Request for an Incidental Harassment Authorization
Haines Borough
Lutak Dock Replacement Project

Lutak Inlet, Haines Borough, Alaska

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Prepared for:
Haines Borough
P.O. Box 1209
Haines, AK 99827

Prepared by:

2607 Fairbanks Street Suite B
Anchorage, Alaska 99503

Submitted to:
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

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ACRONYMS AND ABBREVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
ADF&G	Alaska Department of Fish and Game
AML	Alaska Marine lines
ANSI	American National Standards Institute
AWC	Anadromous Waters Catalog
BIA	Biologically Important Area
cy	cubic yard
dB	decibel
DPS	distinct population segment
DTH	down-the-hole
EDPS	eastern distinct population segment
EFH	essential fish habitat
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
HF	high-frequency
HTL	high tide line
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
km	kilometers
LF	low-frequency
LOA	Letter of Authorization
MF	mid-frequency
MHW	mean high water
mi	miles
MMPA	Marine Mammal Protection Act
M/SI	mortality/serious injury
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OW	otariid pinniped
PBR	potential biological removal
PSO	protected species observer
PTS	permanent threshold shift
PW	phocid pinnipeds
RMS	root mean square
RoRo	Roll-on/Roll-off
SEL	sound exposure level
Sf	square feet
SPL	sound pressure level

SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
UME	unique mortality event
µPa	micro pascal
USACE	U.S. Army Corps of Engineers
WDPS	western distinct population segment
WNP	Western North Pacific

1 DESCRIPTION OF SPECIFIED ACTIVITY

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

1.1 OVERVIEW

The Haines Borough proposes to construct a replacement to the Lutak Dock on the southern shore of Lutak Inlet, approximately 5.5 kilometers northwest of downtown Haines, Alaska. The purpose of the project is to replace the dock facility, constructed in 1953, that has reached the end of its 60-year service life and has experienced local structural failures. The Lutak Dock is an important maritime shipping link that is connected by road to mainland Alaska and Canada and by the Alaska Marine Highway System to many other Alaskan ports. The proposed action would occur in marine waters that support several marine mammal species. Pile driving may result in auditory injury (Level A harassment) and behavioral harassment (Level B harassment) of select marine mammal species. Construction would begin in fall or winter 2023, as soon as approvals are obtained, and continue through winter 2024. In-water pile installation and removal activities are expected to occur for a total of approximately 1,272 hours over 234 days (not necessarily consecutive days).

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

The Haines Borough is requesting an IHA for Level B take of six marine mammal species and Level A take of three marine mammal species that may occur in the vicinity of the proposed action area in Lutak Inlet. The species for which Level B take is requested are: humpback whales, killer whales, Dall's porpoise, harbor porpoise, harbor seals, and Steller sea lions. Level A take is requested for harbor porpoise, harbor seals, and Steller sea lions.

As set out by 50 CFR 216.104, Submission of Requests, the items required for this application are included in the following Sections 1 through 14.

1.2 DETAILED DESCRIPTION OF SPECIFIC ACTIVITIES

1.2.1 Location

The proposed Lutak Dock Replacement Project is located within the Haines Borough (Township 30S, Range 59E, Section 10, Copper River Meridian; latitude 59.282° and longitude -135.467°; Figure 1 and Figure 2; Appendix A).

Figure 1. Lutak Dock Replacement Project Vicinity Map

Figure 2. Lutak Dock Replacement Project Location

1.2.2 Purpose and Need

The purpose of the proposed action is to maintain existing freight and cargo capacities at Lutak Dock so that the Haines area has reliable, safe, and economical barge service for the foreseeable future.

Haines is a regional maritime and transportation hub, and the Lutak Dock is an important link for the Haines Borough and Southeast Alaska. Barge transportation is the most cost-efficient form of transportation for Haines and the surrounding area. Since Haines is connected by road to the rest of mainland Alaska and Canada, the dock also serves as a supply link for Interior Alaska and the Yukon. The dock was listed as a critical transportation facility by the Haines Borough in their 2022 Hazard Mitigation Plan Update (Haines Borough 2022).

The proposed action is needed to ensure continued barge service for residents and businesses that rely on regular shipments of necessities through Lutak Dock. Lutak Dock is deteriorated and unsafe and needs work to maintain the function of critical infrastructure central to the Haines Borough's economic stability. Signs of deterioration and failure risk were identified during a structural assessment completed by PND Engineers, Inc. in November 2014. The assessment found that 6 of the 11 closure arcs (which prevent the loss of dock fill) are compromised due to corrosion, structural loading on weakened sections, and damage that occurred after repair work in the early 2000s. It is PND's view based on the structural assessment that failure conditions exist at all other closure arcs (PND Engineers, Inc. 2014). Moreover, the type of welded connection between the closure arcs and the main cells used on the original dock was prohibited by the U.S. Army Corps of Engineers (USACE) in 1965 after several arc connections using that method failed. Sinkholes in the working surface of the dock structure, corrosion of the sheet piles, and failure of one of the closure arcs led to the conclusion that the dock has reached the end of its service life and does not meet current safety standards (PND Engineers, Inc. 2014).

A site visit in October 2022 by Solstice Alaska Consulting, Inc. (SolsticeAK) documented recent conditions of the surface sinkhole and other signs of deterioration at the dock including damage to the northwest closed cell (SolsticeAK 2022).

This proposed action is also needed to avoid a dock closure which would require shifting to truck-based transport of goods and higher truck traffic volumes, leading to increased risk of highway accidents and injuries and more greenhouse gas emissions.

1.2.3 Proposed Action

The Lutak Dock Replacement Project would install the following components in water and on land adjacent to Lutak Inlet (Figure 3; Appendix A).

In-water pile driving components:

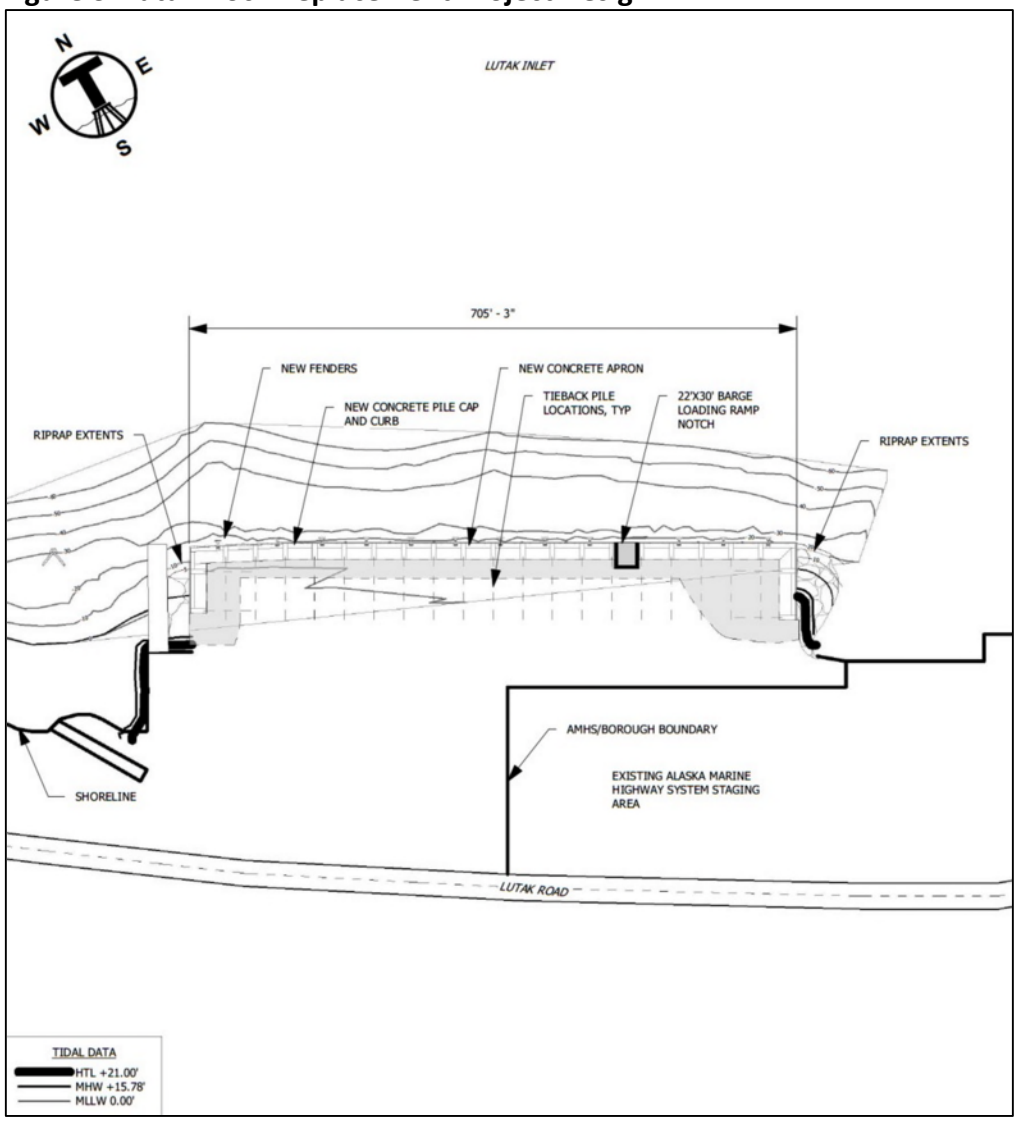
- Removal of twenty-four (24) 16-inch diameter piles associated with four existing mooring dolphins;
- Removal of one (1) 24-inch diameter pile;

- Installation of one hundred eighty (180) 42-inch diameter steel piles;
- Installation and removal of forty-two (42) 36-inch diameter steel piles to guide permanent piles into place;
- Installation of forty (40) 55.5-inch steel sheet piles as part of the combi wall; and
- Fill below high tide line (HTL): 53,310 square feet (sf) (1.2 acres)

Additional project components include:

- Installation of twenty-three (23) 42-inch diameter steel batter piles;
- Installation of forty (40) 55.5-inch steel sheet piles to form the barge loading slip;
- Dock components such as fenders and bollards;
- Rotation (move) of adjacent Alaska Marine Lines (AML) Roll-on/Roll-off (RoRo) ramp; and
- Fill above HTL: 112,155 sf (2.6 acres)

Figure 3. Lutak Dock Replacement Project Design



1.2.4 Construction Methods

1.2.4.1 Construction Vessels

The following vessels are expected to support construction and protected species monitoring:

- One materials barge (approximately 400 feet [ft] by 100 ft) to transport materials from Seattle, Washington to the project site and to be used onsite as a staging area during construction.
- One construction barge (*Brightwater* crane barge [280 ft by 76 ft by 16 ft]) onsite to support construction.
- One skiff (19-foot by 8-foot skiff with a single 90-135 horsepower Honda outboard motor) transported to the project site on the crane barge to support construction and potentially marine mammal monitoring activities.

1.2.4.2 Equipment

The following pile installation equipment would be used (Table 1).

- Vibratory hammer: American Piledriving Equipment 200-6/bare hammer weight without clamp 18,900 pounds
- Diesel impact hammer: Delmag D46/max energy per blow 122,435 feet-pounds; Delmag D80/Max energy per blow 212,420 feet-pounds
- Drilled shaft drill: Holte 100,000 feet-pounds top drive with down-the-hole (DTH) hammer and bit

Table 1. Construction Equipment that will Produce Noise

Driving mechanism	Pile driver	Properties
Vibratory pile driving	APE 200-6/bare hammer weight without clamp 18,900 pounds	6,600 inch-pounds eccentric moment 255 tons drive force
Impact pile driving	Diesel Delmag D46	Max energy per blow 122,435 feet-pounds Speed (blows per minute) 34-53
Impact pile driving	Diesel Delmag D80	Max energy per blow 212,420 feet-pounds Speed (blows per minute) 34-45
Drilled shaft	Holte Top Drive	Max energy 100,000 feet-pounds

1.2.4.3 Transport of Materials and Equipment

The materials barge would be towed from Seattle, Washington to transport materials to the Lutak Dock project site. The construction barge (*Brightwater*) would travel from Whittier in Southcentral Alaska to the project site. All barges would be towed at a speed around 8 knots. These types of barges frequently travel the route to, from, and within Alaska. Once at the project site, the construction barge would be secured in place by four mooring anchors. The anchors would be below the surface and would not be a hazard to navigation. The materials barge would be tied to the construction barge, and materials would be moved from the staging

barge to the construction barge and project site by a crane on the construction barge. Local barge moves to the next pile installation area (in approximately 100-foot increments) would occur at a speed of less than 2 miles (mi) per hour.

1.2.4.4 Other In-water Construction and Heavy Machinery Activities

The proposed action would involve in-water construction and heavy machinery activities in addition to the activities described above. These include using standard barges and tug boats and positioning piles on the substrate using a crane (i.e., "stabbing the pile"). In certain scenarios, the protected species observers (PSOs) would use a skiff to observe the action area. Observer protocols including potential skiff-based monitoring will be developed in consultation with the National Marine Fisheries Servies (NMFS) and be described in the Marine Mammal Monitoring and Mitigation Plan (4MP Appendix C)

1.2.4.5 Construction Sequence

Construction would begin in fall/winter 2023 and continue into winter 2024. In-water pile installation and removal activities are expected to occur for a total of approximately 1,272 hours over 234 days (not necessarily consecutive days).

In-water construction of the combi wall would use the following sequence:

1. Vibrate in 2 to 3 temporary 36-inch diameter steel piles a minimum of 10 feet into overburden to support template frames.
2. Install the template frame with support on the existing dock structure and welded to the temporary pile. The template frame would be sized to hold approximately 10 piles to minimize the number of moves required to complete the work.
3. Within the frame, vibrate, impact, and DTH drill the permanent 42-inch diameter steel piles into place. Only one pile would actively be advanced at a time. However, up to 10 piles may be partially installed at a given time. This ensures that all piles remain vertical and in alignment through the installation process.
4. Remove the template frame and temporary pile, and reinstall in the next location. This process would be repeated for installation of all permanent piles.
5. Vibrate and impact the 55.5-inch sheet piles to make up the new dock return walls.

In-water construction to remove guide pile and mooring dolphins would use the following sequence:

1. Vibrate or dead pull the existing 16-inch diameter steel piles that make up four mooring dolphins.
2. Vibrate or dead pull the existing 24-inch diameter steel guide pile that is embedded 35 feet into the overburden.

Placement of riprap and type C fill would occur above and below HTL as described in Table 3. Placement of fill behind newly established combi wall would not be considered in-water work, since fill would be placed within the constructed wall from land. Placement of gravel surface course would not be considered in-water work, since fill would be overlain on the existing dock surface which is above HTL.

Table 2 provides an estimate of time required for pile installation and removal. Section 2.1 below details estimated construction duration.

1.2.4.6 Installation Methods

Installation of Permanent Piles and Dock Components

If possible, the template frames would be supported by a cantilever on the existing dock to guide installation of permanent piles. However, if needed, temporary piles would be installed to support the template frames. Two or three temporary 36-inch diameter piles may be needed for each template. Most temporary piles would be vibrated into place; however, up to four of these may require the use of an impact hammer in locations where the bedrock is shallow. Shallow bedrock is not anticipated at the project site.

Using the templates as guides for positioning, the one hundred eighty (180) permanent piles would be vibrated and if required, impacted through the overburden to the bedrock to encapsulate the existing dock. Once the pile tips have reached bedrock, they would be socketed into the bedrock 10 feet utilizing a DTH drill. For each permanent 42-inch diameter pile, approximately 5 cubic yards (cy) of drill cuttings would be produced.

The twenty-three (23) permanent 42-inch diameter tieback steel piles would be vibrated or impacted as required through the soil layer to bedrock. A 28-inch diameter shaft would be drilled through the 42-inch diameter pile into the bedrock with the DTH drill and bit, to socket the piles 24 feet into the bedrock. All tieback pile installation would occur above HTL within the existing dock.

Table 2. Lutak Dock Replacement Project Pile Installation and Removal Summary

	In-Water Work (Below HTL)						In-Air Work (Above HTL)	
	Guide Pile Removal	Dolphin Removal	Temp. Pile Installation	Temp. Pile Removal	Perm. Pile Installation	Sheet Pile Installation	Sheet Pile Installation	Batter Pile Installation
Diameter of Steel Pile (inches)	24	16	36	36	42	55.5	55.5	42
Number of Piles	1	24	42	42	180	40	40	23
Vibratory Pile Driving								
Total Quantity	1	24	42	42	180	40	40	23
Max # Piles Vibrated per Day	1	4	4	4	4	6	6	2
Vibratory Time per Pile (minutes)	45	45	15	15	45	30	30	60
Vibratory Time per Day (minutes)	45	180	60	60	180	180	180	120
Number of Days	1	6	11	11	45	7	7	12
Vibratory Time Total (hours)	1	18	11	11	135	20	20	23
Impact Pile Driving								
Total Quantity			42		180	40	40	23
Max # Piles Impacted per Day			4		4	6	6	2
Number of strikes per Pile			900		1,500	900	900	2,700
Impact Time per Pile (minutes)			30		45	30	30	90
Impact Time per Day (minutes)			120		180	180	180	180
Number of Days			11		45	7	7	12
Impact Time Total (hours)			21		135	20	20	35
Down-The-Hole Drilling								
Total Quantity					180			23
Max # Piles Installed per Day					2			1
# Strikes Per Pile					324,000			259,200
# Strikes Per Second					18			18
Drilling Time Per Pile (minutes)					300			240
Time per Day (minutes)					600			240
Number of Days					90			23
DTH Drilling Time Total (hours)					900			92

1.2.4.7 Filling Methods

Following the installation of piles for the combi wall, type C fill would be placed between the combi wall and the existing dock, vibracompacted to ensure stability, and overlain with gravel surface course to match existing grade of the dock. Riprap shore protection would be placed along the southeast and northwest ends of the dock and tied into the existing riprap. The riprap and fill would be placed using a dozer and loader, and fill above HTL would be compacted using a vibratory soil compactor.

Approximately 165,465 sf of fill (27,848 cy) would be placed inside the combi wall to encapsulate the existing closed cell sheet piles and construct the new dock, and along the sides of the dock as bank stabilization. Table 3 describes the specific quantities and types of fill to be placed below mean high water (MHW), in the intertidal zone between MHW and HTL, and above HTL.

Table 3. Lutak Dock Replacement Project Filling Summary

Material Type	Surface Area (sf)	Volume (cy)	Time (hours)	Days
Fill above HTL				
Gravel	85,000	2,000	160	20
Type C Fill	17,500	4,055	327	11
Riprap Total	9,655	127	10	8
Total:	**112,155**	**6,182**	**497**	**39**
Fill in Intertidal Waters (Between MHW and HTL)				
Type C Fill	17,500	4,255	343	11
Riprap Total	9,655	275	22	3
Total:	**27,155**	**4,530**	**365**	**14**
Fill in Marine Waters (below MHW)				
Type C Fill	16,500	14,000	1,130	38
Riprap Total	9,655	3,136	248	31
Total:	**26,155**	**17,136**	**1,378**	**69**
TOTAL	**165,465**	**27,848**	**2,240**	**122**

1.3 ACOUSTIC THRESHOLDS AND ENSONIFIED AREA

Vibratory pile driving, impact pile driving, and DTH drilling would generate in-water and in-air noise that may result in take of marine mammals.

NMFS has developed acoustic thresholds that identify the level of underwater sound above which marine mammals, when exposed to, would be reasonably expected to be behaviorally harassed (Level B harassment) or to incur permanent threshold shift (PTS) to some degree (Level A harassment).

1.3.1 Level A Harassment

NMFS' *Technical Guidance for Assessing the Effects of Anthropogenic Sounds on Marine Mammal Hearing* identifies criteria to assess auditory injury (Level A harassment) from

exposure to noise from two sources (impulsive or non-impulsive) to five marine mammal groups based on hearing sensitivity (NMFS 2018). Haines Borough's activity includes the use of impulsive (impact hammer) and non-impulsive (vibratory hammer) noise sources. DTH systems employ percussive and drilling mechanisms to advance piles. As a result, NMFS considers DTH systems as both impulsive and continuous sounds. Due to limited data, NMFS has determined that Level A threshold calculations should consider DTH as an impulsive sound and Level B threshold calculations as continuous (NMFS 2022). The thresholds for auditory injury to Endangered Species Act (ESA)-listed and MMPA protected species are provided in Table 4.

Table 4. Thresholds Identifying the Onset of Permanent Threshold Shift

Hearing Group	PTS Onset Thresholds*(received level)	
	Impulsive (Impact Pile Driving and DTH Drilling)	**Non-impulsive (Vibratory Pile Driving)**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW), Underwater	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW), Underwater	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

Adapted from: NMFS 2018

***** Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure has a reference value of 1 microPascal (µPa), and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. In this table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (low frequency, mid-frequency, and high-frequency cetaceans, and phocid pinnipeds and otariid pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

1.3.2 Level B Harassment

NMFS predicts that all marine mammals are likely to experience Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 decibels (dB) re 1µPa root mean square (RMS) (continuous) and above 160 dB re 1µPa RMS (non-explosive impulsive sources).

1.3.3 Calculated Distances to Level A and Level B Thresholds

Distances to the Level A and Level B thresholds were calculated using the practical spreading model in the NMFS spreadsheet tool and are based on various source levels, expressed in

sound pressure level (SPL)[1] or sound exposure level (SEL)[2] for a given activity and pile type. For Level A harassment, calculations accounted for the maximum duration of an activity per day. Table 5 provides a summary of the sound proxy sources used to calculate Level A and Level B thresholds. Distances to thresholds are shown in Table 6 and range from approximately 10 meters (33 ft) to 39,811 meters (25 mi).

1.3.4 Action Area

The action area, or the area near the proposed action that will be directly affected by the action, is the area of water that will be ensonified above acoustic thresholds in a day. In this case, the action area is where noise levels from DTH installation of 42-inch piles (the farthest-reaching noise associated with the proposed action) are expected to decline to 120 dB. As shown in Table 6, this area extends 39,811 meters (25 mi) from the source. The action area is within Lutak Inlet, and extends into a portion of Chilkoot Inlet and Taiya Inlet at the northern end of Lynn Canal (Figure 4).[3] The action area would be truncated where land masses obstruct underwater sound transmission; thus, the action area extends west 7 km (4 mi) into Lutak Inlet and east 5 km (3 mi) into the confluence of Chilkoot Inlet and Taiya Inlet and encompasses approximately 21 square km (8 square mi; Figure 4).

In addition to in-water noise, pinnipeds such as Steller sea lions and harbor seals can be adversely affected by in-air noise. Loud noises can cause hauled-out pinnipeds to flush back into the water, leading to disturbance and possible injury. NMFS has established an in-air noise disturbance threshold of 100 dB RMS for Steller sea lions and 90 dB RMS for harbor seals. Pile driving and removal associated with this project will generate in-air noise above ambient levels within the action area; however, the predicted distances to the in-air noise disturbance threshold for hauled-out Steller sea lions will not extend more than 30 meters (99 ft) and the threshold for harbors seals will not extend farther than 100 meters (330 ft) from any type of pile being vibrated or impacted.[4]

The nearest documented Steller sea lion haulout (Gran Point) is 22 km (14 mi) away from the proposed project area (Alaska Fisheries Science Center 2023). However, there is a seasonal haulout site located at Taiya Point during the spring eulachon run (a primary prey species for Steller sea lions) from mid-March through May. Taiya Point is located approximately 3.6 km (2 mi) northeast of the project site and is within the action area. It is estimated that 25 to 40

[1] Sound pressure is the sound force per unit µPa, where 1 pascal is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 µPa, and the units for underwater sound pressure levels are decibels (dB) re 1 µPa (NMFS 2018).

[2] A measure of sound level that takes into account the duration of the signal (NMFS 2018).

[3] Note, this document also refers to the project vicinity. This term refers to an area larger than the action area, which includes Lutak Inlet and adjacent waterbodies. This term is used because some of the information available about species with ranges extending into Lutak Inlet is based on sightings outside the action area.

[4] Predicted distances for in-air threshold distances. The Washington State Department of Transportation has documented un-weighted RMS levels for a vibratory hammer (30-inch pile) to an average 96.5 dB and a maximum of 103.2 dB at 15 meters (Laughlin 2010). Maximum levels were used to extrapolate distances for the project's largest (42-inch-diameter) piles. In-air sound levels for impact hammering are from personal communication with NMFS: the median value for driving of 24- to 48-inch steel pipes at Naval Base Kitsap Bangor is 106 dB rms.

Steller sea lions use the haulout site (Hart Crowser, Inc and KPFF Consulting Engineers 2016). Harbor seals are frequently observed in Taiya Inlet, and seasonally in Lutak Inlet, also often hauled out at Taiya Point or feeding near Chilkoot River (ECO49 Consulting, LLC 2019; SolsticeAK 2023). The closest major haulouts are considerably outside the predicted distances to the in-air noise disturbance threshold, and no in-air disturbance to hauled-out individuals are anticipated as a result of the proposed action; thus, land area is not included in the action area.

To minimize impacts to protected species, shutdown and monitoring of harassment zones will be implemented to protect and document these species in the action area. See Table 6 for calculated distances to the Level A and Level B thresholds, Appendix B for the Level A and Level B threshold distance calculation spreadsheets, and Section 11 for mitigation information and shutdown and monitoring zones and figures. The attached 4MP gives detailed mitigation, shutdown, and monitoring procedures (Appendix C).

Table 5. Lutak Dock Replacement Project Sound Proxy Sources

Method and Pile Type	Sound Source Level at 10 meters			Literature Source
Barge	**dB**			
Barge movements, pile positioning, etc. (throughout construction)	171-176			Richardson et al. 1995; Kipple and Gabriele 2004
Vibratory Hammer	**dB rms**			
16-inch steel piles	161			NAVFAC 2015; Table 2-2
24-inch steel pile	161			NAVFAC 2015; Table 2-2
36-inch steel piles	166			NAVFAC 2015; Table 2-2
42-inch steel piles	170			NMFS calculations from NAVFAC 2015 and Reyff and Heyvaert 2019
55.5-inch steel sheet piles	162			Molnar et al. (Caltrans) 2020
Down-The-Hole Drill	**dB rms**	**dB SEL**	**dB peak**	
42-inch steel piles	174	164	194	NMFS 2022
Impact Hammer	**dB rms**	**dB SEL**	**dB peak**	
36-inch steel piles	192	184	211	NAVFAC 2015; Table 2-1
42-inch steel piles	192	184	211	NAVFAC 2015; Table 2-1[1]
55.5-inch steel sheet piles	190	180	205	NMFS 2023

[1] The recommended proxy source for 42-inch impact driving would result in isopleths smaller than those for 36-inch impact driving, so the proxy source for 36-inch was also used for 42-inch. The use of NAVFAC 2015 for both 36-inch and 42-inch impact pile driving was approved during discussion with NMFS (NMFS 2023a).

Table 6. Lutak Dock Replacement Project Calculated Distances to NMFS Level A and B Acoustic Thresholds

Activity	Distance (meters) to level A and B Thresholds[1]					
	Level A[2]					Level B
	LF Cetaceans	MF Cetaceans	HF Cetaceans	PW	OW	
Vibratory Pile Driving/ Removal						
24-inch pile removal (1 pile; 45 minutes per day; on 1 day)	5.6	0.5	8.3	3.4	0.2	5,412
16-inch pile removal (24 piles; 180 minutes per day; on 6 days)	14.2	1.3	21.8	8.6	0.6	5,412
36-inch temporary pile installation (42 piles; 60 minutes per day on 11 days)	14.7	1.3	21.8	8.9	0.6	11,659
36-inch temporary pile removal (42 piles; 60 minutes per day; on 11 days)	14.7	1.3	21.8	8.9	0.6	11,659
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	56.6	5.0	83.6	34.4	2.4	21,544
Sheet permanent pile installation (40 piles; 180 minutes per day; on 7 days)	16.6	1.5	24.5	10.1	0.7	6,310
Sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	69
42-inch permanent batter pile installation; in-air (23 piles; 120 minutes per day; on 12 days)	--	--	--	--	--	69
Impact Pile Driving						
36-inch temporary pile installation (42 piles; 120 minutes per day; on 11 days)	2,734.9	97.3	3,257.7	1,463.6	106.6	1,359
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	3,844.5	136.7	4,579.4	2,057.4	149.8	1,359
Sheet permanent pile installation (40 piles; 180 minutes per day; on 7 days)	1,939.4	69.0	2,310.1	1,037.9	75.6	1,000
Sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	95
42-inch permanent batter pile installation; in-air (23 piles; 180 minutes per day; on 12 days)	--	--	--	--	--	95
DTH Drilling						
42-inch pile installation (180 piles; 600 minutes per day; on 90 days)	4,046.9	143.9	4,820.5	2,165.7	157.7	39,811

[1] Proxy sources for acoustic threshold calculations are listed in Table 5. Distances, in meters, refer to the maximum radius of the zone. The values provided here represent the distance at which an animal may incur PTS if that animal remained at that distance for the entire duration of the activity within a 24-hour period. For example, a humpback whale would have to remain 42.9 meters from 42-inch piles being installed via vibratory methods for 180 minutes for PTS to occur.

Figure 4. Lutak Dock Replacement Project Proposed Action Area

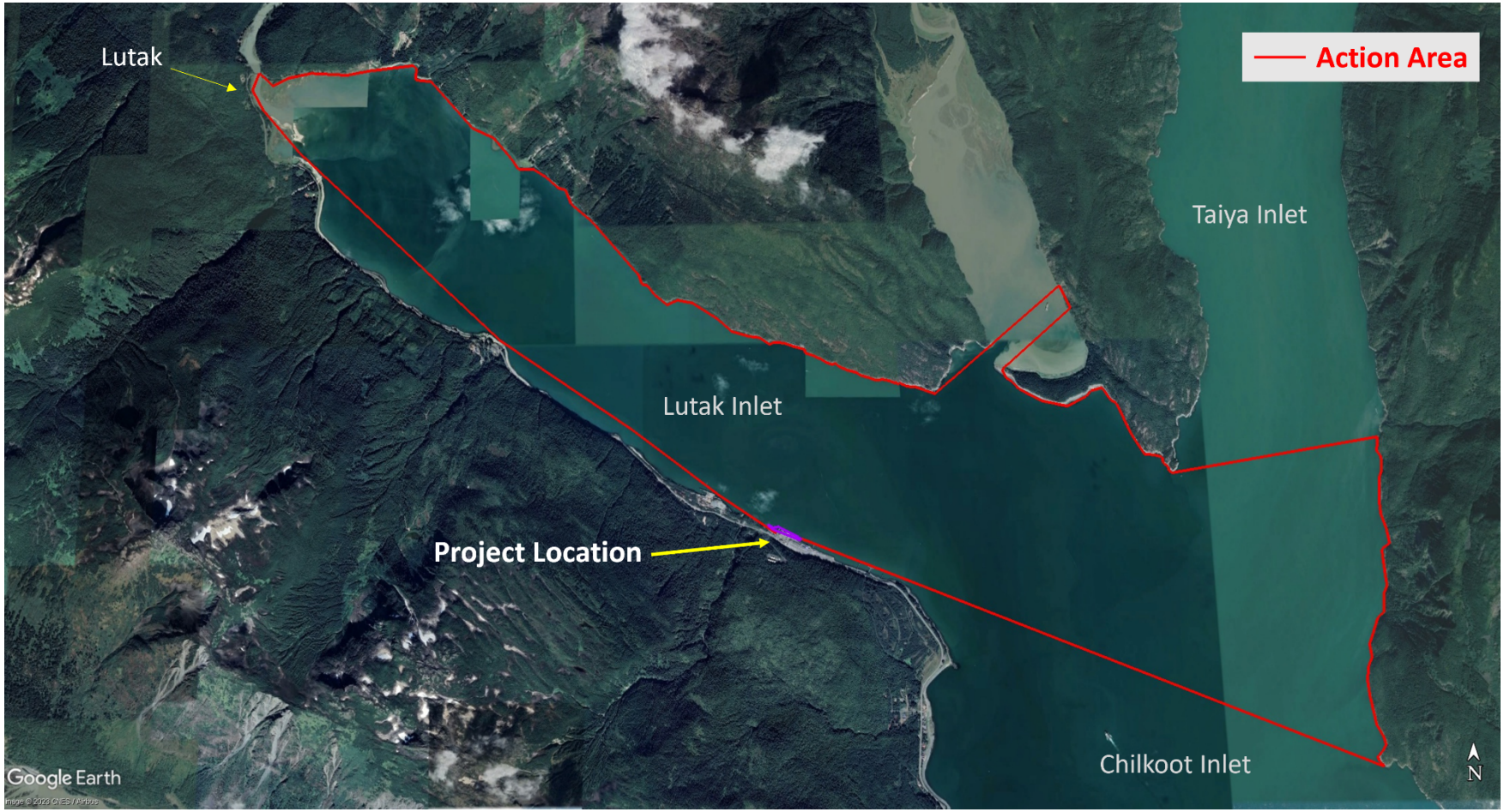


Figure 5. Lutak Dock Replacement Project Approximate Materials Barge Route

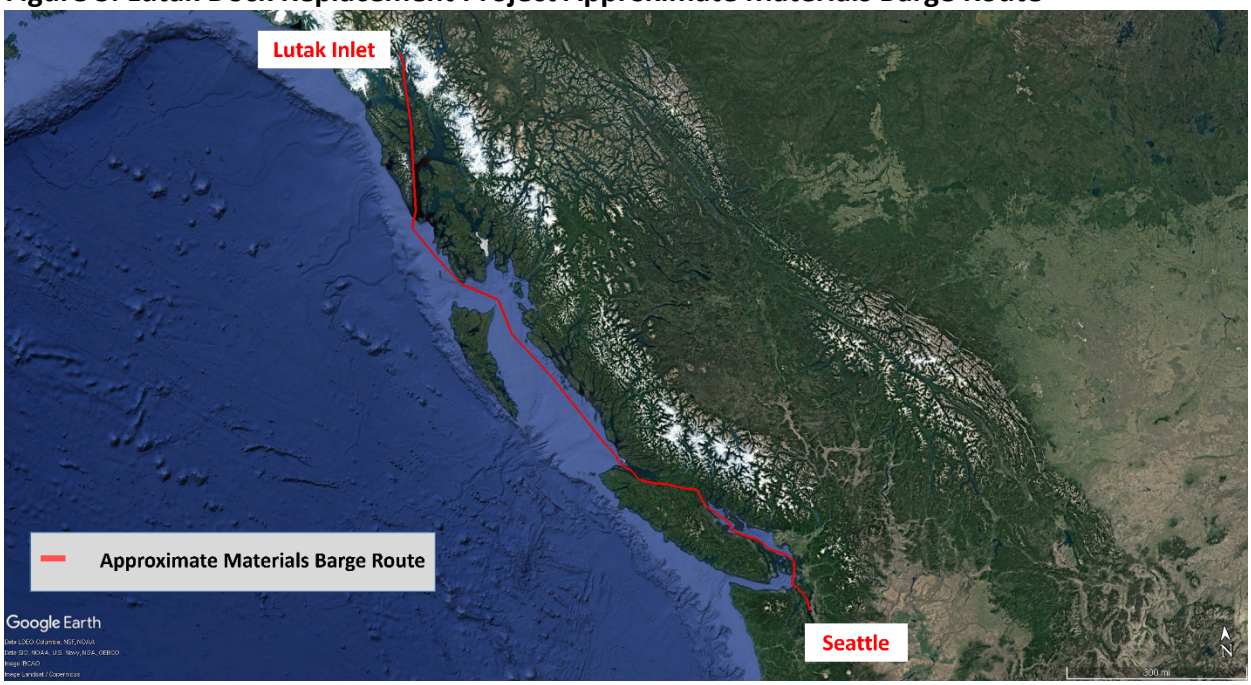
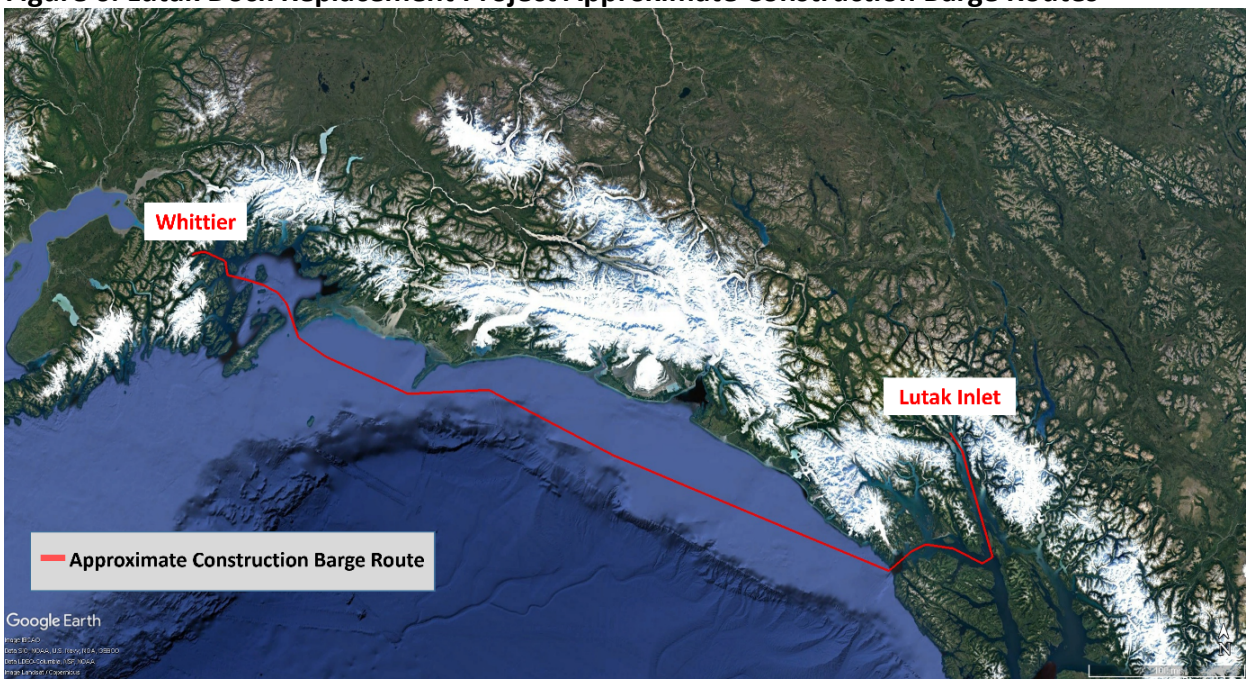


Figure 6. Lutak Dock Replacement Project Approximate Construction Barge Routes



2 DATES, DURATION, AND REGION OF ACTIVITY

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

2.1 DATES AND DURATION

Construction would begin once authorizations are issued in fall or winter 2023 and continue through winter 2024. In-water pile installation activities are expected to occur for a total of approximately 1,272 hours over 234 days (not necessarily consecutive days). See Table 2 for more details about pile installation and removal.

The construction timeline takes into account the mobilization of materials and potential delays due to delayed material deliveries, equipment maintenance, inclement weather, and shutdowns.

2.2 SPECIFIC GEOGRAPHIC REGION

The action area is in the Haines Borough on the southern shore of Lutak Inlet, at the upper reaches of Lynn Canal in Southeast Alaska. Lutak Dock is located approximately 6 km (4 mi) northwest of downtown Haines (see Section 1).

2.2.1 Physical Environment

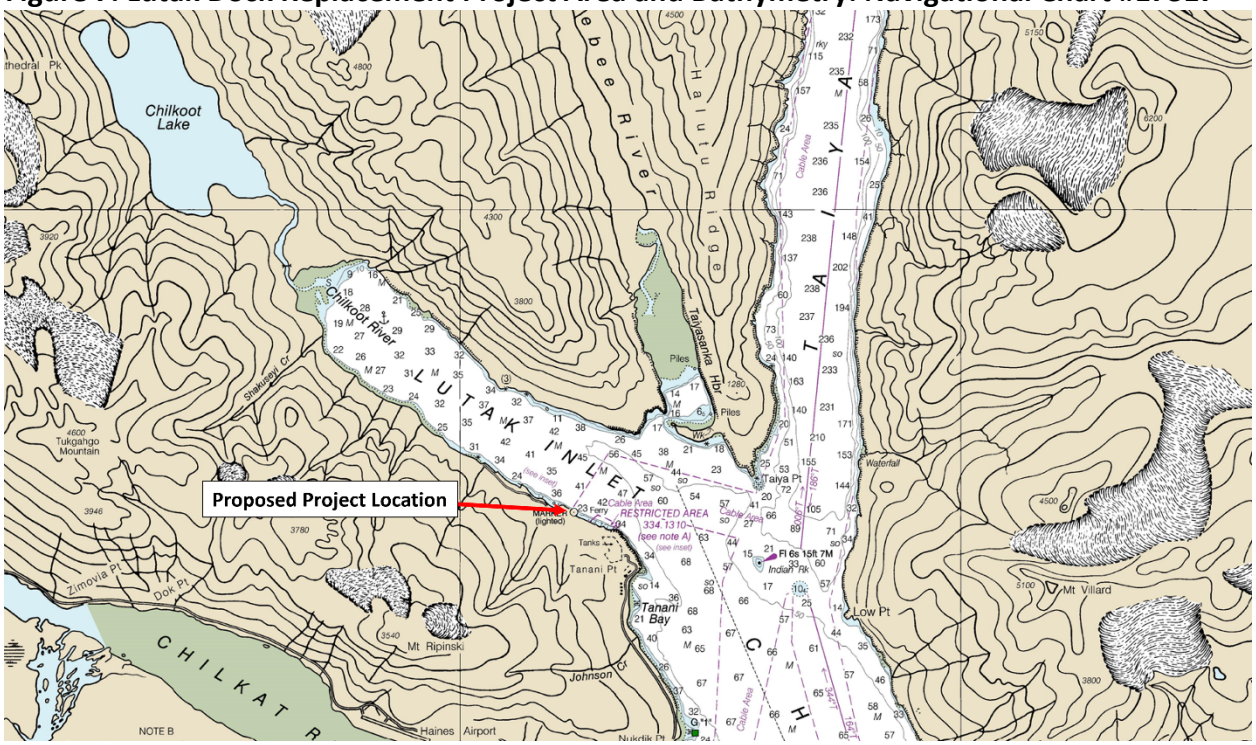
Lutak Inlet is approximately 9-km (6 mi)-long and measures less than 2 km (1 mi) across from shore to shore at its widest point and is about 360 feet deep at its entrance between Tanani Point and Taiya Point. Depths at the proposed action area are shallower, approximately 25 to 100 feet. To the north of the proposed action area, the Ferebee River empties into the Taiyasanka Harbor and then into Lutak Inlet; to the west of the proposed action area, Chilkoot Lake empties into Lutak Inlet via the Chilkoot River (Figure 7).

