4.8.1 Status and Distribution

Gray whales were listed under the Endangered Species Conservation Act in 1970 and under the ESA since its inception in 1973. However, in 1994, the eastern North Pacific stock of gray whales was delisted from the ESA, while the western North Pacific stock remains endangered. All gray whales found in Alaska are part of the eastern North Pacific stock and, therefore, are not listed under the ESA. Commercial whaling severely depleted both populations in the mid-1800s and early 1900s. In the mid-1930s, bans on commercial whaling of gray whales initiated a recovery of the species. Today, the eastern North Pacific stock has recovered to near its original population size and has grown at about 2.5 percent annually (NMFS 2013b). The most recent stock assessment in 2014 estimated 20,990 individuals in the eastern North Pacific stock. The western North Pacific stock has not recovered, and the latest population estimate was 140 individuals (Carretta et al. 2016). The eastern North Pacific stock of gray whales

spend summers feeding in the Chukchi and Bering seas, and their breeding and calving grounds are located off Baja California, Mexico (Caretta et al. 2016).

4.8.2 Presence in Project Area

Gray whales pass through the Shumagin Islands from March through May on their northward migration to the Bering and Chukchi seas. Most individuals pass through Unimak Pass, which is located just west of the Shumagin Islands. The Shumagin Islands are considered a biologically important area for the gray whale due to this consistent migration route. Gray whales pass through again from November through January on their southern migration (NOAA 2016; Caretta et al. 2016).

Gray whales are rarely observed near Sand Point or in Humboldt Harbor. Approximately 10 years ago, a single juvenile gray whale was observed in Humboldt Harbor, but this individual was thought to be separated from its family group (B. Witteveen, pers. comm.). During migration, they are known to pass through Unga Strait, to the north of the Project area, or the Gorman and West Nagai straits south of the Project area (NOAA 2016). We estimate conservatively that gray whales will not be observed more than one time during the construction period (Section 6.5.8).

4.8.3 Life History

Gray whales of the eastern North Pacific stock breed and calve in protected bays and estuaries of Baja California, Mexico. Large congregations form there in January and February. Between February and May gray whales undertake long migrations to the Bering and Chukchi seas where they disperse across the feeding grounds. Gray whales feed on a wide variety of benthic organisms as well as planktonic and nektonic organisms. In recent years, shifts in sub-arctic climatic conditions have reduced the productivity of benthic communities and have resulted in a shift in the food supply. In response, gray whales have shifted their feeding strategies and focus almost exclusively on the Chukchi Sea. Secondary feeding areas include the Bering Sea, Beaufort Sea, and some individuals have been reported along the west coast of North America as far south as California. The southerly migration occurs from October through January (Jones and Swartz 2009; NMFS 2013b).

4.8.4 Acoustics

Detailed information regarding the hearing abilities of gray whales is generally lacking; however, hearing sensitivities have been estimated based on behavioral responses to sounds at various frequencies, favored vocalization frequencies, and body size (Dahlheim and Ljungblad 1990; Crane and Lashkari 1996; Ridgway and Carder 2001). Southall et al. (2007) categorized gray whales in the low frequency cetacean functional hearing group, with an estimated auditory bandwidth of 7 Hz to 22 kHz.

4.9 Minke Whale

4.9.1 Status and Distribution

Minke whales, like all marine mammals, are protected under the MMPA, but they are not listed under the ESA. The population status of minke whales is considered stable throughout most of their range. Historically, commercial whaling reduced the population size of this species, but given their small size, they were never a primary target of whaling and did not experience severe population declines like larger cetaceans. Minke whales are found throughout the northern hemisphere in polar, temperate, and tropical waters. There is a dwarf form of minke whale found in the southern hemisphere, and the subspecies of Antarctic minke whale are

found around the continent of Antarctica. The International Whaling Commission has identified three stocks in the North Pacific: one near the Sea of Japan, a second in the rest of the western Pacific (west of 180°W), and a third, less concentrated stock found throughout the eastern Pacific. NOAA further splits this third stock between Alaskan whales and resident whales of California, Oregon, and Washington (Muto et al. 2016). In Alaskan waters, minke whales are found in the Chukchi and Bering seas as well as along the Aleutian Islands and Gulf of Alaska (Zerbini et al. 2006). There are no population estimates for minke whales in Alaska; however, nearshore aerial surveys of the western Gulf of Alaska took place between 2001 and 2003. These surveys estimated the minke whale population in that area at approximately 1,233 individuals (Zerbini et al. 2006).

4.9.2 Presence in Project Area

Minke whales are common in the Aleutian Islands and north through the Bering Sea and Chukchi Sea, but are relatively uncommon in the Shumagin Islands and Gulf of Alaska (Muto et al. 2016, Zerbini et al. 2006). Surveys throughout the western Gulf of Alaska and eastern Aleutians estimated a density of 0.01 whale per km^2 west of Unimak Pass and a density of 0.001 minke whale per km^2 south of the Alaska Peninsula (including the Shumagin Islands). Local aggregations were observed near Seguam Pass and around the Islands of the Four Mountains (i.e., central Aleutian Archipelago), but only a few sightings occurred each year between Unalaska and the Shumagin Islands (Zerbini et al. 2006). Minke whales are rare in the vicinity of Popof Island (B. Witteveen, pers. comm.). Sightings did occur northwest of Unga Island during surveys in 2001, and northeast of Popof Island during 2002 and 2003 (Zerbini et al. 2006). We use the density estimate of 0.001 minke whale per km^2 to determine the number of minke whales potentially observed within the Project area during the construction period (Section 6.5.9).

4.9.3 Life History

In Alaska, the minke whale diet primarily consists of euphausiids and walleye pollock. Minke whales are generally found in shallow, coastal waters within 200 meters of shore (Zerbini et al. 2006) and are almost always solitary or in small groups of 2 to 3. Rarely, loose aggregations of up to 400 animals have been associated with feeding areas in arctic latitudes. In Alaska, seasonal movements are associated with feeding areas that are generally located at the edge of the pack ice (NMFS 2014).

4.9.4 Acoustics

Minke whales, like all baleen whales, are considered low-frequency cetaceans with an estimated functional hearing frequency range between 7 Hz and 22 kHz (Southall et al. 2007). Minke whales in the North Pacific make unusual sounds called boings that can reach 150 dB (1 μPa at 1 meter) at a maximum frequency of 9 kHz (Oswald et al. 2011).

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

5.1 Incidental Harassment Authorization

Under Section 101(a)(5)(D) of the MMPA, the DOT&PF requests an IHA for the take of small numbers of marine mammals, incidental to the construction of a new city dock in Sand Point, Alaska. The DOT&PF requests an IHA for incidental take of marine mammals described within this application for 1 year, commencing on 01 August 2018 (or the issuance date, whichever is later). The DOT&PF is not requesting an LOA at this time because the activities described herein are expected to be completed within 1 year from the date of authorization, and are not expected to rise to the level of serious injury or mortality, which would require an LOA.

5.2 Take Authorization Request

The DOT&PF requests the issuance of an IHA from 01 August 2018 through 31 July 2019 for Level B take (behavioral harassment) of Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales (transient and resident), humpback whales, fin whales, gray whales, and minke whales that may occur during the Project. In addition, the DOT&PF requests Level A take (permanent threshold shift) for small numbers of harbor seals, harbor porpoises, and humpback whales. As presented in **Table 3-1**, Steller sea lions, harbor seals, harbor porpoises, killer whales, humpback whales, and fin whales are the marine mammal species most likely to be observed within the harassment zones (**Section 6.4.1**). Take is also being requested for species that are rarely observed within the calculated Level B isopleths or could occur just north of Popof Strait, including Dall's porpoises, gray whales, and minke whales. The request for a small number of takes for each species that is rarely observed in the Project area reduces the risk of the Project being shut down if one of these species enters the Level B harassment zone during pile installation.

The methodology described in **Section 6** estimates potential noise exposures of marine mammals resulting from pile installation in the marine environment. Results from this approach tend to provide an overestimation of exposures because all animals are assumed to be available to exposure when piles are being installed, and the formulas used to estimate transmission loss use idealized parameters, which are unrealistic in nature. Additionally, this approach assumes that all exposed individuals are "taken," contributing to an overestimation of "take."

The analysis for the Project predicts 590 potential exposures (see **Section 6** for estimates of exposures by species) to pile installation over the course of the Project that could be classified as Level B harassment as defined under the MMPA and 66 potential exposures that could be classified as Level A harassment as defined under the MMPA. The DOT&PF's mitigation measures for the Project, described in Section 11, include monitoring of mitigation zones prior to the initiation of pile installation, and "soft starts" or ramp-up procedures designed to allow marine mammals to leave the Project area before noise levels reach the threshold for harassment. These mitigation measures decrease the likelihood that marine mammals will be exposed to sound pressure levels that would cause harassment, although the amount of that decrease cannot be quantified. Implementation of shut down zones will avoid Level A harassment of mid-frequency cetaceans (i.e., killer whales) and otariid pinnipeds (i.e., Steller sea lions) during all activities and will avoid Level A harassment of all species during impact and vibratory installation/removal of 24-inch piles or H-piles.

The DOT&PF does not expect that all 66 Level A and 590 Level B harassment incidents will result from Project activities. However, to allow for uncertainty regarding the exact mechanisms of the physical and behavioral effects, and as a conservative approach, the DOT&PF is requesting authorization for Level A harassment of 66 marine mammals and Level B harassment of 590 marine mammals over the course of 1 year in this IHA application. As described in **Section 6.5.1**, most incidents are expected to result from repeated exposures of a small number of individuals.

5.3 Method of Incidental Taking

Pile installation activities as outlined in **Sections 1** and **2** have the potential to disturb or displace small numbers of marine mammals. Specifically, the proposed activities may result in take in the form harassment from underwater sounds generated from vibratory and impact pile installation. See **Section 11** for more details on the impact reduction and mitigation measures proposed.

Detectable effects of the Project on marine mammal habitat are not expected (**Section 9**). Indirect effects to prey would be insignificant and discountable due to recolonization and the temporary nature of the activity, and are expected to be undetectable as well. The proposed Project is not expected to lead to any increases in marine vessel traffic in the region; therefore, ship strikes were not evaluated.

6 TAKE ESTIMATES FOR MARINE MAMMALS

The NMFS application for IHAs requires applicants to determine the number of marine mammals that are expected to be incidentally harassed by an action and the nature of the harassment (Level A or Level B). Project construction activities as outlined in **Sections 1** and **2** have the potential to take marine mammals during pile installation. Other activities are not expected to result in "take" as defined under the MMPA. In-water pile installation activities will temporarily increase the local underwater and airborne noise environment in the "New Harbor." Research suggests that increased noise may impact marine mammals in several ways and depends on many factors (**Section 7**).

6.1 Airborne and Underwater Sound Descriptors

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels. Decibels are measured using a logarithmic scale.

The method commonly used to quantify airborne sounds consists of evaluating all frequencies of a sound according to a weighting system, reflecting that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). A filtering method to reflect the hearing of marine mammals such as whales has not been developed for regulatory purposes. Therefore, sound levels underwater are not weighted and measure the entire frequency range of interest. In the case of marine construction work, the frequency range of interest is 10 to 10,000 Hz.

Underwater sounds are described by a number of terms that are commonly used and specific to this field of study (**Table 6-1**). Two common descriptors are the instantaneous peak sound pressure level (SPL) and the root-mean-square SPL (dB rms) during the pulse or over a defined averaging period. The peak sound pressure is the instantaneous maximum or minimum overpressure observed during each pulse or sound event and is presented in Pascals (Pa) or dB referenced to a pressure of 1 microPascal (dB re 1 µPa). The rms level is the square root of the energy divided by a defined time period. All sound levels throughout this report are presented in dB re 1 µPa rms.

Table 6-1. Definitions of some common acoustical terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 microPascal (µPa) and for air is 20 µPa (approximate threshold of human audibility).
Sound Pressure Level, SPL	Sound pressure is the force per unit area, usually expressed in microPascals (or 20 microNewtons per square meter [m^2]), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 m^2. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure. Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). Typical human hearing ranges from 20 Hz to 20,000 Hz.
Peak Sound Pressure (unweighted), dB re 1 µPa	Peak sound pressure level is based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz. This pressure is expressed in this report as dB re 1 µPa.
Root-Mean-Square (rms), dB re 1 µPa	The rms level is the square root of the energy divided by a defined time period. For pulses, the rms has been defined as the average of the squared pressures over the time that comprises that portion of waveform containing 90 percent of the sound energy for one impact pile installation impulse.
Ambient Noise Level	The background sound level, which is a composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Transmission Loss (TL)	TL underwater is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water chemistry, water depth, bottom composition and topography, and any underwater objects in the area.

Transmission loss is typically between 10 dB (cylindrical spreading) and 20 dB (spherical spreading), typically referred to as 10 log and 20 log, respectively. Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion bounded by the bottom sediment and water surface, such as shallow water, resulting in a 3-dB reduction per doubling of distance. Spherical spreading occurs when the source encounters little to no refraction or reflection from boundaries (e.g., bottom, surface), such as in deep water, resulting in a 6-dB reduction per doubling of distance.

6.2 Applicable Noise Criteria

NMFS recently published updated Technical Guidance that identifies the received levels, or thresholds, above which individual marine mammals are predicted to experience changes in

their hearing sensitivity (either temporary or permanent) for underwater anthropogenic sound sources (NMFS 2016c). This application uses the new Technical Guidance for assessing Level A harassment and uses the NMFS interim "do-not-exceed" criteria for exposure of marine mammals to Level B harassment.

For airborne sound exposure of hauled-out pinnipeds, NMFS uses "do-not-exceed" criteria for Level B harassment of 90 dB re 20 μPa for harbor seals and 100 dB re 20 μPa for all other pinnipeds, including Steller sea lions. These criteria do not differentiate among sound types.

Level A harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to *injure* a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering, but which *does not* have the potential to injure a marine mammal or marine mammal stock in the wild."

6.2.1 Level A Harassment

Received levels, or thresholds, above which individual marine mammals are predicted to experience permanent changes in their hearing sensitivity (or a permanent threshold shift [PTS]) due to underwater anthropogenic sound sources have also been weighted by functional hearing groups as defined in the Technical Guidance (**Table 6-2**; NMFS 2016). Under the new Technical Guidance, these levels are considered thresholds for Level A (injury) harassment. Calculation of Level A harassment isopleth distances based on PTS onset acoustic thresholds requires information on characteristics of the sound and the local environment.

