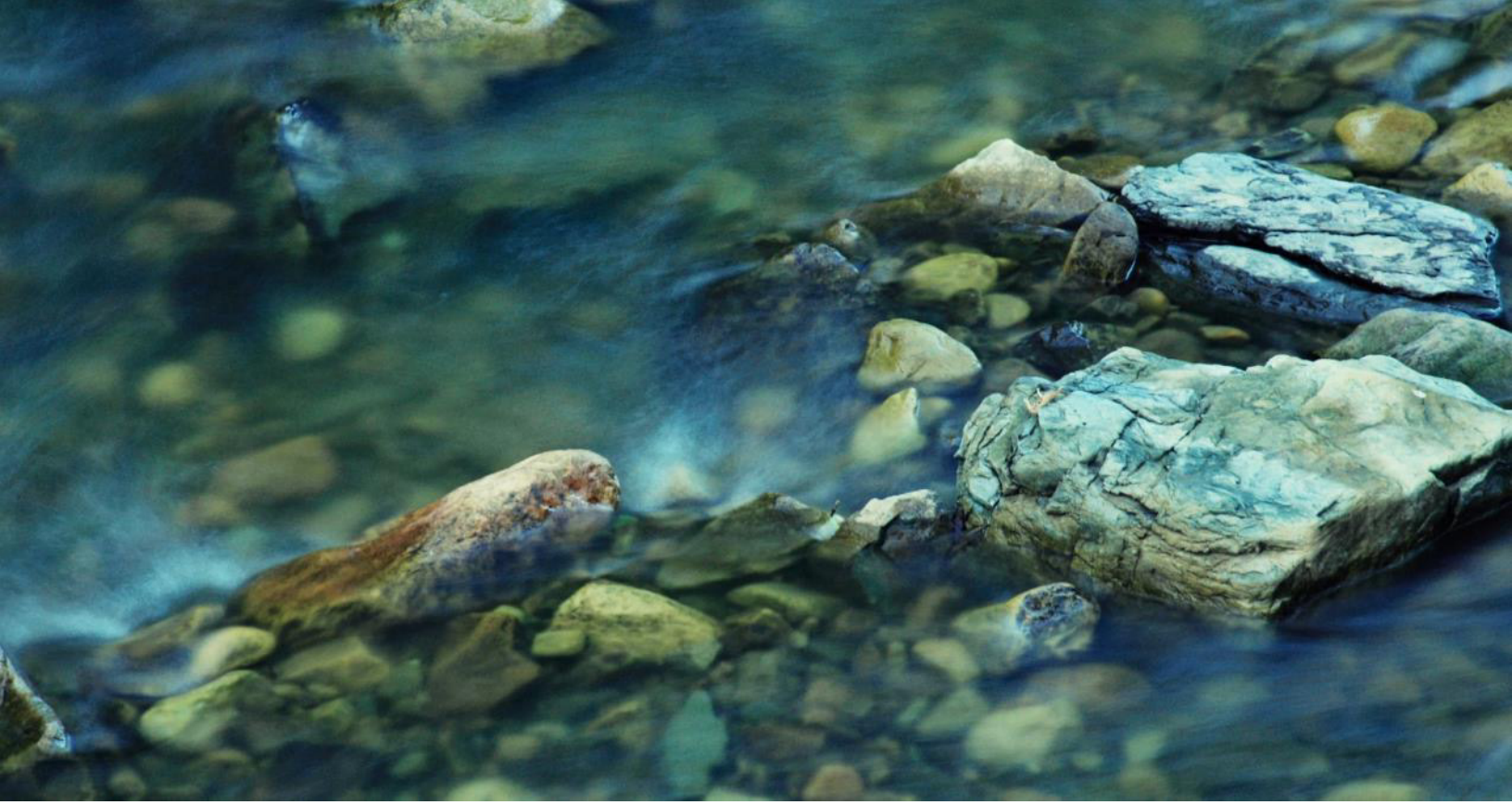

April 2023
Skagway Ore Terminal Redevelopment Project

ANCHOR QEA

Request for an Incidental Harassment Authorization

Prepared for Municipality of Skagway

April 2023
Skagway Ore Terminal Redevelopment Project

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ABBREVIATIONS

AML	Alaska Marine Lines
dB	decibel
DPS	distinct population segment
ESA	Endangered Species Act
HTL	high tide line
Hz	hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
km^2	square kilometer
LEQ	equivalent continuous sound level in decibels
m	meter
MHHW	mean higher high water
MMPA	Marine Mammal Protection Act
MOS	Municipality of Skagway
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PK	peak sound pressure
Port	Port of Skagway
Project	Skagway Ore Terminal Rehabilitation Project
PSO	Protected Species Observers
PTS	permanent threshold shift
RMS	root mean square
RORO	roll-on roll-off
SELcum	cumulative sound exposure level
SEL	sound exposure level
SPL	sound pressure level
ZOI	zone of influence

1 Description of Specified Activity

1.1 Overview

The Municipality of Skagway (MOS) is proposing to redevelop the Skagway Ore Terminal in Skagway, Alaska (Figure 1). The Skagway Ore Terminal Redevelopment Project (Project) will replace existing in-water and overwater structures to serve the multiple needs of the Port of Skagway (Port), including cruise ships, fuel supply barges, cargo barges, and ore export vessels.

The existing infrastructure at the Ore Terminal has been built and modified over the last 50 years by the Port's tenant and subtenants for various operations. Many of the existing structures are at the end of their useful life or do not serve the current and future needs of the Port. The new structures proposed as part of the Project will provide safe mooring and industrial operations with a modern facility. As a result, Skagway's waterfront operational efficiency will be improved, providing better separation between the industrial and tourist parts of the Port and improving cruise ship passenger movements.

The Project includes the following main components (Project drawings are provided in Appendix A):

- Demolition of existing timber, steel, and concrete docks, platforms, walkways, catwalks, and mooring dolphins
- Partial demolition of a concrete dock
- Full demolition of the ore loader and associated platform, fuel header and fuel lines, and overhead electrical lines
- Construction of a new 500- by 50-foot steel cruise ship floating dock, gangway, and guide piles
- Reinforcement of existing dolphins
- Installation of new mooring dolphins, fuel header and fuel line pipe bridge, fuel lines, and access catwalks
- Construction of a new roll-on roll-off (RORO) ramp and access trestle, fuel header dolphin, and underground power lines
- Construction of new marine services platform wharf

This Incidental Harassment Authorization (IHA) application assesses potential and predicted effects on marine mammals from activities associated with the Project, in particular the proposed pile installation and removal activities. The primary focus on in-water pile installation and removal activities is appropriate because these activities have the potential to produce noise in the aquatic marine environment at amplitude and frequencies that could affect marine mammals. Both vibratory (continuous) and impact (impulsive) pile driving are proposed as part of the Project.

Fundamental to this assessment is documenting compliance with the revised acoustic technical guidance issued by the National Oceanic and Atmospheric Administration (NOAA; NOAA 2018). The technical guidance provides acoustic thresholds for onset of permanent threshold shifts (PTS) and temporary threshold shifts in marine mammal hearing for all sound sources (NOAA 2018).

To demonstrate compliance with the NOAA and National Marine Fisheries Service (NMFS) Marine Mammal Protection Act (MMPA) guidelines, this document identifies in-water noise thresholds for each marine mammal species based on the calculated behavioral effects levels and PTS isopleths identified using in-water sound transmission equations and spreadsheets provided by NOAA in the 2018 revised guidance (NOAA 2018). The evaluation used in-water noise values from the most current available Project data for pile-related activities and acoustic monitoring reports. Comparisons between calculated marine mammal noise thresholds and predicted noise values from pile-related activities are also presented in this document and allow for projected effects to be assessed at varying distances from a noise source (i.e., the site of pile-related activities).

To facilitate the development of take estimates and monitoring zones, this document identifies the PTS zone for each hearing group, which is then used as the basis for establishing the proposed Level A Exclusion Zone for monitoring. The noise evaluation identifies Level B (non-injurious) noise thresholds for each hearing group and an associated zone of influence (ZOI) for each hearing group based on the PTS zone and Level B threshold.

Proposed mitigation and conservation strategies are also presented that would function to substantially reduce potential negative effects on marine mammals. Mitigation and minimization measures are discussed in Sections 11, 12, and 13.

1.2 Existing Conditions

The Ore Terminal is located on a 7-acre parcel of waterfront land that includes both the Ore Dock and the associated upland facility (Figure 1). The Ore Terminal facilities are currently owned by the Alaska Industrial Development and Export Authority and used by Pembridge Resources for shipment of ore from the Minto Mine. During the summer season, cruise ships dock at the Ore Terminal when it is not in use for ore loading. Existing in-water and overwater infrastructure includes the following (Appendix A, Sheets 2, 3, and 4):

- A concrete dock and six mooring dolphins extending from the southern tip of the Ore Terminal uplands
- A timber dock adjacent to the Ore Terminal uplands running the length of the harbor, with a timber catwalk in the vicinity of the ore loader
- An ore loader and platform adjacent to the timber dock
- A fuel depot on a timber dock connected to the ore loader platform

Alaska Marine Lines (AML) operates a container facility at a leased cargo dock located at the northeastern end of the terminal; that area consists of a concrete and steel pile dock and associated upland infrastructure. No changes are proposed to the AML container facility or AML dock as part of the Project.

The uplands at the south end of the Ore Dock are used for staging passengers for tour buses after they disembark from cruise ships. Upland areas north of the Ore Dock include a rail track where tourists board a train to the Yukon. The central part of the uplands adjacent to the Ore Dock contains a large warehouse building used to store mined ore. No changes are proposed to these upland features.

1.2.1 Vessel Traffic

The Ore Dock is heavily used by barges, ore vessels, and cruise vessels. The current vessel types, sizes, and numbers are approximately as follows:

- Cargo barges (100 by 300 feet): once a week typical service, plus additional special deliveries
- Fuel delivery barges (80 by 450 feet): once every 3 weeks to deliver several types of fuel for the region
- Bulk ore vessels (Handymax size): approximately four times a year; varies based on mining operations
- Cruise vessels (various sizes, maximum 1,080 feet long): almost daily from April to October each year, bringing in up to 5,000 passengers on the larger vessels

Before the COVID-19 pandemic, Skagway received an average of 742,578 cruise ship passengers per year (since 2000). Between 2013 and 2019, the number of cruise ship calls ranged between 380 and 446. In 2022, Skagway is expected to have 475 cruise ship calls, bringing approximately 1.2 million passengers to the city. The cruise ship and related tourism industry is responsible for 96% of the city's economy. Growth of this economic sector is limited by the current capacity constraints of the cruise ship docks.

1.3 Detailed Project Description

The Project is anticipated to require the following types of heavy construction equipment:

- Two derrick barge cranes for moving large equipment and pile driving
- Vibratory and impact pile drivers
- Three material barges
- Small work boats and work barges with man lifts
- Work trucks, excavator, and upland track-based walker crane
- Dump trucks
- Roller compacters for asphalt work

Most of the construction materials will arrive on a materials barge. Small items may arrive on a truck from the Yukon. Staging will be from barges and upland areas directly behind the existing timber Ore Dock.

1.4 Summary of Project Quantities

The Project includes removal and installation of in-water and overwater structures located below the mean higher high water (MHHW)/high tide line (HTL) of Skagway Harbor, as well as work within the adjacent uplands (work out of water or above MHHW/HTL is only provided as context for the overall project description). Table 1 summarizes Project demolition and installation quantities for in-water piles, overwater structures, and structures and piles located above MHHW/HTL. As shown in the table, the Project will remove 728 piles from the harbor, including 423 creosote-treated timber piles. The Project will add 284 permanent steel piles, for a net reduction of 444 piles in the harbor. The Project will result in a minor increase of pile cover on the harbor bottom.

The Project will benefit the aquatic environment of Skagway Harbor by removing 423 creosote-treated timbers, which will contribute to improving water and habitat quality.

1.5 Structure Demolition and Removal

Demolition plans are provided in Sheets 5 through 8. Demolition quantities and methods are described below.

1.5.1 Pile Removal

The Project will remove 269 steel and 423 creosote-treated timber piles from Skagway Harbor. Sheet 9 provides a section view of a typical existing timber dock and piles to be removed. Piles will be removed using a vibratory hammer or directly pulled using a clamshell bucket, and in accordance with the BMPs described in Section 11 to minimize impacts on aquatic habitats and species. Some steel piles (for example, those that were installed with "fins" to hold them in place) may not be able to be fully removed and will be cut off at or below the mudline. Removed piles will be stockpiled on a barge or on the adjacent uplands for subsequent recycling or disposal. Table 2 lists the size, type, and number of piles to be removed for the Project.

Table 1
Summary of Project Quantities

Project Element	Quantity
In-water pilings (below MHHW/HTL)	
Pilings removed	692 piles
Pilings added (not including temporary piles)	244 piles
Net change	Reduction of 448 piles
Overwater structures (below MHHW/HTL)	
Structures removed	48,482 square feet
Structures added	72,970 square feet
Net change	Net increase of 24,488 square feet overwater cover

Table 2
Pile Removal Quantities

Structure or Pile Type	Quantity
Overwater Coverage	
Overwater Structure Removed	48,482 square feet
Piles Removed	
Timber Piles Removed	423
Steel (10.75-inch)	54
Steel (14-inch)	32
Steel (16-inch)	59
Steel (20-inch)	47
Steel (24-inch)	28
Steel (28-inch)	32
Steel (30-inch)	17

1.5.2 Pile Installation

Steel piles will be installed to support the new dock structures, as part of mooring dolphins, and as fender piles. A total of 244 permanent steel piles will be installed below MHHW/HTL as shown in Table 3. Piles will be driven to the maximum depth feasible using a vibratory pile driver and partially driven and proofed using an impact pile driver to reach required depths. Pile installation will incorporate the BMPs described in Section 11.

In addition, 36 steel piles will be temporarily installed to act as supports or reaction frames to facilitate the installation of permanent piling. These temporary piles are expected to be installed

using vibratory hammers and will be removed by vibratory means by the end of construction. The total number of steel piles to be installed (including temporary piles) is 280.

Table 3
Pile Installation Quantities

Structure or Pile Type	Quantity
Overwater Coverage	
Cruise Dock Float/ Access Area	35,300 square feet
Dolphin Area	1,360 square feet
MSP Area	21,670 square feet
RORO Ramp/Access Area	7,920 square feet
Catwalk Area	3,920 square feet
Fuel Header Area	2,800 square feet
Piles Installed	
Steel (24-inch)	170
Steel (36-inch)	57
Steel (42-inch)	11
Steel (48-inch)	6
Temporary Piles (24-inch or smaller)	36
TOTAL	**280**

Note:
Pile installation above MHHW/HTL is not part of the take request.

1.5.3 Other Structure Installation

Other structures to be installed include steel caps for the new dolphins, the RORO facilities, the marine services platform, the cruise dock float and ramp, and catwalks. The catwalks will be grated to allow light penetration but are included in the overwater cover area as a worst-case estimate for permitting purposes. Overwater construction will be accomplished using land-based and barge-based cranes, excavators, and other equipment. Overwater construction will incorporate the BMPs described in Section 11.

1.6 Source Sound Levels

Source sound levels for each activity are estimated based on the pile size, installation methodology, and substrate conditions. Ideally, source sound levels would be available for the same project area, pile type, and installation method; however, this is often not possible. Therefore, source sound levels are estimated conservatively using data from similar and recent projects. To be conservative and consistent, activities for similar installation types (impact installation of steel piles, vibratory

installation and removal of steel piles, and vibratory removal of timber piles) are estimated to have the same source sound level.

1.6.1 Impact Installation of Steel Piles

For impact installation of 36-, 42-, and 48-inch steel piles, 193 decibels (dB) root mean square (RMS) at 10 meters is used as the estimated sound pressure level (SPL) for calculating isopleths, as suggested by CalTrans (2020) for the impact installation of 36-inch steel piles with a diesel impact hammer (Del Mag D36-32) and the impact installation of 48-inch cast in steel shell CISS piles with a Del Mag D100-13. This is an unattenuated sound level, making this a conservative and appropriate value to use for piles of all three diameters (CalTrans 2020).

For the impact installation of 24-inch steel piles, 189 dB (RMS at 10 meters) is used as the estimated SPL for calculating isopleths, as suggested by CalTrans (2020) for the impact installation of 24-inch steel piles with a diesel impact hammer (Delmag D36-32). This is an unattenuated sound level, making this a conservative and appropriate value to use. While two values were measured in the reference source sound example, 188 dB and 189 dB, we have applied the more conservative value for our calculations (CalTrans 2020). Appendix B contains further details about source sounds.

1.6.2 Vibratory Installation and Removal of Steel Piles Less Than 30 Inches in Diameter

For vibratory installation and removal of steel piles, 159 dB (RMS at 10 meters) is used as the source sound level, as suggested by CalTrans (2020) for the vibratory installation of 36-inch steel piles. No recent site-specific data are available for vibratory installation of 36-inch steel piles. The source level of vibratory pile driving of 36-inch steel piles is conservatively used as the estimate for installation and removal of all steel piles less than or equal to 30 inches in diameter steel including removal of various smaller steel piles and temporary piles associated with this Project. Appendix B contains further details about source sounds.

1.6.3 Vibratory Installation and Removal of 36-, 42-, and 48-Inch Steel Piles

For vibratory installation and removal of 36-, 42-, and 48-inch steel piles, 170 dB (RMS at 10 meters) is used as the source sound level, as suggested by CalTrans (2015) for the vibratory installation of up to 72-inch steel pipe piles. No recent site-specific data are available for vibratory installation of 36-, 42-, and 48-inch steel piles. The source level of vibratory pile driving of 72-inch steel piles is conservatively used as the estimate for installation and removal of 36-, 42-, and 48-inch steel piles. Appendix B contains further details about source sounds.

1.6.4 Vibratory Removal of Timber Piles

For vibratory timber removal, 158dB RMS is used as the estimated source sound level. In 2017, the Seattle Department of Transportation conducted hydroacoustic monitoring during construction of Pier 62 along the waterfront in Seattle, Washington, including removal of 14-inch timber piles. The unweighted SPL ranged from 140 dB to 169 dB with a median for the deeper water removal of 158 dB (RMS at 10 meters; Greenbusch 2018), and this value is conservatively used as the estimate for removal of both the 14- and 11-inch-diameter piles for the Project.

2 Dates, Duration, and Specified Geographic Region

2.1 Dates and Duration

The Project is expected to begin in fall 2023, following receipt of permits, and to be completed in winter 2024. The Project will occur during the winter (November through March) in order to avoid construction during the cruise ship season (April to October). It is possible that the Project could be completed during one winter season; however, it may require two winters to fully complete. For the purpose of producing conservative take estimates, we estimate 219 days of activity in this IHA. This is a conservative estimate based on a very slow rate of pile driving. We will likely accomplish the work in a shorter duration (e.g., within one season). This estimate is the maximum days of activity possible and is unlikely to occur. The anticipated demolition and construction sequence is as follows:

- Demolish existing overwater structures, including the ore loader
- Demolish existing fuel header and fuel lines
- Construct new fuel header and fuel lines
- Install new steel floating dock
- Install steel access ramp to floating dock
- Construct new mooring dolphins and guide piles for floating dock
- Reinforce existing mooring dolphins to remain
- Construct new catwalks to new mooring dolphins
- Construct marine services platform
- Construct RORO access trestle
- Install new RORO ramp

Because of the short construction season and limited winter daylight hours, construction would occur during both daylight hours and for a short time after sunset, if allowed, with construction lighting.

2.2 Specific Geographic Region

The Project is located in Skagway, Alaska, within the Skagway Ore Basin (Figure 1). Skagway is the northernmost city in the Southeast Alaska region, and it provides the nearest access to tidewater for much of the neighboring Yukon Territory, Canada. The MOS is at the southwestern end of the 2.5-mile-long Skagway River valley. The Skagway River empties into Taiya Inlet at the head of Lynn Canal, the northernmost fjord on the Inside Passage of the south coast of Alaska. Pullen Creek empties into the inlet on the southeast side of the valley.

Skagway's Waterfront District Zone, known collectively as Skagway Harbor, includes lands adjacent to Taiya Inlet. The zone includes the following, from northwest to southeast:

- The Ore Dock, upland ore handling facility, fuel infrastructure, heliport, and upland AML container loading facility (the west harbor), all located on MOS property

- The Broadway Dock and the State of Alaska Ferry dock and upland ferry terminal (the central harbor)
- The Small Boat Harbor and Railroad Dock, and upland businesses to the southeast and northeast (the east harbor)

The Ore Terminal is a deep-water port that transitions sharply from a limited nearshore area into deep marine waters of Lynn Canal. The Ore Terminal basin is a 33- to 40-foot-deep (mean lower low water) embayment that extends approximately 1,200 feet from its northern seawall out to a steep (15% to 20%) slope into Lynn Canal. The Ore Terminal basin hosts large vessels (typically cruise ships but also industrial vessels and barges) with drafts of up to 35 feet. Most of the Ore Terminal area within the basin has a nearly uniform depth of approximately -40 feet mean lower low water (Hughes & Associates 2022).

3 Species and Numbers of Marine Mammals

The marine mammal species under NMFS's jurisdiction that have the potential to occur in the construction area include humpback whale (*Megaptera novaeangliae)*, Steller sea lion (*Eumetopias jubatus)*, harbor seal (*Phoca vitulina)*, Dall's porpoise (*Phocoenoides dalli)*, harbor porpoise (*Phocoena phocoena)*, killer whale (*Orcinus orca)*, and minke whale (*Balaenoptera acutorostrata)*. Of these, the humpback whale and Steller sea lion are protected under the Endangered Species Act (ESA). Species status and distribution are described in more detail in Section 4.

The Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) is listed on the Alaska Protected Resources Division Species Distribution Mapper with general distribution in the Taiya Inlet/Lynn Canal that could extend into the Project area (NOAA 2022b). No sightings of the Pacific white-sided dolphin have been documented in Skagway (K. Gross, Never Monday Charters, personal communication as cited in PND Engineers, Inc. and Owl Ridge NRC 2018; R. Ford, Taiya Inlet Watershed Council, personal communication as cited in MOS 2016; Dahlheim et al. 2009).

The gray whale (*Eschrichtius robustus*) is also a species with range that could overlap with the Project area; however, only eight sightings of gray whales have been documented between 1997 and 2016, and none were within the Taiya Inlet/Lynn Canal (J. Neilson, National Park Service, personal communication as cited in MOS 2016).

Sperm whales (*Physeter microcephalus*) have been documented using the Gulf of Alaska, and there was an occurrence of one individual utilizing Lynn Canal in 2014. However, sperm whales primarily prefer deeper water and, thus, are unlikely to occur within the Taiya Inlet (Rice et al. 2021). Due to the low likelihood of these species being present in the Project area, impacts are unlikely. Therefore, incidental take of Pacific white-sided dolphin, gray whale, and sperm whale is not requested, and the species are not further discussed in this application.

Table 4 lists all species with expected potential for occurrence in the Taiya Inlet/Lynn Canal and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA.

The marine mammal abundance estimates presented in Table 4 represent the total number of individuals that make up a given stock, or the total number estimated within a particular study or survey area. The NMFS stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. All seven species that could potentially temporally and spatially co-occur with the activity, to a degree that take is reasonably likely to occur, are included in Table 4 and described in Section 4.

Table 4
Marine Mammal Species Potentially Present in Region of Activity

Species	Stock	ESA/MMPA Status, Strategic (Y/N)[1]	Known Spatially/Temporally Important Areas	Stock Abundance[2] (CV, N_{min}, most recent abundance survey)
Family Balaenidae				
Humpback whale (*Megaptera novaeangliae*)[3]	Central North Pacific Stock (Hawaii DPS)	- / D, Y[4]	More likely to be present during the annual eulachon run in Lynn Canal during April and May	10,103 (N/A, 7,891, 2006)
Minke whale (*Balaenoptera acutorostra*)	Alaska	- /-, N	None noted near the Project site	Unknown
Family Delphinidae				
Killer whale (*Orcinus orca*)	Eastern North Pacific, Northern Residents, Southeast Alaska	- /-, N	None noted near the Project site	302 (N/A, 302, 2018)
	Eastern North Pacific, Alaska Residents	- /-, N	None noted near the Project site	2,347 (N/A, 2.347, 2012)
	West Coast Transients	- /-, N	None noted near the Project site	349 (N/A, 349, 2018)
	Gulf, Aleutian, Bering Transients	- /-, N	None noted near the Project site	587 (N/A, 587, 2012)
Family Phocoenidae				
Harbor porpoise (*Phocoena phocoena*)	Southeast Alaska	- /-. Y	None noted near the Project site	1,057 (N/A, 1,057, 2019)
Dall's porpoise (*Phocoenoides dalli*)	Alaska	- /-, N	None noted near the Project site	13.110 (0.22, 13,100, 2015)
Family Phocidae				
Harbor seal (*Phoco vitulina*)	Alaska – Lynn Canal/Stephens Passage	- /-, N	Taiya River seasonal haulout (3 miles) More likely to be present during the annual eulachon run in Lynn Canal during April and May	13,388 (N/A, 11,867, 2016)

Species	Stock	ESA/MMPA Status, Strategic (Y/N)[1]	Known Spatially/Temporally Important Areas	Stock Abundance[2] (CV, N_{min}, most recent abundance survey)
Family Otariidae				
Steller sea lion (*Eumetopias jubatus*)	Eastern US Stock	- / -, N	Gran Point (24 miles) and Taiya Point (11 miles) haulouts More likely to be present during the annual eulachon run in Lynn Canal during April and May	43,201 (N/A, 43,201, 2017)
	Western US Stock	E/D, Y	Gran Point (24 miles) and Taiya Point (11 miles) haulouts More likely to be present during the annual eulachon run in Lynn Canal during April and May	52,932 (N/A, 52,932, 2016)

Notes:

1. ESA status: Endangered (E), Threatened (T)
   MMPA status: Depleted (D).
   A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds the potential biological removal level or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
   NMFS marine mammal stock assessment reports online at:
   https://media.fisheries.noaa.gov/2022-05/Alaska%20SARS%202020_final.pdf
2. CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable.
3. The newest guidance from NMFS (NOAA 2021; Wade 2021) is used regarding the DPSs that may be present in Alaskan waters. In southeast Alaska, the probability of encountering each of the three stocks that may be present is primarily the non-listed Central North Pacific (Hawaiian DPS, probability of 98%), with 0% probability of encountering the Western North Pacific DPS and 2% of encountering the threatened Eastern North Pacific (Mexico DPS). The population of only the Central North Pacific (Hawaiian DPS) stock is used in this document.
4. ESA and MMPA DPSs for the humpback whale do not align. Therefore, MMPA cannot manage one portion of an MMPA stock as ESA-listed and another portion of a stock as not ESA-listed, until such time as the MMPA stock delineations are reviewed in light of the DPS designations. NMFS continues to use the existing MMPA stock structure and considers this stock to be endangered and depleted for MMPA management purposes

4 Affected Species Status and Distribution

This section describes the status and distribution of the species and stocks of marine mammals likely to be affected by the pile installation and removal during Project construction. There is limited information about the density of each stock in Taiya Inlet. The Marine Species Density Database (U.S. Navy 2021) analyzed literature and research for marine mammal density estimates for the Gulf of Alaska and the Western Behm Canal. These density estimates and sources specific to the Skagway area are described for each species in Section 6.

4.1 Humpback Whale

There are three stocks of humpback whales in the North Pacific considered in Alaska's Marine Mammal Stock Assessment. Individuals from the Western North Pacific DPS are extremely unlikely to be observed in Southeast Alaska (0% probability; NOAA 2021; Wade 2021) and are not discussed further in this assessment. The Central North Pacific stock of humpback whales utilizes Southeast Alaska. This stock is depleted and considered strategic under the MMPA. While 14 distinct population segments (DPSs) of the species are recognized by NMFS (81 Fed. Reg. 62259, 8 September 2016), only one is potentially present in the Project area. ESA's listing final rule on humpback whales (81 FR 62259, September 8, 2016) established 14 DPSs that have different listing statuses (NOAA 2016). Because these DPSs do not overlap exactly with the existing MMPA stocks, and one portion of an MMPA stock cannot be managed as listed and another as unlisted, this stock is considered to be endangered for MMPA management purposes (Muto et al. 2020). The Hawaii DPS (of the Central North Pacific stock) contains whales most likely to utilize the Project area (98% probability; NOAA 2021; Wade 2021) and is not listed under the ESA. The Mexico DPS (of the Eastern North Pacific stock) is listed as threatened and has a low probability of utilizing the Project area (2% probability; NOAA 2021; Wade 2021), so is also not discussed further in this document as there is such a low probability of encountering any of the whales from this stock. No critical habitat has been designated for the humpback whale in the vicinity of the Project.

4.1.1 Distribution

Humpback whales are found in oceans worldwide. Humpback whales are generally most likely to arrive in Southeast Alaska between March and November, although they could be present in the area year-round. Lynn Canal is within the North Pacific feeding and wintering area. Humpback whales have historically been reported by local observers in Taiya Inlet; however, no scientific surveys have documented the species in the area (Dahlheim et al. 2009).

The Central North Pacific stock consists of winter/spring populations off the Hawaiian Islands migrating to Southeast Alaska. The California/Oregon/Washington stock includes winter/spring populations in coastal Central America and coastal Mexico migrating to the coast of California up to British Columbia (Muto et al. 2020). Southeast Alaska primarily provides summer feeding grounds for

humpback whales. NMFS has determined that humpback whales in Southeast Alaska have a 98% probability of being from the Hawaii DPS and a 2% probability of being from the Mexico DPS (NOAA 2021; Wade 2021).

4.1.2 Pertinent Life History and Behavior

Humpback whales have been observed near Skagway and often utilize Lynn Canal. Group sizes are largest in summer and fall, increasing over the course of the year and peaking in late August and September (Dalheim et al. 2009).

The whales annually migrate to the colder waters of Southeast Alaska primarily for feeding. Humpbacks feed primarily on krill (tiny crustaceans), plankton, and small fish. Individuals are usually alone or in small groups, but groups are more often congregated in summer during feeding. Breeding and calving do not occur in Alaska waters. The North Central Pacific stock breeds near Hawaii (Muto et al. 2020).

Humpback whales rely on vocalizations to communicate, forage, and breed. Communication through singing occurs most often in the wintering/breeding areas (Au et al. 2006). Humpbacks are part of the low-frequency cetacean functional hearing group with a generalized hearing range between 7 hertz (Hz) and 35 kilohertz (kHz; NOAA 2018). Loud underwater noises from pile driving have the potential to interfere with humpback whale communication.

4.1.3 Density and Stock Information

No takes of the Central North Pacific stock were reported from 2012 to 2016 (Muto et al. 2018). The Central North Pacific stock is increasing at rates of up to approximately 7% per year (ADFG 2008; Calambokidis et al. 2008). Calambokidis et al. (2008) estimate the population of the California/Oregon/Washington stock to be 1,916 (CV = 0.03). The estimate for the Central North Pacific stock is 10,103 (NOAA 2022a).

Whaling is only permitted for subsistence, yet current human-caused threats still include entanglement in fish gear, ship collisions, disturbance due to shipping and boating, pollutants, exploration for gas and minerals, and habitat loss.

4.2 Steller Sea Lion

The Eastern US stock (Eastern DPS) of Steller sea lion is not listed as a depleted or strategic stock under the MMPA. This stock has steadily been increasing (Muto et al. 2020). The Western US stock (Western DPS) is listed as endangered under the ESA and is considered a strategic stock under the MMPA.

4.2.1 Distribution

The Eastern DPS and Western DPS of Steller sea lions have the potential to occur in the Project area. Gran Point is the closest major haulout and designated critical area, approximately 24 miles away from the Project site (NOAA 2022b). Haulouts are not usually utilized by sea lions for breeding. It is likely that any Steller sea lions in the Project area would be from the Eastern DPS, but it is impossible to distinguish between the two DPSs without tagging or branding.

A seasonal haulout at the southern tip of Taiya Inlet is utilized by sea lions during the eulachon run. Sea lions are most likely to be in Taiya Inlet or Lynn Canal in the fall and winter.

4.2.2 Pertinent Life History and Behavior

The Lutak Inlet eulachon run between April and May correlates with higher sea lion numbers near the Project site, with the Taiya Point haulout (approximately 10 miles away) being a popular land site (NOAA 2022b).

Steller sea lions are colonial breeders. Adult males, known as bulls, establish and defend territories on rookeries to mate with females. Bulls sexually mature between 3 and 8 years of age but typically are not large enough to hold territory successfully until 9 or 10 years old. Mature males may go without eating for 1 to 2 months while aggressively defending their territories. Females, known as cows, typically reproduce for the first time at 4 to 6 years of age, usually giving birth to a single pup each year. At birth, pups are about 45 inches (1.12 meters) in length and weigh 35 to 50 pounds (16 to 22.5 kilograms). Adult females stay with their pups for a few days after birth before beginning a regular routine of alternating foraging trips at sea with nursing their pups on land. Female Steller sea lions use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups. Females usually mate again with males within 2 weeks after giving birth. Males can live to be up to 20 years old, while females can live to be 30.

Steller sea lions are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes such as salmonids, rockfish, forage fish, bivalves, cephalopods, and gastropods. Steller sea lions forage in the nearshore and in pelagic waters. They are capable of traveling long distances in a season and can dive to approximately 1,300 feet (400 meters). Their diet may vary seasonally, depending on the abundance and distribution of prey. They may disperse and range far distances to find prey but are not known to migrate (ADFG 2022a).

Sea lions are part of the otariid pinniped functional hearing group with a generalized hearing range between 60 Hz and 39 kHz (NOAA 2018).

4.2.3 Density and Stock Information

Johnson and Fritz (2014) estimate the population of Eastern DPS of Steller sea lion is 77,149, with the United States portion (excluding Canada) population estimate being 43,201 (NOAA 2022a). Between 1987 and 2017, the Eastern stock increased at approximately 4.25% a year, with the most significant growth occurring in Southeast Alaska and British Columbia where up to 85% of the entire stock count was reported (Johnson and Fritz 2014, Sweeney et al. 2017).

Johnson and Fritz (2014) estimate the population of the Western DPS is 52,932. The Western stock has significantly decreased from approximately 220,000 individuals to less than 50,000 between the late 1970s and 2000 (Loughlin et al. 1984; Loughlin and York 2000; Burkanov and Loughlin 2005). In Alaska, the population is trending positively, at a little over a 2% increase per year between 2003 and 2016 (Sweeny et al. 2016 in NOAA 2022a).

4.3 Minke Whale

The Alaska stock of minke whale is protected under the MMPA but is not listed as a depleted or strategic stock. The minke whale is not listed under the ESA. No critical habitat has been designated for the minke whale in the vicinity of the Project.

4.3.1 Distribution

There is one record of a minke whale near the Project site, where one individual was documented by local observers within Taiya Inlet in 2015. Due to the low occurrence rate, it is not anticipated that minke whales will be exposed to noise resulting from Project activities.

4.3.2 Pertinent Life History and Behavior

Information is not available for the seasonality or likelihood of minke whales occurring in the vicinity of the Project site due to the low number of sightings (Dalheim et al. 2009). The Alaska stock is considered migratory.

Minke whales prefer temperate to boreal waters but are also found in tropical and subtropical regions; they can be found in both coastal/inshore and oceanic/offshore areas. They feed most often in cooler waters at higher latitudes (NOAA 2019). Minke whale breeding areas near Alaska are not known. Minke whales are part of the low-frequency cetacean functional hearing group with a generalized hearing range between 7 Hz and 35 kHz (NOAA 2018).

4.3.3 Density and Stock Information

The stock structure of the species is uncertain in the eastern North Pacific, but minke whales are common in Alaskan waters (Muto et al. 2018). Due to uncertainty, current abundance estimates are not available for the Alaska stock; however, the population as a whole is considered stable (NOAA

2022a). Although portions of the Alaska stock of minke whale have been surveyed, results have not been corrected for missed animals and do not represent the entire range.

4.4 Killer Whale

Killer whale stocks with the potential to utilize the Project area include the Alaska Residents; Northern Residents; Gulf of Alaska, Aleutian Islands, and Bering Sea Transients; and West Coast Transients. These stocks are protected under the MMPA but are not listed as a depleted or strategic stock and are not listed under the ESA. As of 2016, NMFS is reassessing the killer whale stock structure in Alaska due to new preliminary genetic information (Muto et al. 2020). No critical habitat has been designated for the killer whale in the vicinity of the Project.

4.4.1 Distribution

Killer whales are found in every ocean basin, with the highest concentrations in cold temperate waters. Surveys conducted between 1997 and 2007 documented killer whales in all major waterways, protected bays, and inlets in Southeast Alaska, including Lynn Canal (Dalheim et al. 2009).

4.4.2 Pertinent Life History and Behavior

Resident whales in Southeast Alaska travel in groups, known as pods, with average sizes ranging from 19 to 32 individuals, while transient whales have smaller pods of about 4 to 6 individuals (Dalheim et al. 2009). Breeding behavior of pods in the North Pacific is variable, but births commonly occur between fall and spring, with a female giving birth to one offspring every 4 to 6 years (ADFG 2022b). Generally, resident whales feed on fish like salmon, herring, and cod, while transients feed on marine mammals. There are no known natural predators of killer whales. Human-caused threats to killer whales in Southeast Alaska include gunshot wounds, pollution, and vessel strikes (Muto et al. 2020). Shooting at killer whales is illegal (ADFG 2022b).

In surveys conducted between 1997 and 2007, transient stocks were most abundant in summer while resident stocks were encountered at fairly even rates in spring, summer, and fall (Dalheim et al. 2009).

Killer whales use underwater sound to communicate while cooperatively foraging and to navigate. Killer whales are part of the mid-frequency cetacean functional hearing group with a generalized hearing range between 150 Hz and 160 kHz (NOAA 2018).

4.4.3 Density and Stock Information

The killer whale stocks present in Southeast Alaska are catalogued using photographic identification. For 2018, the total population size was estimated to range between 302 and 310 individuals (Muto et

al. 2020). This stock has been increasing at an annual rate of approximately 2.2% over the last 40 years (Towers et al. 2015).

The West Coast Transient stock has an estimated 243 individuals. The stock grew dramatically from the mid-1970s to the mid-1990s, coinciding with an increase in harbor seal counts, the primary prey of the population (Fisheries and Oceans Canada 2009). Growth then slowed in mid-1990s but has increased in recent years (Towers et al. 2019).

The Eastern North Pacific Alaska Resident stock has a minimum of 2,347 individuals (NOAA 2022a). Population trend data for the Alaska Resident stock are not available, although some surveys show a general increase (Matkin et al. 2003 in NOAA 2022a).

The Eastern North Pacific Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock has a total of 587 individuals (Matkin et al. 2013), and the population is stable (NOAA 2022a).

4.5 Harbor Porpoise

The Southeast Alaska stock of harbor porpoise is protected under the MMPA and is not listed as depleted. Due to high human-caused mortality and serious injury rates, the stock is strategic (Muto et al. 2020). The harbor porpoise is not listed under the ESA. No critical habitat has been designated for the harbor porpoise in the vicinity of the Project.

4.5.1 Distribution

Harbor porpoises are found along the Alaska coast in shallow, coastal temperate and subarctic waters (ADFG 2022c). Observations of the species utilizing Lynn Canal are infrequent, with research by Dalheim et al. (2009, 2015) extending only as far north as Haines. Sightings by charter captains within Taiya Inlet have occurred, but encounters are not common and rarely occur near the Project area (K. Gross, personal communication, as cited in MOS 2016).

4.5.2 Pertinent Life History and Behavior

Harbor porpoises prefer habitat with depths less than 300 feet, but in winter can occasionally be found in deeper waters (ADFG 2022c). Harbor porpoises travel alone or in small groups. The average group size documented in surveys between 1997 and 2007 was 1 to 2, with larger groups observed in fall (Dalheim et al. 2009). The porpoises feed on schooling fishes and squid and octopus (ADFG 2022c).

Harbor porpoises tend to avoid vessels or human activity. Due to the preference for inland waters and nearshore areas, modifications from industrial development and overwater structures negatively impact the amount of available habitat for the species (Muto et al. 2020).

Harbor porpoises are part of the high-frequency cetacean functional hearing group with a generalized hearing range between 275 Hz and 160 kHz (NOAA 2018). The range of best hearing in a male harbor porpoise is between 13 and 140 kHz with maximum sensitivity at 125 kHz (Kastelein et al. 2015).

4.5.3 Density and Stock Information

According to the a 2019 vessel survey the Southeast Alaska stock of harbor porpoise is estimated to be 1,057, this number is not corrected for animals missing from the trackline and is therefore negatively biased (NOAA 2022a). The stock in Southeast Alaska is generally stable in inland waters of the northern region, with more fluctuation documented in the southern region (Muto et al. 2020).

4.6 Dall's Porpoise

The Alaska stock of Dall's porpoise is not listed as a depleted or strategic stock under the MMPA. Dall's porpoise is not listed under the ESA, and there is no critical habitat in the vicinity of the Project.

4.6.1 Distribution

Dall's porpoises are found in deep, cold waters within the North Pacific Ocean. The species utilizes deep passages (like inland passages and sounds) to approach the coast from southern California to the Bering Sea (ADFG 2022d). Dalheim et al. (2009) observed concentrations of Dall's porpoise in Lynn Canal during surveys between 1997 and 2007. Dall's porpoise has not been documented close to Skagway, or within Taiya Inlet in summer or winter (MOS 2016).

4.6.2 Pertinent Life History and Behavior

There may be some seasonal movement of Dall's porpoise, with onshore-offshore movements observed along the West Coast of the continental United States and winter movements associated with ice near Prince William Sound (Muto et al. 2020). The species is more often observed in spring, with numbers dropping significantly in fall (Dalheim et al. 2009). Females usually birth calves during mid-summer (ADFG 2022d).

Group sizes of Dall's porpoise in Southeast Alaska averaged between 3 and 4 individuals during 1997 to 2007 surveys, with sizes being smallest in summer (Dalheim et al. 2009). The species has an affinity for boats and will often swim alongside them or other groups of whales or porpoises (ADFG 2022d).

Dall's porpoises are part of the high-frequency cetacean functional hearing group with a generalized hearing range between 275 Hz and 160 kHz (NOAA 2018).

4.6.3 Density and Stock Information

Based on vessel surveys conducted in the Gulf of Alaska in 2015, the population estimate for the Alaska stock of Dall's porpoise is 13,110 (CV = 0.22; Rone et al. 2017 in NOAA 2021).

4.7 Harbor Seal

The Pacific harbor seal is not currently listed under the ESA. No critical habitat has been designated for this species. Harbor seals in the Lynn Canal/Stephens Passage stock are not considered to be depleted or strategic under the MMPA. In Alaska, harbor seals are a Species of Special Concern, which is any species native to Alaska that has entered a long-term decline in abundance (ADFG 2022e).

4.7.1 Distribution

The range of the Lynn Canal/Stephens Passage stock of harbor seal is from Taiya Inlet south to Stephens Passage, utilizing waterways to the east. There are no long-term haulout sites documented within Taiya Inlet. The closest known haulout is at the mouth of the Taiya River, approximately 3 miles north of the Project site (K. Gross, personal communication, as cited in MOS 2016).

Harbor seals can be observed in the Project area throughout the year, and up to 100 seals could be present in Taiya Inlet during the April to May eulachon run (K. Gross, personal communication, as cited in MOS 2016).

