Application for Marine Mammal Protection Act Incidental Harassment Authorization

Hydaburg Seaplane Base Refurbishment Project

State Project #: SFAPT00328

Submitted to:
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Acronyms and Abbreviations

ADF&G	Alaska Department of Fish and Game
dB	decibels
dBA	A-weighted decibels
DOT&PF	Alaska Department of Transportation and Public Facilities
DPS	Distinct Population Segment
DTH	down-the-hole
eDPS	eastern Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FR	*Federal Register*
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
LOA	Letter of Authorization
µPa	microPascals
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Pa	Pascals
PTS	permanent threshold shift
rms	root mean square
SEL	sound exposure level
SEL_{cum}	cumulative Single Strike Equivalent
SPL	sound pressure level
SSL	sound source level
TL	transmission loss
TTS	temporary threshold shift
USFWS	U.S. Fish and Wildlife Service
wDPS	western Distinct Population Segment

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1 DESCRIPTION OF SPECIFIED ACTIVITY

1.1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Alaska Division of the Federal Aviation Administration, is proposing maintenance improvements to the existing Hydaburg Seaplane Base as part of the Hydaburg Seaplane Base Refurbishment Project (Project). The in-water portion of the Project includes removal of five existing steel piles and installation of eight permanent steel piles to support replacement of the floating dock structure. Up to 10 temporary steel piles will be installed to support permanent pile installation and will be removed following completion of permanent pile installation. In addition, above-water construction will include repairs to the vehicle gangway and installation of an electrical lighting system for the approach and the new floating dock.

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) regulations governing the issuance of Incidental Harassment Authorizations (IHAs) and Letters of Authorization (LOAs) permitting the incidental take of marine mammals under certain circumstances are codified in 50 Code of Federal Regulations 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 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, Duration, and Specified Geographic Region
3. Species and Numbers of Marine Mammals
4. Affected Species Status and Distribution
5. Type of Incidental Taking Authorization Requested
6. Take Estimates for Marine Mammals
7. Anticipated Impact of the Activity
8. Anticipated Impacts on Subsistence Uses
9. Anticipated Impacts on Habitat
10. Anticipated Effects of Habitat Impacts on Marine Mammals
11. Mitigation Measures to Protect Marine Mammals and Their Habitat
12. Mitigation Measures to Protect Subsistence Uses
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 Need

Hydaburg is located on Prince of Wales Island, approximately 76 kilometers (47 miles) west of Ketchikan, in Southeast Alaska (Figure 1-1). The Hydaburg Seaplane base is located at the south end of Hydaburg, attached to the Hydaburg city dock on the north shore of the Sukkwan Strait. (Figure 1-2). The existing facility has experienced deterioration in recent years, and DOT&PF has conducted several repair projects. The facility is near the end of its useful life, and replacement of the existing float structures is required to continue safe operation in the future.

The following project description and engineering plan drawings (see Appendix A) are preliminary and may change as engineering and design progress. Actual numbers and sizes of piles, installation times, numbers of impact strikes, and other design and construction details and methods may vary slightly from the estimates outlined in this document. Descriptions of design and construction in this document are as accurate as possible at this stage of the Project but may vary slightly as design and construction advances. It is not anticipated that the Project will change such that potential impacts on marine mammals will change or vary from those described below. If substantial changes to design and construction occur, the DOT&PF will inform NMFS of those changes.

Figure 1-1. Site Location and Vicinity

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Figure 1-2. Location of Seaplane Base in Hydaburg, Alaska

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1.3 Project Activities

Proposed activities included as part of the Project with potential to affect marine mammals include the noise generated by vibratory removal, down-the-hole (DTH) installation, and vibratory and impact installation of steel pipe piles. Such in-water activities could result in harassment to marine mammals as defined under the MMPA of 1972, as amended in 2007 (16 United States Code 31). The proposed pile installation and removal are described in detail in the following section.

In this IHA application, the units of measure reported for construction activities are U.S. customary units, which are typically used in construction. Units of measure for scientific information, including acoustics, are metric.

1.3.1 Pile Removal and Installation

The Project will involve the removal of five existing cantilever steel pipe piles (16-inch diameter) that support the existing multiple-float structure. The multiple-float timber structure, which covers 4,000 square feet, will also be removed. A new 4,800-square-foot single-float timber structure will be installed in the same general location. Four 24-inch and four 20-inch permanent steel pipe piles will be installed vertically to act as restraints for the new seaplane float. Up to 10 temporary 24-inch steel pipe piles will be installed to support pile installation and will be removed following completion of construction. Rock sockets and tension anchors will be required on all 24-inch piles and two 20-inch piles. Rock sockets will also be potentially required on five of the temporary piles.

DTH pile installation involves drilling rock sockets into the bedrock to support installation of piles. A rock socket is a pile inserted into a drilled hole in the underlying bedrock after the pile has been driven through the overlying softer sediments to refusal by vibratory or impact methods. The pile is advanced farther into the drilled hole to properly secure the bottom portion of the pile into the rock. The depth of the rock socket varies, but up to 20 feet may be required for this Project. The diameter of the rock socket is slightly larger than the pile being driven. Rock sockets are constructed using a DTH device that consists of a drill bit that drills through the bedrock using both rotary and percussion mechanisms. This breaks up the rock to allow removal of the fragments and insertion of the pile. The pile is advanced at the same time that drilling occurs. Drill cuttings are expelled from the top of the pile using compressed air. It is estimated that drilling rock sockets into the bedrock may take up to 8 hours per pile; however, an average of 4 hours has been used to calculate days of construction, and durations up to 8 hours were used to calculate Level A zone sizes.

Tension anchors will be installed in six of the permanent piles (four 24-inch and two 20-inch piles). Tension anchors are installed within piles that are drilled into the bedrock below the elevation of the pile tip after the pile has been driven through the sediment layer to refusal. A 6- or 8-inch-diameter steel pipe casing will be inserted inside the larger diameter production pile. A rock drill will be inserted into the casing, and a 6- to 8-inch-diameter hole will be drilled into bedrock with rotary and percussion drilling methods. The drilling work is contained within the steel pile casing and the steel pipe pile. The typical depth of the drilled tension anchor hole varies, but 20–30 feet is common. Rock fragments will be removed through the top of the casing with compressed air. A steel rod will then be grouted into the drilled hole and affixed to the top of the pile. The purpose of a tension anchor is to secure the pile to the bedrock to withstand uplift forces. It is estimated that tension anchor installation will take about 1–4 hours per pile. Table 1-1 indicates the expected number and locations where tension anchors are required. Figure 1-3 depicts a schematic of DTH pile installation and tension anchor installation

techniques. Throughout this document, DTH pile installation generally refers to both rock socket drilling and tension anchor installation, unless specified.

Pile removal will be conducted using a vibratory hammer. Pile installation will be conducted using both a vibratory and an impact hammer and DTH pile installation methods. Piles will be advanced to refusal using a vibratory hammer. After DTH pile installation, the final approximately 10 feet of driving will be conducted using an impact hammer so that the structural capacity of the pile embedment can be verified. The pile installation methods used will depend on sediment depth and conditions at each pile location. Pile installation and removal will occur in waters approximately 6–7 meters (20–23 feet) in depth. Plan drawings of all Project components are provided in Appendix A.

Table 1-1. Numbers and Types of Piles to be Installed and Removed

Pile Diameter and Type	Number of Piles	Rock Sockets	Tension Anchors	Impact Strikes per Pile (duration in minutes)	Vibratory Duration per Pile, minutes	Rock Socket DTH Pile Installation, Duration per Pile, minutes (range)	Tension Anchor DTH Pile Installation, Duration per Pile, minutes (range)	Total Duration of Activity per Pile, hours	Typical Production Rate in Piles per Day (range)	Days of Installation or Removal
Pile Installation										
24" Steel Plumb Piles (Permanent)	4	4	4	50 (30)	15	240 (60–480)	120 (60–240)	6.75	0.5 (0–1)	8
20" Steel Plumb Piles (Permanent)	4	2	2	50 (30)	15	240 (60–480)	120 (60–240)	0.75 / 6.75*	0.5 (0–1)	8
24" Steel Piles (Temporary)	10	5	N/A	N/A	15	240 (60–480)	N/A	4.25	2.5 (1–10)	4
Pile Removal										
16" Steel Cantilevered Piles	5	N/A	N/A	N/A	30	N/A	N/A	0.5	2.5 (2–4)	2
24" Steel Piles (Temporary)	10	N/A	N/A	N/A	30	N/A	N/A	0.5	2.5 (2–4)	4
TOTALS	**23**	**11**	**6**	N/A	N/A	N/A	N/A	N/A	N/A	**26**

Note: DTH = down-the-hole; N/A = not applicable

* Two of the 20-inch plumb piles will include vibratory and impact installation in addition to rock sockets and tension anchors, estimated at 6.75 hours duration total, and two will only use vibratory and impact, estimated at 0.75 hours duration total.

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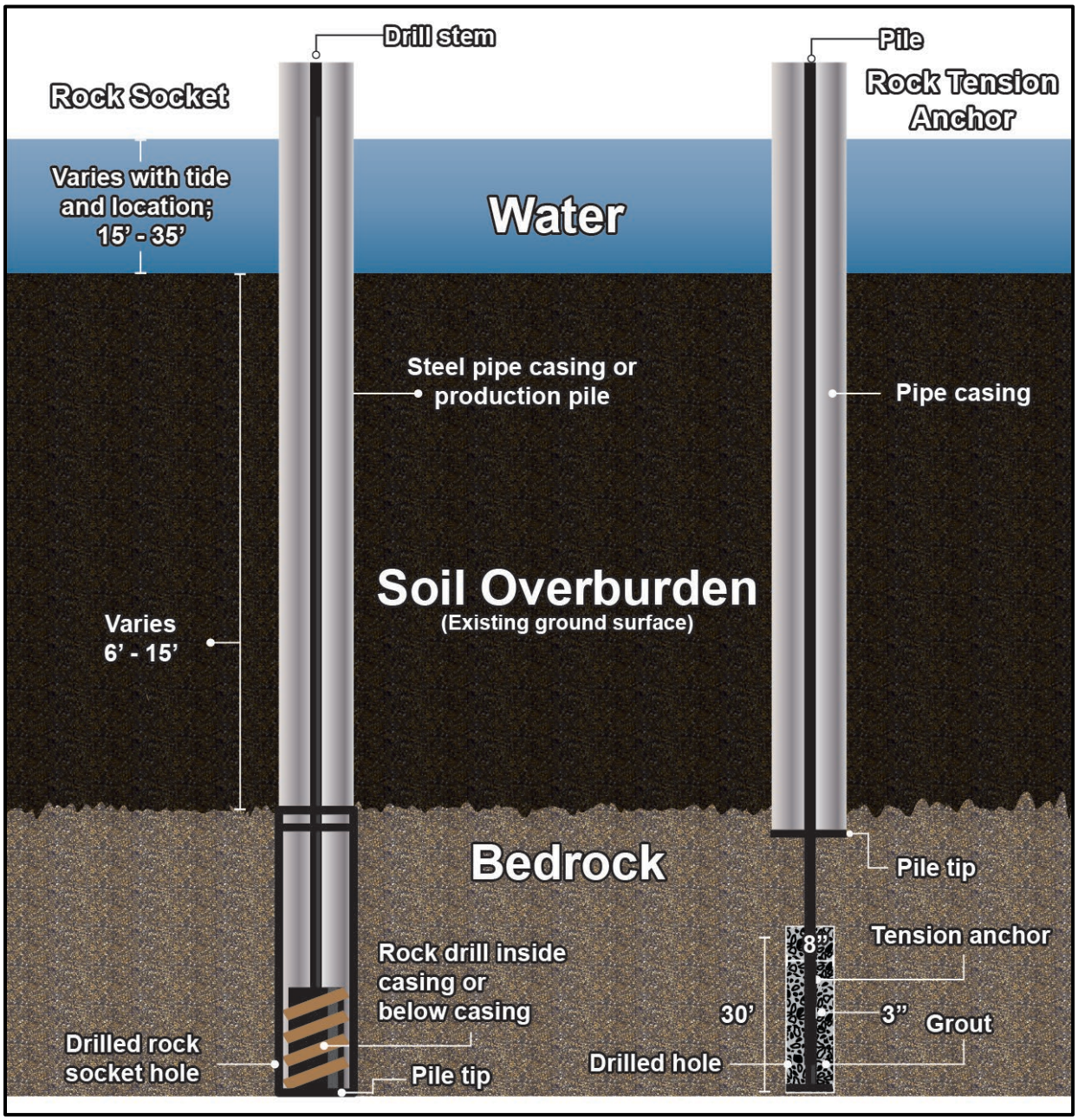

Figure 1-3. Schematic of DTH Pile Installation Method and Tension Anchor Installation

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1.3.2 Above-water Activities

The existing gangway and timber floats will be replaced. An electrical lighting system will be installed on the approach and seaplane float.

1.4 Applicable Permits/Authorizations

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

- U.S. Army Corps of Engineers Section 10 of the Rivers and Harbors Act of 1899
- Section 404 of the Clean Water Act
- Section 401 of the Clean Water Act
- NMFS Endangered Species Act (ESA) Section 7 Consultation
- MMPA Incidental Harassment Authorization
- Magnuson-Stephens Fishery Conservation and Management Act Essential Fish Habitat Consultation

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2 DATES, DURATION, AND SPECIFIED GEOGRAPHIC REGION

2.1 Dates and Durations of Activities

Construction of the Project is anticipated to occur over approximately 2 months beginning in early fall 2023. Pile installation and removal will be intermittent during this period, depending on weather, construction and mechanical delays, protected species shutdowns, and other potential delays and logistical constraints. Pile installation will occur intermittently during the work period for durations of minutes to hours at a time. Pile installation and removal will occur over 26 non-consecutive days within the 2-month construction window. To account for potential Project delays, the IHA is requested for 1 year, from 01 September 2023 through 31 August 2024.

2.2 Geographical Setting

The Project site is located within Section 7 and 12, Township 77 South, Range 83 East of the Copper River Meridian; United States Geological Survey Quad Map Craig A-3 NE; Latitude 55° 12' 22.738" North, 132° 49' 41.927" West. The Project site is located in the City of Hydaburg, on Prince of Wales Island, in the Prince of Wales-Hyder U.S. Census Area of Southeast Alaska.

2.2.1 Physical Environment

Hydaburg is located north of Cordova Bay, along the Sukkwan Strait on the southwest side of Prince of Wales Island. A series of passes and straits lead to the open Pacific Ocean; however, Hydaburg is tucked in a relatively calm and secluded area. Sukkwan Strait is generally characterized by semidiurnal tides with mean tidal ranges of around 5 meters (16 feet). Freshwater inputs to Sukkwan Strait include multiple anadromous streams: Hydaburg River, Saltery Creek, and two streams originating from unnamed lakes. The bathymetry of the bay is variable depending on location and proximity to shore, islands, or rocks. Depths approach 250 feet within Sukkwan Strait and up to 120 feet in South Pass.

2.2.2 Acoustic Environment

Ongoing vessel activities near Hydaburg, as well as land-based industrial and commercial activities, result in elevated in-air and underwater acoustic conditions in the Project area that likely increase with proximity to the Project site. Background sound levels likely vary seasonally, with elevated levels during summer when the commercial and fishing industries are at their peaks. Hydaburg has no cruise ship or ferry facilities, so only commercial and fishing vessels visit Hydaburg regularly (Miller et al. 2019).

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3 SPECIES AND NUMBERS OF MARINE MAMMALS

The following nine species could occur in the Project area: Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), Northern elephant seal (*Mirounga angustirostris*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), and minke whale (*Balaenoptera acutorostrata*; Table 3-1). The Alaska Protected Resources Division of NMFS provides an online interactive mapping tool to identify species protected by the MMPA based on broadly generalized species ranges (NOAA 2018). This tool identified eight of the species listed above, as well as gray whales (*Eschrichtius robustus*). In addition, sperm whales (*Physeter macrocephalus*), which are usually restricted to deep waters of the continental slope in the Gulf of Alaska, have occurred in northern Southeast Alaska in recent years. However, it is highly unlikely that gray or sperm whales will occur in the Project area; recent NMFS IHAs for activities near Hydaburg have not included these species, and therefore they are not discussed further in this document. Northern elephant seals have been observed more regularly within Southeast Alaska in recent years (see Section 4.3.2) and are therefore included in these analyses. Additionally, northern sea otters (*Enhydra lutris kenyoni*), whose range includes areas near Hydaburg, are not expected to be near the Project area (S. Ibarra, personal communication, 25 February 2022) and are managed by the U.S. Fish and Wildlife Service (USFWS); therefore, sea otters are not discussed further in this application. Each of the marine mammal species that may occur in the Project area is discussed in more detail in Section 4.

When available, peer-reviewed scientific publications are used to quantitatively estimate marine mammal abundance in the Project area. However, scientific surveys and resulting data such as population estimates, densities, and other quantitative information are lacking for most marine mammal populations in Southeast Alaska. Therefore, qualitative information was gathered from discussions with knowledgeable local people in the Hydaburg community, including individuals familiar with marine mammals in the Project area. Information from the Metlakatla IHA (86 *Federal Register* [FR] 43190) was also used for animal group sizes and abundance due to similarities between the projects and locations. Throughout the following sections, the anecdotal reports refer to information obtained from discussions with these individuals. People who were interviewed include:

- Sonia Ibarra – PhD Candidate, University of Alaska Fairbanks
- Mark Knapp – Hydaburg Harbormaster
- Justin Fitch – DOT&PF Maintenance and Operations Foreman

A description of each species and its presence in the Project area is provided in Section 4.

Table 3-1. Marine Mammals Known to Occur in or near the Project Area

Species	Abundance (Population/Stock)		MMPA Designation	ESA Listing	Occurrence in Project Area
Steller sea lion	43,201[a] (Eastern DPS)		Protected	None	Uncommon
Harbor seal	23,478 (Dixon/Cape Decision Stock)		Protected	None	Common
Northern elephant seal	179,000 (California breeding stock)		Protected	None	Rare
Harbor porpoise	1,057 [a] (Southeast Alaska)		Strategic	None	Rare
Dall's porpoise	83,400 (Alaska)		Protected	None	Rare
Pacific white-sided dolphin	26,880 (North Pacific stock)		Protected	None	Rare
Killer whale (Orca)	2,347 [a] (Eastern North Pacific Alaska Resident)		Protected	None	Rare
	302 [a] (Northern Resident)		Protected	None	Rare
	349 [a] (West Coast Transient)		Protected	None	Rare
Gray whale	26,960 (Eastern North Pacific)		Protected	None	Unlikely[b]
Sperm whale	244 (North Pacific)		Depleted & Strategic	Endangered	Unlikely[b]
Humpback whale [c]	10,103 (Central North Pacific Stock)	11,398 (Hawaii DPS)	Protected	None	Common
		3,264 (Mexico DPS)	Protected	Threatened	Rare
Minke whale	Unknown (Alaska)		Protected	None	Rare

Sources: Humpback whale abundance estimates: Wade 2017. Gray whale abundance estimate: Carretta et al. 2018 All other abundance estimates: Muto et al. 2021

Note: DPS = Distinct Population Segment; ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act.

[a] Minimum population estimate (N_{min}).

[b] Excluded from further discussion in this IHA Application.

[c] NMFS considers humpback whales in Southeast Alaska to be part of the Central North Pacific stock, with a status of endangered under the ESA and designations of strategic and depleted under the MMPA (Muto et al. 2021). The current estimate of population size for the Central North Pacific stock is 10,103 humpback whales (Muto et al. 2021).

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 FR 49204); they were subsequently partitioned into the western and eastern Distinct Population Segments (wDPS and eDPS, respectively) in 1997 (Allen and Angliss 2010). The eDPS remained classified as threatened (62 FR 24345) until it was delisted in November 2013, while the wDPS (those individuals west of 144° W longitude or Cape Suckling, Alaska) was upgraded to endangered status following separation of the stocks, and it remains listed as endangered.

The majority of Steller sea lions that inhabit Southeast Alaska are part of the eDPS; however, branded individuals from the wDPS make regular movements across the 144° longitude boundary to the northern "mixing zone" haulouts and rookeries within southeast Alaska (Jemison et al. 2013). While haulouts and rookeries in the northern portion of Southeast Alaska may be important areas for wDPS animals, there continues to be little evidence that their regular range extends to the southern haulouts and rookeries in Southeast Alaska (Jemison et al. 2018). Further, wDPS use of southern Southeast Alaska haulouts and rookeries also appears to be limited to the outer coast, with very few wDPS animals entering into the "South Inside" region documented in Hastings et al. (2020). NMFS Protected Resources Division policy is that wDPS individuals are not typically found south of Sumner Strait (D. Gann, personal communication, 10 July 2020; NMFS 2020). Therefore, it is likely that only eDPS Steller sea lions are present as far south as the Project area.

The current minimum abundance estimate for the eDPS of Steller sea lions is 43,201 individuals (Muto et al. 2019). NMFS estimates that the eDPS stock increased in population at a rate of 4.76 percent per year between 1989 and 2015 based on pup counts in Southeast Alaska, British Columbia, Oregon, and California (Muto et al. 2019).

4.1.2 Presence in Project Area

Steller sea lions are not common in the Project area and systematic counts or surveys have not been completed in the area directly surrounding Hydaburg. The nearest documented haulout is Point Islet (Point Rock), about 13 kilometers (8.2 miles) southeast of Hydaburg (see Figure 4-1). No Steller sea lions were present during aerial surveys over Point Islet that occurred during 2013, 2015, or 2017 (Fritz et al. 2016b; Sweeney et al. 2017), and it was not surveyed in 2019 (Sweeney et al. 2019). Anecdotal evidence provided by local residents indicates that Steller sea lions are rare and do not occur regularly near the Project area. However, Steller sea lion presence could be higher during the late summer and early fall salmon runs. Due to a lack of local data and to remain conservative in our estimates, the Project estimates that a group of 10 Steller sea lions could transit the Project area every day.

4.1.3 Life History

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods, including Pacific herring (*Clupea pallasi*), walleye pollock (*Gadus chalcogramma*),

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). Steller sea lions do not generally eat every day, but tend to forage every 1–2 days and return to haulouts to rest between foraging trips (Merrick and Loughlin 1997; Rehberg et al. 2009).

4.1.4 Hearing Ability

Steller sea lions' hearing ability is comparable to that of other otariids. Steller sea lions use both in-air and underwater vocalizations during mating, competition for territory, and rearing of pups (Kastelein et al. 2005). Steller sea lion in-air hearing ability ranges from approximately 0.25 to 30 kilohertz (kHz); however, empirical studies have shown that the hearing of one individual was found to be most sensitive from 5 to 14.1 kHz. Underwater, Steller sea lions' most sensitive hearing range has been measured from 1 to 16 kHz in males and at 25 kHz in females (Muslow and Reichmuth 2010).