According the ShoreZone Mapper (NMFS 2023b), the shoreline at the project site has the following characteristics:

- Habitat Class: protected, anthropogenic impermeable or permeable and protected, partially mobile, sediment
- Coastal Class: man-made impermeable and narrow gravel beach
- Biological Wave Exposure: protected

Green algae, rockweed, and soft brown kelps are the predominant subtidal vegetation at the project site and in Lutak Inlet in general with no eelgrass (*Zostera marina*) reported in the area (NMFS 2023b).

Figure 7. Lutak Dock Replacement Project Area and Bathymetry: Navigational Chart #17317



Source: National Oceanic and Atmospheric Administration (NOAA) 2015

2.3 SEASONAL ISSUES

Marine mammal species may occur year-round in the action area; however, concentrated numbers are most likely to occur during seasonal prey aggregations. Eulachon, Pacific herring, Dolly Varden, and five different types of salmon (Chinook, chum, coho, pink, and sockeye) are among the species that congregate ephemerally, and marine mammals tend to be more common in the action area in early spring through summer when these prey species tend to be more abundant. In Southeast Alaska, eulachon spawn from mid-March or April through May and attract marine mammals that feed on the oily fish, including Steller sea lions and harbor seals (Alaska Department of Fish and Game [ADF&G] 2023; Womble et al. 2005). Pacific herring is also a primary prey species for Steller sea lions. Herring are present throughout Southeast Alaska year-round, utilizing various habitats for rearing and moving to deeper water within Southeast in the winter time. Herring spawning aggregations occur primarily in lower Lynn Canal and southern Southeast Alaska, from Berners Bay south from late April to early May (Carls et al. 2008). The five salmon species have overlapping presence near the action area, returning to spawning grounds in rivers and streams via Lutak Inlet from June through October (ADF&G 2023a). Seasonal variation has been factored into take estimates, as construction could occur year-round.

3 SPECIES AND NUMBER OF MARINE MAMMALS

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

Nine marine mammal species under NMFS jurisdiction may occur in the vicinity of the proposed action based on the NMFS Alaska Species Distribution Mapper (NMFS 2023c). Table 7 lists these

species and summarizes key information regarding their stock status, distinct population segments (DPS), abundance, potential biological removal (PBR), annual mortality/serious injury rate (M/SI), and potential to occur in the action area.

To more accurately determine species that may occur in the action area in Lutak Inlet, the following information was reviewed and gathered:

- Alaska Marine Lines' Lutak Dock Roll on/Roll-off Steel Cargo Bridge Modification Project Biological Opinion (NMFS 2020)
- Marine Mammal Monitoring Report for the Alaska Marine Lines Lutak Dock RoRo Modification Project (Tom Mortensen Associates, LLC 2021)
- Request for Incidental Harassment Authorization—Lutak Dock Project (ECO49 Consulting, LLC 2019)
- Request for Incidental Harassment Authorization—Skagway Gateway Initiative Project (Hart and Crowser, Inc. and KPFF Consulting Engineers 2016)
- Incidental Harassment Authorization Notice—Railroad Dock Dolphin Installation Project, Skagway, Alaska (84 FR 4777)
- Correspondence with tour operator based in Haines (SolsticeAK 2023)

Information from these sources and a review of scientific literature indicate that humpback whales, killer whales, Dall's porpoise, harbor porpoise, harbor seals, and Steller sea lions could occur in the action area during construction. This IHA application requests take for these six species and assesses the potential impacts that may occur to them as a result of the proposed action.

Take for other species is not requested because the animals are expected to spend little, if any, time in the action area. Shutdowns will be implemented only if these or any other marine mammal species not listed above appears likely to approach the Level B harassment zone during in-water work (Figure 20).

Table 7. Abundance Estimates for Marine Mammal Species Occurring in Lynn Canal

Species [a]	Stock and Abundance Estimate [b]	ESA Status and DPS	MMPA Status	PBR	Annual M/SI	Timing and Occurrence in Action Area [c]
Minke Whale (*Balaenoptera acutorostrata*)	Alaska: Unknown	Not listed	Not strategic, non-depleted	Unknown	0	Rare
Humpback Whale (*Megaptera novaeangliae*)	Mexico-North Pacific Stock: unknown	Mexico DPS: Threatened	Strategic, depleted	Unknown	0.36	Year-round; peak presence in late spring/summer and fall)/Infrequent
	Hawaii: 11,278	Hawaii DPS: Not listed	Not strategic, non-depleted	127	7.7	
Killer Whale (*Orcinus orca*)	Eastern North Pacific Alaska Resident: 1,920	Not listed	Not strategic, non-depleted	19	1.3	Infrequent
	Eastern North Pacific Northern Resident: 302	Not listed	Not strategic, non-depleted	2.2	0.2	
	West Coast Transient: 349	Not listed	Not strategic, non-depleted	3.5	0.4	
Dall's Porpoise (*Phocoenoides dalli*)	Inland Waters of Southeast Alaska: 1,637 [d]	Not listed	Not strategic, non-depleted	131	37	Year round/Infrequent
Harbor Porpoise (*Phocoena phocoena*)	Northern Southeast Alaska Inland Waters: 1,619 [e]	Not listed	Not strategic, non-depleted	13	5.6	Year round/Frequent to Infrequent
Pacific White-Sided Dolphin (*Lagenorhynchus obliquidens*)	North Pacific: 26,880	Not listed	Not strategic, non-depleted	Unknown	0	Rare
Harbor Seal (*Phoca vitulina*)	Lynn Canal/ Stephens Passage: 13,388	Not listed	Not strategic, non-depleted	214	0	Year-round /Common
Steller Sea Lion (*Eumetopias jubatus*)	Western U.S.: 52,932	Western DPS: Endangered	Strategic, depleted	318	254	Year-round; peak presence in mid-March - May/Rare
	Eastern U.S.: 43,201	Eastern DPS: Not listed	Not strategic, non-depleted	2,592	112	Year-round; peak presence in mid-March - May/Common

[a] Species listed with ranges extending into the proposed action area derived from the NMFS Species Distribution Mapper (NMFS 2023c) and review of scientific literature. Estimates are presented for either an entire stock or DPS known to be present in the action area.

[b] Abundance estimates are from the most recent stock assessment reports (Young et al. 2022 [humpback whale, harbor porpoise, Eastern North Pacific Alaska resident killer whale]; Muto et al. 2022 [all others]).

[c] Occurrence estimates based on marine mammal monitoring conducted in Southeast Alaska (Dahlheim et al. 2009), Request for IHA for projects in the Lutak Inlet area (ECO49 Consulting LLC 2019; Hart Crowser, Inc and KPFF Consulting Engineers 2016); Biological Opinion for the Lutak Dock RoRo (NMFS 2020), Request for IHA for Railroad Dock dolphin installation in Skagway (84 FR 4777); and correspondence with local tour operator (SolsticeAK 2023).
Common=species has been observed commonly in action area, could occur each day; Frequent=have been observed in Lutak Inlet, multiple sightings every year, could occur each month; Infrequent=few sightings each year, could occur each month; Rare=no sightings in the proposed action area in recent years.
[d] Dall's porpoises are considered one stock in Alaska (13,110), so individual stock estimates are not available. Estimates for the Alaska stock are more than eight years old and no longer considered reliable (Muto et al. 2022). However, abundance estimates for Dall's porpoises in inland waters of Southeast Alaska are provided in Muto et al. 2022 based on surveys from Jefferson et al. 2019. To be conservative, the lowest abundance estimate was used (1,637).

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

A description of the status and distribution of each species or stocks of marine mammals likely to be affected by the activity.

4.1 HUMPBACK WHALE

4.1.1 Description, Behavior, and Life History

Humpback whales are classified in the cetacean suborder Mysticeti, whales characterized by having baleen plates for filtering food from water. The humpback whale is one of the larger baleen whales, weighing up to 25-40 tons (50,000-80,000 pounds) and measuring up to 60 feet long, with females growing larger than males. Newborns are about 15 feet long and weigh about 1 ton (2,000 pounds). Humpback whales reach sexual maturity at 4 to 7 years, and their lifespan is around 50 years or more. The species is known for long pectoral fins, which can be up to 15 feet long. The body coloration is primarily dark grey, but individuals have varying amounts of white on their pectoral fins and belly. This variation is so distinctive that tail fluke pigmentation patterns are used to identify individual whales, analogous to human fingerprints (NOAA 2011).

With some of the longest annual migration routes of any marine mammals, humpbacks travel thousands of miles each year between low-latitude warm water breeding areas and high-latitude colder oceans for feeding. They prefer waters around the continental shelf but have been known to inhabit deeper offshore waters during migration and shallower waters for calving (International Whaling Commission 2022). Humpbacks do not eat during migration and winter breeding and calving, making the summer feeding period particularly important for building fat reserves for future fasting (Gabriele et al. 2017). They typically visit Alaskan waters in the summer months to feed on euphausiids (krill) and small schooling fishes like herring. Humpback whales employ a variety of creative and complex feeding methods such as lunge feeding (Goldbogen et al. 2013), trap feeding (McMillan et al. 2019), and bubble net feeding (Friedlaender et al. 2011).

4.1.2 Hearing Ability and Communication

Humpback whales are classified by NMFS as low-frequency cetaceans with a generalized hearing range of 7 Hertz (Hz) to 35 kilohertz (kHz) (NMFS 2018). However, because of the lack of captive subjects and logistical challenges of bringing experimental subjects into the laboratory, no direct measurements of Mysticete hearing are available. Consequently, hearing in Mysticetes is estimated based on other factors like vocalizations, anatomy, behavioral responses to sound, and nominal natural background noise conditions in their likely frequency ranges of hearing (Racicot 2021; Fournet et al. 2018). The combined information from these and other sources strongly suggests that Mysticetes are likely most sensitive to sound from perhaps tens of hertz to ~10 kHz, and evidence suggests that humpbacks can hear sounds as low as 7 Hz (Southall et al. 2007), up to 24 kHz, and possibly as high as 30 kHz (Au et al. 2006; Ketten 2000).

Humpbacks communicate with each other through vocal signals (singing) and surface-generated signals such as breaching or tail slapping (Fournet et al. 2018a). Generally, humpback whales use communication networks that may extend for several miles with a diverse set of

vocalizations and non-song acoustic communication during foraging, breeding, and other social interactions (Dunlop 2019). It has been suggested that they use vocalizations during feeding to coordinate feeding maneuvers or to stun or trap prey (National Park Service 2020; Leighton et al. 2004).

4.1.3 Status

In 1970, the humpback whale was listed as endangered worldwide, under the Endangered Species Conservation Act (ESCA) of 1969 (35 FR 8491; June 2, 1970), primarily due to decimation from whaling. Congress replaced the ESCA with the ESA in 1973, and some stocks of humpback whales continued to be listed as threatened or endangered. Humpback whale numbers increased following the cessation of most legal whale harvesting.

NMFS conducted a global status review of humpback whales and changed the status of humpback whales under the ESA (Bettridge et al. 2015). The globally-listed species was divided into 14 DPSs, four of which are endangered and one of which is threatened, and the remaining nine are no longer listed under the ESA (81 FR 62260; September 8, 2016).

NMFS is in the process of updating humpback whale stocks. In a draft marine mammal stock assessment, NMFS defined five stocks that are present in the North Pacific based on genetic analysis, photo identification, and migration patterns (Young et al. 2022). They are the Central America/Southern Mexico- California/Oregon/Washington stock (Central America to the west coast of the U.S.; includes the Central America DPS), the Mainland Mexico-California/Oregon/Washington stock (Mexico to the West Coast of the U.S., Alaska, and Russia; includes the Mexico DPS), the Hawaii stock (Hawaii to the west coast of the U.S., Alaska, and Russia; includes the Hawaii DPS), the Mexico-North Pacific stock (Mexico to the west coast of the U.S.; includes the Mexico DPS), and the Western North Pacific (WNP) stock (Asia to Russia and Western Alaska/Bering Sea; includes the WNP DPS) (Young et al. 2022). Four of the stocks (the Central America/Southern Mexico-California/Oregon/Washington, Mexico-North Pacific, Mainland Mexico-California/Oregon/Washington, and WNP) are designated as depleted under the MMPA. The Hawaii stock is not listed as depleted under the MMPA (Young et al. 2022).

Using fluke identification photographs from 2004 through 2006 from the Structure of Populations, Levels of Abundance, and Status of Humpbacks (SPLASH) study (Calambokidis et al. 2008), Barlow et al. (2011) estimates that the abundance of humpback whales in the North Pacific is 21,063 individuals. More recently, using a multi-strata analysis, Wade (2021) estimates the abundance of humpback whales in the North Pacific is 16,293 for the winter areas and 18,942 for the summer areas. The population in the North Pacific has increased substantially since the cessation of major commercial whaling operations, and the current abundance estimate exceeds some pre-whaling estimates. The overall trend for most humpback whale populations found in U.S. waters is positive and recovering (Muto et al. 2022). Estimates of humpback whales in Southeast Alaska indicate that their numbers have been increasing steadily since the 1980s after commercial whaling depleted populations throughout Alaska (Gabriele et al. 2022; Hendrix et al. 2012). However, in 2015, a large whale unusual mortality event (UME) was reported for the Western Gulf of Alaska and British Columbia which included 22 humpback whales in Alaska (Savage 2017). A definitive cause for the UME was not determined, but was likely attributable to ecological factors (i.e., oceanographic changes driven by climate change)

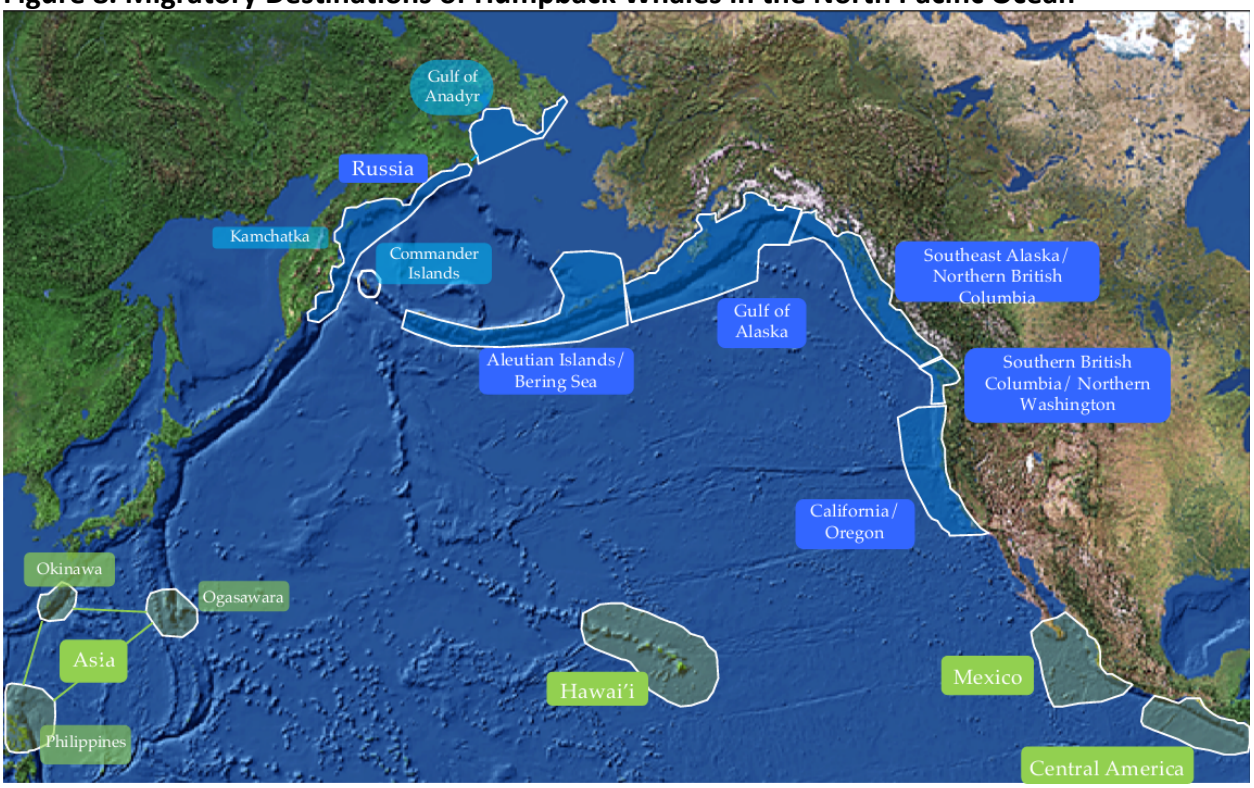
(Savage 2017). A recent study of humpback whales in Southeast Alaska found that they experienced a population decline from around 2014 through 2018. This decline may have been associated with a marine heat wave that caused changes in humpback whale prey availability, leading to declines in humpback whale survival and reproductive success (Gabriele et al. 2022).

4.1.4 Distribution

Humpback whales are distributed worldwide in all ocean basins with a broad geographical range from tropical to temperate waters in the Northern Hemisphere and from tropical to near-ice-edge waters in the Southern Hemisphere (Muto et al. 2022). Humpback whales migrate seasonally between warmer, tropical or sub-tropical waters in winter months, where they reproduce and give birth to calves, and cooler, temperate or sub-Arctic waters in summer months for feeding (Bettridge et al. 2015). Figure 8 below shows migratory destination for winter (green areas) and summer (blue areas) for humpback whales in the North Pacific Ocean (from Wade 2021).

Whales from three DPSs are present in Alaska. Whales from the WNP, Mexico, and Hawaii DPSs overlap on feeding grounds off Alaska and are not visually distinguishable. Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, Wade (2021) concluded that the humpback whales feeding in Alaskan waters belong primarily to the recovered Hawaii DPS, with small contributions from the threatened Mexico DPS and the endangered WNP DPS (NMFS 2021).

Figure 8. Migratory Destinations of Humpback Whales in the North Pacific Ocean



Source: Wade 2021

4.1.5 Presence in Project Area

Feeding aggregations of humpbacks in the North Pacific Ocean have been shown to be genetically distinct and isolated based on a calf's early maternal experience (Witteveen 2011).

NMFS identified most of Southeast Alaska, including Lynn Canal, as a Biologically Important Area (BIA) for humpback whales for feeding during the months of June through August; however, the proposed action area is northwest of and outside the boundaries of the BIA (NMFS 2023d).[5] No humpback whales were observed in Lutak Inlet during monitoring for the Lutak Dock RoRo Modification Project in November 2020 (Tom Mortensen Associates, LLC 2021). However, sightings of humpbacks are common in Southeast Alaska (Dahlheim et al. 2009). In Lynn Canal and Lutak Inlet, humpback whales are traditionally observed during seasons of high prey concentration, May through September (Witteveen et al. 2011; SolsticeAK 2023). However, feeding humpback whales' presence in Southeast Alaska has also been correlated closely with peak herring abundance, which occurs in the late fall and early winter. It has been suggested that some whales remain longer in northern waters to maximize food consumption prior to migrating south to breeding grounds in the winter, and a few may skip migration altogether (Straley et al. 2018). Therefore, humpbacks may be present year-round in Lutak Inlet, but are less common during the late winter and early spring.

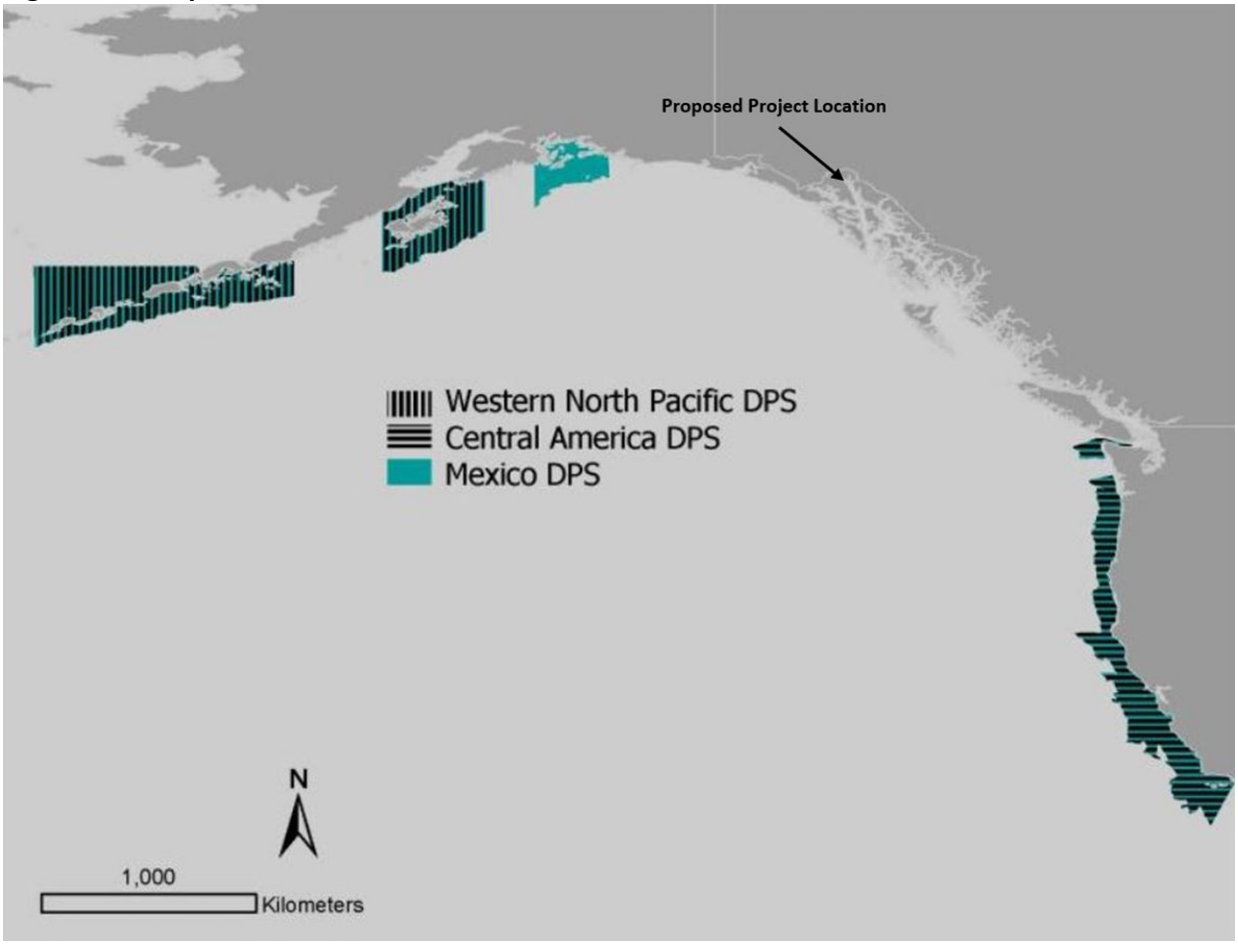
The majority of humpback whales (98%) present in the action area are likely to be from the recovered Hawaii DPS, about 2% are likely to be from the threatened Mexico DPS, and none are likely to be from the endangered WNP DPS (NMFS 2021; Wade 2021).

4.1.6 Critical Habitat

NMFS designated critical habitat for threatened and endangered humpback whale DPSs (WNP, Mexico, and Central America) on April 21, 2021 (86 FR 21082; NMFS 2020a). Under this ruling, NMFS delineated specific coastal areas, or units, that meet the definition of critical habitat for one or more of the three DPSs of whales. There is no designated critical habitat for humpback whales in Southeast Alaska. Critical habitat for WNP DPS humpback whales is near Kodiak Island and the eastern Aleutian Islands and would not be impacted by project actions or associated barge routes. Since much of Prince William Sound is within humpback whale critical habitat, the equipment barge's route would transit through critical habitat on the way to the project site (Figure 9).

[5] BIAs are spatial and temporal boundaries identified for certain marine mammal species where populations are known to concentrate for specific behaviors such as migration, feeding, or breeding (Ferguson et al. 2015). Humpback whale BIAs helped to inform the critical habitat designation finalized by NMFS in 2021 (86 FR 21082).

Figure 9. Humpback Whale Critical Habitat



Source: NMFS 2022a

4.2 KILLER WHALE

4.2.1 Description, Behavior, and Life History

Killer whales, members of the Delphinidae family, or dolphins, are one of the most recognizable marine mammals, with their distinctive black and white bodies. They are highly social animals and apex predators, often traveling in social groups (pods) made up of 20 or more animals, and use coordinated feeding efforts to capture and share prey with others in the pod. Killer whales have diverged evolutionarily into three distinct genetic ecotypes (offshore, resident, and transient) that overlap in distribution somewhat but exhibit different vocalization patterns and prey preferences. They are opportunistic feeders and generally their diet is shaped by where they live, although favored prey are marine mammals, fish, squid, and even sharks (NMFS 2023e).

4.2.2 Hearing Ability and Communication

Killer whales are classified by NMFS as mid-frequency cetaceans with a generalized hearing range of 150 Hz to 160 kHz (NMFS 2018). The hearing of killer whales is well developed. Szymanski et al. (1999) found that they responded to tones between 1 and 120 kHz, with the most sensitive range between 18 and 42 kHz. Their greatest sensitivity is at 20 kHz, which is

lower than many other odontocetes (toothed whales), but it matches peak spectral energy reported for killer whale echolocation clicks. Killer whales use vocalizations in a variety of ways. Each pod employs a unique set of sounds including clicks, whistles, and calls, for echolocation during foraging, to communicate with other pod members, and for navigation (Myers et al. 2021).

4.2.3 Status

Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized within the Pacific U.S. Exclusive Economic Zone, seven of which occur in Alaska. The three stocks that are most likely to occur in Lynn Canal are the Eastern North Pacific Alaska Resident stock, Eastern North Pacific Northern Resident stock, and the West Coast Transient stock (Muto et al. 2022).

The populations that are known to occur in Lynn Canal are not strategic or depleted under the MMPA. The Alaska Resident stock size is 2,347 (121 individuals documented in Southeast Alaska). The Northern Resident stock size is 302. The West Coast Transient stock size is 349 (Muto et al. 2022). Population trend data for the component of the Alaska Resident stock in Southeast Alaska is unavailable. The West Coast Transient population increased rapidly from the 1970s to the 1990s, slowed, and then began to increase again. The Eastern North Pacific Northern Resident population increased from the mid-1970s to the mid-1990s, declined from 1998 to 2001, then began to increase again after 2001 (Muto et al. 2022).

4.2.4 Distribution

Killer whales have been observed in all oceans and seas of the world, but the highest densities occur in colder and more productive waters found at high latitudes. Killer whales are found throughout the North Pacific and occur along the entire Alaska coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (NMFS 2023e).

In Southeast Alaska, the offshore killer whale ecotype is found in pelagic waters off the Aleutian Islands to California and mainly prey on sharks; the two resident ecotypes (Alaska residents and Northern Residents) range from the Aleutian Islands to Washington State and prefer to eat fish; and the transient population (West Coast Transients) prefer marine mammals and are found from California to Southeast Alaska (Muto et al. 2022; Myers et al. 2021). During a 16-year study of marine mammals in Southeast Alaska, Dahlheim et al. (2009) found that transient and resident killer whales were present in all major waterways, and in various environments including open straits, near-shore waters, protected bays and inlets, and in icy waters near tidewater glaciers. Offshore killer whales were observed only four times In Southeast Alaska over the course of the study, all were documented in southern Southeast Alaska. None of the killer whales documented in the study were observed as far north in Lynn Canal as Lutak Inlet (Dahlheim et al. 2009).

4.2.5 Presence in Project Area

Killer whales are observed infrequently in the project area, often only a few times per year (Hart Crowser, Inc. and KPFF Consulting Engineers 2016) in groups ranging anywhere from 4 to 6 individuals (transient) to 19 to 32 individuals (resident) (Dahlheim et al. 2009; Hart Crowser,

Inc. and KPFF Consulting Engineers 2016). A mean group size of 15 individuals in the Lynn Canal region was suggested in a recent IHA application (Hart Crowser, Inc. and KPFF Consulting Engineers 2016). Killer whales enter Lutak Inlet infrequently, and most often in the spring when they have been sighted along with Steller sea lions (ECO49 Consulting, LLC 2019).

Surveys of the inland waters of Southeast Alaska indicate that transient killer whales are present throughout the region. Transient killer whales have been shown to utilize different areas based on maternal group in Southeast Alaska (Dahlheim and White 2010). Dahlheim and White (2010) identified six maternal groups that were only found in northern Southeast. Five maternal groups were primarily found in northern Southeast and infrequently in southern Southeast, and three maternal groups were observed most frequently in southern Southeast. Resident killer whales are also present throughout Southeast Alaska waters, with individual pods exhibiting preferences for specific areas of the region (Dahlheim et al. 2009).

There were no observations of killer whales during marine mammal monitoring for the Lutak Dock RoRo Modification Project in November 2020 (Tom Mortensen Associates, LLC 2021).

4.3 DALL'S PORPOISE

4.3.1 Description, Behavior, and Life History

Dall's porpoises are small black and white odontocetes that are very fast swimmers and generally travel in small groups, but have been observed in larger groups of hundreds of animals. Playful and social, these animals sometimes group and swim alongside larger whales or the bow of transiting vessels. Dall's porpoises are known to feed on small fish, cephalopods, and crustaceans, with a tendency towards high-value prey such as herring and sardines. The life span of the Dall's porpoise is approximately 15 to 20 years. Calving generally occurs between June and September (NMFS 2023f).

4.3.2 Hearing Ability and Communication

Dall's porpoises are classified by NMFS as high-frequency cetaceans with a generalized hearing range of 275 Hz to 160 kHz (NMFS 2018). They emit a variety of intense, high-frequency clicks and whistles which are particularly important for echolocating prey and communication (Kyhn et al. 2013).

4.3.3 Status

Dall's porpoises are not listed as threatened or endangered under the ESA. NMFS currently recognizes a single stock of Dall's porpoises in Alaskan waters and an estimate of 83,400 Dall's porpoises has been used by NMFS for the entire stock; however, surveys that determined this number are more than 8 years old and not considered reliable. The minimum population estimate for this stock has been adjusted to 13,110 animals, although this number is likely low since the survey study area represents only a small fraction of the species' range (Muto et al. 2022). There have been no UMEs declared for this species in recent years (NMFS 2023g).

4.3.4 Distribution

Dall's porpoises are widely distributed across the North Pacific Ocean and are common throughout Southeast Alaska. They are most common in Southeast waters during spring, but are found through summer and early fall as well. Surveys conducted in the inland waters of

Southeast Alaska from 1991 to 2012 indicate that Dall's porpoises inhabit areas throughout Southeast Alaska, with the greatest densities occurring in larger, deeper channels and rare in shallow narrow waterways (Jefferson et al. 2019).

4.3.5 Presence in Project Area

Based on data collected during marine mammal surveys from 1991 to 2012 (from April to September), Dall's porpoises were distributed throughout Southeast Alaska, with more sightings during the spring, fewer sightings during summer, and the fewest in the fall. Dall's porpoises were most common in large deep channels, and were rare in narrow, shallow waterways (Jefferson et al. 2019). Concentrations of Dall's porpoises in Southeast Alaska have been documented in Icy Strait, Lynn Canal, Stephens Passage, upper Chatham Strait, Frederick Sound, and Clarence Strait (Dahlheim et al. 2009).

Correspondence with a local tour boat captain confirmed there are occasional sightings of Dall's porpoises in Taiya Inlet, but most often they are seen farther south near Mud Bay, 15 km (9 mi) south of the project area (SolsticeAK 2023). Dall's porpoises have also been reported by locals in Taiya Inlet on an occasional basis in early spring and late fall (Hart Crowser, Inc. and KPFF Consulting Engineers 2016). No Dall's porpoises were observed in Lutak Inlet during monitoring for the Lutak Dock RoRo Modification Project in November 2020 (Tom Mortensen Associates, LLC 2021).

4.4 HARBOR PORPOISE

4.4.1 Description, Behavior, and Life History

Harbor porpoises are small members of the Phocoenidae family, reaching up to 5 or 6 feet in length and weighing a maximum of 170 pounds. They are shy and prefer coastal habitats, including bays, estuaries, fjords, and harbors (NMFS 2023h). Harbor porpoises are found throughout Alaska and feed on cod, herring, pollock, sardines, whiting, squid, and octopus, and can dive up to 200 feet. They primarily travel alone, or in groups of less than ten individuals (ADF&G 2023b). Harbor porpoises' movements are likely influenced by prey availability, and they may travel from inshore areas to offshore areas following prey (NMFS 2023h). They are primarily found in waters less than 100 meters (328 ft) deep (Young et al. 2022).

4.4.2 Hearing Ability and Communication

Harbor porpoises are classified by NMFS as high-frequency cetaceans with a generalized hearing range of 275 Hz to 160 kHz (NMFS 2018). They produce buzzing sounds for echolocation to locate prey, for example. Though less social in comparison to other marine mammals and thought to produce sounds that are inadequate for communication, research suggests that harbor porpoises use sound to communicate over short distances with conspecifics (Sørensen et al. 2018).

4.4.3 Status

Harbor porpoises are not listed as depleted under the MMPA or as threatened or endangered under the ESA. In Alaska they are divided into three stocks: the Bering Sea stock, Gulf of Alaska stock, and Southeast Alaska stock. In Southeast Alaska, harbor porpoises are further divided

into three stocks, the Northern Southeast Alaska Inland Waters stock, the Southern Southeast stock, and the Yakutat/Southeast stock.

4.4.4 Distribution

Harbor porpoises are distributed widely throughout the world. In the Pacific Ocean they are found from Point Conception in Central California, throughout Western Alaska, north to the Chukchi Sea, and west to Japan (NMFS 2023h). In Southeast Alaska, they are most common in Cross Sound, the Glacier Bay/Icy Strait region, Frederick Sound, Wrangell Island, Zarembo Islands, and Sumner Strait (Young et al. 2022; Zerbini et al. 2022). The Northern Southeast Alaska Inland Waters stock is the only stock expected in the action area. Abundance of the Northern Southeast stock is 1,619. (Young et al. 2022). A 22-year study documented a decline in harbor porpoise abundance in Southeast Alaska during the early 2000s followed by an increase in the early 2010s. However, it is unknown whether this change was due to harbor porpoises moving in and out of the area in response to shifting prey availability, or if an actual decline occurred (Dahlheim et al. 2015).

4.4.5 Presence in Project Area

Harbor porpoises are observed in small groups infrequently near the project area and more often are found in Lynn Canal south of Haines (Dahlheim et al. 2009; ECO49 Consulting, LLC 2019). Harbor porpoises were sighted only occasionally in the Lynn Canal region during a 2019 survey for the species in Southeast Alaska inland waters (Zerbini et al. 2022). No harbor porpoises were observed in Lutak Inlet during monitoring for the Lutak Dock RoRo Modification Project in November 2020 (Tom Mortensen Associates, LLC 2021).

4.5 HARBOR SEAL

4.5.1 Description, Behavior, and Life History

Harbor seals are one of the most common marine mammals in Alaska. They haul out on rocks, reefs, beaches, and drifting glacial ice and feed in marine, estuarine, and occasionally fresh waters. Harbor seals are generally non-migratory, with local movements associated with such factors as tide, weather, season, food availability, and reproduction. They are often seen hauled out in groups for protection against larger predators such as killer whales. Harbor seals dive to depths up to 500 meters (1,640 f) and forage on fish, clams, mussels, and crustaceans. Harbor seals deviate from other pinniped species in that pupping may occur on a wide variety of haul-out sites rather than particular major rookeries (ADF&G 2023c).

4.5.2 Hearing Ability and Communication

Harbor seals are classified by NMFS as phocid pinnipeds with a generalized in-water hearing range of 50 Hz to 86 kHz (NMFS 2018). They respond to underwater sounds from approximately 1 to 180 kHz, with the functional high-frequency limit around 60 kHz and peak sensitivity at about 32 kHz. Their hearing ability in the air is greatly reduced (by 25 to 30 dB); they respond to sounds from 0.1 to 32.5 kHz, with a peak sensitivity of 3.2 kHz (Reichmuth et al. 2013).

Most harbor seal vocalizations are exhibited during breeding season by adult males in order to establish territory and attract females (Casey et al. 2016; Matthews et al. 2020). Vocalizations between mother/pup pairs are also important as female seals forage during the nursing period and use attraction calls to maintain contact with pups (Perry and Renouf 1988; Sauvé et al. 2015).

4.5.3 Status

Harbor seals are not listed as depleted under the MMPA or as threatened or endangered under the ESA. In 2010, harbor seals in Alaska were partitioned into 12 separate stocks based largely on genetic structure (Muto et al. 2022). The status of the 12 stocks relative to their optimum sustainable population size is unknown. The stock that would be expected in the project vicinity (Lynn Canal/Stephens Passage stock) is not classified as strategic under the MMPA.

The current statewide abundance estimate for Alaskan harbor seals is 243,938 based on aerial survey data collected between 1996 and 2018 (Boveng et al. 2019). The abundance estimate for the Lynn Canal/Stephens Passage stock is 13,388 (Muto et al. 2022). The current 8-year estimate of the Lynn Canal/Stephens Passage population is a decrease of 114 seals per year, with a 0.73 probability that the stock is decreasing (Muto et al. 2022).

4.5.4 Distribution

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands.

Distribution of the Lynn Canal/Stephens Passage Stock, the only stock considered in this application, range from the northern reaches of Lynn Canal to Stephens Passage, including Taku Inlet, Tracy Arm, and Endicott Arm (Muto et al. 2022).

4.5.5 Presence in Project Area

Communication with a tour operator in Haines indicates that harbor seals are commonly sighted in the region, often hauled out on Taiya Point, approximately 3.6 km (2 mi) northeast of the Lutak Dock (SolsticeAK 2023). They are also present during the spring at Chilkoot River, approximately 7 km (4 mi) northwest of Lutak Dock where they have been documented in groups of up to 100 individuals (ECO49 Consulting, LLC 2019). The Lynn Canal/Stephens Passage stock of harbor seals are expected to be most abundant near the project area from mid-March through mid-May during the spring eulachon and herring runs (ECO49 Consulting, LLC 2019). The marine mammal monitoring report from the Lutak Dock RoRo Modification Project reported one sighting of an individual harbor seal during monitoring in November 2020 (Tom Mortensen Associates, LLC 2021).

4.6 STELLER SEA LIONS

4.6.1 Description, Behavior, and Life History

Steller sea lions are pinnipeds and members of the Otariidae or "eared seals" family. They are the largest of the eared seals, with males measuring up to 2,500 pounds and 11 feet long. Females of the species are slightly smaller, weighing up to 800 pounds. They are characterized by light blonde to reddish brown coats and long white whiskers on their muzzles used to sense prey and navigate within the water. They have long front flippers that are used to propel themselves in water and shorter back flippers that can be turned for walking on land (NMFS 2023i). Steller sea lions do not follow traditional migration patterns, but will move from offshore rookeries in the summer to more protected haulouts closer to shore in the winter. As social animals, they gather in large groups on land at rookeries for resting, breeding, and raising young pups. They are known to haul out on land, docks, buoys, and navigational markers. Different from rookeries, haulouts are more informal gathering locations used for resting and molting. In their aquatic habitat they are generally more solitary hunters and are excellent divers but often gather in large rafts, or clusters, at the surface.

Steller sea lions are opportunistic foraging feeders with diets consisting of a variety of species including salmon, herring, cod, eulachon, octopus, and squid, depending on prey availability. Feeding habits vary with season. During spring energetic demands are high for pregnant females and for males preparing for extended fasting. Beginning in May and throughout the breeding season, males may fast for up to two months while occupying and defending their rookery territory and breeding females forage closer to rookeries and return often to their nursing pups (NMFS 2023i).