4.7.2 Pertinent Life History and Behavior

Harbor seals use hundreds of sites to rest or haul out along coastal and inland waters, including intertidal sand bars and mudflats in estuaries; intertidal rocks and reefs; sandy, cobble, and rocky beaches; islands; and log booms, docks, and floats in all marine areas of the state (ADFG 2022e). Group sizes typically range from small numbers of animals on some intertidal rocks to several thousand animals found seasonally in coastal estuaries. Harbor seal occurrences in Taiya Inlet are highest during the eulachon run in April and May and rarer during the winter (MOS 2016).

Harbor seals generally give birth from May to July during the summer haulout. No rookeries occur within Taiya Inlet. Harbor seals are part of the phocid pinnipeds functional hearing group with a generalized hearing range between 50 Hz and 86 kHz (NOAA 2018).

4.7.3 Density and Stock Information

Muto et al. (2020) estimates the population abundance of the Lynn Canal/Stephens Passage stock is 13,388 individuals. The current estimate of population trend is -114 seals annually, and the probability of decrease is 0.73 (Muto et al. 2020). The statewide abundance estimate is 243,938, based on survey data collected from 1998 to 2011 (Boveng et al. 2019 in NOAA 2022a).

5 Type of Incidental Taking Authorization Requested

The MMPA defines "harassment" as follows:

> [A]ny act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (50 Code of Federal Regulations, Part 216, Subpart A, Section 216.3 Definitions).

Level A is the more severe form of harassment because it may result in injury or death, whereas Level B harassment causes only disturbance, with no potential for injury.

The 2018 NMFS acoustical guidance, and PTS specifically, identifies the received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute, incidental exposure to all underwater anthropogenic sound sources.

PTS onset acoustic thresholds (Level A harassment) for all sound sources are divided into two broad categories: impulsive and non-impulsive. Acoustic thresholds are also presented as dual metric acoustic thresholds using cumulative sound exposure level (SELcum) and peak sound pressure (PK) metrics for impulsive sounds. As dual metrics, NMFS considers onset of PTS to have occurred when either one of the two metrics is exceeded. NMFS's alternative methods for development of PTS isopleths apply only to acoustic thresholds in the SELcum metric.

Based on the proposed Project details, no component of the action will include work that is expected to exceed the peak SPL PK thresholds for PTS or temporary threshold shift, and no evaluations were required to identify take related to PK thresholds. Therefore, the type of incidental take requested is based on exceedance of the acoustic thresholds in the SELcum metric and the disturbance thresholds identified in Section 6.

5.1 Type of Take Requested

Under Section 101(a)(5)(D) of the MMPA, Anchor QEA requests an IHA for activities beginning as soon as practicable upon receipt of the IHA (expected to be 2023). Level A and Level B incidental take by acoustical harassment are requested for marine mammals, as described in this application, that may occur in the Project impact area during the construction activities below MHHW/HTL. We are only requesting take for activities below MHHW/HTL because vibratory installation and removal and impact installation of pilings in water are the construction activities with the greatest potential for causing take. An IHA is requested because the proposed work will likely take place within one season, with the potential for a smaller amount of work to occur in a second season.

The PTS isopleths were identified for each hearing group for impact and vibratory installation and removal methods that will be used in the Project, as described in Section 1. The PTS isopleth distances (Figures 2 through 6) were calculated using the NMFS acoustic threshold calculator (Appendix B), with inputs based on surrogate noise measurements from other sources and estimating conservative working durations, as described in Section 1. Injury within the PTS isopleth would be consistent with Level A take. Therefore, a Level A Exclusion Zone will be established such that work will stop if animals are present within the Exclusion Zone established for each hearing group based on the PTS isopleth calculated for the proposed pile installation and removal actions. Take requested in this application is primarily Level B acoustical harassment, but some Level A harassment could occur and thus take is also requested as described in Section 6.

5.2 Method of Incidental Taking

The method of incidental take requested is primarily Level B acoustical harassment. It would occur within the 160 dB RMS disturbance threshold during impact pile driving of 36- and 24-inch steel pipe piles; the 120 dB RMS disturbance threshold for vibratory pile driving and removal of 30-, 28-, 24-, 16-, and 11-inch steel pipe piles; and the 120 dB RMS disturbance threshold for vibratory removal of 14-inch timber piles. These thresholds would be met or exceeded within the three ZOIs from pile installation or removal described in Section 1.

Limited Level A take may also occur and is requested for humpback whale, harbor porpoise, Dall's porpoise, harbor seal, and Steller sea lion, as described in Section 6.

5.3 Project Activities Not Considered to Generate Take

5.3.1 Airborne Noise Evaluation

Pile installation and removal activities are not anticipated to generate in-air noise at levels that would injure pinnipeds that spend time on land or make use of haulouts within the vicinity of the Project.

The sound threshold guidance provided by NMFS and summarized in Table 5 is used for estimating exposure behavioral disturbance isopleths.

Table 5
Airborne Behavioral Disturbance Thresholds (dB re: 1 microPascal)

Source	Harbor Seals	Other Pinnipeds	Cetaceans
All sources	90	100	Not established

The practical spreading loss model[1] for airborne noise is used to determine the zones in which pinnipeds have the potential to face behavioral disturbance. No adverse impacts are anticipated for airborne noise for other hearing groups, such as cetaceans. The practical spreading loss model and source sounds for similar impact and vibratory installation activities were used to calculate isopleths for airborne sources, as shown in Table 6.

Table 6
Calculated Isopleths – Airborne Sources

Source	Source Level	Behavioral Disturbance Threshold (m)	
		Harbor Seals	Other Pinnipeds
Vibratory installation and removal (steel and timber)	96.5 dB LEQ at 15 meters[1]	32	10
Impact installation (steel)	101 dB LEQ at 15 meters[2]	53	17

Notes:

1. Laughlin (2010) measured airborne noise from vibratory installation of 30-inch test piles at the Keystone Ferry Terminal in Puget Sound as 96.5 dB LEQ/RMS standardized to 15 meters. This value is used for assessing vibratory installation of steel and timber piles for this Project.
2. Soderberg and Laughlin (2016) measured airborne sound levels during impact driving of 36-inch piles at Colman Dock (Puget Sound) and calculated an unweighted level of 101 dB LEQ/RMS standardized to 15 meters. This value is used for assessing impact installation of steel piles for the Project.

For vibratory installation and/or removal of steel or timber piles, the sound levels are expected to be at or above the threshold for harbor seals within approximately 32 meters of the construction activity. For other pinnipeds, the sound levels are expected to be at or above the threshold within approximately 10 meters of the construction activity. With impact installation of steel piles, the sound levels are expected to be at or above the threshold for harbor seals within approximately 53 meters from the construction activity. For other pinnipeds, the sound levels are expected to be at or above the threshold within approximately 17 meters from the construction activity. It is unlikely that any harbor seals or other pinnipeds will remain out of the water within those thresholds during pile-driving activity and sustain harassment or injury associated with airborne noise. If any do, they will have already been considered a take based on the Level B Harassment Zones and will not need to be counted again as take under an airborne harassment scenario. Therefore, the Project does not request any take for airborne sources of harassment.

Non-acoustic effects to marine mammals from the Project will be negligible. Potential non-acoustic stressors could result from the physical presence of equipment and personnel, and vessel traffic.

[1] Transmission loss = geometric loss coefficient X log (R1/R0), where the geometric loss coefficient is 20, R1 is the range to the target SPL (m), and R0 is the distance from the source of the initial measurement in meters.

Vessel traffic may increase as a result of the Project. During construction, vessel traffic will likely increase and potentially increase the risk for species-vessel interactions. After Project completion, the new structures proposed as part of the Project will provide safe mooring and industrial operations with a modern facility. As a result, Skagway's waterfront operational efficiency will be improved, providing better separation between the industrial and tourist parts of the Port and improving cruise ship passenger movements. The potential short-term and long-term increases in vessel traffic are not expected to result in any vessel strikes or significant increases in noise above baseline and therefore are not considered as part of this application.

6 Take Estimates for Marine Mammals

This section provides an estimate of the number of marine mammals that may be taken by each type of activity identified in Section 5. This application uses species density data from the Stock Assessment Report (U.S. Navy 2021) and sources specific to the Skagway area (described for each species below) to estimate take for marine mammals.

The Marine Species Density Database incorporates analyzed literature and research for marine mammal density estimates per season for the Gulf of Alaska and the Western Behm Canal. The Western Behm Canal is closer to the Project site and geographically more similar (an inlet compared to open ocean); therefore, density estimates for Western Behm Canal are used in this application. Density estimates specific to Taiya Inlet or Lynn Canal are not available for any of the species addressed in this application, and therefore takes must be estimated based on the nearest available and most appropriate density estimates, plus site-specific knowledge and professional judgement. The ZOIs for the Project (Table 7) are based on the overall area of disturbance generated by pile removal and installation given modeled or calculated distances to attenuation below disturbance (Level B) thresholds. Unless otherwise described, incidental take for each activity is estimated by the following equation:

$$\text{Incidental take estimate} = \text{species density} * \text{zone of influence} * \text{days of pile-related activity}$$

This equation accounts for the acoustic thresholds above which NMFS indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment, the area that will be ensonified above these levels in a day, the density of occurrence of marine mammals within the ensonified areas, and the number of days of activity. This, equation, as well as the practical spreading loss model for underwater sounds used to calculate Level B Harassment Zones, are captured in the Take Calculator created by Anchor QEA included in Appendix B. Because little observational data are available for marine mammals in Taiya Inlet and Lynn Canal in the winter, this equation is assumed to be a reasonable extrapolation for estimating takes, which relies on analytical calculation of the likelihood that a species is present (density), in the area (ZOI), on a day activity is occurring in that ZOI. Level A take is estimated based on the likelihood that marine mammals would enter the Level A Exclusion Zone without detection.

There is little information available for estimating potential occurrence of marine mammals in Taiya Inlet in the winter. The best data on marine mammal use of upper Taiya Inlet come from personal communications by K. Gross (Never Monday Charters) and R. Ford (Taiya Inlet Watershed Council), both of whom were interviewed for a previous IHA application in Skagway (MOS 2016).

For each species, the Marine Species Density Database density estimate is listed along with any pertinent local monitoring or occurrence information. The density determination for each species is described in the following sections.

Table 7
Level B Zones of Influence Descriptions and Duration of Activity

Zone of Influence	Activity	Construction Method	ZOI Area (km^2)	Days of Activity in ZOI
1	Installation of 24-inch steel piles	Impact	0.35	38 days
2	Installation of 36-, 42-, and 48-inch steel piles	Impact	1.04	39 days
3	Installation and removal of 10.75- through 30-inch steel piles	Vibratory	9.08	95 days
4	Installation and removal of 36-, 42-, and 48-inch steel piles	Vibratory	20.33	15 days
5	Removal of timber piles	Vibratory	8.06	24 days

Note:
The ZOI listed here is the ensonified area for the Level B Harassment Zone.

6.1 Humpback Whale

Based on Marine Species Density Database estimates for Alaska in the winter, potential take of humpback whales is estimated as shown in Table 8.

Table 8
Take Estimate for Humpback Whale

ZOI	Density	Level B ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.0081	0.35	38 days	0.11	1	1	--	--
2	0.0081	1.04	39 days	0.33	1	1	--	--
3	0.0081	9.08	95 days	6.99	7	0	--	--
4	0.0081	20.33	15 days	2.47	3	0	--	--
5	0.0081	8.06	24 days	1.57	2	0	--	--
Total	--	--	--	14	14	2	10,103	0.16%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on these calculations, total Level B take of humpback whale is estimated to be 14 individuals. Local observations of humpback whales in Taiya Inlet and Lynn Canal are limited. Humpback whales have been observed in Lynn Canal during other times of year, but scientific surveys have not documented humpback whales within Taiya Inlet in the winter (Dahlheim et al. 2009). Some local observations have documented humpback whales near Skagway (K. Gross, personal communication reported in MOS 2016); however, winter observations have not been recorded likely due to limited monitoring and low density. In the absence of site-specific seasonal distribution information, the winter density estimates provided by the Marine Species Density Database are appropriate for estimating Level B take.

Because the Level A thresholds for low-frequency cetaceans are so close to the Project site for three of the five planned activities, there is little likelihood that a humpback whale would enter the Level A ensonified area during vibratory pile driving. For impact installation of steel piles, the Level A threshold extends to 1,246 meters for 24-inch steel pile installation (388 meters outside of the Level B threshold of 858 meters) and 2,346 meters for 36-, 42-, and 48-inch steel pile installation (761 meters outside of the Level B threshold of 1,585 meters; Figures 2 and 3). For this reason, Level A take of two individuals is requested based on the estimation that up to two humpback whales might enter the Level A Exclusion Zones during active Project activities without immediate detection.

In summary, the Project requests Level B take of 14 individuals and Level A take of two individuals. It is expected that of the takes estimated and requested, none of the humpback whales would be from the threatened Mexico DPS because this DPS is expected to make up only 6.1% of humpback whale occurrences in Southeast Alaska (Wade et al. 2016).

6.2 Steller Sea Lion

Based on Marine Species Density Database density estimates for Alaska in the winter, potential take of Steller sea lions is estimated as shown in Table 9. However, based on local observations, the requested Level B take is higher. Marine Species Density Database estimates do not distinguish between stocks; therefore, both stocks are summed.

Table 9
Take Estimate for Steller Sea Lion

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.01229	0.35	38 days	0.16	2	1	--	--
2	0.01229	1.04	39 days	0.50	6	1	--	--
3	0.01229	9.08	95 days	10.60	129	0	--	--
4	0.01229	20.33	15 days	3.75	45	0	--	--
5	0.01229	8.06	24 days	2.38	29	0	--	--
Total	--	--	--	18	211	2	130,081	0.16%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.

b. (take/abundance) x100

Based on the density calculations, total Level B take is estimated to be 18 individuals. However, based on local observation data for Taiya Inlet, the number of Steller sea lions potentially affected by the Project is expected to be greater than 18. Several long-term Steller sea lion haulouts are located in Lynn Canal but there are no documented long-term haulouts in Taiya Inlet. Local boat captains and residents indicate Steller sea lions are common in the Project area during the spring months, particularly during the eulachon run (K. Gross, Never Monday Charters; R. Ford, Taiya Inlet Watershed Council, personal communications reported in MOS 2016). The National Marine Mammal Laboratory database also identifies large numbers of Steller sea lions in the lower reaches of Lynn Canal during the fall and winter (Fritz et al. 2016).

During the spring eulachon run, Taiya Point, just south of the largest ZOI and at the entrance to Taiya Inlet, becomes a seasonal haulout site with up to approximately 40 sea lions using the site. Based on these survey data and local observations, it is expected that the Marine Species Density Database estimated density is lower than what can be expected in the ZOIs for the Project during the winter. We anticipate that one Steller sea lion per day could enter the Level B ZOI (211 days of activity). The level B take for each ZOI is proportional to this total take number. This is consistent with NOAA's estimates of sea lion density in a similar project area in February 2019, as reported in the final Federal Register Notice for a project also located in Skagway (84 Fed. Reg. 4777, February 19, 2019).

Because the Level A thresholds for otariid pinnipeds are so close to the Project site for three of the five planned activities, there is little likelihood that a sea lion would enter the Level A ensonified area during pile driving except for during impact installation of steel piles, when the Level A threshold extends to 48.5.5 meters for 24-inch steel pile installation and 91.4 meters for 36-, 42-, and 48-inch steel pile installation (Figures 2 and 3). In that scenario, it is expected that few if any sea lions would

approach that close to the Project site undetected; however, it is possible and we conservatively estimated that two Level A takes could occur.

In summary, the Project requests Level B take of 211 individuals and Level A take of two individuals. Both the Western US stock and Eastern US stock of Steller sea lions could be subject to Level B or Level A harassment by occurring in the Project area. NOAA's 2019 final Federal Register Notice for issuing the IHA for the Skagway Railroad Dock Project (84 Fed. Reg. 4777, February 19, 2019), in consultation with the Alaska Regional Office, applies a 2% distinction factor to the Western stock based on the percent of branded animals at Gran Point. Therefore, of the 213 total takes requested in this application, approximately one is expected to be from the Western stock.

6.3 Minke Whale

Based on Marine Species Density Database density estimates for Alaska in the winter, potential take of minke whales is estimated as shown in Table 10.

Table 10
Take Estimate for Minke Whale

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.001699	0.35	38 days	0.02	1	1	--	--
2	0.001699	1.04	39 days	0.07	1	1	--	--
3	0.001699	9.08	95 days	1.46	2	0	--	--
4	0.001699	20.33	15 days	0.52	1	0	--	--
5	0.001699	8.06	24 days	0.33	1	0	--	--
Total	--	--	--	3	6	2	unknown	unknown

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on these calculations, total take is estimated to be 3 individuals. Minke whales are rarely observed in the Project area, and scientific surveys have not documented the species within Taiya Inlet (Dahlheim et al. 2009). There was one documented sighting of a minke whale in 2015 (K. Gross, Never Monday Charters, and R. Ford, Taiya Inlet Watershed Council, personal communications reported in MOS 2016). Based on the low density-based take estimates and single historical observation, it is very unlikely but possible that minke whales will be present during Project operations, so 6 Level B takes are estimated.

Level A take is very unlikely due to the extremely low likelihood that a minke whale would enter the Level A Exclusion Zone without detection by observers. However, it is possible, so two Level A take are requested.

In summary, the Project requests Level B take of six minke whales and two Level A take.

6.4 Killer Whale

Based on Marine Species Density Database density estimates for Alaska in the winter, potential take of killer whales is estimated as shown in Table 11. However, based on local observations, the requested Level B take is higher. Marine Species Density Database estimates do not distinguish between stocks; therefore, all stocks are summed.

Table 11
Take Estimate for Killer Whale

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.0041	0.35	38 days	0.05	15	1	--	--
2	0.0041	1.04	39 days	0.17	15	1	--	--
3	0.0041	9.08	95 days	3.54	30	0	--	--
4	0.0041	20.33	15 days	1.25	15	0	--	--
5	0.0041	8.06	24 days	0.79	15	0	--	--
Total	--	--	--	6	90	2	3,585	2.57%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on the density calculations, total Level B take is estimated to be 6 individuals. However, based on local observation data for Taiya Inlet, the number of killer whales potentially affected by the Project is expected to be potentially greater than 6. There are little observational data for killer whales in Taiya Inlet and no recorded winter sightings. Local observations indicate killer whales are observed four to five times per year generally in groups of 15 to 20 in the spring to fall (K. Gross, personal communication reported in MOS 2016). Based on local observations, it is expected that the Marine Species Density Database estimated density might be lower than what should be expected in the ZOIs for the Project, simply due to a lack of observational data in the winter. Because groups of killer whales are observed between four and five times per year and 95 days is approximately 26% of a year, we conservatively estimate that two pods could be observed in ZOI 3, the project's largest ZOI, during activity. . Since there are significantly fewer days of activity and smaller areas for ZOIs 1, 2, 4, and 5, the pod of 15 whales would be less likely to occur during this time, so we conservatively

estimate that one pod will occur in each ZOI during activity, and we are requesting 15 takes for ZOIs 1,2, 4, and 5. Based on the size of the Level A Exclusion Zones for 24 inch and 36-, 42-, and 48-inch steel pile installation, there is a slight possibility for some take in these zones. Thus, we request Level A take of two individuals.

In summary, the Project requests Level B take of 90 individuals and Level A take of two individuals.

6.5 Harbor Porpoise

Based on Marine Species Density Database density estimates for Alaska in the winter, potential take of harbor porpoise is estimated as shown in Table 12. Density estimates for harbor porpoise are available for the Western Behm Canal (winter density of 0.01 animals per square kilometer [km^2]) or Gulf of Alaska for varying depths. Within the 100-meter isobath, densities are estimated to be much higher (0.0473 animals/km^2 in the winter). Because much of the Project area includes shoreline areas of Taiya Inlet, this 100-meter isobath density is more appropriate for estimating density in the Project area than the general Western Behm Canal estimate.

Table 12
Take Estimate for Harbor Porpoise

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.4547	0.35	38 days	0.62	1	2	--	--
2	0.4547	1.04	39 days	1.92	2	3	--	--
3	0.4547	9.08	95 days	40.80	41	0	--	--
4	0.4547	20.33	15 days	14.42	15	0	--	--
5	0.4547	8.06	24 days	9.15	10	0	--	--
Total	--	--	--	67	69	5	1,057	7.0%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on the density calculations, total take is estimated to be 67 individuals. Harbor porpoises are primarily found in coastal waters, and in Southeast Alaska, in waters less than 100 meters (Dalheim et al. 2009). Scientific studies on harbor porpoise abundance have not been conducted in the Project area, but summertime surveys have been conducted farther south in Lynn Canal. Local charter boat captains indicated that harbor porpoises do occur in Taiya Inlet in groups of two to three (K. Gross, personal communication reported in MOS 2016).

Because the Level A thresholds for high-frequency cetaceans are so close to the Project site for three of the five planned activities, there is little likelihood that a harbor porpoises would enter the Level A ensonified area during vibratory pile driving. For impact installation of steel piles, the Level A threshold extends to 1,484 meters for 24-inch steel pile installation and 2,794 meters for 36-, 42-, and 48-inch steel pile installation, which is 626 and 1,209 meters outside of the Level B thresholds, respectively (858 meters and 1,585 meters; Figures 2 and 3). Because the Level A threshold extends beyond the Level B threshold quite significantly for two of the five activities, it is likely that some Level A takes would occur when individuals are not detected before they appear within the Level A Exclusion Zone. Due to this activity, an estimated five Level A takes are anticipated.

In summary, the Project requests Level B take of 69 individuals and Level A take of five individuals.

6.6 Dall's Porpoise

Based on Marine Species Density Database density estimates for Alaska, potential take of Dall's porpoise is estimated as shown in Table 13.