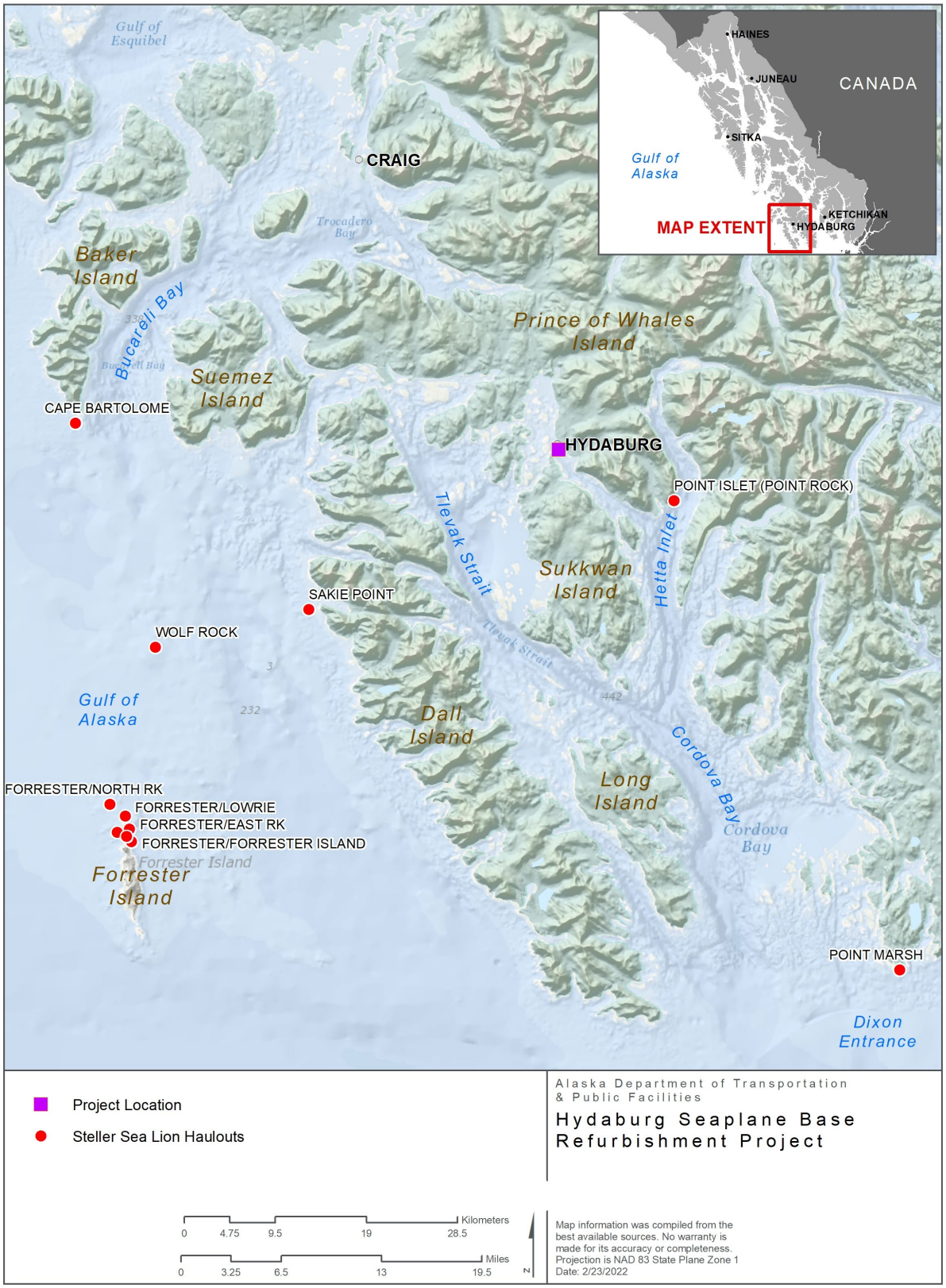

Figure 4-1. Steller Sea Lion Haulouts Located nearest to the Project Area

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4.2 Harbor Seal

4.2.1 Status and Distribution

Harbor seals range from Baja California north along the west coasts of California, Oregon, Washington, 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 are not designated as strategic or depleted under the MMPA and are not listed under the ESA, but like all other marine mammals, they are protected under the MMPA. 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 (Boveng et al. in press, as cited in Muto et al. 2018).

The Dixon/Cape Decision stock of harbor seals is present in the Project area. The most recent population estimate for this stock is 23,478 individuals (Muto et al. 2021). No other stocks of harbor seals are present in the Project area, so only the Dixon/Cape Decision stock is considered in this application.

4.2.2 Presence in Project Area

Harbor seals are commonly sighted in the waters of the inside passages throughout Southeast Alaska. The Muto et al. (2020) updates to the Dixon/Cape Decision stock indicate that surveys have been rarely carried out on this stock, with the last surveys taking place between 2007 to 2011 and 2015. The current 8-year estimate of the population trend is +142 harbor seals per year (Muto et al. 2020). The Alaska Fisheries Science Center identifies two “key” haulouts, or haulouts that have had 50 or more harbor seals documented during surveys, in Sukkwan Strait and four additional “not key” haulouts, those with fewer than 50 harbor seals documented during surveys, near the Project area (Figure 4-2; NOAA 2021). NMFS aerial survey data indicate that as few as 0 to as many as 157 harbor seals were sighted near the Project area during surveys between 2003 and 2011 (Areas BD28 and BD30, NOAA 2022). However, local residents report that only small numbers (two to four individuals) of harbor seals are regularly observed near Hydaburg. These individuals are generally observed near the small boat harbor outside of the Project area and during peak salmon runs in late summer and early fall. Harbor seals are known to be curious and may approach novel activity, so it is possible that some may enter the Project area during pile installation and removal. We estimate that up to eight harbor seals per day could be present in the Project Area during peak abundance.

4.2.3 Life History

Harbor seals forage on fish and invertebrates (Orr et al. 2004) including capelin, eulachon (*Thaleichthys pacificus*), 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 are locally and seasonally abundant (Payne and Selzer 1989). Depending on prey availability, research has demonstrated that harbor seals conduct both shallow and deep dives while foraging (Tollit et al. 1997). Harbor seals usually give birth to a single pup between May and mid-July; birthing locations are dispersed over several haulout sites and not confined to major rookeries (Klinkhart et al. 2008). Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice. They are non-migratory; their local movements are associated with tides, weather, season, food availability, and

reproduction, as well as sex and age class (Swain et al. 1996; Lowry et al. 2001; Boveng et al. 2012).

4.2.4 Hearing Ability

In general, phocids have a functional hearing range between approximately 50 Hertz (Hz) and 86 kHz, although it is most acute below 60 kHz (Møhl 1968). Harbor seals produce social calls at 0.5 to 3.5 kHz and clicks from 8 to 150 kHz (Richardson et al. 1995). Recent research by Kastelein et al. (2018) suggests that harbor seals may experience a temporary threshold shift (TTS) when exposed to broadband pile-driving noise, but that hearing is recovered within 60 minutes post-exposure.

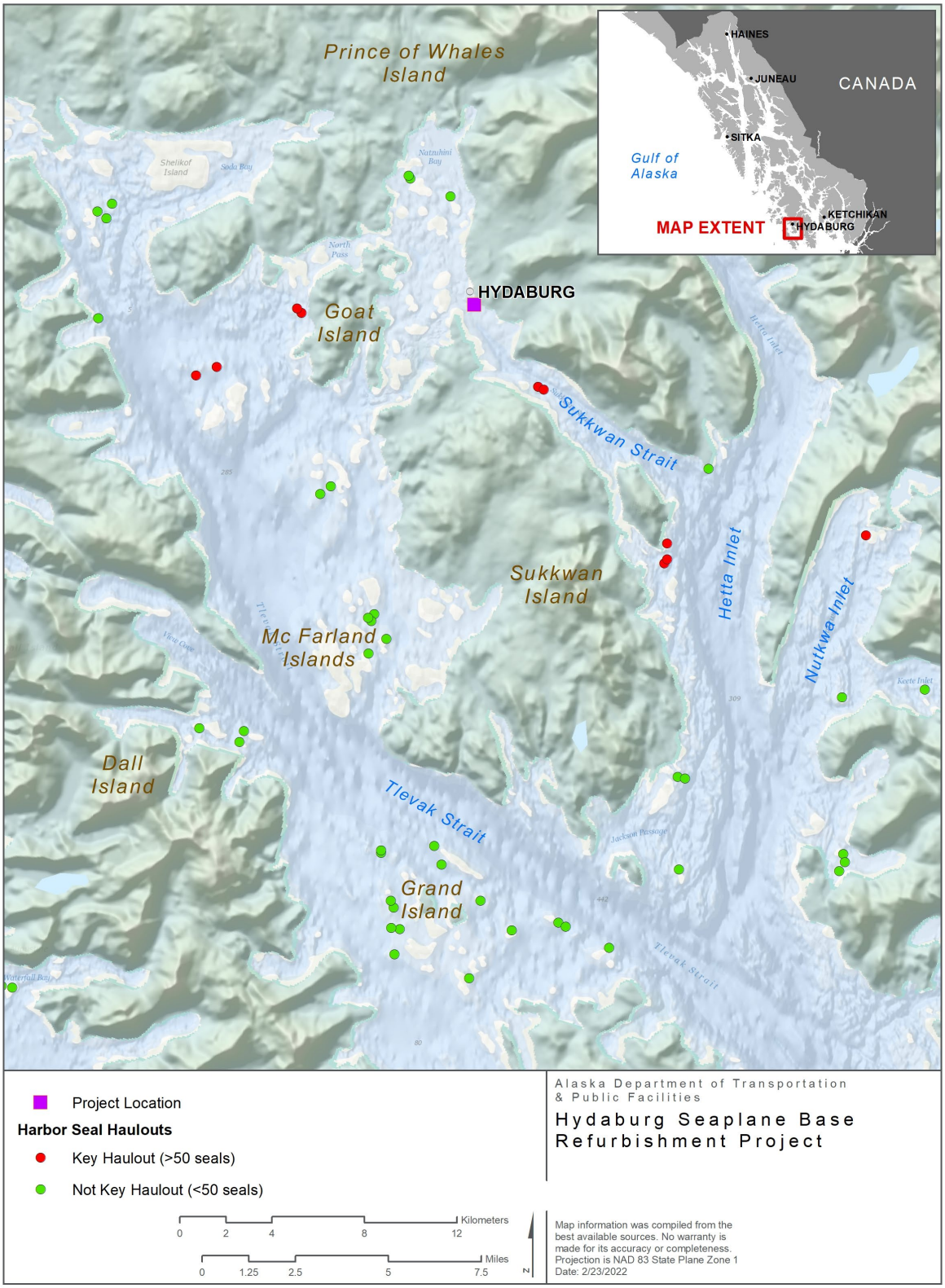

Figure 4-2. Known Harbor Seal Haulouts Located nearest to the Project Area

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4.3 Northern Elephant Seal

4.3.1 Status and Distribution

Northern elephant seals are wide-ranging throughout the North Pacific, spending as much as 80 percent of their time at sea (Hindell and Perrin 2009). Northern elephant seals have been undergoing a large population increase, estimated at 3.8 percent annually from 1988 to 2010 (Lowry et al. 2014). The most recent minimum population estimate of the California breeding stock, based on the count of pups observed in the 2010 survey, is 81,368 seals (Lowry et al. 2014), and the estimate for the total population is as high as 179,000 seals (Carretta et al. 2015).

Northern elephant seals are not designated as strategic or depleted under the MMPA and are not listed under the ESA, but like all other marine mammals, they are protected under the MMPA.

4.3.2 Presence in Project Area

There is a low probability that northern elephant seals would occur in the Project area. No sightings of elephant seals have been documented near Hydaburg; however, Marine Mammal Observers (MMOs) at a DOT&PF project site in Ketchikan (75 km east of Hydaburg) reported sightings of a northern elephant seal on multiple days (C. Gentemann, personal communication, 08 April 2022). Additional sightings of northern elephant seals around the state concurrent to the Ketchikan sighting were reported in Seward, King Cove, and Kodiak (L. Davis, personal communication, 14 April 2022).

Hydaburg is an unlikely area for an occurrence, as northern elephant seals generally feed along the continental shelf break (Le Boeuf et al. 2000) and are not expected to spend time in shallow areas like the Sukkwan Strait; but given the recent increase in sightings, including sightings in Southeast Alaska, it is assumed that small numbers of northern elephant seals could be present in Hydaburg during construction of the Project.

4.3.3 Life History

Northern elephant seals breed and give birth in California and Baja Mexico in winter months (Stewart et al. 1994) before dispersing widely across the North Pacific (Le Boeuf et al. 2000). Females migrate to deep water locations in the North Pacific, feeding on pelagic prey, whereas male seals migrate as far north as the Aleutian Islands and other continental-fringe, shallow areas where they feed on benthic prey (Le Boeuf et al. 2000). Gestation in elephant seals lasts 11 months, with births taking place onshore when seals are at the breeding colony (Stewart et al. 1994).

4.3.4 Hearing Ability

Phocids in general have a functional hearing range between approximately 50 Hz and 86 kHz, although it is most acute below 60 kHz (Møhl 1968). Elephant seal underwater hearing sensitivity is best between 3.2 and 45 kHz, with an upper cutoff of 55 kHz and the greatest sensitivity of 6.4 kHz (Kastak and Schusterman 1999).

4.4 Harbor Porpoise

4.4.1 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. 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. The Southeast Alaska stock ranges from Cape Suckling to the Canada boundary (Muto et al. 2018). Only the Southeast Alaska stock is considered in this application because the other stocks occur outside the geographic area under consideration. Harbor porpoises frequent primarily coastal waters in Southeast Alaska (Dahlheim et al. 2009) and occur most frequently in waters less than 100 meters deep (Hobbs and Waite 2010).

Harbor porpoises are neither designated as depleted under the MMPA nor listed under the ESA, but the Southeast Alaska stock is denoted as "strategic" under the MMPA. The strategic designation indicates that the stock is declining or that human-caused mortality exceeds the potential biological removal level. The current corrected abundance estimate for harbor porpoises in the Southeast Alaska stock is 11,146 individuals, based on estimates completed in 1997 (Muto et al. 2018). Based on shipboard surveys completed in 2010–2012, the minimum population estimate for the Southeast Alaska stock of harbor porpoise is 1,224 animals (Muto et al. 2021). No reliable information is available to determine trends in abundance.

4.4.2 Presence in Project Area

Although there have been no systematic studies or observations of harbor porpoises specific to Hydaburg or Sukkwan Strait, there is potential for them to occur in the Project area. Abundance data for harbor porpoises in Southeast Alaska were collected during 18 seasonal surveys spanning 22 years, from 1991 to 2012 (Dahlheim et al. 2015). During that study, a total of 81 harbor porpoises were observed in the southern inland waters of Southeast Alaska; however, the survey terminated 80 kilometers (50 miles) southeast of Hydaburg and did not include Sukkwan Strait as part of the survey. There does not appear to be any seasonal variation in harbor porpoise density in the inland waters of Southeast Alaska (Dahlheim et al. 2015).

Harbor porpoises were not reported by local residents during interviews; however, due to their small overall size, lack of a visible blow, low dorsal fins, overall low profile, and short surfacing time, harbor porpoises are difficult to spot (Dahlheim et al. 2015), likely reducing identification and reporting of this species. To be conservative, it is estimated that up to two harbor porpoises per day could be sighted near the Project area.

4.4.3 Life History

Harbor porpoises forage in waters less than 200 meters deep on small pelagic schooling fishes 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. According to aerial surveys of harbor porpoise abundance in Southeast Alaska conducted in 1991–1993, mean group size was calculated to be 1.2 animals (Dahlheim et al. 2000).

4.4.4 Hearing Ability

Harbor porpoise echolocation clicks and buzzes have been measured at peak frequencies between 130 and 140 kHz, with a bandwidth of 6–26 kHz (Villadsgaard et al. 2007). Similar to other toothed whales, their hearing sensitivity improves with increasing frequency and is best between 10 and 120 kHz (Au and Hastings 2008). Unlike most odontocetes, harbor porpoises do not produce whistles. Recent data suggest that harbor porpoises communicate using clicks

and buzzes that, despite being in the lower end of their frequency range, are of a frequency sufficiently high so as to attenuate very rapidly, thereby not alerting predators at longer distances (Sørensen et al. 2018).

4.5 Dall's Porpoise

4.5.1 Status and Distribution

Dall's porpoises are found throughout the North Pacific, from southern Japan to southern California and north to the Bering Sea. All Dall's porpoises in Alaska are members of the Alaska stock, and those off California, Oregon, and Washington are part of a separate stock. This species can be found in offshore, inshore, and nearshore habitat, but prefers waters more than 183 meters deep (Dahlheim et al. 2009; Jefferson 2009).

Dall's porpoises are protected under the MMPA like all marine mammals but 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. 2018).

4.5.2 Presence in Project Area

No systematic studies of Dall's porpoise abundance or distribution have occurred in Sukkwan Strait; however, Dall's porpoises have been observed in Cordova Bay 30 kilometers (19 miles) south of Hydaburg during a summer 2011 survey (Jefferson et al. 2019). The species is generally found in waters in excess of 600 feet (183 meters) deep, which do not occur in Sukkwan Strait. Despite generalized water depth preferences, Dall's porpoises may occur in shallower waters. Moran et al. (2018) recently mapped Dall's porpoise distributions in bays, shallow water, and nearshore areas of Prince William Sound, habitats not typically utilized by this species. If Dall's porpoises occur in the Project area, they will likely be present in March or April, given the strong seasonal patterns observed in nearby areas of Southeast Alaska (Dahlheim et al. 2009). No local residents described seeing Dall's porpoises within Sukkwan Strait; however, because the exact schedule of the Project is unknown and may be subject to delays, the Project estimates that one group of Dall's porpoises may transit the Project location during the 26 days of construction.

4.5.3 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). Common prey include a variety of small, schooling fishes (such as herrings and mackerels) and cephalopods. Dall's porpoises may migrate between inshore and offshore areas and make latitudinal movements or short seasonal migrations, but these movements are generally not consistent (Jefferson 2009).

4.5.4 Hearing Ability

Similar to other porpoises, Dall's porpoises produce echolocation clicks at high frequencies from 135 to 149 kHz, but can also produce relatively low-frequency communication clicks ranging from 0.04 to 12 kHz (Richardson 1995). Dall's porpoise vocalizations have not been widely studied; however, recent research from wild porpoise recordings showed that echolocation click frequencies were centered between 117 and 141 kHz, with some as high as 198 kHz (Bassett et al. 2009). Spectral banding patterns have also been observed in this species, similar to

Risso's and Pacific white-sided dolphins, which may assist with population classification for Dall's porpoises across geographic regions.

4.6 Pacific White-Sided Dolphin

4.6.1 Status and Distribution

Pacific white-sided dolphins are a pelagic species inhabiting temperate waters of the North Pacific Ocean and along the coasts of California, Oregon, Washington, and Alaska (Muto et al. 2018). Despite their distribution mostly in deep, offshore waters, they may also be found over the continental shelf and in nearshore waters, including inland waters of Southeast Alaska (Ferrero and Walker 1996).

Pacific white-sided dolphins are not listed as threatened or endangered under the ESA but are protected under the MMPA. They are managed as two distinct stocks: the California/Oregon/ Washington stock and the North Pacific stock (north of 45° N, including Alaska).

The most complete population abundance estimate, based on line-transect surveys conducted from 1987 to 1990, is 931,000 animals and most likely reflects a range-wide estimate (Buckland et al. 1993). This estimate does not take into account the two management stocks; thus, according to Muto et al. (2018), a more reasonable estimate of the North Pacific stock is approximately 26,880 individuals. Currently, there is no reliable information on trends in the abundance of Pacific white-sided dolphins.

4.6.2 Presence in Project Area

Scientific studies and data are lacking relative to the presence or abundance of Pacific white-sided dolphins in or near Sukkwan Strait. When Pacific white-sided dolphins have been observed, sighting rates were highest in spring and decreased throughout summer and fall (Dahlheim et al 2009).

Most observations of Pacific white-sided dolphins occur off the outer coast or in inland waterways near entrances to the open ocean. According to NOAA (Muto et al. 2018), aerial surveys in 1997 sighted one group of 164 Pacific white-sided dolphins in Dixon Entrance to the southeast of Hydaburg. These observational data, combined with anecdotal information, indicate that there is a small potential for Pacific white-sided dolphins to occur in the Project area. In a recent authorization in Metlakatla, NMFS estimated that one group of Pacific white-sided dolphins (median between 20 and 164 individuals) may occur in that location (86 FR 43190). Therefore, the Project is estimating that one pod of up to 92 individuals may occur in the Project area during the 26 days of construction.

4.6.3 Life History

Pacific white-sided dolphins prey on squid and small schooling fish such as capelin, sardines, and herring (Morton 2006). They are known to work in groups to herd schools of fish and can dive underwater for up to 6 minutes to feed (Morton 2006). Group sizes have been reported to range from 40 to over 1,000 animals, but groups of between 10 and 100 individuals (Stacey and Baird 1991) occur most commonly. Seasonal movements of Pacific white-sided dolphins are not well understood, but there is evidence of both north-south seasonal movement (Leatherwood et al. 1984) and inshore-offshore seasonal movement (Stacey and Baird 1991).

4.6.4 Hearing Ability

NMFS classifies Pacific white-sided dolphins as mid-frequency hearing cetaceans, having hearing sensitivity that is best between 2 and 128 kHz (Tremel et al. 1998). They produce echolocation clicks that range in frequency from 20 Hz to more than 100 kHz (Soldevilla et al. 2008) and also produce burst pulses and buzzes (Lammers et al. 2006). However, there is ongoing debate regarding whether Pacific white-sided dolphins produce whistles (Rankin et al. 2007).

4.7 Killer Whale

4.7.1 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 2016a). 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 2016a).

There are three distinct ecotypes, or forms, of killer whales recognized: resident, transient, and offshore. The three ecotypes differ morphologically, ecologically, behaviorally, and genetically. 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. This application considers only the Eastern North Pacific Alaska Resident stock (Alaska Resident stock), Eastern North Pacific Northern Resident stock (Northern Resident stock), and West Coast Transient stock, because all other stocks occur outside the geographic area under consideration (Muto et al. 2018). None of these three stocks of killer whales are designated as depleted or strategic under the MMPA or listed as threatened or endangered under the ESA.

The Alaska Resident stock occurs from Southeast Alaska to the Aleutian Islands and Bering Sea. Photo-identification studies between 2005 and 2009 identified 2,347 individuals in this stock, including approximately 121 in Southeast Alaska (Muto et al. 2018). The Northern Resident stock occurs from Washington north through part of Southeast Alaska and consists of 261 individuals. The West Coast Transient stock occurs from California north through Southeast Alaska. Between 1975 and 2012, surveys identified 521 individual West Coast Transient killer whales. In the most recent stock assessment (Muto et al. 2018), the minimum population for the transient stock is estimated to be 243 individuals. Dahlheim et al. (2009) noted a 5.2 percent annual decline in transient killer whales observed in Southeast Alaska between 1991 and 2007.

Surveys between 1991 and 2007 encountered resident killer whales during all seasons throughout Southeast Alaska. Both residents and transients were common in a variety of habitats and all major waterways, including protected bays and inlets. There does not appear to be strong seasonal variation in abundance or distribution of killer whales, but there was substantial variability between years during this study (Dahlheim et al. 2009).

4.7.2 Presence in Project Area

No systematic studies of killer whales have been conducted in or around Sukkwan Strait. Dahlheim et al. (2009) observed transient killer whales within Lynn Canal, Icy Strait, Stephens Passage, Frederick Sound, and upper Chatham Strait. Anecdotal local information suggests that killer whales are rarely seen near the Hydaburg area, but a pod may be seen occasionally every few months. Therefore, the Project is estimating that one pod of 15 individuals may transit the Project area during the 26 days of construction.