Table 6-2. Summary of PTS onset acoustic thresholds for assessing Level A harassment of marine mammals from exposure to noise from continuous and pulsed underwater sound sources

Functional Hearing Group Frequency Range Species Groups	Impulsive (Impact Hammer)	Non Impulsive (Vibratory Hammer)
Low-Frequency (LF) Cetaceans 7 Hz to 35 kHz Baleen whales	$L_{pk,flat}$: 219 dB $L_{E,\ LF,\ 24h}$: 183 dB	$L_{E,\ LF,\ 24h}$: 199 dB
Mid-Frequency (MF) Cetaceans 150 Hz to 160 kHz Dolphins, beluga whales, killer whales, beaked whales	$L_{pk,flat}$: 230 dB $L_{E,\ MF,\ 24h}$: 185 dB	$L_{E,\ MF,\ 24h}$: 198 dB
High-Frequency (HF) Cetaceans 275 Hz to 160 kHz Dall's porpoises, harbor porpoises, Pacific white-sided dolphins	$L_{pk,flat}$: 202 dB $L_{E,\ HF,\ 24h}$: 155 dB	$L_{E,\ HF,\ 24h}$: 173 dB
Phocid Pinnipeds (PW) Underwater 50 Hz to 86 kHz True seals	$L_{pk,flat}$: 218 dB $L_{E,\ PW,\ 24h}$: 185 dB	$L_{E,\ PW,\ 24h}$: 201 dB
Otariid Pinnipeds (OW) Underwater 60 Hz to 39 kHz Sea lions and fur seals	$L_{pk,flat}$: 232 dB $L_{E,\ OW,\ 24h}$: 203 dB	$L_{E,\ OW,\ 24h}$: 219 dB

$L_{pk,flat}$ = Peak sound pressure level (unweighted); $L_{E,24h}$ = Sound exposure level, cumulative 24 hours; dB = decibels; Hz = Hertz; kHz = Kilohertz

Source: NMFS 2016.

6.2.2 Level B Harassment

To assess Level B harassment levels, this document uses the NMFS interim "do-not-exceed" criteria for exposure of marine mammals to various underwater sound sources. For impulse sounds (e.g., impact pile installation) the Level B harassment threshold is set at an SPL value of 160 dB re 1 μPa rms. For non-pulsed and continuous sounds (e.g., vibratory pile installation), the Level B harassment threshold is set at an SPL of 120 dB re 1 μPa rms.

6.3 Description of Noise Sources

For the purposes of this IHA application, the sound field in the Project area is the existing ambient noise plus additional construction noise from the proposed Project. The component of the Project expected to affect marine mammals is the sound generated by vibratory and impact pile installation. Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth. A vibratory hammer would be used for approximately 45 minutes per pile to insert each pile through the overburden sediment layer and into the bearing layer. An impact hammer would generally be used for approximately 20 minutes per pile to place the pile at its intended depth. The actual durations of each installation method vary depending on the type and size of the pile (**Section 1.3.1**). An impact hammer is a steel device that works like a piston, producing a series of independent strikes to drive the pile. Impact hammering typically generates the loudest noise associated with pile installation.

Factors expected to minimize the potential impacts of pile installation associated with the Project include:

- The soft sediment marine seafloor and shallow waters in the Project area (Taylor et al. 2008)
- Land forms around Sand Point that would block the noise from spreading
- Vessel traffic and other commercial and industrial activities in the Project area that contribute to elevated background noise levels

Sound would likely dissipate relatively rapidly in the shallow waters over soft seafloors in the Project area. Additionally, portions of Popof Island and Unga Island would block much of the noise from propagating to its full extent through the marine environment.

6.3.1 Underwater Noise Levels

30-inch Piles (Permanent Support Piles)

Empirical data from recent sound source verification (SSV) studies funded by the DOT&PF and conducted in Kake, Ketchikan, and Auke Bay, Alaska, were used to estimate sound source levels (SSLs) for vibratory and impact installation of 30-inch steel pipe piles (Denes et al. 2016; MacGillivray et al. 2016; Warner and Austin 2016b). Data from construction sites in Alaska were assumed to best represent the environmental conditions found in Sand Point and represent the nearest available SSL data for 30-inch steel piles. Similarities among the sites include island chains and groups of islands adjacent to continental land masses; deeply incised marine channels and fjords; local water depths of 20–40 meters; Gulf of Alaska marine water influences; numerous freshwater inputs; and dense substrates.

During the three studies, hydrophones were placed at two locations for each pile, and SPLs were recorded during vibratory installation of eight 30-inch-diameter steel piles and impact

installation of five 30-inch-diameter steel piles. For each pile, the mean recorded SPL in dB re 1 µPa was reported for the location of each hydrophone (Denes et al. 2016; MacGillivray et al. 2016; Warner and Austin 2016b); the data were then converted to a 10-meter standard distance using the practical spreading loss model and the transmission loss coefficient modeled for each pile. The mean of the mean SSLs was then calculated for the set of piles installed by each method (vibratory and impact) and for each measurement (rms, sound exposure level [SEL], and peak; **Table 6-3**).

24-inch Piles (Dolphin and Fender Piles)

Empirical data from an SSV study funded by DOT&PF and conducted in Kodiak, Alaska, during construction of the Kodiak Ferry Terminal in 2016 (Kodiak Pier 1; Warner and Austin 2016a) were used to estimate SSLs for vibratory and impact installation of 24-inch steel piles. These are the nearest available SSL data for 24-inch steel piles to Sand Point, Alaska.

Environmental characteristics of the two sites, including bathymetry and substrate type, are similar. Water depths at the Sand Point and Kodiak Pier 1 construction locations are similar, ranging between 5 and 6 fathoms (9 to 11 meters or 30 to 36 feet) referenced to Mean Lower Low Water (MLLW; NOAA nautical charts 16553 and 16595). Both locations are on islands that face a second island across a channel. For Kodiak Pier 1, the Near Island Channel is about 200 meters (656 feet) wide and up to 6 to 7 fathoms (11 to 13 meters or 36 to 42 feet) deep; Popof Channel in Sand Point is about 2 kilometers (6,560 feet) wide and up to 14 fathoms (26 meters or 84 feet) deep, with more typical depths of 3 to 7 fathoms (5 to 13 meters or 18 to 42 feet; NOAA nautical charts 16553 and 16595).

At Kodiak Pier 1, the substrate consists of 10 to 30 feet of a soft sediment layer overlying a bedrock layer. At Sand Point, the substrate is generally a loose to medium dense, silty sand that continues to a depth of approximately 15 feet with layers of gravel. Beneath the sand is a very stiff to hard, silty clay to clayey silt that has previously been interpreted as weathered volcanic bedrock (D. Lowell, DOT&PF, pers. comm.). The Alaska Stream, part of the Alaska Coastal Current, flows to the west past both locations, providing a similar oceanic signature that is then influenced by unique local nearshore processes.

At Kodiak Pier 1, hydrophones were placed at two locations for each pile, and Warner and Austin (2016a) recorded SPLs during vibratory installation of five 24-inch steel piles and impact installation of four 24-inch steel piles. For each pile, the mean SPL in dB re 1 µPa was reported for each location of the hydrophones, and the data were converted to a 10-meter standard distance using the practical spreading loss model and the field-recorded transmission loss coefficient. The mean of the mean SSLs was then calculated for the set of piles installed by each method (vibratory and impact) and for each measurement (rms, SEL, and peak; **Table 6-3**).

<24-inch Piles (Temporary Piles)

The size and type (round or H) of temporary pile that would be used to support the template for Sand Point City Dock construction is currently unknown and would be determined by the Contractor. If round piles are used, these would likely be either 18- or 20-inch steel pipe piles. Data on vibratory installation of 20-inch steel piles and H-piles in Alaska are not available. Hydroacoustic monitoring at the Norfolk Naval Station in Norfolk, Virginia, during installation of H-piles recorded SPLs of 142 dB at 10 meters (CALTRANS 2015; **Table 6-2**). The Kake SSV study measured mean SPLs of 151.8 dB at 10 meters during vibratory installation of an 18-inch steel pipe pile (MacGillivray et al. 2016; **Table 6-3**). It is assumed that SPLs during installation and removal are similar.

Table 6-3. Estimates of mean underwater sound levels (decibels) generated during vibratory and impact pile installation and vibratory pile removal

Method and Pile Type	Sound Level at 10 meters			Literature Source
Vibratory Hammer	**dB re 1 µPa rms**			
30-inch steel piles	163.0			Derived from Denes et al. 2016; MacGillivray et al. 2016; and Warner and Austin 2016b
24-inch steel piles	154.6			Derived from Warner and Austin 2016a
18-inch steel piles	151.8			Derived from MacGillivray et al. 2016
Steel H-piles	142.0			Caltrans 2015, Norfolk Naval Station, VA
Impact Hammer	**dB rms**	**dB SEL**	**dB peak**	
30-inch steel piles	194.2	180.0	208.0	Derived from Denes et al. 2016; MacGillivray et al. 2016; and Warner and Austin 2016b
24-inch steel piles	181.1	167.8	192.8	Derived from Warner and Austin 2016a

Note: All data are from Alaska DOT&PF sound source verification (SSV) studies in Kake, Kodiak, Ketchikan, and Auke Bay, Alaska, with the exception of the Norfolk Naval Station study from Virginia. It is assumed that sound levels during pile installation and removal are similar.

6.3.2 Airborne Noise Levels

For airborne noise exposure of hauled-out pinnipeds NMFS uses “do-not-exceed” disturbance criteria of 100 dB rms re 20 µPa for Steller sea lions. Note that all airborne sound discussed in this document will be referenced to 20 µPa, unless otherwise noted. These criteria for in-air sound do not differentiate among sound types.

The Project includes vibratory and impact installation of 30-inch support piles, 24-inch fender and dolphin piles, and temporary piles that would be less than 24 inches in diameter or H-piles. As described in **Section 6.4.2**, vibratory and impact installation of all piles for Sand Point was conservatively estimated to generate 96.5 and 98 dB rms at 15 meters, respectively (**Table 6-4**).

Table 6-4. Conservative estimates for airborne sound levels (decibels) that would be generated during pile installation

Method and Pile Type	Sound Level (dB) at 15 meters
Vibratory Hammer	
30- and 24-inch permanent steel piles; <24-inch or H-pile temporary piles	96.5
Impact Hammer	
30- and 24-inch steel piles	98

6.3.3 Ambient Noise

Ambient noise is background noise that is composed of many sources from multiple locations (Richardson et al. 1995). In general, ambient noise levels in the marine environment are variable over time due to a number of biological, physical, and anthropogenic (e.g., man-made) sources. Ambient noise can vary with location, time of day, tide, weather, season, and frequency on scales ranging from a second to a year. Underwater sound levels in the action

area include physical noise, biological noise, and anthropogenic noise. Physical noise includes waves at the water surface, rain, and currents; moving rocks, sediment, and silt; and atmospheric noise. Biological sound includes vocalizations produced by marine mammals, fishes, seabirds, and invertebrates. Anthropogenic noise includes vessels (small and large), shore-based processing plants, marine fueling facilities, ferry and barge cargo loading/unloading operations, maintenance dredging, aircraft overflights, construction noise, and other sources, which produce varying noise levels and frequency ranges (**Table 6-5**).

Table 6-5. Representative noise levels of anthropogenic sources of noise commonly encountered in marine environments

Noise Source	Frequency Range (Hz)	Underwater Noise Level (dB rms re 1 μPa @ 1m)
Small vessels	250–1,000	151–159
Tug pulling barge	1,000–5,000	145–170
Container ship	7–428	169–198
Dredging operations	50–3,000	150–162

NOTE: dB rms = root mean square sound pressure level
Source: Richardson et al. 1995

The area around the City Dock and Humboldt Harbor are frequented by fishing vessels and tenders; the *M/V Tustumena*, barges, tugboats; and other commercial and recreational vessels that use the small-boat harbor, City Dock, seafood processing plant, and other commercial facilities. At the seafood processing dock, located north of the City Dock, fish are offloaded into the processing plant from the vessels' holds. The small boat harbor houses the largest fishing fleet in the Aleutian Islands, in addition to other vessels. High levels of vessel traffic are known to elevate ambient sound levels in the marine environment.

Although ambient underwater measurements have not been conducted for the Project, ambient underwater sound levels measured in early March 2016 at Kodiak, Alaska, may be used for comparison. During hydroacoustic studies conducted during the Kodiak Ferry Terminal and Dock Improvements Project (State Project #68938), ambient underwater SPLs averaged 122.7 dB re 1 μPa rms (Warner and Austin 2016). Those measurements included industrial noise from maritime operations, including fishing vessels, recreational activity, commercial shipping, and ferry operation. Background sound levels measured in Kodiak were highly variable, ranging from 80 to 140 dB re 1 μPa rms. Ambient noise measurements at Unalaska ranged from 119 to 147 dB rms (PND 2016). Although ambient underwater noise levels greater than 120 dB rms are commonly recorded in areas with large tidal fluctuations, strong currents, or high levels of vessel activity, 120 dB rms is generally regarded as the typical background noise level in maritime environments of the North Pacific. The 120 dB rms background ambient noise level is also used by NMFS as the default for regulatory purposes, including incidental take estimation under the MMPA.

6.4 Distances to Sound Thresholds and Areas

6.4.1 Underwater Noise

Vibratory and impact pile installation would generate underwater noise that could potentially disturb marine mammals in the action area. Ambient underwater sound levels were assumed to be 120 dB rms for this evaluation (see **Section 6.3**). The SSLs for proposed pile installation

activities were estimated by using the results of measurements from the best available and most relevant sound source verification studies (**Table 6-3**).

Attenuation levels measured at other ports in coastal Alaska ranged from a 14.6 to a 21.9 dB decrease in SPL per tenfold increase in distance (Denes et al. 2016; MacGillivray et al. 2016; Warner and Austin 2016). For example, monitoring at Kodiak Pier 1 calculated transmission loss (TL) coefficients of 20.3 during impact hammering and 21.9 during vibratory installation (Warner and Austin 2016). However, NMFS typically recommends a default practical spreading loss of 15 dB per tenfold increase in distance when empirical data are unavailable. Using a TL coefficient of 15 dB produces conservative estimates of harassment thresholds for the Project.

Level A Harassment

Sound propagation and the distances to the sound isopleths defined by NMFS for Level A harassment of marine mammals under the new Technical Guidance were estimated using the User Spreadsheet developed by NMFS for this purpose (NMFS 2016). The method uses estimates of SPL and duration of the activity to calculate the threshold distances at which a marine mammal exposed to those values would experience a PTS. Differences in hearing abilities among marine mammals are accounted for by use of weighting factor adjustments for the five functional hearing groups (NMFS 2016). Pulse duration from the SSV studies used for source level estimates are unknown. All necessary parameters were available for the SEL_{cum} (cumulative Single Strike Equivalent) method for calculating isopleths, and therefore this method was selected. The SEL_{cum} method resulted in isopleths that were larger than those calculated using the peak source level method, and therefore the SEL_{cum} isopleths were selected for the Project (**Table 6-6**). To account for potential variations in daily productivity during impact installation, isopleths were calculated for different numbers of piles that could be installed each day **(Table 6-6)**. Therefore, should the contractor expect to install fewer piles in a day than the maximum anticipated, a smaller Level A shutdown zone would be required to avoid take.