Table 13
Take Estimate for Dall's Porpoise

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	0.121	0.35	38 days	1.61	2	4	--	--
2	0.121	1.04	39 days	4.91	5	6	--	--
3	0.121	9.08	95 days	104.37	105	0	--	--
4	0.121	20.33	15 day	36.89	37	0	--	--
5	0.121	8.06	24 days	23.41	24	0	--	--
Total	--	--	--	172	173	10	13,110	1.40%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on these calculations, total Level B take is estimated to be 172 individuals. Local observations of Dall's porpoises in Taiya Inlet and Lynn Canal are limited. Local observations have not occurred in winter months and are sporadic during other times of year. Density varies between summer, spring, fall, and winter according to the Marine Species Density Database, so even those observations that have been recorded in other times of the year may not be completely accurate. Local observation indicates that three to six Dall's porpoises may be present in Taiya Inlet during the spring to fall; however, the observations are not daily (K. Gross, personal communication reported in MOS 2016).

In the absence of site-specific seasonal distribution information, the winter density estimates provided by the Marine Species Density Database are appropriate for estimating Level B take. Because the Level A thresholds for high-frequency cetaceans are so close to the Project site for three of the five planned activities, there is little likelihood that a Dall's porpoise would enter the Level A ensonified area during vibratory pile driving. For impact installation of steel piles, the Level A threshold extends to 1,484 meters for 24-inch steel pile installation and 2,794 meters for 36-, 42-, and 48-inch steel pile installation, which is 626 and 1,209 meters outside of the Level B thresholds, respectively (858 meters and 1,585 meters; Figures 2 and 3). Because the Level A threshold extends significantly beyond the Level B threshold for two of the five activities, it is likely that some Level A takes would occur when individuals are not detected before they appear within the Level A Exclusion Zone. Due to this activity, an estimated 10 Level A takes are anticipated.

In summary, the Project requests Level B take of 173 individuals and Level A take of 10 individuals.

6.7 Harbor Seal

Based on Marine Species Density Database density estimates for Alaska in the winter, spring, and fall, potential take of harbor seal is estimated as shown in Table 14.

Table 14
Take Estimate for Harbor Seal

ZOI	Estimated Density (per km^2)	ZOI Area (km^2)	Days of Activity	Level B Take Estimate	Level B Take Request[a]	Level A Take Request[a]	Stock Abundance	% of Stock[b]
1	1.73	0.35	38 days	23.01	24	57	--	--
2	1.73	1.04	39 days	70.17	71	146	--	--
3	1.73	9.08	95 days	1,492.30	1,493	0	--	--
4	1.73	20.33	15 days	527.56	528	0	--	--
5	1.73	8.06	24 days	334.65	335	0	--	--
Total	--	--	--	2,448	2.451	203	13,338	19.90%

Notes:

a. Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.
b. (take/abundance) x100

Based on the density calculations, total take is estimated to be 2,649 individuals. No long-term harbor seal haulout sites are documented in Taiya Inlet. Seasonal haulouts have been observed within 6 miles of the Project at Seal Cove at the outlet of the Taiya River (K. Gross and R. Ford, personal communications reported in MOS 2016). Local observers report that resident harbor seals are expected to occur within Taiya Inlet year-round. During the April and May eulachon run, numbers range from approximately 20 to over 100 harbor seals (K. Gross and R. Ford, personal

communications reported in MOS 2016). Based on these survey data and local observations, it is expected that the Marine Species Density Database estimated density is likely somewhat high considering work will occur in winter.

Because the Level A thresholds for phocid pinnipeds are near the Project site for three of the five planned activities, there is little likelihood that a harbor seal would enter the Level A ensonified area during vibratory pile driving. For impact installation of steel piles, the Level A threshold extends to 667 meters for 24-inch steel pile installation and 1,256 meters for 36-, 42-, and 48-inch steel pile installation (Figures 2 and 3). Because the Level A threshold is so close to the Level B threshold distances for both impact pile driving activities it is likely that multiple Level A takes would occur when individuals are not detected before they appear within the Level A Exclusion Zone. It is reasonable to expect that many of the harbor seals that enter the Level B threshold will appear in the Level A Exclusion Zone, which is consistent with these numbers. Due to this activity, an estimated 203 Level A takes are also anticipated.

In summary, the Project requests Level B take of 2.451 individuals and Level A take of 203 individuals.

6.8 Summary of Request for Take

Table 15 shows the summary of take requested for each species and stock based on Project activities.

Table 15
Summary of Requested Takes

Species	Stock	Level A Take	Level B Take	Total Take	Stock Abundance	Take Percent of Total Stock
Humpback whale (*Megaptera novaeangliae*)	Central North Pacific (Hawaii DPS) Stock + California/Washington/ Oregon Stock (Mexico DPS)	2	14	16	10,103	0.16%
Minke whale (*Balaenoptera acutorostrata*)	Alaska	2	6	8	Unknown	Unknown
Killer whale (*Orcinus orca*)	Eastern North Pacific, Northern Residents – Southeast Alaska + Eastern North Pacific, Alaska Residents + West Coast Transients + Gulf, Aleutian, Bering Transients	2	90	92	302 + 2,347 + 349 + 587 = 3,585	2.57%
Harbor porpoise (*Phocoena phocoena*)	Southeast Alaska	5	69	74	1,057	7.0%
Dall's porpoise (*Phocoenoides dalli*)	Alaska	10	173	183	13,110	1.40%
Harbor seal (*Phoco vitulina*)	Alaska – Lynn Canal/Stephens Passage	203	2,451	2,654	13,338	19.9%
Steller sea lion[1] (*Eumetopias jubatus*)	Eastern US Stock + Western US Stock	2	211	213	77,149 + 52,932 = 130,081	0.16%

Note:

1. For Steller sea lion, based on NOAA's 2019 Final IHA for the Railroad Dock Project, which is based on the percent of branded animals at Gran Point and in consultation with the Alaska Regional Office, a 2% distinction factor was used to determine the number of animals potentially from the Western DPS.

7 Anticipated Impact of the Activity

Incidental take estimates are provided in Section 6. The stock take calculations identified in Tables 9 to 15 in Section 6 assume takes of individuals; therefore, the stock take percentage calculations summarized in Table 15 are conservative. There is a general lack of density information for winter abundance in Taiya Inlet; therefore, conservative estimates of presence or density were used for calculating takes for each species. Notably, the Project includes only stationary activities. When resident animals may be present, the estimated take numbers represent instances of take that may occur to an even smaller number of individuals and percent of a stock.

The Project is not anticipated to cause permanent harm or lethal take of any marine mammal species. Behavioral impacts of the activity are not expected to include impacts to important feeding or breeding behaviors because the Project area is typically only sporadically utilized for transit by most marine mammals. If incidental takes occur, they are expected to result in only short-term changes and potential temporary hearing threshold shift. Further, the redevelopment of the Skagway Ore Terminal will not create barriers to entrance or egress from biologically important areas, nor will work occur in a critically important habitat location. Mitigation and monitoring measures described in Sections 11 and 13 will further decrease any adverse impacts. The potential effectiveness of the mitigation measures in reducing the numbers of takes or exposure time is also not quantified in the take estimation process—another reason the estimates should be considered conservative.

Overall, the potential Level A and Level B harassment takes identified in Section 6 are not expected to have any impact on stock recruitment or survival, and therefore would have a negligible impact on the stocks of any of the species evaluated. Because no potential biological removal (i.e., mortality) is anticipated as part of the Project, there is no anticipated effect to any stock's ability to reach or maintain its optimum sustainable population as defined by NMFS in Stock Assessment Reports.

8 Anticipated Impacts on Subsistence Uses

In the Skagway area, sea lions and harbor seals are available for subsistence harvest authorized under the MMPA. The Alaska Department of Fish and Game, Division of Subsistence, and Alaska Native Harbor Seal Commission conduct voluntary household surveys to estimate annual subsistence takes by Alaska Natives of harbor seals and sea lions, reporting take results and traditional ecological knowledge on the species (ADFG 2022f). Sixteen native communities are surveyed through this program. The subsistence areas used by the Hoonah and Angoon communities are in the vicinity of the Project area, but the Project site will not directly overlap these areas.

While harbor seal harvest in Southeast Alaska is more significant at 595 seals taken, only nine sea lions were taken in the region in 2012 (Wolfe et al. 2013). Harbor seal harvest is lowest during the summer and peaks in spring and fall. Similarly, sea lions are more often taken during spring and fall.

The proposed Project may cause short-term disturbance to sea lions and harbor seals, but this disturbance is not expected to be lethal and therefore should not have an adverse impact on subsistence use in the area.

9 Anticipated Impacts on Habitat

The Project could potentially affect habitat and the Skagway Harbor ecosystem via effects to water quality (increases in turbidity levels), prey species distribution, and passage obstructions. However, negative effects would be temporary in nature and would not result in long-term effects to habitat for species protected under the MMPA. There is no ESA critical habitat designated within the Project area.

9.1 Water Quality

The types of water quality effects from the Project include the generation of short-term turbidity or resuspension of sediments during pile removal and pile driving. The U.S. Army Corps of Engineers and Alaska Department of Environmental Conservation will require that water quality standards be met throughout the construction duration; thus, no adverse effects are expected to marine mammals, and only minor short-term disturbance would occur to their prey species, such as salmonids and marine invertebrates. The short-term changes in turbidity will affect only a small proportion of the available habitat in the Taiya Inlet (i.e., within 100 feet of the construction activity).

For reference, water quality monitoring was conducted in Puget Sound, Washington, for the Elliott Bay Seawall Project between 2013 and 2016. Turbidity generated from project activities was observed to disperse up to approximately 50 feet and then quickly dissipated (SDOT 2014, 2015, 2016).

9.2 Effects to Prey Species

It is expected that both marine mammals and their prey will disperse from the Project area due to noise generated by Project activities. Prey species for the various marine mammals discussed in this document include marine invertebrates and fish species. Short-term effects would occur to marine invertebrates during removal of existing piles. This effect is expected to be minor and short-term on the overall population of marine invertebrates in Taiya Inlet because Skagway Harbor is already a busy port. Construction will also have temporary effects on salmonids and other fish species in the Project area due to disturbance, turbidity, noise, and the potential resuspension of contaminants. All in-water work will occur during the winter, when marine resident fish species are only present in limited numbers.

Because the effects are short-term and limited to the extent of underwater noise, it is expected that habitat alterations due to prey distribution will be insignificant.

9.3 Loss or Modification of Habitat

The placement of the floating dock and dolphins and presence of equipment during construction will result in a minor loss of benthic habitat and potentially change underwater features for fish. These changes are insignificant and limited to the area of construction.

Habitat will be temporarily modified in the Project area due to elevated underwater noise levels. However, noise from the Project will not be detectable at the nearest haulouts for sea lions and seals. Pile activity can cause pinnipeds to move out of an ensonified area (Russell et al. 2016), but distribution returns to normal approximately 2 hours after the activity ceases. Therefore, any avoidance of the ensonified Project area is expected to be temporary and will not restrict mammals from accessing prey.

10 Anticipated Effects of Habitat Impacts on Marine Mammals

The proposed Project will not result in a significant permanent loss or modification of habitat for marine mammals or their food sources. The most likely effects on marine mammal habitat for the proposed Project are temporary, short-duration, in-water noise; temporary prey (fish) disturbance; and localized, temporary water quality effects. The direct loss of habitat available to marine mammals during the Project is expected to be minimal because the habitat near the Project area is in a heavily trafficked industrial area.

11 Mitigation Measures to Protect Marine Mammals and Their Habitat

11.1 Timing

Vibratory and impact pile driving and removal will occur only between civil dawn and civil dusk when marine mammal monitors can effectively monitor for the presence of marine mammals. Pile-driving activities will only continue for a maximum of 30 minutes after sunset during evening civil twilight, and only as necessary to secure piles prior to demobilization for the evening. This increases the probability of detecting marine mammals and supports implementation of the Marine Mammal Monitoring Plan.

11.2 Pre-Construction Briefing

MOS will conduct briefings for construction supervisors and crews, the monitoring team, and MOS staff prior to the start of all pile-driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, the Marine Mammal Monitoring Protocol, and operational procedures.

11.3 Soft Start for Impact Driving

Each day at the beginning of impact pile driving, or any time there has been cessation or downtime of 30 minutes or more without pile driving, contractors will initiate soft start for impact hammers by providing an initial set of three strikes from the impact hammer at 40% energy, followed by a 30-second waiting period, then two subsequent three-strike sets. Soft start will 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 30 minutes or longer.

11.4 Shutdown Measures

For in-water heavy machinery activities other than pile driving, if a marine mammal comes within 10 meters, work generating underwater noise will stop and vessels will reduce speed to the minimum level required to maintain steerage and safe working conditions.

The contractor shall implement shutdown measures if the cumulative total of individuals observed within the Level B Harassment Zones for any particular species exceeds the number authorized under the IHA, and if such marine mammals are sighted within the vicinity of the Project area and are approaching the Level B Harassment Zones during in-water construction activities.

If a marine mammal approaches or enters the Level A Exclusion Zone (shutdown zone) during activities or pre-activity monitoring, all pile-driving activities at that location will be halted or delayed, respectively. If pile driving is halted or delayed due to the presence of a marine mammal,

the activity will not resume or commence until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 15 minutes have passed without redetection of the animal.

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 Level B Harassment Zones for the pile size and method used or within the shutdown zones (Table 16), pile driving and removal activities must shut down immediately using delay and shutdown procedures. Activities must not resume until the animal has been confirmed to have left the area or the observation time period indicated in the IHA has elapsed.

A determination that the shutdown zone is clear must be made during a period of good visibility (i.e., the entire shutdown zone and surrounding waters must be visible to the naked eye).

Table 16
Summary of Level A Exclusion Zone Thresholds and Level B Harassment Thresholds

Hearing Group	Level A Exclusion Zone Thresholds (meters)	Level B Harassment Zones (meters)	Pile Activity
Low-frequency cetaceans	1,245.8	857.7	Impact Steel (24-inch)
	2,345.7	1,584.9	Impact Steel (36-, 42-, and 48-inch)
	12.1	3,981.1	Vibratory Steel (<30-inch)
	65.6	21,544.35	Vibratory Steel (36,42, and 48 inch)
	14.7	3,414.55	Vibratory Timber
Mid-frequency cetaceans	44.3	857.7	Impact Steel (24-inch)
	83.4	1,584.9	Impact Steel (36-, 42-, and 48-inch)
	1.1	3,981.1	Vibratory Steel (<30-inch)
	5.8	21,544.35	Vibratory Steel (36,42, and 48 inch)
	1.3	3,414.55	Vibratory Timber
High-frequency cetaceans	1,483.9	857.7	Impact Steel (24-inch)
	2,794.1	1,584.9	Impact Steel (36-, 42-, and 48-inch)
	17.9	3,981.07	Vibratory Steel (<30-inch)
	97.0	21,544.35	Vibratory Steel (36,42, and 48 inch)
	21.7	3,414.55	Vibratory Timber
Phocid pinnipeds	666.7	857.7	Impact Steel (24-inch)
	1,255.3	1,584.9	Impact Steel (36-, 42-, and 48-inch)
	7.4	3,981.07	Vibratory Steel (<30-inch)
	39.9	21,544.35	Vibratory Steel (36,42, and 48 inch)
	8.9	3,414.55	Vibratory Timber
Otariid pinnipeds	48.5	857.7	Impact Steel (24-inch)
	91.4	1,584.9	Impact Steel (36-, 42-, and 48-inch)
	0.5	3,981.07	Vibratory Steel (<30-inch)
	2.8	21,544.35	Vibratory Steel (36,42, and 48 inch)
	0.6	3,414.55	Vibratory Timber

11.5 Level B Harassment Zones

MOS will implement the Level B Harassment Zones described in Table 16.

11.6 Construction Best Management Practices

All Project construction activities will be performed in accordance with the established standards to reduce environmental impacts on all species and habitats. These activities are subject to state and federal permit conditions and use the best guidance available to accomplish the necessary work while avoiding and minimizing environmental effects to the greatest extent possible. The following best management practices will be implemented during construction to avoid or minimize potential impacts to the environment:

- All applicable permits for the Project will be obtained prior to construction. All work will be performed according to the requirements and conditions of these permits.
- The contractor will be responsible for the preparation and implementation of a Spill Prevention, Control, and Countermeasures Plan to be used for the duration of the Project.
- Excess or waste materials will not be disposed of or abandoned waterward of MHHW or allowed to enter waters of the State.
- No petroleum products, chemicals, or other toxic or deleterious materials will be allowed to enter surface waters.
- The contractor will be required to retrieve any floating debris generated during construction, using a skiff and a net. Debris will be disposed of at an appropriate upland facility.
- Demolition and construction materials will not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters.
- All creosote-treated materials will be disposed of in a landfill or recycling facility approved to accept these types of materials.
- During the placement of concrete, the contractor will ensure that no uncured concrete comes into contact with nearby surface waters.
- The contractor will be responsible for the preparation of a Spill, Prevention, Control, and Countermeasure Plan to be used for the duration of the project. The plan will be submitted to the project engineer prior to the commencement of any construction activities. A copy of the plan with any updates will be maintained at the work site by the contractor.
- Construction of the proposed project will comply with water quality regulations required by the Alaska Department of Environmental Conservation.
- Barges will not be allowed to ground out during construction.
- Piles that break or are already broken below the waterline may be removed with a clamshell bucket, direct pull (using a cable), or by cutting the pile 2 feet below the mudline. The contractor will confirm that no piles remain in the project area and no voids or holes from piles are present before beginning installation of new piles. Filling holes or voids with clean

material is not anticipated to be required during this project but will be implemented if determined to be necessary.

11.7 Measures Considered but Not Proposed

Bubble curtains have the potential to decrease the noise generated by impact pile installation by up to 10 dB in good conditions (CalTrans 2020) and are often required as a mitigation measure to limit sound from impact pile driving. Based on knowledge from the contractor, due to the depth of the water column, strong currents, and large tidal exchange present at the Project site, bubble curtains are not proposed for use in this Project because they would not be effective. However, a cushion block may be considered for impact pile driving. Including an ineffective mitigation measure would artificially decrease the estimated noise generated by the Project and potentially increase effects to marine mammals without accounting for those effects in take estimates.

12 Mitigation Measures to Protect Subsistence Uses

Mitigation measures to protect subsistence uses for this Project are not applicable (see Section 8). The proposed activity will take place in Taiya Inlet, and no activities overlap with subsistence hunting areas; therefore, there are no relevant subsistence uses of marine mammals adversely impacted by this action. With no adverse impacts, no mitigation is required.

13 Monitoring and Reporting

13.1 Marine Mammal Monitoring

Marine mammal monitoring will be conducted at all times during in-water pile driving and removal in strategic locations around the area of potential effects. There will be three Protected Species Observers (PSOs) at all times to adequately cover and monitor the exclusion and harassment zones. Monitors will be positioned such that each monitor has a distinct viewshed and the monitors collectively have overlapping viewsheds. In the case where visibility becomes limited, additional land-based monitors and/or boat-based monitors may be deployed. The proposed monitoring locations are:

1. The edge of the Ore Dock
2. The edge of the pier at Burro Creek Lodge; could also be deployed on a boat to cover the southern portion of the zones, will change location as needed.
3. On a boat, to cover northern portion of the zones, will change location as needed.

13.1.1 Exclusion Zone Monitoring

Proposed Level A Exclusion Zone thresholds are provided in Table 16. Each Exclusion Zone threshold and Level B Harassment Zone was determined by using the practical spreading model for the pile types proposed and NOAA's 2018 guidance (NOAA 2018, Appendix B). All thresholds represent radii distances from the point source, pile-related work, and each is specific to marine mammal hearing groups. In addition, the Level A Exclusion Zones and Level B Harassment Zones are specific to the type of pile activity (installation via impact or vibratory hammer, removal via vibratory hammer), and pile type (steel or timber).

Level A Exclusion Zones, which have been established by hearing group per NOAA's 2018 guidance, are intended to provide a physical threshold that, when crossed by a given marine mammal species, will trigger a stop-work order for in-water pile installation or removal (NOAA 2018). In the event that a stop-work order is triggered, the observed marine mammal will be closely monitored while it remains in or near the Exclusion Zone, and only when it moves well outside of the Exclusion Zone or has not been observed for at least 15 minutes will the lead monitor allow work to recommence. It will be up to the best scientific judgement of the monitor(s) observing the marine mammal to determine when it has moved far enough away from the Exclusion Zone.

All marine mammals that are near an applicable Exclusion Zone threshold will be closely monitored. If an individual marine mammal shows signs of distress or unexpected behavior, even while they are well outside of an applicable Exclusion Zone threshold, a stop-work order will be issued and further consultation will be made with NOAA/NMFS.

13.1.2 Stop-Work Order Protocol

When a marine mammal is observed approaching the applicable Level A Exclusion Zones (see Table 16 and Figures 2 through 6), the monitor(s) will immediately notify the construction manager of the direction of travel and distance of the marine mammal relative to the Exclusion Zone. A stop-work order would be immediately issued if a monitor observes a marine mammal clearly crossing an applicable Exclusion Zone, regardless of observed marine mammal behavior. In response, the construction manager will immediately require the operator of the vibratory or impact hammer to stop work.

Following issuance of a stop-work order, the marine mammal will be closely monitored and updates of location and behavior will be provided to the construction manager at appropriate intervals, likely less than 15 minutes apart. The marine mammal will continue to be monitored while it is within the Exclusion Zone until it has clearly moved out of and away from the threshold, has not been observed for at least 15 minutes for pinnipeds or 30 minutes for whales, or when the end of the work day is reached.

Work will resume after the marine mammal monitor(s) has notified the construction manager that the marine mammal has moved outside of, and is headed away from, the Exclusion Zone or has not been observed for at least 15 minutes for pinnipeds or 30 minutes for whales. At times, unanticipated scenarios may be encountered by the marine mammal monitors, who will use their best scientific judgement to make conservative decisions to ensure no marine mammal will be harmed by in-water operation of a vibratory or impact hammer.