4.6.2 Hearing Ability and Communication

Steller sea lions are classified by NMFS as otariid pinnipeds with a generalized in-water hearing range of 60 Hz to 39 kHz (NMFS 2018). The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. Sea lions have a range of vocalizations used on land and in water in conjunction with territorial behaviors, breeding, and communication between mother/pup pairs (Charrier 2021). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between 1 to 25 kHz (Kastelein et al. 2005) and in air between 250Hz and 30 kHz (Mulsow and Reichmuth 2010).

4.6.3 Status

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 due to significant population decline (55 FR 49204). Speculated causes of the decline included competition with commercial fisheries, environmental change, disease, predation, incidental take, and shooting (NMFS 2008). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 7, 1997). At that time, the eastern DPS (EDPS; which includes animals born east of Cape Suckling, Alaska) was listed as threatened, and the western DPS (WDPS; which includes animals breeding west of Cape Suckling, both in

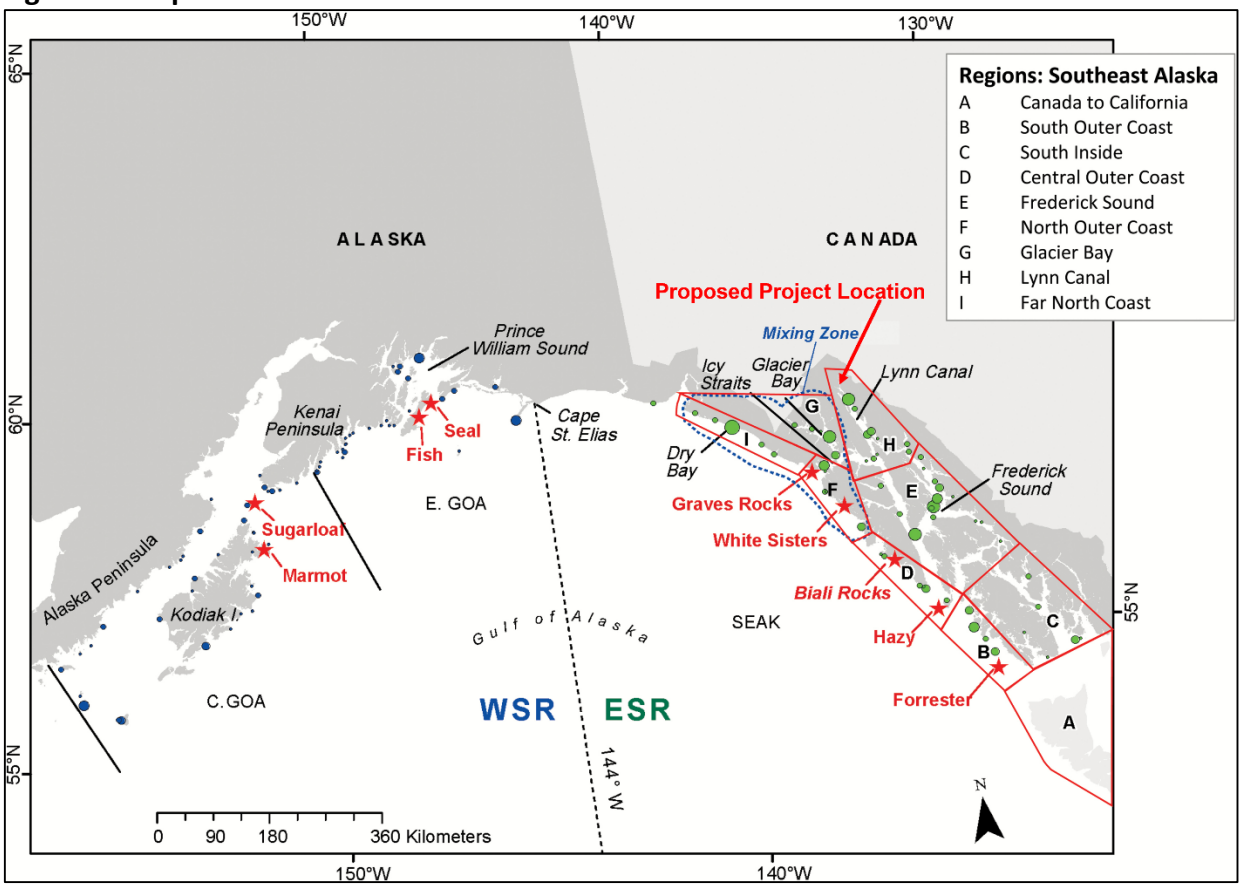
Alaska and Russia) was listed as endangered. The EDPS was removed from the endangered species list on November 4, 2013 (78 FR 66140). The WDPS remains on the ESA's endangered list. There have been no UMEs declared for this species in recent years (NMFS 2023g).

4.6.4 Distribution

Steller sea lions' range runs along the North Pacific Ocean from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (NMFS 2008). They are distributed mainly on the coastlines and coastal waters but can be found in pelagic waters (NMFS 2023i).

Of the two Steller sea lion populations in Alaska, the WDPS includes sea lions born on rookeries at or west of Cape Suckling, and the EDPS includes sea lions born on rookeries from California north through Southeast Alaska. A dividing line, based on genetic studies, is established at 144°W as shown in Figure 10 (NMFS 2023i; Hastings et al. 2020). It is expected that primarily EDPS Steller sea lions are found within the project area. Steller sea lions are not known to migrate annually, but individuals may disperse widely outside of the breeding season (late May to early July), leading to the intermixing of stocks. Lutak Inlet is outside of the known core mixing zone; however, it is within the extended mixing zone where WDPS animals have been recorded (Allen and Angliss 2015; Hastings et al. 2020; Jemison et al. 2013).

Figure 10. Separation of WDPS and EDPS Steller Sea Lion Rookeries at 144°W



Source: Hastings et al. 2020

4.6.5 Presence in Project Area

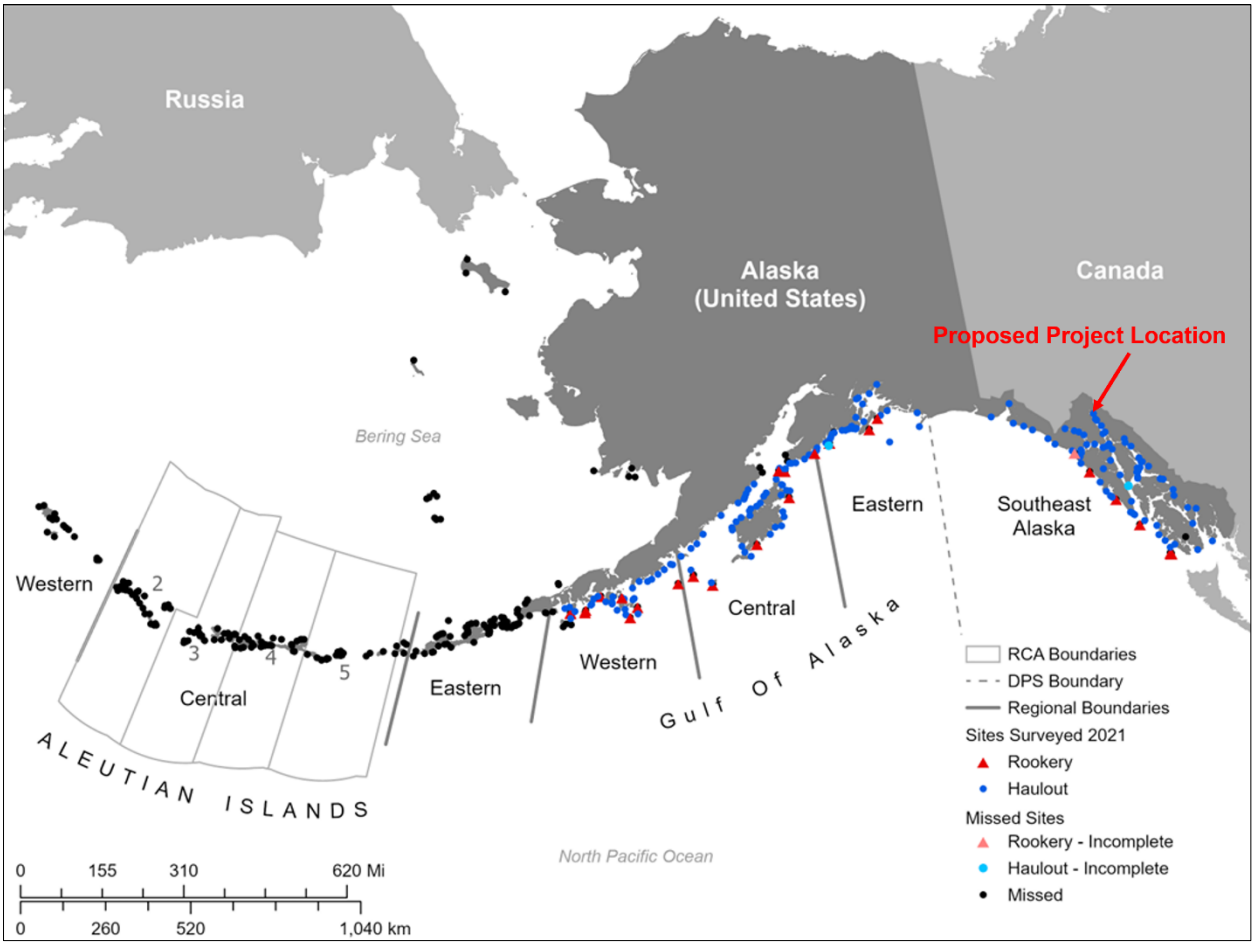
Steller sea lions are distributed throughout Southeast Alaska, with patterns loosely correlated to aggregations of spawning and migrating prey species (Sinclair and Zeppelin 2002; Sinclair et al. 2013). Steller sea lions are drawn to high forage value areas such as anadromous streams. Lutak Inlet has several anadromous streams that support salmon species (ADF&G 2023e).

Haulout and rookery sites in Southeast Alaska are documented through biennial aerial surveys and are shown in Figure 11 (Sweeney et al. 2022). During sea lion aerial surveys in 2002, large aggregations of Steller sea lions were seen in Lutak Inlet, with a maximum number of 506 individuals sighted on April 29 (Womble et al. 2005). There are no documented year-round haulouts or rookeries within Lutak Inlet; however, one seasonal haulout, Taiya Point, has been documented within the project action area (ECO49 Consulting, LLC 2019; Hart Crowser, Inc. and KPFF Consulting Engineers 2016). Steller sea lions have been observed hauled out on Taiya Point, approximately 3.6 km (2 mi) northeast of the project area during the spring eulachon run from mid-March through May (Womble et al. 2005).

Based on a personal communication with a local charter company that operates from May through September in the Haines area, Steller sea lions are seen primarily at Gran Point haulout and not often in Lutak Inlet (SolsticeAK 2023). During in-water work for construction of the AML RoRo ramp from November 8 to November 30, 2020, a total of 2 individual Steller sea lions were observed (Tom Mortensen Associates, LLC 2021).

During the winter and early spring (December through March), Steller sea lions move south in Lynn Canal and away from the project area (NMFS 2020). It is estimated that 1.4% of non-pup Steller sea lions in the Lynn Canal area are from the endangered WDPS and the remaining 98.6% are from the (not listed) EDPS (Hastings et al. 2020; NMFS 2020).

Figure 11. Steller Sea Lion Rookeries and Haulouts Map



Source: Sweeney et al. 2022

4.6.6 Critical Habitat

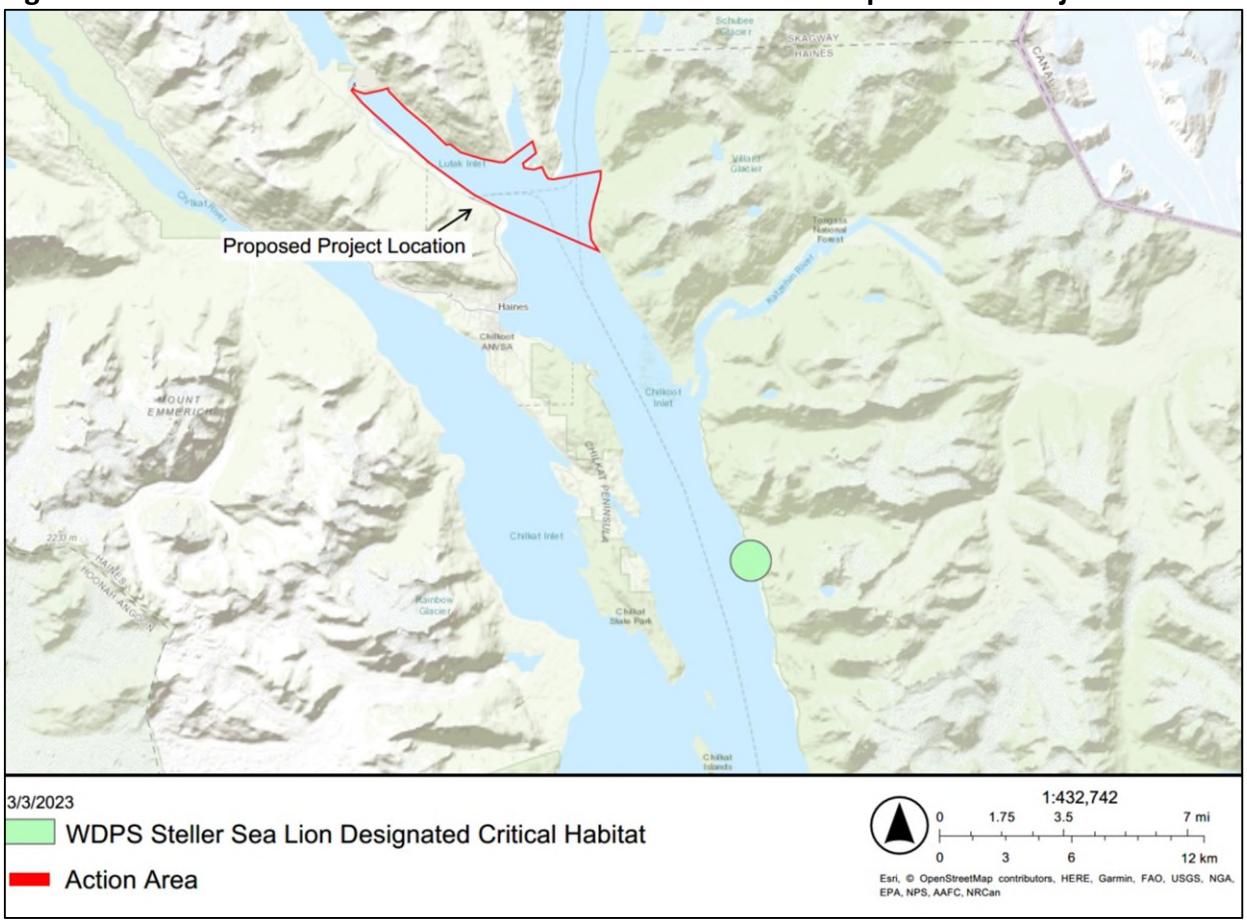
Critical habitat for Steller sea lions was designated by NMFS in 1993 based on the following essential physical and biological habitat features: terrestrial habitat (including rookeries and haulouts important for rest, reproduction, growth, social interactions) and aquatic habitat (including nearshore waters around rookeries and haulouts, free passage for migration, and prey resources, and foraging habitats) (58 FR 45269). Specifically, designated critical habitat consists of a terrestrial buffer zone that extends 914 meters (3,000 ft) landward from each major sea lion rookery and haulout. The aquatic buffer zone extends 914 meters (3,000 ft) from major rookeries and haulouts east of 144° W longitude (the dividing line for EDPS and WDPS Steller sea lions) and 37 km (20 nautical mi) from major rookeries and haulouts west of 144° W longitude (Figure 11).

The nearest rookery is located on Graves Rock near Graves Harbor, 140 km (76 nautical mi) southwest of the proposed project site. The nearest major year-round haulouts are Gran Point, approximately 22 km (12 nautical mi) southeast of the proposed project area; Eldred Rock, approximately 37 km (20 nautical mi) southeast; and Met Point, approximately 43 km (23 nautical mi) southeast (Alaska Fisheries Science Center 2023). The ensonified action area does not encompasses Steller sea lion designated critical habitat (Figure 12). However, since most of

Prince William Sound is within Steller sea lion critical habitat, the equipment barge route would transit through critical habitat on the way to the project site (Figure 13).

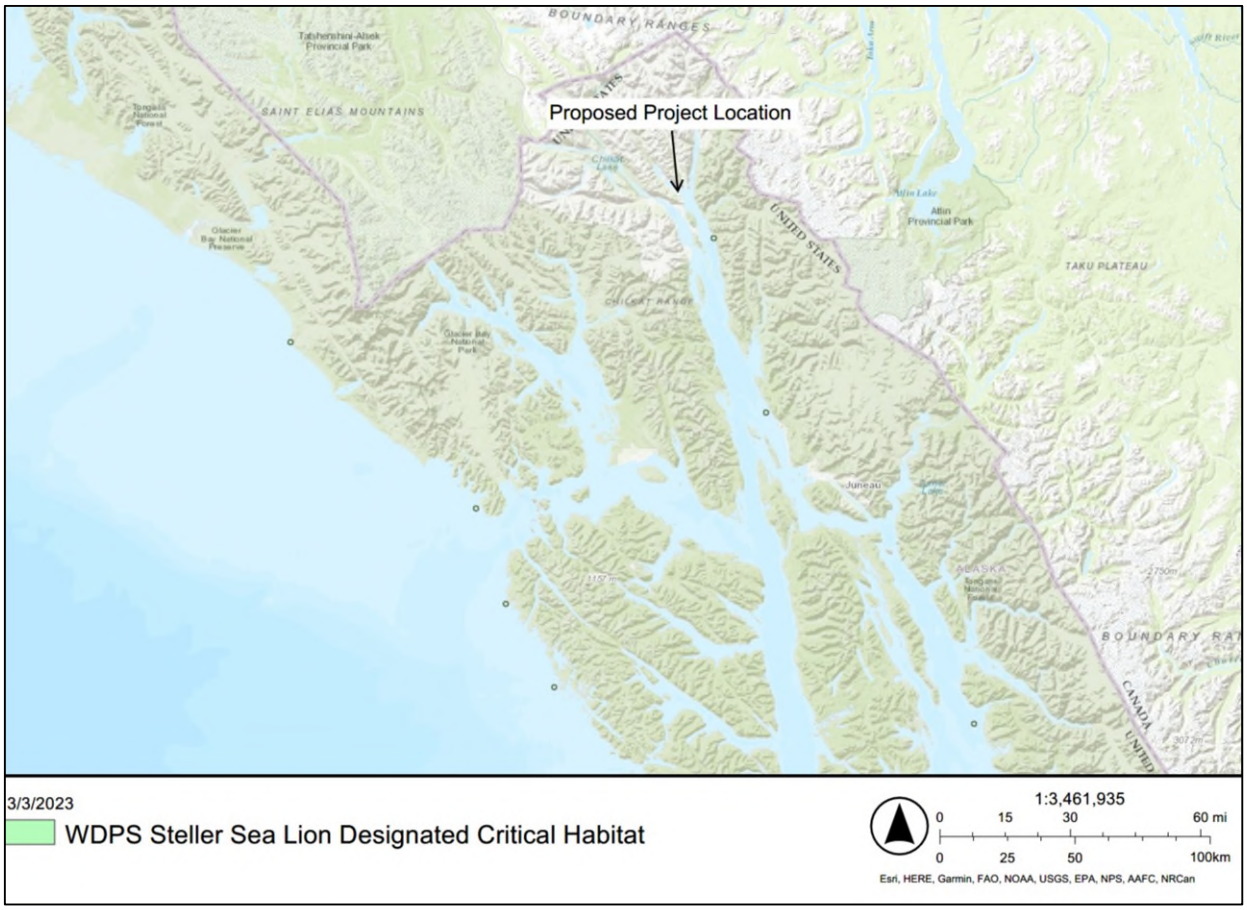
Within the action area all the important aquatic features exist for Steller sea lions, although some prey availability has been declining in the area in recent years. Pacific cod and Pacific herring are both primary prey species for Steller sea lions. Pacific cod in the Gulf of Alaska and have been in decline since the early 2000s (NMFS 2020b). Terrestrial habitat exists within the action area, but as it has not been previously used by Steller sea lions as a rookery or major haulout site, it does not meet the functions needed for critical habitat (NMFS 2023i).

Figure 12. Steller Sea Lion Critical Habitat Near the Lutak Dock Replacement Project Area



Source: NMFS 2023c

Figure 13. Steller Sea Lion Critical Habitat in Northern Southeast Alaska



Source: NMFS 2023c

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

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

Haines Borough requests the issuance of an IHA pursuant to Section 101(a)(5) of the MMPA for incidental take by Level B harassment of six species (humpback whale, killer whale, Dall's porpoise, harbor porpoise, harbor seal, and Steller sea lion) and Level A take of three species (harbor porpoise, harbor seal, and Steller sea lion) that may occur in the Lutak Dock Replacement Project harassment zones during construction.

The activities outlined in Section 1 have the potential to take marine mammals through exposure to in-water sound. Level B take of the six species listed above will potentially result from noise associated with pile installation and removal using the methods mentioned above (vibrating, impacting, and DTH drilling). Pile driving will be shut down if species enter or appear likely to enter shutdown zones for pile driving activities (Table 6), thereby decreasing potential Level A take of marine mammals. However, in some instances, zones where Level A take could occur are larger than the Level B monitoring zones for certain hearing groups and certain activities. For those activities, the Level A shutdown zone is shown on the Level B monitoring zone figure (Figure 20). In other cases, the full calculated Level B zone is truncated where land

masses are reached so Level B monitoring zones for practical application (shown here) is smaller. Section 11 describes mitigation measures including shutdown zones and procedures that will prevent most Level A takes, except for some harbor porpoises, harbor seals, and Steller sea lions for which Level A take is requested.

The applicant requests an IHA for incidental take of marine mammals described within this application for 1 year, beginning on October 1, 2023 (or the issuance date, whichever is later). Haines Borough is not requesting a Letter of Authorization (LOA) at this time because the activities described herein are expected to be completed within 1 year from the date of authorization and are not expected to rise to the level of serious injury or mortality, which would require an LOA.

6 TAKE ESTIMATES FOR MARINE MAMMALS

The number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.

6.1 ESTIMATED TAKE

Incidental take is estimated for each species considering the following:

1) acoustic thresholds above which NMFS believes marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment;
2) the size of the action area (the area of water that will be ensonified above acoustic thresholds in a day);
3) the density or occurrence of marine mammals in the action area;
4) the number of days of pile driving and removal activity.

Consultation with a local tour company, IHAs from previous marine construction projects in the Lutak Inlet area, and available scientific literature are used to estimate the occurrence of marine mammals in the action area. Incidental take is being requested for each species whose occurrence in the action area is described as 'common,' frequent,' or 'infrequent'. Take of species whose occurrence in the action area is described as 'rare' is not requested. See Table 7.

Occurrence estimates are based on historic data of occurrence, seasonality, and group size in the Lynn Canal region. For total take estimate, the daily occurrence probability for a species was multiplied by the estimated group size and by the number of days of each type of pile driving activity. Group size is based on the best available published research for these species and their presence in this area. Estimates for Steller sea lions and harbor seals factor in larger group sizes during pile driving activities that produce noise that would reach the Taiya Point seasonal haulout during approximately 2.5 months (mid-March through May); estimates for humpback whales and killer whales factor in different group sizes and occurrence based on available information about seasonal abundance in the region (Table 8).

Using the daily occurrence estimates for a species, we multiplied by the estimated group size and by the number of days of each type of pile driving activity for total take estimate.

Estimated take = Group size x groups per day x days of pile driving activity

Haines Borough is requesting Level A take for harbor porpoise, harbor seal, and Steller sea lion and Level B take for humpback whale, killer whale, Dall's porpoise, harbor porpoise, harbor seal, and Steller sea lion (Table 10). Species occurrence information used to estimate take and take calculations are shown in Table 8 and
Table 9.

6.1.1 Level A Take Calculation Rationale

For Steller sea lions, the level A zones for vibratory pile driving and impact sheet pile driving are small, and sea lions are not anticipated to occur in these areas. Therefore, all days of vibratory pile driving and impact sheet pile installation are excluded from Level A take calculations for sea lions. Only impact pipe (not sheet) pile driving and DTH drilling days are included in Steller sea lion Level A take calculations.

The Level A take days for harbor seals and harbor porpoises occur during impact and DTH drilling days only. All vibratory pile driving days are excluded from Level A take calculations for harbor seals and harbor porpoise, since they are not expected to occur in these small vibratory pile driving Level A harassment areas. If a marine mammal approaches or appears in one of these Level A zones, all in-water construction activities will be shut down.

6.1.2 Level B Take Calculation Rationale

The total number of days that Level B take could occur is determined in the following ways for the following species:

- **Humpback whales'** Level B take days are distributed between three time periods: mid-July to September during feeding in Lynn Canal (75 days); October to April during migration (215 days); and May to mid-July (75 days) when they are more common in the region. Each time period was taken as a percentage of a full year (365 days) and multiplied by the number of pile driving days for each activity. For example, vibratory pile driving from mid-July to September: (75 days in Lynn Canal/365 in a year)*80 days of pile driving = 16.4 days of humpback whale Level B take.
- **Killer whales'** Level B take days are distributed between two time periods: mid-March to May (75 days) when killer whales are expected in the region and the remainder of the year (290 days) when their presence is sporadic. Each time period was taken as a percentage of a full year (365 days) and multiplied by the number of pile driving days for each activity. For example, impact pile driving: (75 day of expected presence/365 days in a year)*80 days of vibratory drilling = 19.1 days.
- **Harbor seals'** Level B take days consider the days when Lynn Canal/Stephens Passage stock of harbor seals are expected to be most abundant near the project area from mid-March through mid-May during the spring eulachon and herring runs (75 days). Because exact in-water work methodology is unknown for each day of construction, take during the 75 days was distributed between the three pile driving methods, resulting in 25 days applied to each pile driving method. The remaining days for each pile driving method do not include take during high seal abundance days.

- **Steller sea lions'** use of the Taiya Point seasonal haulout between mid-March and May (75 days) is assumed and considered when calculating the days that Level B take could occur. Because exact in-water work methodology is unknown for each day of construction, it was estimated that that 1/3 of the time would be spent impacting, 1/3 would be spent vibrating, and 1/3 would be spent DTH drilling. Therefore, during 25 of the 75 days that Steller sea lions would be expected to be at Taiya point, they would be expected to be taken by vibratory driving. Steller sea lions would be taken by impact driving on the other 25 days and by DTH drilling on the other 25 days. (No double days of Level B take were counted.) The remaining days for each pile driving method do not include take at Taiya Point.

Species occurrence numbers were determined considering the information presented in Table 8, and Level B take estimates by species for the Lutak Dock Replacement Project are presented in Table 9.

Table 8. Species Occurrence Information for the Lutak Dock Replacement Project

Species	Occurrence information
Humpback Whale	• Anticipated to be present in Southeast Alaska from May to September, with more frequent presence in northern Southeast Alaska in the summer.[1,2] • Variable group size expected based on season: a group size of 2 from May to September and a group size of 1 during the rest of the year. The group size of 2 from May to September is based on personal communication with local charter captain (1-2 individuals sighted 4-6 times per week during summer). Humpback whales are sighted less frequently during from October to April near Lutak Inlet, and group sizes during this time in Lynn Canal area can range from 1-2 individuals.[1,3,4] • Humpback whales migrate south during the winter, typically leaving Alaska's waters; however, some individuals may remain in Southeast Alaska, including Lynn Canal year-round.[3,5] • In Southeast Alaska, 98% of humpback whales are estimated to be from the Hawaii DPS and 2% are estimated to be from the Mexico DPS. This breakdown was used to estimate take from each DPS.[6]
Killer Whale	• Observed sporadically and infrequently in Upper Lynn Canal area.[1,7,8] • Group size of 15 is based on surveys of marine mammals in Southeast Alaska where mean group sizes by season were 19.3 in fall, 21.5 in spring, and 32.3 in summer; ranges from 1 to 16 for transient killer whales and 4 to 45 for resident killer whales annually[7]; a group size of 15 was determined for resident killer whales in the Upper Lynn Canal region for an IHA in Taiya Inlet.[9] • The three stocks expected in the Lutak Inlet area are (population): Eastern North Pacific Alaska Resident (1,920); West Coast Transient (349); and Eastern North Pacific Northern Resident (302). To estimate the take of each stock present in the project vicinity, each stock was calculated as a percentage of the population of the three combined stocks (2,571 individuals). For Alaska Residents: 1,920/2,571*100=75%. For West Coast Transients: 349/2,571*100= 13.5%. For Northern Residents: 302/2,571*100=12%.
Dall's Porpoise	• Occasionally present in Upper Lynn Canal in early spring or late fall; more common south of Lutak Inlet.[1,7,9] • Group size of 4 used based on surveys of marine mammals in Southeast Alaska. Mean annual group size was 2.8 in summer, 3.6 in spring, and 3.3 in fall.[7]
Harbor Porpoise	• Occasionally present in Lynn Canal; more common in Southern Southeast Alaska and Icy Strait area.[1,7,8] • Group size of 2 is based on surveys of marine mammals in Southeast Alaska. Mean annual group size of harbor porpoises reported was 1.6 in summer, 1.6 in spring, and 1.9 in fall.[7] • Harbor porpoises are usually shy animals, and are not expected to frequent the area adjacent to Lutak Dock; therefore, Level A take excludes vibratory pile driving which reaches a maximum distance of 65 meters.
Harbor Seal	• Common in Lynn Canal; most abundant in Lutak Inlet from mid-March through May.[8] • Group size of 100 individuals during spring foraging (mid-March through May) and group size of 5 individuals during the rest of the year based on communication with local tour operator and an IHA prepared for the Lutak Dock RoRo project.[1,8]
Steller Sea Lion	• Frequently observed in Lynn Canal; seasonally observed in larger groups in Lutak Inlet and hauled out at Taiya Point.[1,10] • A group size of 40 for 2.5 months and 2 for the rest of the year is based on the estimated seasonal haulout size at Taiya Point of 25-40 individuals (mid-March through May) and estimated group size during the rest of the year based on lower abundances in the region and personal communication.[1,8,11,12] • In Lynn Canal, 1.4% of Steller sea lions are estimated to be from the WDPS and 98.6% are estimated to be from the EDPS (Hastings et al. 2020; NMFS 2020). This was used to estimate take from each DPS.

[1] SolsticeAK 2023; [2] Witteveen et al. 2011; [3] Straley et al. 2018; [4] Happywhale 2023; [5] International Whaling Commission 2022; [6] NMFS 2021, Wade 2021; [7] Dahlheim et al. 2009; [8] ECO49 Consulting, LLC 2019; [9] Hart Crowser, Inc. and KPFF Consulting Engineers 2016; [10] Womble et al. 2005; [11] NMFS 2020; [12] 84 FR 4777

Table 9. Species Take Calculation Estimates for the Lutak Dock Replacement Project

Species	Frequency	Seasonality	Abundance Notes	Group Size	Expected No. of Groups	Pile Driving Method	Total # days[1]	Distance (m)	Take Calculation	Total Exposure
Level A										
Harbor Porpoise	Infrequent	Year-round	Sporadically seen in Lynn Canal area	2	1 group every 30 days	Impact (36-inch)	11	3,260	2 individuals X 1 group every 30 days X 11 days = 2^2	**13**
						Impact (42-inch)	45	4,580	2 individuals X 1 group every 30 days X 45 days = 3	
						Impact (sheet)	7	2,310	2 individuals X 1 group every 30 days X 7 days = 2^2	
						DTH (42-inch)	90	4,825	2 individuals X 1 group every 30 days X 90 days = 6	
Harbor Seal	Common	Year-round	Level A threshold does not include the seasonal haulout	5	1 group every 10 days	Impact (36-inch)	11	1,500	5 individuals X 1 group every 10 days X 11 days = 6	**79**
						Impact (42-inch)	45	2,060	5 individuals X 1 group every 10 days X 45 days = 23	
						Impact (sheet)	7	1,040	5 individuals X 1 group every 10 days X 7 days = 5^2	
						DTH (42-inch)	90	2,170	5 individuals X 1 group every 10 days X 90 days = 45	
Steller Sea Lion	Common	Year-round	Level A threshold does not include the seasonal haulout	2	1 group per day	Impact (36-inch)	11	110	2 individuals X 1 group per day X 11 days = 22	**292**
						Impact (42-inch)	45	150	2 individuals X 1 group per day X 45 days = 90	
						DTH (42-inch)	90	160	2 individuals X 1 group per day X 90 days = 180	

Species	Frequency	Seasonality	Abundance Notes	Group Size	Expected No. of Groups	Pile Driving Method	Total # days[1]	Distance (m)	Take Calculation	Total Exposure
Level B										
Humpback Whale	Infrequent	Year-round	Mid-July – September during feeding in Lynn Canal area	2	1 group every 10 days	Vibratory (all)	17	5,425 - 7,000	2 individuals X 1 group every 10 days X 17 days = 4	**26**
			October – April during migration to southern waters	1	1 group every 10 days	Vibratory (all)	48	5,425 - 7,000	1 individual X 1 group every 10 days X 48 days = 5	
			May – mid-July when they are more frequently seen	2	1 group every 2 days	Vibratory (all)	17	5,425 - 7,000	2 individuals X 1 group every 2 days X 17 days = 17	
Killer Whale	Infrequent	Year-round	More common during mid-March – May, every few weeks	15	1 group every 20 days	Vibratory (all)	17	5,425 - 7,000	15 individuals X 1 group every 20 days X 17 days = 15^2	**138**
						Impact (all)	13	1,500	15 individuals X 1 group every 20 days X 13 days = 15^2	
						DTH (all)	19	7,000	15 individuals X 1 group every 20 days X 19 days = 15^2	
			Less common, sporadic the rest of the year	15	1 group every 30 days	Vibratory (all)	64	5,425 - 7,000	15 individuals X 1 group every 30 days X 64 days = 32	
						Impact (all)	50	1,500	15 individuals X 1 group every 30 days X 50 days = 25	
						DTH (all)	72	7,000	15 individuals X 1 group every 30 days X 72 days = 36	
Dall's Porpoise	Infrequent	Year-round	More common farther south in Chilkoot Inlet	4	1 group every 30 days	Vibratory (all)	80	5,425 - 7,000	4 individuals X 1 group every 30 days X 80 days = 11	**31**
						Impact (all)	62	4,580	4 individuals X 1 group every 30 days X 62 days = 8	
						DTH (all)	90	7,000	4 individuals X 1 group every 30 days X 90 days = 12	

Species	Frequency	Seasonality	Abundance Notes	Group Size	Expected No. of Groups	Pile Driving Method	Total # days[1]	Distance (m)	Take Calculation	Total Exposure
Level B (Continued)										
Harbor Porpoise	Infrequent	Year-round	Sporadically seen in Lynn Canal area	2	1 group every 30 days	Vibratory (all)	80	5,425 - 7,000	2 individuals X 1 group every 30 days X 80 days = 5	**15**
						Impact (all)	62	4,580	2 individuals X 1 group every 30 days X 62 days = 4	
						DTH (all)	90	7,000	2 individuals X 1 group every 30 days X 90 days = 6	
Harbor Seal	Common	Year-round	Highest abundance of individuals counted was 100 feeding near Chilkoot River. Most abundant in mid-March – May	100	1 group every 10 days	Vibratory (all)	25	5,425 - 7,000	100 individuals X 1 group every 10 days X 25 days = 250	**827**
						Impact (all)	25	1,500-2,060	100 individuals X 1 group every 10 days X 25 days = 250	
						DTH (all)	25	7,000	100 individuals X 1 group every 10 days X 25 days = 250	
			Very few seen the rest of the year	5	1 group every 10 days	Vibratory (all)	55	5,425 - 7,000	5 individuals X 1 group every 10 days X 55 days = 28	
						Impact (36-inch)	11	1,500	5 individuals X 1 group every 10 days X 11 days = 6	
						Impact (42-inch)	20	2,060	5 individuals X 1 group every 10 days X 20 days = 10	
						DTH (42-inch)	65	7,000	5 individuals X 1 group every 10 days X 65 days = 33	

Species	Frequency	Seasonality	Abundance Notes	Group Size	Expected No. of Groups	Pile Driving Method	Total # days[1]	Distance (m)	Take Calculation	Total Exposure
Level B (Continued)										
Steller Sea Lion	Common	Year-round	Includes haulout (mid-March – May)	40	1 group per day	Vibratory (all)	25	5,425 - 7,000	40 individuals X 1 group per day X 25 days = 1,000	**2,352**
						DTH (42-inch)	25	7,000	40 individuals X 1 group per day X 25 days = 1,000	
			Does not include haulout (June – mid-March)	2	1 group per day	Vibratory (all)	55	5,425 - 7,000	2 individuals X 1 group per day X 55 days = 110	
						Impact (36-inch)	11	1,500	2 individuals X 1 group per day X 11 days = 22	
						Impact (42-inch)	45	1,500	2 individuals X 1 group per day X 45 days = 90	
						DTH (42-inch)	65	7,000	2 individuals X 1 group per day X 65 days = 130	

[1]The number of days for each pile driving method were rounded up to the nearest whole number.

[2]For some individual take calculations, calculated exposures were smaller than species group size. For these species, group size was used instead of the smaller take calculation.

6.2 ALL MARINE MAMMAL TAKE REQUESTED

For potential takes of marine mammals classified as Level B harassment under the MMPA, this analysis for the Lutak Dock Replacement Project predicts 25 potential takes of non-ESA listed and 1 potential take of ESA listed humpback whales, 138 potential takes of killer whales, 31 potential takes of Dall's porpoises, 16 potential takes of harbor porpoises, 827 potential takes of harbor seals, 2,319 potential takes of non-ESA listed Steller sea lions and 33 potential takes of ESA-listed Steller sea lions. Potential Level A takes are predicted for 13 harbor porpoises, 79 harbor seals, 288 non ESA-listed Steller sea lions, and 4 ESA-listed Steller sea lions. See **Table 9** and Table 10.

Table 10. Lutak Dock Replacement Project Take Requests for Marine Mammals and Percent of Stock

Species	Stock/DPS (N_{EST})[a]	Level A	Level B[b]	Percent of Stock[c]
Humpback Whale	Hawaii DPS (11,278) [d, f]	0	25	Less than 1
	Mexico DPS (2,806) [e]	0	1	Less than 1
Killer Whale	Eastern North Pacific Alaska Resident (1,920) [f]	0	103	5.4
	West Coast Transient (349)	0	19	5.4
	Eastern North Pacific Northern Resident (302)	0	16	5.3
Dall's Porpoise	Southeast inland waters (Spring: 5,381; Summer: 2,680; and Fall: 1,637) [g]	0	31	1.9
Harbor Porpoise	Northern Southeast Alaska (1,619) [f]	13	16	1.8
Harbor Seal	Lynn Canal/Stephens Passage (13,388)	79	827	6.8
Steller Sea Lion	Western U.S. (52,932)	4	33	Less than 1
Steller Sea Lion	Eastern U.S (43,201)	288	2,319	6.0

[a] Stock estimate from Muto et al. 2022; unless otherwise noted.

[b] Take estimates are weighted between stocks/DPS for each species based on calculated percentages of population for each distinct stock, assuming animals present during construction would have the same distribution in project area as outlined in Table 8.

[c] Percent of stock reflects the combined total of Level B and Level A take (if requested).

[d] Under the MMPA, humpback whales are considered a single stock (Central North Pacific); however, we have divided them here to account for DPSs listed under the ESA: 98 percent of humpback whales present in Southeast Alaska are expected to be from the Hawaii DPS, 2 percent from the Mexico DPS, and none are expected to be from the WNP DPS (NMFS 2021; Wade 2021).

[e] Mexico DPS estimate from 86 FR 21082.

[f] Stock estimates from Young et al. 2022.

[g] Dall's porpoises are considered one stock in Alaska, so stock estimates are not available. However, abundance estimates for Dall's porpoises in inland waters of Southeast Alaska are provided in Muto et al. 2022 based on surveys from Jefferson et al. 2019. To be conservative, for percent of stock estimate, the lowest abundance estimate was used (1,637).

7 ANTICIPATED IMPACT OF THE ACTIVITY

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

Haines Borough is requesting authorization for Level A and Level B take of marine mammals. Table 10 shows take requests in relation to the overall stock size of each species. The calculations of stock take in Table 10 assume takes of individual animals, instead of repeated takes of a smaller number of individuals; therefore, the stock take percentage calculations are conservative.

Incidental Level B take is expected to primarily result in short-term changes in behavior, such as avoidance of the proposed action area, changes in swimming speed or direction, and changes in foraging behavior. Level B exposure could occur during the 1,462 hours when pile driving and removal would occur. The proposed action would be unlikely to have any impact on stock recruitment or survival because of the limited time that marine mammals could be exposed to Level B harassment; therefore, the proposed action would have a negligible impact on the stocks of these species.