For vibratory pile installation, Level A harassment isopleths range from 1 to 29 meters for all functional hearing groups (**Table 6-6**). For impact installation, Level A harassment isopleths range from 1 meter to 1.9 kilometer, with the largest Level A zones calculated for high-frequency and low-frequency cetaceans (**Table 6-6; Figure 6-1**, **Figure 6-2**, **Figure 6-3**, and **Figure 6-4**). The maximum aquatic areas ensonified during pile installation and removal for the Project range are presented in **Table 6-7**.

To avoid and minimize incidental Level A exposure of marine mammals, a conservative shutdown zone of 100 meters will be used during monitoring. Level A take will be requested for some species because the large sizes of the Level A harassment zones and the low conspicuity of the animals increases the likelihood of exposure to Level A thresholds to a level that exceeds what can be effectively mitigated through a monitoring program.

Level B Harassment

Sound propagation and the distances to the sound isopleths defined by NMFS for Level B harassment of marine mammals were estimated using the Practical Spreading Loss model. The source levels for proposed pile installation and removal activities were estimated by using the results of measurements from the best available and most relevant sound source verification studies (**Table 6-3**).

The formula for transmission loss is TL = X log10 (R/10), where R is the distance from the source assuming the near-source levels are measured at 10 meters and X is the TL coefficient (i.e., 15log10 in this case). This TL model, based on the default practical spreading loss

assumption, was used to predict the distances to the Level B disturbance isopleths for the underwater noise levels generated by pile installation from the Project (**Table 6-6**).

For vibratory pile installation, Level B harassment isopleths range from about 1.3 to 7.4 kilometers (**Table 6-6**). For impact installation, Level B harassment isopleths range from 255 meters to 1.9 kilometer (**Table 6-6; Figure 6-5; Figure 6-6**).

Land forms (including causeways and breakwaters) are impenetrable by underwater noise and create shadows where noise from construction would not be audible. At Sand Point, noise from vibratory and impact installation would be blocked from entering the small boat harbor and new harbor because of the existing breakwater and causeway. Noise produced during vibratory installation would also be impeded by the jut of land at Sand Point proper (now the Sand Point Airport), Unga Island, Range Island, and the land form where the City of Sand Point is located (**Figure 6-5; Figure 6-6)**. The maximum aquatic areas ensonified during pile installation and removal for the Project are presented in **Table 6-7**.

Table 6-6. Pile installation and removal activities and calculated distances to Level A and Level B harassment isopleths

Activity	Estimated Duration				Level A Harassment Zone (meters) (based on new Technical Guidance)					Level B Harassment Zone (meters) (based on Practical Spreading Loss Model)
	Number of piles	Piles installed per day	Hours per day	Days of effort	Cetaceans			Pinnipeds		Cetaceans and Pinnipeds (120 dB)
					LF	MF	HF	PW	OW	
Vibratory Installation 30"	52	4	3	13	20	2	29	12	1	7,356
Vibratory Installation 24" Dolphin	3	2	1	2	3	1	4	2	1	2,026
Vibratory Installation 24" Fender	8	4	1	2	3	1	4	2	1	
Vibratory Installation and/or removal < 24" or H-piles	90	12	3	15	4	1	6	2	1	1,318
Activity	**Number of piles**	**Piles installed per day**	**Strikes per pile**	**Days of effort**	**Cetaceans**			**Pinnipeds**		**Cetaceans and Pinnipeds (160 dB)**
					LF	**MF**	**HF**	**PW**	**OW**	
Impact Installation 30"	52	4	1,000	13	1,588	57	1,892	850	62	1,905
		3		18	1,311	47	1,562	702	52	
		2		26	1,001	36	1,192	536	39	
		1		52	631	23	751	338	25	
Impact Installation 24" Dolphin	3	2	400	2	84	3	100	45	4	255
		1		3	53	2	63	29	2	
Impact Installation 24" Fender	8	4	120	2	60	3	71	32	3	
		3		3	49	2	59	27	2	
		2		4	38	2	45	20	2	
		1		8	24	1	29	13	1	

Note: assuming a 120 dB background noise level and a 15Log TL coefficient; values are rounded up to nearest whole meter.

Table 6-7. Calculated areas (km^2) ensonified within Level A and Level B harassment thresholds in excess of 100-meter distance during pile installation and removal activities

Activity	Level A Harassment Zone (km^2) (based on new Technical Guidance)					Level B Harassment Zone (km^2) (based on Practical Spreading Loss Model)
	Cetaceans			Pinnipeds		Cetaceans and Pinnipeds (120 dB)
	LF	MF	HF	PW	OW	
Vibratory Installation 30”	NA					19.38
Vibratory Installation 24”						5.34
Vibratory Installation and/or removal < 24” or H-piles						2.45
Activity	**Cetaceans**			**Pinnipeds**		**Cetaceans and Pinnipeds (160 dB)**
	LF	**MF**	**HF**	**PW**	**OW**	
Impact Installation 30” (4 piles per day)	3.46	NA	4.74	1.10	NA	4.80
Impact Installation 30” (3 piles per day)	2.43	NA	3.36	0.79	NA	
Impact Installation 30” (2 piles per day)	1.47	NA	2.03	0.50	NA	
Impact Installation 30” (1 pile per day)	0.66	NA	0.88	0.22	NA	
Impact Installation of 24”	NA					0.13

Note: NA = area ensonified is within 100-meter radius shutdown zone

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Figure 6-1. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of one 30-inch pile per day

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Figure 6-2. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of two 30-inch piles per day

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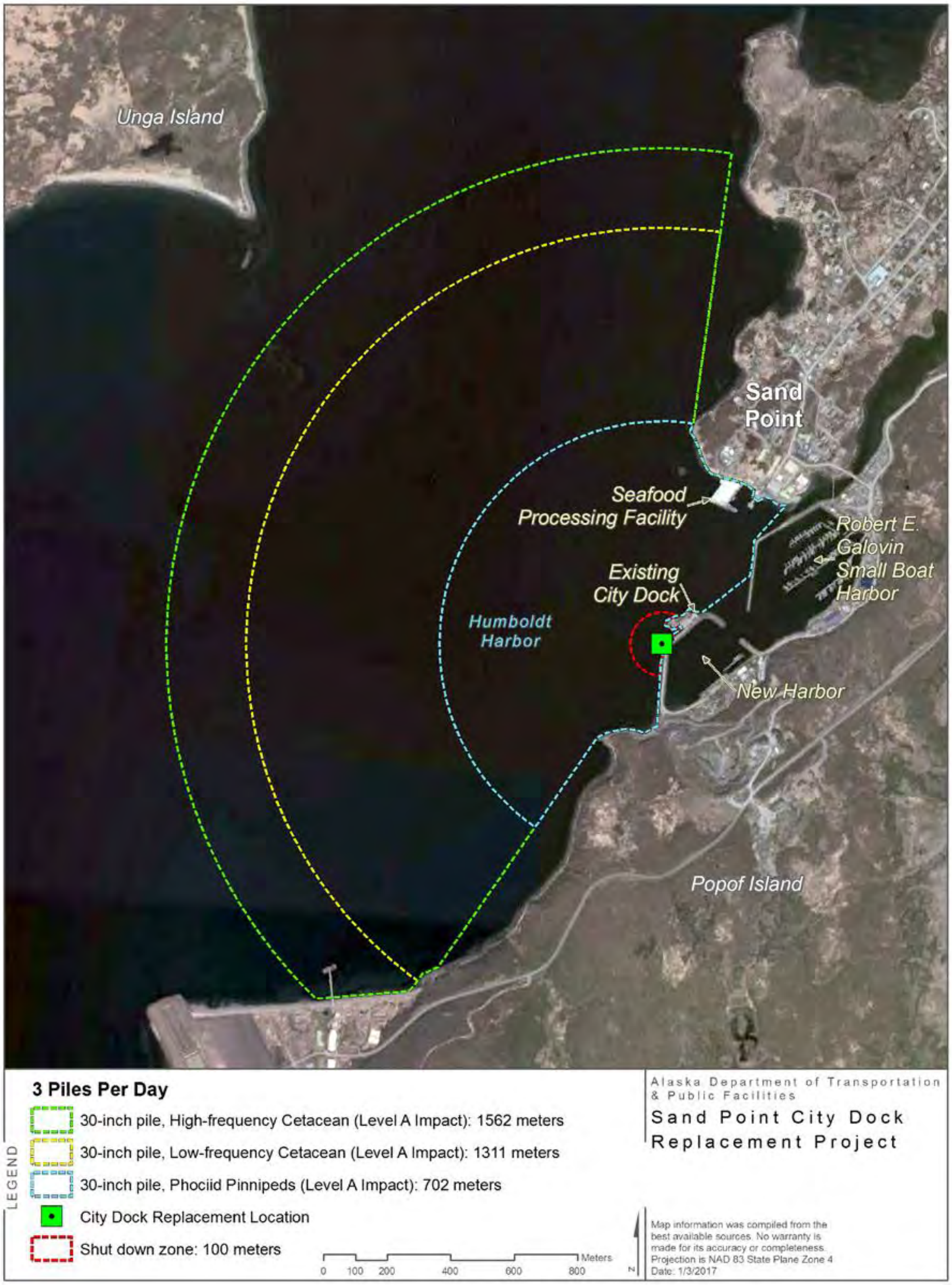

Figure 6-3. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of three 30-inch piles per day

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Figure 6-4. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of four 30-inch piles per day

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Figure 6-5. Underwater distances to Level B harassment thresholds for all marine mammals during vibratory and impact installation of 30-inch piles

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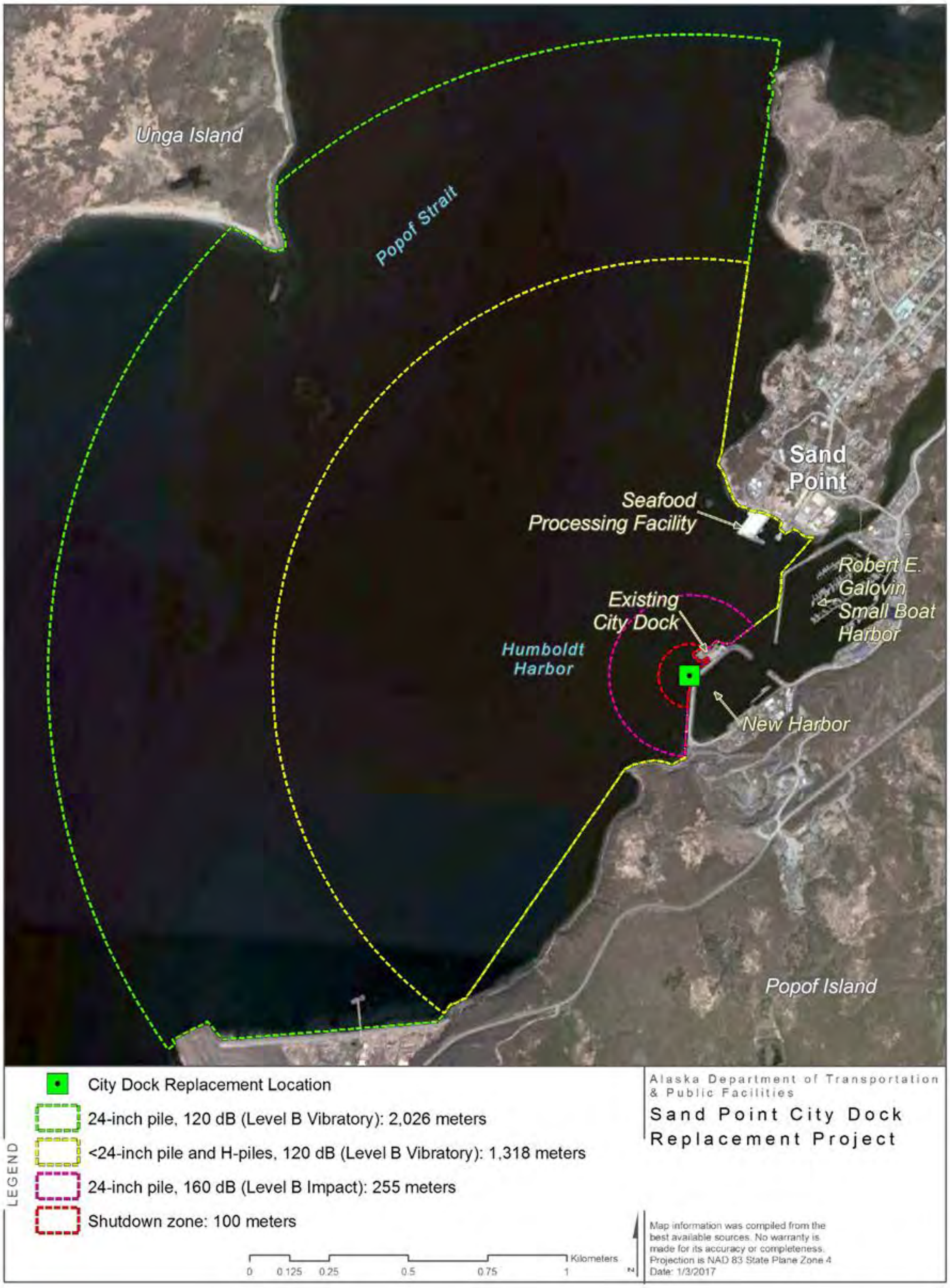

Figure 6-6. Underwater distances to Level B harassment thresholds for all marine mammals during vibratory and impact installation of 24-inch piles, <24-inch piles, and H-piles

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6.4.2 Airborne Noise

Pinnipeds can be affected by in-air noise when they are hauled out. Loud noises can cause hauled-out pinnipeds to panic back into the water, leading to disturbance and possible injury. For airborne sound exposure of hauled-out pinnipeds, NMFS uses "do-not-exceed" criteria for Level B harassment of 90 dB re 20 µPa rms for harbor seals and 100 dB re 20 µPa rms for all other pinnipeds, including Steller sea lions. These criteria do not differentiate among sound types.

No data for in-air noise production during installation of 30- or 24-inch piles in Alaska are available. However, in-air measurements during vibratory installation of 30-inch steel piles in Washington averaged 96.5 dB rms at 15 meters (Laughlin 2010b). Vibratory installation of 30-inch steel piles, 24-inch steel piles, and temporary piles (<24-inch or H-pile) will therefore be conservatively estimated to generate 96.5 dB rms at 15 meters (**Table 6-8**). In a sound source verification study in Washington, Magnoni et al. (2014) found that in-air measurements during impact installation of 24-inch steel piles ranged from 97 to 98 dB rms at 15 meters. The source level for impact installation of 30- and 24-inch steel piles is therefore assumed to be 98 dB rms at 15 meters (**Table 6-8**).