4.7.3 Life History

Transient killer whales hunt and feed primarily on marine mammals, while residents 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 2016a).

Transient killer whales are often found in long-term stable social units (pods) of 1 to 16 whales. Average pod sizes in Southeast Alaska were six in spring, five in summer, and four in fall (Dahlheim et al. 2009). Pod sizes of transient whales are generally smaller than those of resident social groups. Resident killer whales occur in pods ranging from 7 to 70 whales that are seen in association with one another more than 50 percent of the time (Dahlheim et al. 2009; NMFS 2016b). In Southeast Alaska, resident killer whale mean pod size was approximately 21.5 in spring, 32.3 in summer, and 19.3 in fall (Dahlheim et al. 2009).

4.7.4 Hearing Ability

Killer whales are categorized as mid-frequency hearing cetaceans, although they hear best at the higher end of that spectrum, between 80 and 120 kHz (Richardson et al. 1995). The ability to hear most acutely in this frequency range is related to their use of high-frequency sound for echolocation. Killer whale vocalizations include clicks and whistles but are most often high-energy rapid pulsed sounds in the 500-Hz to 25-kHz range, with pulse duration varying between echolocation clicks and other pulsed calls (Ford and Fisher 1982). North Pacific killer whales are known to produce whistles from 1 to 18 kHz (Thomsen et al. 2001).

4.8 Humpback Whale

4.8.1 Status and Distribution

Humpback whales worldwide were designated as "endangered" under the Endangered Species Conservation Act in 1970 and had been listed as a species under the ESA since its inception in 1973. On 08 September 2016, NMFS published a final decision that 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 Project area are predominantly members of the Hawaii DPS, which is not listed under the ESA. However, based on a comprehensive photo-identification study, members of the Mexico DPS, which is listed as threatened, are known to occur in Southeast Alaska. 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. Approximately 2.0 percent of all humpback whales in Southeast Alaska and northern British Columbia are members of the Mexico DPS, while all others are members of the Hawaii DPS (Wade 2021).

The DPSs of humpback whales that were identified through the ESA listing process do not necessarily equate to the existing MMPA stocks. The stock delineations of humpback whales under the MMPA are currently under review. Until this review is complete, NMFS considers humpback whales in Southeast Alaska to be part of the Central North Pacific stock, with a status of endangered under the ESA and designations of strategic and depleted under the MMPA (Muto et al. 2021). The current estimate of population size for the Central North Pacific stock is 10,103 humpback whales (Muto et al. 2021).

Humpback whales experienced large population declines in the early twentieth century due to commercial whaling operations. Barlow (2003) estimated the population of humpback whales at approximately 1,200 animals in 1966. The population in the North Pacific grew to between 6,000 and 8,000 by the mid-1990s. Current threats to humpback whales include vessel strikes, spills, climate change, and commercial fishing operations (Muto et al. 2021).

Humpback whales are found throughout Southeast Alaska in a variety of marine environments, including open ocean, nearshore waters, and areas with strong tidal currents (Dahlheim et al. 2009). Most humpback whales are migratory and spend winters in the breeding grounds off either Hawaii or Mexico. Humpback whales generally arrive in Southeast Alaska in March and return to their wintering grounds in November. Some humpback whales depart late or arrive early to feeding grounds, and therefore the species occurs in Southeast Alaska year-round (Straley 1990; Straley et al. 2018). Across the region, there have been no recent estimates of humpback whale density.

4.8.2 Presence in Project Area

No systematic studies have documented humpback whale abundance near Hydaburg. Anecdotal information from local residents suggests that humpback whales' utilization of the area is intermittent year-round. Their abundance, distribution, and occurrence are dependent on and fluctuate with fish prey. Local residents estimate that one to two humpback whales may be present in the Sukkwan Strait on a weekly basis. Elsewhere in Southeast Alaska, marine mammal monitoring for projects in Tongass Narrows, Ketchikan, Alaska, indicate that humpback whales are present in that area most regularly from May through October (DOT&PF 2021, 2022) and may occur in lower numbers in winter, which we would expect to be the case for Hydaburg.

4.8.3 Life History

Southeast Alaska is considered a biologically important area for feeding humpback whales between March and May (Ellison et al. 2012). Most humpback whales migrate to other regions during winter to breed, but over-wintering (non-breeding) humpback whales have been noted and may be increasingly common (Straley 1990). In Alaska, humpback whales filter feed on tiny crustaceans, plankton, and small fish such as walleye pollock, Pacific sand lance, herring (*Clupea pallasii*), eulachon (*Thaleichthys pacificus*), and capelin (Witteveen et al. 2012). It is common to observe groups of humpback whales cooperatively bubble feeding. Group sizes in Southeast Alaska generally range from one to four individuals (Dahlheim et al. 2009).

4.8.4 Hearing Ability

Humpbacks are classified in the low-frequency cetacean functional hearing group, able to perceive frequencies between 7 Hz and 35 kHz (Richardson et al.1995). Humpback whales create several types of vocalizations ranging from 20 Hz to 10 kHz in order to forage for prey, organize collaborative feeding efforts, facilitate mother-calf communication, and select and attract potential mates (Winn et al. 1970; Au et al. 2006; Vu et al. 2012). Anthropogenic noise has the potential to result in social disturbance, physical discomfort or trauma, and masking of communication with conspecifics. Underwater activities such as pile driving, vessel traffic, and seismic surveys may cause humpbacks to modify their acoustic behavior in the more complex sound-scape (Fleming and Jackson 2011; Blair et al. 2016; Dunlop et al. 2016; Fournet et al. 2018).

4.9 Minke Whale

4.9.1 Status and Distribution

Minke whales, like all other marine mammals, are protected under the MMPA but 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 the severe population declines that larger cetaceans did. Minke whales are found throughout the northern hemisphere in polar, temperate, and tropical waters (Jefferson et al. 2008).

The International Whaling Commission has identified three minke whale 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 throughout the eastern Pacific. NOAA further splits this third stock between Alaska whales and resident whales of California, Oregon, and Washington (Muto et al. 2018). Minke whales in Southeast Alaska are part of the Alaska stock (Muto et al. 2018). Minke whales are found in all Alaska waters, although there are no population estimates for minke whales in Southeast Alaska. Surveys in Southeast Alaska have consistently identified individuals throughout inland waters in low numbers (Dahlheim et al. 2009).

4.9.2 Presence in Project Area

Minke whales in Southeast Alaska are part of the Alaska stock (Muto et al. 2021). Dedicated surveys for cetaceans in Southeast Alaska found that minke whales were scattered throughout inland waters from Glacier Bay and Icy Strait to Clarence Strait, with small concentrations near the entrance of Glacier Bay (Dahlheim et al. 2009). All sightings were of single minke whales, except for a single sighting of multiple minke whales. Surveys took place in spring, summer, and fall, and minke whales were present in low numbers in all seasons and years. No information appears to be available on the winter occurrence of minke whales in Southeast Alaska. Anecdotal observations suggest that minke whales are not seen near Hydaburg and so are expected to occur rarely in the Project area. However, a nearby authorization in Metlakatla (86 FR 43190) estimated that a group of up to three individuals could be present at that Project site over 4 months, so, to be conservative, the Project is estimating that up to three individuals could transit the Project area during 26 days of construction.

4.9.3 Life History

In Alaska, the minke whale diet consists primarily 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 two to three. Rarely, loose aggregations of up to 400 animals have been associated with feeding areas in Arctic latitudes.

4.9.4 Hearing Ability

Similar to other baleen whales, minke whale hearing is optimized in the low frequencies, ranging from 7 Hz to 35 kHz. Recent research by Yamato et al. (2012) exploring minke whale auditory physiology has shown that minke whales may be able to hear more acutely at higher frequencies than previously thought, perhaps as a defense mechanism to hear predatory killer whale vocalizations.

5 TYPE OF INCIDENTAL TAKING 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 installation and removal of steel piles associated with the Hydaburg Seaplane Base Refurbishment Project in Hydaburg, Alaska. The IHA is requested from 01 September 2023 through 31 August 2024. The DOT&PF is not requesting an LOA at this time because the Project will not occur for more than 1 calendar year, and the impacts described herein 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 for Level B take (behavioral harassment) of small numbers of Steller sea lions, harbor seals, northern elephant seals, harbor porpoises, Dall's porpoises, killer whales, humpback whales, and minke whales that may occur incidentally during the Project. In addition, the DOT&PF requests small numbers of Level A take of harbor seals and harbor porpoises that may occur incidentally during the Project. Level A take is not anticipated, and shutdown protocols are intended to prevent cumulative exposure to sound that could result in Level A take. However, Level A take is requested to ensure compliance in the unlikely event that a harbor seal or harbor porpoise enters a Level A harassment zone undetected. Several of the species for which take is requested are uncommon in the Project area. The request for a small number of takes for each species that is rarely or occasionally 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 or removal. It is unlikely, however, that take of these species will occur.

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

The analysis for the Project predicts 508 potential exposures to Level B harassment and predicts 56 potential exposures to Level A harassment (564 total exposures) during pile installation and removal. DOT&PF mitigation measures for the Project (Section 11) include monitoring of Level B and Level A harassment zones prior to the initiation of pile installation and removal, 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. In addition, "shutdown zones" have been established for pile installation and removal to avoid injury to marine mammals. These mitigation measures decrease the likelihood that marine mammals will be exposed to sound pressure levels that will cause harassment or harm, although the amount of that decrease cannot be quantified.

The DOT&PF does not expect that all potential exposures to Level B and Level A harassment 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 incidental harassment of marine mammals during Project activities. Most takes are expected to result from repeated exposures of a small number of individuals.

5.3 Method of Incidental Taking

Pile installation and removal as outlined in Section 1 have the potential to disturb or displace small numbers of marine mammals. Specifically, the proposed activities may result in take in the form of Level B harassment from underwater sounds generated from vibratory, impact and DTH pile installation, and vibratory pile removal. In addition, humpback whales, harbor seals, and harbor porpoises may be incidentally exposed to Project-related underwater noise levels that exceed species-specific thresholds for Level A harassment. Section 11 provides details on the impact minimization and reduction measures proposed.

Detectable effects of the Project on marine mammal habitat will be minor (Section 9). Indirect effects to prey will be insignificant and discountable due to recolonization and the temporary nature of the activity and are expected to be undetectable. The 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 and species 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 as outlined earlier has the potential to take marine mammals during pile installation and removal. Other activities are not expected to result in take as defined under the MMPA. In-water pile installation and removal will temporarily increase the local underwater and airborne noise environment in the Project area. Research suggests that increased noise may impact marine mammals in several ways and that the likelihood of impacts depends on many factors (Section 7).

6.1 In-Air 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 (dB). Decibels are measured using a logarithmic scale.

Underwater sounds are described by a number of common terms that are 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 in-water sound levels throughout this report are presented in dB re 1 µPa rms unless otherwise specified.

Transmission loss is the accumulated decrease in acoustic intensity as an acoustic pressure wave propagates outward from a source such as a pile during installation. The intensity of the sound at its source is reduced because it spreads as it moves away from the source. Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion, bounded by the bottom sediment and water surface, such as in 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 or surface), such as in deep water, resulting in a 6-dB reduction per doubling of distance.

Table 6-1. Definitions of Some Common Acoustical Terms

Term	Definition
Decibel, dB	A decibel is 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 SPL is expressed in decibels as 20 times the logarithm to the base 10 of the ratio of the pressure exerted by the sound to a reference sound pressure. SPL 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 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 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 ambient noise level is 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 accumulated 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 underwater objects in the area.

6.2 Applicable Noise Criteria

NMFS published updated *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* (Technical Guidance) in April 2018 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 noise sources (i.e., Level A harassment; NMFS 2018). The 2018 Technical Guidance contains the same criteria included in the 2016 guidance (NMFS 2016b). To assess Level B harassment levels, NMFS continues to use its interim criteria.

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

For underwater noise exposure, this IHA application uses the NMFS Technical Guidance (revised 2018). 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 been weighted by functional hearing groups as defined in the Technical Guidance (Table 6-2; NMFS 2018). Under the 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 Permanent Threshold Shift 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* Humpback whales, minke whales, other 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* Harbor seals, other 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, fur seals	$L_{pk,flat}$: 232 dB $L_{E, OW, 24h}$: 203 dB	$L_{E, OW, 24h}$: 219 dB

Source: NMFS 2018.

Note: dB = decibels; Hz = Hertz; kHz = kilohertz; $L_{pk,flat}$ = peak sound pressure level (unweighted); $L_{E,24h}$ = sound exposure level, cumulative 24 hours

6.2.2 Level B Harassment

To assess Level B harassment levels, this document uses the NMFS interim criteria for exposure of marine mammals to various underwater sound sources. For impulsive noise (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 noise (e.g., vibratory pile installation), the Level B harassment threshold is set at an SPL of 120 dB re 1 µPa rms.

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

6.3 Description of Noise Sources

The Project will temporarily increase the existing in-air and underwater acoustic levels of Sukkwan Strait, which is an area with frequent marine vessel traffic, seaplane traffic, and associated activities. The soundscape in the vicinity of the Project includes existing ambient sound plus construction noise from the Project. The primary component of the Project that may affect marine mammals is the noise generated by vibratory removal of steel pipe piles, vibratory and impact installation of steel pipe piles, and DTH pile installation. Refer to Section 1.3 for a description of these pile installation and removal techniques. Other activities associated with the Project (e.g., upland and above-water construction activities, vessel activities) do not produce in-air or underwater noise levels expected to exceed Level A or Level B harassment levels for any marine mammal hearing group.

6.3.1 Ambient Sound

Ambient (or background) sound is composed of sound from many sources and from multiple locations (Richardson et al. 1995). In general, ambient sound 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 types in the Project area include physical noise, biological noise, and anthropogenic noise. Physical noise includes noise from waves at the water surface, rain, and currents; moving rocks, sediment, and silt; and atmospheric noise. Biological sound includes vocalizations and other sounds produced by marine mammals, fishes, seabirds, and invertebrates. Anthropogenic noise includes noise from 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 6-3).

Table 6-3. 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)	Reference
Small vessels	250–1,000	151 dB at 1 meter	Richardson et al. (1995)
Tug docking gravel barge	200–1,000	149 dB at 100 meters	Blackwell and Greene (2002)
Container/cruise ship	100–500	180 dB at 1 meter	Richardson et al. (1995)
Dredging operations	50–3,000	120–140 dB at 500 meters; 156.9 dB at 30 meters	URS (2007); SFS (2009)

Note: dB = decibels; Hz = Hertz; rms re 1 µPa = root mean square referenced to 1 microPascal

Ongoing vessel activities throughout the Sukkwan Strait area, as well as land-based industrial and commercial activities, result in elevated in-air and underwater sound conditions in the Project area that increase with proximity to the Project site. Sound levels likely vary seasonally, with elevated levels during summer, when the commercial and fishing industries are at their peaks. The 120 dB rms ambient sound level is used by NMFS in the absence of empirical data and is the default for regulatory purposes, including incidental take estimation under the MMPA, and will be used for this Project.

6.3.2 Underwater Noise Levels

Pile Installation/Removal Noise Levels

The Project includes vibratory and impact pile installation of steel pipe piles, DTH pile installation, and vibratory removal of steel pipe piles. Sound source levels (SSLs) for each type of activity were estimated using empirical measurements from similar activities elsewhere in Alaska or outside of Alaska and relied on the best available and most relevant sound source verification studies (Table 6-4). Recently proposed and issued IHAs from Southeast Alaska were also reviewed to identify the most appropriate SSLs for use in this application.

Table 6-4. Estimates of Underwater Sound Source Levels Generated during Vibratory and Impact Pile Installation, DTH Pile Installation, and Vibratory Pile Removal

Method and Pile Type	SSL at 10 Meters			Transmission Loss Coefficient	Literature Source
Continuous	**dB rms**			**TL (log_{10})**	
16-inch Steel Piles	158			15	Caltrans 2020
20-inch Steel Piles	161			15	Navy 2015
24-inch Steel Piles	161			15	Navy 2015
20- and 24-inch DTH, Level B (Rock Sockets)	167			19	Heyvaert and Reyff 2021
8-inch DTH, Level A and B (Tension Anchors)	156			19	Reyff and Heyvaert 2019
Impulsive	**dB rms**	**dB SEL**	**dB Peak**	**TL (log_{10})**	
24-inch Steel Piles	193	178	208	15	Caltrans 2020
20-inch Steel Piles	187	176	208	15	Caltrans 2020
20- and 24-inch DTH, Level A (Rock Sockets)	173	159	184	19	Heyvaert and Reyff 2021

Note: It is assumed that noise levels during pile installation and removal are similar. dB peak= peak sound level; rms = root mean square; SEL = sound exposure level; SELss = single strike sound exposure level; TL = transmission loss.

Because DTH pile installation in rock sockets includes both impulsive and continuous sound components, NMFS guidance drafted in 2020 recommends that DTH installation be treated as a continuous sound for Level B calculations and impulsive for Level A calculations. Data from DTH installation of 24-inch piles in Kodiak and Tenakee Springs, Alaska, indicate a continuous sound source level of 167 dB rms (Table 6-4). These data also indicate that sounds from drilling rock sockets of this size decay at a greater rate than practical spreading, and a TL of 19.0 for 20- and 24-inch piles was therefore used (Denes et al. 2016; Heyvaert and Reyff 2021; Appendix C). The impulsive nature of DTH pile installation is reflected in the 159 dB SEL value used for Level A calculations, and also with TL of 19 log (Denes et al. 2016; Heyvaert and Reyff 2021) to reflect the greater rate of decay of sound pressure levels (Appendix C).

Underwater noise from tension anchor construction is typically low. The bedrock is overlain with sediments, which together attenuate noise production from drilling and reduce noise

propagation into the water column. Additionally, the casing used during drilling is inside the larger-diameter pile, further reducing noise levels. In the past, NMFS IHA analyses have concluded that tension anchor installation would not reach levels that might harass marine mammals (82 FR 34632; 83 FR 12152).

Heyvaert and Reyff (2021) measured the installation of 8-inch tension anchors at Tenakee Springs, with a reported Level B harassment zone size of 408 meters based on a measured 149 dB rms source level at 10 meters and 18 Log transmission loss (TL) coefficient; they could not classify the tension anchor installation as impulsive for the purposes of Level A harassment zone calculations. Additionally, Reyff and Heyvaert (2019) measured 8-inch tension anchor installation in Skagway, Alaska, and reported a continuous rms value of 156 dB with a 30 Log TL coefficient from the pile tip source, or 24 Log horizontally from the pile. This application uses 156 dB RMS as the continuous source level paired with 19 Log TL coefficient for Level B harassment zone calculations for 8-inch DTH, and treats the 8-inch tension anchor installation as continuous for both Level B and Level A harassment purposes. This is based on the two sound source verification studies, which may be the only studies of tension anchor installations available (see Appendix C for summary).

6.3.3 In-Air Noise Levels

The Washington State Department of Transportation recorded airborne noise levels from impact installation of 24-inch piles in December 2015 at the Vashon Ferry Terminal near Seattle, Washington (WSDOT 2018). In-air noise levels during impact installation were 108 A-weighted decibels (dBA) as measured at 50 feet (15.24 meters). This value was chosen as the estimate for impact installation of 24-inch-diameter steel piles for the Project.

6.4 Distances to Sound Thresholds

6.4.1 Underwater Noise

Vibratory, impact, and DTH pile installation will generate underwater noise that could disturb marine mammals in the Project area. Ambient underwater sound levels were assumed to be 120 dB rms for this evaluation (Section 6.3.1). The SSLs for pile installation were estimated by using the results of measurements from the best available and most relevant sound source verification studies (Table 6-4).

The attenuation of underwater noise (transmission loss [TL]) for impact and vibratory pile installation is estimated using the practical spreading loss model. The formula for transmission loss is:

$$TL = X \log10^{(R/D)}$$

where R is the distance from the source, D is the distance of the known or measured noise level, and X is the TL coefficient. NMFS typically recommends a TL coefficient of 15 dB per tenfold increase in distance when site-specific empirical data are unavailable. Site-specific data for impact and vibratory installation of 16- and 24-inch piles are unavailable; therefore, this document adopts the default NMFS TL coefficient of 15 log for impact and vibratory pile installation. The value of 19 log was used for transmission loss for installation of tension anchors. This model can be rearranged to estimate the propagation of underwater noise as follows:

$$R = D * 10^{(\Delta/TL)}$$

where Δ is the difference between the SSL and the noise level at which behavioral harassment may occur (i.e., approximately 120 dB for vibratory sources or 160 dB for impulsive sources). The SSL and the propagation of underwater noise vary by pile size and installation method (Table 6-4).

Land forms (including causeways, breakwaters, islands, and other land masses) impede the transmission of underwater sound and create shadows behind them where sound from construction is not audible. At Hydaburg, sound from the Project will be blocked by Sukkwan Island, Spook Island, Mushroom Island, and the coastline along Prince of Wales Island both southeast and northwest of the Project site (Figure 1-2). The monitoring zones (see Section 11) will be inclusive of all areas that may be exposed to noise levels in excess of 120 dB for vibratory sources and 160 dB for impulsive sources.

Level A Harassment

Sound propagation and the distances to the sound isopleths defined by NMFS for Level A harassment of marine mammals under the current Technical Guidance were estimated using the User Spreadsheet developed by NMFS for this purpose (NMFS 2018). 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 2016b). Pulse duration from the sound source verification studies used for source level estimates are unknown. All necessary parameters were available for the cumulative Single Strike Equivalent (SEL_{cum}) method for calculating isopleths. 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.

As described above, NMFS typically recommends a TL coefficient of 15 dB per tenfold increase in distance when site-specific empirical data are unavailable. Site-specific data are unavailable for impact and vibratory piling methods, and therefore this document adopts the default NMFS TL coefficient of 15 for calculation of Level A zone sizes. For DTH, a TL coefficient of 19 was used due to comparable data from locations in Alaska, including Kodiak, Skagway, and Tenakee Springs (Denes et al. 2016; Reyff and Heyvaert 2019; Heyvaert and Reyff 2021; discussed in Appendix C).

To account for potential variations in daily productivity during DTH installation, isopleths were calculated for either different durations of installation (Table 6-5). Therefore, if the Contractor installs piles for a shorter duration in a day than the maximum anticipated, the Level A harassment zone will be smaller. For DTH, monitoring may start at the maximum Level A zone size (e.g., 480 minutes for 20- or 24-inch piles), but zones will be reduced in size as pile driving occurs, assuming that zones are free of marine mammals. For vibratory installation, harassment zones were calculated based on various durations (Table 6-5); however, a “maximum scenario” of 10 vibratory installations of 20- or 24-inch piles at 30 minutes duration each (300 minutes in a day total) was calculated and used for shutdown zones to enable maximum contractor flexibility.

The pulse rate or frequency for DTH pile installation is generally negatively correlated with bore hole diameter but varies by the equipment used. It is estimated that 24-inch-diameter bore holes will be constructed by equipment operating at approximately 15 Hz, or 15 cycles per second, which is equivalent to 900 strikes per minute. In the absence of pulse rate data for 8-inch bore holes, we assume they are also on the order of 900 strikes per minute. Level A distances are provided in Table 6-5 for various production durations.

The number of strikes per pile during impact installation is expected to be 50 per pile for proofing; however, this may vary based on the embedment.