Haines Borough is requesting minimal Level A take for harbor porpoises, harbor seals, and Steller sea lions that may occur during impact hammer or DTH drilling pile installation, when the Level A zone extends beyond 10 meters (33 ft) (see Table 10). Incidental Level A take can cause injury including permanent partial or full hearing loss if marine mammals are exposed to underwater sounds exceeding their injury threshold. Marine mammals exposed to high sound levels may experience non-auditory physiological effects such as increased stress, neurological effects, bubble formation, resonance effects, and organ or tissue damage.

Because of the limited area where harbor porpoises (maximum of 4,825 meters [15,830 ft]), harbor seals (maximum 2,170 meters [7,119 ft]) and Steller sea lions (maximum 160 meters [525 ft]) could experience Level A harassment, it is not expected that there would be any impact on stock recruitment or survival; therefore, there would be no impact to the stocks of these species.

8 ANTICIPATED IMPACTS ON SUBSISTENCE USES

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

Alaska Natives have used subsistence resources including saltwater and anadromous fish, shellfish, marine mammals, and plants in Southeast Alaska for thousands of years. Lutak Inlet and other nearby areas are within the traditional territory of the Chilkat and Chilkoot Tlingit. Salmon and eulachon were especially important to the Tlingit for food, oil, and trade. Today the majority of subsistence species used in the region include salmon, halibut, eulachon, Dolly Varden, marine invertebrates, large land mammals, and plant species such as wild berries (Sill and Koster 2017).

The last recorded harvest of marine mammals in Haines was in 1996, where it was reported that 41 harbor seals were harvested (ADF&G 2023d). Other nearby communities, including

Hoonah, Angoon, and Hydaburg reported harvesting marine mammals during the 2012 ADF&G survey, primarily harbor seals and sea otters, and some of the harvests took place near the confluence of Chilkoot and Chilkat Inlets, south of Haines (Sill and Koster 2017). No marine mammal harvests were reported by residents of Haines during ADF&G household surveys in 2012 (Sill and Koster 2017). In the most recent ADF&G survey from 2014, the community of Klukwan (located approximately 20 mi northwest of Haines) reported harvests of 224 pounds, or 3.5 pounds per capita, of marine mammals (ADF&G 2023d).

Harbor seals have been traditionally harvested by Alaska Natives throughout their range—from Southeast Alaska through western Alaska—and provide food, skins, and oil and are commonly traded among households. In recent years, the number of hunters targeting harbor seals in Southeast Alaska has declined. A survey conducted by ADF&G in 2012 found that the number of households harvesting harbor seals had declined by 49.7 percent since surveys began in 1992 and the number of seals harvested declined by 64.3 percent over that same time period (Wolfe et al. 2013).

The proposed action is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes or to impact subsistence harvest of marine mammals in the region because:

- there is no recent recorded subsistence harvest of marine mammals in the area;
- construction activities are localized and temporary;
- mitigation measures will be implemented to minimize disturbance of marine mammals in the action area (see Section 11); and,
- the proposed action will not result in significant changes to availability of subsistence resources.

9 ANTICIPATED IMPACTS ON HABITAT

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

9.1 LOSS OF MARINE MAMMAL HABITAT DUE TO THE PROJECT FOOTPRINT

The Lutak Dock Replacement Project would likely not impact any important marine mammal habitat since its proposed location is an active dock adjacent to an area used year-round by large passenger ferries and shipping vessels.

9.2 LOSS OF MARINE MAMMAL HABITAT DUE TO TURBIDITY AND SEDIMENT

A temporary and localized increase in turbidity near the seafloor would occur in the immediate area surrounding the dock during the estimated 1,272 hours of in-water pile work and 1,743 hours (approximate) of in-water filling activities. A portion of the in-water work would involve DTH drilling which would also release drill cuttings into the marine environment from the top of the piles and increase turbidity in the immediate area during pile driving. A sediment curtain will be employed during DTH drilling to temporarily contain the slurry of soil, water, and drill cuttings as they are released from the top of the pile being installed. The sediment curtain would trap the suspended drill spoils in a smaller in-water area to prevent dispersal and contain the area of increased turbidity until the sediment largely settles back to the seafloor.

As seen in aerial photography (Figure 14), the area near Lutak Dock is already turbid due to glacial sediment outfall from Chilkoot Lake and Ferebee River. Due to the existing turbid conditions and the sediment curtain that would be used to contain pile slurry, construction-induced turbidity is unlikely to measurably affect marine mammal species or prey species in the action area.

Figure 14. Existing Turbid Conditions near Lutak Dock Replacement Project Area

Source: Google Earth 2019

9.3 NOISE

A temporary loss of marine mammal habitat may occur because of elevated noise levels in the action area. Displacement of marine mammals by construction noise is not expected to be permanent nor is it anticipated to have long-term effects on the species present. Proposed action activities are 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 driving and other construction-related noise sources will be temporary and intermittent. As Lutak Inlet is not a significant habitat resource for any marine mammal species, the proposed action would not result in any marine mammal populations losing a significant portion of their habitat.

9.4 CRITICAL HABITAT

There is no designated critical habitat within the action area. The nearest designated critical habitat for WDPS Steller sea lions is Gran Point, approximately 22 km (14 mi) south of the Lutak Dock. It is not anticipated that the Lutak Dock Replacement Project will impact this critical

habitat. Furthermore, the Lynn Canal area already has an elevated level of baseline noise from vessels transiting through the area, including near the Gran Point haulout. The seasonal haulout in the project area is not considered critical habitat and there are no other known rookeries or major year-round haulouts that would be impacted by the project.

9.5 EFFECTS TO MARINE MAMMAL PREY SPECIES

Humpback whales filter-feed on small crustaceans (mostly krill) and small fish. The impacts of underwater sound on some fish are well understood; however, impacts on species further down the food chain (such as euphausiids) that are important prey species for cetaceans and fish are not as well studied.

A 2015 study examined the impacts of sound produced by seismic air guns on marine invertebrates, specifically zooplankton. Seismic air guns produce low frequency, high intensity underwater sound ranging from 156 dB re 1 μPa^2s^{-1} to 183 dB re 1 μPa^2s^{-1} approximately 509 meters (1,670 ft) to 658 meters (2,160 ft) from the source. The seismic air gun used in this study is within or below the range of pile installations equipment that will be deployed during the proposed action (Corbett 2019). The results indicate that there was an increased mortality in adult and larval zooplankton and total mortality of larval krill from this type of noise (adults were not present) (McCauley et al. 2017).

Fish populations and euphausiids in the proposed action area that serve as marine mammal prey could be affected by noise or turbidity generated from in-water pile driving and the placement of fill associated with this project. It is expected that most fish will be able to move away from the proposed activity to avoid harm and will still be available to marine mammals as a food source in the project vicinity. The quantity, quality, and availability of adequate marine mammal food resources are therefore not likely to be reduced as a result of this project due to the small area affected, mobility of fish, anticipated recolonization, and the temporary nature of the proposed action.

Other prey species' marine habitat supported by the action area include anadromous fish, such as Pacific salmon (all five species) (ADF&G 2023e). Table 11 details species with essential fish habitat (EFH) that may occur near the proposed action during at least one phase of their life cycle.

There are five anadromous streams identified by the ADF&G Anadromous Waters Catalog (AWC) in the vicinity of the proposed action that flow into or near the action area: Chilkoot River (115-33-10200), Mink Creek (115-34-10900), an unnamed waterway (115-34-10900), Ferebee River (115-33-10650), and Little Ferebee River (ADF&G 2023e; Table 12). Chinook, coho, chum, sockeye, and pink salmon are supported by these streams.

An EFH Assessment has been drafted for this project and was submitted for review on June 14, 2023. Concurrence by NMFS Habitat Division in Anchorage, Alaska is expected in August 2023. The EFH Assessment details the potential impacts to fish, including salmon and other species that are marine mammal prey as summarized below.

Actions that could potentially cause impacts on EFH during the proposed action include in-water disturbance, increased turbidity, or water quality degradation. Increased sedimentation

associated with the proposed action would be localized and temporary and is not likely to have detectable effects on any krill or fish. The proposed action would not include any work in or near the identified anadromous streams in the project vicinity. In addition, the proposed action does not include any activities that are toxic to krill or fish.

Krill and fish populations in the vicinity of the proposed action that serve as marine mammal prey could be affected by noise from in-water pile driving. Sound is particularly important for fish as other senses are muted underwater. High underwater sound pressure levels have been documented to alter behavior, cause hearing loss, and injure or kill individual fish by causing serious internal injury (Popper and Hawkins 2019). Temporary and localized turbidity associated with the proposed action may cause displacement of small schooling fish from the construction area; however, such distribution shifts are likely to be temporary and localized and it is expected that fish will return to the immediate area after pile driving is complete.

In general, impacts to marine mammal prey species are expected to be minor and temporary. The area impacted by the proposed action is very small compared to the available habitat in the Upper Lynn Canal area. The most likely impact to prey will be temporary behavioral avoidance of the immediate area. Fish and marine mammals are expected to temporarily move to nearby locations during pile driving and return to the area following cessation of in-water construction activities; therefore, indirect effects on marine mammal prey during construction are not expected to be substantial or sustained.

Table 11. EFH Species Present in Lutak Inlet

Species	Life stage(s) Found at Project Location
Alaska plaice (*Pleuronectes quadrituberculatus*)	egg (summer) and larvae (summer)
Arrowtooth flounder (*Atheresthes stomias*)	larvae (summer)
Chinook salmon (*Oncorhynchus tshawytscha*)	mature and immature adult (marine)
Chum salmon (*O. keta*)	mature and immature adult; juvenile (marine)
Coho salmon (*O. kisutch*)	mature adult and juvenile (marine)
Dover sole (*Solea solea*)	egg (summer) and larvae (summer)
Flathead sole (*Hippoglossoides elassodon*)	egg (summer) and larvae (summer)
Northern rock sole (*Lepidopsetta polyxystra*)	larvae (summer)
Pacific cod (*Gadus macrocephalus*)	larvae (summer)
Pacific ocean perch (*Sebastes alutus*)	larvae (summer)
Pink salmon (*O. gorbuscha*)	mature adult and juvenile (marine)
Rex sole (*Glyptocephalus zachirus*)	egg (summer) and larvae (summer)
Sablefish (*Anoplopoma fimbria*)	larvae (summer)
Sockeye salmon (*O. nerka*)	mature and immature adult; juvenile (marine)
Southern rock sole (*L. bilineata*)	larvae (summer)
Walleye pollock (*Gadus chalcogrammus*)	egg (summer) and larvae (summer)
Yellowfin sole (*Limanda aspera*)	egg (summer)

Table 12. Anadromous Streams Present Within the Action Area

Waterbody Name	AWC Number	Species Present*	Distance from Project Site (km [mi])
Chilkoot River	115-33-10200	COp, CHp, Kp, Pp, Sp	6.96 (4.33) northwest
Mink Creek	115-34-10900	COr	1.92 (1.19) southeast
Unnamed	115-33-10198	Ps	5.97 (3.71) northwest
Ferebee River	115-33-10650	COp	3.37 (2.1) northeast
Little Ferebee River	115-33-10650-2001	COp	6.82 (4.24) northeast

Source: ADF&G 2023e *Key: Chum Salmon (CH); Coho Salmon (CO); Pink Salmon (P); Sockeye Salmon (S); Chinook Salmon (K); spawning (s); present (p); rearing(r)

9.6 INDIRECT HABITAT IMPACTS

Because the proposed action would replace existing dock features and would not change the function or capacity of the dock, no indirect impacts are anticipated as a result of this project. Additional vessel traffic is not expected once the project is completed because the project would not increase the available docking space or storage area. Because the purpose of the proposed action is to repair an aging dock to maintain its current use, it is not anticipated to induce any indirect development.

10 ANTICIPATED EFFECT OF HABITAT IMPACTS ON MARINE MAMMALS

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

The most likely effects on marine mammal habitat from the proposed action would be: localized, temporary water quality effects from increased turbidity; temporary, short duration in-water noise; and temporary prey (krill and fish) disturbance. The direct loss of marine mammal habitat during construction due to water quality impacts, noise, and general construction activity is expected to be short-term and minimal.

All of the species discussed in this application could experience a temporary loss of suitable habitat within the action area, depending on the degree that they use the area, if elevated noise levels associated with in-water construction result in their displacement form the area. However, displacement of species by noise is expected to be temporary and would not result in long-term effects to the local populations.

11 MITIGATION MEASURES

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

Mitigation measures and construction techniques will be employed to minimize effects to marine mammal species and habitat. These measures are described below and presented in detail in the Lutak Dock Replacement Project 4MP (Appendix C).

11.1 MITIGATION MEASURES DESIGNED TO REDUCE PROJECT IMPACTS

The proposed action uses the most compact design possible while meeting the demands of the vessels that would use the facility.

- The proposed action uses a design that will not require dredging or blasting.
- The proposed action uses a design that minimizes pile diameters, number of piles, and overall footprint to the greatest extent practicable.
- The proposed action uses a design that minimizes in-water fill.
- The proposed action makes use of a land-based cantilever to reduce the number of template piles needed for permanent pile installation.

11.2 OIL AND SPILL PREVENTION

- The contractor will provide and maintain a spill cleanup kit on-site at all times, to be implemented as part of the Oil Pollution Emergency Plan for oil spill prevention and response.
- Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment would be checked regularly for drips or leaks and maintained and stored properly to prevent spills.
- Oil booms will be readily available for oil or another containment should a release occur.
- All chemicals and petroleum products will be properly stored to prevent spills.
- No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.

11.3 MITIGATION MEASURES DESIGNED TO REDUCE IMPACTS TO MARINE MAMMALS

- Pile caps (pile softening material) will be used to minimize noise during impact pile driving. Much of the noise generated during pile installation comes from contact between the pile and the steel template used to stabilize the pile. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel-on-steel noise.
- A silt curtain will be employed during all DTH-drilling activities to contain drill spoils as much as possible to allow them to settle to the sea floor in the immediate area rather than dispersing increased turbidity over a wider area.
- The contractor is required to conduct briefings for construction supervisors and crews and the monitoring team prior to the start of all pile driving activity and upon hiring new personnel to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.
- The contractor must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.

- Turnagain will attempt to minimize the use of an impact hammer to the extent possible by utilizing a vibratory hammer to advance the piling as deep as possible prior to switching to impact driving.
- The contractor is required to employ PSOs during all in-water construction activities.
- Marine mammal monitoring must take place starting 30 minutes prior to initiation of pile driving and ending 30 minutes after completion of pile driving activity. Pile driving may commence when observers have declared the shutdown zone clear of marine mammals.
- Pile driving must be halted or delayed if a marine mammal is observed entering or within an established shutdown zone (Table 13). Pile driving may not commence or resume until either: the animal has voluntarily left and has been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent observations of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent observations of large cetaceans.
- Pile installation and removal must be delayed or halted immediately if a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone (Table 13). Activities must not start or resume until the animal has been confirmed to have left the area or the observation time period, as indicated in the conditions above, has elapsed.

11.4 SHUTDOWN AND MONITORING ZONES

Haines Borough is requesting Level A take for harbor porpoises, harbor seals, and Steller sea lions incidental to construction of the dock to their frequency near the proposed action area. Haines Borough is also requesting Level B take for humpback whales, killer whales, Dall's porpoises, harbor porpoises, harbor seals, and Steller sea lions. Haines Borough is not requesting take for any other marine mammals. Shutdown and monitoring zones are described in the following sub-sections.

11.4.1 Level A Shutdown Zones

There will be a nominal 10-meter shutdown zone for construction-related activity where acoustic injury is not an issue. This type of work could include (but is not limited to) the following activities:

- movement of the barge to the pile location;
- positioning of the pile on the substrate via a crane (i.e., stabbing the pile);
- placement of in-water fill; and
- the placement of sound attenuation devices around the piles.

For species without Level A take authorized, the contractor will implement shutdowns during pile driving to protect marine mammals from Level A harassment and prevent auditory injury to all hearing groups during pile installation and removal activities as shown in Table 13 and Figure 15 through Figure 19. For HF cetaceans and phocid pinnipeds Level A shutdown zones during impact pile driving and DTH drilling, a 200-meter minimum shutdown zone has been established inside the calculated Level A isopleths (NMFS 2023j). Because of the likelihood of their presence in the action area, Level A take has been requested for Steller sea lions and

harbor seals. Level A take has been requested for harbor porpoises because of the large Level A zone during impact hammering and DTH drilling of some pile sizes (maximum of 4,825 meters [15,830 ft]).

11.4.2 Level B Monitoring Zones

Haines Borough is requesting level B take of humpback whales, killer whales, Dall's porpoises, harbor porpoises, harbor seals, and Steller sea lions, incidental to constructing the proposed dock. Shutdowns associated with Level B harassment of these species are not proposed. Calculated distances to Level B thresholds reflect the full extent of potential sound propagation; however, some monitoring distances will be truncated where land masses block sound transmission. The monitoring zones associated with Level B disturbance are outlined in Table 13 and Figure 20. However, zones where Level A take could occur are larger than the shutdown zones for some species and activities. For those activities, the Level A zone is shown on the Level B action area figure (Figure 20). If species other than those listed above approach or appear likely to enter the Level B area without Level A take authorized, in-water work would be shut down. As addressed above, a construction shutdown will be implemented if a species for which Level B take authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the Level B zone

Table 13. Lutak Dock Replacement Project Level A Shutdown Zones and Level B Monitoring Zones

Activity	Distance (meters) and Area (square kilometers)					
	Level A					Level B
	LF Cetaceans	MF Cetaceans	HF Cetaceans	PW Pinnipeds	OW Pinnipeds	All Marine Mammals
In-water Activities						
Barge movements, pile positioning etc.	10 m	10 m	10 m	10 m	10 m	10 m
Vibratory Pile Driving/ Removal						
24-inch pile removal (1 pile; 45 minutes per day; on 1 day)	10 m 0.01 km^2	10 m 0.01 km^2	10 m 0.01 km^2	10 m 0.01 km^2	10 m 0.01 km^2	5,425 m 19.53 km^2
16-inch pile removal (24 piles; 180 minutes per day; on 6 days)	15 m 0.02 km^2	10 m 0.01 km^2	30 m 0.02 km^2	10 m 0.01 km^2	10 m 0.01 km^2	5,425 m 19.53 km^2
36-inch temporary pile installation (42 piles; 60 minutes per day on 11 days)	15 m 0.02 km^2	10 m 0.01 km^2	30 m 0.02 km^2	10 m 0.01 km^2	10 m 0.01 km^2	11,660 m (blocked at 7,000 m) 20.86 km^2
36-inch temporary pile installation (42 piles; 60 minutes per day on 11 days)	15 m 0.02 km^2	10 m 0.01 km^2	30 m 0.02 km^2	10 m 0.01 km^2	10 m 0.01 km^2	11,660 m (blocked at 7,000 m) 20.86 km^2
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	60 m 0.04 km^2	10 m 0.01 km^2	85 m 0.06 km^2	35 m 0.03 km^2	10 m 0.01 km^2	21,544 m (blocked at 7,000 m) 20.86 km^2
Sheet permanent pile installation (40 piles; 180 minutes per day; on 7 days)	20 m 0.02 km^2	10 m 0.01 km^2	25 m 0.02 km^2	10 m 0.01 km^2	10 m 0.01 km^2	6,310 m 20.69 km^2
Sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	70 m 0.05 km^2
42-inch permanent batter pile installation; in-air (23 piles; 120 minutes per day; on 12 days)	--	--	--	--	--	70 m 0.05 km^2
Impact Pile Driving						
36-inch temporary pile installation (42 piles; 120 minutes per day; on 11 days)	2,735 m 8.99 km^2	110 m 0.07 km^2	3,260 m (200 m) [1] 11.22 km^2 (0.15 km^2)	1,500 m (200 m) [1] 3.89 km2 (0.15 km^2)	110 m 0.07 km^2	1,500 m 3.89 km^2
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	3,845 m 13.35 km^2	150 m 0.12 km^2	4,580 m (200 m) [1] 16.11 km^2 (0.15 km^2)	2,060 m (200 m) [1] 6.30 km^2 (0.15 km^2)	150 m 0.11 km^2	1,500 m 3.89 km^2
Sheet permanent pile installation (40 piles; 180 minutes per day; on 7 days)	1,940 m 5.83 km^2	70 m 0.05 km^2	2,310 m (200 m) [1] 7.31 km^2 (0.15 km^2)	1,040 m (200 m) [1] 2.02 km^2 (0.15 km^2)	80 m 0.05 km^2	1,000 m 1.89 km^2
Sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	100 m 0.07 km^2
42-inch permanent batter pile installation; in-air (23 piles; 120 minutes per day; on 12 days)	--	--	--	--	--	100 m 0.07 km^2
DTH Drilling						
42-inch pile installation (180 piles; 600 minutes per day; on 90 days)	4,050 m 14.10 km^2	145 m 0.10 km^2	4,825 m (200 m)[1] 17.09 km^2 (0.15 km^2)	2,170 m (200 m)[1] 6.74 km^2 (0.15 km^2)	160 m 0.11 km^2	39,815 (blocked at 7,000) 20.86 km^2

[1] According to NMFS, the Level A shutdown zones for HF cetaceans and phocid pinnipeds during impact pile driving and DTH drilling are too large for PSOs to accurately identify these species and shut down construction before Level A take occurs. NMFS recommended that in these circumstances, a minimum Level A shutdown zone of 200 meters be implemented (NMFS 2023j).

Figure 15. Lutak Dock Replacement Project Level A Shutdown Zones for Low-Frequency Cetaceans

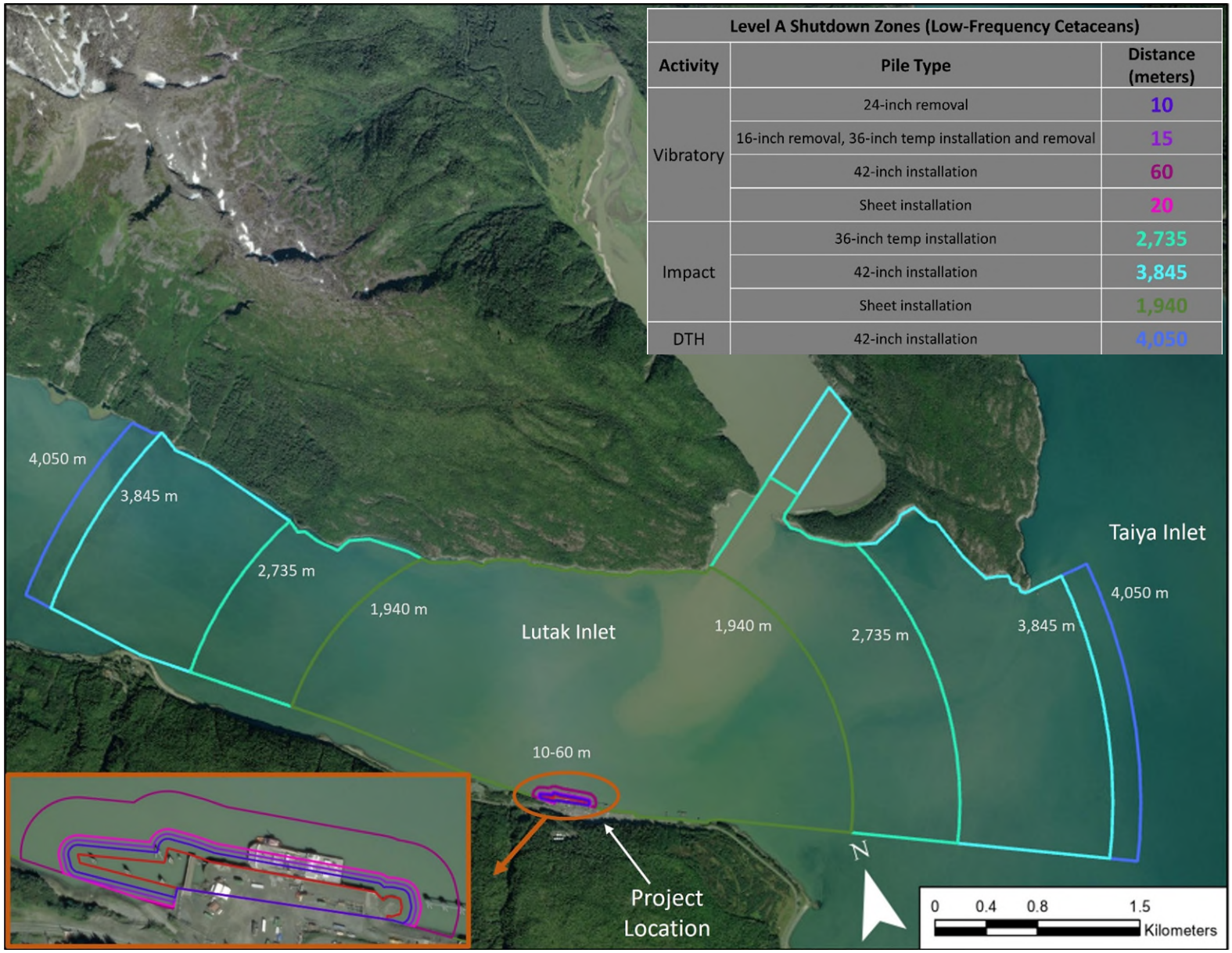
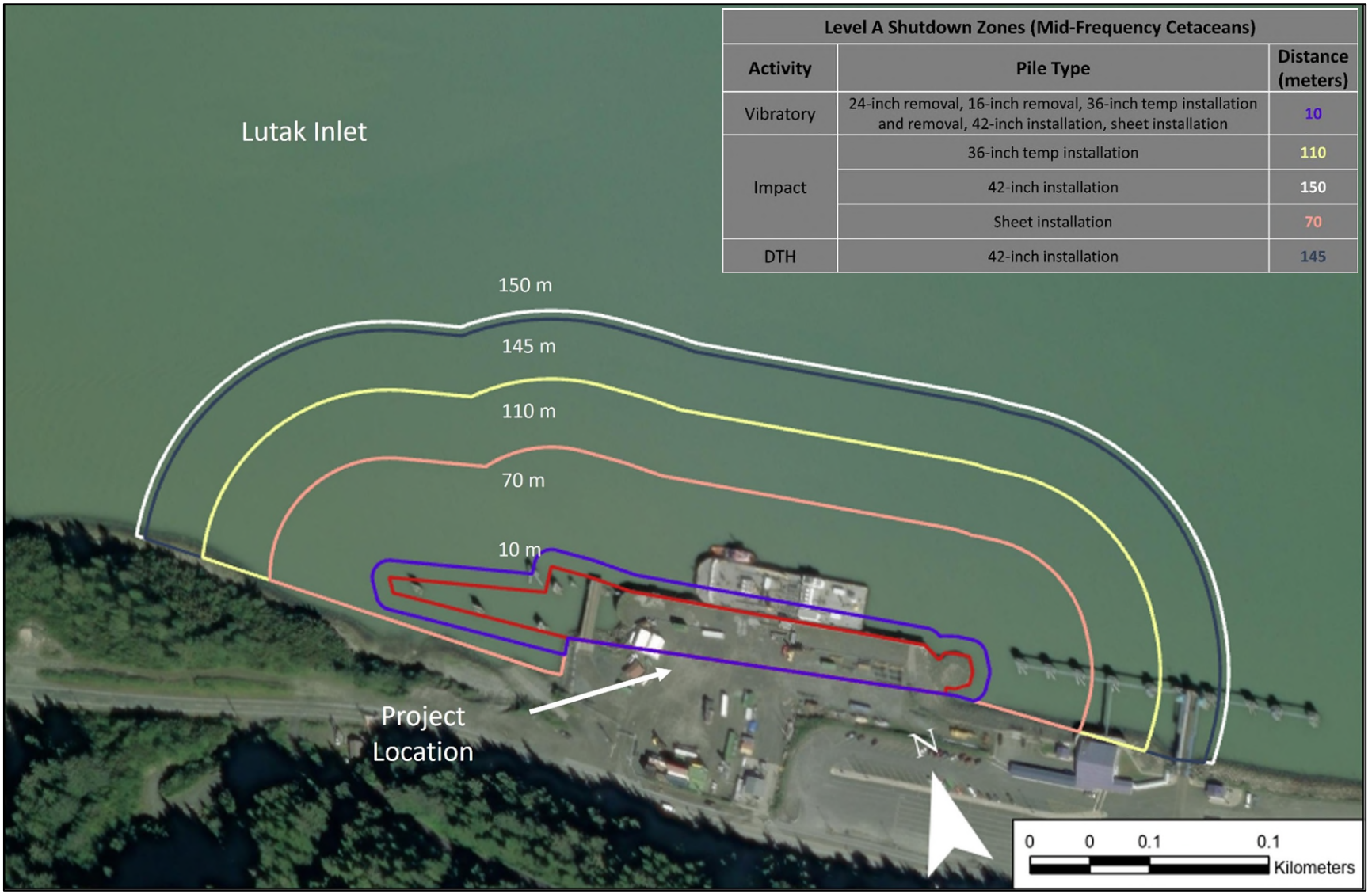


Figure 16. Lutak Dock Replacement Project Level A Shutdown Zones for Mid-Frequency Cetaceans



Level A Shutdown Zones (Mid-Frequency Cetaceans)		
Activity	**Pile Type**	**Distance (meters)**
Vibratory	24-inch removal, 16-inch removal, 36-inch temp installation and removal, 42-inch installation, sheet installation	10
Impact	36-inch temp installation	110
	42-inch installation	150
	Sheet installation	70
DTH	42-inch installation	145

Figure 17. Lutak Dock Replacement Project Level A Shutdown Zones for High-Frequency Cetaceans

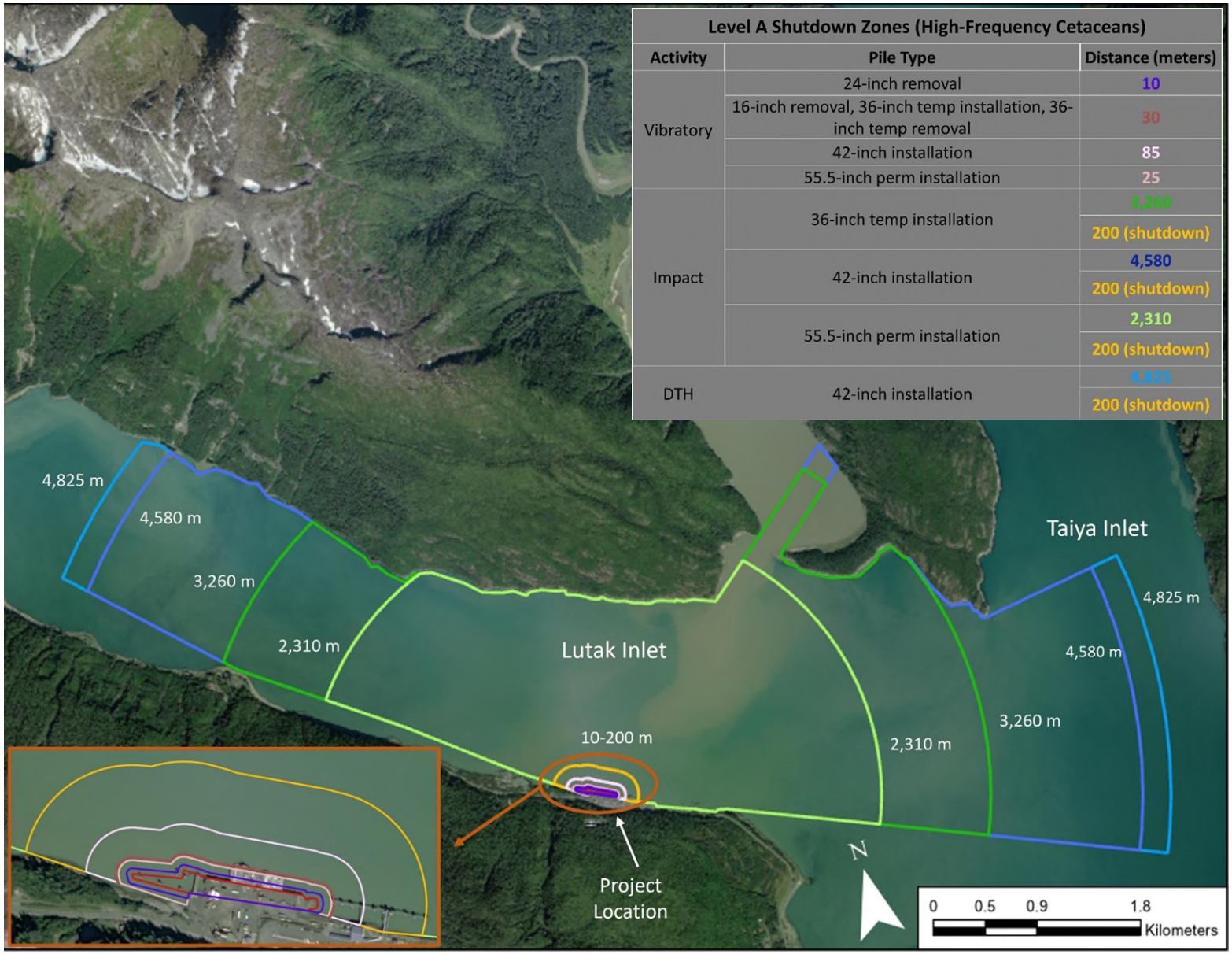


Figure 18. Lutak Dock Replacement Project Level A Shutdown Zones for Phocid Pinnipeds

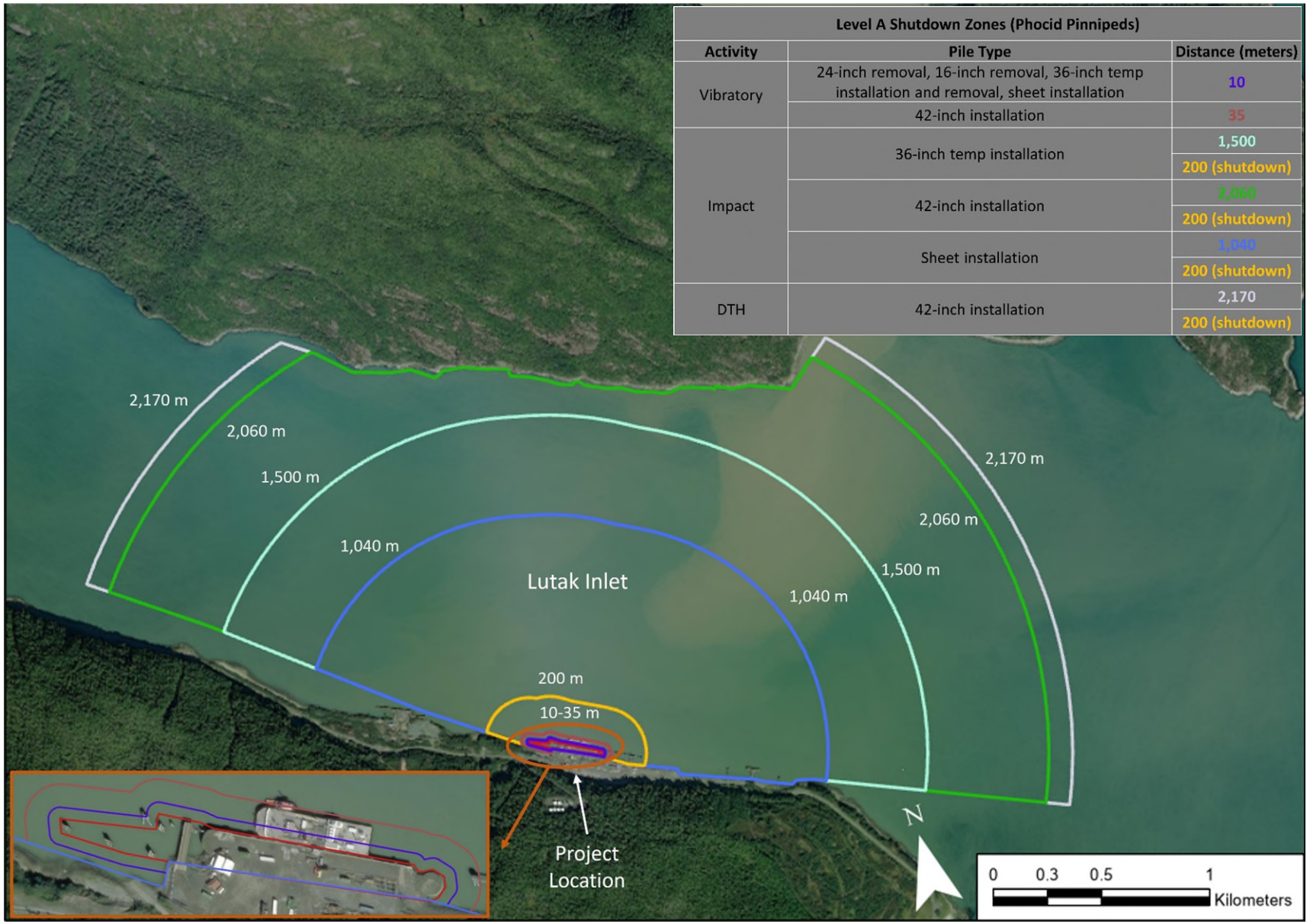
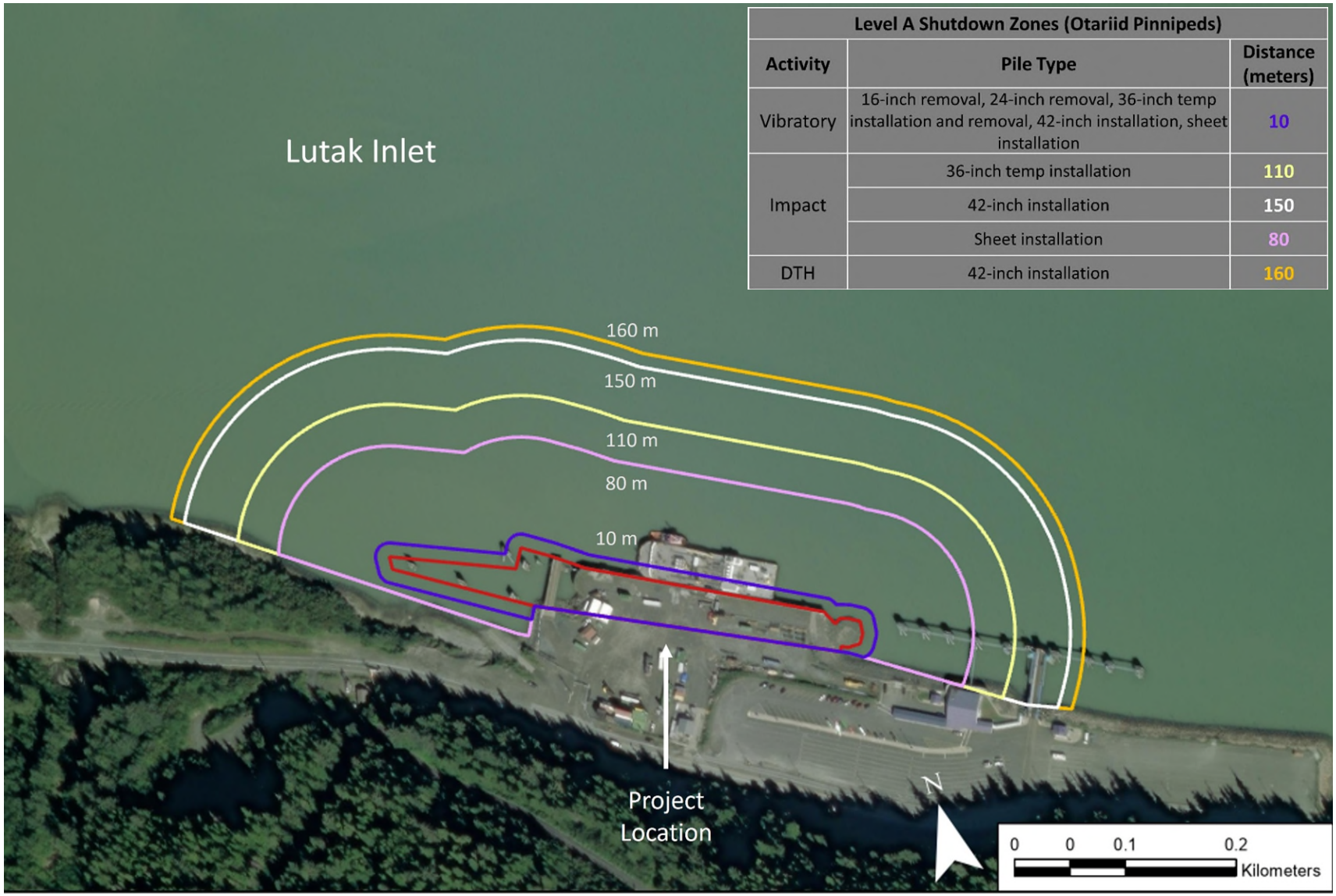
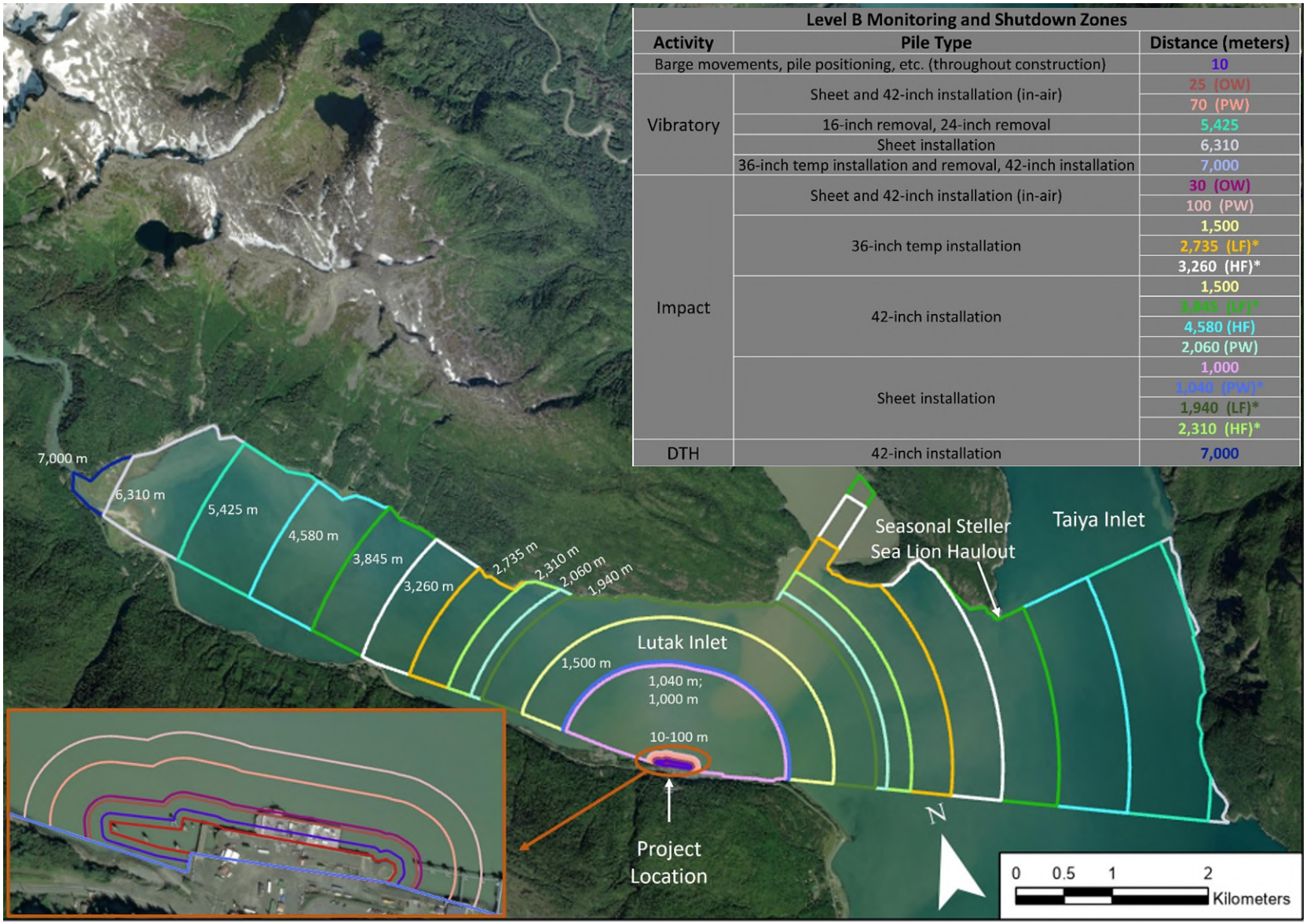


Figure 19. Lutak Dock Replacement Project Level A Shutdown Zones for Otariid Pinnipeds



Level A Shutdown Zones (Otariid Pinnipeds)		
Activity	**Pile Type**	**Distance (meters)**
Vibratory	16-inch removal, 24-inch removal, 36-inch temp installation and removal, 42-inch installation, sheet installation	10
Impact	36-inch temp installation	110
	42-inch installation	150
	Sheet installation	80
DTH	42-inch installation	160

Figure 20. Lutak Dock Replacement Project Level B Monitoring Zones (All Marine Mammals)



*Indicates Level A zone. Where Level A zone radii are larger than the corresponding Level B radii, the Level A zone is shown.