13.1.3 Level B Behavioral Harassment Zones

In addition to monitoring the Level A Exclusion Zones described above, PSOs will also monitor the Level B Harassment Zones. These zones vary by activity but are the same for all hearing groups. Table 17 provides a summary of the Level B Harassment Zones for each activity. The Level B Harassment Zone starts at the activity-specific Exclusion Zone for the relevant hearing group and extends in a radial arc out to the distance indicated in the table. The distance to the Level B Harassment Zone stops short of the threshold when it encounters an intervening land mass (Figures 2 through 6).

Table 17
Summary of Level B Harassment Zones

Pile Type and Activity	Pile Driver Type	Distance to Level B Harassment Zone (meters)
Timber pile extraction	Vibratory	3,414.5
Steel pile installation	Impact (24-inch)	857.7
	Impact (36, 42, 48-inch)	1,584.9
	Vibratory (36, 42, 48-inch)	21,544.35
	Vibratory (30-inch or less)	3,981.1

Within this monitoring area, the cumulative daily number of takes will be documented throughout each pile-related work day. All sightings of marine mammals will be documented by the monitors on a marine mammal sighting form such as the example provided in the NOAA guidance, or similarly detailed. A take will be documented for each individual marine mammal no more than once in a 24-hour period. The monitors will keep an accurate take count of marine mammals sighted within their applicable Level B Harassment Zone, document each take on the sighting form, and notify the construction crew and other appropriate staff if any marine mammal has the potential to cross an applicable Exclusion Zone threshold. Once a marine mammal is within the area of potential effects, the observers will track its movements and document its behaviors until it moves well out of the area.

13.1.4 Marine Mammal Monitoring Protocol

Marine mammal monitors would be deployed in strategic locations around the area of potential effects at all times during in-water pile driving and removal (Figure 7). Monitors will be positioned at locations that provide full views of the impact hammering monitoring zone and the Level A Exclusion Zones. The stations will be at the Railroad Dock, Yakutania Point, and Dyea Point. The vibratory monitoring zone will be monitored using observers stationed on boats anchored near the shoreline. A total of up to five monitors will be used at a time depending on the size of the monitoring area. Feedback received from NMFS during the consultation process will be incorporated in the final Marine Mammal Monitoring Protocol developed before project construction.

Marine mammal monitoring will begin at least 30 minutes prior to the start of all pile driving and removal each day and will continue at all times during active pile driving and removal. If necessary due to the presence of a marine mammal within or near the Exclusion Zone at the end of the pile-driving or removal shift, marine mammal monitoring will continue for up to 30 minutes following construction. If visibility precludes monitors from viewing their designated viewsheds (due to fog or poor lighting), then pile-driving activities would not be allowed or alternate methods of monitoring must be employed (i.e., boat-based monitoring). Monitors will be continually updated on pile-related

construction activities in a manner that would allow them to make adjustments to provide accurate and appropriate marine mammal observations.

All monitors will be trained PSOs with good eyesight and identification skills. Monitors will have received NOAA-approved training that covers detection, identification, and distance estimation (i.e., estimating the distance a marine mammal is from an observer) of all marine mammal species potentially found in and around Taiya Inlet. Each monitor must pass an identification test conducted at the training. Each will have the experience and ability to conduct field observations and collect data according to this protocol. They will be experienced with directional orienteering, using binoculars and spotting scopes, efficiently accessing and referencing marine mammal identification materials, understanding safety protocol, and writing field notes and entering data into the field datasheets. Each monitor will be properly equipped with necessary gear during their shift, including binoculars, field guides, compass, cellular phone, and back-up power.

A comprehensive marine mammal monitoring plan and manual will be assembled for the monitoring team prior to the start of in-water work. The manual will contain all relevant permit requirements and will describe the procedures that the Project team will implement to comply with the conditions of applicable permits. The plan and proof of monitor training will be provided to NOAA if requested for review or approval. Additionally, any input received from NMFS during the consultation process or during review of the plan will be incorporated in the final marine mammal monitoring plan.

13.1.5 Marine Mammal Sighting Form

A sighting form or application will capture all necessary details important to marine mammal identification and protection during pile-related activities.

The monitoring form or application will be used to record the following information:

- Background information
  - Date, observer name, and location.
  - Environmental conditions (weather, wind, waves), plus notes on conditions that could confound marine mammal detections and the time and location that they occurred.
- For marine mammal sightings
  - Species observed, number, pod composition, distance to pile-related activities, and behavior of marine mammals throughout duration of sighting.
  - Time of first and last sighting.
  - Discrete behavioral reactions to construction, if apparent.
  - Pile-related activities taking place concurrently with each sighting.
  - Monitor response including whether a stop-work order was issued, why, and for how long, or if a take was recorded.
  - The number of take(s) (by species), their locations, and behavior.

13.2 Acoustic Monitoring

Acoustic monitoring will be conducted during in-water pile installation and removal, for each of the three scenarios (impact installation of steel piles, vibratory installation and removal of steel piles, and vibratory removal of timber piles). Collection of the acoustic data will be accomplished using a minimum of two hydrophones. At least one land-based microphone would also be deployed to record airborne sound levels. For underwater acoustic monitoring, the hydrophones will be placed such that there is a direct line of acoustic transmission through the water column between the impact or vibratory hammer and the hydrophones, without any interposing structures (including other piles) that could impede sound transfer, when possible. All acoustical recordings will be conducted at least 1 meter below the water surface and 1 meter above the sea floor to minimize interference with the surface or sea floor. Background noise recordings (in the absence of pile-related work) will also be made during the study to provide a baseline background noise profile.

All sensors, signal conditioning equipment, and sampling equipment will be calibrated at the start of the monitoring period to National Institute of Standards and Technology standards and will be rechecked at the start of each day.

A stationary two-channel hydrophone recording system will be deployed to record continuous sound associated with pile driving and removal activities during the monitoring period. Key methodological details are as follows:

- Prior to monitoring, water depth measurements will be made to ensure that hydrophones will not drag on the bottom during tidal changes. The hydrophones will be placed at least 1 meter below the surface and 1 meter above the seafloor. The depth with respect to the bottom may vary somewhat due to tidal changes and current effects.
- The hydrophone systems will be deployed at 10 meters and at a further distance from the pile-related noise source.
- The hydrophones, signal conditioning, and recording equipment will be configured to acquire maximum source levels without clipping recorded data.

Post-analysis of underwater sound level signals would include the following:

- Impact Pile Driving
  - Determination of the maximum absolute value of the instantaneous pressure within each strike.
  - RMS value for the period of which 90% of the energy is represented (RMS 90, 5% to 95%) for each absolute peak pile strike.
  - Peak SPL and pulse duration for each pile strike.
  - Mean and standard deviation/error of the RMS 90% for all pile strikes of each pile.
  - Rise time.

  - Number of strikes per pile and per day.
  - Sound exposure level (SEL) of the single pile strike with the absolute PK, mean SEL.
  - Minimum, maximum, mean, and median cumulative SEL (cumulative SEL = single strike SEL + 10*LOG (number of pile strikes)).
  - Frequency spectrum, between 20 Hz and 20 kHz, for up to eight successive strikes with similar sound level.
- Vibratory Pile Driving and Removal
  - RMS values (median, standard deviation/error, minimum, and maximum) for each recorded pile. The 10-second, RMS-averaged values will be used for determining the source value and extent of the 120 dB underwater isopleth.
  - Frequency spectra will be provided for each functional hearing group as outlined in NOAA's 2018 guidance (NOAA 2018).
  - All underwater source levels will be standardized to a reference distance of 10 meters (33 feet).

Post-analysis of airborne noise will be presented in an unweighted format, and will include the following:

- The unweighted RMS values (average, minimum, and maximum) for each recorded pile. The average values will be used for determining the extent of the airborne isopleths relative to species specific criteria.
- Frequency spectra will be provided from 10 Hz to 20 kHz for representative pile-related activity.
- All airborne source levels will be standardized to a reference distance of approximately 15 meters (50 feet).

Acoustic monitoring will be performed using a standardized method that will facilitate comparisons with other studies. In the event that pile-related noise trends toward consistently surpassing calculated levels, NOAA/NMFS will be contacted immediately to revise Exclusion Zones as needed.

13.3 Reporting

MOS will submit written reports detailing the results of marine mammal monitoring and acoustic monitoring. The Marine Mammal Monitoring Report will include a description of the pile driving or removal activities and the monitoring effort. It will also provide total takes, takes by day, stop-work orders for each species, and information on observed behavior. The Acoustic Monitoring Report will provide details on the monitored piles, method of installation, monitoring equipment, and sound levels documented during monitoring.

The Marine Mammal Monitoring Report will be drafted and submitted to NOAA Office of Protected Resources at the end of construction. The report will summarize information presented in the daily

monitoring logs in a manner to effectively convey important marine mammal observations made during the Project. The annual monitoring report will include the following:

- Data and time collected for each distinct marine mammal species observed in the Project area.
- Weather conditions.
- Approximate distance between the marine mammal and the noise source.
- Activity at the construction site when a marine mammal was sighted.
- A summary of take issued per species that year and to date.
- A summary of any stop-work orders given that year including number, species involved, and circumstances.
- Descriptions of marine mammal species observed, overall numbers of individuals observed, frequency of observation, behavior and any behavioral changes, and context of the changes relative to construction activities.
- Other important details that would provide context to the marine mammal observations made that year.

The Acoustic Monitoring Report will provide the results of all acoustic monitoring and would also be drafted and submitted to NOAA/NMFS. This report will include the following:

- Size and type of piles monitored.
- A detailed description of any sound attenuation device used, including design specifications.
- The impact hammer energy rating used to drive the piles, description of the vibratory hammer, and make and model of the hammer(s).
- A description of the sound monitoring equipment.
- The distance between hydrophones and depth of water and the hydrophone locations.
- The depth of the hydrophones.
- The distance from the pile to the water's edge.
- The depth of water in which the pile was driven.
- The depth into the substrate that the pile was driven.
- The physical characteristics of the bottom substrate into which the pile was driven.
- The total number of strikes to drive each pile.
- The results of the hydroacoustic monitoring, including the frequency spectrum, ranges and means for the peak and RMS SPL, and an estimation of the distance at which RMS values reach the relevant marine mammal thresholds and background sound levels. Vibratory driving results would include the maximum and overall average RMS calculated from 10-second RMS values during the drive of the pile.
- A description of any observable marine mammal behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time.

14 Suggested Means of Coordination

MOS proposes to coordinate at the earliest possible time with NOAA/NMFS for direction on how to proceed in the following situations:

- The allowable Level B harassment take is met, and work is not complete.
- The acoustic monitoring data show that noise levels are consistently higher than anticipated.

Monitoring will be conducted to collect information on the presence of marine mammals within the Project area. Data from these monitoring efforts will be shared with NOAA in a final report as described in Section 13 and made available for incorporation into databases or research.

If the Project team becomes aware of other co-occurring or preceding construction projects in Skagway, similar coordination efforts will be made.

15 Conclusion

MOS has described how the proposed Project has the potential to result in Level A and Level B harassment of marine mammals. The Project will implement mitigation measures, including marine mammal and acoustic monitoring, to minimize harassment and avoid unauthorized take. As described in this IHA application, the Project will have negligible effects to stocks of marine mammals protected by the MMPA or their habitats and will result in small numbers of incidental take. Results of marine mammal and acoustic monitoring will further inform understanding of marine mammal behavior in Taiya Inlet and the acoustic behavior of construction-related noise in Skagway Harbor.

16 References

ADFG (Alaska Department of Fish and Game), 2008. "Humpback Whale. Revised and Reprinted 2008." Available at: https://www.adfg.alaska.gov/static/education/wns/humpback_whale.pdf.

ADFG, 2022a. "Steller Sea Lion (Eumetopias jubatus): Species Profile." Accessed: June 28, 2022 Available at: http://www.adfg.alaska.gov/index.cfm?adfg=stellersealion.main.

ADFG, 2022b. "Killer Whale (Orcinus orca): Species Profile." Accessed: June 28, 2022. Available at: https://www.adfg.alaska.gov/index.cfm?adfg=killerwhale.main.

ADFG, 2022c. "Harbor Porpoise (Phocoena phocoena): Species Profile." Accessed: June 28, 2022. Available at: https://www.adfg.alaska.gov/index.cfm?adfg=harborporpoise.main.

ADFG, 2022d. "Dall's Porpoise (Phocoenoides dalli): Species Profile." Accessed: June 28, 2022. Available at: https://www.adfg.alaska.gov/index.cfm?adfg=dallsporpoise.main.

ADFG, 2022e. "Harbor Seal (Phoca vitulina): Species Profile." Accessed: June 28, 2022. Available at: https://www.adfg.alaska.gov/index.cfm?adfg=harborseal.main.

ADFG, 2022f. "Subsistence Research – Subsistence Harvest Monitoring and Traditional Knowledge." Accessed: February 12, 2019. Available at: http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.subsistence_harvest_monitoring.

Au, W., A. Pack, M. Lammers, L. Herman, M. Deakos, and K. Andrews, 2006. "Acoustic properties of humpback whale songs." *The Journal of the Acoustical Society of America* 120(2). August 2006.

Boveng, P.L., J.M. London, J.M. Ver Hoef, J.K. Jansen, and S. Hardy, 2019. "Abundance and Trend of Harbor Seals in Alaska, 2004-2018." Memorandum to the Record. Available from Marine Mammal Laboratory, AFSC, NMFS, 7600 Sand Point Way NE, Seattle, WA 98115.

Burkanov, V., and T.R. Loughlin, 2005. "Distribution and Abundance of Steller Sea Lions on the Asian Coast, 1720's–2005." *Marine Fisheries Review* 67(2):1-62.

Calambokidis, J., E.A. Falcone, T.J. Quinn, A.M. Burdin, P.J. Clapham, J.K.B. Ford, C.M. Gabriele, R. LeDuc, D. Mattila, L. Rojas-Bracho, J.M. Straley, B.L. Taylor, J. Urban, D. Weller, B.H. Witteveen, M. Yamaguchi, A. Bendlin, D. Camacho, K. Flynn, A. Havron, J. Huggins, and N. Maloney, 2008. *SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific*. Final report for Contract AB133F-03-RP-00078. 58 p. Available from Cascadia Research.

CalTrans, 2020. *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. California Department of Transportation, Division of Environmental Analysis. Available at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/hydroacoustic-manual.pdf. June 2020.

Dahlheim, M.E., J.M. Waite, and P.A. White, 2009. "Cetaceans of Southeast Alaska: Distribution and Seasonal Occurrence." Publications, Agencies and Staff of the U.S. Department of Commerce. 157. http://digitalcommons.unl.edu/usdeptcommercepub/157

Dahlheim, M.E., Zerbini, A.N., Waite, J.M., & Kennedy, A.S. 2015. "Temporal changes in abundance of harbor porpoise (Phocoena phocoena) inhabiting the inland waters of Southeast Alaska". Fishery Bulletin, 113(3). https://spo.nmfs.noaa.gov/sites/default/files/dahlheim.pdf

Fisheries and Oceans Canada, 2009. *Recovery Potential Assessment for West Coast Transient killer Whales.* DFO Canadian Science Advisory Secretariat Science Advisory Report 2009.

Fritz, L., K. Sweeney, R. Towell, and T. Gelatt, 2016. "Aerial and Ship-Based Surveys of Steller Sea Lions (*Eumetopias Jubatus*) Conducted in Alaska in June-July 2013 Through 2015, and an Update on the Status and Trend of the Western Distinct Population Segment in Alaska." U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-321, 72 p.

Greenbusch, 2018. *Pier 62 Project – Draft Acoustic Monitoring Season 1 (2017/2018) Report*. Prepared for City of Seattle Department of Transportation. April 9, 2018.

Hughes & Associates, 2022. *Multibeam Bathymetric Survey of Skagway Harbor*. April 6-7, 2022. On file at the Municipality of Skagway.

Johnson, D.S., and L.W. Fritz, 2014. "agTrend: A Bayesian Approach for Estimating Trends of Aggregated Abundance." *Methods in Ecology and Evolution* 5:1110-1115. DOI: dx.doi.org/10.1111/2041-210X.12231.

Kastelein, R.A., J. Schop, L. Hoek, and J. Covi, 2015. "Hearing Thresholds of a Harbor Porpoise (*Phocoena Phocoena*) for Narrow-Band Sweeps." *The Journal of the Acoustical Society of America* 2015 138:4, 2508-2512.

Laughlin, J., 2010. "Memorandum: Airborne Noise Measurements (A-weighted and un-weighted) during Vibratory Pile Installation – Technical Memorandum." Washington State Department of Transportation.

Loughlin, T.R., D.J. Rugh, and C.H. Fiscus, 1984. "Northern Sea Lion Distribution and Abundance: 1956-1980." *Journal of Wildlife Management* 48:729-740.

Loughlin, T.R., and A.E. York, 2000. "An Accounting of the Sources of Steller Sea Lion Mortality." *Marine Fisheries Review* 62(4):40-45.

Matkin, C.O., G. Ellis, L. Barrett-Lennard, H. Yurk, E. Saulitis, D. Scheel, P. Olesiuk, and G. Ylitalo, 2003. *Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords.* Exxon Valdez Oil Spill Restoration Project 030012, Final Report. North Gulf Oceanic Society, 60920 Mary Allen Ave, Homer, AK 99603. 118 p.

Matkin, C. O., G. Ellis, E. Saulitis, D. Herman, R. Andrews, and A. Gaylord, 2013. *Monitoring, Tagging, Feeding Habits, and Restoration of Killer Whales in Prince William Sound/Kenai Fjords 2010-2012*. Exxon Valdez Oil Spill Restoration Project Final Report, EVOS Project #10100742, North Gulf Oceanic Society, 3430 Main Street, Suite B1, Homer, Alaska 99603. 62 p.

MOS (Municipality of Skagway), 2016. *Request for an Incidental Harassment Authorization (IHA), Skagway Gateway Initiative Project, Skagway, Alaska.* Project 19101-00. Prepared for MOS by Hart Crowser Inc. and KPFF Consulting Engineers, Edmonds, Washington 98020, April 12, 2016.

Muto, M.M., V.T. Helker, B.J. Delean, N.C. Young, J.C. Freed, R.P. Angliss, N.A. Friday, P.L. Boveng, J.M. Breiwick, B.M. Brost, M.F. Cameron, P.J. Clapham, J.L. Crance, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, K.T. Goetz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.E.W. Shelden, K.L. Sweeney, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini, 2020. *Alaska Marine Mammal Stock Assessments, 2020.* U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-421.

NOAA, 2016. "Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (Megaptera novaeangliae) and Revision of Species-Wide Listing". Accessed June 28, 2022. Available at: https://www.federalregister.gov/documents/2016/09/08/2016-21276/endangered-and-threatened-species-identification-of-14-distinct-population-segments-of-the-humpback .

NOAA, 2018. 2018 *Revisions: to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts.* U.S. Department of Commerce. NOAA Technical Memorandum NMFS-OPR-59. Available at: https://www.fisheries.noaa.gov/webdam/download/75962998

NOAA, 2019. "Protected Species: Minke Whale (*Balaenoptera acutorostrata*)." Accessed June 28, 2022. Available at: https://www.fisheries.noaa.gov/species/minke-whale.

NOAA, 2021. Occurrence of Endangered Species Act (ESA) Listed Humpback Whales off Alaska. Available at: https://media.fisheries.noaa.gov/2021-12/Guidance-Humpbacks-Alaska.pdf.

NOAA, 2022a. "Alaska Marine Mammal Stock Assessments, 2021." Accessed: October 5, 2022. Available at: https://media.fisheries.noaa.gov/2022-08/NOAA-TM-AFSC-441.pdf

NOAA, 2022b. "Alaska Protected Resources Division Species Distribution Mapper." Alaska Fisheries. Accessed: June 22, 2022. Available at: https://alaskafisheries.noaa.gov/portal/apps/webappviewer/index.html?id=446543503a2e4660b0f5ee55e6407d27.

PND Engineers, Inc. and Owl Ridge NRC, 2018. *Request for an Incidental Harassment Authorization for the Railroad Dock Dolphin Installation, White Pass & Yukon Route*. Submitted to: National Marine Fisheries Services. November 9, 2018.

Rice, A., A. Širović, J.S. Trickey, J. Amanda, R. Debich, S. Gottlieb, S.M. Wiggins, J.A. Hildebrand, and S. Baumann-Pickering, 2021. "Cetacean Occurrence in the Gulf of Alaska from Long-Term Passive Acoustic Monitoring." *Marine Biology* 2021.

Russell, D.J.F., G. Hastie, D. Thompson, V.M. Janik, P. Hammond, L. Scott-Hayward, J. Matthiopoulos, E. Jones, and B. McConnell, 2016. "Avoidance of Windfarms by Harbour Seals Is Limited to Pile Driving Activities." *Journal of Applied Ecology* 2016.

SDOT (Seattle Department of Transportation), 2014. *EBSP Section 401 Water Quality Certification (#9828) First Annual (November 2013 to May 2014) Construction Status Report*. Technical Memorandum from Maureen Meehan to Rebekah Padgett. June 13, 2014.

SDOT, 2015. *EBSP Section 401 Water Quality Certification (#9828) Second Annual (June 2014 to May 2015) Construction Status Report*. Technical Memorandum from Maureen Meehan to Rebekah Padgett. June 15, 2015.

SDOT, 2016. *EBSP Section 401 Water Quality Certification (#9828) Third Annual (June 2015 to May 2016) Construction Status Report*. Technical Memorandum from Maureen Meehan to Rebekah Padgett. July 7, 2016.

Soderberg and Laughlin, 2016. *Underwater Sound Level Report: Colman Dock Test Pile Project 2016. Prepared for WSDOT*. Office of Air, Acoustics, and Energy. June 8, 2016. Shoreline, WA.