When possible, to avoid and minimize potential incidental Level A exposure of marine mammals, pile installation or removal will cease prior to a marine mammal entering the shutdown zone specific to the species and the in-water activity (including production rate) underway (Table 6-5). Implementation of shutdown zones will prevent injury to marine mammals (Table 6-5;Figure 6-1 and Figure 6-2). The shutdown zones are larger than the species-specific Level A harassment zones (Figure 6-3 through Figure 6-6) as defined under the MMPA.

Level B Harassment

Sound propagation and distances to the sound isopleths defined by NMFS for Level B harassment of marine mammals were estimated using the practical spreading loss model described above, except for distances to isopleths for DTH installation of 20- and 24-inch piles, which were calculated using transmission loss of 19.0. The source levels for pile installation and removal were estimated using the results of measurements from the best available and most relevant sound source verification studies (Table 6-4). The Level B harassment zones and areas for the Project are presented in Table 6-5 and shown in Figure 6-7.

Table 6-5. Combined Level A Harassment Zones, Shutdown Zones, and Level B Zones

Activity	Pile Size (in)	Minutes per Pile or Strikes per Pile	Piles Per Day	Rounded Level A Zones and Minimum Shutdown Zones (meters)										Level B Zones
				LF		MF		HF		PW		OW		
				Humpback Whale, Minke Whale		Killer Whale, Pacific White-sided Dolphin		Harbor and Dall's Porpoise		Harbor and Northern Elephant Seal		Steller Sea Lion		All Species
				Level A Take for Humpback Whale Only		**No Level A Take**		**Level A Take for Harbor Porpoise Only**		**Level A Take for Harbor Seal Only**		**No Level A Take**		
				Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	
Vibratory Installation	20- and 24-inch	15 Minutes	2 Piles	30	5	30	1	30	7	30	3	30	1	5,412
Vibratory Installation	20- and 24-inch	30 Minutes	10 Piles	30	20	30	2	30	30	30	13	30	1	
Vibratory Removal	16-inch	30 Minutes	2 Piles	30	5	30	1	30	7	30	3	30	1	3,415
Vibratory Removal	24-inch	30 Minutes	2 Piles	30	7	30	1	30	11	30	5	30	1	5,412
DTH (Rock Socket)	20- and 24-inch	60 Minutes	Based on Minutes of DTH	170	169	30	13	200	194	110	103	30	14	2,976
		120 Minutes		250	243	30	18	280	279	150	149	30	19	
		180 Minutes		310	301	30	22	350	346	190	184	30	24	
		240 Minutes		350	350	30	26	410	402	220	214	30	27	
		300 Minutes		400	394	30	29	460	452	250	241	40	31	
		360 Minutes		440	434	40	32	500	498	270	265	40	34	
		420 Minutes		470	470	40	34	540	540	290	287	40	37	
		480 Minutes		510	504	40	37	580	579	310	308	40	39	

Activity	Pile Size (in)	Minutes per Pile or Strikes per Pile	Piles Per Day	Rounded Level A Zones and Minimum Shutdown Zones (meters)										Level B Zones
				LF		MF		HF		PW		OW		
				Humpback Whale, Minke Whale		Killer Whale, Pacific White-sided Dolphin		Harbor and Dall's Porpoise		Harbor and Northern Elephant Seal		Steller Sea Lion		All Species
				Level A Take for Humpback Whale Only		**No Level A Take**		**Level A Take for Harbor Porpoise Only**		**Level A Take for Harbor Seal Only**		**No Level A Take**		
				Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	
DTH (Tension Anchor)	8-inch	60 Minutes	Based on Minutes of DTH	30	6	30	1	30	8	30	4	30	1	785
		120 Minutes		30	9	30	2	30	12	30	6	30	1	
		180 Minutes		30	11	30	2	30	15	30	7	30	1	
		240 Minutes		30	13	30	2	30	17	30	9	30	1	
Impact	24-inch	50 Strikes	1 Pile	70	63	30	3	80	75	40	34	30	3	1,585
			2 Piles	100	100	30	4	120	119	60	54	30	4	
Impact	20-inch	50 Strikes	1 Pile	50	47	30	2	60	56	30	25	30	2	631
			2 Piles	80	74	30	3	90	88	40	40	30	3	

Note: DTH = down-the-hole pile installation; HF = high frequency; in = inches; LF = low frequency; MF = mid-frequency; Min = minutes; PW = phocid in water; OW = otariid in water.

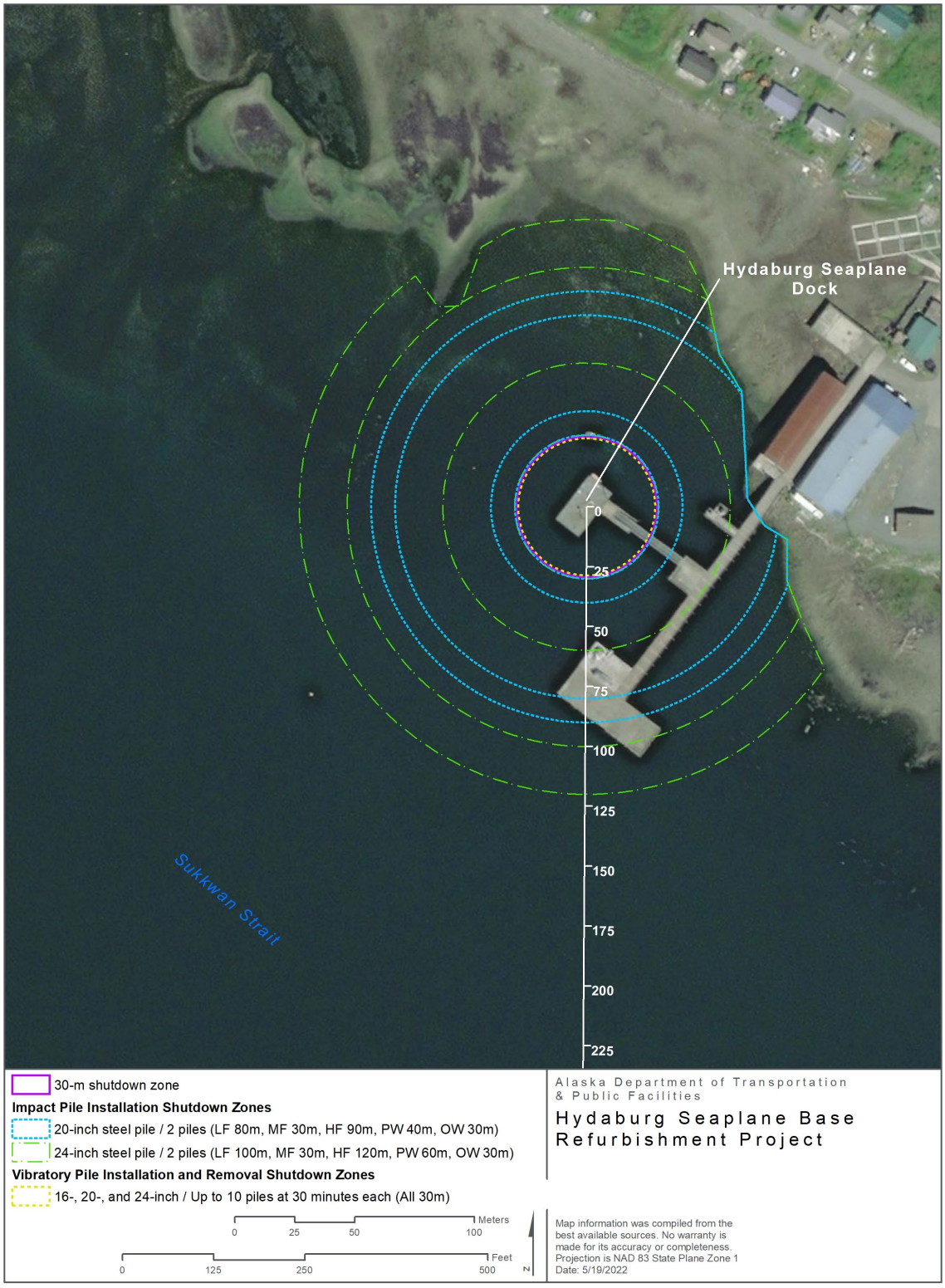

Figure 6-1. Shutdown Zones during 2 Impact Piles per day Installation and Vibratory Installation and Removal at Hydaburg Seaplane Base

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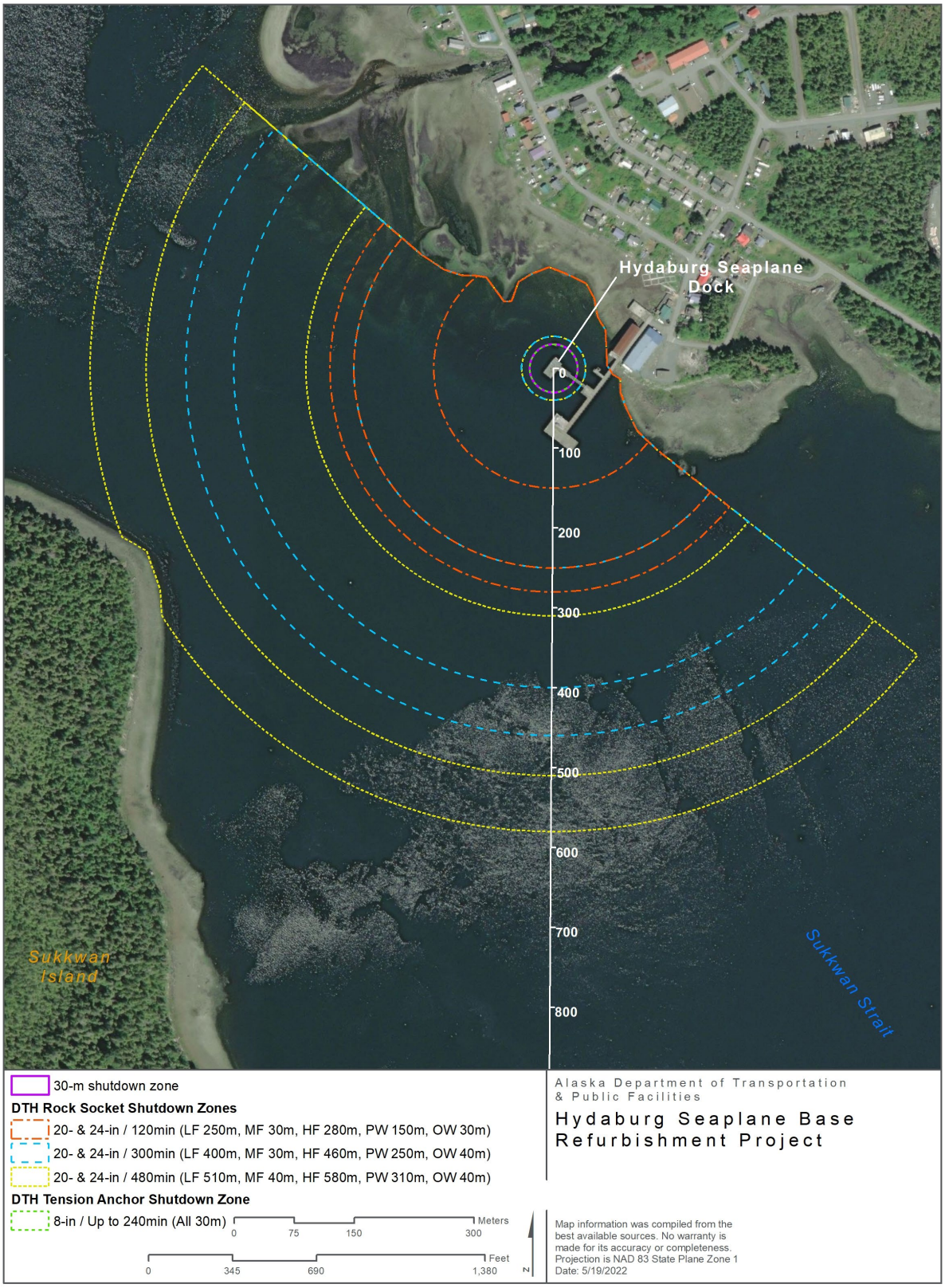

Figure 6-2. Shutdown Zones during DTH Rock Socket Pile and Tension Anchor Installation at Hydaburg Seaplane Base

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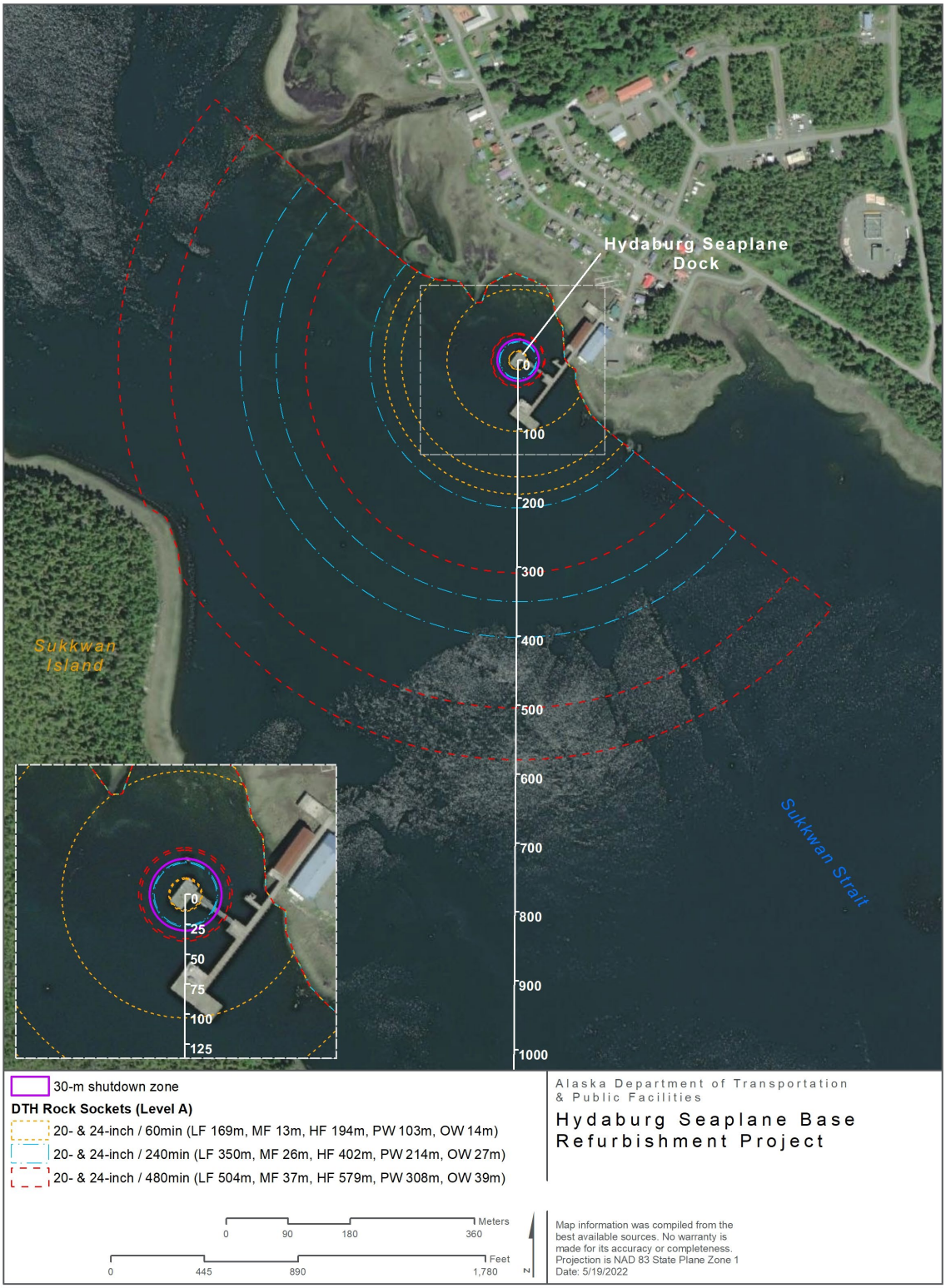

Figure 6-3. Level A Harassment Zones during Rock Socket Installation at Hydaburg Seaplane Base

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Figure 6-4. Level A Harassment Zones during Tension Anchor Installation at Hydaburg Seaplane Base

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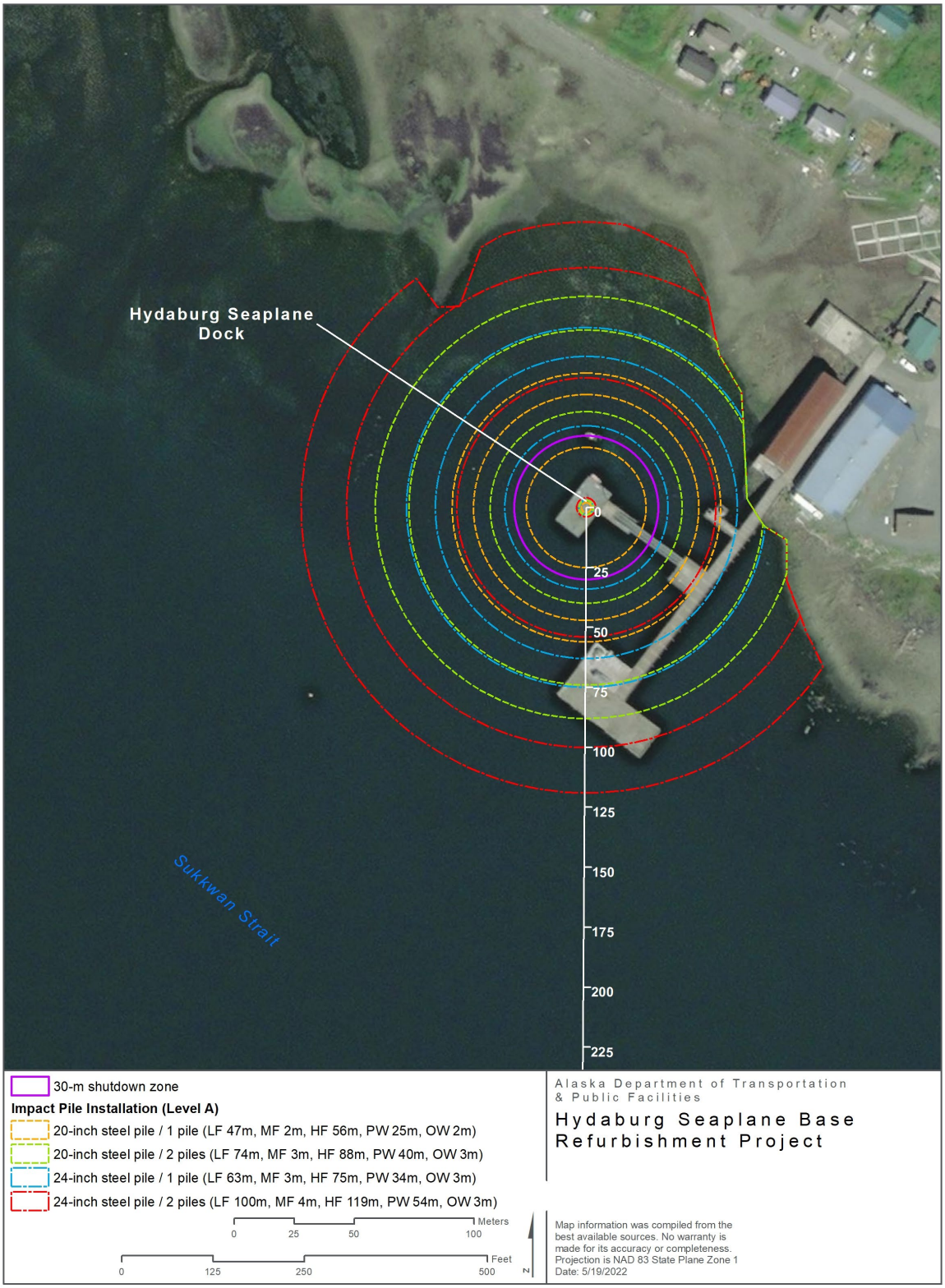

Figure 6-5. Level A Harassment Zones during Impact Installation at Hydaburg Seaplane Base

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Figure 6-6. Level A Harassment Zones during Vibratory Installation and Removal at Hydaburg Seaplane Base

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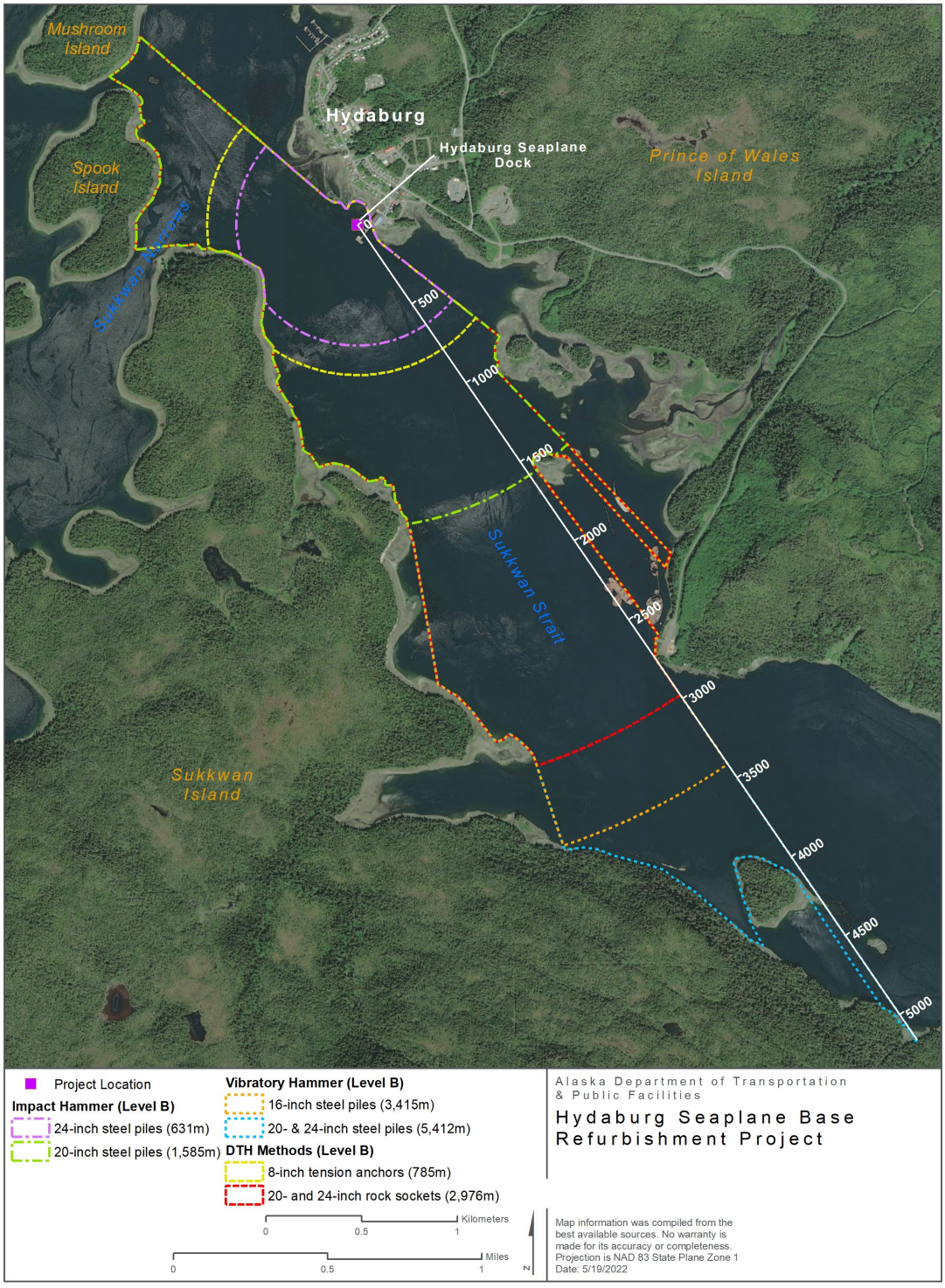

Figure 6-7. Level B Harassment Zones during Pile Installation and Removal at Hydaburg Seaplane Base

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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 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.