12 MITIGATION MEASURES TO PROTECT SUBSISTENCE USES

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

No activities associated with the proposed action would take place in or near traditional Arctic subsistence hunting areas. Although the proposed action is located south of 60° north, the latitude NMFS regulations consider Arctic waters, and no activities would take place in or near traditional Arctic subsistence areas, there are subsistence uses of marine mammal in Southeast Alaska. As described in Section 8, although there are subsistence uses of marine mammals in Lynn Canal, and there were subsistence harvests of marine mammals near the community of Haines in the past, the most recent recorded/documented harvests of marine mammals in Haines were in 2012 and in nearby Klukwan in 2014 (ADF&G 2023d).

13 MONITORING AND REPORTING

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

13.1 MONITORING PROTOCOLS

To minimize impacts of proposed action activities on marine mammals, a detailed 4MP has been developed for the project and is included as Appendix C. Project shutdown and monitoring zones as outlined in Appendix C and Section 11.4 would be implemented during any in-water pile driving activities associated with the proposed action. If the number of animals of a species exposed to Level A or Level B harassment approaches the number of takes allowed by the IHA, Haines Borough will notify NMFS and seek further consultation.

13.2 MONITORING REPORT

13.2.1 Monthly Report

During construction, Haines Borough will submit brief, monthly reports to the NMFS Alaska Region Protected Resources Division that summarize PSO observations and recorded takes. Monthly reporting will allow NMFS to track the amount of takes (including extrapolated takes) to allow for the timely reinitiating of consultation, if necessary. The monthly reports will be submitted by email to akr.section7@noaa.gov.

The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by close of business on the tenth day of the month following the end of the reporting period (e.g., the monthly report covering April 1–30, 2024, would be submitted to the NMFS by close of business on May 10, 2024).

13.2.2 Final Report

Haines Borough will submit a draft report to NMFS no later than 90 days following the end of construction activities or 60 days prior to the issuance of any subsequent IHA for the proposed action. Haines Borough will provide a final report within 30 days following resolution of NMFS' comments on the draft report. Reports will contain, at minimum, the following:

- Date and time that monitored activity begins and ends for each day when monitoring is conducted (monitoring period)
- Construction activities occurring during each daily observation period, including how many and what type of piles were driven
- Weather parameters in each monitoring period (e.g., wind speed, percent cloud cover, visibility)
- Water conditions in each monitoring period (e.g., sea state, tide state);
- For each marine mammal sighting:
  - Species, numbers, and, if possible, sex and age class of marine mammals
  - Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity
  - Type of construction activity that was taking place at the time of the sighting;
  - Locations of marine mammals and their distance from pile driving activities to the observation point
  - Reason shutdown was implemented (if needed)
  - If shutdown was implemented, behavioral reactions noted and whether they occurred before or after shutdown
  - Estimated amount of time that the animals remained in the Level A or Level B zone
- Description of implementation of mitigation measures within each monitoring period (e.g., shutdown or delay)
- Other human activity in the area within each monitoring period
- A summary of the following:
  - Total number of individuals of each species detected within the Level B Zone and estimated as taken
  - Total number of individuals of each species detected within the Level A Zone and estimated as taken

Haines Borough will also immediately report injured or dead marine mammals to NMFS, and, if the specified activity clearly causes the take of marine mammals in a manner prohibited by the IHA (e.g., serious injury or mortality), Haines Borough will immediately cease pile activities and report the incident to NMFS by calling the NOAA Fisheries statewide 24-hour Stranding Hotline (877) 925-7773.

14 SUGGESTED MEANS OF COORDINATION

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

Existing research has informed the request for take associated with this IHA application. In-water and in-air noise generated by vibratory pile driving, impact hammer pile driving, and DTH drilling at the Lutak Dock Replacement Project is the primary issue of concern to local marine

mammals during this project. Potential impacts on marine mammals from the types of in-water construction activities for this proposed action have been studied, with the results used to establish the noise criteria for evaluating take.

Additionally, the data recorded during marine mammal monitoring for the proposed action will be provided to NMFS in the monitoring report (Section 13.2). The report will provide information on marine mammals' use of Lutak Inlet, including numbers before, during, and after pile driving activities. The monitoring data may also inform NMFS and future permit applicants generally about the behavior of marine mammals during pile installation and removal for future projects of a similar nature.

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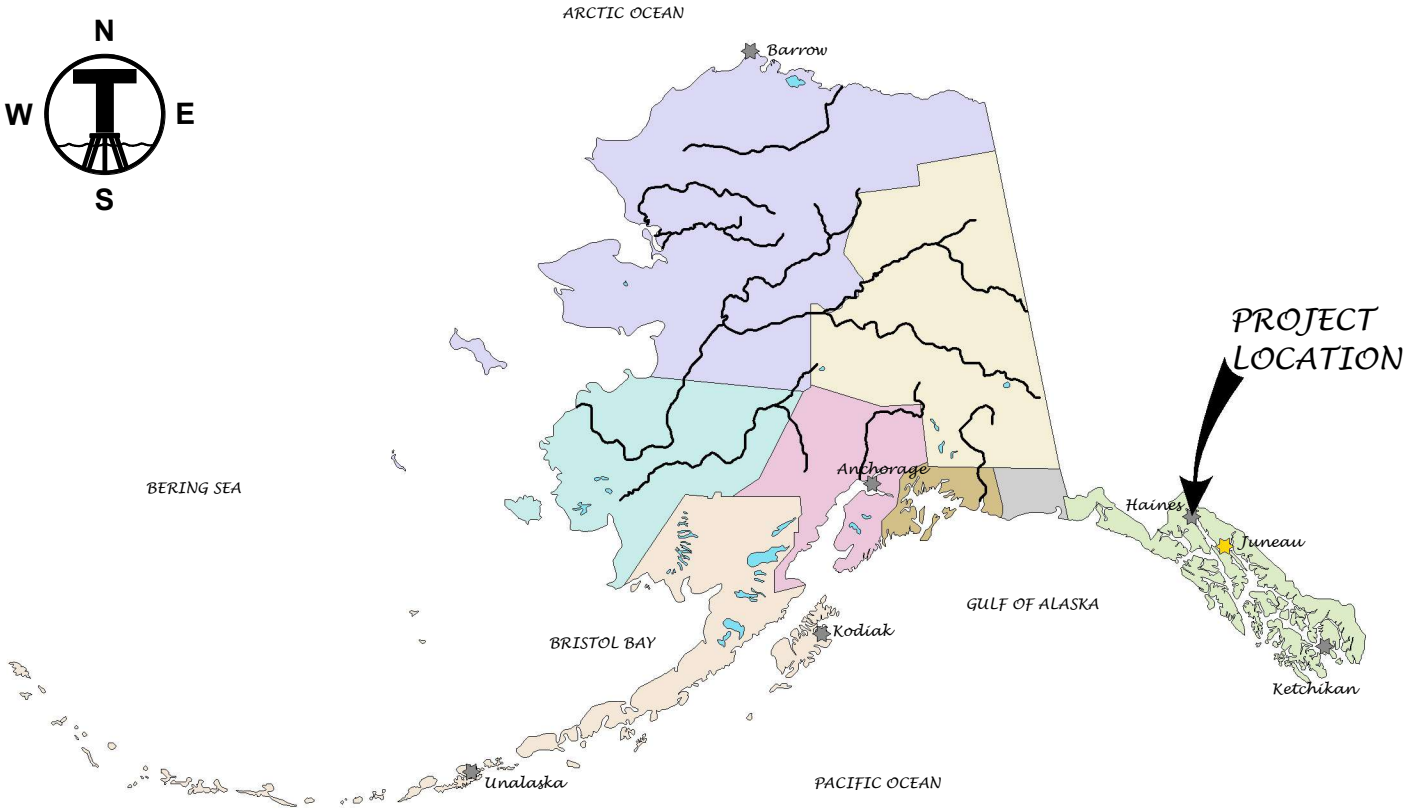
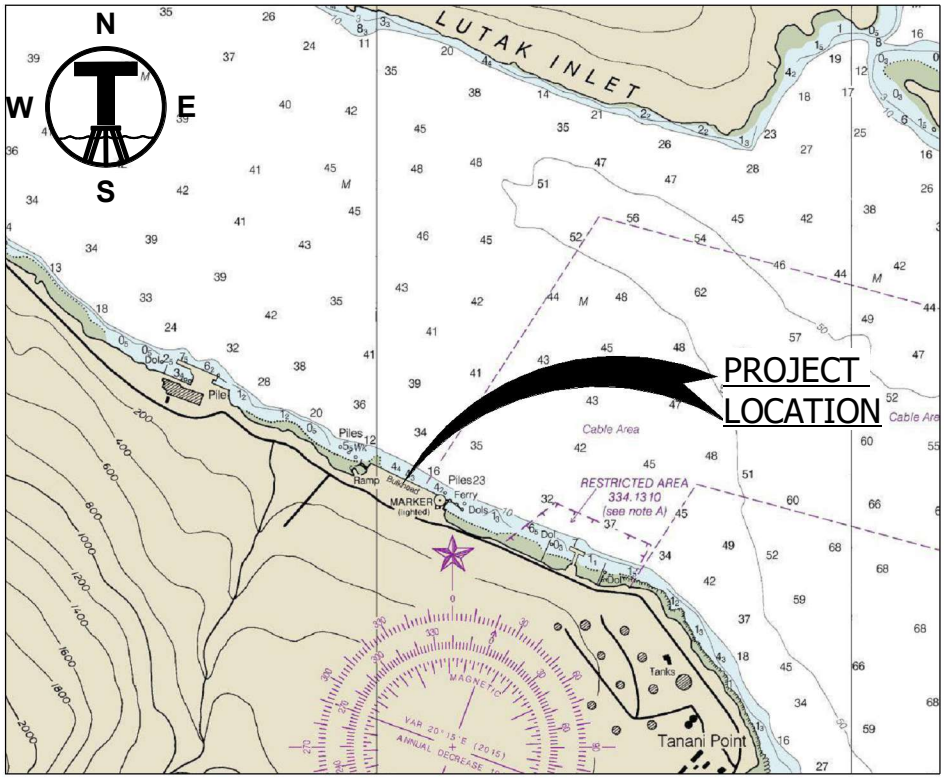
Appendix A
Project Drawings





TIDAL DATA	
HTL	+21.00'
MHHW	+16.74'
*MHW	+15.78'
MLW	+1.62'
MLLW	0.00'

TIDAL DATA BASED OFF OF NOAA STATION #9452400 - SKAGWAY, TAIYA INLET AK

*MHW BASED OFF OF NOAA STATION #9452434 - TAIYASANKA HARBOR AK

PURPOSE:
HAINES LUTAK DOCK REPLACEMENT

COVER SHEET

JOB NO. XX-XXXX

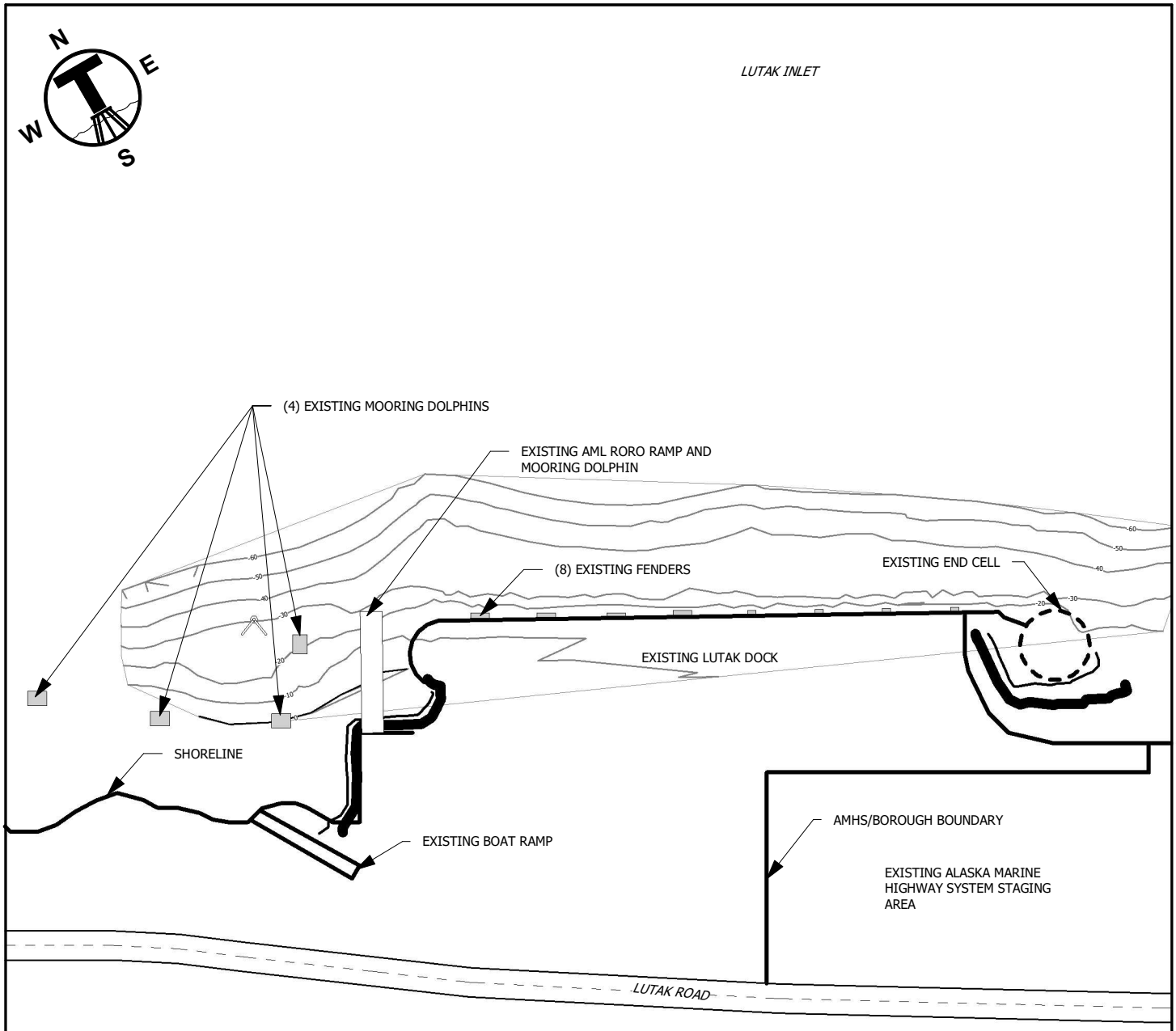
PROPOSED: TURNAGAIN MARINE

AT: LUTAK INLET, HAINES ALASKA

APPLICATION BY: TURNAGAIN MARINE

DATE: JUNE 7, 2023

SHEET: 1



TIDAL DATA

HTL +21.00'

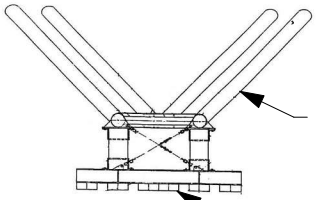
MHW +15.78'

MLLW 0.00'

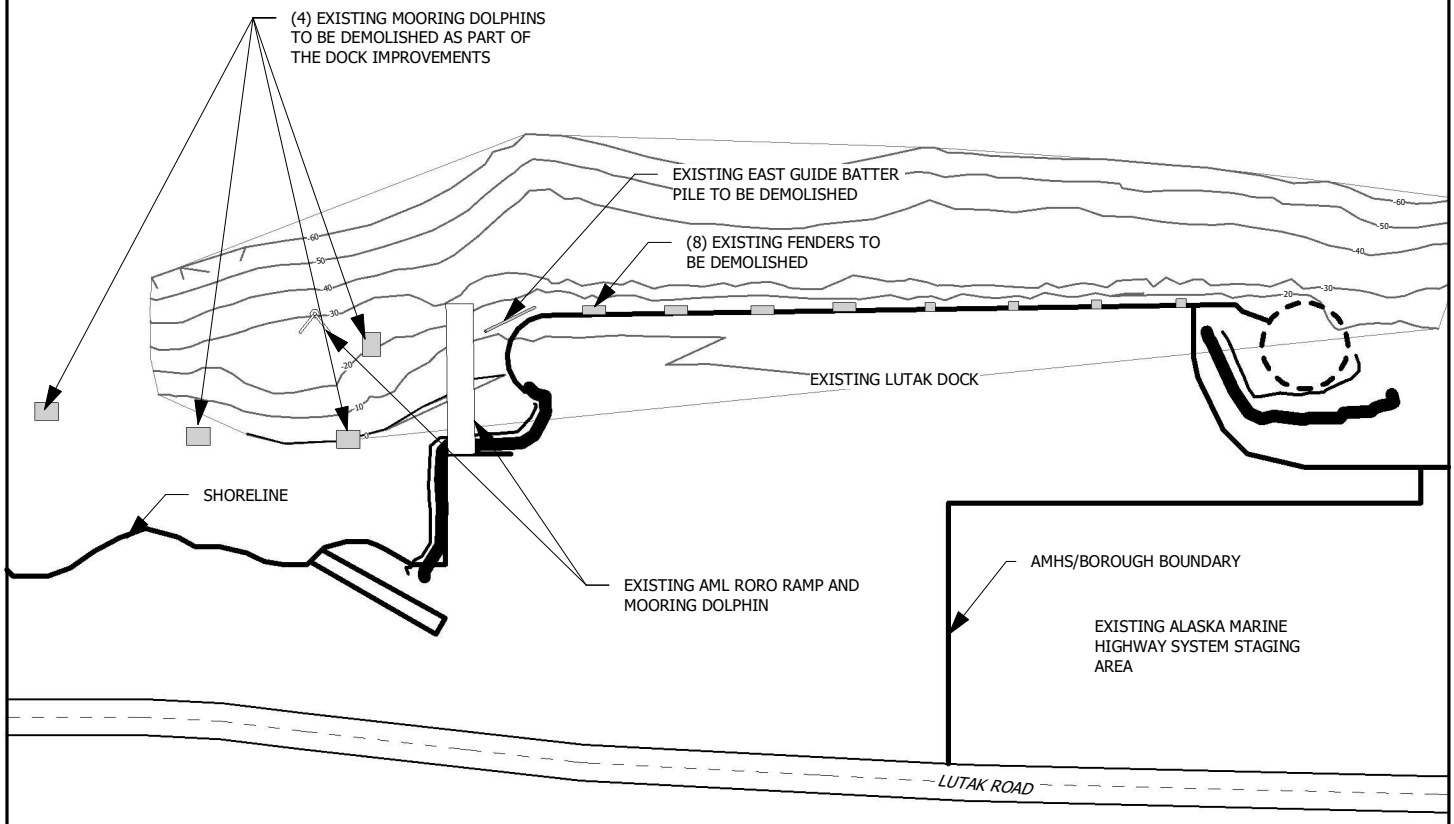
1 EXISTING SITE PLAN

1" = 160'-0"

PURPOSE: HAINES LUTAK DOCK REPLACEMENT	EXISTING CONDITIONS SITE PLAN JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023 SHEET: 2



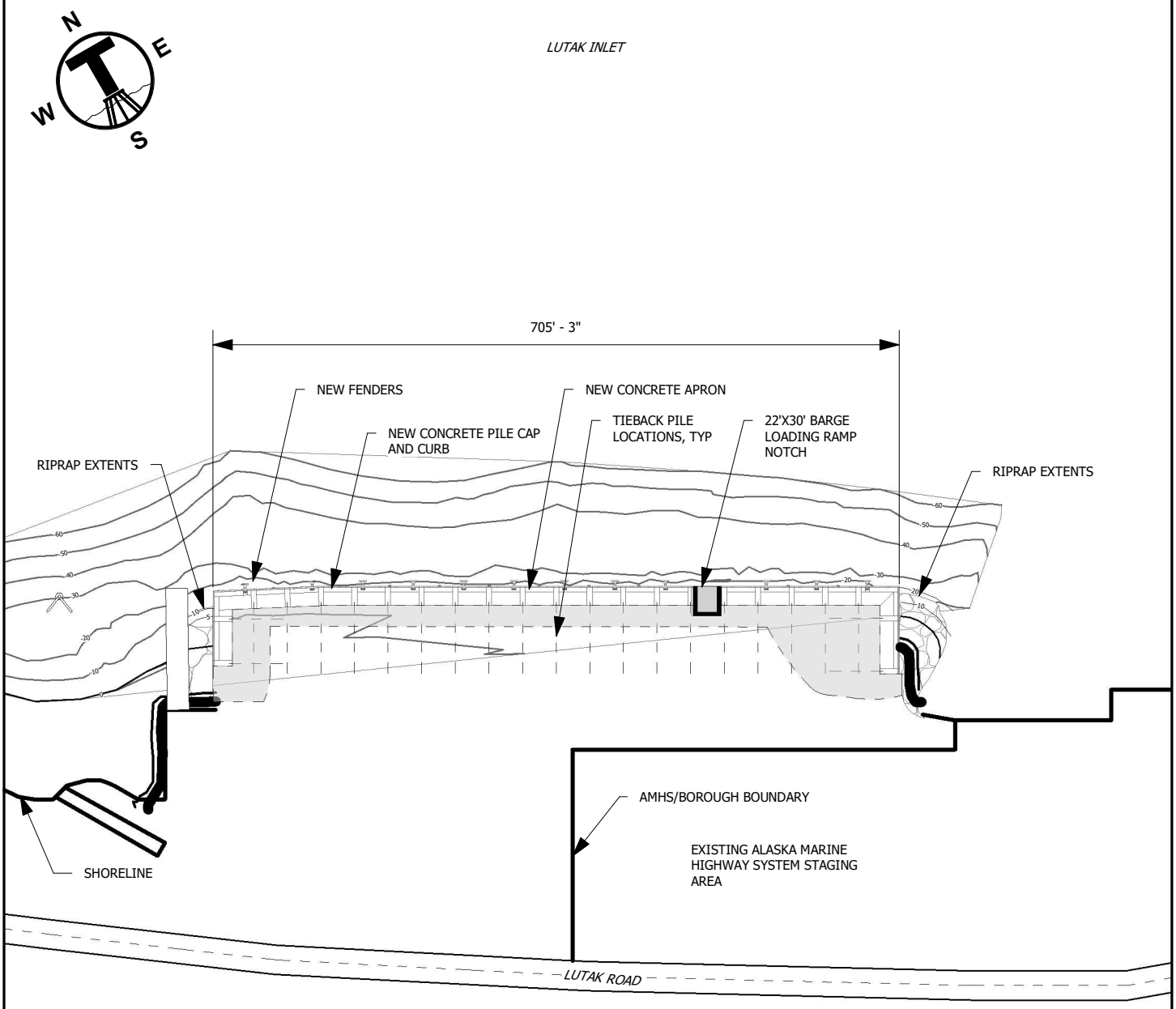
EXISTING MOORING DOLPHINS



TIDAL DATA
HTL +21.00'
MHW +15.78'
MLLW 0.00'

1 DEMOLITION PLAN
1" = 160'-0"

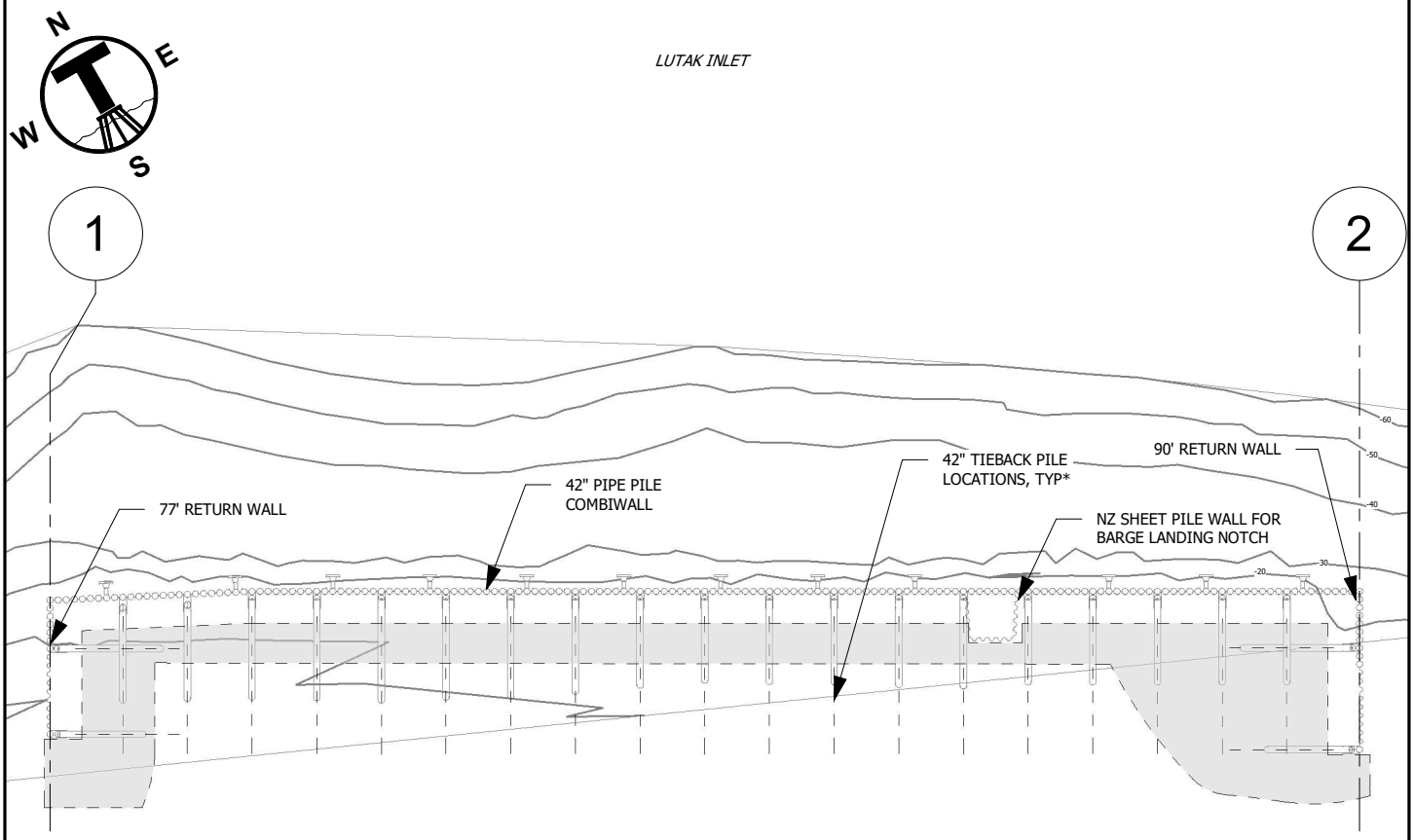
PURPOSE: HAINES LUTAK DOCK REPLACEMENT	DEMOLITION PLAN JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023 SHEET: 3



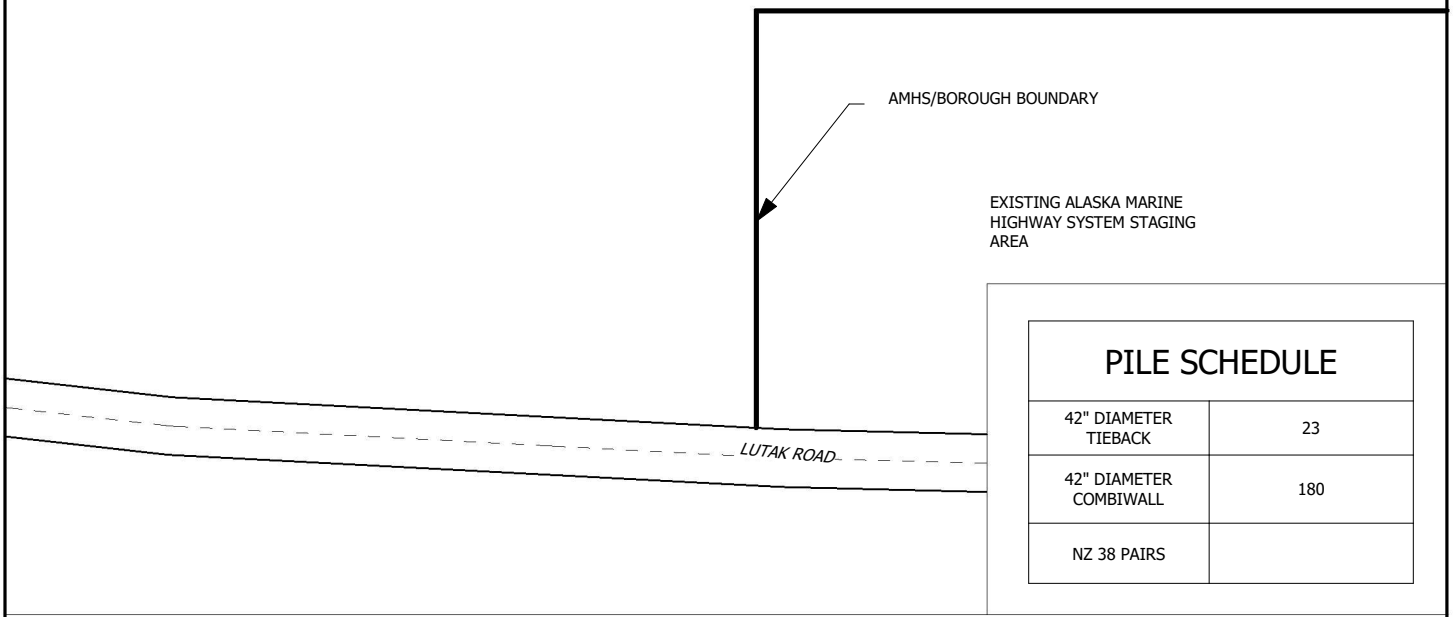
TIDAL DATA
- HTL +21.00'
- MHW +15.78'
- MLLW 0.00'

1 PROPOSED SITE PLAN
1" = 160'-0"

PURPOSE: HAINES LUTAK DOCK REPLACEMENT	PROPOSED SITE PLAN JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023 SHEET: 4



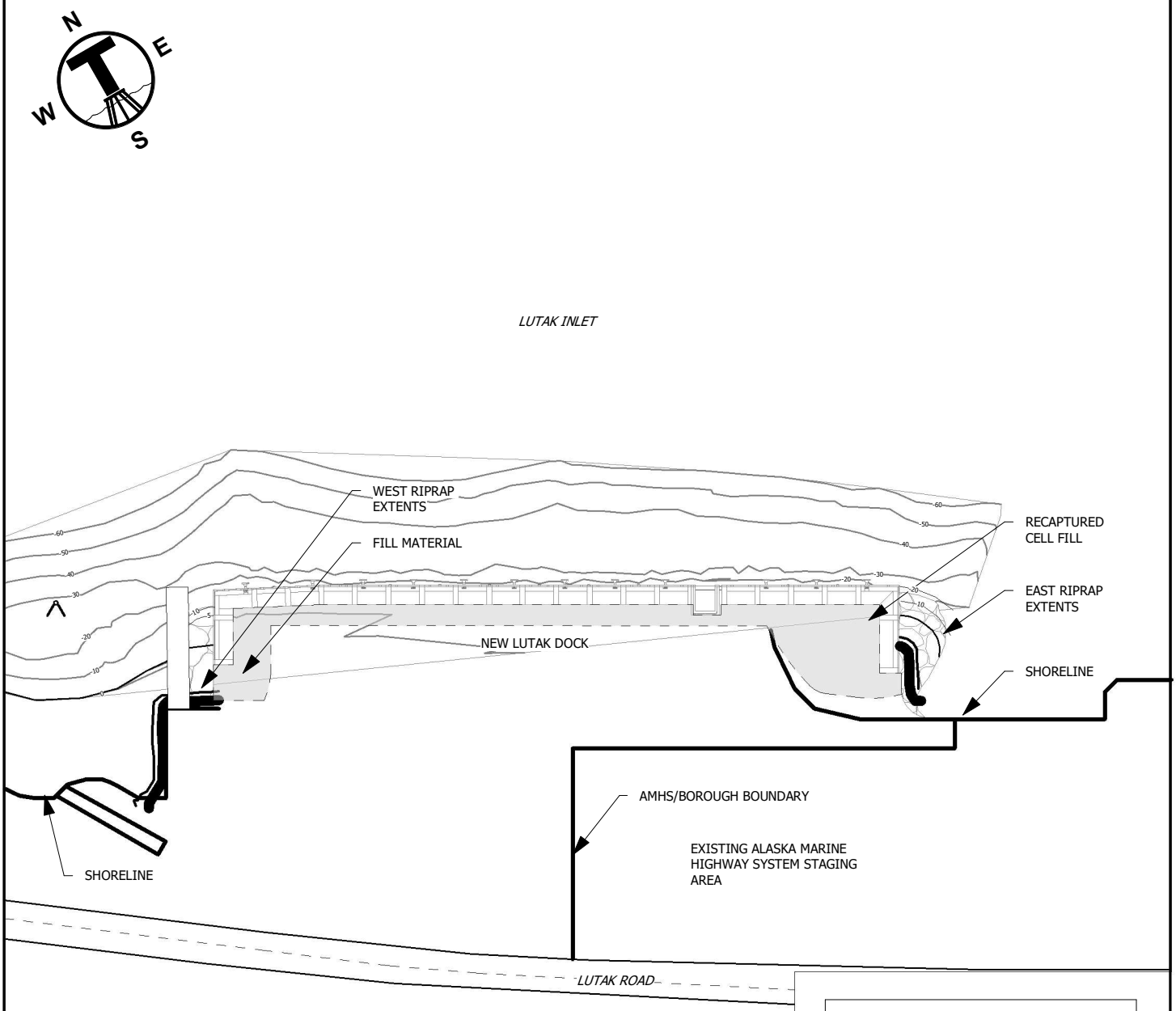
*NOTE: ALL 42" TIEBACK PILES ARE INSTALLED UPLAND IN THE DRY.



PILE SCHEDULE	
42" DIAMETER TIEBACK	23
42" DIAMETER COMBIWALL	180
NZ 38 PAIRS	

1 PILE PLAN
1" = 100'-0"

PURPOSE: HAINES LUTAK DOCK REPLACEMENT	PILE PLAN JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023 SHEET: 5



FILL SCHEDULE	
TYPE C TOTAL	22304 CY
GRAVEL TOTAL	2000 CY
RIP RAP TOTAL	3538 CY

TIDAL DATA
- HTL +21.00'
- MHW +15.78'
- MLLW 0.00'

1 FILL AND RIPRAP PLAN
1" = 160'-0"

PURPOSE:
HAINES LUTAK DOCK REPLACEMENT

FILL AND RIPRAP PLAN

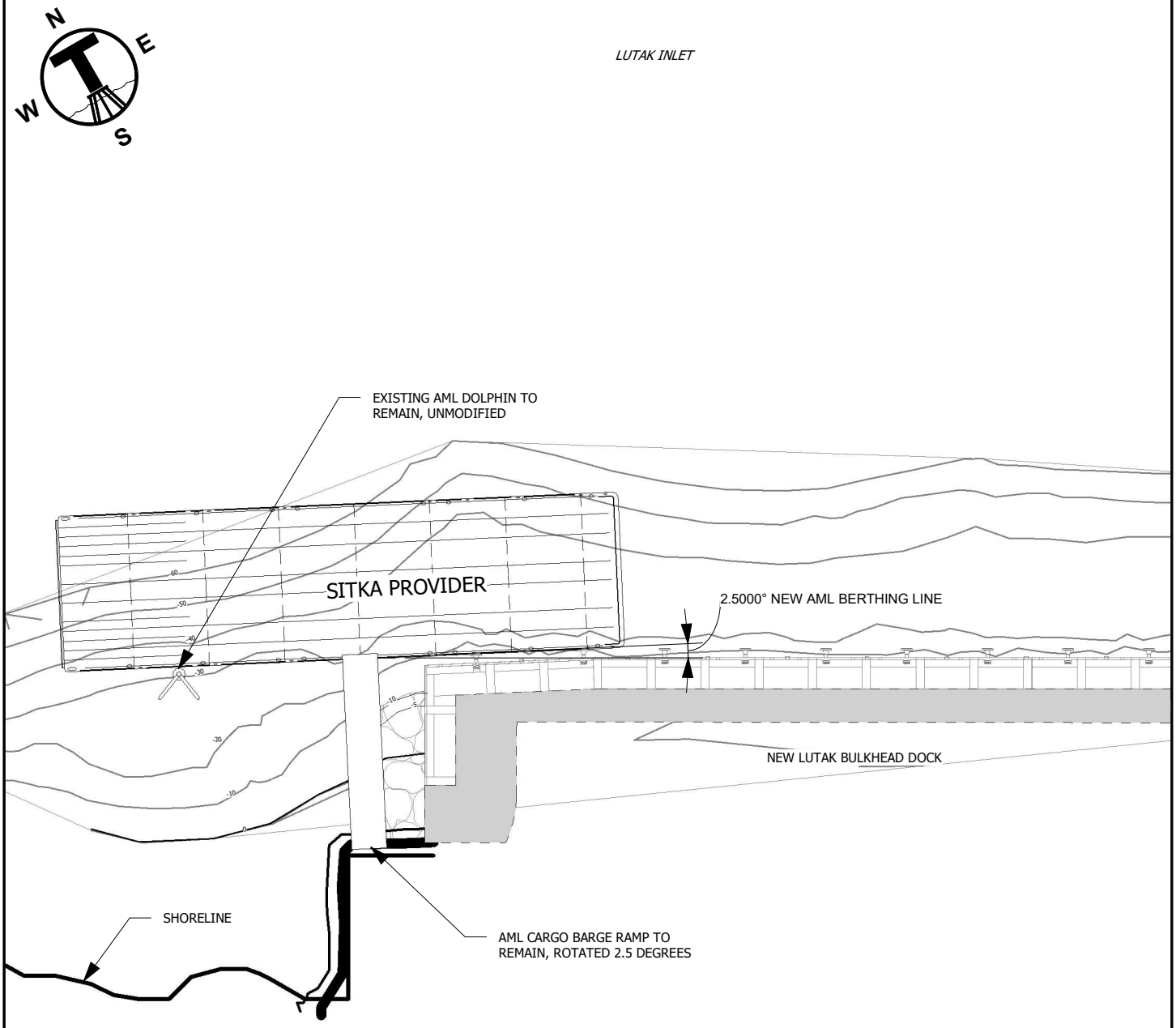
JOB NO. XX-XXXX

PROPOSED: TURNAGAIN MARINE

AT: LUTAK INLET, HAINES ALASKA

APPLICATION BY: TURNAGAIN MARINE

DATE: JUNE 7, 2023



TIDAL DATA

HTL +21.00'
MHW +15.78'
MLLW 0.00'

NOTE:

THE OFFSHORE END OF RAMP WILL UTILIZE THE EXISTING GUIDE DOLPHINS (WITH THE EXCEPTION OF THE DEMOLISHED BATTER), WHILE THE UPLANDS END OF THE RAMP WILL BE ROTATED TO ACCOMMODATE THE 2.5 DEGREE SHIFT.