Sweeney, K., L. Fritz, R. Towell, and T. Gelatt. 2017. "Results of Steller Sea Lion Surveys in Alaska, June-July 2017." Memorandum to the Record, December 5, 2017. Available from Marine Mammal Laboratory, AFSC, NMFS, 7600 Sand Point Way NE, Seattle, WA 98115.

Towers, J.R., G.M. Ellis, and J.K.B. Ford, 2015. "Photo-Identification Catalogue and Status of the Northern Resident Killer Whale Population in 2014." *Can. Tech. Rep. Fish. Aquat. Sci.* 3139:iv + 75 p.

Towers, J.R., G.J. Sutton, T.J.H. Shaw, M. Malleson, D. Matkin, B. Gisborne, J. Forde, D. Ellifrit, G.M. Ellis, J.K.B. Ford, and T. Doniol-Valcroze, 2019. "Photo-Identification Catalogue, Population Status, and Distribution of Bigg's Killer Whales Known from Coastal Waters of British Columbia, Canada." *Can. Tech. Rep. Fish. Aquat. Sci.* 3311: vi + 299 p

U.S. Navy, 2021. "Mapping Tool for the Navy Marine Species Density Database for U.S. Pacific & Gulf of Alaska". Accessed June 22, 2022. https://seamap.env.duke.edu/models/mapper/PACGOA.

Wade, P.R., 2021. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. International Whaling Commission. SC/68c/IA/03. 32 pp. https://archive.iwc.int/.

Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Falcone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urbán, D. Weller, B.H. Witteveen, and M. Yamaguchi, 2016. "Estimates of Abundance and Migratory Destination for North Pacific Humpback Whales in Both Summer Feeding Areas and Winter Mating and Calving Areas." Submitted to the Scientific Committee of the International Whaling Commission. June 2016. Available at: https://archive.iwc.int/pages/view.php?search=&k=e2a521041f&modal=&display=list&order_by=field3&offset=4123&per_page=240&archive=0&sort=ASC&restypes=&recentdaylimit=&foredit=&ref=19118

Wolfe, R.J., J. Bryant, L. Hutchinson-Scarbrough, M. Kookesh, and L.A. Sill, 2013. *The Subsistence Harvest of Harbor Seals and Sea Lions in Southeast Alaska in 2012*. Technical Paper No. 383. Alaska Department of Fish and Game Division of Subsistence and Alaska Native Harbor Seal Commission. Anchorage, Alaska. July 2013.

Figures

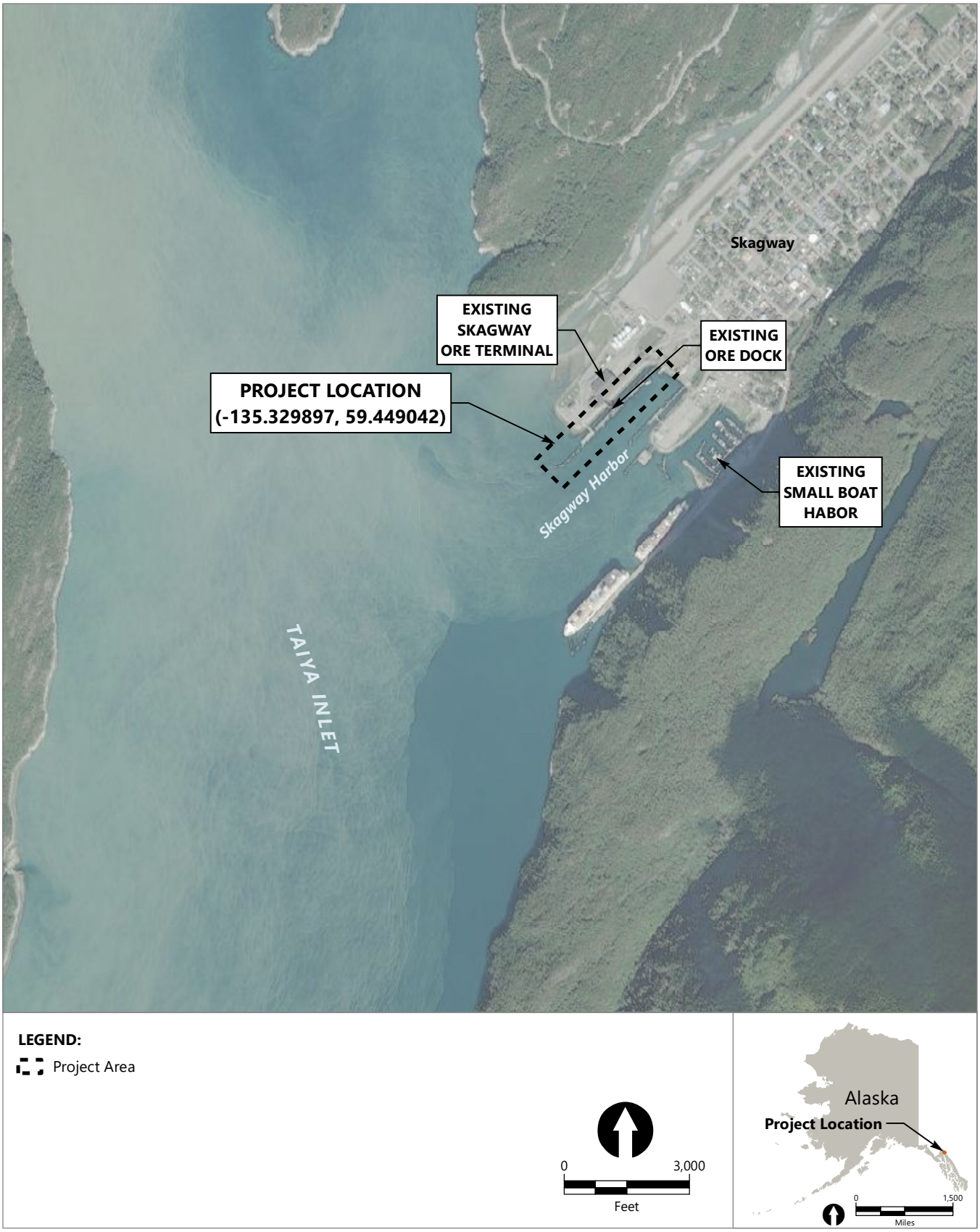

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Figure 1
Vicinity Map

Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

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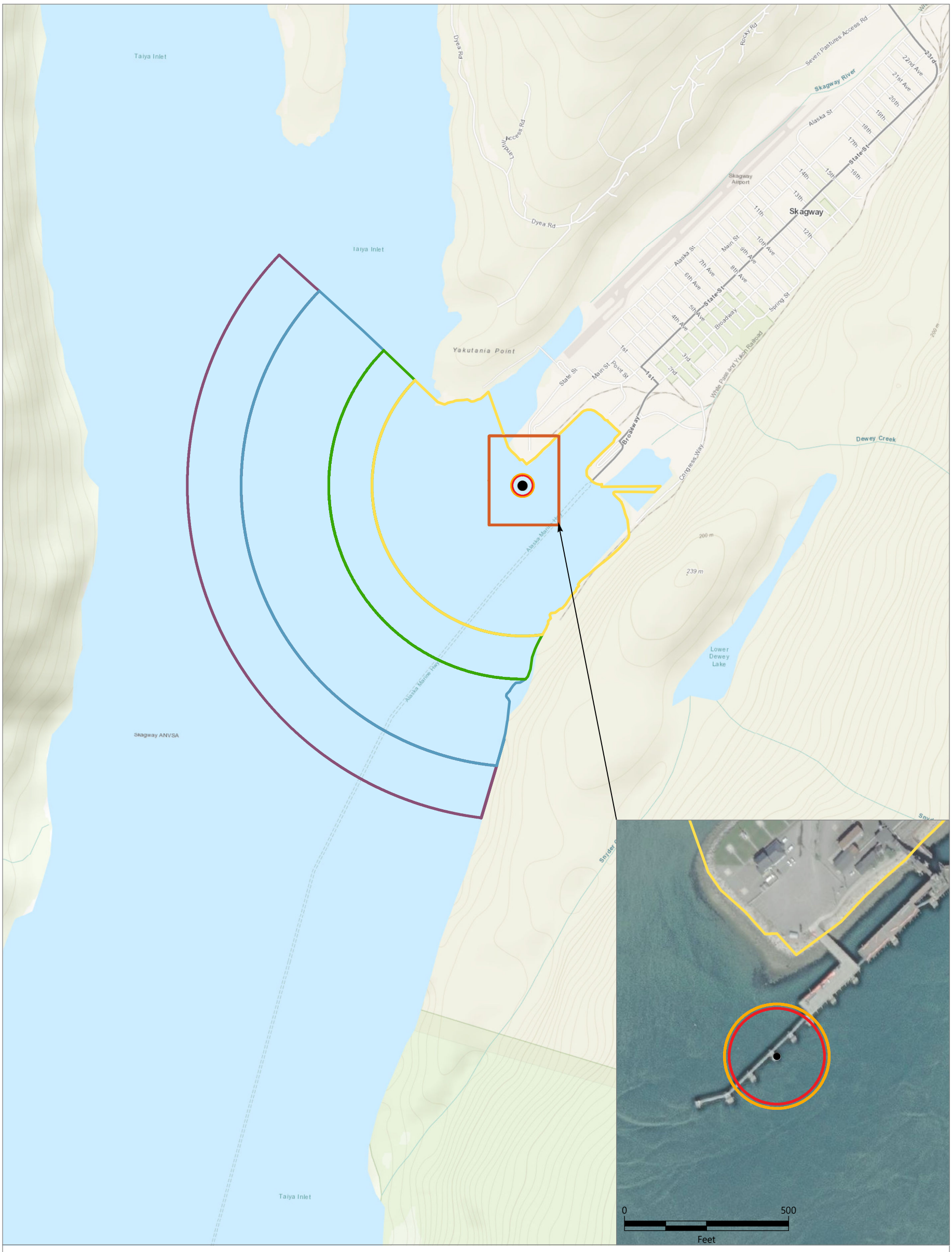

LEGEND:

- Hammer Location

Level A Exclusion Zone

- High-Frequency Cetaceans (4,868.7 feet / 1,483.9 meters)
- Mid-Frequency Cetaceans (145.3 feet / 44.3 meters)
- Low-Frequency Cetaceans (4,087.5 feet / 1,245.8 meters)
- Otariid Pinnipeds (159.1 feet / 48.5 meters)
- Phocid Pinnipeds (2,187.4 feet / 666.7 meters)

Level B Harassment Zone

- All Cetaceans and Pinnipeds (2,814.1 feet / 857.7 meters)

NOTES:

1. Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations.
2. Level B Harassment Zone extends from the end of Level A Exclusion Zone for each hearing group to the dashed line.
3. Basemaps: Esri World Topographic Map and Esri World Imagery

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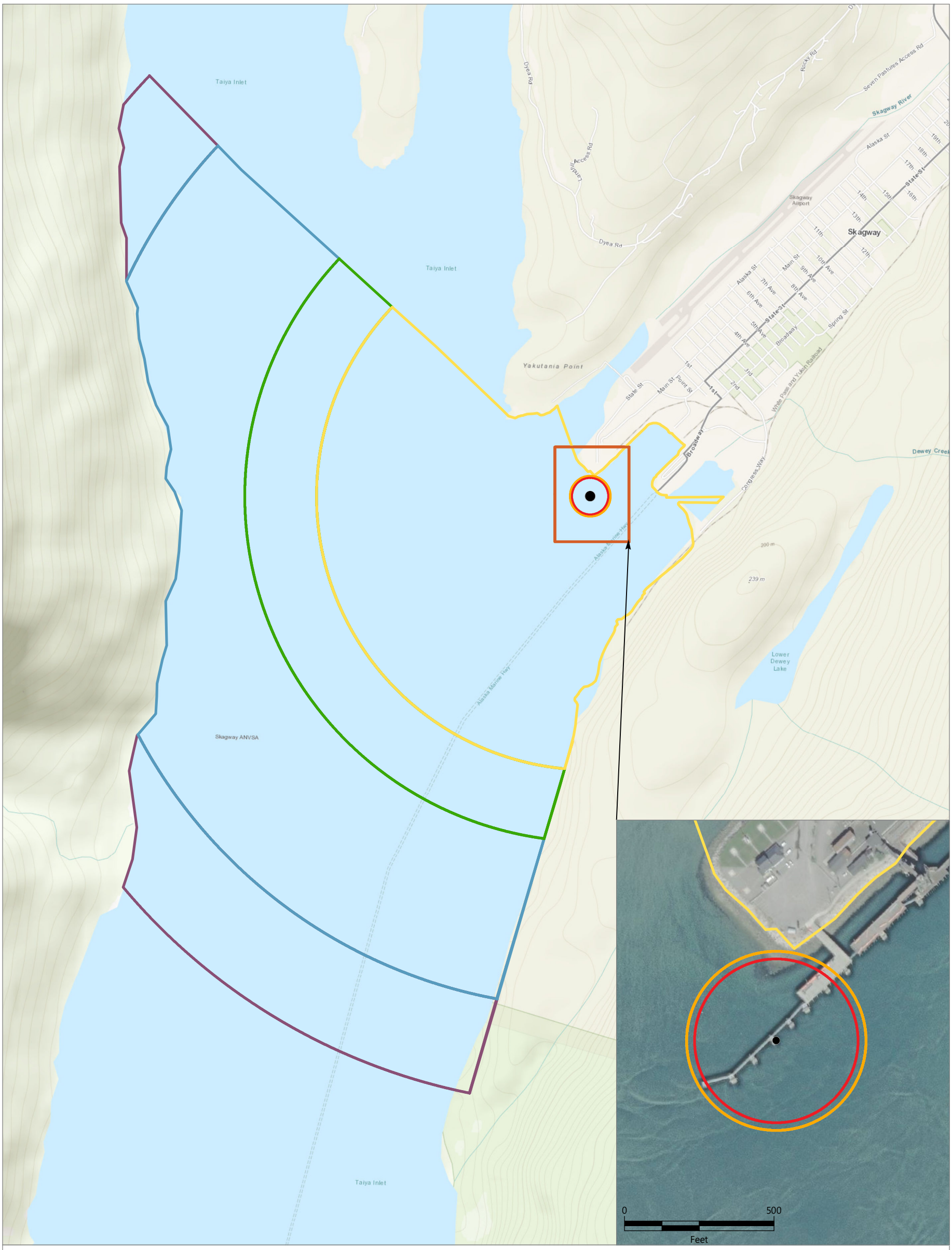
Figure 2
Exclusion and Harassment Zones for 24-Inch Steel Pile Impact Driving
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project



LEGEND:

- Hammer Location

Level A Exclusion Zone

- High-Frequency Cetaceans (9,167.4 feet / 2,794.1 meters)
- Mid-Frequency Cetaceans (273.6 feet / 83.4 meters)
- Low-Frequency Cetaceans (8,256.3 feet / 2,345.7 meters)
- Otariid Pinnipeds (299.9 feet / 91.4 meters)
- Phocid Pinnipeds (4,118.6 feet / 1,255.3 meters)

Level B Harassment Zone

- All Cetaceans and Pinnipeds (5,200.1 feet / 1,584.9 meters)

NOTES:

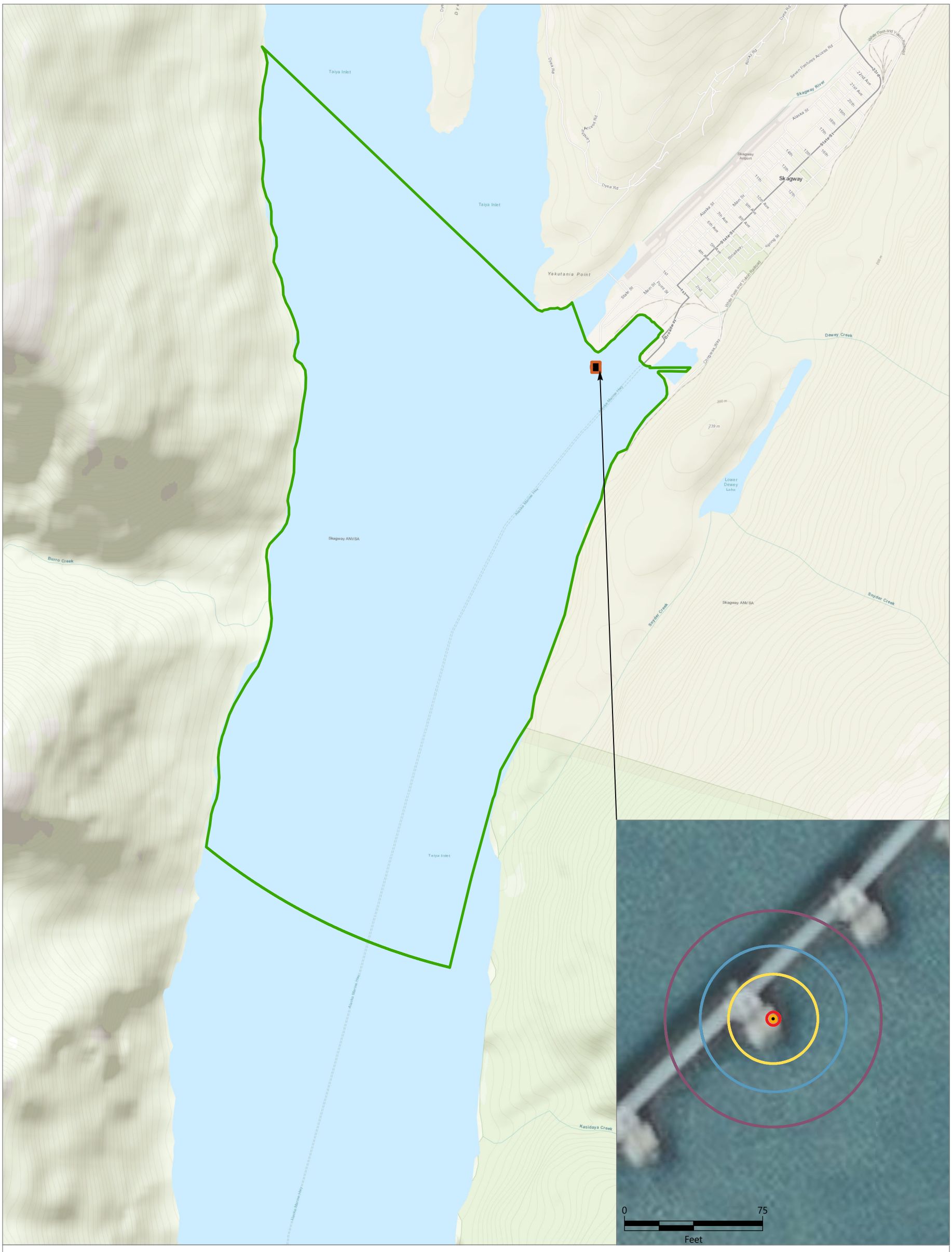
1. Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations.
2. Level B Harassment Zone extends from the end of Level A Exclusion Zone for each hearing group to the dashed line.
3. Basemaps: Esri World Topographic Map and Esri World Imagery

Publish Date: 2023/02/17, 12:41 PM | User: dlockwood
Filepath: Q:\Jobs\KPFF_0159\SkagwayAK_ConceptualRemedialOptions\Maps\IHA\Fig3_IHA_ImpactInstall48inSteelPiles.mxd

ANCHOR QEA

Figure 3
Exclusion and Harassment Zones for 48-Inch Steel Pile Impact Driving
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

DRAFT



LEGEND:

- Hammer Location

Level A Exclusion Zone

- High-Frequency Cetaceans (58.7 feet / 17.9 meters)
- Mid-Frequency Cetaceans (3.6 feet / 1.1 meters)
- Low Frequency Cetaceans (39.7 feet / 12.1 meters)
- Otariid Pinnipeds (1.6 feet / 0.5 meters)
- Phocid Pinnipeds (24.3 feet / 7.4 meters)

Level B Harassment Zone

- All Cetaceans and Pinnipeds (13,061.9 feet / 3,981.1 meters)

NOTES:

1. Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations.
2. Level B Harassment Zone extends from the end of the Level A Exclusion Zone for each hearing group to the dashed line.
3. In instances where exclusion zone threshold is less than 10 meters, stop work will be initiated at the 10m threshold.
4. Basemaps: Esri World Topographic Map and Esri World Imagery