The spherical spreading model is used to estimate distances to the noise thresholds from the maximum anticipated in-air noise source level:

$$D = D_o * 10^{((\text{Construction Noise} - \text{Noise Threshold})/\alpha)}$$

where D is the distance from the noise source, D_o is the reference measurement distance (15 meters in this case), and α is the transmission loss per doubling of distance (estimated at 20 dBA for hard-site conditions [over water] and 25 dBA for soft-site conditions [forested or urbanized terrain]). For this analysis, hard-site conditions were assumed above the surface of the ocean. Given the conservative source level of 108 dBA chosen for impact pile installation of 24-inch steel piles, the calculated isopleths for in-air noise can be used for all pile sizes and types associated with the Project. Installation of smaller piles is generally assumed to produce lower sound levels than installation of larger piles. The estimated distance to the airborne sound level thresholds from pile installation of all pile types and sizes for the Project is 120 meters for harbor seals and 38 meters for Steller sea lions and other pinnipeds (Table 6-6).

Table 6-6. Distances to which In-air Sound will Attenuate to NMFS Threshold for Level B Harassment

Method, pile type	Harbor Seals (90 dB)	Other Pinnipeds (100 dB)
Impact Hammer		
All Project piles	122 meters (400 feet)	39 meters (125 feet)

Note: dB = decibels.

6.5 Estimated Takes

Estimated exposure and take of marine mammals associated with the Project is based on presence/absence, distribution, and abundance information presented in Section 4. Although construction is currently planned to begin in fall 2023, unexpected delays associated with construction can occur. To account for this uncertainty, the following exposure estimates assume that construction would occur during the periods of peak abundance for each species, for those species for which abundance varies seasonally.

Estimated exposures are primarily by Level B harassment, as use of the acoustic source (i.e., vibratory or impact pile driving or DTH pile installation) has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result, primarily for low- and high-frequency cetaceans because predicted auditory injury zones are larger than for mid-frequency species and pinnipeds. Although shutdown zones will be implemented during pile installation and removal (Table 6-5), Level A take will not occur until an individual crosses the Level A harassment isopleth and remains within the ensonified area for the duration specific to the in-water activity underway (Table 6-5).

6.5.1 Steller Sea Lion

During peak salmon runs, we conservatively estimate that six groups of 10 individuals (60 individuals total; see Section 4.1.2) of Steller sea lions may be exposed to Project-related underwater noise each week during pile installation and removal activities, for a total of 240 exposures (4 weeks [26 days] * 60 sea lions per week = 240). It is expected that the same individuals will be exposed on multiple days; therefore, the total number of individuals exposed by the Project will likely be fewer than 240.

The largest Level A harassment zone for otariid pinnipeds extends 39 meters from the noise source (Table 6-5). It is unlikely that a sea lion will approach the Project this closely (Table 6-5) and remain unobserved; therefore, no Level A take is requested for Steller sea lions.

The in-air Level B harassment zone extends 38 meters from the noise source (Table 6-5). No Steller sea lions are known to haul out within 38 meters of the Project; therefore, exposure of hauled-out Steller sea lions to in-air noise is not anticipated.

6.5.2 Harbor Seal

Up to six known harbor seal haulouts are located near the Project site as described in Section 4.2.2; however, harbor seal sightings within the Project area remain relatively rare as described by local residents. For these reasons, we conservatively estimate that up to eight harbor seals could be exposed to noise levels in excess of the Level B harassment threshold each day, for a total of 208 exposures (26 days * 8 seals per day = 208).

The largest Level A harassment zone for phocid pinnipeds extends 308 meters from the noise source (Table 6-5). There are no haulouts located within the Level A harassment zone, and although it is unlikely that harbor seals will enter this area without detection while underwater activities are underway, it is possible that harbor seals may approach and enter the Level A zone undetected. For this reason, the DOT&PF requests a small number of Level A takes from the above anticipated Level B exposures to safeguard against the possibility of MMOs being unable to detect a harbor seal within the Level A harassment zone (Table 6-5). Similar to other projects in Alaska (85 FR 673), we estimate that up to 12 seals per week could occur within the Level A harassment zone during impact or DTH pile installation, for a total of 48 exposures (12 seals per week * 4 weeks of pile installation = 48). In total, DOT&PF is requesting 160 Level B and 48 Level A exposures of harbor seals.

The in-air Level B harassment zone for harbor seals extends 120 meters from the noise source (Table 6-6). No harbor seals are known to haul out within 120 meters of the Project; therefore, exposure of hauled out harbor seals to in-air noise is not anticipated.

6.5.3 Northern Elephant Seal

Northern elephant seal abundance throughout coastal Southeast Alaska is low, and anecdotal reports have not included northern elephant seals near the Project area. However, northern elephant seals have been observed elsewhere in Southeast Alaska as discussed in Section 4.3.2; therefore, this species could occur near the Project area and we estimate that one northern elephant seal could be exposed to Level B harassment per 7 days of in-water construction, totaling 4 Level B takes for the Project (4 weeks * 1 northern elephant seal each week = 4).

6.5.4 Harbor Porpoise

Sightings of harbor porpoises in Sukkwan Strait were not described by local residents (Section 4.4.2). As such, there is limited potential for them to occur in the Project area, but they could occur in low numbers. Based on information synthesized in Section 4.4.2, we assume that up to two harbor porpoises per day of in-water work could enter the Level B harassment zone, and therefore we estimate 52 exposures over the course of the Project (26 days * 2 porpoises per day = 52).

The largest Level A harassment zone for harbor porpoises extends 579 meters from the noise source (Table 6-5). Harbor porpoises are an inconspicuous species and are challenging for MMOs to sight, making any approach to a monitoring zone potentially difficult to detect. Because harbor porpoises move quickly and elusively, it is possible, but unlikely, that harbor porpoises may enter the Level A harassment zone (Table 6-5) without detection. As such, the DOT&PF requests small numbers of Level A take for harbor porpoises during the Project. We conservatively assume that one pair of harbor porpoises may enter the Level A harassment zone for every 7 days of in-water construction, and therefore estimate a total of 8 exposures to Level A harassment levels over the 26 days of pile installation (4 weeks * 2 porpoises each week = 8). In total, DOT&PF is request 44 Level B and 8 Level A exposures of harbor porpoises.

6.5.5 Dall's Porpoise

Dall's porpoises are not expected to occur in Sukkwan Strait because the shallow water habitat of the bay is atypical of areas where Dall's porpoises usually occur (see Section 4.5.2). However, recent research indicates that Dall's porpoises may opportunistically exploit nearshore habitats when predators, such as killer whales, are absent (Moran et al. 2018). Therefore, we anticipate approximately one observation of one large Dall's porpoise pod (15 individuals) in the Project area during in-water construction, for a total of 15 Level B exposures.

The largest Level A harassment zone for Dall's porpoises extends 579 meters from the noise source (Table 6-5). Given the larger group size and more conspicuous rooster-tails generated by swimming Dall's porpoises, which make them more noticeable than harbor porpoises, Level A take for Dall's porpoises is not requested.

6.5.6 Pacific White-sided Dolphins

Pacific white-sided dolphins do not generally occur in the shallow, inland waterways of Southeast Alaska. There are no records of this species occurring in Sukkwan Strait, and it is uncommon for individuals to occur in the Project area (see Section 4.6.2). However, recent fluctuations in distribution and abundance decrease the certainty in this prediction. In order to reduce risk to the Project, we conservatively predict that one large group (92 individuals) of Pacific white-sided dolphins may be exposed to Level B harassment noise during the in-water construction period, for a total of 92 Level B exposures.

The largest Level A harassment zone for Pacific white-sided dolphins extends 579 meters from the noise source (Table 6-5). Given the large group size and more conspicuous nature of Pacific white-sided dolphins, Level A take for this species is not requested.

6.5.7 Killer Whale

Killer whales are observed infrequently throughout Sukkwan Strait (see Section 4.7.2), and their presence near Hydaburg is unlikely. As a precaution, because of the large Level B isopleths associated with DTH installation, the DOT&PF requests Level B take for one killer whale pod of up to 15 individuals once during the Project (15 exposures total).

Because killer whales are unlikely to enter Sukkwan Strait and are a relatively conspicuous species, all pile installation/removal will be shut down prior to a killer whale entering the shutdown zone implemented for the specific pile installation or removal method underway (Table 6-5). No Level A take is requested for killer whales.

6.5.8 Humpback Whale

Use of Sukkwan Strait by humpback whales is common but intermittent and dependent on the presence of prey fish. Based on the available information synthesized in Section 4.8.2, the DOT&PF predicts that four group of two whales, up to eight individuals per week, may be exposed to Project-related underwater noise each week during the 4 weeks of the Project, for a total of 32 individuals (8 per week * 4 weeks = 32 humpback whales). It is likely that some individuals will be exposed more than once during the Project, so the total number of individual whales exposed is likely to be less than 32.

Wade (2021) estimated that approximately 2.4 percent of humpback whales in Southeast Alaska are members of the Mexico DPS, while all others are members of the Hawaii DPS. Therefore, we predict that 1 of the exposures (32 whales x 0.024 = 0.77 rounded up to 1) will be of Mexico DPS individuals and 31 exposures will be of Hawaii DPS individuals.

The largest Level A shutdown zone for humpback whales extends 510 meters from the noise source (Table 6-5). All pile installation/removal will be shut down prior to a humpback whale entering the Level A zone specific to the in-water activity underway at the time (Table 6-5) when possible. However, due to the long duration of DTH piling that is anticipated, and the potential for humpback whales to enter the large LF cetacean zones from around obstructions or landforms near the Project area, the Project is requesting 4 Level A take (equivalent to two groups of two individuals) of Hawaii DPS humpback whales. Due to the small percentage of humpback whales that may belong to the Mexico DPS in SE Alaska, no Level A take of Mexico DPS whales are expected. In total, DOT&PF requests 27 Level B take of Hawaii DPS humpback whales, 1 Level B take of Mexico DPS humpback whales, and 4 Level A take of Hawaii DPS humpback whales.

6.5.9 Minke Whales

Minke whale abundance throughout Southeast Alaska is low, and anecdotal reports have not included minke whales near the Project area. However, minke whales are distributed throughout a wide variety of habitats and have been observed elsewhere in Southeast Alaska; therefore, this species could occur near the Project area. On a similar project, NMFS estimated that three individual minke whales could occur near Metlakatla every 4 months (86 FR 43190), so the DOT&PF conservatively estimates that up to three minke whales may be exposed to Level B harassment over the entire Project. Level A take is not requested for minke whales.

6.6 All Marine Mammal Takes Requested

The analysis of marine mammal take predicts 601 potential exposures of marine mammals to Level B harassment and 60 potential exposures of marine mammals to Level A harassment (Table 6-7). Estimated Level A takes were subtracted from Level B takes to get the total number of unique Level B takes that do not double-count the Level A takes.

Table 6-7. Summary of the Estimated Numbers of Marine Mammals Potentially Exposed to Level B Harassment Sound Levels

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B)	Stock Abundance	Percent of Population
Steller sea lion	Eastern DPS	240	0	240	43,201	0.56
Harbor seal	Dixon/Cape Decision Stock	160	48	208	23,478	0.89
Harbor porpoise	Southeast Alaska	44	8	52	1,057	4.92
Northern elephant seal	California breeding stock	4	0	4	179,000	<0.01
Dall's porpoise	Alaska	15	0	15	83,400	0.02
Pacific white-sided dolphin	North Pacific	92	0	92	26,880	0.34
Killer whale	West Coast Transient	15	0	15	349	4.3 [a]
	Alaska Resident				2,347	0.6 [a]
	Northern Resident				302	5.0 [a]
Humpback whale	Hawaii DPS	27	4	31	11,398	0.12
	Mexico DPS	1	0	1	3,264	0.03 [b]
Minke whale	Alaska	3	0	3	Unknown	--
Total	**N/A**	**601**	**60**	**661**	**N/A**	**N/A**

Note: DPS = Distinct Population Segment; N/A = not applicable.

[a] These percentages assume that all takes come from each individual killer whale stock; thus the percentage should be adjusted down if multiple stocks are actually affected.

[b] Assumes that 2.4 percent of humpback whales exposed are members of the Mexico DPS (Wade 2021).

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7 ANTICIPATED IMPACT OF THE ACTIVITY

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 on 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 construction 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 Assessment of Potential Acoustic Impacts

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

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) have suggested four zones (described below) to assess the potential effects of noise on marine mammals.

7.1.1 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. Temporary or permanent reduction in hearing sensitivity may result from high levels of received sound. An animal may experience TTS when hearing loss is temporary or PTS when partial or full hearing loss is permanent. The level of hearing loss depends on the sound frequency, intensity, and duration (see Section 6.2.1). Marine mammals exposed to high received sound levels may also experience non-auditory physiological effects such as increased stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. PTS and TTS may reduce an animal's ability to avoid predators, communicate with others, or forage effectively. TTS is not considered injurious and constitutes a Level B take.

Kastak and Schusterman (1995) 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. 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).

Given the short duration and intermittent nature of potentially injurious sound, PTS and TTS are not expected to occur in any marine mammal species as a result of the Project. Furthermore, implementation of mitigation measures will help avoid the potential for close approaches of animals to activities that could result in Level A takes (i.e., injury/mortality) and will limit the time an animal is exposed to that level of sound.

7.1.2 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.

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 to 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, from less than 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 is located in an area with regular vessel activity, including recreational craft, commercial fishing vessels, and industry vessels in addition to regular seaplane traffic. It is likely that marine mammals in the Project area have become habituated to increased noise levels. In general, pinnipeds seem to habituate more readily to disruptive underwater sounds than cetaceans do (Southall et al. 2007). Implementation of the proposed mitigation measures (Section 11) will reduce impacts on marine mammals, with any minor masking occurring near the sound source, if at all.

7.1.3 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 the acoustical characteristics of the noise, current physical and behavioral state of the animals, ambient noise levels and environmental conditions, and 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 are considered Level B harassment.

Responses from marine mammals in the presence of pile installation and removal 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 displace marine mammals from the immediate area of the activity; however, they will 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 events that could possibly rise to Level B harassment under the MMPA will 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.

7.1.4 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 (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 porpoises), medium-sized odontocetes (e.g., killer whales), and pinnipeds (e.g., Steller sea lions and harbor seals). 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.

Repeated or sustained disruption of important behaviors (e.g., 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 the ambient 120-dB sound level and continue to use this area; therefore, they do not appear to be harassed by these sounds, or they have become habituated.

7.2 Conclusions Regarding Impacts to Species or Stocks

Incidental take is expected to result in only short-term changes in behavior, such as avoidance of the Project area, changes in swimming speed or direction, and changes in foraging behavior. Such impacts are unlikely to have any effect on recruitment or survival and, therefore, will have a negligible impact on the affected stocks of Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales, humpback whales, and minke whales. Implementation of the mitigation measures proposed in Section 11 is likely to minimize most potential adverse impacts on individual marine mammals from pile installation or removal. Impacts on individual Steller sea lions, harbor seals, Northern elephant seals, harbor porpoises, Dall's porpoises, Pacific white-sided dolphins, killer whales, humpback 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.

Requested Level B take of marine mammals will likely include multiple (estimated as daily) takes of the same individual(s), resulting in estimates of take (as percentage of the DPS/stock) that are high compared to actual take.

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8 ANTICIPATED IMPACTS ON SUBSISTENCE USES

There are no subsistence activities that target humpback whales, and subsistence hunters rarely target Steller sea lions near the Project area; however, harbor seals and sea otters are harvested for subsistence in the waters surrounding Hydaburg (NOAA 2013).

Alaska Natives have traditionally harvested subsistence resources in Southeast Alaska for many hundreds of years, particularly large terrestrial mammals, marine mammals, salmon, and other fish (ADF&G 1997). Harbor seals and sea otters are reported to be the marine mammal species most regularly harvested for subsistence by households in Hydaburg. An estimated 14.4 harbor seals were harvested by Hydaburg residents every year from 2000 through 2008 (ADF&G 2009a, 2009b). Hunting usually occurs in the late fall and winter (ADF&G 2009a). The Alaska Department of Fish and Game (ADF&G) has not recorded harvest of cetaceans from Hydaburg (ADF&G 2022).

Approximately 93 percent of Hydaburg residents identified as Alaska Native (Sill and Koster 2017) in 2012. Nearly half of all households harvested wild resources in 2012, with nearly all Hydaburg households using salmon, non-salmon fish, marine invertebrates, and vegetation (Sill and Koster 2017). Only 6 percent of Hydaburg households participated in the hunting, use, or receiving of harbor seals in 2012, whereas up to 8 percent used sea otters (Sill and Koster 2017). Based on data from 2012, marine mammals account for approximately 1 percent (1,666 pounds) of all subsistence harvest in Hydaburg (Sill and Koster 2017).

All Project activities will take place in the vicinity of seaplane dock immediately adjacent to Hydaburg where subsistence activities do not generally occur. The Project will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away. Some minor, short-term disturbance of the harbor seals or sea otters could occur, but this is not likely to have any measurable effect on subsistence harvest activities in the region. No changes to availability of subsistence resources will result from Project activities.

Additionally, DOT&PF is working with Haida Elders on the project to raise awareness and collaborate on the project within the local community.

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9 ANTICIPATED IMPACTS ON HABITAT

9.1 Effects of Project Activities on Marine Mammal Habitat

The Project will occur within the same footprint as existing marine infrastructure. The nearshore and intertidal habitat where the Project will occur is an area of relatively high marine vessel traffic. Most marine mammals do not generally use the area within the footprint of the Project area. Temporary, intermittent, and short-term habitat alteration may result from increased noise levels within the Level A and Level B harassment zones. Effects on marine mammals, as described above, will be limited to temporary displacement from pile installation and removal noise, and effects on prey species (Section 9.2).

Habitat quality can play a significant role in behavioral response to noise exposure; less avoidance by marine mammals may be displayed when habitat value is higher (Hastie et al. 2021). Although Southeast Alaska in its entirety is listed as a Biologically Important Area for humpback whales, the Project area does not contain particularly high-value habitat and is not unusually important for the species. Furthermore, mitigation measures (Section 11) such as marine mammal monitoring would limit the number of humpback whales exposed to underwater noise as a result of the Project. Avoidance of the Project area by humpback whales is possible but would be temporary and intermittent in duration.

9.2 Effects of Project Activities on Marine Mammal Prey Habitat

Essential Fish Habitat (EFH) has been designated in the Project area for all five species of salmon (i.e., chum salmon, pink salmon, coho salmon, sockeye salmon, and Chinook salmon; NMFS 2017), which are common prey of marine mammals. Many creeks flowing into Sukkwan Strait and nearby areas are known to contain salmonids, including three primary creeks: Hydaburg River, Natzuhini River, and Saltery Creek (Giefer and Blossom 2020); however, adverse effects on EFH in this area are not expected. Fish populations in the Project area that serve as marine mammal prey could be temporarily affected by noise from pile installation and removal. 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 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).

Drilling of rock sockets or tension anchors, pile installation, and pile removal may result in a small increase in sedimentation within a few feet of the piles. A small amount of sediment may be deposited in proximity to each pile. Minor and temporary increases in turbidity may result from this process, but the effects on fish and marine mammal prey will be negligible. Indirect effects on prey will be insignificant and discountable due to the temporary nature of the activity and are expected to be undetectable to marine mammals.

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

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10 ANTICIPATED EFFECTS OF HABITAT IMPACTS ON MARINE MAMMALS

The potential impacts of the Project on marine mammal habitat are discussed in Section 9. The effects of the Project on marine mammal habitat are expected to be short-term and minor. Permanent loss of habitat is limited to the footprint of the piles only. One potential impact on marine mammals associated with the Project could be a temporary loss of habitat because of elevated noise levels. Displacement of marine mammals by noise will not be permanent and will not have long-term effects. The 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 removal will be temporary and intermittent.

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11 MITIGATION MEASURES TO PROTECT MARINE MAMMALS AND THEIR HABITAT

The estimates outlined in Section 6 represent the maximum potential numbers of marine mammals exposed to Project-related noise, including multiple takes of the same resident individuals that could be exposed to acoustic sources reaching Level B harassment levels. The DOTP&F proposes to employ a number of mitigation measures to minimize the number of marine mammals affected. Mitigation measures will include those that address all phases of construction in general, those that are specific to physical pile installation/removal, 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 Plan (Appendix B).

11.1 Pile Installation and Associated Activities

Pile installation mitigation measures include:

- MMOs will be employed as described in Section 13 and the Marine Mammal Monitoring Plan (Appendix B).
- Prior to the beginning of pile installation/removal, MMOs will visually inspect the Level A and Level B harassment zone from strategic locations for the presence of marine mammals. The Level A and Level B harassment zone sizes will vary based on the size of pile and installation method underway. If a marine mammal is observed, it will be monitored until it has departed the Level A and Level B harassment zone. Ramp-up procedures may be initiated while the marine mammal is within the Level B harassment zone. As long as the marine mammal does not approach the construction site in such a way that injury or harm is possible, and assuming that take has not exceeded the number authorized, all pile installation and removal may continue while the marine mammal is within the Level B harassment zone (each individual will be considered a Level B take as allowed under the IHA to be issued by NMFS).
- In order to prevent harm or injury to marine mammals, the Contractor will implement conservative shutdown zones for marine mammals during pile installation and removal (Table 6-5). For species with no authorized Level A take or if Level A take has been used, all shutdown zones are larger than the corresponding Level A harassment zone calculated for the species group and pile installation/removal method (Table 6-5). If a marine mammal approaches the shutdown zone specific to the species group and pile installation/removal method underway, the activity will cease until the marine mammal has voluntarily left the shutdown zone or 15 minutes (30 minutes for humpback whales, killer whales, and minke whales) have passed without subsequent detections.
- Ongoing in-water pile installation/removal will be stopped during periods when conditions such as low light, darkness, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring within the shutdown zones described above.
- Before impact pile installation occurs, the Contractor will employ a ramp-up procedure to minimize impacts. The following guidelines will be employed by the Contractor:

- When the impact hammer is used, operators will provide an initial set of three strikes from the impact hammer at reduced energy, followed by a 30-second waiting period and then two subsequent three-strike sets.
- 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 will begin only after the MMO 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 will be recorded. Ramping up may occur when these species are in the Level B harassment zone, whether they enter 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. To avoid a Level B take, ramping up will begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the Level B harassment zone or 15 minutes have elapsed without resighting the marine mammal.
- No vibratory ramping up is required.