The spherical spreading model with sound transmission loss of 6.0 dB per doubling distance for a hard surface ($D = D_o * 10^{[(\text{Construction Noise – Ambient Sound Level in dBA})/\alpha]}$; WSDOT 2010) was used to estimate noise threshold distances from the mean source levels. In the model,

D = the distance from the noise source

D_o = the reference measurement distance (15 meters [50 feet] in this case)

α = 20 for hard ground, which assumes a 6 dBA reduction per doubling distance

The distance to the airborne sound level threshold from vibratory pile installation of 20- and 24-inch steel piles is 10 meters for all pinnipeds except harbor seals, and 32 meters for harbor seals (**Table 6-8**). The distance to the airborne sound level threshold from impact pile installation of 20- and 24-inch steel piles is 12 meters for all pinnipeds except harbor seals, and 38 meters for harbor seals (**Table 6-8**).

Table 6-8. Distances (meters) from Sand Point construction activity where airborne sound will attenuate to NMFS threshold for Level B harassment, and estimated Source Levels at 15 m (dB re: 20µPa)

Method, pile type	Harbor Seals (90 dB)	Other Pinnipeds (100 dB)	Source Level (dB @ 15 m)
Vibratory Hammer			
30-, 24- and <24-inch steel piles or H-piles	32	10	96.5
Impact Hammer			
30- and 24-inch steel piles	38	12	98

6.5 Estimated Takes

6.5.1 Steller Sea Lions

Assuming approximately 12 unique individual sea lions occur in Humboldt Harbor each day, 12 individuals could potentially be exposed to Level B harassment (**Figure 6-5**) due to pile installation on no more than 40 days during the Project. Therefore:

*12 sea lions per day * 40 days of exposure = 480 potential exposures*

This estimate was derived from the information presented in **Section 4.1**. The number of unique individuals used to calculate take was based on information provided from the seafood processing facility, estimating that about 12 unique individual sea lions likely occur in Humboldt Harbor each day during the pollock fishing seasons (R. Kochuten, pers. comm.; A. Audette, pers. comm.). It is assumed that Steller sea lions may be present every day, and also that take will include multiple harassments of the same individual(s) both within and among days. No Level A take is requested for Steller sea lions (**Table 6-9**).

6.5.2 Harbor Seals

Harbor seals are non-migratory; therefore, our exposure estimates are not dependent on season. Given a conservative estimate of two harbor seals exposed to construction related in-water noise each day, we estimate that a total of 80 harbor seals could be potentially taken during the pile installation period. Therefore:

*2 harbor seals per day * 40 days of exposure = 80 potential exposures*

During impact installation of 30-inch support piles, the Level A harassment isopleth for harbor seals extends a distance of 850 meters (assuming optimal productivity of 4 piles installed per day; **Table 6-6** and **Figure 6-4**). Harbor seals often act curious toward on-shore activities and are known to approach humans, lifting their heads from the water to look around. Given this characteristic, the difficulty of detecting the species at far distances, and their relative abundance in the outer portions of Humboldt Harbor near the airport (R. Kochuten, pers. comm.), we are requesting Level A take for a small number of harbor seals. We anticipate that it is possible for one harbor seal per day to approach the interior of Humboldt Harbor and enter the 850 meter Level A harassment zone. Therefore, we anticipate that of the 80 exposures, 40 will occur within the Level A harassment isopleth and 40 will occur within only the Level B harassment isopleth (**Table 6-9**).

6.5.3 Harbor Porpoises

Harbor porpoises are non-migratory; therefore, our exposure estimates are not dependent on season. Given a conservative estimate of one harbor porpoise exposed to construction-related in-water noise every day, we estimate a total of 40 harbor porpoises taken during the pile installation period. Therefore:

*1 harbor porpoise per day * 40 days of exposure = 40 potential exposures*

During impact installation of 30-inch support piles, the Level A harassment isopleth for harbor porpoises extends a distance of 1,892 meters (assuming optimal productivity of 4 piles installed per day; **Table 6-6** and **Figure 6-4**). This zone covers most of the marine water between Sand Point and Unga Island, and extends completely across Popof Strait. Harbor porpoises are fast swimmers and relatively small cetaceans, which makes their detection at long distances difficult. As such, we are requesting Level A take for a small number of harbor porpoises. We anticipate that it is possible for one harbor porpoise to travel through Popof Strait and through the 1,892

meter Level A harassment zone once every 2 days. Therefore, we anticipate that of the 40 exposures, 20 will occur within the Level A harassment isopleth and 20 will occur within only the Level B harassment isopleth (**Table 6-9**).

6.5.4 Dall's Porpoises

Dall's porpoise are non-migratory; therefore, our exposure estimates are not dependent on season. Dall's Porpoise are not expected to enter Humboldt Harbor or Popof Strait, as they prefer deeper waters and are considered rare for the area. Therefore, exposure of Dall's Porpoise to noise from impact hammer pile installation is unlikely, as they are not expected to occur within the 1,905-meter Level B harassment zone (**Figure 6-5**). Similarly, we do not anticipate Dall's porpoise would be exposed to noise in excess of the Level A harassment threshold, located at 1,892 meters (**Table 6-6**, **Figure 6-4**). Over the course of the 40-day construction period, we anticipate no more than one observation of a Dall's Porpoise pod in the Level B vibratory harassment zone (**Figure 6-5**), with an average pod size of 3.7 (Wade et al. 2003); therefore, we round our estimate up to a total of four Dall's porpoises that could be taken during the pile installation period. No Level A take is requested for Dall's porpoises.

6.5.5 Killer Whales

Although they range over vast areas, killer whales are non-migratory; therefore, our exposure estimates are not dependent on season. Killer whales are not expected to enter Humboldt Harbor, and therefore exposure of killer whales to noise from impact hammer pile installation is unlikely, as they would not occur within the 1,905-meter Level B harassment zone (**Figure 6-5**). Given the low probability of occurrence within the Project area, using the available density estimates as an indication of exposure is a conservative approach to estimate potential killer whale exposure to construction noise. Therefore, at a density of 0.002 whales/km^2, we anticipate approximately 0.039 killer whales per day (i.e., 0.002 whales/km^2 * 19.39 km^2 vibratory harassment zone) would be exposed to construction noise, or about one whale every 26 days. However, killer whales generally travel in pods, or groups of individuals, and the average pod size of transient killer whales is four individuals (Zerbini et al. 2007). Over the course of the 40-day construction period, we anticipate no more than two observations of killer whale pods in the Project area; therefore, we estimate that a total of eight killer whales could be taken during the pile installation period. These killer whales, although most likely to be transients, could potentially be either residents or transients, and take is requested for either stock. No Level A take is requested for killer whales (**Table 6-9**).

6.5.6 Humpback Whales

Exposure of humpback whales to construction-related noise levels is possible in August and, to a lesser extent, in September. Exposure is unlikely between October and December because, as described in **Section 4.6**, humpback whale abundance is low during late fall and winter. Humpback whales, when present, are unlikely to enter Humboldt Harbor and approach the City of Sand Point, but would instead transit through Popof Strait or feed in the deeper waters off the airport, between Popof and Unga islands (B. Witteveen, pers. comm.). Harassment from pile installation is possible in areas between Popof and Unga islands, including Popof Strait. Because at this time we do not know exactly when construction might occur, we will use the updated summer density estimate (and our only density estimate) of 0.04 whales/km^2 to estimate exposure (**Section 4.6**). Therefore, we have determined that approximately 0.78 humpback whales (e.g., 0.04 whales/km^2 * 19.39 km^2 vibratory harassment zone) could be exposed to construction-related noise each day, or approximately one whale every 1.3 days. Therefore, we conservatively estimate that no more than 32 humpback whales (i.e., 0.78 whales

per day * 40 days [rounded up]) would be exposed to construction-related noise over the course of the pile installation period (**Table 6-9**).

A subset of the 32 humpback whales potentially exposed to construction-related noise may also enter the Level A harassment zone, which extends 1,588 meters (assuming optimal productivity of 4 piles per day; **Table 6-6** and **Figure 6-4**). As such, we are requesting Level A take for a small number of humpback whales. Applying the same density estimate to the Level A harassment zone (**Figure 6-4**), we anticipate approximately 0.14 humpback whales (e.g., 0.04 whales/km^2 * 3.47 km^2 Level A harassment zone) would be exposed to Level A harassment each day, or approximately 6 exposures (i.e., 0.14 whales per day * 40 days [rounded up]) over the course of the construction period. Therefore, we are requesting Level B take for 26 humpback whales and Level A take for 6 humpback whales (**Table 6-9**).

6.5.7 Fin Whales

Incidental take was estimated for fin whales by adopting the estimated density reported by Zerbini et al. (2006; **Section 4.7.2**). Given the distance to the Level B harassment isopleth predicted for vibratory pile installation, and accounting for land form obstructions that inhibit the propagation of noise through water, approximately 19.39 km^2 of marine water would be ensonified during vibratory installation of 30-inch piles. Therefore, we conservatively estimate that 0.14 fin whales (i.e., 0.007 whales/km^2 * 19.39 km^2 vibratory harassment zone) could be exposed to construction-related noise each day, or approximately one fin whale every 8 days. Therefore, we conservatively estimate that no more than six fin whales (i.e., 0.14 whales per day * 40 days [rounded up]) would be exposed to construction-related noise at the Level B harassment level over the course of the pile installation period. No Level A take is requested for fin whales (**Table 6-9**).

6.5.8 Gray Whales

Gray whales could potentially migrate through the area between May and November. Gray whale presence near Sand Point and in Humboldt Harbor is rare and unlikely to occur during the construction period. As such, exposure of gray whales to noise from impact hammer pile installation is unlikely, as they are not expected to occur within the 1,905-meter harassment zone. Harassment from vibratory pile installation is possible in the deeper water just north of Popof Strait (**Figure 6-5**). Because at this time we do not know exactly when construction might occur, because there are no density estimates for the area, and because of the rarity of gray whales being observed within the Project area, we conservatively estimate that gray whales will not be observed more than one time during the construction period. Multiplying the one potential observation by the average pod size of 2.4 (Rugh et al. 2005), we round up the conservative estimate to three gray whales that could be exposed to construction-related noise at the Level B harassment level over the course of the construction period. No Level A take is requested for gray whales (**Table 6-9**).

6.5.9 Minke Whales

Some minke whales migrate seasonally, while others develop home ranges and do not migrate long distances. Conservatively, minke whales could be exposed to construction-related noise levels year round. Surveys indicate a density of 0.001 minke whales per km^2 south of the Alaska Peninsula (including the Shumagin Islands). Therefore, we conservatively estimate that 0.019 minke whales (i.e., 0.001 whales/km^2 * 19.39 km^2 vibratory harassment zone) could be exposed to construction-related noise each day. Over the course of the 40-day construction period, we anticipate no more than one observation of a minke whale in the Project area. With a pod size of two or three (NMFS 2014), we estimate a total of three minke whales could be

taken during the construction period. No Level A take is requested for minke whales (**Table 6-9**).

6.6 All Marine Mammal Takes Requested

The analysis of marine mammal take for the Project predicts 480 potential exposures of Steller sea lions, 80 potential exposures of harbor seals, 40 potential exposures of harbor porpoises, 4 potential exposures of Dall's porpoises, 8 potential exposures of killer whales, 32 potential exposures of humpback whales, 6 potential exposures of fin whales, 3 potential exposures of gray whales, and 3 potential exposures of minke whales to noise from pile installation over the course of construction. Of these, 40 potential exposures of harbor seals, 20 potential exposures of harbor porpoises, and 6 potential exposures of humpback whales could occur within Level A harassment thresholds. Therefore, the DOT&PF requests 590 total Level B takes and 66 total Level A takes of marine mammals (**Table 6-9**).

Table 6-9. Summary of the estimated numbers of marine mammals potentially exposed to Level A and Level B harassment noise levels

Species (DPS/Stock)	Estimated Number of Individuals Potentially Exposed to the Level A Harassment Threshold	Estimated Number of Individuals Potentially Exposed to the Level B Harassment Threshold	DPS/Stock Abundance (DPS/Stock)	Percent of Population Exposed to Level A or Level B Thresholds
Steller sea lion (wDPS)	0	480	49,497	0.92
Harbor seal (Cook Inlet/Shelikof Strait)	40	40	27,386	0.29
Harbor porpoise (Gulf of Alaska)	20	20	31,046	0.13
Dall's porpoise (Alaska)	0	4	83,400	0.005
Killer whale (Gulf of Alaska, Aleutian Islands, and Bering Sea transient or Alaska resident)	0	8	587 (transient) 2,347 (resident)	1.36 (transient) 0.34 (resident)
Humpback whale[a] (Hawaii, Western North Pacific, or Mexico DPS)	6	26	11,398 (Hawaii DPS) 1,059 (Western North Pacific DPS) 3,264 (Mexico DPS)	0.25 0.19 0.12
Fin whale (Northeast Pacific)	0	6	N/A	N/A
Gray whale (Eastern North Pacific)	0	3	20,990	0.0001
Minke whale (Alaska)	0	3	N/A	N/A
Total	**66**	**590**	**N/A**	**N/A**

[a] As discussed in Section 4.6.1, the Hawaii DPS is estimated to account for approximately 89 percent of all humpback whales in the Gulf of Alaska, whereas the Western North Pacific and Mexico DPSs account for approximately 0.5% and 10.5%, respectively (Wade et al. 2016; NMFS 2016). The percent of each population potentially exposed to Level A or Level B thresholds is therefore based on a these proportions.

N/A: Not Applicable or no stock population assessment is available.

7 DESCRIPTION OF POTENTIAL IMPACTS OF THE ACTIVITY TO MARINE MAMMALS

The ability to hear and transmit sound (echolocation/vocalization) is vital for marine mammals to perform several life functions. Marine mammals use sound to gather and understand information about their current environment, including detecting prey and predators. They also use sound to communicate with one another. The distance a sound travels through the water depends highly on existing environmental conditions (sea floor topography and ambient noise levels) and characteristics of the sound (source levels and frequency; Richardson et al. 1995). Impacts to marine mammals can vary among species, based on their sensitivity to sound and their ability to hear different frequencies. The Project may impact marine mammals behaviorally and physiologically from temporary increases in underwater and airborne noises during reconstruction activities. The level of impact on marine mammals from construction activities will vary depending on the species of marine mammal, the distance between the marine mammal and the construction activity, the intensity and duration of the construction activity, and the environmental conditions.

7.1 Potential Effects of Pile Installation on Marine Mammals

7.1.1 Zones of Noise Influence

Behavioral and physiological changes that may result from increased noise levels include changes in tolerance levels; masking of natural sounds; behavioral disturbances; and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al. 1995). Richardson et al. (1995) suggested four zones to assess potential effects of noise on marine mammals.

Zone of Hearing Loss, Discomfort, or Injury

This is the area within which the received sound level is high enough to cause discomfort or tissue damage to auditory or other systems. An animal may experience temporary threshold shift (TTS) when hearing loss is temporary, or PTS when partial or full hearing loss is permanent. Marine mammals exposed to high received sound levels may experience non-auditory physiological effects such as increased stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. Based on NMFS' new Technical Guidance, PTS thresholds were calculated in **Section 6.4** and potential exposure of marine mammals to noise levels in excess of PTS thresholds was calculated in **Section 6.5**.