1 AML BARGE RAMP
1" = 100'-0"

PURPOSE:
HAINES LUTAK DOCK REPLACEMENT

AML RORO RAMP PLAN

JOB NO. XX-XXXX

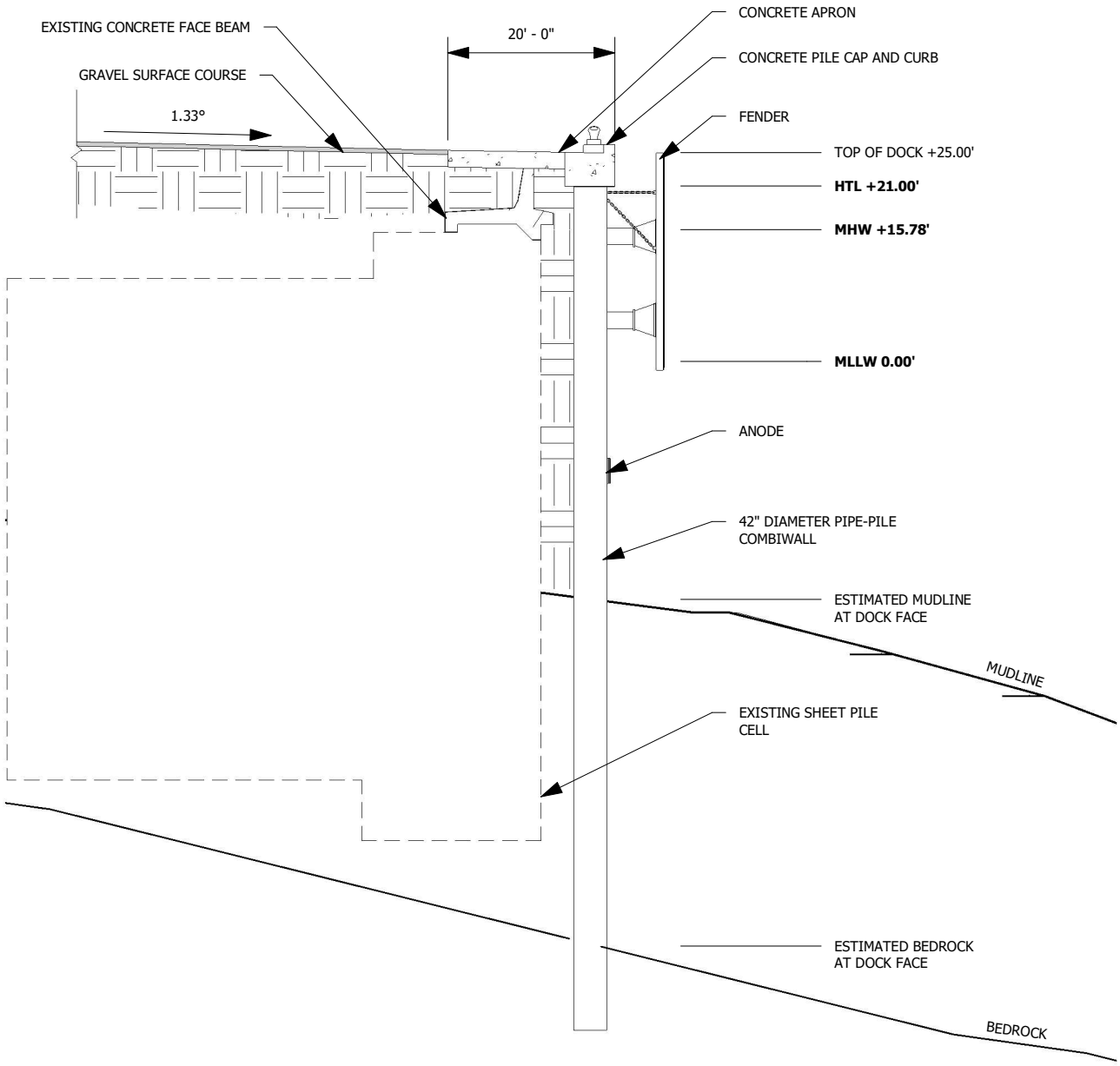
PROPOSED: TURNAGAIN MARINE

AT: LUTAK INLET, HAINES ALASKA

APPLICATION BY: TURNAGAIN MARINE

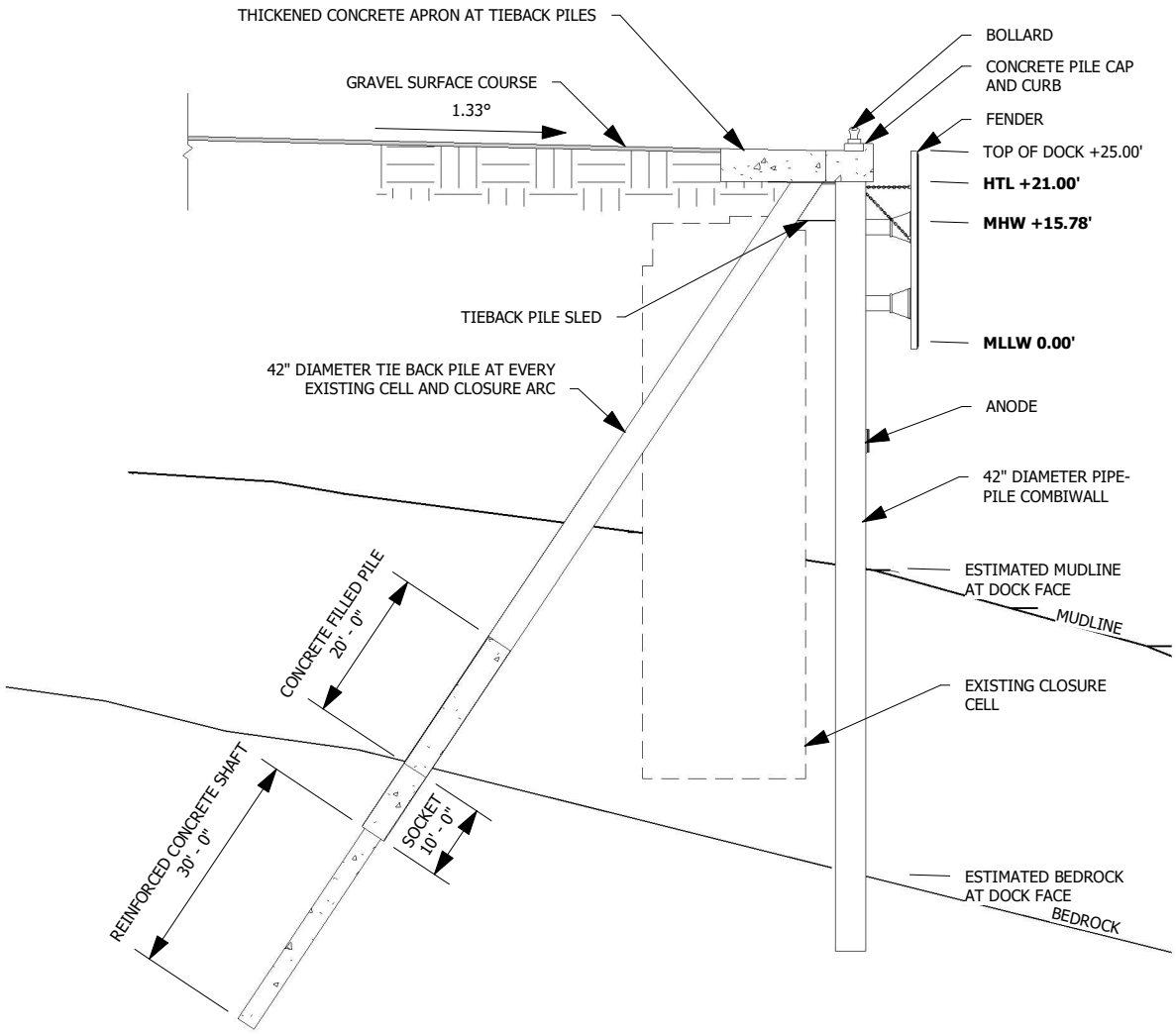
DATE: JUNE 7, 2023

SHEET: 7



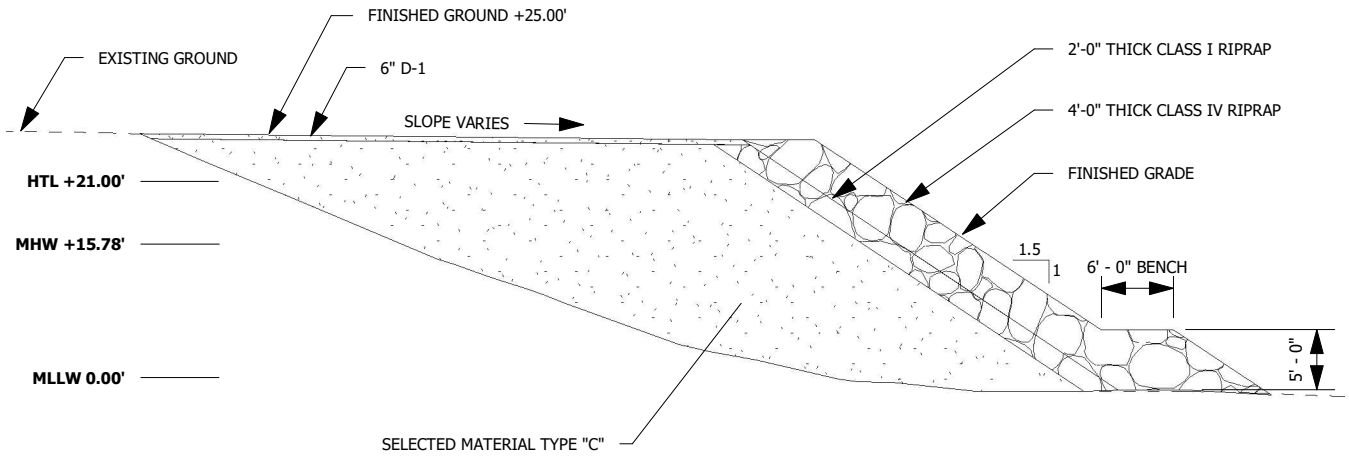
1 TYPICAL SECTION
1" = 20'-0"

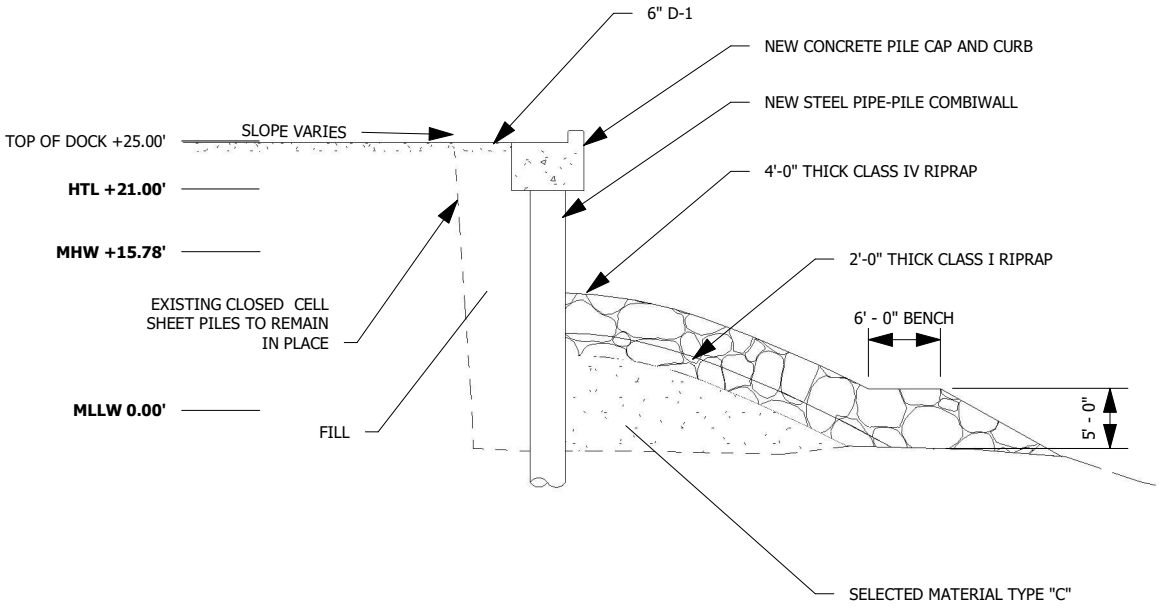
PURPOSE: HAINES LUTAK DOCK REPLACEMENT	TYPICAL BULKHEAD SECTION JOB NO. XX-XXXX	PROPOSED:	TURNAGAIN MARINE
		AT:	LUTAK INLET, HAINES ALASKA
		APPLICATION BY:	TURNAGAIN MARINE
		DATE: JUNE 7, 2023	SHEET: 8



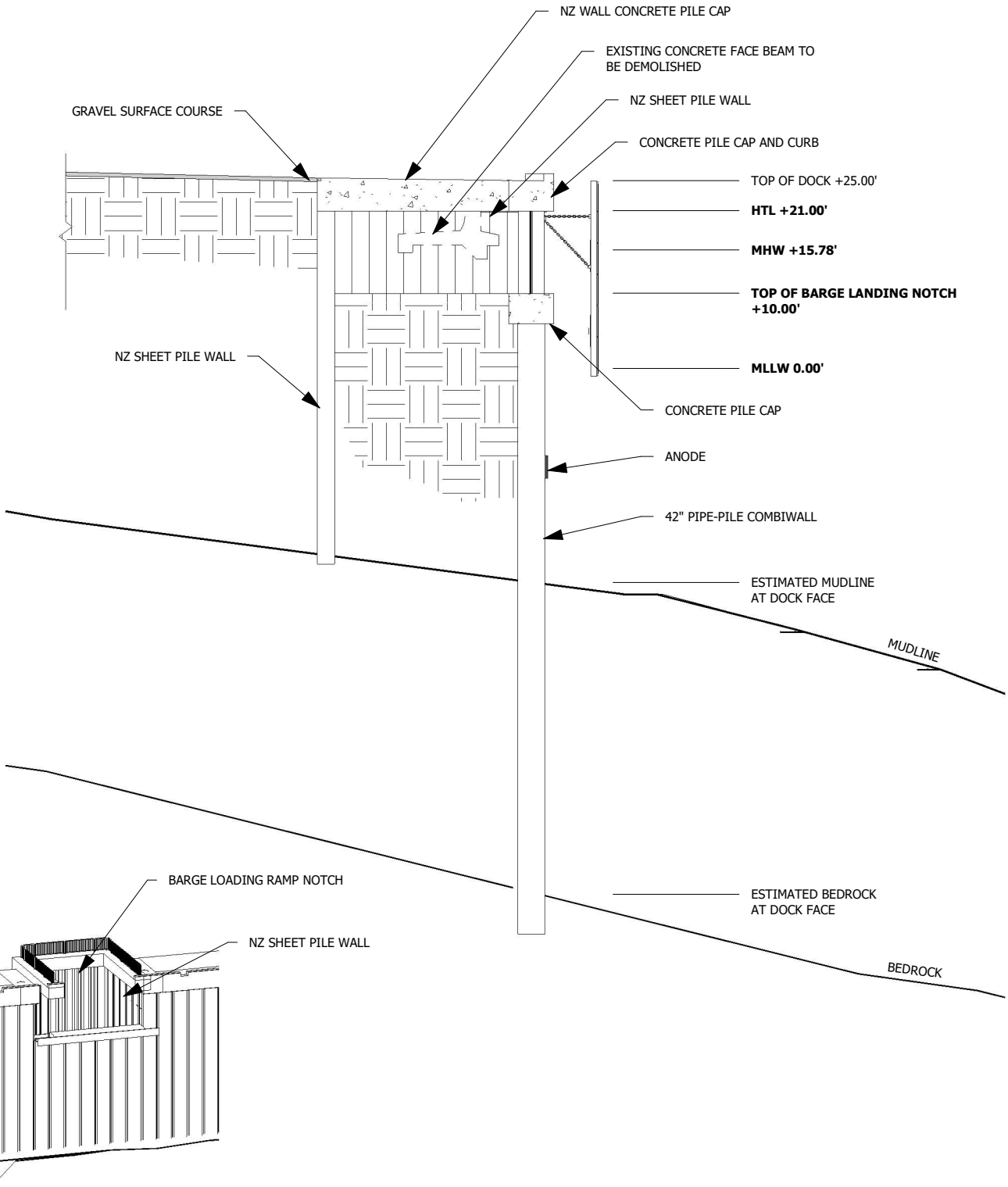
1 SECTION AT TIEBACK PILE
1" = 25'-0"

PURPOSE: HAINES LUTAK DOCK REPLACEMENT	TYPICAL TIEBACK SECTION JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023	SHEET: 9





PURPOSE: HAINES LUTAK DOCK REPLACEMENT	TYPICAL RIP RAP SECTIONS JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023 SHEET: 10



1 BARGE LOADING SECTION
1" = 20'-0"

PURPOSE: HAINES LUTAK DOCK REPLACEMENT	BARGE LOADING RAMP SECTION JOB NO. XX-XXXX	PROPOSED: TURNAGAIN MARINE AT: LUTAK INLET, HAINES ALASKA APPLICATION BY: TURNAGAIN MARINE DATE: JUNE 7, 2023	SHEET: 11

Appendix B
Threshold Calculation Spreadsheets

Lutak Dock Replacement Project Sound Calculation Proxy Summary

Project Pile Size (inches)	Installation method	Proxy Pile Size	Proxy Sound Source @ m			Weighting Factor	Project Source Specific Information (Level A Spreadsheet)					Reference	Link to Document	Notes
			RMS/SPL	SEL	PK		# of piles in 24-hour	Duration (mins)	Duration (Strikes)	TLC	Distance of Measurement			
16-removal	Vibratory	24	161	--	--	2.5	4	45	--	15	10	Proxy Source: recommended proxy source SPLs from impact installation of 16- inch and 24-inch piles from four projects at Bangor Naval Base on Puget Sound, WA presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-2)	https://media.fisheries.noaa.gov/dam-migration/navymsm_2018rule_appappendices_opr1.pdf	
24-removal	Vibratory	24	161	--	--	2.5	1	45	--	15	10	Proxy Source: recommended proxy source SPLs from impact installation of 16- inch and 24-inch piles from four projects at Bangor Naval Base on Puget Sound, WA presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-2)	https://media.fisheries.noaa.gov/dam-migration/navymsm_2018rule_appappendices_opr1.pdf	
36 - temporary	Vibratory	36	166	--	--	2.5	4	15	--	15	10	Proxy Source: Sound measurements from 36-inch piles at the Bangor, Washington waterfront project. Presented in Table 2-2 of *Proxy Source Sound Levels and Potential Bubble Curtian Attentuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound* (NAVFAC 2015).	https://media.fisheries.noaa.gov/dam-migration/navymsm_2018rule_appappendices_opr1.pdf	
42-permanent	Vibratory	48	170	--	--	2.5	4	45	--	15	10	Recommended by NMFS PR1 analysis of NAVFAC 2015 and Illingsworth and Rodkin (Reyff and Heyvaert) (2019)	Personal communication with NMFS	
Sheet-permanent	Vibratory	24-inch	162	--	--	2.5	6	30	--	15	10	Proxy Source: median measured source levels from vibratory pile driving of 24-inch sheets for Berth 30 at the Port of Oakland, CA (Molnar et al. [CALTRANS] 2020; Table I.6-2)	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwievqTTirf_AhVZITQIHaKsCZUQFnoECBEQAQ&url=https%3A%2F%2Fdot.ca.gov%2F-%2Fmedia%2Fdot-media%2Fprograms%2Fenvironmental-analysis%2Fdocuments%2Fenv%2Fhydroacoustic-manual-a11y.pdf&usg=AOvVaw1-YgYM7U3y-CLefKvfmO1b	
36- temporary	Impact	36	192	184	211	2	4	--	900 strikes/pile	15	10	Proxy Source: average of unattentuated measurements from impact installation of 36-inch piles from three projects in Puget Sound presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-1)	https://media.fisheries.noaa.gov/dam-migration/navymsm_2018rule_appappendices_opr1.pdf	
42-permanent	Impact	36	192	184	211	2	4	--	1500 strikes/pile	15	10	Proxy Source: average of unattentuated measurements from impact installation of 36-inch piles from three projects in Puget Sound presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-1)	https://media.fisheries.noaa.gov/dam-migration/navymsm_2018rule_appappendices_opr1.pdf	
Sheet-permanent	Impact	-	190	180	205	2.5	6	--	900 strikes/pile	15	10	Personal communication with NMFS	Personal communication with NMFS	
42-permanent	DTH	42	174	164	194	2	2	300	18 strikes/second	15	10	Proxy source: recommended levels for 25"-42" diameter piles using DTH systems (NMFS 2022).	https://media.fisheries.noaa.gov/2022-11/PUBLIC%20DTH%20Basic%20Guidance_November%202022.pdf	
All Piles	In-air Vibratory	30	103.2	--	--	--	--	--	--	--	15	Proxy Source: Washington State Department of Transportation has documented un-weighted rms levels for a vibratory hammer (30-inch pile) to an average 96.5 dB and a maximum of 103.2 dB at 15 meters (Laughlin 2010). Maximum levels were used to extrapolate distances for the projects.	https://wsdot.wa.gov/sites/default/files/2021-10/Env-Noise-MonRpt-AirborneVibratory.pdf	
All Piles	In-air Impact	48	106	--	--	--	--	--	--	--	15	Proxy source: The median value for driving of 24 - 48 in steel pipes at Naval Base Kitsap Bangor was 106 dB rms	Personal communication with NMFS	

16-inch vibratory removal

Vibratory Pile Driving

Use check boxes for Taxa present

VERSION 1.2-Multi-Species: 2022

☑ LF Cet. ☑ Fishes ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/Range to Effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user; Row 64, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	For vibratory removal of 16-inch piles: Sound measurements from 16-inch and 24-inch piles at the Bangor, Washington waterfront project. Presented in Table 2-2 of Proxy Source Sound Levels and Potential Bubble Curtian Attentuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015).

Notes (please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC RMS (NOT Peak)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	 Marine Mammal Default WFA (kHz)
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	161		
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	161	0.16	2.5
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*		
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	4	Attenuation (e.g., bubble curtain) (enter positive number)	0
Duration to drive a single pile (minutes) (best estimate based on previous experience)	45		
Duration of Sound Production within a day (seconds)	10800	Cumulative SEL at measured distance (dB)	201.33
10 Log (duration of sound production)	40.33		

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Information in Step 1

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

Fishes present

FISHES	
	BEHAVIOR
	RMS Threshold (dB)
	150
Isopleth (meters)	54.1
Isopleth (feet)	177.5

NO SEA TURTLES

SEA TURTLES		
	PTS ONSET	BEHAVIOR
	PTS SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	220	175
Isopleth (meters)	0.6	1.2
Isopleth (feet)	1.9	3.8

MARINE MAMMALS					
			PTS ONSET		
Hearing Group	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	199	198	173	201	219
Isopleth (meters)	14.2	1.3	21.0	8.6	0.6
Isopleth (feet)	46.6	4.1	68.9	28.3	2.0

ALL MARINE MAMMALS	BEHAVIOR
	RMS Threshold (dB)
	120
Isopleth (meters)	5,411.7
Isopleth (feet)	17,754.9

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.05	-16.83	-23.50	-1.29	-0.60	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

24-inch vibratory removal

Vibratory Pile Driving

Use check boxes for Taxa present

☑ Fishes ☑ LF Cet. ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

VERSION 1.2-Multi-Species: 2022

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/Range to Effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user; Row 64, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	For vibratory removal of 24-inch piles: Sound measurements from 16-inch and 24-inch piles at the Bangor, Washington waterfront project. Presented in Table 2-2 of Proxy Source Sound Levels and Potential Bubble Curtian Attentuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015).

Notes (please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC RMS (NOT Peak)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	 Marine Mammal Default WFA (kHz)
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	161		
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	**161**	**0.16**	**2.5**
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*		
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	1	**Attenuation (e.g., bubble curtain) (enter positive number)**	0
Duration to drive a single pile (minutes) (best estimate based on previous experience)	45		
Duration of Sound Production within a day (seconds)	2700	**Cumulative SEL at measured distance (dB)**	195.31
10 Log (duration of sound production)	34.31		

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Information in Step 1

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

Fishes present

FISHES	
BEHAVIOR	
RMS Threshold (dB)	
150	
Isopleth (meters)	**54.1**
Isopleth (feet)	**177.5**

NO SEA TURTLES

SEA TURTLES	
PTS ONSET	**BEHAVIOR**
PTS SEL_{cum} Threshold (dB)	**RMS Threshold (dB)**
220	**175**
Isopleth (meters)	**0.2**	**1.2**
Isopleth (feet)	**0.7**	**3.8**

MARINE MAMMALS					
			PTS ONSET		
Hearing Group	**LF Cetacean PTS SEL_{cum} Threshold (dB)**	**MF Cetacean PTS SEL_{cum} Threshold (dB)**	**HF Cetacean PTS SEL_{cum} Threshold (dB)**	**PW Pinniped PTS SEL_{cum} Threshold (dB)**	**OW Pinniped PTS SEL_{cum} Threshold (dB)**
	199	**198**	**173**	**201**	**219**
Isopleth (meters)	**5.6**	**0.5**	**8.3**	**3.4**	**0.2**
Isopleth (feet)	**18.5**	**1.6**	**27.3**	**11.2**	**0.8**

ALL MARINE MAMMALS

BEHAVIOR	
RMS Threshold (dB)	
120	
Isopleth (meters)	**5,411.7**
Isopleth (feet)	**17,754.9**

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.05	-16.83	-23.50	-1.29	-0.60	0.00

36-inch temp vibratory

Vibratory Pile Driving

Use check boxes for Taxa present

VERSION 1.2-Multi-Species: 2022

☑ LF Cet. ☑ Fishes ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/Range to Effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user; Row 64, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	For vibratory installation and removal of 36-inch temporary piles: Sound measurements from 36-inch piles at the Bangor, Washington waterfront project. Presented in Table 2-2 of Proxy Source Sound Levels and Potential Bubble Curtian Attentuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015).

Notes (please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC RMS (NOT Peak)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	 Marine Mammal Default WFA (kHz)
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	166		
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	**166**	**0.16**	**2.5**
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*		
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	4	Attenuation (e.g., bubble curtain) (enter positive number)	0
Duration to drive a single pile (minutes) (best estimate based on previous experience)	15		
Duration of Sound Production within a day (seconds)	3600	Cumulative SEL at measured distance (dB)	201.56
10 Log (duration of sound production)	35.56		

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Information in Step 1

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

Fishes present

FISHES	
	BEHAVIOR
	RMS Threshold (dB)
	150
Isopleth (meters)	116.6
Isopleth (feet)	382.5

NO SEA TURTLES

SEA TURTLES		
	PTS ONSET	BEHAVIOR
	PTS SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	220	175
Isopleth (meters)	0.6	2.5
Isopleth (feet)	1.9	8.2

MARINE MAMMALS					
			PTS ONSET		
Hearing Group	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	199	198	173	201	219
Isopleth (meters)	14.7	1.3	21.8	8.9	0.6
Isopleth (feet)	48.3	4.3	71.4	29.3	2.1

ALL MARINE MAMMALS	BEHAVIOR
	RMS Threshold (dB)
	120
Isopleth (meters)	11,659.1
Isopleth (feet)	38,251.8

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.05	-16.83	-23.50	-1.29	-0.60	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^a}\right\}$$

42-inch perm vibratory

Vibratory Pile Driving

Use check boxes for Taxa present

☑ LF Cet. ☐ MF Cet. ☑ HF Cet. ☑ Fishes ☐ Sea Turtles ☑ Phocid ☑ Otariid

VERSION 1.2-Multi-Species: 2022

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/Range to Effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user; Row 64, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	For vibratory installation of 42-inch piles: NMFS PR1 2023 calculations from NAVFAC 2015 and Illingworth and Rodkin 2019

Notes (please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC RMS (NOT Peak)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	 Marine Mammal Default WFA (kHz)
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	170		
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	**170**	**0.16**	**2.5**
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*		
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	4	**Attenuation (e.g., bubble curtain)** (enter positive number)	0
Duration to drive a single pile (minutes) (best estimate based on previous experience)	45		
Duration of Sound Production within a day (seconds)	10800	Cumulative SEL at measured distance (dB)	210.33
10 Log (duration of sound production)	40.33		

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Information in Step 1

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

	FISHES
Fishes present	**BEHAVIOR**
	RMS Threshold (dB)
	150
Isopleth (meters)	**215.4**
Isopleth (feet)	**706.8**

NO SEA TURTLES	SEA TURTLES	
	PTS ONSET	**BEHAVIOR**
	PTS SEL_{cum} Threshold (dB)	**RMS Threshold (dB)**
	220	**175**
Isopleth (meters)	**2.3**	**4.6**
Isopleth (feet)	**7.4**	**15.2**

	MARINE MAMMALS				
			PTS ONSET		
Hearing Group	**LF Cetacean PTS SEL_{cum} Threshold (dB)**	**MF Cetacean PTS SEL_{cum} Threshold (dB)**	**HF Cetacean PTS SEL_{cum} Threshold (dB)**	**PW Pinniped PTS SEL_{cum} Threshold (dB)**	**OW Pinniped PTS SEL_{cum} Threshold (dB)**
	199	**198**	**173**	**201**	**219**
Isopleth (meters)	**56.6**	**5.0**	**83.6**	**34.4**	**2.4**
Isopleth (feet)	**185.6**	**16.4**	**274.3**	**112.8**	**7.9**

ALL MARINE MAMMALS	
	BEHAVIOR
	RMS Threshold (dB)
	120
Isopleth (meters)	**21,544.3**
Isopleth (feet)	**70,683.6**

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW): true seals
Otariid pinnipeds (OW): sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.05	-16.83	-23.50	-1.29	-0.60	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^a}\right\}$$

Sheet vibratory

Vibratory Pile Driving

Use check boxes for Taxa present

☑ LF Cet. ☑ Fishes ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

VERSION 1.2-Multi-Species: 2022

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/Range to Effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user; Row 64, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	For vibratory installation of sheet piles, vibratory source level is proxy from median measured source levels from vibratory pile driving of 24-inch sheets for Berth 30 at the Port of Oakland, CA (Molnar et al. 2020; Table I.6-2).

Notes (please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC RMS (NOT Peak)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	 Marine Mammal Default WFA (kHz)
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	162		
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	**162**	**0.16**	**2.5**
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*		
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	6	**Attenuation (e.g., bubble curtain) (enter positive number)**	0
Duration to drive a single pile (minutes) (best estimate based on previous experience)	30		
Duration of Sound Production within a day (seconds)	10800	**Cumulative SEL at measured distance (dB)**	202.33
10 Log (duration of sound production)	40.33		

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Information in Step 1

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

FISHES

	BEHAVIOR
Fishes present	RMS Threshold (dB)
	150
Isopleth (meters)	63.1
Isopleth (feet)	207.0

SEA TURTLES

NO SEA TURTLES	PTS ONSET	BEHAVIOR
	PTS SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	220	175
Isopleth (meters)	0.7	1.4
Isopleth (feet)	2.2	4.5

MARINE MAMMALS

			PTS ONSET		
Hearing Group	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	199	198	173	201	219
Isopleth (meters)	16.6	1.5	24.5	10.1	0.7
Isopleth (feet)	54.3	4.8	80.3	33.0	2.3

ALL MARINE MAMMALS	BEHAVIOR
	RMS Threshold (dB)
	120
Isopleth (meters)	6,309.6
Isopleth (feet)	20,700.7

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.05	-16.83	-23.50	-1.29	-0.60	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

36-inch temp impact

IMPACT PILE DRIVING

Use check boxes for Taxa present

☑ Fishes ☐ Sea Turtles ☑ Phocid
☑ LF Cet. ☐ MF Cet. ☑ HF Cet. ☑ Otariid

VERSION 1.2-Multi-Species: 2022

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/range to effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user, Row 67, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, pile strikes, etc.)	For impact installation of 36-inch piles: Average of unattentuated measurements from impact installation of 36-inch piles from three projects in Puget Sound presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-1)

Notes (Please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

	METRICS: Peak	SELss	RMS
Unattenuated Single strike level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	211	184	192
Attenuated Single strike level (dB)* (calculation done automatically)	211	184	192
Distance associated with single strike level/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*	*10*	*10*
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	4	Attenuation assumed (e.g., bubble curtain) (enter positive number)	0
Number of strikes per pile (best estimate based on previous experience)	900		NMFS recommends 5 dB as default, If attenuation used
Number of strikes per day	3600		
Cumulative SEL at measured distance	220		

	Effective Quiet (Fish Only)	WEIGHTING (WFA in kHz): Sea Turtle Default WFA (kHz)	Marine Mammal Default WFA (kHz)
	150	0.16	2

WFA: Weighting Factor Adjustment

RESULTANT ISOPLETHS† (Range to Effects)

†Impulsive sounds have dual metric thresholds for injury (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Fishes present

FISHES	ONSET OF INJURY: Peak (PK) Threshold (dB)	PHYSICAL INJURY: SEL_{cum} Threshold (dB)** Fish ≥ 2 g	PHYSICAL INJURY: SEL_{cum} Threshold (dB)** Fish < 2 g	BEHAVIOR: RMS Threshold (dB)
	206	187	183	150
Isopleths (meters)	21.5	1,482.1	1,847.8	6,309.6
Isopleth (feet)	70.7	4,862.4	6,062.5	20,700.7

**This calculation accounts for single strike SEL < 150 dB do not accumulate to cause injury (Effective Quiet)

NO SEA TURTLES

SEA TURTLES	PTS ONSET: Peak (PK) Threshold (dB)	PTS ONSET: SEL_{cum} Threshold (dB)	BEHAVIOR: RMS Threshold (dB)
	232	204	175
Isopleths (meters)	0.4	109.1	135.9
Isopleth (feet)	1.3	358.0	446.0

MARINE MAMMALS	LF Cetacean PTS Peak (PK) Threshold (dB)	MF Cetacean Peak (PK) Threshold (dB)	HF Cetacean PTS Peak (PK) Threshold (dB)	PW Pinniped PTS Peak (PK) Threshold (dB)	OW Pinniped PTS Peak (PK) Threshold (dB)
Hearing Group			PTS ONSET		
	219	230	202	218	232
Isopleths (meters)	2.9	0.5	39.8	3.4	0.4
Isopleth (feet)	9.6	1.8	130.6	11.2	1.3
	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	183	185	155	185	203
Isopleths (meters)	2,734.9	97.3	3,257.7	1,463.6	106.6
Isopleth (feet)	8,972.7	319.1	10,687.9	4,801.8	349.6

ALL MARINE MAMMALS	BEHAVIOR: RMS Threshold (dB)
	160
Isopleths (meters)	1,359.4
Isopleth (feet)	4,459.8

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS (Sea Turtles and Marine Mammals Only)

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.01	-19.74	-26.87	-2.08	-1.15	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^a}\right\}$$

42-inch perm impact

IMPACT PILE DRIVING — Use check boxes for Taxa present

VERSION 1.2-Multi-Species: 2022

☑ LF Cet. ☑ Fishes ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

KEY

	User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
	Preset NMFS Provided Information (cannot be altered by user). NMFS thresholds/default weighting value are in bold red.
	OUTPUT: Resultant Isopleth/range to effects (cannot be altered by user); Note: isopleths are presented in meters and feet
	Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user, Row 67, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, pile strikes, etc.)	For impact installation of 42-inch piles: Average of unattenuated measurements from impact installation of 36-inch piles from three projects in Puget Sound presented in Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound (NAVFAC 2015; Table 2-1)

Notes (Please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

	Peak	SELss	RMS
		METRICS	
Unattenuated Single strike level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	211	184	192
Attenuated Single strike level (dB)* (calculation done automatically)	**211**	**184**	**192**
Distance associated with single strike level/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*	*10*	*10*
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	4	**Attenuation assumed (e.g., bubble curtain)** (enter positive number)	0
Number of strikes per pile (best estimate based on previous experience)	1500		NMFS recommends 5 dB as default, If attenuation used
Number of strikes per day	6000		
Cumulative SEL at measured distance	222		

	Effective Quiet (Fish Only)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	Marine Mammal Default WFA (kHz)
	150	0.16	2

WFA: Weighting Factor Adjustment

RESULTANT ISOPLETHS† (Range to Effects)

†Impulsive sounds have dual metric thresholds for injury (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Fishes present

FISHES	ONSET OF INJURY		BEHAVIOR
	Peak (PK) Threshold (dB)	SEL_{cum} Threshold (dB)**	RMS Threshold (dB)
		Fish ≥ 2 g / Fish < 2 g	
	206	187 / 183	150
Isopleths (meters)	21.5	1,847.8 / 1,847.8	6,309.6
Isopleth (feet)	70.7	6,062.5 / 6,062.5	20,700.7

**This calculation accounts for single strike SEL < 150 dB do not accumulate to cause injury (Effective Quiet)

NO SEA TURTLES

SEA TURTLES	PTS ONSET		BEHAVIOR
	Peak (PK) Threshold (dB)	SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	232	204	175
Isopleths (meters)	0.4	153.4	135.9
Isopleth (feet)	1.3	503.2	446.0

MARINE MAMMALS			PTS ONSET		
Hearing Group	LF Cetacean PTS Peak (PK) Threshold (dB)	MF Cetacean Peak (PK) Threshold (dB)	HF Cetacean PTS Peak (PK) Threshold (dB)	PW Pinniped PTS Peak (PK) Threshold (dB)	OW Pinniped PTS Peak (PK) Threshold (dB)
	219	230	202	218	232
Isopleths (meters)	2.9	0.5	39.8	3.4	0.4
Isopleth (feet)	9.6	1.8	130.6	11.2	1.3
	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	183	185	155	185	203
Isopleths (meters)	3,844.5	136.7	4,579.4	2,057.4	149.8
Isopleth (feet)	12,613.2	448.6	15,024.2	6,750.0	491.5

ALL MARINE MAMMALS

BEHAVIOR	
RMS Threshold (dB)	
160	
Isopleths (meters)	1,359.4
Isopleth (feet)	4,459.8

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW): true seals
Otariid pinnipeds (OW): sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS (Sea Turtles and Marine Mammals Only)

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.01	-19.74	-26.87	-2.08	-1.15	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

Sheet impact

IMPACT PILE DRIVING

Use check boxes for Taxa present

VERSION 1.2-Multi-Species: 2022

☑ LF Cet. ☑ Fishes ☐ MF Cet. ☐ Sea Turtles ☑ HF Cet. ☑ Phocid ☑ Otariid

KEY

- User Provided Information *Default values are in bold, italics turquoise (can be changed by user if project-specific information is available).*
- Preset NMFS Provided Information (cannot be altered by user). **NMFS thresholds/default weighting value are in bold red.**
- OUTPUT: Resultant Isopleth/range to effects (cannot be altered by user); Note: isopleths are presented in meters and feet
- Automatically Calculated Values Based on User Provided Information (only weighting adjustment (-dB) can be altered by user, Row 67, if spectrum is available)

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Lutak Dock Replacement Emma Kimball emma@solsticeak.com
PROJECT/SOURCE INFORMATION (size, material, number, pile strikes, etc.)	For impact installation of sheet piles, based on personal communication with NMFS: use NMFS proxy values of 190 dB @ 10 m RMS/SPL, 205 dB peak, and 180 dB SEL for steel sheet impact driving.