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 and removal. During pile installation and removal, the shutdown zone will include all areas where the underwater SPLs have the potential to equal or exceed the Level A (injury) harassment criteria (see Table 6-5).

For those marine mammals for which Level B take has not been requested, in-water pile installation/removal will shut down immediately when an animal is sighted and before the animal has entered the Level B harassment zone. In-water pile installation and removal will remain shut down until marine mammals for which no take has been authorized have left the harassment zone per the procedures described in Section 11.1. If a marine mammal authorized for Level B take is present in the Level B harassment zone, in-water pile installation and removal may continue, and a Level B take will be recorded. Pile installation and removal may occur when these species are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone (if relevant), or from outside the Project area. If Level B take reaches the authorized limit, pile installation will be stopped as these species approach to avoid additional take of these species.

For DTH installation of 20- and 24-inch piles and tension anchors, a tiered approach will be implemented based on the size of the Level A isopleths at varying durations (Table 6-5). Shutdown zones will define the area within which shutdown of the activity would occur upon sighting of a marine mammal or anticipation that a marine mammal would enter the defined area. MMOs will monitor the largest Level A monitoring zones expected for the specified activity at all times until it is determined that a lesser duration of that activity is the maximum possible amount for (the remainder of) a given workday, as described in Section 6.4.1.

12 MITIGATION MEASURES TO PROTECT SUBSISTENCE USES

The Project is not known to occur in an important subsistence hunting area. The Project area is a developed area with regular marine vessel traffic. However, the DOT&PF plans to provide advance public notice of construction activities to reduce construction impacts on local residents, adjacent businesses, and other users of Sukkwan Strait and nearby areas. This will include notification to nearby 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 are known to be used for subsistence in the region; however, recent harvest data indicate that harbor seal subsistence use has decreased in recent years. It is unlikely that the Project will interrupt any subsistence activity. If any tribes express concerns regarding Project impacts on subsistence hunting of marine mammals, further communication with the DOT&PF will take place, including provision of any Project information and clarification of any mitigation and minimization measures that may reduce potential impacts on marine mammals used for subsistence.

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13 MONITORING AND REPORTING

Monitoring measures will be implemented along with mitigation measures (Section 11) to avoid and minimize impacts on marine mammals during the Project, as discussed in detail in the Marine Mammal Monitoring Plan (Appendix B).

One or more trained MMOs will collect sighting data and behavioral responses to pile installation and removal for all marine mammals observed within the harassment zones during these activities. MMOs will meet with the Contractor and DOT&PF to determine the most appropriate observation location(s) for monitoring during pile installation and removal.

Trained or experienced MMOs will be present during all pile installation and removal using impact, vibratory, and DTH methods. MMOs 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. MMOs must maintain verbal contact with construction personnel to immediately call for a halt of pile installation and removal to avoid exposures to noise, as described in Section 11.2.

The Contractor, MMOs, and DOT&PF (or DOT&PF's designee) will conduct a briefing prior to the start of in-water construction, or when new staff join the work, in order to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.

13.1 MMO Qualifications

Marine mammal monitoring will be conducted by one or more MMOs who meet or exceed the minimum qualifications identified by NMFS in the final IHA. These include the following:

- MMOs will be independent observers (i.e., not construction personnel).
- The MMO or one MMO (if more than one are observing) must have prior experience working as an observer.
- Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience.
- If there is more than one MMO, one MMO will be designated as the lead MMO or monitoring coordinator. The lead MMO must have prior experience working as an observer.
- MMOs must have:
    - The ability to conduct field observations and collect data according to assigned protocols.
    - Experience or training in the field identification of marine mammals, including the identification of behaviors.
    - Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
    - Lead MMOs must have writing skills sufficient to prepare a report of observations, including, but not limited to:

- The number, species, and behavior of marine mammals observed
- Dates and times when in-water pile installation and removal were conducted
- Dates and times when in-water pile installation and removal were suspended to avoid potential harassment of marine mammals observed within the harassment zones

- The ability to communicate orally, by radio, or in person with Project personnel to provide real-time information on marine mammals observed in the area.

13.2 Observations

MMOs will be positioned at the best practical vantage point(s). Monitoring locations will be selected by the Contractor during pre-construction. MMOs will monitor for marine mammals entering the Level B harassment zones; the position(s) may vary based on construction activity and location of piles or equipment. At least one of the monitoring locations will have the following characteristics:

- An unobstructed view of the pile being driven, and
- An unobstructed view of the Level A harassment zones.

This central position will generally be staffed by the lead MMO, who will monitor the shutdown zones and communicate with construction personnel about shutdowns and management of take. The MMO at this location will be able to see at least a 500-meter radius, which exceeds the largest Level A zone, around the construction site. Walking or otherwise moving around the general construction site may be helpful for monitoring the shutdown zones in their entirety. The other MMO(s) will watch for marine mammals entering and leaving the Level B zone(s) and will alert the lead MMO of the number and species sighted, so that no unexpected marine mammals will approach the construction site. This will minimize Level A take of all species.

The MMOs will begin observations 30 minutes prior to the start of pile installation/removal and 30 minutes following completion each day. Pile installation/removal may commence when MMOs have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown resulting from marine mammals in the shutdown zone, their behavior must be monitored and documented until they leave of their own volition, at which point pile installation or removal may begin.

At least two MMOs will be available to observe during rotating shifts of no more than 4 hours without a break and no more than 12 hours each day to prevent fatigue. While the 4-hour time limit is required by NMFS, pile driving is intermittent in nature, and it is expected that MMOs on watch will be able to take frequent breaks as needed while still being able to maintain sufficient coverage of the Project area.

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

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

- If waters exceed a sea-state that restricts the MMO's ability to make observations within the Level A harassment zone of pile driving (e.g., if there is excessive wind or fog), pile installation and removal will be halted. Pile driving will not be initiated until the entire Level A harassment zone is visible.
- If any marine mammal species not authorized for take is encountered during pile installation or removal and is likely to be exposed to Level B harassment, in-water pile installation or removal will be halted. If take occurs, the observations will be reported to NMFS' Office of Protected Resources.
- When a marine mammal is observed, its location will be determined using tools to verify distance and heading (e.g., rangefinder, reticle binoculars, GPS, compass).
- The MMOs will record any authorized cetacean or pinniped present during monitoring and the harassment zone within which it is located, if applicable. The harassment zones are described in Table 6-5 and shown on Figure 6-3 through Figure 6-7.
- Ongoing in-water pile installation/removal may be continued during periods when conditions such as low light, high sea state, fog, ice, rain, or glare prevent effective marine mammal monitoring of the entire Level B harassment zone. MMOs will continue to monitor the visible portion of the Level B harassment zone throughout pile installation and removal.

13.3 Data Collection

NMFS requires that MMOs use NMFS-approved sighting forms (see Appendix B) that contain the following information:

- Date and time that pile installation begins or ends
- Construction activities occurring during each observation period
- Weather (e.g., 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 site to marine mammals, if pile installation is occurring during marine mammal observations
- Other human activity in the area

13.4 Reporting

A draft report will be submitted to NMFS within 90 calendar days of the completion of marine mammal monitoring. A final report will be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS. To the extent practicable, the

MMOs will 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 will include:

- Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones
- Descriptions of in-water and in-air construction activities occurring at the time of the observable behavior
- Actions performed to minimize impacts on marine mammals (e.g., shutdowns)
- 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 marine mammals observed during the course of construction

See the Marine Mammal Monitoring Plan (Appendix B) for more detail.

14 SUGGESTED MEANS OF COORDINATION

To minimize the likelihood that impacts will occur to the species, stocks, and subsistence use of marine mammals, all Project activities will be conducted in accordance with federal, state, and local regulations. To further minimize potential impacts from the planned Project, the DOT&PF will continue to cooperate with NMFS and other appropriate federal agencies (e.g., USFWS, U.S. Army Corps of Engineers), and the State of Alaska. DOT&PF will also coordinate with the Hydaburg Cooperative Association in order to minimize impacts on the community.

The DOT&PF will cooperate with any other marine mammal monitoring and research programs in Southeast Alaska that may take place in the Hydaburg area. The DOT&PF will also assess mitigation measures that can be implemented to eliminate or minimize impacts from these activities.

The DOT&PF will make available its field data and behavioral observations on marine mammals that occur in the Project area. The draft summary report described in Section 13.4 documents the results of monitoring efforts and will be provided to NMFS within 90 calendar days of the conclusion of monitoring. This information will 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
Project Site Plan Drawings

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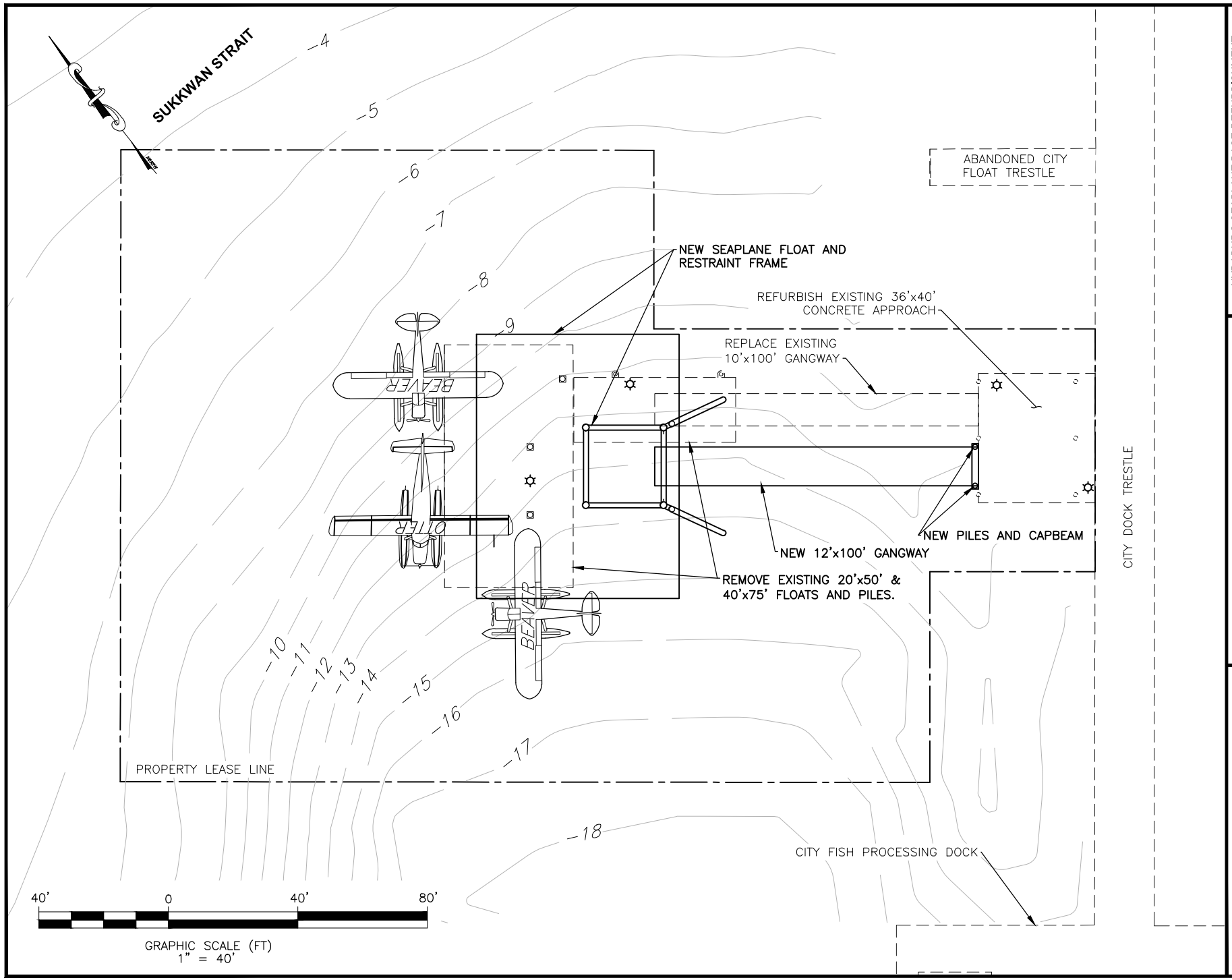

HYDABURG SEAPLANE BASE REFURBISHMENT
PROJECT NO. SFAPT00328
AT: HYDABURG, ALASKA
LOCATED IN: TOWNSHIP 77 SOUTH,
RANGE 84 EAST CRM, ALASKA
DATE: September 30, 2021 SHEET 3 OF 3

SITE PLAN

APPLICATION BY:
ALASKA STATE DEPT. OF TRANSPORTATION
AND PUBLIC FACILITIES
SOUTHCOAST REGION

WATER BODIES:
SUKKWAN STRAIT

ADJACENT PROPERTY OWNERS:
CITY OF HYDABURG

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Appendix B
Marine Mammal Monitoring and Mitigation Plan

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Marine Mammal Monitoring and Mitigation Plan

Hydaburg Seaplane Base Refurbishment Project

State Project #: SFAPT00328

Prepared for:
Alaska Department of Transportation & Public Facilities
6860 Glacier Highway
Juneau, Alaska 99801

Prepared by:
HDR
582 E 36th Ave, Suite 500
Anchorage, AK 99503

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Attachment 1: Example Data Forms

Acronyms and Abbreviations

BiOp	Biological Opinion
DOT&PF	Alaska Department of Transportation & Public Facilities
DPS	Distinct Population Segment
DTH	Down-the-Hole
ESA	Endangered Species Act
IHA	Incidental Harassment Authorization
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
PSO	Protected Species Observer
QA	Quality Assurance
QC	Quality Control

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1 INTRODUCTION

The purpose of this Marine Mammal Monitoring and Mitigation Plan is to describe monitoring procedures for affected marine species and mitigation actions that will be implemented by the Alaska Department of Transportation & Public Facilities (DOT&PF) during pile installation and removal associated with the Hydaburg Seaplane Base Refurbishment Project (Project; see Figure 1-1). This Marine Mammal Monitoring and Mitigation Plan was prepared as part of the application for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) and in support of formal consultation with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA).

The overall goal of the Marine Mammal Monitoring and Mitigation Plan is to comply with the Project IHA and Biological Opinion (BiOp) during in-water pile installation and removal by monitoring the Project area and documenting all marine mammals potentially exposed to noise at or above established thresholds; minimizing impacts to marine mammals through mitigation measures; and collecting data pertaining to marine mammal exposures (takes), occurrence, and behavior of marine mammals in the Project area.

1.1 Project Description

The Project will involve the removal of five existing cantilever steel pipe piles (16-inch diameter) that support the existing multiple-float structure. The multiple-float timber structure, which covers 4,000 square feet, will also be removed. A new 4,800-square-foot, single-float timber structure will be installed in the same general location. Four 24-inch and four 20-inch permanent steel pipe piles will be installed vertically to act as restraints for the new seaplane float. Up to 10 temporary 24-inch steel pipe piles will be installed to support pile installation and will be removed following completion of construction. Rock sockets and tension anchors will be required on all 24-inch piles and two 20-inch piles. Rock sockets will also be potentially required on five of the temporary piles. The marine construction associated with the Project will occur during a 2-month period in fall 2023; however, to avoid unexpected delays, a 1-year authorization is requested to begin on 01 September 2023. See the Project IHA application for further design and construction details.

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 revised Technical Guidance (NMFS 2018) and the interim criteria (70 *Federal Register* 1871–1875), respectively. Level A harassment means 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 means 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.

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Figure 1-1. Project Location

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1.2 Protected Marine Mammals

Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), Northern elephant seals (*Mirounga angustirostris*), harbor porpoises (*Phocoena phocoena*), Dall's porpoises (*Phocoenoides dalli*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), killer whales (*Orcinus orca*), minke whales (*Balaenoptera acutorostrata*), and humpback whales (*Megaptera novaeangliae*), including the ESA-listed Mexico Distinct Population Segment (DPS) of humpback whales, may occur in the Project area; a small number of Level B exposures was authorized for these marine mammal species under the MMPA (see Project IHA, NMFS 2022a). Additionally, a small number of Level A exposures were authorized for harbor seals and harbor porpoises under the MMPA (NMFS 2022a). Authorization for a small number of Level B exposures of the ESA-listed Mexico DPS of humpback whales was also granted in the Project BiOp and Incidental Take Statement (NMFS 2022b).

The analysis of marine mammal exposures for the Project predicts 601 potential exposures of marine mammals to Level B harassment and 60 potential exposures of marine mammals to Level A harassment, for a total of 601 potential exposures (Table 1-1).

Table 1-1. Summary of the Estimated Numbers of Marine Mammals Potentially Exposed to Level A and B Harassment Sound Levels

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B)	Stock Abundance	Percent of Population
Steller sea lion	Eastern DPS	240	0	240	43,201	0.56
Harbor seal	Dixon/Cape Decision Stock	160	48	208	23,478	0.89
Northern elephant seal	California breeding stock	4	0	4	179,000	<0.01
Harbor porpoise	Southeast Alaska	44	8	52	1,057	4.92
Dall's porpoise	Alaska	15	0	15	83,400	0.02
Pacific white-sided dolphin	North Pacific	92	0	92	26,880	0.34
Killer whale	West Coast Transient Alaska Resident Northern Resident	15	0	15	349 2,347 302	4.3 [a] 0.6 [a] 5.0 [a]
Humpback whale	Hawaii DPS	27	4	31	11,398	0.12
	Mexico DPS	1	0	1	3,264	0.03 [b]
Minke whale	Alaska	3	0	3	Unknown	--
Total	**N/A**	**601**	**60**	**661**	**N/A**	**N/A**

Note: DPS = Distinct Population Segment; N/A = not applicable.

[a] These percentages assume that all takes come from each individual killer whale stock; thus the percentage should be adjusted down if multiple stocks are actually affected.

[b] Assumes that 2.4 percent of humpback whales exposed are members of the Mexico DPS (Wade 2021).

2 MARINE MAMMAL MONITORING AND MITIGATION MEASURES

The complete list of required avoidance, minimization, and mitigation measures can be found in the Project IHA (NMFS 2022a) and BiOp (NMFS 2022b). Avoidance and minimization measures described here include establishment of Level A and Level B harassment zones, marine mammal monitoring, and specific mitigation measures that will be implemented during in-water pile installation and removal.

2.1 Shutdown Zones

During in-water pile installation, removal, or down-the-hole (DTH) drilling, the Contractor will monitor for all marine mammals within or approaching the Level A and Level B harassment zones. Monitoring all harassment zones, including the outer margins, enables trained Marine Mammal Observers (MMOs; also known as Protected Species Observers or PSOs) to be aware of and communicate the presence of marine mammals in the Project area and thus prepare for potential shutdown of activity and documentation of exposures (takes).

Distances to the Level A and Level B harassment thresholds, as defined by sound isopleths, vary by marine mammal functional hearing group, pile size, duration of installation, and pile-installation method (Table 2-1). Figures illustrating the anticipated Level A and Level B harassment zones for the different numbers and types of piles, as well as installation methods, are provided in Figure 2-1 through Figure 2-7.

Note that the actual pile installation and removal durations may be longer or shorter than the numbers used for calculations in Table 2-1. Estimated duration of pile installation and removal methods are used to predict harassment zone sizes and are not intended to be caps or limits on these activities. It is anticipated that the actual durations will be determined based on the engineering specifications for the Project as determined by the contractor.

For those marine mammal species for which Level B exposures have not been requested, in-water pile installation and removal and DTH drilling will shut down immediately when the animals are sighted approaching or within the Level B zone. If a marine mammal authorized for Level B exposure is present in the Level B harassment zone, in-water pile installation and removal may continue, and a potential Level B exposure will be recorded. Pile installation by vibratory, impact, and DTH drilling methods may occur when marine mammals for which Level B exposure has been authorized are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone (if relevant) or from outside the Project area. If the number of potential Level B exposures reaches the authorized limit, pile installation will be stopped as these species approach to avoid additional exposures of these species.

A 30-meter shutdown zone will be implemented for all species and all pile installation and removal methods to prevent direct contact and injury of marine mammals with construction equipment (Table 2-1). Shutdown zones shown in Table 2-1 have been rounded up to simplify management of monitoring. Shutdown zones less than 1,000 meters were rounded up to the nearest 10 meters (Table 2-1).