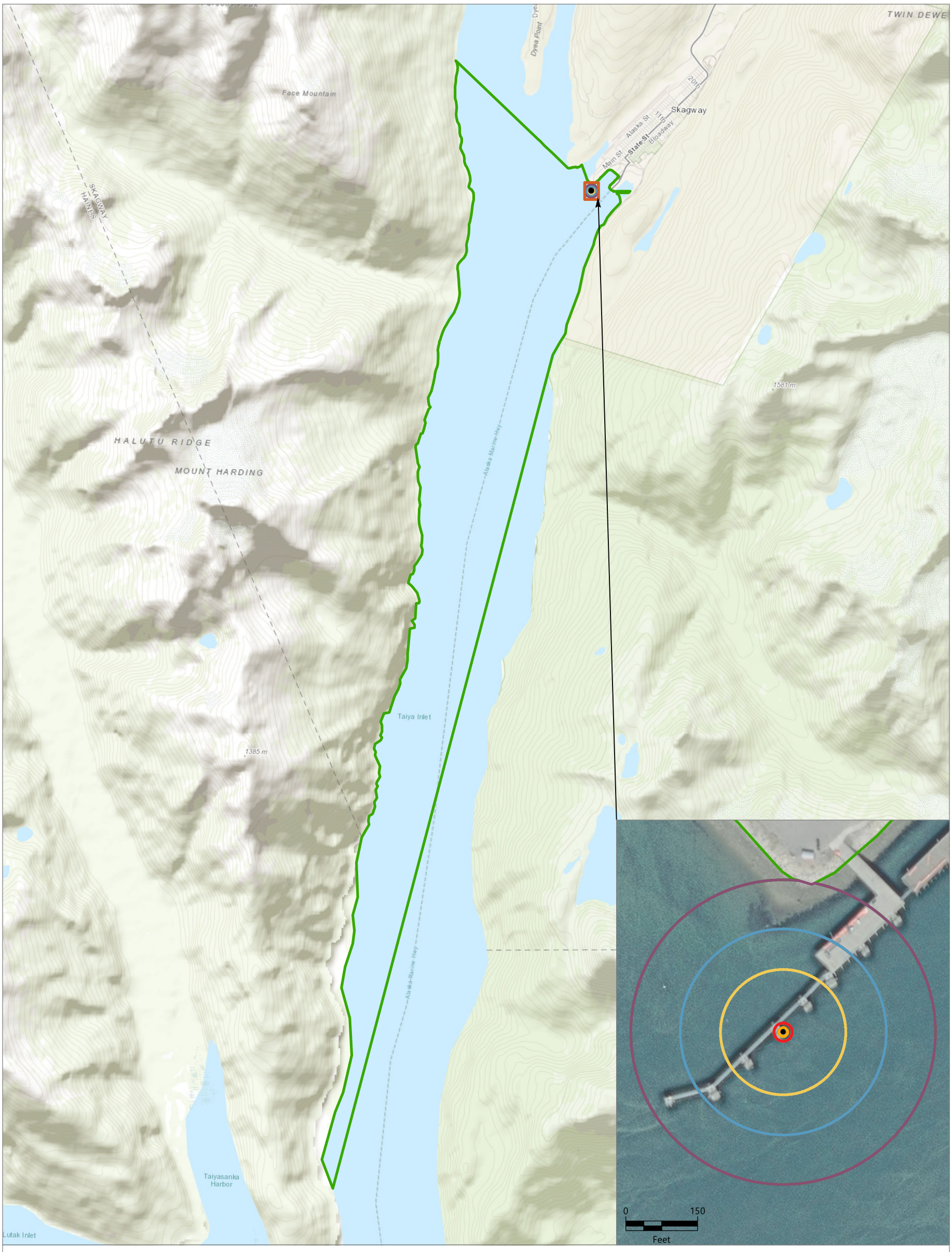
0 0.5
Miles

Publish Date: 2023/02/20, 4:01 PM | User: dlockwood
Filepath: \\orcas\GIS\Jobs\KPFF_0159\SkagwayAK_ConceptualRemedialOptions\Maps\IHA\Fig4_IHA_VibratoryInstRem30inSteelPiles.mxd

ANCHOR QEA

Figure 4
Exclusion and Harassment Zones for Steel Pile Vibratory Installation and Removal of 30-Inch and Smaller Piles
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

DRAFT



LEGEND:

- Hammer Location

Level A Exclusion Zone

- High-Frequency Cetaceans (318.3 feet / 97 meters)
- Mid-Frequency Cetaceans (19 feet / 5.8 meters)
- Low-Frequency Cetaceans (215.2 feet / 65.6 meters)
- Otariid Pinnipeds (9.2 feet / 2.8 meters)
- Phocid Pinnipeds (130.9 feet / 39.9 meters)

Level B Harassment Zone

- All Cetaceans and Pinnipeds (70,687 feet / 21,544.35 meters)

NOTES:

1. Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations.
2. Level B Harassment Zone extends from the end of the Level A Exclusion Zone for each hearing group to the dashed line.
3. In instances where exclusion zone threshold is less than 10 meters, stop work will be initiated at the 10 m threshold.
4. Basemaps: Esri World Topographic Map and Esri World Imagery

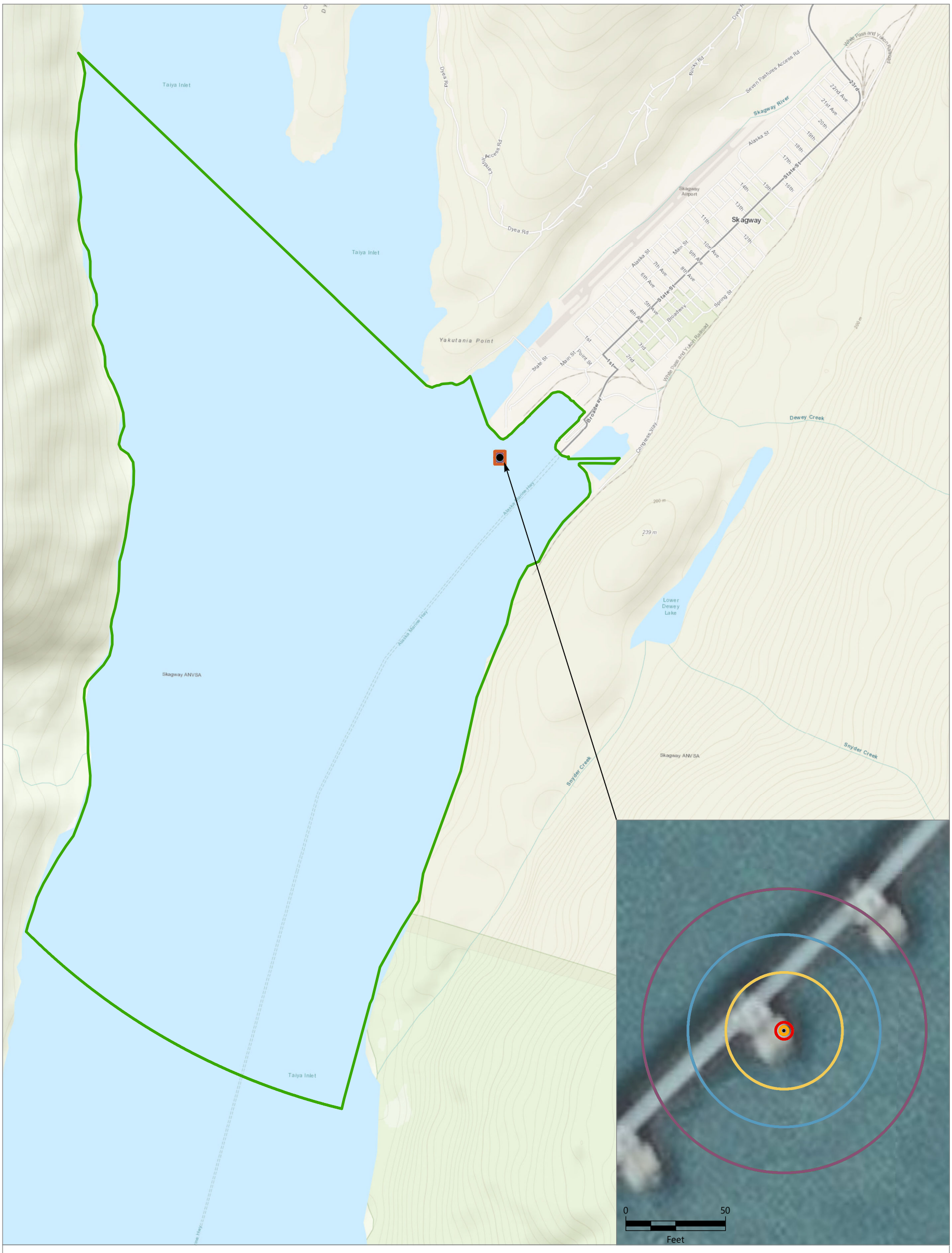
0 1
Mile

Publish Date: 2023/02/17, 11:27 AM | User: dlockwood
Filepath: Q:\Jobs\KPFF_0159\SkagwayAK_ConceptualRemedialOptions\Maps\IHA\Fig5_IHA_ImpactInstRem364248StPiles.mxd

ANCHOR QEA

Figure 5
Exclusion and Harassment Zones for Steel Pile Vibratory Installation and Removal of 36-, 42-, and 48-Inch Piles
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

DRAFT



LEGEND:

- Hammer Location

Level A Exclusion Zone

- High-Frequency Cetaceans (71.2 feet / 21.7 meters)
- Mid-Frequency Cetaceans (4.3 feet / 1.3 meters)
- Low-Frequency Cetaceans (48.2 feet / 14.7 meters)
- Otariid Pinnipeds (2 feet / 0.6 meters)
- Phocid Pinnipeds (29.2 feet / 8.9 meters)

Level B Harassment Zone

- All Cetaceans and Pinnipeds (11,203.1 feet / 3,414.6 meters)

NOTES:

1. Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations.
2. Level B Harassment Zone extends from the end of the Level A Exclusion Zone for each hearing group to the dashed line.
3. In instances where exclusion zone threshold is less than 10 meters, stop work will be initiated at the 10 m threshold.
4. Basemaps: Esri World Topographic Map and Esri World Imagery

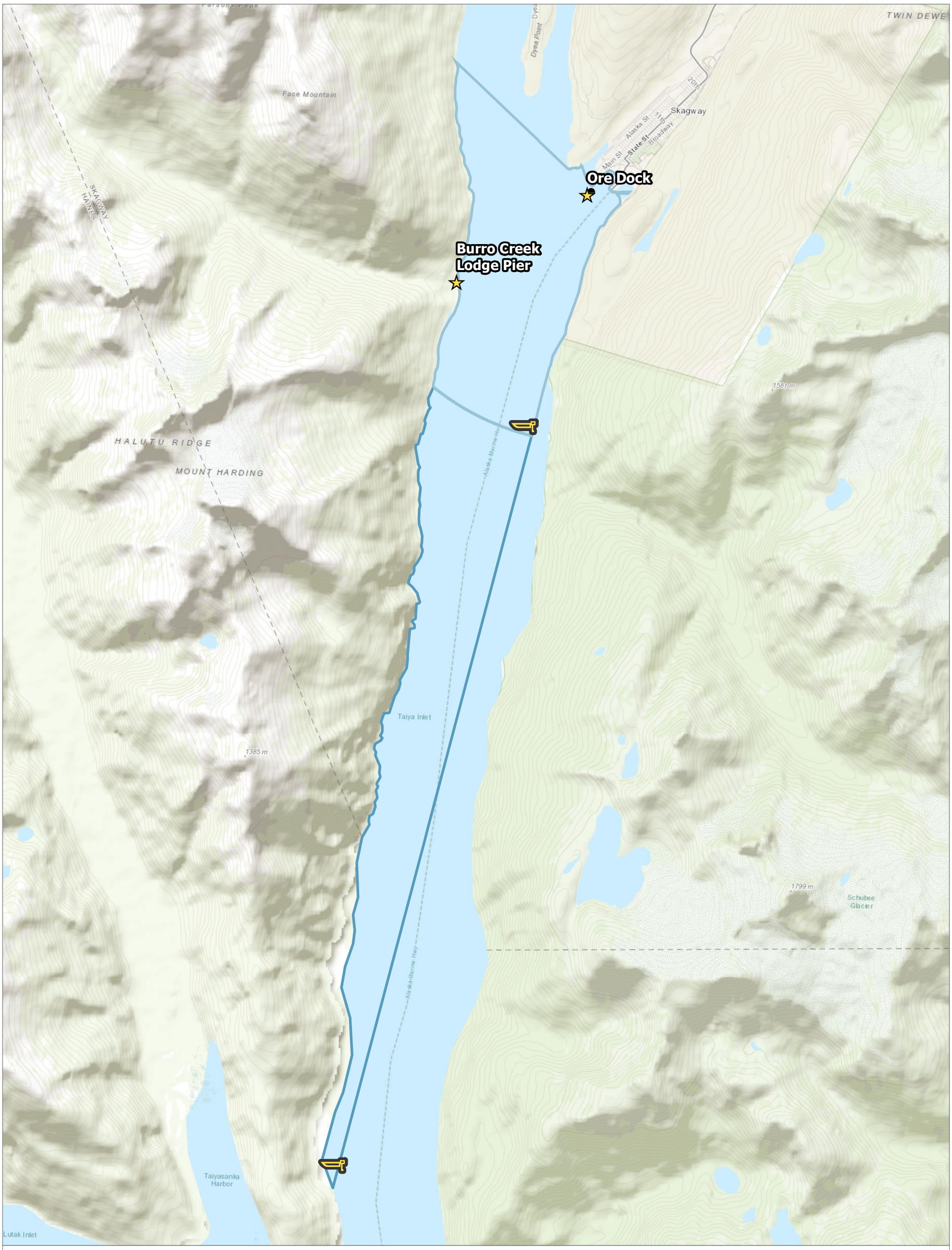
0 0.25
Miles

Publish Date: 2023/02/17, 11:39 AM | User: dlockwood
Filepath: Q:\Jobs\KPFF_0159\SkagwayAK_ConceptualRemedialOptions\Maps\IHA\Fig6_IHA_VibratoryRemTimberPiles.mxd

ANCHOR QEA

Figure 6
Exclusion and Harassment Zones for Timber Pile Vibratory Removal
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

DRAFT



LEGEND:

- Hammer Location
- Monitoring Location
- Moving Monitoring Location (Boat)
- Level B Harassment Zone for Vibratory Install of Steel Piles 30-Inches or Less (13,062 feet/ 3981 meters)
- Level B Harassment Zone for Vibratory Install of Steel Piles Greater Than 30-Inches (70,687 feet / 21,544.35 meters)

NOTES:
1. Basemaps: Esri World Topographic Map and Esri World Imagery

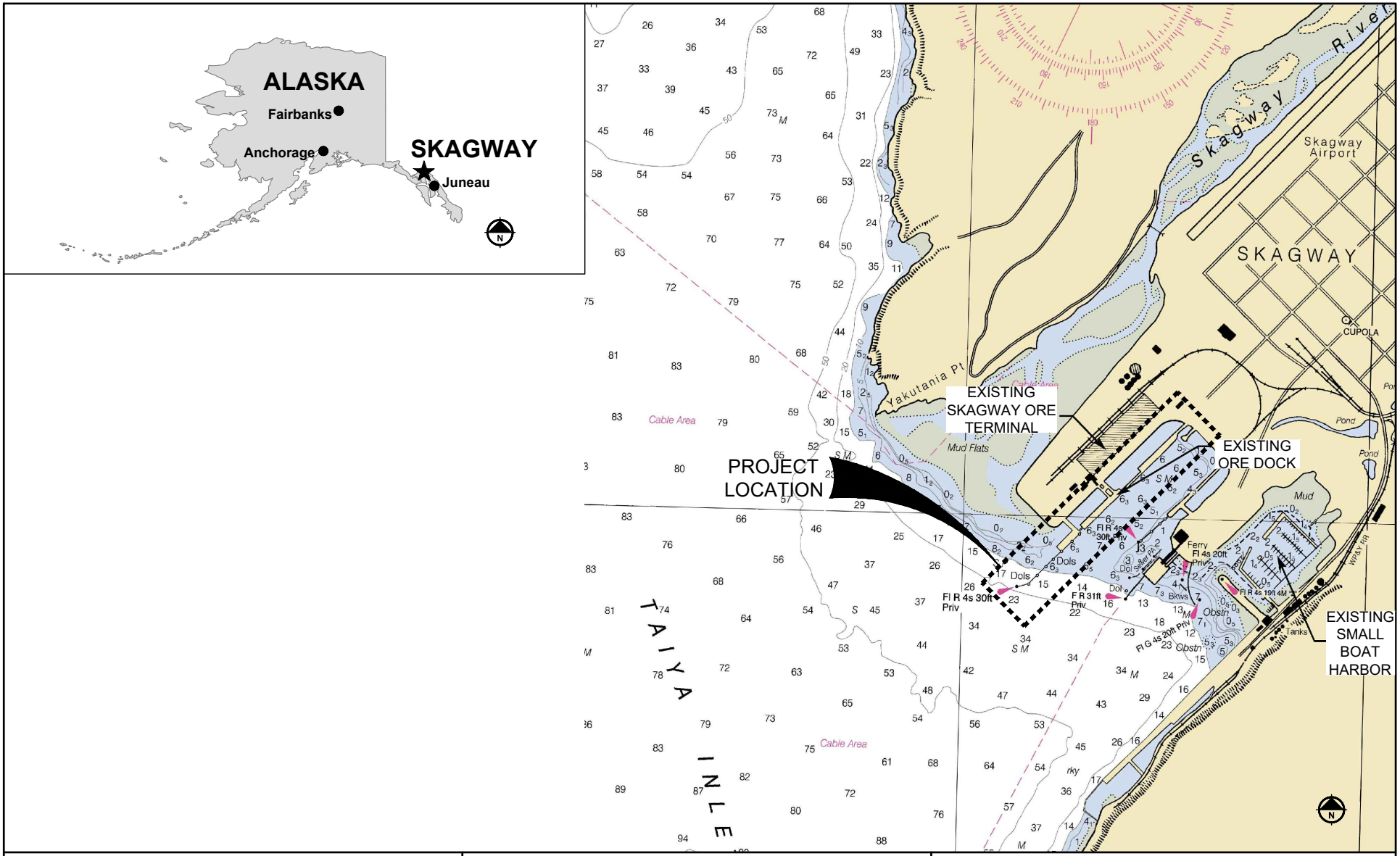
0 1
Mile

Publish Date: 2023/02/21, 11:32 AM | User: dlockwood
Filepath: Q:\Jobs\KPFF_0159\SkagwayAK_ConceptualRemedialOptions\Maps\IHA\Fig7_IHA_Monitoring_Locations.mxd

ANCHOR QEA

Figure 7
IHA Monitoring Locations
Request for an Incidental Harassment Authorization
Skagway Ore Terminal Redevelopment Project

Appendix A
Project Drawings



IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

VICINITY MAP

DATE: 11/18/2022

SHEET: 01 OF 19

Plotted: Nov 17, 2022 – 1:06pm dyu Layout: 01-VICINITY MAP
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_01_Vicinity Map.dwg

SOURCE: GOOGLE EARTH IMAGE DATED 08-30-2021

N

0 100 200

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

OVERALL SITE PLAN

DATE: 11/18/2022

SHEET: 02 OF 19

Plotted: Nov 17, 2022 - 1:06pm dyu Layout: 02-OVERALL SITE PLAN
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_02_Overall Site Plan.dwg

SOURCE: GOOGLE EARTH IMAGE DATED 08-30-2021

N

0 50 100

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

EXISTING SITE PLAN AREA 1

DATE: 11/18/2022

SHEET: 03 OF 19

Plotted: Nov 17, 2022 - 1:06pm dyu Layout: 03-EXI COND-AREA 1
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_03_Existing Site Plan Area 1.dwg

TIDAL DATUM

MEAN HIGHER HIGH WATER (MHHW) = HIGH TIDE LINE (HTL) = 16.73'

MEAN HIGH WATER (MHW) = 15.73'

MEAN LOWER LOW WATER (MLLW) = 0.0'

SOURCE: GOOGLE EARTH IMAGE DATED 08-30-2021

N

0 50 100

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

EXISTING SITE PLAN AREA 2

DATE: 11/18/2022

SHEET: 04 OF 19

Plotted: Nov 17, 2022 - 1:06pm dyu Layout: 04-EXI COND-AREA 2
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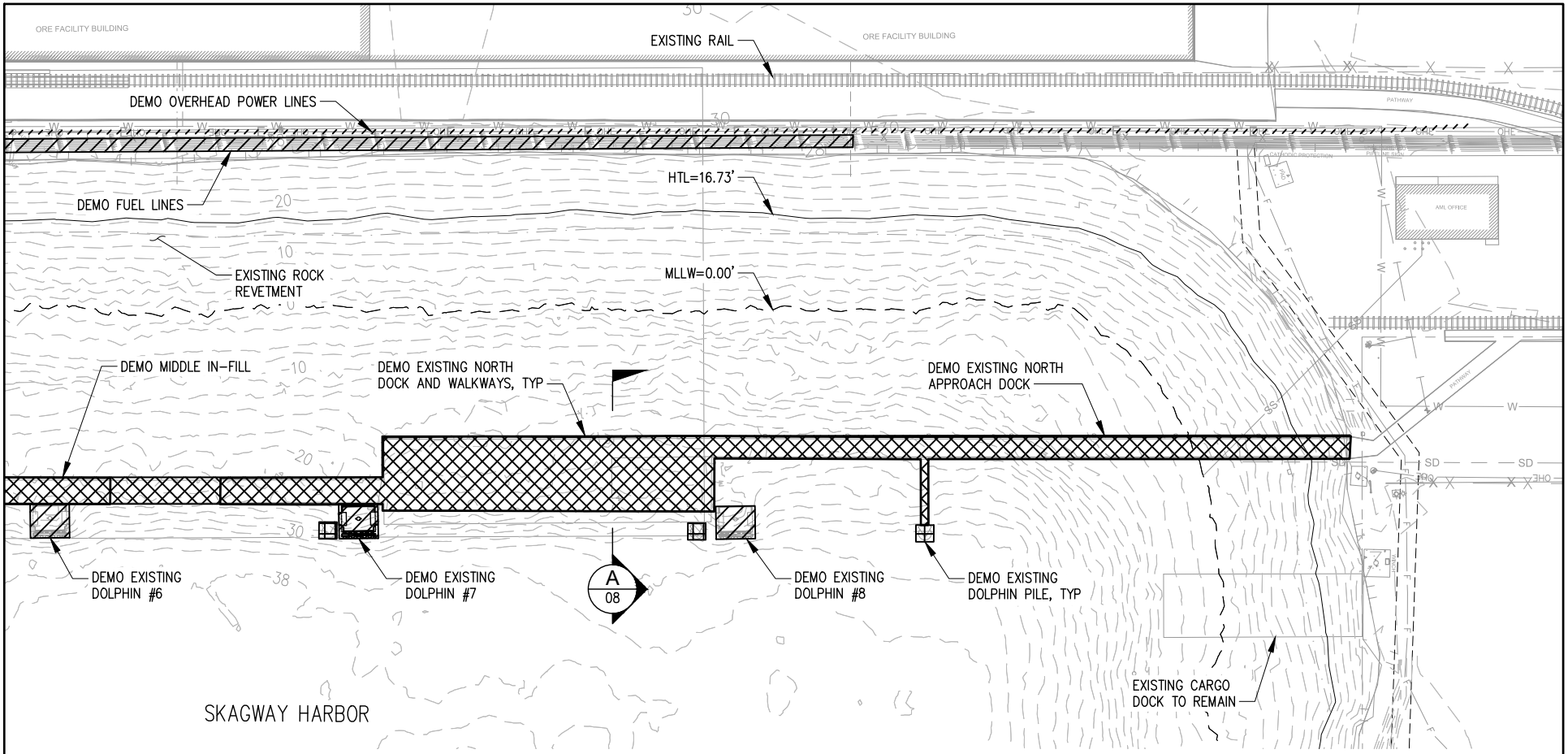