Notes (Please include all assumptions)

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

	METRICS Peak	SELss	RMS
Unattenuated Single strike level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	205	180	190
Attenuated Single strike level (dB)* (calculation done automatically)	**205**	**180**	**190**
Distance associated with single strike level/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	*10*	*10*	*10*
Transmission loss constant (NMFS recommends: 15 if unknown)	*15*		
Number of piles per day (best estimate based on previous experience)	6	Attenuation assumed (e.g., bubble curtain) (enter positive number)	0
Number of strikes per pile (best estimate based on previous experience)	900		NMFS recommends 5 dB as default, If attenuation used
Number of strikes per day	5400		
Cumulative SEL at measured distance	217		

	Effective Quiet (Fish Only)	WEIGHTING (WFA in kHz) Sea Turtle Default WFA (kHz)	Marine Mammal Default WFA (kHz)
	150	0.16	2

WFA: Weighting Factor Adjustment

RESULTANT ISOPLETHS† (Range to Effects)

†Impulsive sounds have dual metric thresholds for injury (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Fishes present

FISHES	ONSET OF	PHYSICAL INJURY		BEHAVIOR
	Peak (PK) Threshold (dB)	SEL_{cum} Threshold (dB)**		RMS Threshold (dB)
		Fish ≥ 2 g	Fish < 2 g	
	206	187	183	150
Isopleths (meters)	8.6	1,000.0	1,000.0	4,641.6
Isopleth (feet)	28.1	3,280.8	3,280.8	15,228.3

**This calculation accounts for single strike SEL < 150 dB do not accumulate to cause injury (Effective Quiet)

NO SEA TURTLES

SEA TURTLES	PTS ONSET		BEHAVIOR
	Peak (PK) Threshold (dB)	SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	232	204	175
Isopleths (meters)	0.2	77.4	100.0
Isopleth (feet)	0.5	253.8	328.1

MARINE MAMMALS			PTS ONSET		
Hearing Group	LF Cetacean PTS Peak (PK) Threshold (dB)	MF Cetacean Peak (PK) Threshold (dB)	HF Cetacean PTS Peak (PK) Threshold (dB)	PW Pinniped PTS Peak (PK) Threshold (dB)	OW Pinniped PTS Peak (PK) Threshold (dB)
	219	230	202	218	232
Isopleths (meters)	1.2	0.2	15.8	1.4	0.2
Isopleth (feet)	3.8	0.7	52.0	4.5	0.5
	LF Cetacean PTS SEL_{cum} Threshold (dB)	MF Cetacean PTS SEL_{cum} Threshold (dB)	HF Cetacean PTS SEL_{cum} Threshold (dB)	PW Pinniped PTS SEL_{cum} Threshold (dB)	OW Pinniped PTS SEL_{cum} Threshold (dB)
	183	185	155	185	203
Isopleths (meters)	1,939.4	69.0	2,310.1	1,037.9	75.6
Isopleth (feet)	6,362.9	226.3	7,579.2	3,405.1	247.9

ALL MARINE MAMMALS

	BEHAVIOR
	RMS Threshold (dB)
	160
Isopleths (meters)	1,000.0
Isopleth (feet)	3,280.8

LF Cet. present
NO MF CET.
HF Cet. present
Phocids present
Otariids present

Marine Mammal Hearing Group
Low-frequency (LF) cetaceans: baleen whales
Mid-frequency (MF) cetaceans: dolphins, toothed whales, beaked whales, bottlenose whales
High-frequency (HF) cetaceans: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*
Phocid pinnipeds (PW):true seals
Otariid pinnipeds (OW):sea lions and fur seals

WEIGHTING FUNCTION CALCULATIONS (Sea Turtles and Marine Mammals Only)

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	Sea Turtles
a	1	1.6	1.8	1	2	1.4
b	2	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94	0.077
f_2	19	110	140	30	25	0.44
C	0.13	1.2	1.36	0.75	0.64	2.35
Adjustment (-dB)†	-0.01	-19.74	-26.87	-2.08	-1.15	0.00

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

E.2: DTH PILE DRIVING/INSTALLATION (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Lutak Dock Replacement
PROJECT/SOURCE INFORMATION	For DTH installation of 42-inch piles: recommended levels for 25"-42" piles for DTH systems from the National Marine Fisheries Service (2022).

Please include any assumptions

PROJECT CONTACT	Emma Kimball emma@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)*	2

* Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 50), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**222.1**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,single\ strike}$) specified at "x" meters (Cell B30)	164
Strike rate (average strikes per second)	18
Duration to drive pile (minutes)	300
Number of piles per day	2
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,single\ strike}$) measurement (meters)	10
Total number of strikes in a 24-h period	648000

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G26)	
Distance of $L_{p,0\text{-}pk}$ measurement (meters)*	
$L_{p,0\text{-}pk}$ Source level	#NUM!

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**4,046.9**	**143.9**	**4,820.5**	**2,165.7**	**157.7**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2\sigma}}{[1+(f/f_1)^2]^{a}[1+(f/f_2)^2]^{b}}\right\}$$

42-inch perm DTH level B

Fill in SPL and distances for peak and rms pressures, and read distance to threshold for appropriate model

Project Title	Lutak Dock Replacement Project
PROJECT /SOURCE INFORMATION please include any assumptions	For DTH installation of 42-inch piles: recommended levels for 25"-42" piles for DTH systems from the National Marine Fisheries Service (2022).

Measured pressure	Peak	RMS
SPL =		174
Distance =		10

https://asa.scitation.org/doi/10.1121/1.5003328
Journal of Acoustical Society of America Underwater noise from geotechnical drilling and standard penetration testing The Journal of the Acoustical Society of America 142, EL281 (2017); https://doi.org/10.1121/1.5003328

	Fish Meters to Threshold		Spreading Model	MarMam Meters to Threshold				
Spreading Model	Peak(180 dB)	RMS (150 dB)		RMS 180 dB	RMS 160 dB	RMS 120 dB	RMS 90dB- harbor seal in air	RMS 100dB-sea lion in air
Spherical spreading	0	158	dB = 20*log(R1/R2)	5	50	5012	158489.3192	50118.7234
Cylindrical spreading	0	2512	dB = 10*log(R1/R2)	3	251	2511886		
Practical spreading	0	398	dB = 15*log(R1/R2)	4	86	39811		

Fill in SPL and distance at which SPL was measured

Conversion	meters	feet	miles
	464	1522.30976	0.288

All piles in-air vibratory

PROJECT/SOURCE INFORMATIONPlease include any assumptions	For in-air vibratory hammer installation:In-air vibrating sound source is proxy from the Washington State Department of Transportation has documented un-weighted rms levels for a vibratory hammer (30-inch pile) to an average 96.5 dB and a maximum of 103.2 dB at 15 meters (Laughlin 2010). Maximum levels were used to extrapolate distances for the projects.
PROJECT CONTACT	Emma Kimball (emma@solsticeak.com)

Fill in SPL and distances for peak and rms pressures, and read distance to threshold for appropriate model

Measured pressure	Peak	RMS
SPL =		103.2
Distance =		15

	Fish Meters to Threshold			Spreading Model	MarMam Meters to Threshold				
Spreading Model	Peak(180 dB)	RMS (150 dB)			RMS 180 dB	RMS 160 dB	RMS 120 dB	RMS 90dB- harbor seal in air	RMS 100dB - sea lion in air
Spherical spreading	0	0		dB = 20*log(R1/R2)	0	0	2	68.56323	21.6816
Cylindrical spreading	0	0		dB = 10*log(R1/R2)	0	0	0		
Practical spreading	0	0		dB = 15*log(R1/R2)	0	0	1		

Fill in SPL and distance at which SPL was measured

Conversion	meters	feet	miles
	1	3.733157477	7E-04

All piles in-air impact

PROJECT/SOURCE INFORMATIONPlease include any assumptions	In-air impacting sound source proxy is he median value for driving of 24 - 48 in steel pipes at Naval Base Kitsap Bangor, 106 dB rms (Personal communication with NMFS).
PROJECT CONTACT	Emma Kimball (emma@solsticeak.com)

Fill in SPL and distances for peak and rms pressures, and read distance to threshold for appropriate model

Measured pressure	Peak	RMS
SPL =		106
Distance =		15

	Fish Meters to Threshold		Spreading Model	MarMam Meters to Threshold				
Spreading Model	Peak(180 dB)	RMS (150 dB)		RMS 180 dB	RMS 160 dB	RMS 120 dB	RMS 90dB- harbor seal in air	RMS 100dB - sea lion in air
Spherical spreading	0	0	dB = 20*log(R1/R2)	0	0	3	94.6436	29.92893
Cylindrical spreading	0	0	dB = 10*log(R1/R2)	0	0	1		
Practical spreading	0	0	dB = 15*log(R1/R2)	0	0.0038	2		

Fill in SPL and distance at which SPL was measured

Conversion	meters	feet	miles
	2	5.737767906	0.001

Appendix C
Marine Mammal Monitoring and Mitigation Plan

Marine Mammal Monitoring and Mitigation Plan

Haines Borough
Lutak Dock Replacement Project

Lutak Inlet, Haines Borough, Alaska

Revised October 2023

Prepared for:
U.S. Department of Transportation Maritime Administration

and

Haines Borough
P.O. Box 1209
Haines, Alaska 99827

Prepared by:

2607 Fairbanks Street Suite B
Anchorage, Alaska 99503

Submitted to:
National Marine Fisheries Service

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Appendix A: List of Species with Ranges in the Project Action Area
Appendix B: Construction Activity and Communication Log
Appendix C: Marine Mammal Sighting Forms
Appendix D: Grid Maps

ACRONYMS AND ABBREVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
AML	Alaska Marine Lines
BA	Biological Assessment
dB	decibel
DPS	distinct population segment
EDPS	eastern distinct population segment
ESA	Endangered Species Act
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
PR1	NMFS Office of Protected Resources
PRD	NMFS Alaska Region, Protected Resources Division
PSO	protected species observer
rms	root mean square
RoRo	Roll-on/Roll-off
SPL	sound pressure level
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDPS	western distinct population segment

1 INTRODUCTION

The Haines Borough proposes the following Marine Mammal Monitoring and Mitigation Plan (4MP) for use during pile installation/removal during construction of the Lutak Dock Replacement Project in Haines, Alaska (Figure 1). The project is in waters of the U.S., within the ranges of marine mammals listed in the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA), and has the potential to generate noise that could exceed Level A and B harassment thresholds established by the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). This 4MP supports the Biological Assessment (BA) in accordance with the ESA, and the Incidental Harassment Authorization (IHA) application, in accordance with the MMPA (Section 101(a)(5)(D) permitting). Monitoring and shutdown zones will be implemented to minimize Level A and Level B harassment of marine mammals.

The goal of this 4MP is to ensure compliance with the ESA and the MMPA when implemented by the protected species observers (PSOs) at the project site. The project will comply with the terms and conditions outlined in the following requested permits and authorizations:

- U.S. Army Corps of Engineers (USACE), Lutak Inlet for activities in waters of the U.S. (to be requested)
- NMFS Office of Protected Resources (PR1) IHA (to be requested)
- NMFS Alaska Region Protected Resources Division (PRD), ESA Section 7(a)(2) Biological Opinion (requested)

2 PROJECT DESCRIPTION

The Haines Borough proposes to repair and replace the Lutak Dock on the south shore of Lutak Inlet, approximately 5.5 kilometers northwest of downtown Haines, Alaska.

The proposed project involves construction of a new 705-foot-long combi wall to form a new bulkhead dock directly in front of the existing dock. The combi wall would be constructed of a series of interlocking steel pipe piles joined together by steel connectors using a ball-and-socket joint. The ball-and-socket joints are welded directly onto the piles before installation and would not require a separate installation process. The combi wall would extend down the west side of the dock for 77 feet and along southeast side for 90 feet to completely enclose the existing dock, which would remain in place. Gravel fill would be placed in between the new combi wall and the existing dock, and gravel surface course would be overlain on top. New riprap shore protection would be added on the east and west ends of the combi wall to tie into existing shore protection. A concrete cap would be added to the top of the combi wall and new fenders and mooring bollards would be added to the front of the dock. The Alaska Marine Lines (AML) Roll-on/Roll-off (RoRo) ramp would be rotated 2.5 degrees to accommodate the extension to the front of the dock in order to continue receiving barge traffic safely without damage to structures or front fendering. Four mooring dolphins, and one guide dolphin to the west of the dock would be removed.

Pile driving may result in auditory injury (Level A harassment) and behavioral harassment (Level B harassment) of select marine mammal species. Construction would begin in fall/winter 2023 and continue through fall/winter 2024. All pile installation activities (both above and below HTL) are expected to occur for a total of approximately 1,462 hours over 295 days (not necessarily consecutive days). The project would occur within waters of the U.S. No blasting is proposed as part of this project. Table 1 and Table 2 and provide a more detailed overview of the project components.

Figure 1. Lutak Dock Replacement Project Location and Action Area

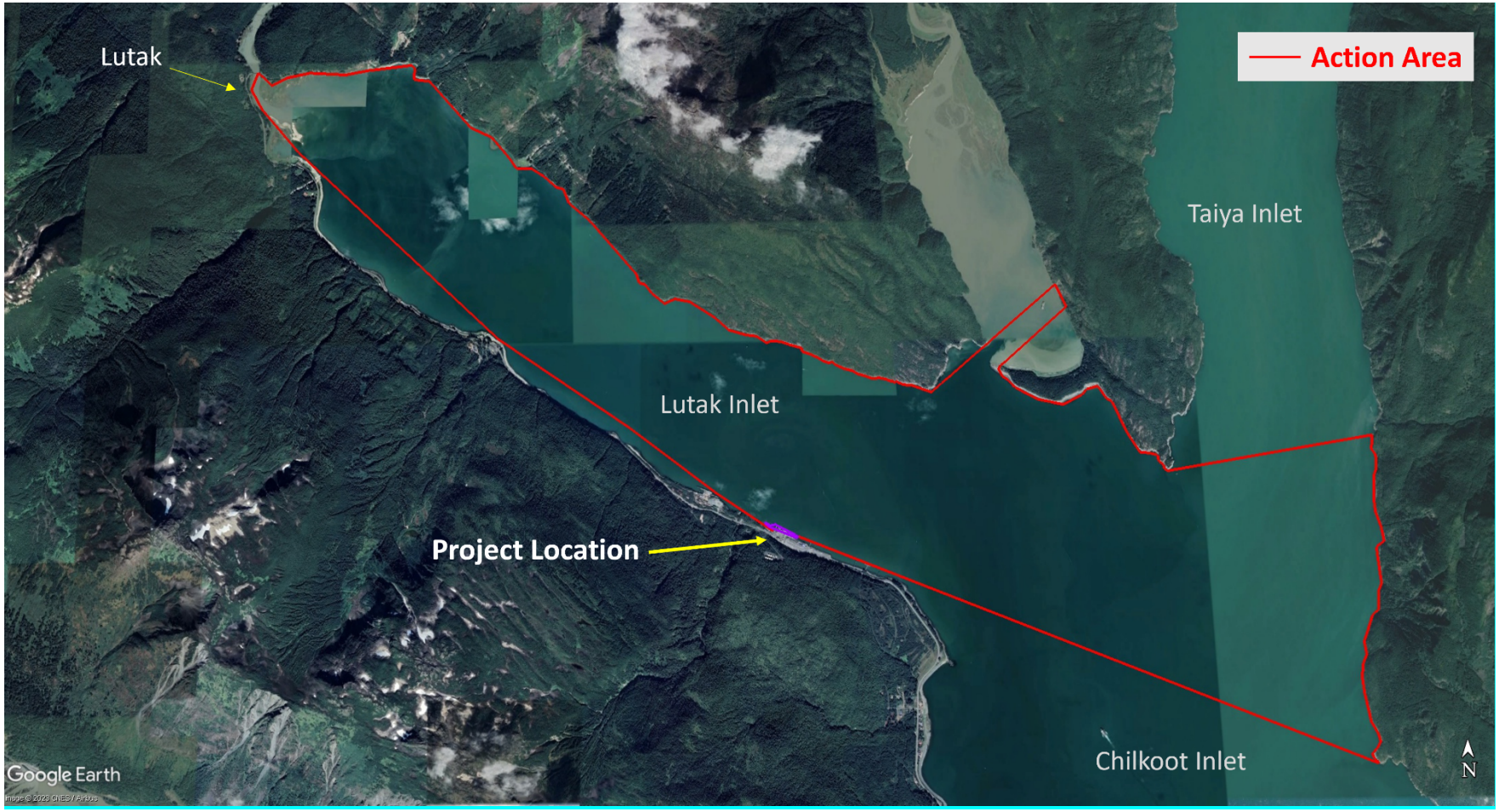


Table 1. Lutak Dock Replacement Project Pile Size, Quantity, and Installation and Removal Method

	In-Water Work (Below HTL)						In-Air Work (Above HTL)	
	Guide Pile Removal	Dolphin Removal	Temp. Pile Install	Temp. Pile Removal	Perm. Pile Installation	Sheet Pile Installation	Sheet Pile Installation	Batter Pile Installation
Diameter of Steel Pile (inches)	24	16	36	36	42	55.5	55.5	42
Number of Piles	1	24	42	42	180	40	40	23
Vibratory Pile Driving								
Total Quantity	1	24	42	42	180	40	40	23
Max # Piles Vibrated per Day	1	4	4	4	4	6	6	2
Vibratory Time per Pile (minutes)	45	45	15	15	45	30	30	60
Vibratory Time per Day (minutes)	45	180	60	60	180	180	180	120
Number of Days	1	6	11	11	45	7	7	12
Vibratory Time Total (hours)	1	18	11	11	135	20	20	23
Impact Pile Driving								
Total Quantity			42		180	40	40	23
Max # Piles Impacted per Day			4		4	6	6	2
Number of strikes per Pile			900		1,500	900	900	2,700
Impact Time per Pile (minutes)			30		45	30	30	90
Impact Time per Day (minutes)			120		180	180	180	180
Number of Days			11		45	7	7	12
Impact Time Total (hours)			21		135	20	20	35
Down-The-Hole Drilling								
Total Quantity					180			23
Max # Piles Installed per Day					2			1
# Strikes Per Pile					324,000			259,200
# Strikes Per Second					18			18
Drilling Time Per Pile (minutes)					300			240
Time per Day (minutes)					600			240
Number of Days					90			23
DTH Drilling Time Total (hours)					900			92

Table 2. Lutak Dock Replacement Project Fill Summary

	Surface Area (square feet)	Volume (cubic yards)	Time (hours)	Days
Fill above HTL				
Gravel	85,000	2,000	160	20
Type C Fill	17,500	4,055	327	11
Riprap Total	9,655	127	10	8
Total:	**112,155**	**6,182**	**497**	**39**
Fill in Intertidal Waters (Between MHW and HTL)				
Type C Fill	17,500	4,255	343	11
Riprap Total	9,655	275	22	3
Total:	**27,155**	**4,530**	**365**	**14**
Fill in Marine Waters (below MHW)				
Type C Fill	16,500	14,000	1,130	38
Riprap Total	9,655	3,136	248	31
Total:	**26,155**	**17,136**	**1,378**	**69**
Grand Total	**165,465**	**27,848**	**2,240**	**122**

3 SPECIES COVERED UNDER THE IHA

There are 9 species under NMFS jurisdiction and 1 species under USFWS jurisdiction that have ranges that extend into the project area. Take has been requested for the ESA-listed and MMPA-listed species known to frequent the area, broken down by stock or distinct population segment (DPS; Table 3).

There are several marine mammal species with habitat ranges that overlap with the ensonified area of the project; however, these species have not been observed or are rare in the project area. No Level A or B take is requested for the following species: minke whales, Pacific white-sided dolphins, and northern sea otters. For additional information about species with ranges in the project action area, see Appendix A.

The shutdown of work following Level B thresholds will occur if any other marine mammal enters the project action area (Table 4).

Table 3. Species Known to Occur in Lutak Dock Project Area and Requested Level A and Level B Take (may be updated following issuance of IHA)

Species	Stock/DPS	Hearing Group	Level A	Level B
Humpback Whale (*Megaptera novaeangliae*)	Hawaii DPS	Low-Frequency (LF) Cetacean	0	25
	Mexico DPS		0	1
Killer Whale (*Orcinus orca*)	Eastern North Pacific Alaska Resident	Mid-Frequency (MF) Cetacean	0	103
	West Coast Transient		0	19
	Eastern North Pacific Northern Resident		0	16
Dall's Porpoise (*Phocoenoides dalli*)	Southeast Inland Waters	High-Frequency (HF) Cetacean	0	31
Harbor Porpoise (*Phocoena phocoena*)	Northern Southeast Alaska		13	16
Harbor Seal (*Phoca vitulina*)	Lynn Canal/Stephens Passage Stock	Phocid Pinniped (PW)	79	827
Steller Sea Lion (*Eumetopias jubatus*)	Eastern DPS (EDPS)	Otariid Pinniped (OW)	288	2,319
	Western DPS (WDPS)		4	33

4 MONITORING AND SHUTDOWN ZONES

The harassment zones will be monitored throughout the permitted in-water construction activity. The following mitigation measures will be applied based on species, in-water activity, and distance of the mammalian species from the project location:

- If a permitted marine mammal enters a Level B monitoring zone during permitted activities, a Level B take will be recorded and animal behaviors documented. Permitted construction activities would continue without cessation unless the animal approaches or enters the shutdown zone.
- If a marine mammal approaches or appears in a Level A shutdown zone, all permitted construction activities will immediately halt until the marine mammal has left the shutdown zone on its own accord or has not been sighted for 15 minutes (pinnipeds and small cetaceans) or 30 minutes (large cetaceans and sea otters).
- If a non-permitted marine mammal approaches or appears in a Level B zone, all permitted construction activities will immediately halt until the animal has left the Level B zone or has not been sighted for 15 minutes (pinnipeds, small cetaceans, and otters) or 30 minutes (large cetaceans and sea otters).

Takes, in the form of Level A or Level B harassment, of marine mammals other than permitted species are not authorized and will be avoided by shutting down construction activities before these species enter the Level B monitoring zone.

Because species are impacted differently by noise, species-specific monitoring and shutdown zones have been calculated for this project. These monitoring and shutdown zones are shown in Figure 2.

4.1 Monitoring Zones

Level B monitoring zones have been determined based on in-water activity type. For NMFS species, Level B monitoring zones represent areas where the sound pressure levels (SPLs) generated from pile driving activities meet or exceed 120 decibels (dB) root mean square (rms) during vibratory pile driving and 160 dB rms during impact pile driving.

These monitoring zones serve as an area within which instances of permitted marine mammal harassment (Level B take) will be documented, if in-water work is actively occurring. Alternatively, for non-permitted marine mammals, it acts as an area in which in-water work should cease if they approach or appear likely to enter. These Level B zones also allow PSOs to be aware of the presence of permitted marine mammals as they near the shutdown zone and prepare for shutdowns if required.

Level B monitoring/shutdown zones are presented in Table 4 and Figure 2 below. For certain species and certain pile driving activities, the Level A shutdown zones are larger than the Level B monitoring zones due to differences in calculation methods used by NMFS. For those activities, the Level B monitoring zones shown in the following tables and figures also represent the Level A shutdown zone for this activity.

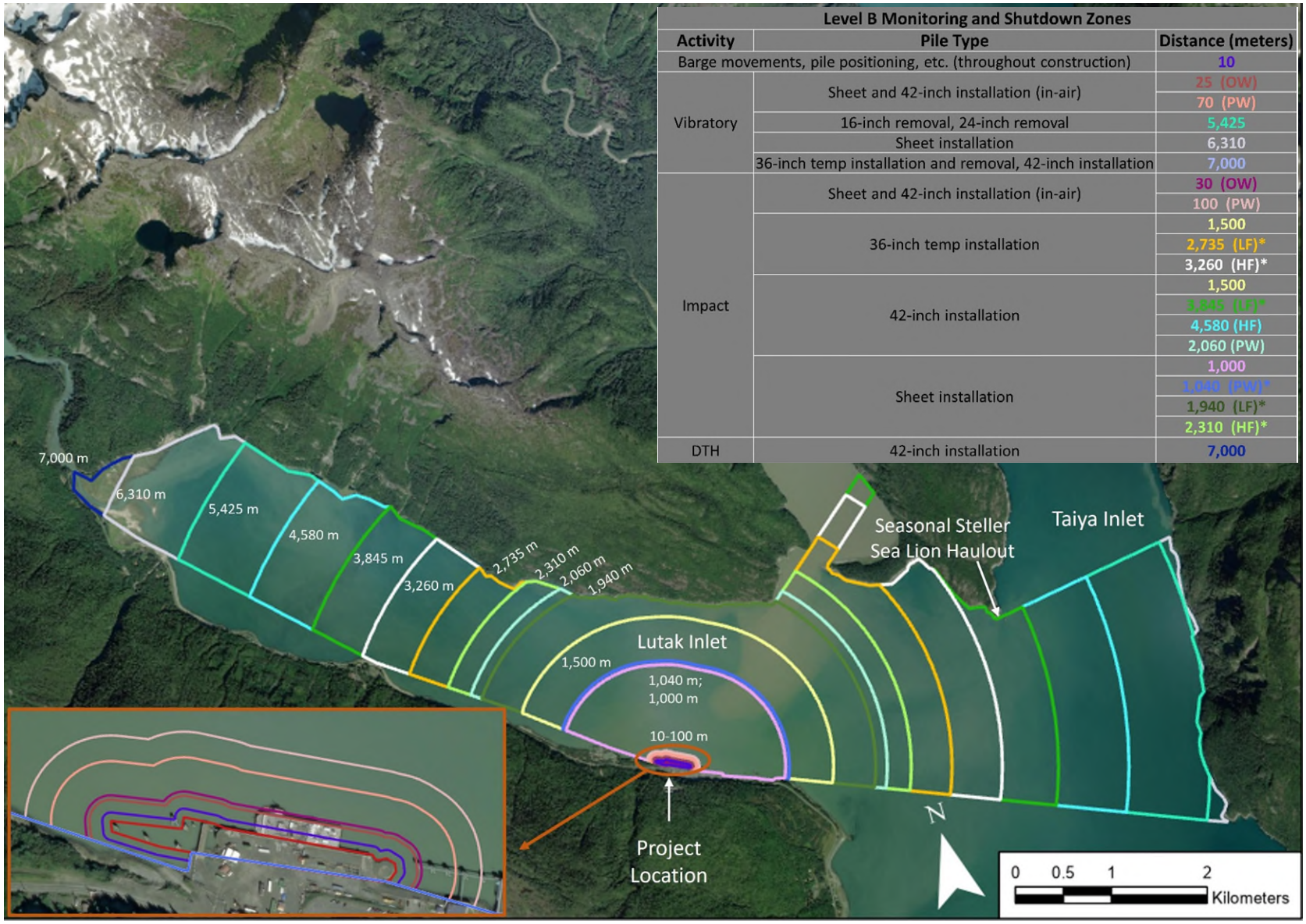
Table 4. Lutak Dock Replacement Project Harassment Zones

Source	Distance (meters)					
	Level A					Level B
	LF Cetaceans	MF Cetaceans	HF Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	All Marine Mammals
In-water Activities						
Barge movements, pile positioning, etc.[a]	10	10	10	10	10	10
Vibratory Pile Driving/Removal						
24-inch pile removal (1 pile; 45 minutes per day; on 1 day)	10	10	10	10	10	5,425
16-inch pile removal (24 piles; 180 minutes per day; on 6 days)	15	10	30	10	10	5,425
36-inch temporary pile installation (42 piles; 60 minutes per day on 11 days)	15	10	30	10	10	11,660[b]
36-inch temporary pile removal (42 piles; 60 minutes per day; on 11 days)	15	10	30	10	10	11,660[b]
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	60	10	85	35	10	21,544[b]
55.5-inch sheet permanent pile installation; (40 piles; 180 minutes per day; on 7 days)	20	10	25	10	10	6,310
55.5-inch sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	70 (PW); 25 (OW)[c]
42-inch permanent batter pile installation; in-air (23 piles; 120 minutes per day; on 12 days)	--	--	--	--	--	70 (PW); 25 (OW)[c]
Impact Pile Driving						
36-inch temporary pile installation (42 piles; 120 minutes per day; on 11 days)	2,735[d]	110	3,260[2] (200)[e]	1,500 (200)[e]	110	1,500[d]
42-inch permanent pile installation (180 piles; 180 minutes per day; on 45 days)	3,845[d]	150	4,580[d] (200)[e]	2,060[d] (200)[e]	150	1,500
55.5-inch sheet permanent pile installation (40 piles; 180 minutes per day; on 7 days)	1,940[d]	70	2,310[d] (200)[e]	1,040[d] (200)[e]	80	1,000
55.5-inch sheet permanent pile installation; in-air (40 piles; 180 minutes per day; on 7 days)	--	--	--	--	--	100 (PW); 30 (OW)[c]
42-inch permanent batter pile installation; in-air (23 piles; 180 minutes per day; on 12 days)	--	--	--	--	--	100 (PW); 30 (OW)[c]
DTH Drilling						
42-inch pile installation (180 piles; 600 minutes per day; on 90 days)	4,050	145	4,825 (200)[e]	2,170 (200)[e]	160	39,815[b]

Shutdown zone distances refer to the maximum radius of the zone and are rounded.

[a] Although acoustic injury is not the primary concern with these activities, shutdowns will be implemented to avoid impacts to species.
[b] These sound zones are blocked by landforms at 7,000 meters.
[c] In-air distances apply to marine mammals that spend significant amounts of time hauled out (Steller sea lions and harbor seals).
[d] For certain species and certain pile driving activities, the Level A harassment zones should be used in place of the Level B monitoring zones during monitoring.
[e] According to NMFS, the Level A shutdown zones for HF cetaceans and phocid pinnipeds during impact pile driving and DTH drilling are too large for PSOs to accurately identify these species and shut down construction before Level A take occurs. NMFS recommended that in these circumstances, a minimum Level A shutdown zone of 200 meters be implemented.

Figure 2. Lutak Dock Replacement Project Level B Harassment Zones



*Indicates Level A zone. Where Level A zone radii are larger than the corresponding Level B radii, the Level A zone is shown.

4.2 Shutdown Zones

Shutdown zones are defined as areas where SPLs meet or exceed the level that would cause auditory injury to ESA-listed marine mammals. Shutdown zones are intended to protect marine mammals from auditory injury. In-water activities would be halted upon the sighting of a marine mammal that is in (or anticipated to enter) the shutdown zone. Shutdown zones for USFWS species apply to northern sea otters and were established using the USFWS *Observer Protocols for Pile Driving, Dredging, ad Placement of Fill* and the distance at which SPLs meet or exceed 160 dB rms.

Further, there will be a nominal 10-meter shutdown zone for construction activity where acoustic injury is not the primary concern. This type of work could include (but is not limited to) the following activities: movement of the barge to the pile location; positioning of the pile on the substrate via a crane (i.e., stabbing the pile); and removal of the pile from the water column/substrate via a crane (i.e., deadpull). For these activities, monitoring would take place starting 15 minutes before initiation and ending when the action is complete. This can be monitored by the vessel operator or personnel on the barge when a PSO is not present. Radial distances to Level A shutdown zone boundaries are defined in Table 4 and shown in Figure 3 through Figure 7.

A 200-meter minimum shutdown zone has been established inside the calculated Level A isopleth for HF cetaceans and phocid pinnipeds during impact pile driving and DTH drilling. NMFS stated that the Level A shutdown zones during impact pile driving and DTH drilling were too large for PSOs to accurately identify these species at the calculated distances. For HF cetaceans and phocid pinnipeds identified outside of the 200-meter minimum shutdown zone but within the calculated Level A harassment zones, Level A take will be recorded for those species for which take is authorized. For HF cetaceans and phocid pinnipeds seen entering or appear likely to enter the 200-meter zone, construction activities will be shut down and take recorded.

Figure 3. Lutak Dock Replacement Project Level A Shutdown Zones for Low-Frequency Cetaceans

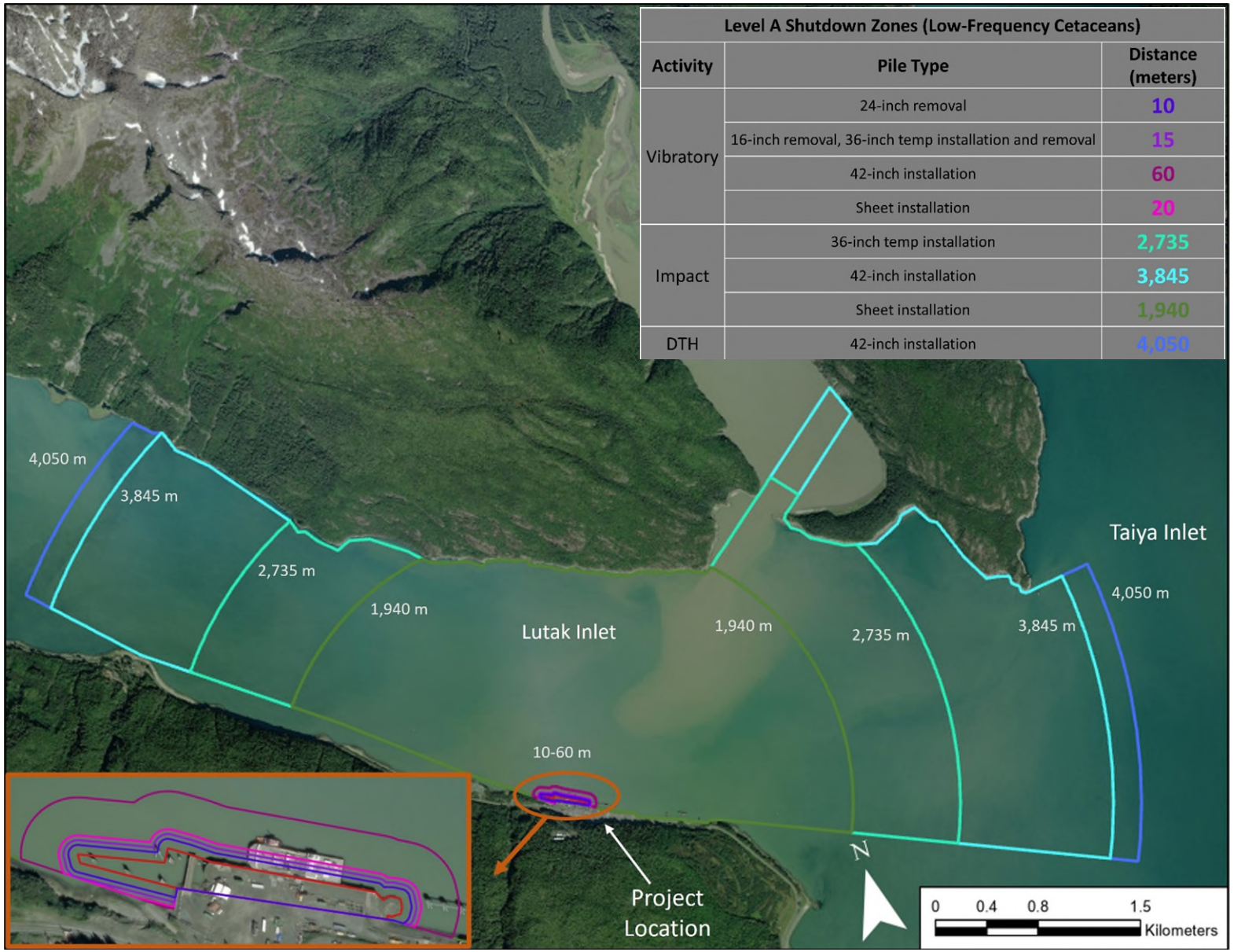
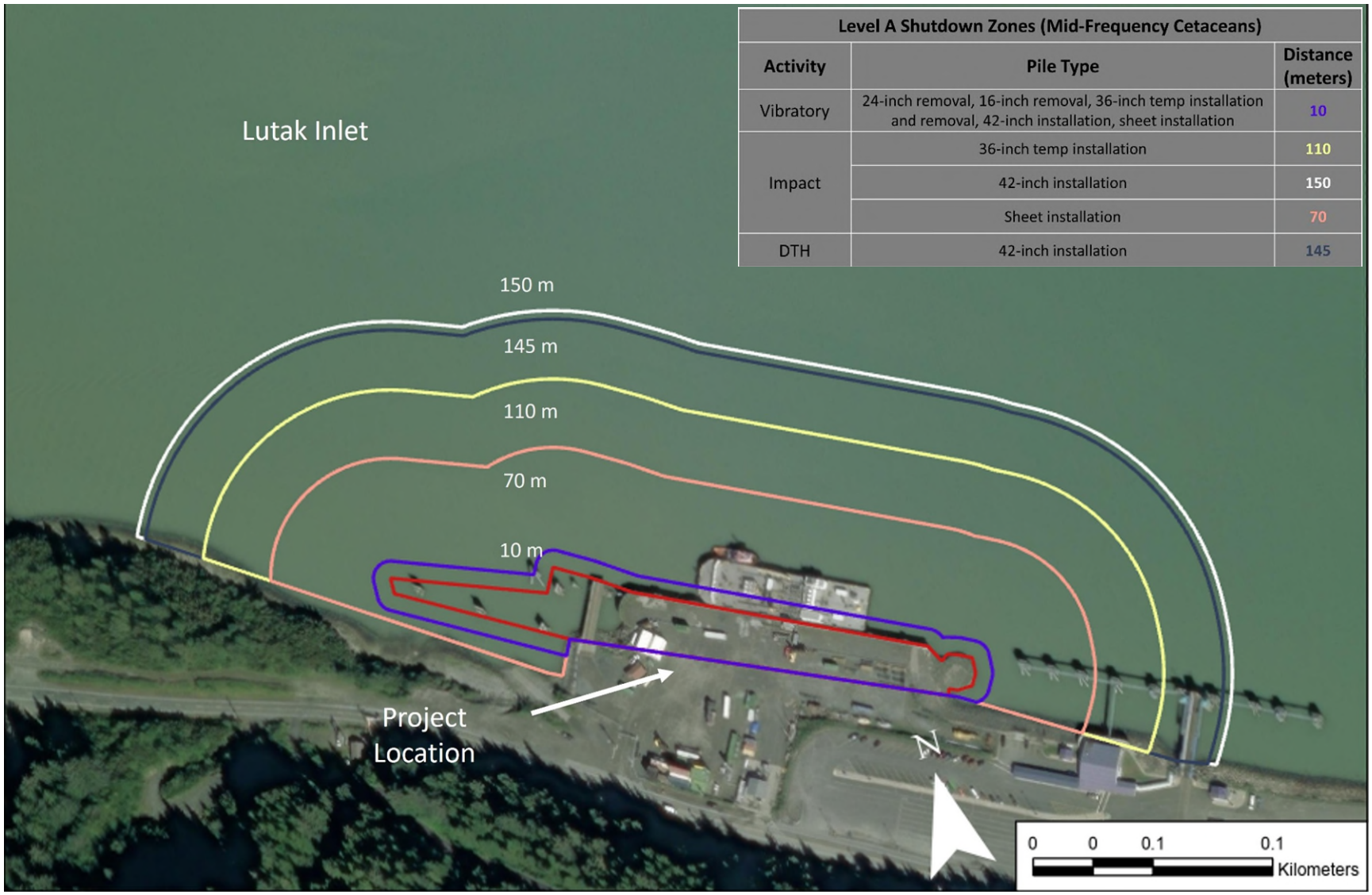


Figure 4. Lutak Dock Replacement Project Level A Shutdown Zones for Mid-Frequency Cetaceans



Level A Shutdown Zones (Mid-Frequency Cetaceans)		
Activity	**Pile Type**	**Distance (meters)**
Vibratory	24-inch removal, 16-inch removal, 36-inch temp installation and removal, 42-inch installation, sheet installation	10
Impact	36-inch temp installation	110
	42-inch installation	150
	Sheet installation	70
DTH	42-inch installation	145

Figure 5. Lutak Dock Replacement Project Level A Shutdown Zones for High-Frequency Cetaceans