Zone of Masking

This is the area within which noise is strong enough to interfere with the detection of other sounds, including communication calls, prey or predator sounds, and other environmental sounds. Masking is considered Level B harassment and is usually considered 160 dB for impact noise and 120 dB for continuous noise.

Zone of Responsiveness

This is the area within which marine mammals react behaviorally or physiologically from exposure to increased noise levels. The level of effect is dependent on acoustical characteristics of the noise, the current physical and behavioral state of the animals, ambient noise levels and environmental conditions, and the context of the sound (e.g., if it sounds similar to a predator; Richardson et al. 1995; Southall et al. 2007). Behavioral effects that are

temporary may indicate that the animal has simply heard a sound and the effect may not be long term (Southall et al. 2007). Behavioral and physiological effects described here will be considered Level B harassment.

Zone of Audibility

This is the area within which the animal might hear the noise; it is the most extensive of the four zones. Marine mammals as a group have functional hearing ranges of 10 Hz to 180 kHz, with thresholds of best hearing near 40 dB (Ketten 1998; Southall et al. 2007). Marine mammals can typically be divided into three groups that have consistent patterns of hearing sensitivity: small odontocetes (e.g., harbor porpoise), medium-sized odontocetes (e.g., killer whale), and pinnipeds (e.g., Steller sea lion and harbor seal). Difficulties in human ability to determine the audibility of a particular noise for other species has so far precluded development of applicable criteria for the zone of audibility. This zone does not fall in the sound range of a “take” as defined by NMFS.

7.2 Assessment of Acoustic Impacts

Behavioral and physiological impacts from noise exposure differ among species. Differences in response have also been documented between age and sex classes. Younger animals are often more sensitive to noise disturbance, and noise can therefore have a greater effect (NRC 2003).

7.2.1 Zone of Hearing Loss, Discomfort, or Injury

Temporary or permanent reduction in hearing sensitivity may result from high received sound levels. The level of hearing loss depends on the sound frequency, intensity, and duration. PTS and TTS may reduce an animal’s ability to avoid predators, communicate with others, or forage effectively.

Kastak and Schusterman (1996) tested in-air auditory thresholds by exposing a harbor seal inadvertently to broadband construction noise for 6 days, with intermittent exposure averaging 6 to 7 hours per day. When the harbor seal was tested immediately upon cessation of the noise, a TTS of 8 dB at 100 Hz was evident. Following 1 week of recovery, the harbor seal’s hearing threshold was within 2 dB of its original level.

Pure-tone sound detection thresholds were obtained in-water for harbor seals before and immediately following exposure to octave-band noise (Kastak et al. 1999). Test frequencies ranged from 100 Hz to 2 kHz, and octave-band sound exposure levels (SELs) were approximately 60 to 75 dB SEL. Each harbor seal was trained to dive into a noise field and remain stationed underwater during a noise-exposure period that lasted a total of 20 to 22 minutes. The average threshold shift relative to baseline thresholds for the harbor seals following noise exposure was 4.8 dB, and the average shift following the recovery period was 20.8 dB (Kastak et al. 1999).

Kastelein et al. (2013) determined that the hearing threshold was lower when a harbor porpoise was exposed to multiple strike sounds than when it was exposed only to a single strike sound. Using a psychophysical technique, a harbor porpoise’s hearing thresholds were obtained for a series of five pile installation sounds (inter-pulse interval 1.2 to 1.3 seconds) recorded at 100 and 800 meters from the pile installation site, and played back in a pool. The 50 percent detection threshold SELs for the first sound of the series (no masking) were 72 dB (100 meters) and 74 dB (800 meters) referenced to 1 μPa squared second. Multiple sounds in succession (series) caused a 5 dB decrease in hearing threshold.

7.2.2 Zone of Masking

Marine mammal signals may be masked by increased noise levels or overlapping frequencies. Research has indicated that the majority of vibratory activity falls within 400 and 2,500 Hz (Blackwell 2005; URS 2007). The frequency range of Steller sea lions' vocalization is unknown; however, Steller sea lions have been documented producing low-frequency vocalizations (Kastelein et al. 2005). Harbor seals produce social calls at 500 to 3,500 Hz and clicks from 8 to 150 kHz (reviewed in Richardson et al. 1995). Harbor porpoises produce acoustic signals in a very broad frequency range, <100 Hz to 160 kHz (Verboom and Kastelein 2004). Killer whales produce whistles between 1.5 and 18 kHz, and pulsed calls between 500 Hz and 25 kHz. Echolocation clicks are far above the frequency range of the sounds produced by vibratory pile installation.

The Project area is within an existing active harbor area, and therefore marine mammals in the Project area have likely become habituated to increased noise levels. Implementation of the proposed mitigation measures (**Section 11**) will reduce impacts on marine mammals, with any minor masking occurring close to the sound source, if at all.

7.2.3 Zone of Responsiveness

Responses from marine mammals in the presence of pile installation activity might include a reduction of acoustic activity, a reduction in the number of individuals in the area, and avoidance of the area. Of these, temporary avoidance of the noise-impacted area is the most common response. Avoidance responses may be initially strong if the marine mammals move rapidly away from the source, or weak if movement is only slightly deflected away from the source. Noise from pile installation could potentially displace marine mammals from the immediate location of the activity; however, they would likely return after pile installation is completed, as demonstrated by a variety of studies on temporary displacement of marine mammals by industrial activity (reviewed in Richardson et al. 1995). Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile installation, and have already been taken into account in the exposure analysis.

Marine mammals in the Sand Point area, especially Steller sea lions, are exposed to a variety of vessel and industrial sounds, and maintain a presence in the area. This suggests some level of habituation to anthropogenic sounds and activity. Steller sea lions are especially habituated in this location because of the presence of commercial fishing vessels and a seafood processing facility with available food resources.

7.2.4 Habituation and Sensitization

Repeated or sustained disruption of important behaviors (such as feeding, resting, traveling, and socializing) is more likely to have a demonstrable impact than a single exposure (Southall et al. 2007). However, it is likely that marine mammals exposed to repetitious construction sounds will become habituated, desensitized, and tolerant after initial exposure to these sounds. Marine mammals residing in and transiting this area are routinely exposed to sounds louder than 120 dB, and continue to use this area; therefore, they do not appear to be harassed by these sounds, or they have become habituated.

7.3 Conclusions Regarding Impacts to Species or Stocks

Incidental take is expected to result only in short-term changes in behavior, such as avoidance of the Project area, changes in swimming speed or direction, changes in foraging behavior, and possibly minor changes in hearing threshold for some individuals. These takes would be

unlikely to have any impact on recruitment or survival, and therefore would have a negligible impact on marine mammals. Implementation of mitigation measures proposed in **Section 11** is likely to minimize most potential adverse underwater impacts to individual marine mammals from pile installation activities. Impacts to individual Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales, humpback whales, fin whales, gray whales, and minke whales are expected to be small and of short duration. Nevertheless, some level of disturbance impact is unavoidable. The expected level of unavoidable impact (defined as an acoustic or harassment "take") is defined in **Section 6**.

Level A and Level B take would likely include multiple takes of the same individual(s), resulting in estimates of take (as percentage of the population) that are high compared to actual take that would occur. This is particularly likely for Steller sea lions that congregate at the seafood processing facility or harbor seals that are generally more resident than transient animals in the area. Estimates of Level A and Level B take represent small proportions of all affected stocks.

8 DESCRIPTION OF POTENTIAL IMPACTS TO SUBSISTENCE USES

Alaska Natives have traditionally harvested subsistence resources in the Shumagin Islands for many hundreds of years, particularly salmon, halibut, and other fish (ADF&G 2016). Harbor seals are the marine mammal species most regularly harvested for subsistence in Sand Point (ADF&G 1997). No traditional subsistence hunting areas are within the Project vicinity, however; there are three harbor seal haulouts on the south side of Popof Island and one on the east side of Unga Island, near Baralof Bay (London et al. 2015; **Section 4.2.2**).

An estimated 25 percent of the households in Sand Point use marine mammals for subsistence purposes. Based on household surveys in 1992, each person takes an average of 5 pounds (2.3 kilograms) of useable marine mammal meat each year. This is a small amount of harvest relative to other Aleutian and Pribilof islands communities, which can reach at least 150 pounds (68 kilograms) per person. Between 1992 and 1995, estimated harbor seal harvest in Sand Point ranged from 9 to 38 animals (ADF&G 1997). Between 1992 and 2008, average annual harbor seal harvest in Sand Point was 25 animals. Steller sea lion harvest averaged 2.2 per year during the same period (ADF&G 2016). While Steller sea lions represent an important subsistence resource in some Aleutian Islands communities, they are not an important resource in Sand Point (ADF&G 1997). The harvest of one unidentified whale was reported in 1992, but subsistence harvest of whales in Sand Point is very uncommon (ADF&G 2016).

Marine mammals make up approximately 2 percent of all subsistence harvest in Sand Point. Fish are the primary subsistence resource and represent about 75 percent of subsistence harvest in Sand Point. Land mammals and other resources account for the remaining 23 percent of subsistence harvest at Sand Point (ADF&G 1997).

All Project activities will take place within the immediate vicinity of the Sand Point City Dock, and therefore the Project will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away. No disturbance or displacement of marine mammals from traditional hunting areas by activities associated with the Project is expected. No changes to availability of subsistence resources will result from Project activities.

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9 DESCRIPTION OF POTENTIAL IMPACTS TO MARINE MAMMAL HABITAT

9.1 Effects of Project Activities on Steller Sea Lion Habitat

The Project site is located within designated critical habitat for the Steller sea lion (**Section 4.1.3**). The closest Steller sea lion haulout to the action area is located on Egg Island, which is approximately 6 kilometers (3.7 nautical miles) from the Project. As described in **Section 4.1.1**, Steller sea lions use the marine and coastal environment around Sand Point for foraging. Construction activities would likely have temporary impacts on Steller sea lion habitat through increases in underwater and airborne sound from pile installation. Other potential temporary impacts include changes in prey species distribution in the immediate vicinity of pile installation activities. Best management practices and mitigation used to minimize potential environmental effects from Project activities are described in **Section 11**.

Project-related disturbances will not be detectable at the Egg Island haulout or any other haulouts, and the level of disturbance and habitat alteration in the Project area would be insignificant, especially when considered in relation to the activity already taking place in the Project area and the apparent tolerance to such activity by the Steller sea lions in the area. Detectable effects of the proposed fill and armor rock placement on Steller sea lions and their habitat are not expected. Steller sea lions do not haul out in the area where the fill and armor rock would be placed.

9.2 Effects of Project Activities on Habitat for Other Marine Mammals

Harbor seals, harbor porpoises, Dall's porpoise, killer whales, humpback whales, fin whales, gray whales, and minke whales are occasional and rare visitors to the Project area; their physical habitat would not be affected by the proposed Project. Effects on these marine mammal species would be limited to temporary displacement from pile installation noise and effects on prey species (**Section 9.3**).

9.3 Effects of Project Activities on Marine Mammal Prey Habitat

Essential Fish Habitat (EFH) has been designated within the Project area for all five species of salmon (i.e., chum, pink, Coho, sockeye, and Chinook salmon), walleye pollock, Pacific cod, yellowfin sole (*Limanda aspera*), arrowtooth flounder (*Atheresthes stomias*), rock sole (*Lepidopsetta spp.*), flathead sole (*Hippoglossoides elassodon*), and sculpin (Cottidae), EFH may also be in the area for foraging fish species, and squid (Teuthoidea). It is expected that there will be no adverse effect on EFH. Fish populations in the Project area that serve as marine mammal prey could be affected by noise from in-water pile installation. The frequency range in which fish generally perceive underwater sounds is 50 to 2,000 Hz, with peak sensitivities below 800 Hz (Popper and Hastings 2009). Fish behavior or distribution may change, especially with strong and/or intermittent sounds that could potentially harm fish. High underwater SPLs have been documented to alter behavior; cause hearing loss; and injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005).

Placement of fill and armor rock may increase turbidity temporarily. Indirect effects to prey would be insignificant and discountable due to the temporary nature of the activity, and are expected to be undetectable to marine mammals.

In general, impacts to marine mammal prey species are expected to be minor and temporary. The area likely to be impacted by the proposed Project is relatively small compared to the available habitat in Popof Strait and around the Shumagin Islands. The most likely impact to fish from the proposed Project would be temporary behavioral avoidance of the immediate area, although any behavioral avoidance of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat. Therefore, the impacts on marine mammal prey during the proposed Project are expected to be negligible.

10 DESCRIPTION OF POTENTIAL IMPACTS FROM LOSS OR MODIFICATION OF HABITAT TO MARINE MAMMALS

Descriptions of the proposed Project impacts on habitat were discussed in **Section 9**. The effects of the proposed Project on marine mammal habitat are expected to be short-term and minor. One potential impact on marine mammals, especially Steller sea lions, associated with the Project could be a temporary loss of habitat because of elevated noise levels. Displacement of Steller sea lions by noise would not be permanent and would not have long-term effects. The proposed Project is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations, because pile installation and other noise sources would be temporary and intermittent.

Another essential feature of Steller sea lion critical habitat pertinent to the Project is adequate food resources. It is expected that most fish are able to move away from the proposed activity to avoid harm, and would still be available to Steller sea lions and other marine mammals. The quantity, quality, and availability of adequate food resources are therefore not likely to be reduced (due to the small area affected, mobility of fish, anticipated recolonization, and the temporary nature of the Project).

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11 MITIGATION MEASURES

The exposures outlined in **Section 6** represent the maximum potential number of marine mammals that could be exposed to acoustic sources reaching harassment levels. The DOTP&F proposes to employ a number of mitigation measures to minimize the number of marine mammals potentially affected. Mitigation measures would include those that address all phases of construction in general, those that are specific to physical pile installation, those that pertain to Level A and Level B harassment zones, and those that involve observation of marine mammals in the Project area. Marine mammal monitoring and mitigation methods are described in more detail in the Marine Mammal Monitoring and Mitigation Plan (**Appendix A**).

11.1 Pile Installation

Pile installation mitigation measures include the following:

- The Project was designed with relatively small-diameter piles, which would avoid the elevated noise impacts associated with larger piles.
- Protected Species Observers (PSOs) would be employed as described in **Section 11.3**.
- Before impact hammering efforts occur, the Contractor would employ a soft start or ramp-up procedure to minimize impacts. The following guidelines would be employed by the Contractor:
    - If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity would begin only after the PSO has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone.
    - If a marine mammal is present in the Level B harassment zone, ramping up may begin and a Level B take would be recorded. Ramping up may occur when these species are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone or from outside the Project area.
    - If a marine mammal is present in the Level B harassment zone, the Contractor may elect to delay ramping up to avoid a Level B take. Ramping up would then begin only after the PSO has determined, through sighting, that the animal(s) has moved outside the Level B harassment zone.