Table 2-1. Combined Level A Harassment Zones, Shutdown Zones, and Level B Zones

Activity	Pile Size (in)	Minutes per Pile or Strikes per Pile	Piles Per Day	Rounded Level A Zones and Minimum Shutdown Zones (meters)										Level B Zones
				LF		MF		HF		PW		OW		
				Humpback Whale, Minke Whale		Killer Whale, Pacific White-sided Dolphin		Harbor and Dall's Porpoise		Harbor and Northern Elephant Seal		Steller Sea Lion		All Species
				Level A Take for Humpback Whale Only		**No Level A Take**		**Level A Take for Harbor Porpoise Only**		**Level A Take for Harbor Seal Only**		**No Level A Take**		
				Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	
Vibratory Installation	20- and 24-inch	15 Minutes	2 Piles	30	5	30	1	30	7	30	3	30	1	5,412
Vibratory Installation	20- and 24-inch	30 Minutes	10 Piles	30	20	30	2	30	30	30	13	30	1	
Vibratory Removal	16-inch	30 Minutes	2 Piles	30	5	30	1	30	7	30	3	30	1	3,415
Vibratory Removal	24-inch	30 Minutes	2 Piles	30	7	30	1	30	11	30	5	30	1	5,412
DTH (Rock Socket)	20- and 24-inch	60 Minutes	Based on Minutes of DTH	170	169	30	13	200	194	110	103	30	14	2,976
		120 Minutes		250	243	30	18	280	279	150	149	30	19	
		180 Minutes		310	301	30	22	350	346	190	184	30	24	
		240 Minutes		350	350	30	26	410	402	220	214	30	27	
		300 Minutes		400	394	30	29	460	452	250	241	40	31	
		360 Minutes		440	434	40	32	500	498	270	265	40	34	
		420 Minutes		470	470	40	34	540	540	290	287	40	37	
		480 Minutes		510	504	40	37	580	579	310	308	40	39	

Activity	Pile Size (in)	Minutes per Pile or Strikes per Pile	Piles Per Day	Rounded Level A Zones and Minimum Shutdown Zones (meters)										Level B Zones
				LF		MF		HF		PW		OW		
				Humpback Whale, Minke Whale		Killer Whale, Pacific White-sided Dolphin		Harbor and Dall's Porpoise		Harbor and Northern Elephant Seal		Steller Sea Lion		All Species
				Level A Take for Humpback Whale Only		**No Level A Take**		**Level A Take for Harbor Porpoise Only**		**Level A Take for Harbor Seal Only**		**No Level A Take**		
				Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	Shutdown Zone to Avoid Take	Level A Zone	
DTH (Tension Anchor)	8-inch	60 Minutes	Based on Minutes of DTH	30	6	30	1	30	8	30	4	30	1	785
		120 Minutes		30	9	30	2	30	12	30	6	30	1	
		180 Minutes		30	11	30	2	30	15	30	7	30	1	
		240 Minutes		30	13	30	2	30	17	30	9	30	1	
Impact	24-inch	50 Strikes	1 Pile	70	63	30	3	80	75	40	34	30	3	1,585
			2 Piles	100	100	30	4	120	119	60	54	30	4	
Impact	20-inch	50 Strikes	1 Pile	50	47	30	2	60	56	30	25	30	2	631
			2 Piles	80	74	30	3	90	88	40	40	30	3	

Note: Actual pile installation and removal durations may be longer or shorter. Estimated duration of pile installation and removal methods are not intended to be caps or limits on these activities. It is anticipated that the actual durations will be determined based on the engineering specifications for the Project as determined by the contractor. HF = high frequency; LF = low frequency; MF = mid-frequency; OW = otariid in water; PW = phocid in water

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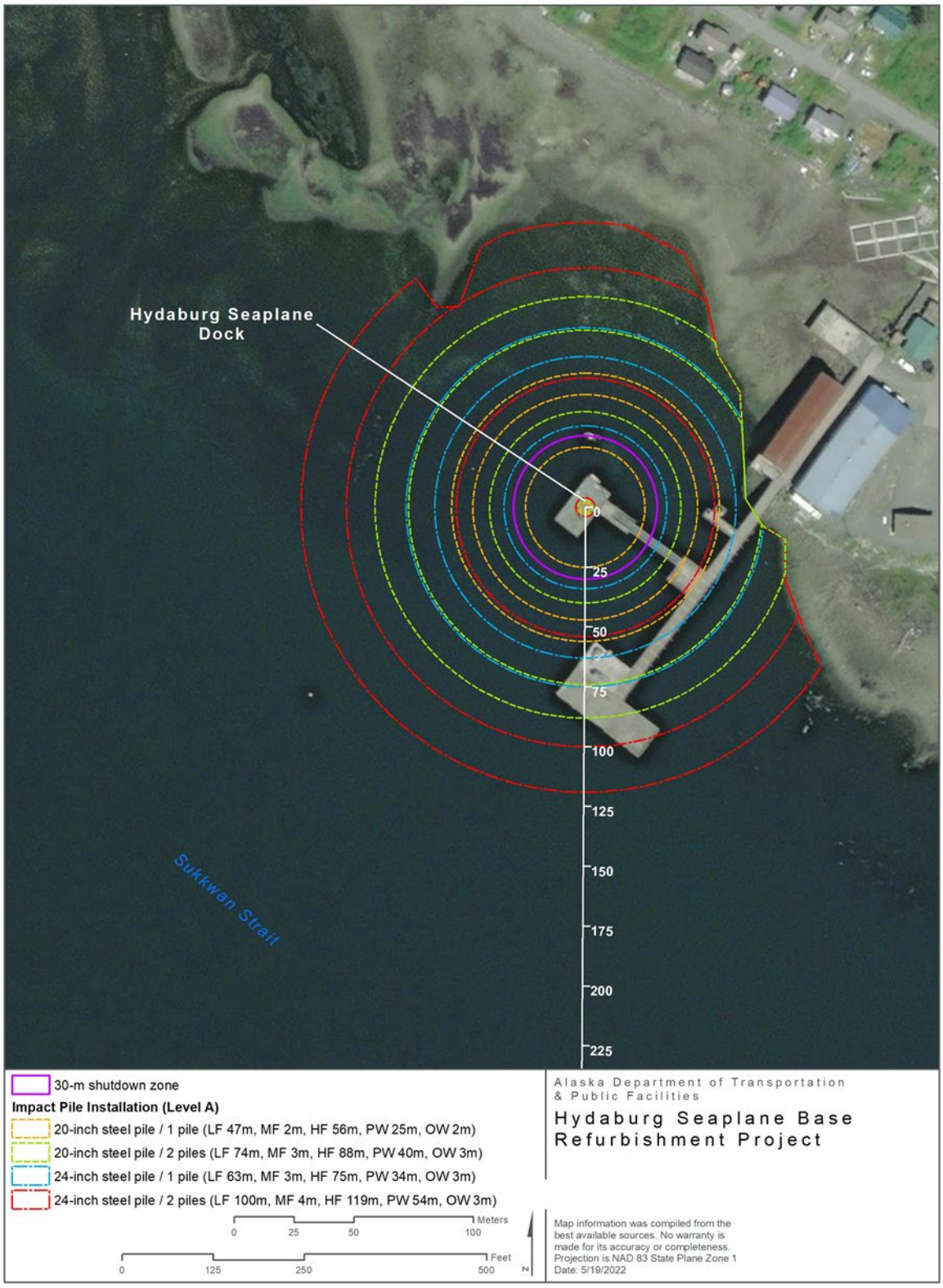

Figure 2-1. Level A Harassment Isopleths for Impact Pile Installation

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Figure 2-2. Level A Harassment Isopleths for Vibratory Pile Installation or Removal

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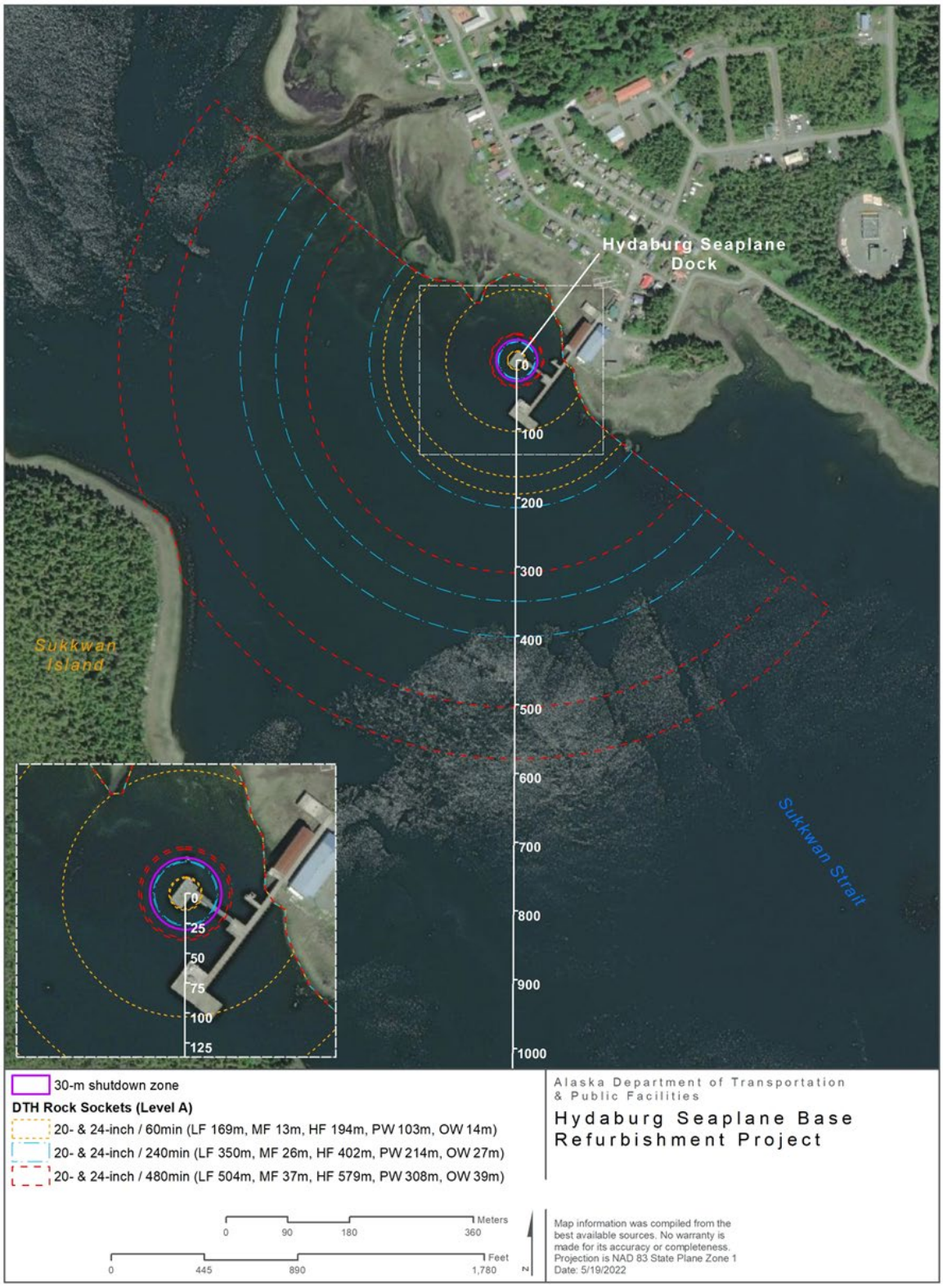

Figure 2-3. Level A Harassment Isopleths during Down-the-Hole Installation of 20- and 24-Inch Piles for 1, 4, and 8 Hours

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Figure 2-4. Level A Harassment Isopleths during Down-the-Hole Installation of Tension Anchors for 2 and 4 Hours

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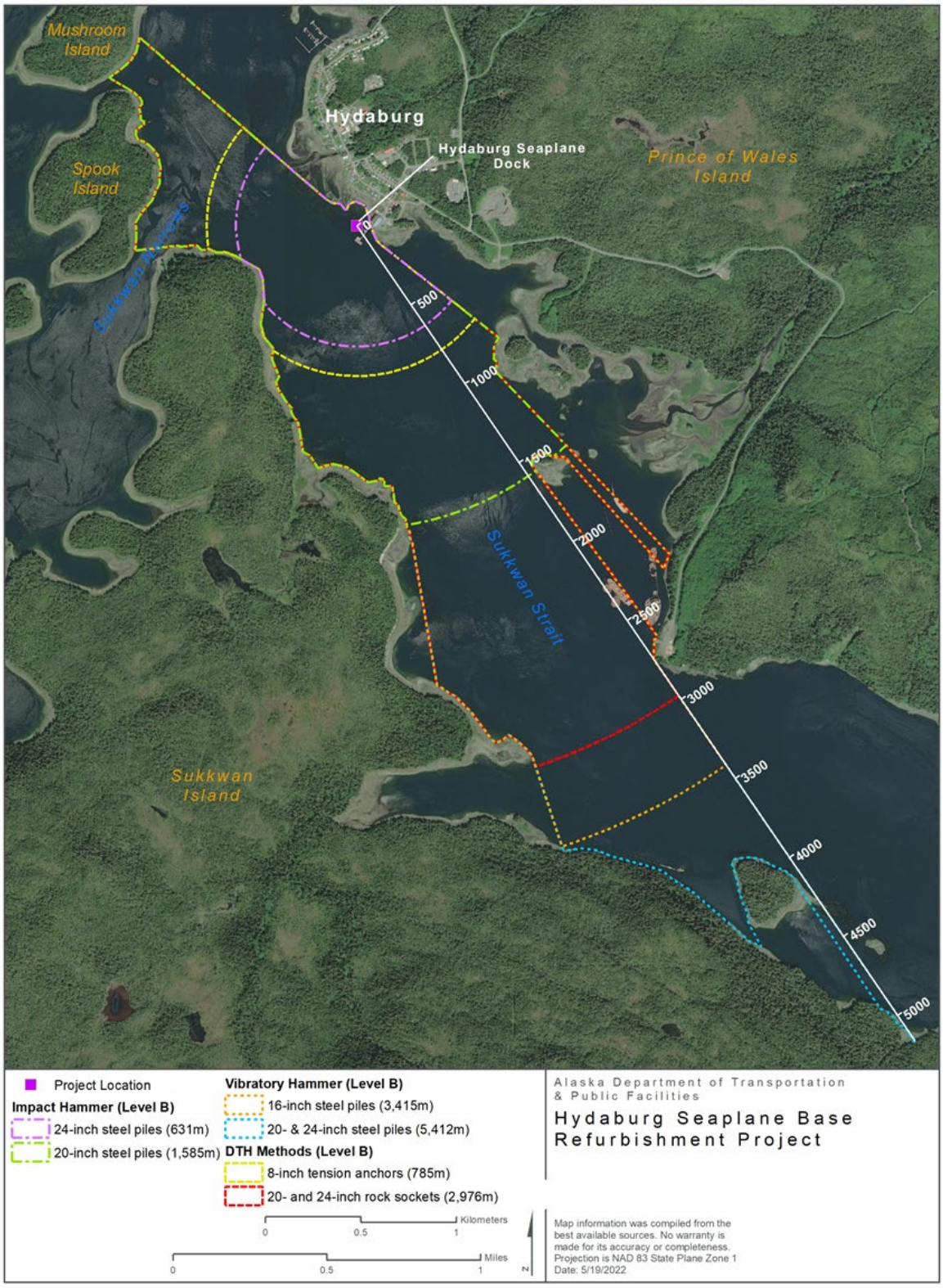

Figure 2-5. Level B Harassment Isopleths during Vibratory, Impact, and Down-the-Hole Installation and Vibratory Removal

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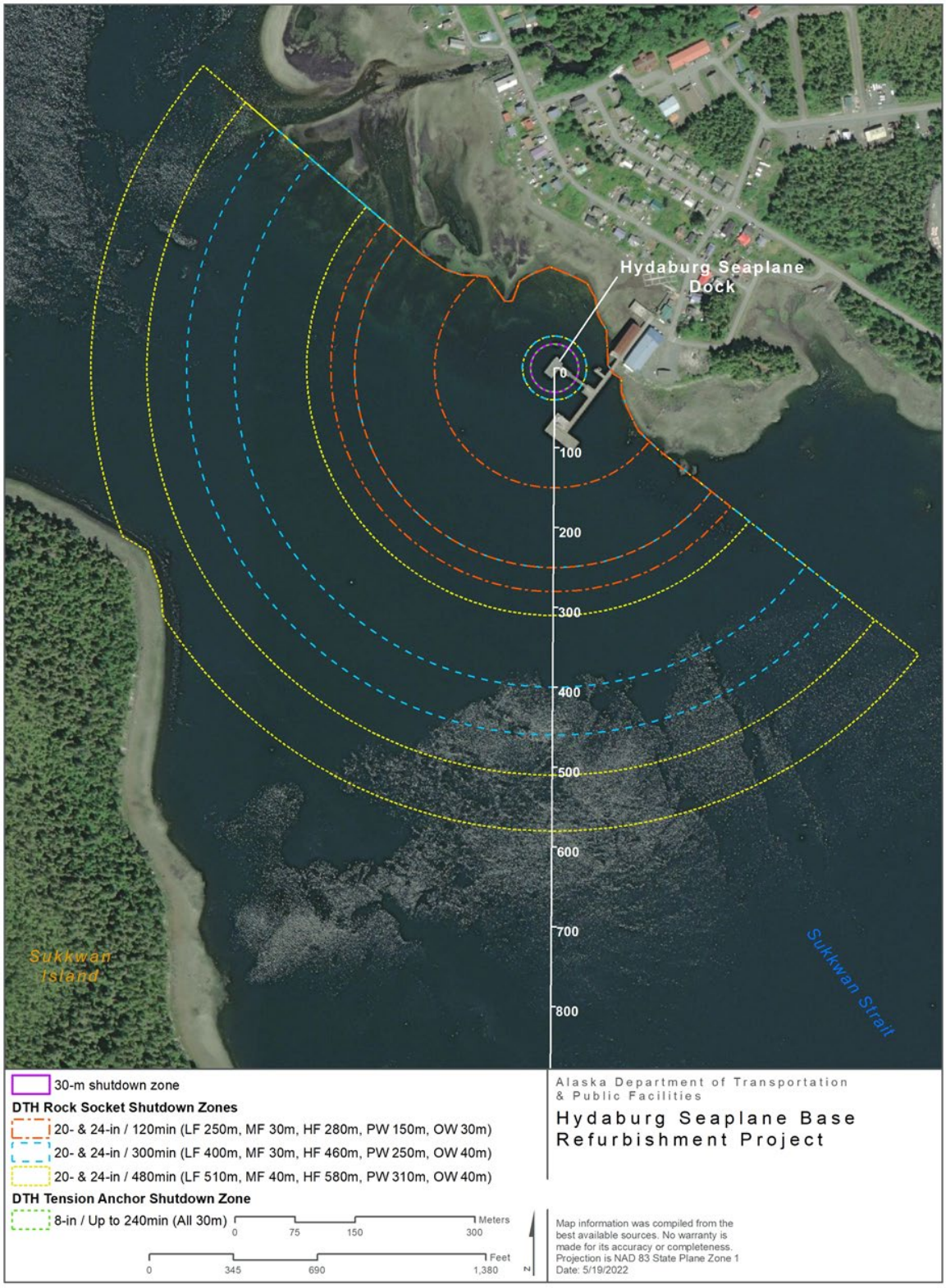

Figure 2-6. Shutdown Zones during Down-the-Hole Installation

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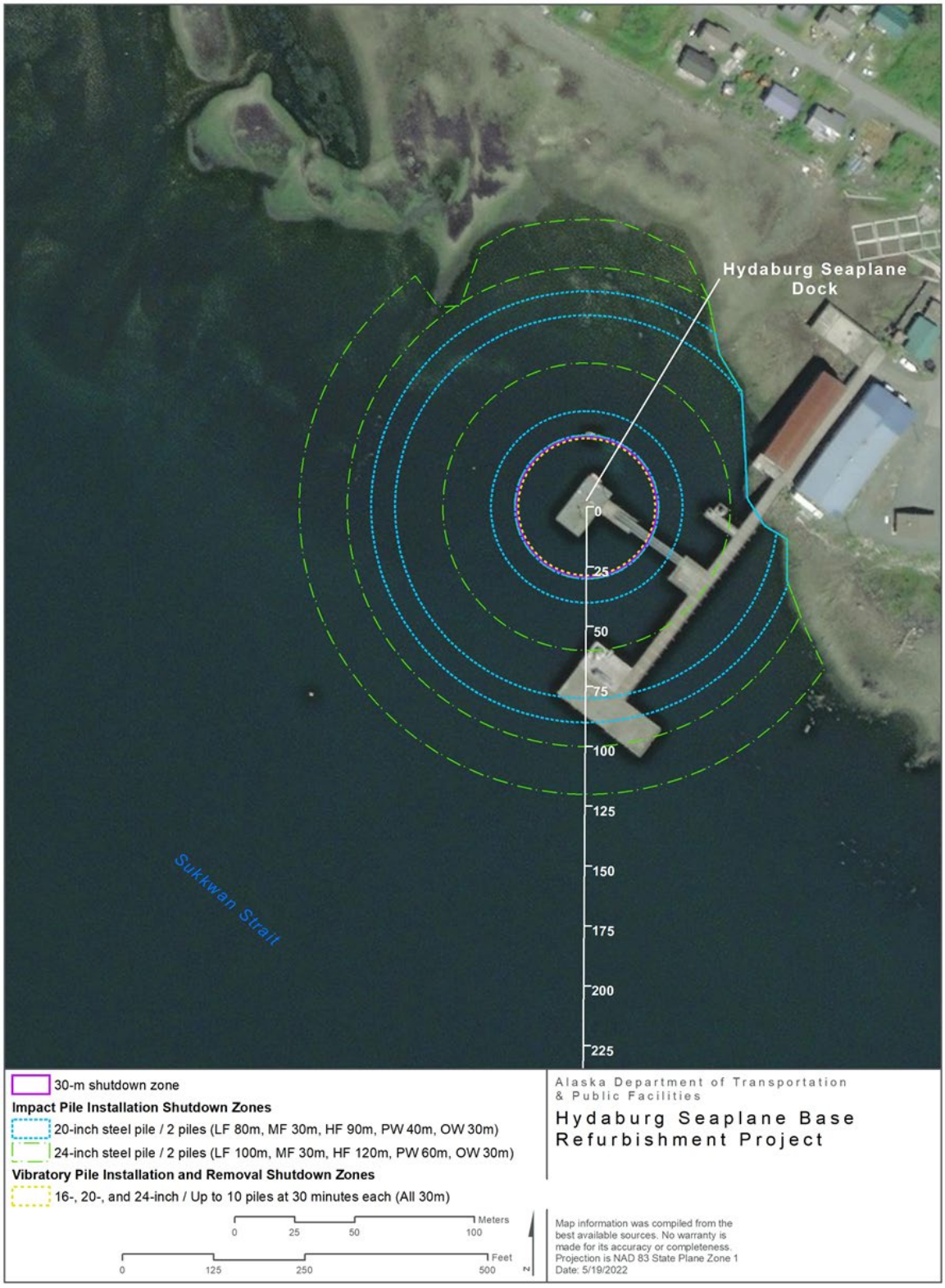

Figure 2-7. Shutdown Zones during Impact Installation and Vibratory Installation and Removal

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2.2 Marine Mammal Monitoring

To minimize potential impacts of Project activities on marine mammals, MMOs will be present during all pile installation and removal using impact, vibratory, and down-the-hole installation methods. The MMOs' primary responsibilities will be to search for, monitor, document, and track marine mammals.

MMOs will have no other construction-related tasks or responsibilities while monitoring for marine mammals. MMOs will understand their roles and responsibilities before beginning observations. A clear authorization and communication system will be in place to ensure that MMOs and construction crew members understand their respective roles and responsibilities.

2.2.1 Positioning

MMOs will be positioned at the best practical vantage point(s). It is possible to observe the entire width of Sukkwan Strait with unaided eyes. A minimum of two MMOs will monitor from different locations along the Hydaburg shorefront, allowing them collectively to monitor larger zones.

The observation point(s) may vary based on construction activity and location of piles or equipment. At least one of the monitoring locations will have an unobstructed view of the pile being driven and a good view of the Level A zones. This central position will be staffed by the Lead MMO, who will monitor the Level A zones and communicate with construction personnel about shutdowns and marine mammal exposure management. Walking or otherwise moving around the construction site may be helpful for monitoring the shutdown and Level A zones in their entirety.

MMOs stationed along the road system will watch for marine mammals entering and leaving the Project area. MMOs will monitor for marine mammals approaching the Level B harassment zones from the north or south and will alert the Lead MMO of the number and species sighted so that no unexpected marine mammals approach the construction site. All MMOs will be in constant radio contact with one another, and the Lead MMO will be in contact with the construction team to request a work stoppage, if necessary.

The DOT&PF has recently implemented marine mammal monitoring programs around the state, including in Tongass Narrows for other marine construction projects, and it is anticipated that the Contractor and MMOs for this Project will benefit from this experience. MMOs will be positioned at the best practical vantage point(s) around the ensonified area. Suitable observation points are available from the northern shoreline in Hydaburg, which could include the small boat harbor, as well as southward along the shoreline.

2.2.2 Daily Monitoring Protocols

At the start of each day, the Contractor(s) will hold a briefing with the Lead MMO to outline the activities planned for that day. The MMOs will begin observations 30 minutes prior to the start of pile installation and removal (includes the start of the day and any break in activity longer than 30 minutes) and will continue observing at least 30 minutes following completion of pile installation and removal. The Contractor will have at least two MMOs present during pile installation and removal. MMOs will observe during rotating shifts of 4 to 6 hours, or as needed to prevent fatigue given the intermittent nature of pile installation and removal. No MMO will perform duties as an MMO for more than 12 hours in a 24-hour period.