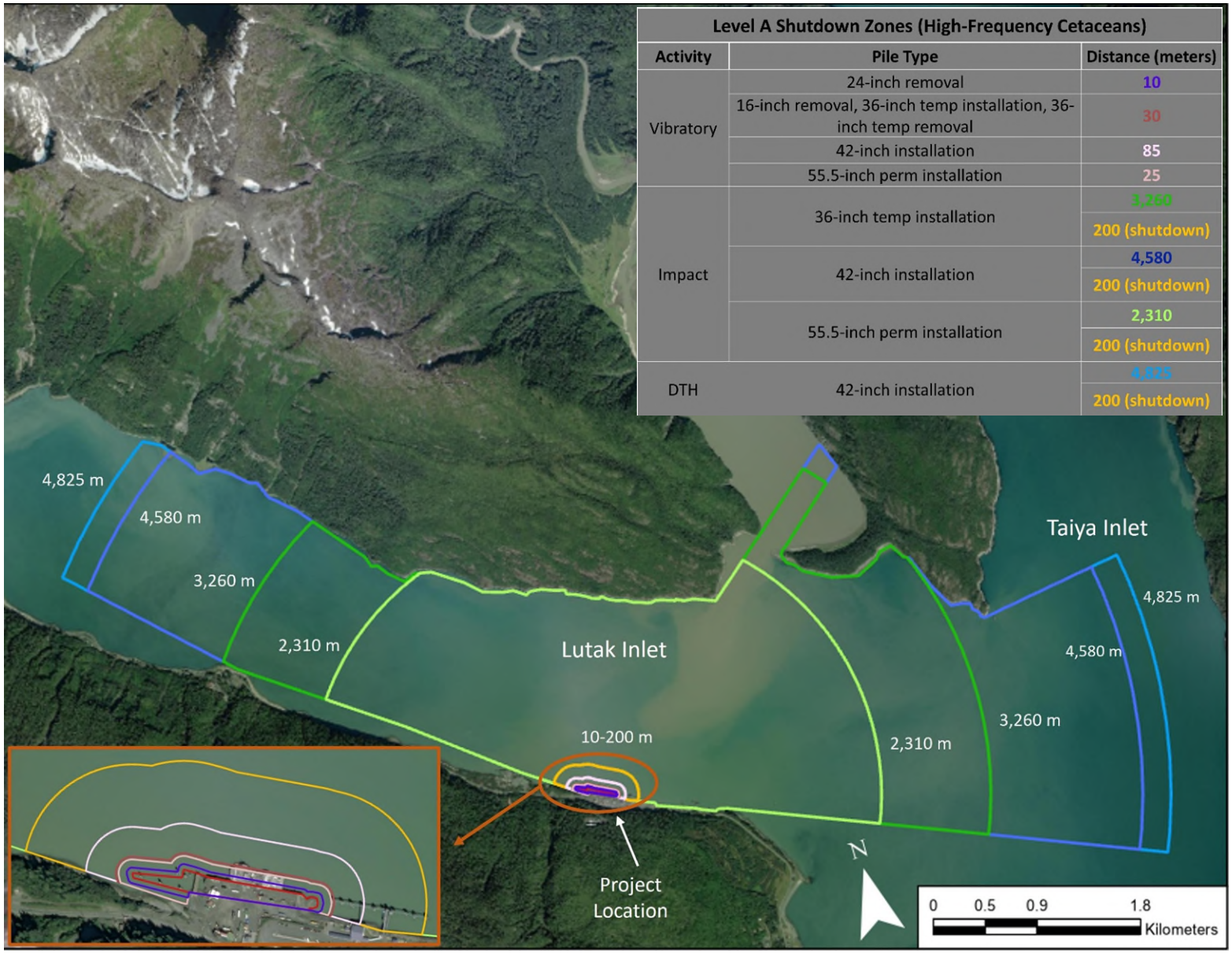


Figure 6. Lutak Dock Replacement Project Level A Shutdown Zones for Phocid Pinnipeds

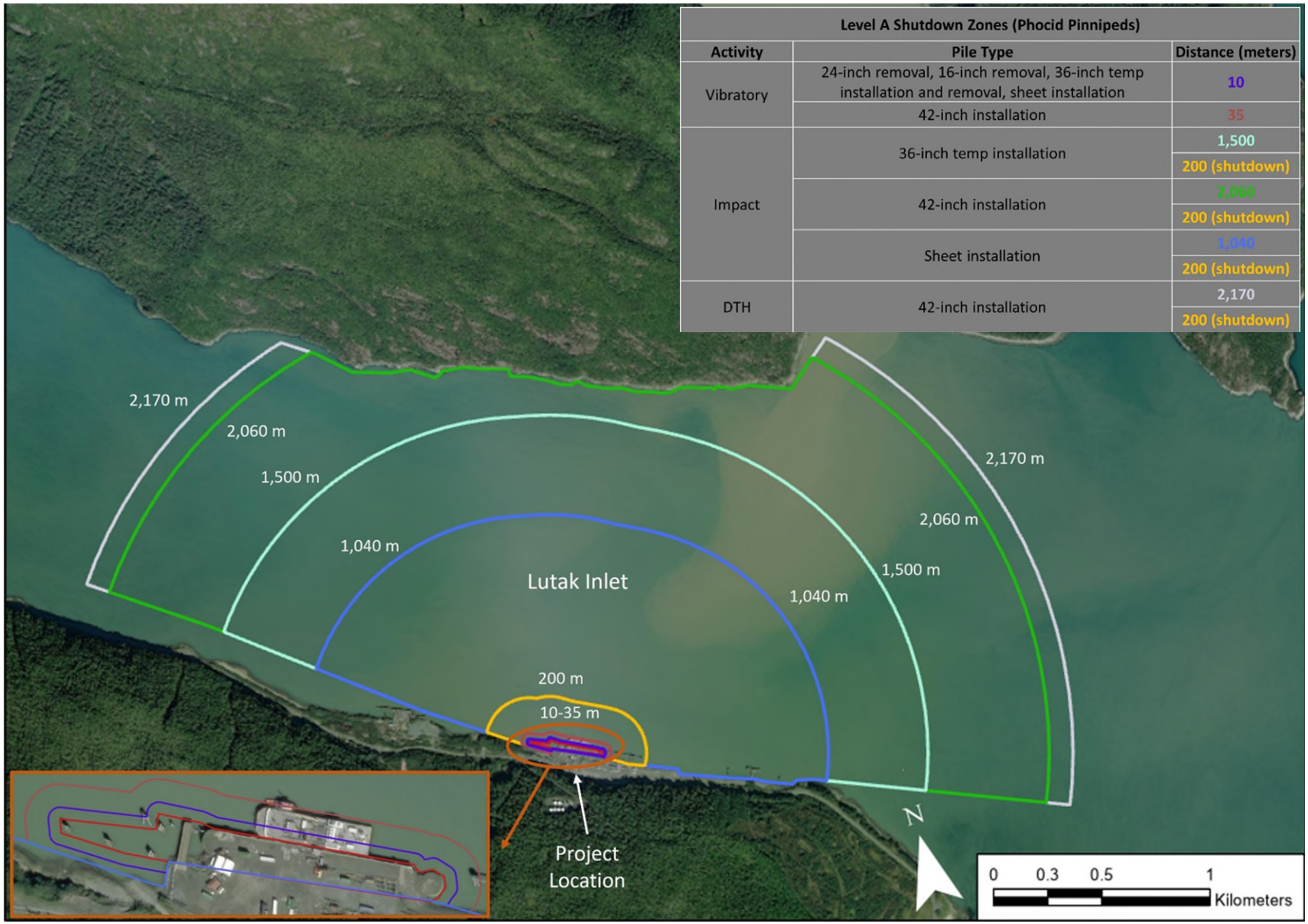
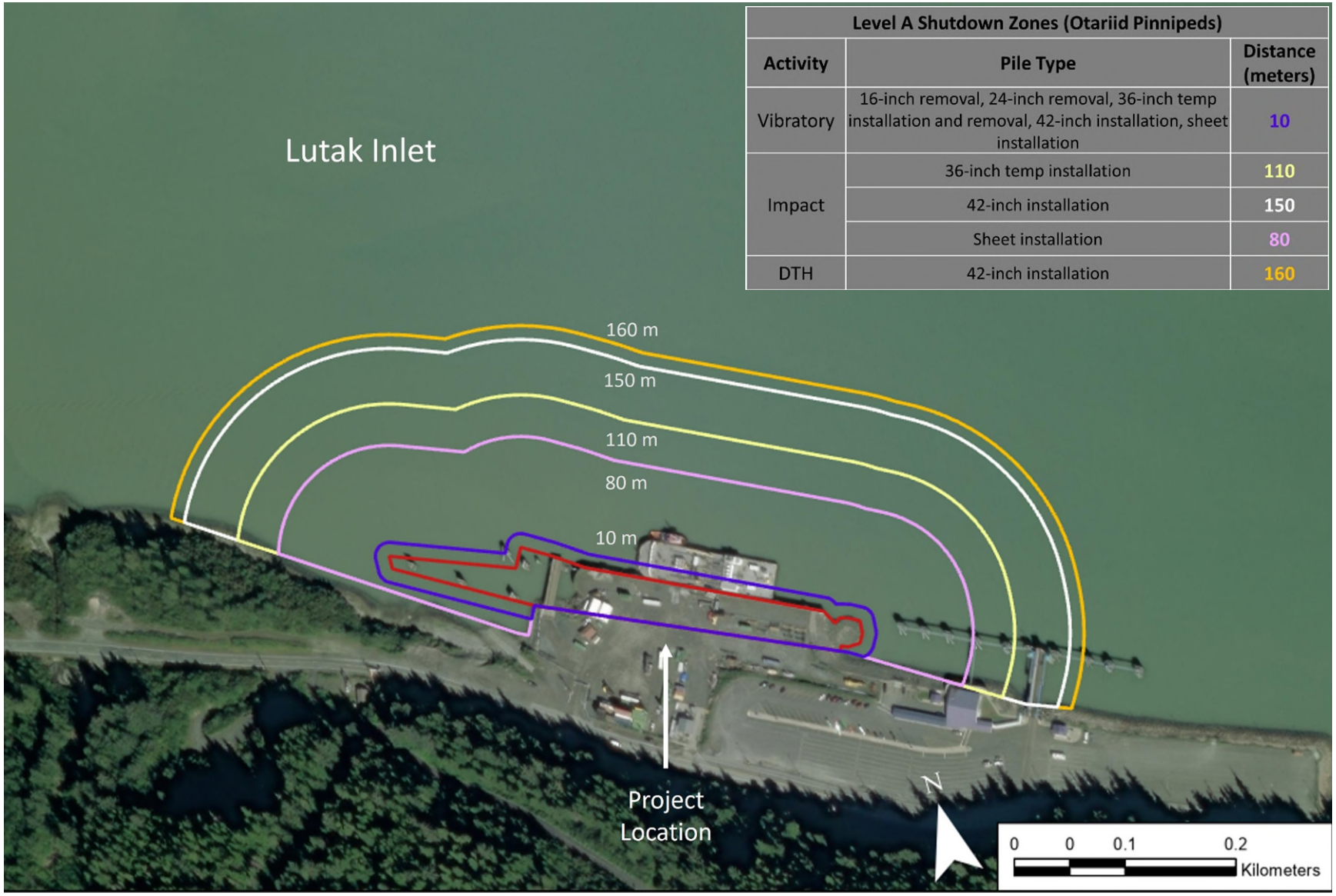


Figure 7. Lutak Dock Replacement Project Level A Shutdown Zones for Otariid Pinnipeds



Level A Shutdown Zones (Otariid Pinnipeds)		
Activity	**Pile Type**	**Distance (meters)**
Vibratory	16-inch removal, 24-inch removal, 36-inch temp installation and removal, 42-inch installation, sheet installation	10
Impact	36-inch temp installation	110
	42-inch installation	150
	Sheet installation	80
DTH	42-inch installation	160

5 MITIGATION MEASURES

The purpose of a marine mammal monitoring plan is to observe for marine mammals in the area where potential sound effects may occur. Work will be stopped or delayed if a non-permitted marine mammal is sighted in the Level B monitoring area or Level A shutdown area. Work will not begin or resume until the marine mammal species has moved out of the monitoring area on its own accord.

The following mitigation measures will be implemented during in-water activities to limit impacts to marine mammals, including ESA-listed species.

5.1 General Conditions and Requirements

- The contractor will attempt to minimize the use of an impact hammer to the extent possible by utilizing a vibratory hammer to advance the piling as deep as possible prior to switching to impact driving.
- The contractor will also employ pile caps (pile softening material), used to minimize noise during impact pile driving. Much of the noise generated during pile installation comes from contact between the pile and the steel template used to stabilize the pile. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel-on-steel noise.
- The contractor is required to conduct briefings for construction supervisors and crews and the monitoring team prior to the start of all pile driving activity, and upon hiring new personnel, to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.
- The contractor is required to employ PSOs during all in-water construction activities.
- Marine mammal monitoring must take place starting 30 minutes prior to initiation of in-water work and ending 30 minutes after completion of in-water work. In-water work may commence when observers have declared the appropriate zones clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammal species in the shutdown zone, their behavior must be monitored and documented until they leave of their own volition, at which point the activity may begin or resume.
- In-water work must be halted or delayed if a marine mammal is observed entering or within an established shutdown zone (Table 4). Pile driving may not commence or resume until either: the animal has voluntarily left and has been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent observations of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent observations of large cetaceans.
- The contractor must use soft start techniques when impact pile driving.
- In-water work must be delayed or halted immediately if a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zones (Table 4). Activities must not start or resume until the animal has been confirmed to have left the area or the observation time period, as indicated in the conditions above, has elapsed.

- In-water activities will take place only:
    - between civil dawn and civil dusk when PSOs can effectively monitor for the presence of marine mammals;
    - during conditions with a Beaufort Sea State of 4 or less;
    - when the entire shutdown zone and adjacent waters are visible (e.g., monitoring effectiveness is not reduced due to rain, fog, snow, volcanic ash, etc.).
- Should light or environmental conditions deteriorate such that marine mammals within the entire largest Level A shutdown zone would not be visible (e.g., fog, heavy rain), pile driving and removal must be delayed until the PSOs are confident marine mammals within the shutdown zone could be detected.
- When doing so will not compromise human safety, in-water work will be conducted when the fewest individuals of listed species are expected to be in the area (e.g., during the low-tide cycle).
- PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break between shifts, and will not perform PSO duties for more than 12 hours in a 24-hour period (to reduce PSO fatigue).
- Project-associated staff will cut all materials that form closed loops (e.g., plastic packing bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured trash bin. Trash bins will be properly secured with locked or secured lids that cannot blow open, preventing trash from entering into the environment, thus reducing the risk of entanglement in the event that waste enters marine waters. Trash bins will be emptied on a regular schedule to ensure they do not overflow (making covers ineffective and causing debris to enter the environment).
- Project-associated staff will properly secure all ropes, nets, and other materials that could blow or wash overboard.

5.2 Observer Qualifications and Requirements

- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface and ability to estimate target size and distance. Use of binoculars and/or spotting scope may be necessary to correctly identify the target.
- Advanced education in biological science, wildlife management, mammalogy or related fields (Bachelor's degree or higher is preferred), or equivalent Alaska Native traditional knowledge. PSOs may substitute education or training for experience.
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in field identification of marine mammals.
- Training, knowledge of or experience with vessel operation and pile driving operations sufficient to provide personal safety during observations.
- Writing skills sufficient to prepare a report of observations. Reports should include: the number, type, and location of marine mammals observed; the behavior of marine mammals in the area of potential sound effects during construction; dates and times when observations and in-water construction activities were conducted; dates and

times when in-water construction activities were suspended because of marine mammals; etc.
- Ability to communicate orally as needed, by radio or in person, with project personnel to provide real time information about marine mammals observed in the area.
- PSOs must be independent (i.e., not construction personnel) and have no other assigned tasks during monitoring periods.
- A lead observer or monitoring coordinator must be designated if a team of three or more PSOs are required. The lead observer must have prior experience working as a marine mammal observer during construction.
- The contractor must submit PSO resumes for approval by NMFS prior to the onset of pile driving.

5.3 Data Collection

5.3.1 Environmental Conditions and Construction Activities

PSOs will use the construction activities log and marine mammal observation record to document the following (Appendices B and C):

- Environmental Conditions:
  - Environmental conditions will be recorded at the beginning and end of every monitoring period and as conditions change.
  - Recordings will include PSO 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).
- Construction Activities:
  - PSOs will record the time that observations begin and end as well as the durations of shutdowns.
  - PSOs will document the reason for stopping work, time of shutdown, and type of pile installation or other in-water work taking place.
  - PSOs will document other, non-project-related activities that could disturb marine mammals in the area, such as the presence of large and small vessels.
- If possible, observations of humpback whales will be transmitted to AKR.section7@noaa.gov , including:
  a. photographs (especially flukes) and video obtained.
  b. geographic coordinates for the observed animals, with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or a similar standard, or extrapolated from grid map).
  c. Number of animals per observation event; and number of adults/juveniles/calves per observation event (if determinable).
  d. Environmental conditions as they existed during each observation event, including sea conditions, weather conditions, visibility, lighting conditions, and percent ice cover.
- If possible, observations of North Pacific right whales will be transmitted to AKR.section7@noaa.gov , including:

e. photographs (especially flukes) and video obtained.
f. geographic coordinates for the observed animals, with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or a similar standard, or extrapolated from grid map).
g. Number of animals per observation event; and number of adults/juveniles/calves per observation event (if determinable).
h. Environmental conditions as they existed during each observation event, including sea conditions, weather conditions, visibility, lighting conditions, and percent ice cover.

PSOs will record all communications with the construction crew. The environmental conditions and construction activities log will be checked for quality assurance and quality control (QA/QC) by the lead PSO for submission at the end of every monitoring day. Upon request, the data will be submitted to NMFS along with the final report.

5.3.2 Sightings

Observers will use an approved marine mammal sighting form and GPS grid maps (Appendices C and D) which will be completed by each observer for each survey day and location. Sighting forms will be used by observers to record the following:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (e.g., percent glare, visibility) and sea state (determined by the Beaufort Wind Force Scale);
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Behavioral patterns observed, including bearing and direction of travel;
- Behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- The marine mammal's location, distance from the observer, and distance from pile driving or removal activities;
- Whether mitigation measures, including shutdown procedures, were required by an observation, including the duration of each shutdown;
- Observer rotations including the time of rotation and the initials of the incoming observer.

The observation record forms will be checked for quality assurance and quality control (QA/QC) by the lead PSO for submission at the end of every monitoring day. Upon request, the data will be submitted to NMFS along with the final report.

5.4 Equipment

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

- Appropriate personal protective equipment;
- Portable VHF radios for the observers to communicate with other observers and the pile driving supervisor;
- Cellular phone as backup for radio communication;
- Contact information for the other observers, the pile driving supervisor, and the NMFS point of contact;

- Daily tide tables for the project area;
- Binoculars (quality 7 x 50 or better) and a rangefinder;
- Hand-held GPS unit, or grid map along with map and stand-alone compass or clinometer to record locations of marine mammals;
- Copies of the 4MP, IHA, and other relevant permit requirement specifications in a sealed, clear, plastic cover;
- Notebook with pre-standardized monitoring observation record forms and grid maps (Appendices B and C).

Note: Each PSO is equipped with a rangefinder, binoculars, and typically identifies objects or points at a known distance prior to the start of in-water work. The grid map is an additional tool to aid in tracking an individual through the action area, communicate where the next PSO can expect to sight the individual, and as a visual log of sightings over the course of the project. PSOs ultimately use the rangefinder to determine if mitigation measures are needed (shutdown or delay) and note whether an individual was present in the Level B or Level A zone during construction activities.

5.5 Number and Location of PSOs

The number of locations of PSOs are determined to ensure that there is full coverage of the action area during all in-water activities. Locations are chosen based on site accessibility and field of vision.

One to four PSOs will be onsite during in-water activities associated with the Lutak Dock Replacement Project, stationed in the following locations (Figure 8):

- Station 1: stationed at the project site.
- Station 2: stationed off Lutak Road at a beach across from Takshanuk Mountain trail.
- Station 3: stationed along the shoreline at Tanani Point along Lutak Road.
- Station 4: stationed on a boat triangulating an area outside of the mouth of Lutak Inlet between Low Point and Taiya Point.

The number and locations of monitors will be based on the following in-water work scenarios:

- Scenario #1: In-water construction not involving pile driving; barge movements, etc.
    - One location: Station 1
- Scenario #2: Impact hammer, vibratory hammer, and DTH drill installation of all pile sizes.
    - Three locations: Stations 1 – 3
- Scenario #3: Vibratory hammer and DTH drill installation of all piles, impact installation of all piles except sheet piles.
    - One location: Station 4

Figure 8. Lutak Dock Replacement Project PSO Locations

5.6 Strike Avoidance

Vessels will adhere to the Alaska Humpback Whale Approach Regulations when transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). These regulations require that all vessels:

- Do not approach, or cause a vessel or object to approach, within 100 yards of a humpback whale;
- Do not obstruct the path of oncoming humpback whales causing them to surface within 100 yards of the vessel;
- Do not disrupt the normal behavior or prior activity of a whale; and
- Operate at a slow, safe speed when near a humpback whale (safe speed is defined in regulation 33 CFR § 83.06).

Vessels will follow the NMFS Marine Mammal Code of Conduct for other species of marine mammals, which recommend: maintaining a minimum distance of 100 yards; not encircling or trapping marine mammals between boats, or between boats and the shore; and putting engines in neutral if approached by a whale or other marine mammal to allow the animals to pass.

5.7 Monitoring Techniques

5.7.1 Pre-Activity Monitoring

The following monitoring methods will be implemented before permitted construction begins:

- The lead PSO and Contractor Superintendent will meet at the start of each day to discuss planned construction activities for the day and to conduct a radio/phone check.
- Prior to the start of permitted activities, observers will conduct a 30-minute pre-watch of the shutdown and monitoring zones. They will ensure that no marine mammals are present within the shutdown zone before permitted activities begin.
- The shutdown zone will be cleared when marine mammals have not been observed within the zone for the 30-minute pre-watch period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes (for pinnipeds) or 30 minutes (for cetaceans and sea otters).
- When all applicable exclusion zones are clear, the observers will radio the pile driving supervisor. Permitted activities will not commence until the pile driving supervisor receives verbal confirmation that the zones are clear.
- If permitted species are present within the monitoring zone, work will not be delayed, but observers will monitor and document the behavior of individuals that remain in the monitoring zone.
- In case of fog or reduced visibility, observers must be able to see all of the shutdown zones before permitted activities can begin.

5.7.2 Soft Start Procedures

Soft start procedures will be used prior to periods of impact driving to allow marine mammals to leave the area prior to exposure to maximum noise levels. Soft start procedures for vibratory pile driving will not be implemented and are not required.

- The contractor will initiate approximately three strikes at a reduced energy level, followed by a 30-second waiting period. This procedure would be repeated twice more.
- If work ceases for more than 30 minutes, soft start procedures must be used prior to continuing work.

5.7.3 During Activity Monitoring

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

5.7.4 Inclement Weather

If inclement weather, limited visibility, or increased sea state restricts the observers' ability to make observations, in-water activities will not be initiated or continued until the largest Level A shutdown zone for the activity is visible.

If visibility is diminished, but the parameters for initiating or continuing work (referenced above) are met, the following should occur:

- All appropriate PSO locations for the planned in-water activities should be occupied for the entirety of the monitoring period regardless of visibility.
- All PSO locations should collectively determine what percentage of the Level B zone is visible for use in calculating extrapolations. The lead PSO should document this with time stamps as conditions change and this percentage should be adopted by all PSO locations.
- Extrapolate takes for each species with authorized take using the equation below.

Number of individuals sighted in the visible portion of the Level B zone ÷ percentage of visible Level B zone = extrapolated takes for species

5.7.5 Shutdowns

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

- The observers will immediately alert the pile driving supervisor.
- All permitted activities will immediately halt.
- In the event of a shutdown, permitted pile installation or removal activities may resume only when the animal(s) within or approaching the shutdown zone has been visually confirmed beyond or heading away from the shutdown zone, or 15 minutes (for pinnipeds) or 30 minutes (for cetaceans and sea otters) have passed without observation of the animal. Observers will contact the pile driving supervisor and inform them that activities can re-commence.

5.7.6 Breaks in Work

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

If permitted activities cease for more than 30 minutes and monitoring has not continued, pre-activity monitoring and soft start procedures must recommence. This includes breaks due to scheduled or unforeseen construction practices or breaks due to permit-required shutdown.

Work can begin following the 30-minute pre-watch monitoring protocols. Work cannot begin if an animal is within the shutdown zone or if visibility is not clear throughout the Level A shutdown zones.

5.7.7 Post Activity Monitoring

Monitoring of the shutdown and monitoring zones will continue for 30 minutes following completion of in-water activities. PSOs will continue to record observations during this post-watch period, with a focus on observing and reporting unusual or abnormal behaviors.

If construction were to resume during the post-watch period, PSOs will follow pre-watch protocols to ensure that that the shutdown and monitoring zones are clear prior to work resuming.

6 REPORTING

6.1 Notification of Intent to Commence Construction

The contractor will inform NMFS PR1 and NMFS PRD one week prior to commencing construction activities.

6.2 Weekly Sighting Counts

A summary of the following will be submitted to the construction project manager at the conclusion of each week of construction activity (Friday evening):

- Completed monitoring forms for the week
- Completed environmental conditions and construction activity logs for the week
- Preliminary counts of sightings and takes per species

6.3 Interim Monthly Reports

The contractor will submit brief, monthly reports to the NMFS PRD summarizing PSO observations and recorded takes during construction. Monthly reporting will allow NMFS to track takes (including extrapolated takes) and reinitiate consultation in a timely manner, if necessary. Monthly reports will be submitted by email to akr.section7@noaa.gov.

The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by the end of business hours on the tenth day of the month following the end of the reporting period (e.g., the monthly report covering September 1–30, 2023, would be submitted to the NMFS by close of business on October 10, 2023).

6.4 Final Report

The contractor will submit a draft final report by email to akr.section7@noaa.gov no later than 90 days following the end of construction activities. The contractor will provide a final report within 30 days following resolution of NMFS's comments on the draft report. If no comments are received from the agency within 30 days, the draft final report will be considered the final report.

The final reports will contain, at minimum, the following information:

- A summary of construction activities, including start and end dates.
- A description of any deviation from the initially proposed pile numbers, pile types, average driving times, etc.

- A table summarizing all marine mammal sightings during the construction period, including:
    - dates, times, species, numbers, locations, and behaviors of any observed ESA-listed marine mammals, including all observed humpback whales and Steller sea lions;
    - daily average number of individuals of each species (differentiated by month as appropriate) detected within the Level A and Level B zones, and whether estimated as taken, if appropriate; and
    - the number of shut-downs throughout all monitoring activities.
- A brief description of any impediments to obtaining reliable observations during construction period.
- A description of any impediments to complying with these mitigation measures.
- Appendices containing all PSO daily logs and marine mammal sighting forms.

6.5 Reporting Injured or Dead Marine Mammals or Illegal Harassment

If it is clear that project activity has caused the take of a marine mammal in a manner prohibited by the (requested) IHA, such as unauthorized Level A harassment, serious injury, or mortality, the contractor shall immediately cease the specified activities and report the incident to NMFS PR1, NMFS PRD, and the NMFS statewide 24-hour Stranding Hotline (877) 925-7773.

If a sea otter, report to the USFWS Marine Mammal Management Office at (800) 362–5148, or the Alaska SeaLife Center in Seward (888) 774–7325, or both. The report must include the following:

- Time and date of the incident
- Description of the incident
- Environmental conditions (e.g., wind speed and direction, Beaufort Sea state, cloud cover and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and;
- Photographs or video footage of the animal(s) (if available).

Activities will not resume until NMFS or USFWS is able to review the circumstances of the unauthorized take. NMFS or USFWS would work with the contractor to determine what measures are necessary to minimize the likelihood of further unauthorized take and ensure ESA and MMPA compliance. The contractor may not resume their activities until notified by NMFS or USFWS.

In the event that the contractor discovers an injured or dead marine mammal within the action area, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (e.g., in less than a moderate state of decomposition), the contractor will immediately report the incident to the USFWS or NMFS PR1, and the NMFS Alaska Regional Stranding Coordinator or Hotline.

The report must include the same information identified in the paragraph above. Activities may continue while NMFS or USFWS reviews the circumstances of the incident. NMFS or USFWS will

work with the contractor to determine whether additional mitigation measures or modifications to the activities are appropriate.

In the event that the contractor discovers an injured or dead marine mammal and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the contractor must report the incident to the NMFS PR1 and the NMFS Alaska Regional Stranding Coordinator or Hotline within 24 hours of the discovery. If a sea otter, it must be reported to USFWS within 24 hours of the discovery to either the USFWS Marine Mammal Management Office at (800) 362–5148 (business hours), or the Alaska SeaLife Center in Seward (888) 774–7325 (24 hours a day), or both. The contractor will provide photographs, video footage (if available), or other documentation of the stranded animal sighting to NMFS or USFWS.

If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS Office of Law Enforcement at (1-800-853-1964).

Appendix A: List of Species with Ranges in the Project Action Area

Species and their Status Listed by the NMFS Mapper and USFWS IPaC Mapper that May Occur in the Project Vicinity

Species	Status Listing	Jurisdiction	Occurrence	Link to Species Profile
Minke Whale (*Balaenoptera acutorostrata*)	MMPA	NMFS	Rare	https://www.fisheries.noaa.gov/species/minke-whale
Humpback Whale (*Megaptera novaeangliae*)	Hawaii DPS: Not listed Mexico DPS: Threatened	NMFS	Hawaii DPS: Infrequent; Mexico DPS: Rare	https://www.fisheries.noaa.gov/species/humpback-whale
Killer Whale (*Orcinus orca*)	MMPA	NMFS	Infrequent	https://www.fisheries.noaa.gov/species/killer-whale
Dall's Porpoise (*Phocoenoides dalli*)	MMPA	NMFS	Infrequent	https://www.fisheries.noaa.gov/species/dalls-porpoise
Harbor Porpoise (*Phocoena phocoena*)	MMPA	NMFS	Frequent to Infrequent	https://www.fisheries.noaa.gov/species/harbor-porpoise
Pacific White-Sided Dolphin (*Lagenorhynchus obliquidens*)	MMPA	NMFS	Rare	https://www.fisheries.noaa.gov/species/pacific-white-sided-dolphin
Harbor Seal (*Phoca vitulina*)	MMPA	NMFS	Common	https://www.fisheries.noaa.gov/species/harbor-seal
Steller Sea Lion (*Eumetopias jubatus*)	WDPS: ESA Endangered; EDPS: not listed	NMFS	WDPS: rare; EDPS: frequent to common	https://www.fisheries.noaa.gov/species/steller-sea-lion
Northern Sea Otter *(Enhydra lutris kenyoni)*	ESA	USFWS	Rare	https://www.fws.gov/alaska/pages/endangered-species/northern-sea-otter

Appendix B: Construction Activity and Communication Log

Construction Activity and Communication Log

Project:_____ Location: _____ Observer(s): _____ Date:_____

Time	Pile Size	Pile Type	Construction Type	Obs.	Construction Personnel	Communication/Comments

Filling Out Construction Activity and Communication Logs	
Data Columns	**Definition and How to Record**
General Information *(top of form)*	
Project	Time that monitoring by MMOs/PSOs began and ended, without interruption (military time)
Project Name	Lutak Dock Replacement Project
Monitoring Location	See 4MP
Observer	Names of Observers at each location
Date	MM/DD/YYYY
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, type of pile installation technique, pile size, and pile type (permanent or temporary)
Communication	Information communicated between MMOs/PSOs and construction crew

Appendix C: Marine Mammal Sighting Form

MARINE MAMMAL OBSERVATION RECORD

Project Name: ____________________

Monitoring Location: ____________________

Date: ____________________

Time Effort Initiated: ____________________

Time Effort Completed: ____________________

Page ________ of ________

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

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

Marine Mammal Observation Record – Sighting Codes

Behavior Codes

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

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

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

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

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

Event

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

Sighting Cues

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

Marine Mammal Species

Code	Marine Mammal Species
STSL	Steller Sea Lion
HPBK	Humpback Whale
HAPO	Harbor Porpoise
DAPO	Dall's Porpoise
PSWD	Pacific white-sided dolphin
SO	Sea Otter
HSEA	Harbor Seal
MINKE	Minke Whale
ORCA	Killer Whale

Construction Type

Code	Activity Type
OWC	Over-Water Construction
NOWC	No Over-Water Construction
V	Vibratory Hammer
I	Impact Hammer
DR	Drilling
NONE	No Construction

Mitigation Codes

Code	Activity Type
DE	Delay onset of In-Water Work
SD	Shutdown In-Water Work

Weather Conditions

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

Wave Height

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

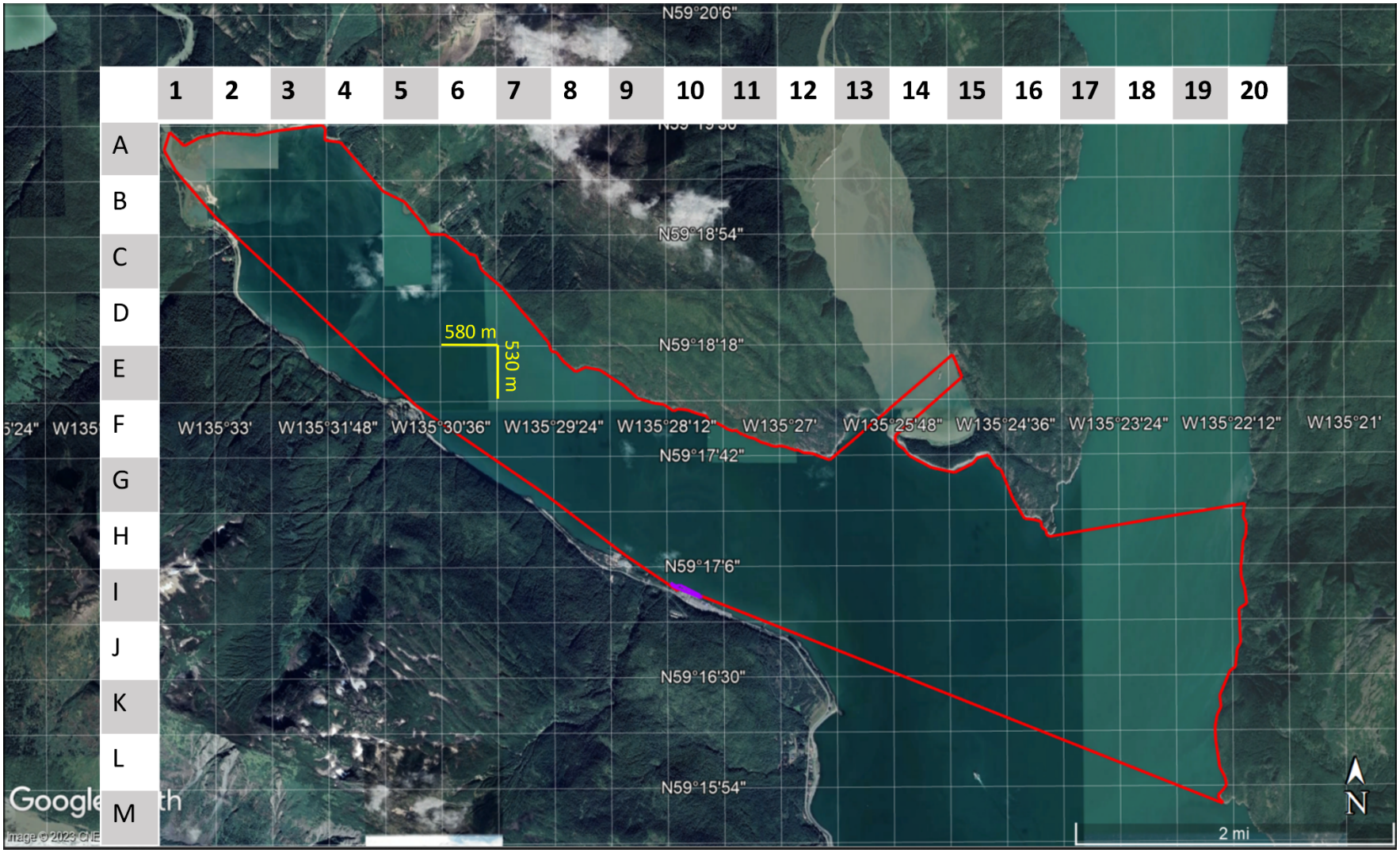
Filling Out Sighting Forms	
Data Columns	**Definition and How to Record Data**
General Information *(Top of Form)*	
Project Name	Lutak Dock Replacement Project
Monitoring Location	See 4MP
Date	MM/DD/YYYY
Time effort initiated and completed	Time started pre-watch and time post-watch ended (military time). If there is more than one monitoring period in a day, start a new form for each period.
Environmental Conditions	
Environmental Conditions	Record at the start of monitoring period, when changes, and at the end of monitoring period.
Visibility	B-bad, P-poor, M-moderate, G-good, and E-excellent
Glare	Amount of water obstructed by glare (0–100%) and direction of glare (from south, north, or another direction)
Weather conditions	Dominant weather conditions: sunny (S), partly cloudy (PC), light rain (LR), steady rain (R), fog (F), overcast (OC), light snow (LS), snow (SN)
Wave Height	Lt-light, Mod-moderate, Hvy-heavy
Wind and Swell direction	From the north (N), northeast (NE), east (E), southeast (SE), south (S), southwest (SW), west (W), northwest (NW)
Beaufort Sea State	Scale 1-12. See BSS sheet.
Sightings	
Event Code	Indicates what events are happening at the time of the sighting, what events may have occurred due to the sighting, and observer rotations.
Time/Duration	Time first sighted and time of last sighting (military time).
Sighting Number	Chronological (1,2,3, etc.) If the same marine mammal is resighted at a distance greater than 25 meters from the original sighting location record as a resight (Ex. 1.1- same marine mammal as sighting 1, but sighted for a second time in different location)
Waypoint (WP)/Grid #/DIR of Travel	Grid number that marine mammal was sighted in and direction of travel. Format should be ***grid map letter-grid*** (Example: If a marine mammal is sighted in grid **2B** on **Grid Map B** this should be denoted by **B-2B**).
Distance from Pile	Distance from pile driving site to the sighted marine mammal.

Observer (Obs.)	Initials of the Observer who sighted the marine mammal or who is coming on shift during a rotation
Sighting Cue	How was the marine mammal sighted
Species	Appropriate species abbreviation from code sheet
Group Size	Record the minimum and maximum number of individuals that were sighted. Then determine and record the best number of individuals.
Behavior	Behaviors observed using appropriate abbreviations from code sheet
Construction Type	Circle construction type that is actively occurring at the time and for the duration of the sighting.
Mitigation Type	Circle mitigation type, if any. Based upon monitoring and shutdown zones does a delay of work (pre-watch and post-watch) or a shutdown (monitoring period) need to occur.
Exposure	If a marine mammal enters its Level A or Level B distance and work is actively occurring it will be an exposure indicate yes (Y). If no work is actively occurring indicate no (N)

Estimating Wind Speed and Sea State with Visual Clues

Beaufort number	Wind Description	Wind Speed	Wave Height	Visual Clues
0	Calm	0 knots	0 feet	Sea is like a mirror. Smoke rises vertically.
1	Light Air	1-3 kts	< 1/2	Ripples with the appearance of scales are formed, but without foam crests. Smoke drifts from funnel.
2	Light breeze	4-6 kts	1/2 ft (max 1)	Small wavelets, still short but more pronounced, crests have glassy appearance and do not break. Wind felt on face. Smoke rises at about 80 degrees.
3	Gentle Breeze	7-10 kts	2 ft (max 3)	Large wavelets, crests begin to break. Foam of glassy appearance. Perhaps scattered white horses (white caps). Wind extends light flag and pennants. Smoke rises at about 70 deg.
4	Moderate Breeze	11-16 kts	3 ft (max 5)	Small waves, becoming longer. Fairly frequent white horses (white caps). Wind raises dust and loose paper on deck. Smoke rises at about 50 deg. No noticeable sound in the rigging. Slack halyards curve and sway. Heavy flag flaps limply.
5	Fresh Breeze	17-21kts	6 ft (max 8)	Moderate waves, taking more pronounced long form. Many white horses (white caps) are formed (chance of some spray). Wind felt strongly on face. Smoke rises at about 30 deg. Slack halyards whip while bending continuously to leeward. Taut halyards maintain slightly bent position. Low whistle in the rigging. Heavy flag doesn't extended but flaps over entire length.
6	Strong Breeze	22-27 kts	9 ft (max 12)	Large waves begin to form. White foam crests are more extensive everywhere (probably some spray). Wind stings face in temperatures below 35 deg F (2C). Slight effort in maintaining balance against wind. Smoke rises at about 15 deg. Both slack and taut halyards whip slightly in bent position. Low moaning, rather than whistle, in the rigging. Heavy flag extends and flaps more vigorous.
7	Near Gale	28-33 kts	13 ft (max 19)	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of wind. Necessary to lean slightly into the wind to maintain balance. Smoke rises at about 5 to 10 deg. Higher pitched moaning and whistling heard from rigging. Halyards still whip slightly. Heavy flag extends fully and flaps only at the end. Oilskins and loose clothing inflate and pull against the body.
8	Gale	34-40 kts	18 ft (max 25)	Moderately high waves of greater length. Edges of crests begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind. Head pushed back by the force of the wind if allowed to relax. Oilskins and loose clothing inflate and pull strongly. Halyards rigidly bent. Loud whistle from rigging. Heavy flag straight out and whipping.
9	Strong Gale	41-47 kts	23 ft (max 32)	High waves. Dense streaks of foam along direction of wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.
10	Storm	48-55 kts	29 ft (max 41)	Very high waves with long overhanging crests. The resulting foam, in great patches is blown in dense streaks along the direction of the wind. On the whole, the sea takes on a whitish appearance. Tumbling of the sea becomes heavy and shock-like. Visibility affected.
11	Violent Storm	56-63 kts	37 ft (max 52)	Exceptionally high waves (small and medium-sized ships might be for time lost to view behind the waves). The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere, the edges of the wave crests are blown into froth. Visibility greatly affected.
12	Hurricane	64+ kts	45+ ft	The air is filled with foam and spray. The sea is completely white with driving spray. Visibility is seriously affected.

Appendix D: Grid Map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