11.2 Harassment Zones

Modeling results for Level A and Level B harassment zones discussed in **Section 6** were used to develop mitigation measures for pile installation activities. These include the following:

- A conservative shutdown zone of 100 meters will be used during monitoring to prevent incidental Level A exposure to most species. During vibratory installation of 30-inch piles and vibratory and impact installation of 24-inch piles, piles under 24 inches, and H-piles, a 100-meter shutdown zone would prevent Level A take to marine mammals. A 100-meter shutdown zone would also be sufficient to prevent Level A take of mid-frequency cetaceans and otariid pinnipeds (i.e., Steller sea lions) during impact installation of 30-inch piles. However, during impact installation of 30-inch piles, a 100-meter shutdown zone would *not* be sufficient to prevent Level A take of low-frequency cetaceans (i.e., humpback whales), high-frequency cetaceans (i.e., harbor porpoises), or phocid pinnipeds (i.e.,

harbor seals). For this reason, we have requested Level A take for small numbers of harbor seals, harbor porpoises, and humpback whales (**Section 6.6**).

- During impact installation of 30-inch piles, the Level B harassment zone shall extend to 1,905 meters for all marine mammals. During impact installation of 24-inch piles, the Level B harassment zone shall extend to 255 meters for all marine mammals. For those marine mammals for which Level B take has not been requested, impact pile installation would shut down prior to marine mammals entering the Level B harassment zone.
- During vibratory installation of 30-inch piles, the Level B harassment zone shall extend to 7,356 meters for all marine mammals. During vibratory installation of 24-inch piles, the Level B harassment zone shall extend 2,026 meters for all marine mammals. During vibratory installation and removal of piles less than 24 inches in diameter, the Level B harassment zone shall extend 1,318 meters for all marine mammals. For those marine mammals for which Level B take has not been requested, vibratory pile installation would shut down prior to marine mammals entering the Level B harassment zone.
- The Level A and Level B harassment zones would be monitored during all pile installation activities, as well as 30 minutes before installation/removal begins and 20 minutes after installation/removal completes. If a Steller sea lion, harbor seal, harbor porpoise, Dall's porpoise, killer whale, humpback whale, fin whale, gray whale, or minke whale is observed entering the Level B harassment zone, a Level B exposure would be recorded and behaviors documented. That pile segment would be completed without cessation, unless the animal approaches the 100-meter shutdown zone. Pile installation would be halted before the animal enters the 100-meter shutdown zone.
- Level A take is requested for harbor seals, harbor porpoises, and humpback whales. To the extent possible, Level A take would be avoided by shutting down activity prior to any marine mammal entering a Level A harassment zone. Level A take is requested for the above species because the sizes of the Level A harassment zones and the low conspicuity of the animals increases the likelihood of exposure to Level A thresholds to a level that exceeds what can be effectively mitigated through a monitoring program. Level A take for all other marine mammals would be avoided by shutting down activity before individuals enter the shutdown zone.

11.3 Marine Mammal Observation and Protection

Monitoring plans are discussed in detail in **Section 13** and in the Marine Mammal Monitoring and Mitigation Plan (**Appendix A**). Monitoring activities would include and require the following:

- Two or more trained or experienced PSOs would be present during all pile installation and removal. Observers must be able to positively identify the marine mammals in the area and have prior training or expertise in monitoring and surveying marine mammals, with credentials available for review.
- Monitoring for marine mammals would take place for at least 30 minutes prior to pile installation operations.
- Observers must maintain verbal contact with construction personnel to immediately call for a halt of pile installation operations to avoid exposures as described in **Section 11.2**.
- NMFS would be provided with a draft report of all marine mammal sightings during the Project within 90 days of the completion of pile installation.

12 MEASURES TO REDUCE IMPACTS TO SUBSISTENCE USERS

The proposed Project is not known to occur in a subsistence hunting area. It is a developed area with regular marine vessel traffic. However, DOT&PF plans to provide advanced public notice of construction activities to reduce construction impacts on local residents, ferry travelers, adjacent businesses, and other users of the Sand Point City Dock and nearby areas. This would include notification to local Alaska Native tribes that may have members who hunt marine mammals for subsistence. Of the marine mammals considered in this IHA application, only harbor seals and Steller sea lions are used for subsistence in the Project area. If any Alaska Native tribes express concerns regarding Project impacts to subsistence hunting of marine mammals, further communication between DOT&PF and the tribes would take place, including provision of any Project information, and clarification of any mitigation and minimization measures that may reduce potential impacts to marine mammals.

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13 MONITORING AND REPORTING

Monitoring measures would be implemented along with mitigation measures (**Section 11**) to reduce impacts to marine mammals to the lowest degree practicable during construction, as discussed in detail in the Marine Mammal Monitoring and Mitigation Plan (**Appendix A**). The monitoring plan would focus on visual observations. It should be noted that the titles “Protected Species Observers” and “Marine Mammal Observers” are intended to be synonymous for consultation, documentation, and construction purposes.

Trained PSOs would collect sighting data and behavioral responses to construction for all marine mammals observed within the harassment zones during construction. The Project would be shut down if marine mammals for which no take has been authorized are observed approaching the 1,905-meter Level B harassment zone during impact pile installation or the 7,356-meter Level B harassment zone during vibratory pile installation. In-water work would remain shut down until marine mammals for which no take has been authorized have left the harassment zones. For marine mammals for which take authorization has been received, pile installation activities may continue if the marine mammal enters the Level B harassment zone and take is documented. In-water activities would be immediately halted if a marine mammal species approaches the 100-meter Level A shutdown zone.

All PSOs would be trained in marine mammal identification and behaviors. NMFS requires that PSOs have no other construction-related tasks while conducting monitoring. The PSO(s) would monitor the Level A and Level B harassment zones before, during, and after pile installation, which is considered likely to generate noise levels reaching or exceeding harassment levels.

13.1 Observations

PSOs would begin observations 30 minutes prior to the start of pile installation, and would continue to observe for 20 minutes after completion of pile installation.

PSOs would have no other construction-related tasks or responsibilities while monitoring for marine mammals. PSOs would understand their roles and responsibilities before beginning observations. Each PSO would be trained and provided with reference materials to ensure standardized and accurate observations and data collection. A clear authorization and communication system would be in place to ensure PSOs and construction crew members understand their respective roles and responsibilities.

Before the proposed Project commences, the PSOs and DOT&PF authorities would meet to determine the most appropriate observation location(s) for monitoring during pile installation. If necessary, observations may occur from two locations simultaneously. Potential observation locations include the existing City Dock, the airport, the fish processing facility, or the hillside located south of the project site. Considerations would include:

- Ability to see the entirety of the harassment zones and maximize field of view
- Elevation and location
- Safety of the PSOs, construction crews, and other people present at the Project
- Minimization of interference with Project activities

Specific aspects and protocols of observations would also include the following:

- Monitoring distances would be measured with range finders.
- Distances to animals would be based on the best estimate of the PSO relative to known distances to objects in the vicinity of the PSO and by the use of the range finder.
- Bearings to animals would be determined by using a compass.
- Pre-activity monitoring:
  - The Level A and Level B harassment zones would be monitored for 30 minutes prior to in-water pile installation.
  - If a marine mammal is present within the Level A harassment zone, ramping up would be delayed until the animal(s) leaves the zone. Activity would begin only after the PSO has determined that, through sighting, the animal(s) has moved outside the Level A harassment zone.
  - If any marine mammal for which take has not been authorized is in the Level B harassment zone, ramping up would begin only after the PSO has determined that, through sighting, the animal(s) has moved outside the Level B harassment zone. If any marine mammal for which take has not been authorized is observed approaching the Level B harassment zone, pile installation would be shut down before take occurs.
  - If a marine mammal for which take has been requested (i.e., Steller sea lion, harbor seal, harbor porpoise, Dall's porpoise, killer whale, humpback whale, fin whale, gray whale, or minke whale) is within the Level B harassment zone, pile installation may begin with Level B take documented.
- Post-Activity Monitoring
  - Monitoring of the Level A and Level B harassment zones would continue for 20 minutes following the completion of the activity.
- Ongoing in-water pile installation may be continued during periods when conditions such as low light, darkness, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone, provided both the in-water noise-generating activity and marine mammal monitoring continues (acknowledging that monitoring would occur at a reduced level of effectiveness). A PSO would continue to monitor the visible portion of the Level B harassment zone throughout the duration of activities producing in-water noise. Pile installation would not be initiated or ramped up from a "shutdown condition" when the complete Level B harassment zone is not visible for a continuous 30-minute pre-operational monitoring period (whether due to darkness, low light, high sea state, fog, ice, heavy rain, glare, or other conditions). A shutdown condition is defined as a duration of 30 minutes or more when in-water noise from pile installation does not occur.
- Pile installation must be halted immediately during periods when conditions such as low light, darkness, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level A harassment zone. Once shutdown occurs, the above initiation and ramp up procedures would apply.

13.2 Data Collection

NMFS requires that the PSOs use NMFS-approved sighting forms (see **Appendix A**) that contain the following information:

- Date and time that pile installation begins or ends
- Construction activities occurring during each observation period
- Weather (wind, precipitation, fog)
- Tide state and water currents
- Visibility
- Species, numbers and, if possible, sex and age class of marine mammals
- Marine mammal behavior patterns observed, including bearing and direction of travel and, if possible, the correlation to SPLs
- Distance from pile installation activities to marine mammals, if pile installation is occurring during marine mammal observation
- Other human activity in the area

13.3 Reporting

A draft report would be submitted to NMFS within 90 calendar days of the completion of marine mammal monitoring. A final report would be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS. To the extent practicable, the PSOs would record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of Project activities over the course of a day.

In general, reporting would include:

- Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones
- Descriptions of underwater and airborne sound levels occurring at the time of the observable behavior
- Actions performed to minimize impacts to marine mammals
- Times when work was stopped and resumed due to the presence of marine mammals
- Results, which include the detections of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within the Level A and Level B harassment zones
- A refined take estimate based on the number of Steller sea lions, harbor seals, harbor porpoises, Dall's porpoise, killer whales, humpback whales, fin whales, gray whales, and minke whales observed during the course of construction

See **Appendix A** for more detail.

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14 SUGGESTED MEANS OF COORDINATION

To minimize the likelihood that impacts would occur to the species, stocks, and subsistence use of marine mammals, all Project activities would be conducted in accordance with all federal, state, and local regulations. To further minimize potential impacts from the planned Project, the DOT&PF would continue to cooperate with NMFS and other appropriate federal agencies (e.g., U.S. Fish and Wildlife Service, USACE, Federal Highway Administration), and the State of Alaska.

The DOT&PF would cooperate with other marine mammal monitoring and research programs taking place in the Sand Point area. The DOT&PF would also assess mitigation measures that can be implemented to eliminate or minimize any impacts from these activities. The DOT&PF would make available its field data and behavioral observations on marine mammals that occur in the Project area. Results of monitoring efforts would be provided to NMFS in a draft summary report within 90 calendar days of the conclusion of monitoring. This information could be made available to regional, state, and federal resource agencies; universities; and other interested private parties upon written request to NMFS.

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Appendix A
Marine Mammal Monitoring and Mitigation Plan

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HDR

Marine Mammal Monitoring and Mitigation Plan

Sand Point City Dock Replacement Project

State Project # SFHWY00006

April 2017

Prepared for:
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Acronyms and Abbreviations

4MP	Marine Mammal Monitoring and Mitigation Plan
dB	Decibel
DOT& PF	Alaska Department of Transportation and Public Facilities
FR	*Federal Register*
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
μPa	MicroPascal
NMFS	National Marine Fisheries Service
PSO	Protected Species Observer
rms	root mean square
wDPS	Western Distinct Population Segment

1.0 INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes the following Marine Mammal Monitoring and Mitigation Plan (4MP) for use during pile installation and removal for the proposed Sand Point City Dock Replacement Project (Project) in Sand Point, Alaska. The 4MP was prepared as an appendix to the application for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA), and in support of the Biological Assessment for formal Section 7 consultation with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA).

The Project would entail installing piles in the marine environment and replacing the existing City Dock with a new dock of similar size. The Project has the potential to generate elevated levels of underwater and in-air noise that could exceed Level A (injury) and Level B (disturbance) harassment thresholds established by NMFS under the new Technical Guidance (NMFS 2016) and the interim “do-not-exceed” criteria (70 Federal Register [FR] 1871-1875), respectively.

Level A harassment is any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment is any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but that does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Steller sea lions (*Eumetopias jubatus*) from the western Distinct Population Segment (wDPS), harbor seals (*Phoca vitulina*), harbor porpoises (*Phocoena phocoena*), Dall’s porpoises (*Phocoenoides dalli*), killer whales (*Orcinus orca*), humpback whales (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus*), gray whales (*Eschrichtius robustus*) and minke whales (*Balaenoptera acutorostrata*) may occur in the Project area, and a small number of Level B and Level A takes was requested for these marine mammals (see IHA application).

The overall goal of this 4MP is to ensure compliance with the ESA and MMPA. This 4MP has been developed to minimize and mitigate harassment to marine mammals during pile installation/removal, and to monitor and record the extent of harassment when it does occur. This 4MP also describes the methods that would be used to monitor and record the extent of Level A and Level B harassment. Please refer to the IHA application and Biological Assessment prepared for the Project for a more detailed discussion of the Project and its potential effects on marine mammals.

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2.0 HARASSMENT THRESHOLDS

Distances to Level B harassment thresholds, as defined by sound isopleths, vary by pile installation technique, and pile size and type (Table 2.1). Level B harassment zones would be the same for all marine mammal functional hearing groups. For vibratory pile installation, Level B harassment isopleths range from about 1.3 to 7.4 kilometers (Table 2.1). For impact installation, Level B harassment isopleths range from 255 meters to about 1.9 kilometers (Table 2.1; Figure 2-1; Figure 2-2). The monitored Level B harassment zone for vibratory pile installation would include the entire area that is ensonified within Popof Strait, and would extend along the Strait to the north and southwest based on vectors from the sound source (Figure 2-1 and 2-2). Marine waters would not be monitored if they are located behind landmasses such as islands, headlands, breakwaters, or causeways that block transmission of sound, as these areas would not be ensonified.

Sound propagation and the distances to the sound isopleths are defined by NMFS for Level A harassment of marine mammals under the new Technical Guidance (NMFS 2016). Distances to Level A harassment thresholds, as defined by sound isopleths, vary by marine mammal functional hearing group, pile installation technique, and pile size and type (Table 2.1). Distances to the Level A harassment thresholds also increase as the duration of pile installation increases, as measured by number of piles installed or removed per day (Table 2.1). For vibratory pile installation, Level A harassment isopleths range from 1 to 29 meters for all functional hearing groups, pile sizes, and numbers of piles per day (Table 2.1). For impact installation, Level A harassment isopleths range from 1 meter to about 1.9 kilometers, with the largest Level A zones calculated for high-frequency and low-frequency cetaceans, and up to four, 30-inch piles per day (Table 2.1; Figure 2-3, Figure 2-4, Figure 2-5, and Figure 2-6).