Specific aspects and protocols of observations will include:

- Ongoing in-water pile installation and removal and DTH drilling may be continued during periods when conditions such as low light, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone. MMOs will continue to monitor the visible portion of the Level B harassment zone throughout the duration of pile installation and removal.
- If waters exceed a sea state that restricts the MMOs' abilities to make observations within the Level A harassment zones (e.g., heavy rain, excessive wind or fog), pile installation and removal will cease. Pile driving will not be re-initiated until the entire relevant Level A harassment zones are visible.
    - If zones are unable to be monitored for a period of 30 minutes or more due to environmental conditions, MMO breaks, or other circumstances, the 30-minute observation period prior to pile installation or removal will need to be completed again.
- If any marine mammal species not authorized for exposure is encountered during in-water pile installation or removal, pile installation or removal will cease and exposure will be avoided. Furthermore, the observations will be reported immediately to the DOT&PF Project Engineer, who will coordinate communication with the NMFS Office of Protected Resources.
- If a humpback whale potentially crosses into a Level A zone before shutdown occurs, this observation will be immediately reported to the DOT&PF Project Engineer, who will coordinate communication with the NMFS Office of Protected Resources.
- When a marine mammal is observed, its location will be determined using a rangefinder to verify distance and a GPS or compass to verify heading. Comparisons to nearby landmarks will also aid in determining the locations of sightings.
- Potential Level A and Level B exposures will be documented and recorded as they occur.

2.3 Mitigation Measures for In-water Pile Installation and Removal

The DOT&PF intends to implement the general monitoring approach that was analyzed in the project BiOp and *Federal Register* Notice of Proposed IHAs. DOT&PF also intends to adhere to the monitoring and mitigation measures as outlined in the final BiOp, Incidental Take Statement, and IHA. The complete list of required avoidance, minimization, and mitigation measures can be found in the Project IHA. Avoidance and minimization measures described here include soft starts, establishment of shutdown zones, and marine mammal monitoring. To minimize the effects of in-water pile installation and removal on marine mammals, the following measures will be observed:

- Pile installation, proofing, and removal will occur only during daylight hours, when visual monitoring of marine mammals can be conducted.
    - Daylight hours, for the purposes of monitoring, are defined as the time between civil dawn and civil dusk. Exact times for civil dawn and dusk for various locations can be found online.

- A 30-meter shutdown zone will be implemented for all species and all pile installation and removal methods to prevent direct contact and injury of marine mammals with construction equipment.
- Shutting down pile installation or removal when a marine mammal is approaching or observed within a defined shutdown zone will be used to avoid exposure.
- If a marine mammal authorized for Level B exposure is present in the Level B harassment zone, in-water pile installation and removal may continue, and a Level B exposure will be recorded. Pile installation and DTH installation may occur when these species are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone (if relevant) or from outside the Project area.
- If Level A or Level B exposure for a species reaches the authorized limit, pile installation will be stopped as individuals of this species approach the relevant zones to avoid additional exposure of this species.
    - If Level A or Level B exposure for a species reaches 80% of the authorized limit, the Project Engineer will be alerted.
- The Project Engineer will be alerted immediately if a potential unauthorized Level A take occurs.
- For those marine mammal species for which Level B exposure has not been requested, in-water pile installation and removal and drilling will shut down before they enter the Level B harassment zone to avoid unauthorized Level B exposure.
- If a marine mammal is entering or is observed within an established shutdown zone, pile installation and removal must be halted or delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without subsequent detections of the animal.
- For impact pile installation, the Contractor will provide an initial set of three strikes from the impact hammer at reduced energy, followed by a 1-minute waiting period and then two subsequent three-strike sets. This soft start will be applied prior to the beginning of pile installation each day or after an impact hammer has been idle for more than 30 minutes. No vibratory soft start is required.
- If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal leaves the Level A harassment zone. Ramping up and pile installation or removal will begin only after the MMO has determined, through sighting, that the animal has moved outside the Level A harassment zone.
- If a marine mammal authorized for exposure is present in the Level B harassment zone, ramping up may begin and a potential Level B exposure will be recorded. Ramping up may occur when these species are in the Level B harassment zone, whether they enter 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 exposure. To avoid a Level B exposure, ramping up will begin only after the MMO has determined, through sighting or if 15 minutes has passed without a re-sighting, that the animal has moved outside the Level B harassment zone.

- If a marine mammal approaches within 10 meters of a Project vessel (e.g., barge, tugboat), the vessel shall reduce speed to the minimum level required to maintain safe steerage and working conditions until the marine mammal is at least 10 meters away from the vessel.
- The Level A harassment zones for each pile will be monitored and implemented according to pile size, type, duration of installation, installation method, and functional hearing group as analyzed in the project BiOp and *Federal Register* Notice of Proposed IHAs.
- The Level B harassment zone for each pile will be monitored and implemented according to pile size, type, and installation method as outlined in the BiOp and *Federal Register* Notice of Proposed IHAs.
- MMO teams will be staffed as needed to effectively monitor the exposure zones.

3 MARINE MAMMAL OBSERVER QUALIFICATIONS

All MMOs will undergo project-specific training in monitoring, data collection, and mitigation procedures specific to the Project. This training will also include communication protocols.

All MMOs must be capable of spotting and identifying marine mammals and documenting applicable data during all types of weather, including rain, sleet, snow, and wind. At a minimum, all MMOs will have or meet the following qualifications:

- MMOs will be independent observers not engaged in construction activities.
- MMOs' visual acuity (correction is permissible) will be sufficient to allow detection and identification of marine mammals at the water's surface; use of binoculars may be necessary to correctly identify a sighting to species.
- MMOs will demonstrate ability to conduct field observations and collect data according to assigned protocols (this may include academic training and/or previous field experience).
- MMOs will have documented marine mammal monitoring experience or training, or an undergraduate degree in biological science or a related field. Project-specific training for this Project will meet the training requirement if the MMO has experience identifying marine mammals to species.
- MMOs will have sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
- MMOs will have the ability to communicate orally, by radio or in person, with project personnel about marine mammals observed in the area.
- MMOs will have the ability to collect the required marine mammal observation data as detailed in Section 4.

A designated Lead MMO will always be on-site and will remain responsible for implementing the Monitoring Plan for in-water pile installation and removal for the Project.

The Lead MMO must have education and experience that demonstrates qualifications to serve as the lead, including the following minimum requirements:

- Education in wildlife observation techniques from a university, college, or other formal education program,
- Writing skills sufficient to prepare daily activity logs and monthly and final reports, and
- Previous professional marine mammal observation experience during construction.

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4 DATA COLLECTION

4.1 Environmental Conditions and Construction Activity

MMOs will use the environmental conditions and construction activities log to document environmental conditions, types of construction activities, and other human activity in the area (Attachment 2). Environmental conditions will be recorded at the beginning and end of every monitoring period and at every half hour or as conditions change. Data collected will include MMO names, location of the observation station, time and date of the observation, weather conditions, air temperature, sea state, cloud cover, visibility, glare, tide, and ice coverage (if applicable).

MMOs will record the time that observations begin and end as well as the durations of shutdowns and delays. MMOs will document the reason(s) for stopping work, time of shutdown, and type of pile installation or other in-water work taking place. MMOs will document other, non-project-related activities that could disturb marine mammals in the area, such as the presence of large and small vessels. Additionally, all communications between MMOs and the construction crew will be documented.

Data concerning environmental conditions, marine mammal sightings, and mitigation measures will be entered into a spreadsheet. Each data entry will be checked for quality assurance and quality control (QA/QC). Upon request, the data will be submitted to NMFS along with the final monitoring report.

4.2 Sightings

Each marine mammal observation will be documented on a Marine Mammal Sighting Form consisting of a data page/table and a schematic map of the location of the observed animal (Attachment 1). Sightings data will include start and end times of each sighting; species; number of individuals; sex and age class, if possible; behavior and movement; distances from Project activities to the sighting; initial and final heading of the animal; type of in-water activity at the time of sighting; and if and when Project activities were stopped in response to the sighting (Table 4-1). MMOs will record whether no exposures occurred or a potential Level A and/or Level B exposure occurred, including the number of marine mammals and species potentially exposed. To the extent practicable, the MMOs will record behavioral observations that may make it possible to determine if the same or different individuals are exposed as a result of Project activities over the course of a single day. When marine mammals are sighted, MMOs should delegate responsibilities so that one or more MMOs continue to scan the water to identify other marine mammals that may enter the area while another MMO continues to monitor and track the first sighting.

Table 4-1. Data Attributes and Definitions

Data Attribute	Attribute Definition and Units Collected
Start and end times of monitoring period	Time that monitoring by MMOs/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, or another direction)
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 MMOs/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 MMOs/PSOs and construction crew
Marine Mammal Sighting Data	
Time of initial and last sightings	Time the animals are initially and last sighted
Species	Species (use unidentified mysticete, odontocete, cetacean, or pinniped if unknown); sex and age class, if possible
Number of individuals	Minimum and maximum number of animals counted; record the count the MMO believes to be the most accurate (i.e., best estimate)
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	Types of construction activities occurring at time of sighting and mitigation measures implemented
Distance from marine mammal to construction activities	Distance from marine mammal to construction activities when initially sighted, at closest approach to activities, and at final sighting (include location relative to monitoring and shutdown zones)
Commercial activities at time of sighting	Description of nearby commercial or anthropogenic activities occurring at time of sighting not associated with the Project
Behavior	Behaviors observed; indicate 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

4.3 Equipment

The following equipment and information will be required on-site for marine mammal monitoring:

- Portable radios for the MMOs to communicate with the Construction Contractor point of contact and other MMOs, or cellular phones and phone numbers for all MMOs and the Construction Contractor point of contact
- Daily tide tables
- Hand-held binoculars (7X or better) with built-in rangefinder or reticles
- Rangefinder
- Paper data forms or electronic data collection system (e.g., Toughbook or iPad) and backup paper forms
- Large (11- by 17-inch or similar) waterproof maps of the Project area and monitoring zones

4.4 Quality Assurance and Quality Control

Electronic data collection or paper data sheets will be QA/QC'd by the Lead MMO at the end of each monitoring day. No cells or information will be left blank. If information is not available or not applicable, the field will be populated with an "NA" or dash. The data will also be QA/QC'd once it is entered electronically.

4.5 Marine Mammal Monitoring Data Management

All marine mammal monitoring data will be entered into and stored in an electronic database or spreadsheet. The database or spreadsheet will be set up and structured for easy access and management of data and will be used to develop the marine mammal monitoring report. An electronic copy of the data spreadsheet will be available to NMFS upon request.

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5 REPORTING

5.1 Notification of Intent to Commence Construction

DOT&PF will inform the NMFS Office of Protected Resources and the NMFS Alaska Region Protected Resources Division 1 week prior to commencing pile installation and removal (Reny Tyson Moore, 301-427-8481, reny.tyson.moore@noaa.gov).

5.2 Reporting

During construction, MMOs/PSOs will maintain daily activity logs that include the following information:

- Time that each monitoring period begins and ends
- Prevailing environmental conditions
- In-water construction activities occurring during each monitoring period (including number, type, and size of piles)
- Indication of whether marine mammals were sighted

Within 90 days of the completion of the project, DOT&PF will submit to the NMFS Office of Protected Resources (Silver Spring, MD) a draft final report of all monitoring conducted during the Project. Within 30 days of receiving comments from NMFS on the draft final report, DOT&PF will submit the final report to NMFS.

To the extent practicable, the MMOs will record behavioral observations that may make it possible to determine if the same or different individuals are being “taken” (or exposed) as a result of Project activities over the course of a day.

The monitoring reports will include a description of the monitoring protocol, a summary of the data recorded during monitoring, and an estimate of the number of marine mammals that may have been harassed, including the total number extrapolated from observed animals across the entirety of relevant monitoring zones. The data will include:

- Dates and times of monitoring and total number of days and hours of observations
- Weather and water conditions during each monitoring period
- Locations of observation stations used and dates/times when each location was used
- Numbers, species, group sizes, dates/times, and locations of marine mammals observed
- Sex and age classes of marine mammals observed, if possible
- Distances to marine mammal sightings relative to construction location(s), including closest approach to construction activities
- Details of all recorded marine mammal exposures, including the species, number of individuals, date/time, location, and type of pile installation/removal occurring at the time of exposure
- Descriptions of observable marine mammal behavior in the Level A and Level B harassment zones
- Times of shutdown and delay events, including when work was stopped and resumed

due to the presence of marine mammals or other reasons

- Descriptions of the type and duration of any pile installation work occurring and soft start procedures used while marine mammals were being observed
- Description of all non-Project-related human activities in the area
- Details of all shutdown and delay events and whether they were due to the presence of marine mammals, inability to clear the hazard area due to low visibility, or other reasons
- Tables, text, and maps to clarify observations

5.3 Notification of Injured or Dead Marine Mammals

In the unanticipated event that the specified activity (pile installation and removal) clearly causes the exposure of a marine mammal for which authorization has not been granted, such as a serious injury or mortality, DOT&PF will immediately cease pile installation and removal and report the incident to the NMFS Office of Protected Resources (301-427-8401), the NMFS Alaska Region Protected Resources Division (907-271-5006), and the NMFS Alaska Regional Stranding Coordinator (907-271-3448) or hotline (1-877-925-7773).

The report will include the following information:

- Time, date, and location (latitude/longitude) of the incident
- Detailed description of the incident
- Description of vessel involved (if applicable), including the name, type of vessel, and vessel speed before and during the incident
- Status of all sound source use in the 24 hours preceding the incident
- Environmental conditions (wind speed and direction, wave height, cloud cover, and visibility)
- Description of marine mammal observations in the 24 hours preceding the incident
- Species identification, description, condition, and fate of animal(s) involved
- Photographs or video footage of animal(s) or equipment (if available)

Pile installation and removal shall not resume until NMFS is able to review the circumstances of the prohibited exposure. NMFS shall work with DOT&PF to determine what is necessary to minimize the likelihood of further prohibited exposures and ensure MMPA compliance. DOT&PF may not resume pile installation and removal until notified by NMFS' MMPA program via letter, email, or telephone.

In the event that DOT&PF discovers an injured or dead marine mammal and the Lead MMO determines that the cause of the injury or death is unrelated to the Project, DOT&PF will immediately report the incident to the Alaska Regional Stranding hotline (877-925-7773).

The report will include any applicable information listed above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with DOT&PF to determine whether modifications to the activities are appropriate.

6 LITERATURE CITED

NMFS (National Marine Fisheries Service). 2018. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts, 2018 Revision. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59.

NMFS. 2022a. Incidental Harassment Authorization – Hydaburg Seaplane Base Refurbishment Project. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS, Silver Spring, MD. Date.

NMFS. 2022b. Endangered Species Act Section 7(a)(2) Biological Opinion for Construction of the Hydaburg Seaplane Base Refurbishment Project. NMFS Consultation Number: AKRO-XXXX. Date.

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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								
		Fin Whale					Unknown Sex			
		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

Appendix C
Down-The-Hole Drilling Memo

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ILLINGWORTH & RODKIN, INC.
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M E M O

Date: April 29, 2022

To: **Christy Gentemann**
DOT&PF, Southcoast Region
P.O. Box 112506
Juneau, Alaska USA 99811-2506
christy.gentemann@alaska.gov

From: James A. Reyff
Illingworth & Rodkin, Inc.
429 E. Cotati Ave
Cotati, CA 94931
jreyff@illingworthrodkin.com

RE: SFAPT00328 Hydaburg SPB – Hydaburg, AK

SUBJECT: **DTH Underwater Acoustics for Small Diameter Piles**
Job#22-009

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Alaska Division of the Federal Aviation Administration (FAA), is proposing to refurbish the existing Hydaburg Seaplane Facility located in Hydaburg, Alaska. Due to the hard rock substrate conditions in this region of Alaska, down-the-hole (DTH) drilling methods are planned. This method utilizes percussive hammering and rotational drilling to break up the rock and advance the pile. Unlike pile driving, the source of sound from DTH pile drilling is mostly below the pile where mechanical contact with the rock substrate occurs. This makes DTH drilling a point source. During impact and vibratory pile driving, the sound source is extended from above water at the top of the pile through the water column and into the substrate because the entire length of the pile releases energy as sound. Impact and vibratory pile driving are an extended sound source. Therefore, sound propagation from a point source that is also underground, like DTH, would be associated with a higher transmission loss coefficient.
The proposed DTH activities for the Hydaburg project involve the installation of 24- and 20-inch diameter piles into rock sockets and 8-inch diameter tensions anchors. The sound level data used to model the acoustic impacts for these activities are based on empirical data collected for several projects:

1. Installation of 24-inch rock socket piles using DTH drilling at drilling at the Kodiak ferry terminal in Alaska[1].
2. Installation of 8-inch diameter tension anchors using DTH drilling for new mooring dolphins at a cruise ship terminal in Skagway, Alaska[2].
3. Installation of 24-inch rock socket piles and 8-inch diameter tension anchors using DTH drilling for improvements made to the Tenakee ferry terminal in Tenakee Springs, Alaska[3].
4. Installation of 18-inch diameter piles using DTH drilling off Biorka Island in Alaska[4].

24-inch DTH Rock Sockets

The Hydaburg project would include four 24-inch and four 20-inch diameter rock socket piles installed by DTH methods. Available literature reviewed included 24-inch diameter piles measured during DTH installation at Kodiak and Tenakee.

At Kodiak, there were eight 24-inch diameter piles installed using DTH drilling. The median sound pressure level (i.e., continuous RMS or 1-second SEL) was reported as 166 dB. The transmission loss coefficient for sound propagation was reported at 18.9 Log_{10} (Distance). The impulsive strike rate was 15.5 Hz. Impulsive sounds were not measured but estimated to be 154 dB when considering the continuous level equal to the 1-sec SEL and strike rate of 15.5 Hz.

For Tenakee, there were four 24-inch diameter rock socket piles installed using DTH drilling. The median sound pressure level (i.e., continuous RMS or 1-second SEL) was 167 dB. The transmission loss coefficient for sound propagation was reported at 19.1 Log_{10} (Distance). The pulsed-RMS level was 173 dB at 10m with a transmission loss coefficient for sound propagation of 20.3 Log_{10} (Distance). The impulsive strike rate was 9 Hz, much lower than Kodiak. Installation time for each socket was about 30 minutes.

Unlike impact pile driving, sounds from this DTH source decay at a greater rate of 19 to 20 Log_{10}. This is characteristic of a point source. The use of the proper source level, sound transmission rate and strike rate are critical inputs to an acoustic assessment. Table 1 shows the effect of predicting distances to Level A zones for LF cetaceans for one hour of DTH and the extent of the Level B zone (out to 120 dB).

1 S.L. Denes, G.J. Warner, M.E. Austin and A.O. MacGillivray. 2016. *Hydroacoustic Pile Driving Noise Study – Comprehensive Report*. November 23. Accessed 10/7/2019 at http://www.dot.alaska.gov/stwddes/research/search_lib.shtml

2 J. Reyff and Heyvaert, C. 2019. *White Pass & Yukon Railroad Mooring Dolphin Pile Driving and Drilling Sound Source Verification. Skagway, Alaska*. August 22.

3 C. Heyvaert and Reyff, J. 2021. *Tenakee Ferry Terminal Improvements Project – Pile Driving and Drilling Sound Source Verification. Tenakee Springs, Alaska*. January.

4 Guan S. and Miner, R. 2020. *Underwater Noise Characterization of down-the-hole pile driving activities off Biorka Island, Alaska*. Mar. Pollut. Bull. 160, 111664.

Table 1 Calculation of Impact Zones for 24-in Diameter Rock Socket Piles

Description (Source levels referenced to 10 meters)	**Distance to Level B 120 dB zone (Cont. Sound)**	**Distance to Level B 160 dB zone (Imp. Sound)**	**Distance to Level A LF Cetacean Zone**
Kodiak using 15.5Hz strike rate, 166dB cont. RMS, 173 dB imp. RMS, 154 dB pulse SEL, and 18.9 Log_{10} sound transmission coefficient	2,716m	Not reported	94m 1 hour Impulsive
Tenakee using 9Hz strike rate, 167dB cont. RMS, RMS, 173 dB imp. RMS,159 dB pulse SEL, and 19.1 and 20.3 Log_{10} sound transmission coefficient	2,889m	48m	127m 1 hour Impulsive
NMFS current method using 15Hz strike rate, 167 dB cont. RMS, 159 dB pulse SEL, and 15 Log_{10} sound transmission coefficient	13,594m	74m	356m 1 hour Impulsive

8-inch Diameter Rock Tension Anchors

The Hydaburg project would include six 8-inch rock tension anchor piles installed by DTH methods. Available literature reviewed includes 8-inch diameter piles measured during DTH installation at Skagway and Tenakee.

There have been two studies that we are aware of that involved the installation of 8-inch rock tension anchors. While these sounds had impulsive characteristics at times, they were considered mostly continuous sounds because the impulse level was generally not 3 dB or greater above the continuous sound level. Continuous sound levels measured in Skagway were reported at 156 dB at 10 meters. The pulsed sounds, which occurred about 30 percent of the time of active DTH, were 144 dB at 10 meters. The transmission loss coefficient for sound propagation was reported at over 30 Log_{10} (Distance) from the source and 24 Log_{10} (Distance) from the pile. Note that it took about one hour to install each of the deep rock tension anchors measured at Skagway. Rock tension anchor DTH sounds were measured at Tenakee and found to be much quieter. Note that Skagway rock tension anchors were installed at depths well below the substrate in water that was about 30 meters deep. Tenakee, which has similar conditions to Hydaburg, had water depths of less than 10 meters. The measurements at Tenakee were identified as continuous sounds, with the RMS sound level ranging from 141 to 149 dB at 10 meters. The transmission loss coefficient for sound propagation was reported at 17 to 19 Log_{10} (Distance). The rock anchor tension DTH activity lasted about 15 to 20 minutes for each anchor. Table 2 shows the effect in predicting distances to Level A zones for LF cetaceans for one hour of DTH and the extent of the Level B zone (out to 120 dB).

Note that measurements made for DTH sounds from the installation of 18-inch diameter piles off Biorka Island had sounds similar to and slightly higher than the loudest 8-inch anchor tension sounds measured at Skagway. These were a continuous level of 157 dB, pulsed level of 146 dB at 10 meters and a strike rate of 13 Hz. The measurements off Biorka Island are consistent with the sound levels measured at Skagway and Tenakee.

Table 2. Calculation of Impact Zones for 8-in Diameter Rock Anchor Tension Piles

Description (Source levels referenced to 10 meters)	**Distance to Level B 120 dB zone (Cont. Sound)**	**Distance to Level B 160 dB zone (Imp. Sound)**	**Distance to Level A LF Cetacean Zone**
Skagway using 15Hz strike rate (adjusted for 30% of time), 156dB cont. RMS, 144 dB pulse SEL, and 24 Log_{10} sound transmission coefficient	316m	Not reported	14m 1 hour Impulsive
Tenakee non-impulsive, 149dB cont. RMS and 18 Log_{10} sound transmission coefficient	408m	Not reported	2m 1 hour Non-Impulsive
NMFS current method using 15Hz strike rate, 167 dB cont. RMS, 159 dB pulse SEL, and 15 Log_{10} sound transmission coefficient	13,594m	74m	356m 1 hour Impulsive

Recommended Small Pile DTH Levels

Based on available measurement data, sound levels transmission coefficients representative of DTH installation of small socket or rock anchor piles are presented in Table 3 below.

Table 3. Calculation of Impact Zones for Small Diameter Piles Using DTH

Description (Source levels referenced to 10 meters)	**Hammer Rate**	**Pile Duration**	**SEL (pulse)**	**RMS (pulse)**	**SEL (cont.)**	**Transmission Loss Coefficient**
24-inch Rock Socket Piles	15 Hz	<1 hour	159 dB	173 dB	167 dB	19 Log_{10} (Distance)
8-inch Rock Tension Anchor Piles	Non Impulsive	<1 hour	Non Impulsive	Non Impulsive	156 dB	19 Log_{10} (Distance)