To avoid and minimize incidental Level A take, a conservative shutdown zone of 100 meters would be used during monitoring for all marine mammals. This “shutdown” zone would avoid exposure of all marine mammals to sound levels within the 100-meter shutdown zone. Although every effort would be made to shut down before marine mammals enter the 100-meter shutdown zone, if the Level A isopleth for a species is smaller than 100 meters, take of that species would not occur unless individuals enter their respective Level A harassment zones (Table 2.1).

Land forms (including causeways and breakwaters) are impenetrable by underwater noise and create shadows where noise from construction would not be audible. At Sand Point, noise from vibratory and impact installation would be blocked from entering the small boat harbor and new harbor because of the existing breakwater and causeway. Noise produced during vibratory installation would also be impeded by the jut of land at Sand Point proper (now the Sand Point Airport), Unga Island, Range Island, and the land form where the City of Sand Point is located.

Table 2.1. Pile installation and removal activities and calculated distances to Level A and Level B harassment isopleths

Activity	Estimated Duration				Level A Harassment Zone (meters) (based on new Technical Guidance)					Level B Harassment Zone (meters) (based on Practical Spreading Loss Model)
					Cetaceans			Pinnipeds		
	Number of piles	Piles installed per day	Hours per day	Days of effort	LF	MF	HF	PW	OW	Cetaceans and Pinnipeds (120 dB)
Vibratory Installation 30”	52	4	3	13	20	2	29	12	1	7,356
Vibratory Installation 24” Dolphin	3	3	1	2	3	1	4	2	1	2,026
Vibratory Installation 24” Fender	8	4	1	2	3	1	4	2	1	
Vibratory Installation and/or removal < 24” or H-piles	90	12	3	15	4	1	6	2	1	1,318
Activity	**Number of piles**	**Piles installed per day**	**Strikes per pile**	**Days of effort**	**Cetaceans**			**Pinnipeds**		**Cetaceans and Pinnipeds (160 dB)**
					LF	**MF**	**HF**	**PW**	**OW**	
Impact Installation 30”	52	4	1,000	13	1,588	57	1,892	850	62	1,905
		3		18	1,311	47	1,562	702	52	
		2		26	1,001	36	1,192	536	39	
		1		52	631	23	751	338	25	
Impact Installation 24” Dolphin	3	2	400	2	84	3	100	45	4	255
		1		3	53	2	63	29	2	
Impact Installation 24” Fender	8	4	120	2	60	3	71	32	3	
		3		3	49	2	59	27	2	
		2		4	38	2	45	20	2	
		1		8	24	1	29	13	1	

Note: assuming a 120 dB background noise level and a 15Log TL coefficient; values are rounded up to nearest whole meter.

Figure 2-1. Underwater distances to Level B harassment thresholds for all marine mammals during vibratory and impact installation of 30-inch piles

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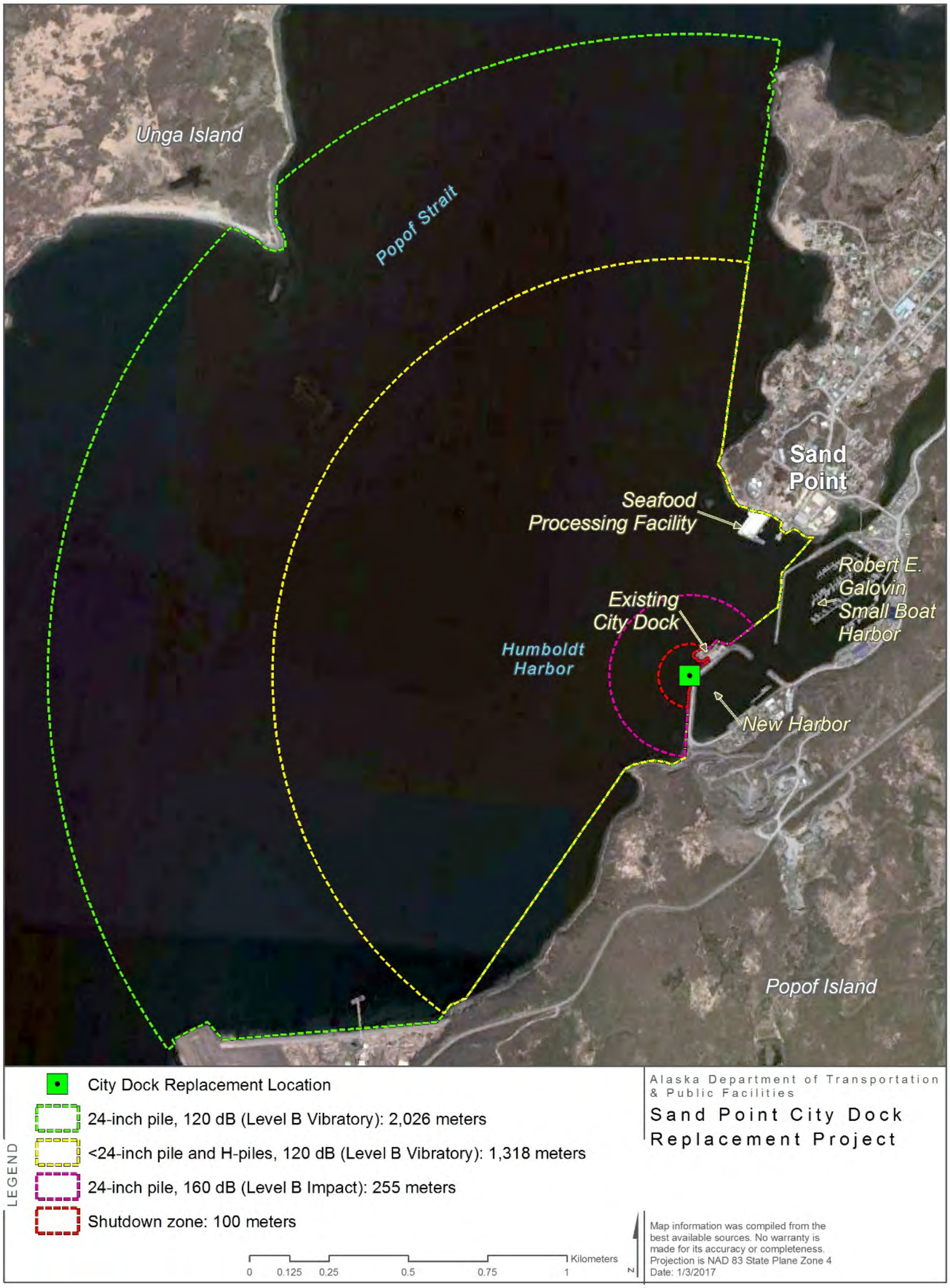

Figure 2-2. Underwater distances to Level B harassment thresholds for all marine mammals during vibratory and impact installation of 24-inch piles, <24-inch piles, and H-piles

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Figure 2-3. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of one 30-inch pile per day

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Figure 2-4. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of two 30-inch piles per day

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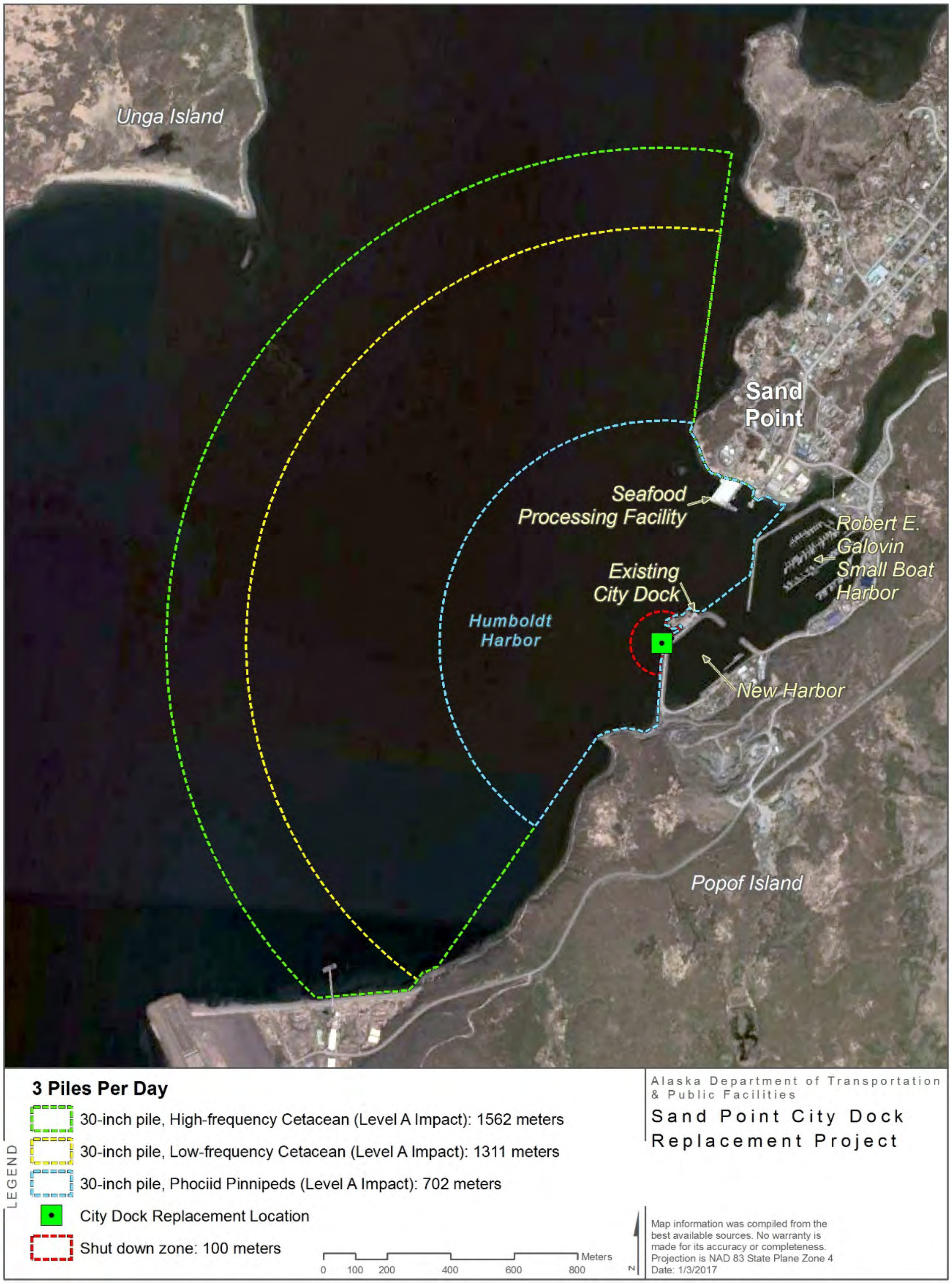

Figure 2-5. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of three 30-inch piles per day

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Figure 2-6. Underwater distances to the Level A harassment thresholds for phocid pinnipeds and low- and high-frequency cetaceans during impact installation of four 30-inch piles per day

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3.0 MARINE MAMMAL MONITORING

To minimize impacts of Project activities on marine mammals, two or more Protected Species Observers (PSOs) would be present during vibratory and impact pile installation. PSOs would search for, monitor, document, and track marine mammals around and within the Level A and Level B harassment zones (Figures 2-1 through 2-6). It should be noted that the titles Protected Species Observer and Marine Mammal Observer are intended to be synonymous for consultation, documentation, and construction purposes.

3.1 Monitoring Overview

PSOs would begin observations of the appropriate harassment zones 30 minutes prior to the start of pile installation, and would continue to observe for 20 minutes after completion of pile installation. During monitoring, the PSO would scan the water every few minutes with high-quality binoculars, and would use the naked eye to scan during the remainder of the time. A high-powered spotting scope would also be available for scanning greater distances, so that any marine mammals swimming toward the harassment zones could be observed.

PSOs would have no other construction-related tasks or responsibilities while monitoring for marine mammals. Each PSO would be trained in marine mammal identification and behaviors, and provided with reference materials to ensure standardized and accurate observations and data collection.

Before construction commences, PSOs would meet with the Contractor and DOT&PF to determine the most appropriate observation location(s) for monitoring during pile installation and removal. If necessary, observations may occur from two locations simultaneously. Potential observation locations include the existing City Dock, the airport, the fish processing facility, or the hillside located south of the project site. Considerations would include:

- Ability to see the harassment zones and maximize field of view
- Elevation and location
- Safety of the PSOs, construction crews, and other people present during construction
- Minimal interference with construction activities

A clear authorization and communication system would be in place to ensure that both PSOs and the construction crew understand their respective roles and responsibilities. It is generally expected that if pile installation must be powered down or shut down to avoid take, the PSO would contact a designated member of the construction crew. PSOs and the construction manager would be equipped with a hand-held radio and/or phone, to ensure immediate communication of a shutdown. A “shutdown” is defined as a period of time when in-water noise from pile installation does not occur. All communications with the construction crew would be documented in the environmental conditions and construction activities log (Section 3.3.1). Although it is the role of the PSOs to watch for marine mammals, DOT&PF construction personnel would be instructed to notify the PSOs immediately if they observe a marine mammal.

Specific aspects and protocols of marine mammal observations would also include:

- Monitoring distances would be measured with range finders.
- Distances to animals would be based on the best estimate of the PSO, relative to known distances to objects in the vicinity and the use of the range finder.
- Bearings to animals would be determined by using a compass.
- Pre-Activity Monitoring:
  - The Level A and Level B harassment zones would be monitored for 30 minutes prior to in-water pile installation.
  - If a marine mammal is present within the Level A harassment zone, ramping up and pile installation would be delayed until the animal(s) leaves the zone. Activity would begin only after the PSO has determined that, through sighting, the animal(s) has moved outside the Level A harassment zone.
  - If any marine mammal other than Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales, humpback whales, fin whales, gray whales and minke whales are present in the Level B harassment zones, ramping up and pile installation would be delayed until the animal(s) leaves the zone. Ramping up and pile installation would begin only after the PSO has determined that, through sighting, the animal(s) has moved outside the harassment zone.
  - If a marine mammal for which Level B take has been requested (i.e., Steller sea lion, harbor seal, harbor porpoise, killer whale, humpback whale, fin whale, gray whale, or minke whale) is within the Level B harassment zone, pile installation may begin with Level B take documented.
- During-Activity Monitoring:
  - Level B Harassment Zone
    - Pile installation may continue if a marine mammal for which Level B take has been authorized enters the Level B harassment zone and if a Level B take is documented. If Level B take reaches the authorized limit, then pile installation would be stopped as these species approach to avoid additional take of these species.
    - Pile installation would be stopped if a marine mammal for which take is not authorized approaches the Level B harassment zone, prior to the marine mammal entering the Level B harassment zone.
  - Level A Harassment Zone
    - Pile installation will stop for all marine mammals approaching their respective Level A harassment zones.
    - If a marine mammal enters its respective Level A harassment zone, all pile installation or removal will cease and Level A take will be documented.
- Post-Activity Monitoring:

- Monitoring of the Level A and Level B harassment zones would continue for 20 minutes following the completion of pile installation or removal.

3.2 Marine Mammal Observer Qualifications

At a minimum, all PSOs must be capable of spotting and identifying marine mammals and documenting applicable data during all types of weather, including rain, sleet, snow, and wind. All PSOs must also be comfortable with handling the authority to stop work when necessary.

Qualifications would include:

- Lead PSOs would have previous PSO experience which includes authorization of shutdown zones.
- Visual acuity in both eyes (correction is permissible) sufficient to allow detection and identification of marine mammals at the water's surface. Use of binoculars may be necessary to correctly identify the target to species.
- Demonstrated ability to conduct field observations and collect data according to assigned protocols (this may include academic training), including the ability to use a range finder and compass accurately to determine distances to marine mammals.
- Ability to work in cold, wet weather, including sleet, wind, snow, and rain.
- Experience or training in field identification of marine mammals. Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
- Ability to communicate orally, by radio or in person, with project personnel about marine mammals observed in the area.
- Ability to collect the required marine mammal observation data as detailed in Section 3.3.

3.3 Data Collection

3.3.1 Environmental Conditions and Construction Activity

The PSOs would also document environmental conditions, types of construction activities, types of nearby commercial activities, and any communications with the construction crew in the environmental conditions and construction activities log. Environmental conditions would be documented at the beginning and end of every monitoring period and every half hour, or as conditions change. Any nearby commercial activities that could influence marine mammal behavior would be documented at the time of a marine mammal sighting. These could include the presence and number of vessels offloading at the seafood processing facility or the number and type of vessels present. Data collected would also include the PSOs' names; location of the observation station; time of observation; wave height; wind speed; amount and position of glare; weather conditions; and visibility (Table 3.1).

The PSOs would document the time of startup or ramping up (Section 4.2) as well as shutdown. The PSOs would also document the reason for stopping work, time of shutdown, and type of pile driving or other in-water work taking place. Additionally, all communications between a PSO and the construction crew would be documented.

Data collected regarding environmental conditions, marine mammal sightings, and mitigation measures would be entered into a spreadsheet. Each data entry would be checked for quality assurance and quality control. Upon request, the data would be submitted to NMFS along with the final monitoring report.

3.3.2 Sightings

Each marine mammal sighting would be documented on a sighting form, which consists of a data page/table and a map of where the marine mammal was observed (Attachment 1). Alternatively, data can be collected using a laptop, tablet or similar electronic device that is protected from wet weather. Regardless of the collection platform, data would consist of start and end times of each sighting; number of individuals; sex and age class, if possible; behavior and movement; distances from Project activities to the sighting; type of in-water activity at the time of sighting; and if and when Project activities were stopped in response to the sighting (Table 3.1). Monitoring distances would be measured with range finders. PSOs would record if Level A and/or Level B take occurred, including the number of animals and species taken. To the extent practicable, the PSOs would record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of Project activities over the course of a single day. While monitoring and tracking a sighting, PSOs would also continue to sweep the water with binoculars and the naked eye to identify other marine mammals potentially entering the area. These data would be submitted to NMFS as part of the final monitoring report.

Table 3.1. Data attributes and definitions

Data Attribute	Attribute Definition and Units Collected
Start and End time of monitoring period	Time monitoring by PSOs began and ended, without interruption.
Environmental Conditions	
Weather conditions	Dominant weather conditions, collected every 30 minutes: sunny (S), partly cloudy (PC), light rain (LR), steady rain (R), fog (F), overcast (OC), light snow (LS), snow (SN)
Wind speed	In knots
Wind direction	From the north (N), northeast (NE), east (E), southeast (SE), south (S), southwest (SW), west (W), northwest (NW)
Wave height	Calm, ripples (up to 4 inches), small wavelets (up to 8 inches), large wavelets (up to 2 feet), small waves (up to 3 feet), moderate waves (up to 6 feet), large waves (up to 9 feet)
Cloud cover	Amount of cloud cover (0–100%)
Visibility	Maximum distance at which a marine mammal could be sighted
Glare	Amount of water obstructed by glare (0–100%) and direction of glare (from south, north, etc.)
Tide	Predicted hourly data information gathered from National Oceanic and Atmospheric Administration will be available on site
Construction and Communication Activities	
Time of event	Time that construction activities and all communications between PSOs and construction crews take place
Type of construction activity	Type of construction activity occurring, including ramp up, startup, shutdown, and type of pile installation technique
Communication	Information communicated between PSOs and construction crew
Marine Mammal Sighting Data	
Time of initial and last sighting	Time the animals are initially and last sighted
Number of individuals	Minimum and maximum number of animals counted; record the count the Wildlife Observer believes to be the most accurate
Sex and age, if possible	Generally, numbers of females with pups or calves
Initial and final heading	Direction animals are headed when initially and last sighted
In-water construction activities at time of sighting	Type of construction activities occurring at time of sighting
Distance from marine mammal to construction activities	Distance from marine mammal to construction activities when initially sighted, closest approach to activities, and final sighting
Commercial activities at time of sighting	Description of nearby commercial activities occurring at time of sighting, such as presence and number of vessels offloading at seafood processing facility dock, number and type of vessels near by
Behavior	Behaviors observed, indicating the primary and secondary behaviors
Change in behavior	Changes in behavior; indicate and describe
Group cohesion	Orientation of animals within the group and the distance between animals

4.0 MITIGATION MEASURES

The DOT&PF proposes to employ mitigation measures to minimize the number of marine mammals potentially affected by the Project. Mitigation measures discussed here would include those that pertain to Level A and Level B harassment zones for pile installation, and those that involve observation of marine mammals and actions designed specifically to minimize the number of marine mammal takes in the immediate Project area.

4.1 Harassment Zones

Modeling results for Level A and Level B harassment zones discussed in the IHA were used to develop mitigation measures for pile installation activities. These include:

- A conservative shutdown zone of 100 meters would be used during monitoring to avoid incidental Level A exposure to most species. During vibratory installation of 30-inch piles and vibratory and impact installation of 24-inch piles, piles under 24 inches, and H-piles, a 100-meter shutdown zone would avoid Level A take of all marine mammals. A 100-meter shutdown zone would also be sufficient to avoid Level A take of mid-frequency cetaceans and otariid pinnipeds (i.e., Steller sea lions) during impact installation of 30-inch piles. However, during impact installation of 30-inch piles, a 100-meter shutdown zone would *not* be sufficient to prevent Level A take of low-frequency cetaceans (e.g., humpback whales), high-frequency cetaceans (e.g., harbor porpoises), or phocid pinnipeds (i.e., harbor seals). For this reason, we have requested Level A take for small numbers of harbor seals, harbor porpoises, and humpback whales.
- Level A take is requested for harbor seals, harbor porpoises, and humpback whales. To the extent possible, Level A take would be avoided by shutting down pile installation or removal prior to any marine mammal entering a Level A harassment zone. Level A take is requested for the above species because the sizes of the Level A harassment zones and the low conspicuity of the animals increases the likelihood of inadvertent exposure to Level A thresholds. Level A take for all other marine mammals would be avoided by shutting down activity before individuals enter the shutdown zone.
- During impact installation of 30-inch piles, the Level B harassment zone shall extend to 1,905 meters for all marine mammals. During impact installation of 24-inch piles, the Level B harassment zone shall extend to 255 meters for all marine mammals. For marine mammals for which Level B take has not been requested or authorized, impact pile installation would shut down prior to marine mammals entering the Level B harassment zone.
- During vibratory installation of 30-inch piles, the Level B harassment zone shall extend to 7,356 meters for all marine mammals. During vibratory installation of 24-inch piles, the Level B harassment zone shall extend 2,026 meters for all marine mammals. During vibratory installation and removal of piles less than 24 inches in diameter, the Level B harassment zone shall extend 1,318 meters for all marine mammals. For marine mammals for which Level B take has not been requested or authorized, vibratory pile installation would shut down prior to marine mammals entering the Level B harassment zone.
- The Level A and Level B harassment zones would be monitored during all pile installation and removal, as well as 30 minutes before installation/removal begins and 20 minutes after installation/removal is completed. If a Steller sea lion, harbor seal, harbor

porpoise, Dall's porpoise, killer whale, humpback whale, fin whale, gray whale, or minke whale is observed entering the Level B harassment zone, a Level B exposure would be recorded and behaviors documented. That pile segment would be completed without cessation, unless the animal approaches the 100-meter shutdown zone. Pile installation would be halted before the animal enters the 100-meter shutdown zone.

4.2 Starting Up and Ramping Up

At the beginning of the work day or when pile installation activities have been stopped for longer than 30 minutes, ramping up procedures would be implemented when the impact pile installation technique is used. Ramping up generally involves starting the equipment for brief durations to provide marine mammals in the vicinity of a construction site with an audible warning of impending noise, giving them the opportunity to leave the area before noise reaches the threshold of disturbance.

Each day before in-water pile installation begins, the PSOs would search the Level A and Level B harassment zones for 30 minutes to locate any marine mammals. If a marine mammal is present within the Level A harassment zone, ramping up or pile installation would not begin. If a marine mammal for which Level B take is not authorized is present within the Level B harassment zone, ramping up or pile installation would not begin. If a Steller sea lion, harbor seal, harbor porpoise, Dall's porpoise, killer whale, humpback whale, fin whale, gray whale, or minke whale is present within the Level B harassment zone, ramping up may be authorized to begin and a Level B take would be recorded for each individual marine mammal. Alternatively, to avoid Level B take, ramping up would be delayed until the marine mammal has been observed leaving the Level B harassment zone or no marine mammals have been observed within the Level B more than 30 minutes.

Ramping up would be accomplished by an initial set of three strikes, followed by a 30-second waiting period, and then followed by two subsequent three-strike sets. Ramping up is not required for vibratory pile installation.

If pile installation is stopped for more than 30 minutes, work may be started again after the above ramping-up procedures are followed for impact pile installation.

Ongoing in-water pile installation may be continued during periods when conditions such as low light, darkness, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone, provided both the in-water noise-generating activity and marine mammal monitoring continues (acknowledging that monitoring would occur at a reduced level of effectiveness). A PSO would continue to monitor the visible portion of the Level B harassment zone throughout the duration of activities producing in-water noise. Pile installation would not be initiated or ramped up from a "shutdown condition" when the complete Level B harassment zone is not visible for a continuous 30-minute pre-operational monitoring period (whether due to darkness, low light, high sea state, fog, ice, heavy rain, glare, or other conditions). A shutdown condition is defined as a duration of 30 minutes or more when in-water noise from pile installation does not occur.

5.0 REPORTING

A draft report would be submitted to NMFS within 90 calendar days of the completion of marine mammal monitoring. A final report would be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS. To the extent practicable, the PSOs would record behavioral observations that may make it possible to determine if the same or different individuals are being “taken” as a result of Project activities over the course of a single day.

In general, reporting would include:

a. Numbers of days of observations

b. Lengths of observation periods

c. Locations of observation station(s) used and dates of when each location was used

d. Numbers, species, dates, group sizes, and locations of marine mammals observed

e. Descriptions of work activities, categorized by type of work taking place during monitoring

f. Distances to marine mammal sightings, including closest approach to construction activities and if Level A or Level B take occurred.

g. Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones

h. Actions performed to minimize impacts to marine mammals

i. Times of shutdown events including when work was stopped and resumed due to the presence of marine mammals or other reasons

j. Refined take estimates based on the numbers of Steller sea lions, harbor seals, harbor porpoises, Dall’s porpoises, killer whales, humpback whales, fin whales, gray whales and minke whales observed during the course of pile installation activities

k. Descriptions of the type and duration of any pile installation work occurring and ramp-up procedures used while marine mammals were being observed

l. Details of all shutdown events, and whether they were due to presence of marine mammals, inability to clear the hazard area due to low visibility, or other reasons

m. Summary of non-Project related activities (including vessel traffic), tables, text, and maps to clarify observations

Full documentation of monitoring methods, an electronic copy of the data spreadsheet, and a summary of results would also be included in the report.

If a marine mammal stranding is observed, NMFS or the U.S. Fish and Wildlife Service would be contacted immediately through the Alaska Marine Mammal Stranding Hotline (1-877-925-7773).

Attachment 1: Example Data Forms

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Marine Mammal Sighting Form

Project: **Location:** **Sighting #:**
(1st sighting of the day is Sighting#: 1)

Date: **Observer(s):**

Time *(military)*		**Species** *(circle)*	**Distance** *(animal to activity)*		**Number of Animals**		**Number of Animals in Each Class** *(if possible)*			
Initial Sighting Time		Steller Sea Lion	Initial Distance		Min Count		Adults		Calves/ Pups	
Final Sighting Time		Harbor Seal								
Time Entered H-Zone B		Harbor Porpoise	Closest Distance		Max Count		Juveniles		Unkn. Age	
Time Exited H-Zone B		Dall's Porpoise								
Time Entered H-Zone A		Killer Whale	Final Distance		Best Count		Male		Female	
Time Exited H-Zone A		Humpback					Unknown Sex			
		Fin Whale								
		Gray Whale								
		Minke Whale								
		other: _________								

Behavior of Marine Mammal check all observed behaviors; place a 1 next to primary, 2 next to secondary activity):
Indicate any changes in behavior in the Additional Information section

__ Travel __ Fight __ Mill Other:______________________
__ Disoriented __ Play __ Dive
__ Slap __ Spyhop __ Unknown
__ Feeding Observed __ Swimming Toward __ Swimming Away from Site

Group Cohesion (Orientation of animals within the group and the approx. distance between animals) :

Project Activities and Harassment Zone

Entered Harassment Zone A? Y or N **Entered Harassment Zone B?** Y or N

In-Water Work was occuring at initial sighting? Y or N **List In-water Activites:**______________________

SHUT DOWN or **DELAYED** from _________ to _________ (time)

NO SHUT DOWN, *EXPLANATION REQUIRED*:

Describe Commerical Activities (# and type of vessels offloading at sea food processing dock, traveling by, refueling at dock):

Additional Information (include more detailed information on behavior):

Draw locations on hardcopy map

Daily Environmental Conditions, Construction, and Communication Activity Log

Page _____ of _____

Project:______________________ Location:_________________ Observer(s):___________ Date: __________

Environmental Conditions (Recorded every 30 minutes or as conditions change)									Construction and Communication Activities *(include all start up and shut-down activities and all communication to construction crew)*		
Time	Weather Conditions	Wind Speed	Wind Direction	Beaufort Sea State	Glare (%)	Visibility (m)	Cloud Cover (%)	Comments	Time	Type of Construction Activity *(Ramp up, Startup, shutdown, type of pile driving)*	Communication/Comments

Weather Conditions: (S) Sunny, (PC) Partly Cloudy, (L) Light Rain, (R) Steady Rain, (F) Fog, (OC)Overcast, (LS) Light Snow, (SN) Snow

Beaufort Scale: (0) Calm (1) ripples- up to 4 in (2) small wavelets- up to 8 in (3) large wavelets- up to 2 ft, (4) small waves- up to 3 ft (5) moderate waves- up to 6 ft (6) large waves- up to 9 ft