LEGEND

- TIMBER DOCK AND TIMBER PILE DEMOLITION
- CONCRETE DOCK WITH STEEL PILE DEMOLITION
- STEEL STRUCTURE WITH STEEL PILE DEMOLITION

N

0 83

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

DEMOLITION PLAN AREA 1

DATE: 11/18/2022

SHEET: 05 OF 19

Plotted: Nov 17, 2022 – 1:07pm dyu Layout: 05-Area 1 Demo Plan
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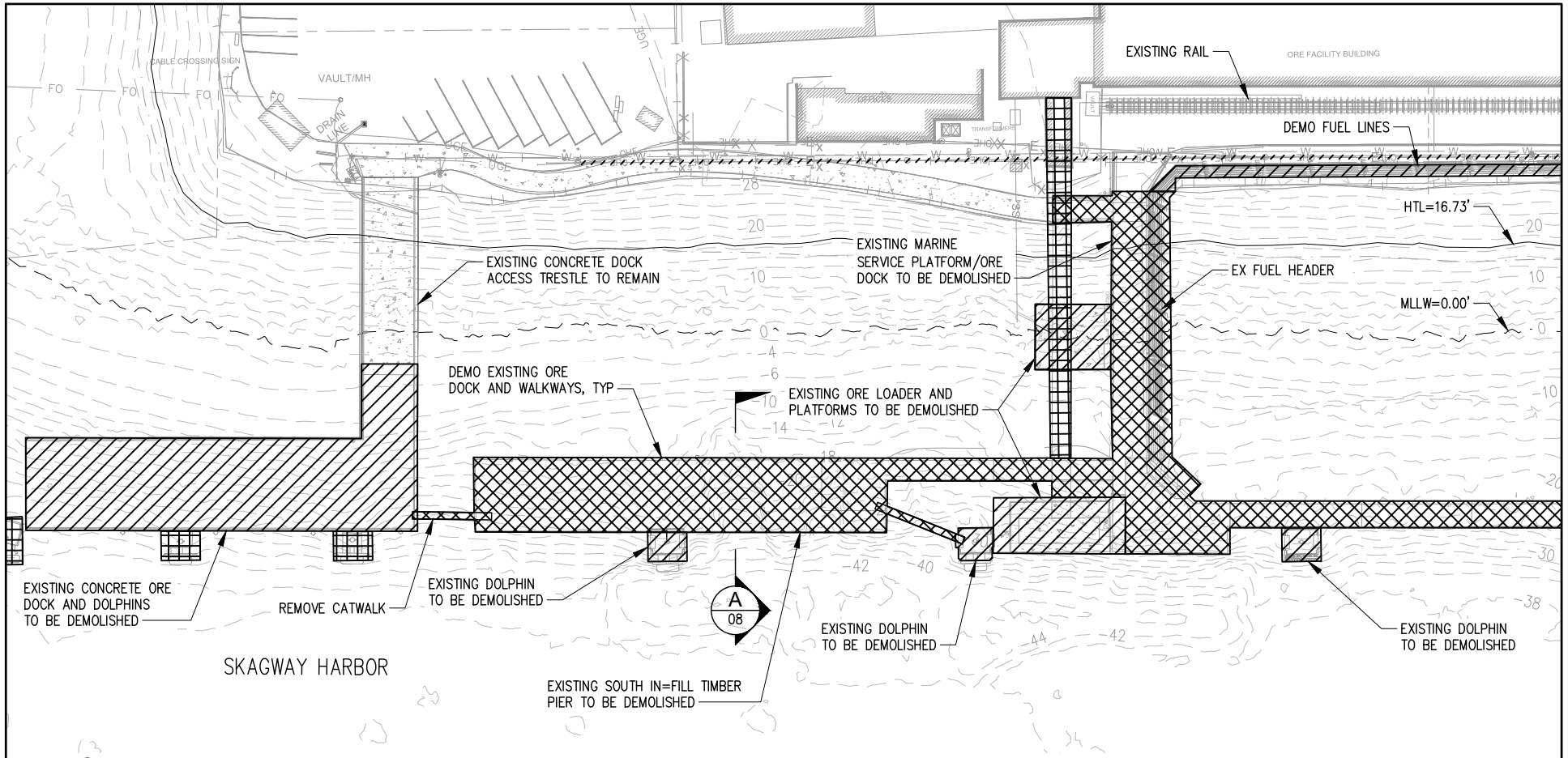

LEGEND

- TIMBER DOCK AND TIMBER PILE DEMOLITION
- CONCRETE DOCK WITH STEEL PILE DEMOLITION
- STEEL STRUCTURE WITH STEEL PILE DEMOLITION

N

0 83

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

DEMOLITION PLAN AREA 2

DATE: 11/18/2022

SHEET: 06 OF 19

Plotted: Nov 17, 2022 – 1:07pm dyu Layout: 06–Area 2 Demo Plan
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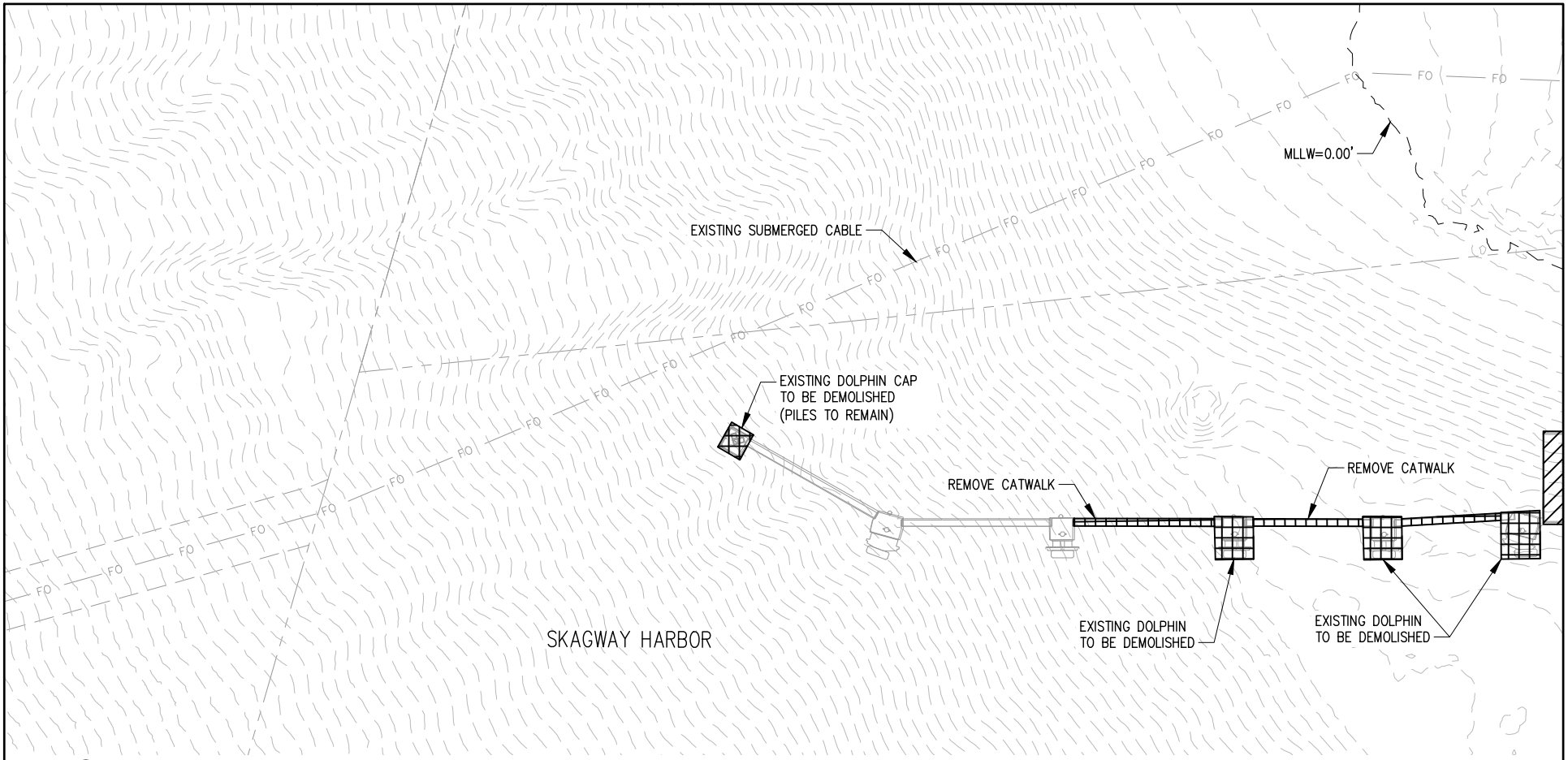


LEGEND

- TIMBER DOCK AND TIMBER PILE DEMOLITION
- CONCRETE DOCK WITH STEEL PILE DEMOLITION
- STEEL STRUCTURE WITH STEEL PILE DEMOLITION

N

0 83

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

DEMOLITION PLAN
AREA 3

DATE: 11/18/2022

SHEET: 07 OF 19

Plotted: Nov 17, 2022 – 1:07pm dyu Layout: 07–Area 3 Demo Plan
M:\2021\2100135 Skagway Ore Peninsula Multi–use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11–11–2022\2100135_07_Area 3 Demolition Plan.dwg

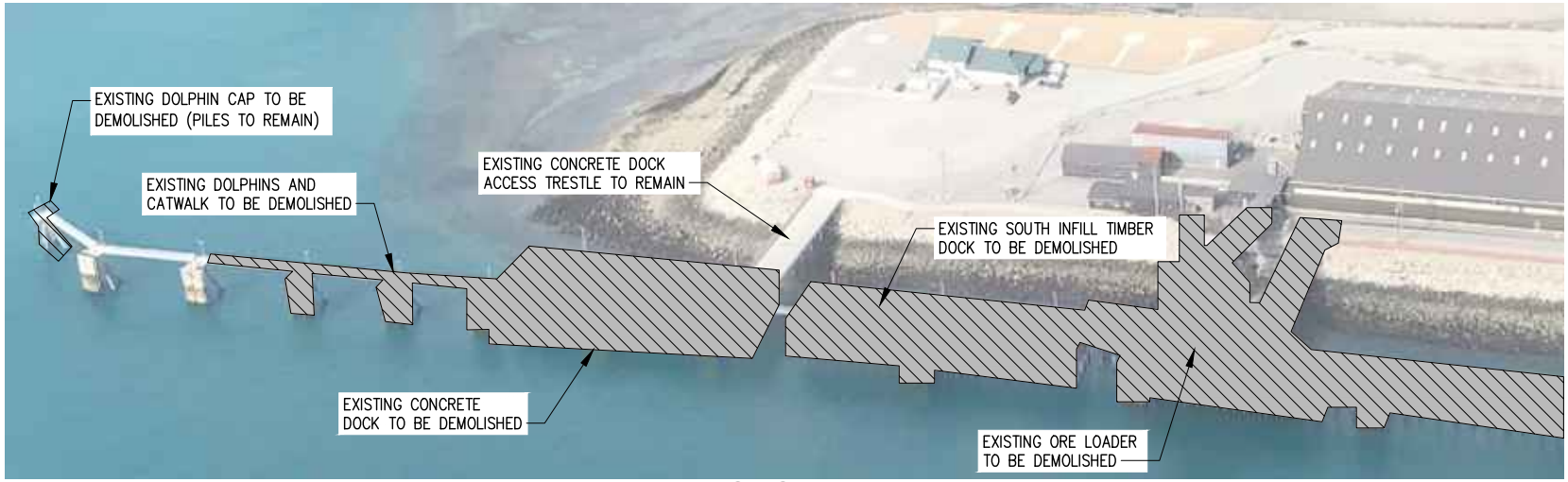


PHOTO
SCALE: NTS

PHOTO
SCALE: NTS

DEMOLITION TABLE	QTY
OVER WATER STRUCTURE REMOVED	48,482 SF
TIMBER PILES REMOVED	423
STEEL 10-3/4" PILES REMOVED	54
STEEL 14" PILES REMOVED	32
STEEL 16" PILES REMOVED	59
STEEL 20" PILES REMOVED	47
STEEL 24" PILES REMOVED	28
STEEL 28" PILES REMOVED	32
STEEL 30" PILES REMOVED	17

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

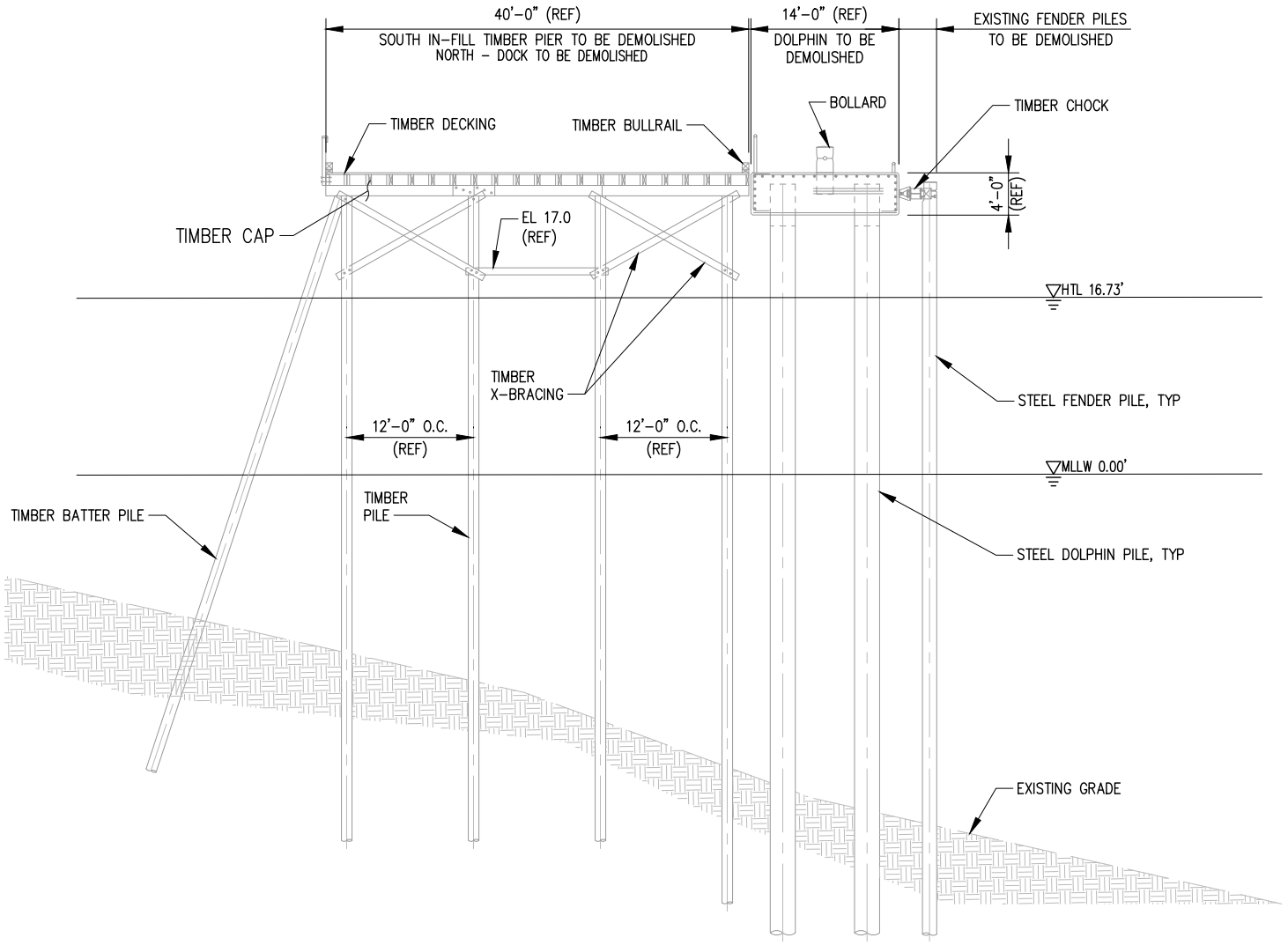
ORE TERMINAL REDEVELOPMENT

DEMO PHOTOS

DATE: 11/18/2022

SHEET: 08 OF 19

Plotted: Nov 17, 2022 - 1:07pm dyu Layout: 08-PHOTOS
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_08_Demo Photos.dwg



A/06 **TYPICAL SECTION - EXISTING TIMBER DOCK**
SCALE: 1/16" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA
AT: ORE DOCK TERMINAL
CITY: SKAGWAY **COUNTY:**
STATE: ALASKA **PARCEL #:**
APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"
TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"
RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

DEMOLITION SECTIONS EXISTING TIMBER DOCK AND DOLPHIN

DATE: 11/18/2022

SHEET: 09 OF 19

Plotted: Nov 17, 2022 - 1:07pm dyu Layout: 09-TYP SECTION EX TIMBER DOCK
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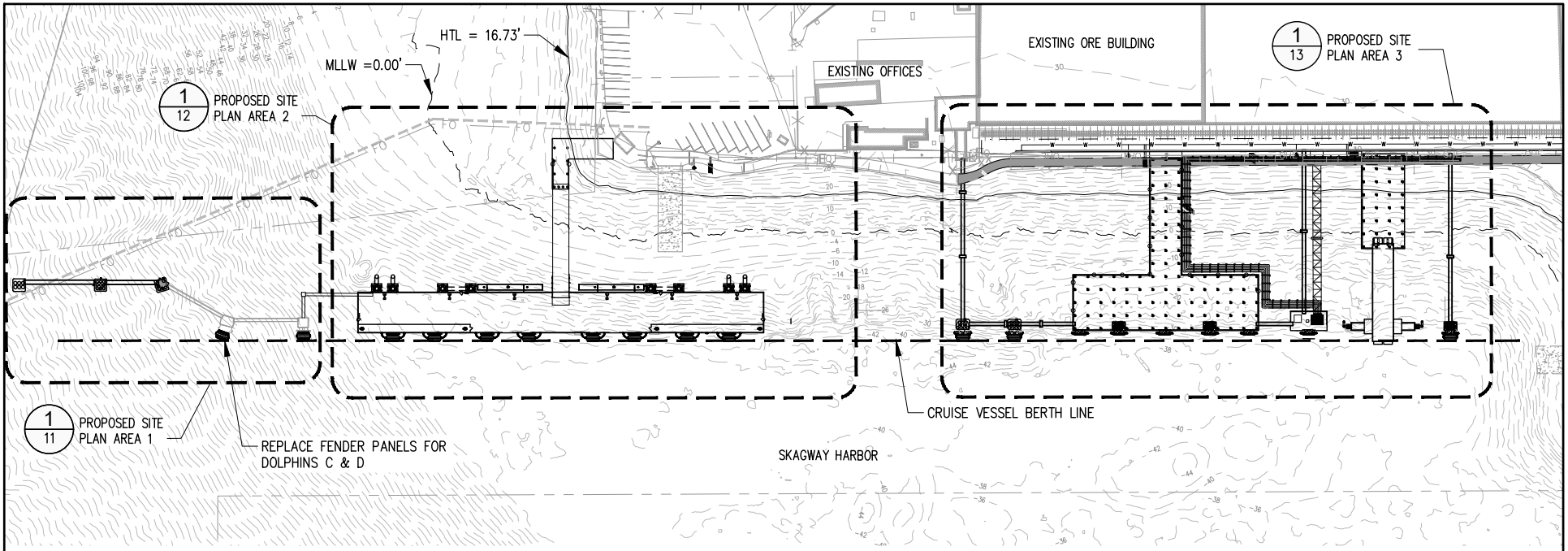


PROPOSED SITE PLAN

SCALE: 1/16" = 1'-0"

TABLE 1 - PILES INSTALLED

DESCRIPTION	DIAMETER	QUANTITY
FLOAT GUIDE PILES	36 INCH	12
FLOAT TRANSFER SPAN HEAD FRAME	24 INCH	2
DOLPHIN PILES (24 INCH)	24 INCH	15
DOLPHIN PILES (36 INCH)	36 INCH	21
DOLPHIN PILES (42 INCH)	42 INCH	11
DOLPHIN PILES (48 INCH)	48 INCH	6
CATWALK PILES	24 INCH	14
FUEL HEADER (24 INCH)	24 INCH	4
FUEL HEADER (36 INCH)	36 INCH	7
MSP DOCK PILES (24 INCH)	24 INCH	103
MSP DOCK PLES (36 INCH)	36 INCH	11
RORO RAMP ACCESS PILES	24 INCH	20
RORO RAMP GUIDE PILES	36 INCH	6
CRUISE DOCK ACCESS RAMP	24 INCH	12

TABLE 2 - NEW OVERWATER COVERAGE

DESCRIPTION	AREA BEYOND HTL (SF)
CRUISE DOCK FLOAT/ACCESS AREA	35,300
DOLPHIN AREA	1,360
MSP AREA	21,670
RORO RAMP/ACCESS AREA	7,920
CATWALK AREA	3,920
FUEL HEADER AREA	2,800

NOTE

1. FLOATING FENDERS ARE SEASONAL

N

0 96 192 288

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

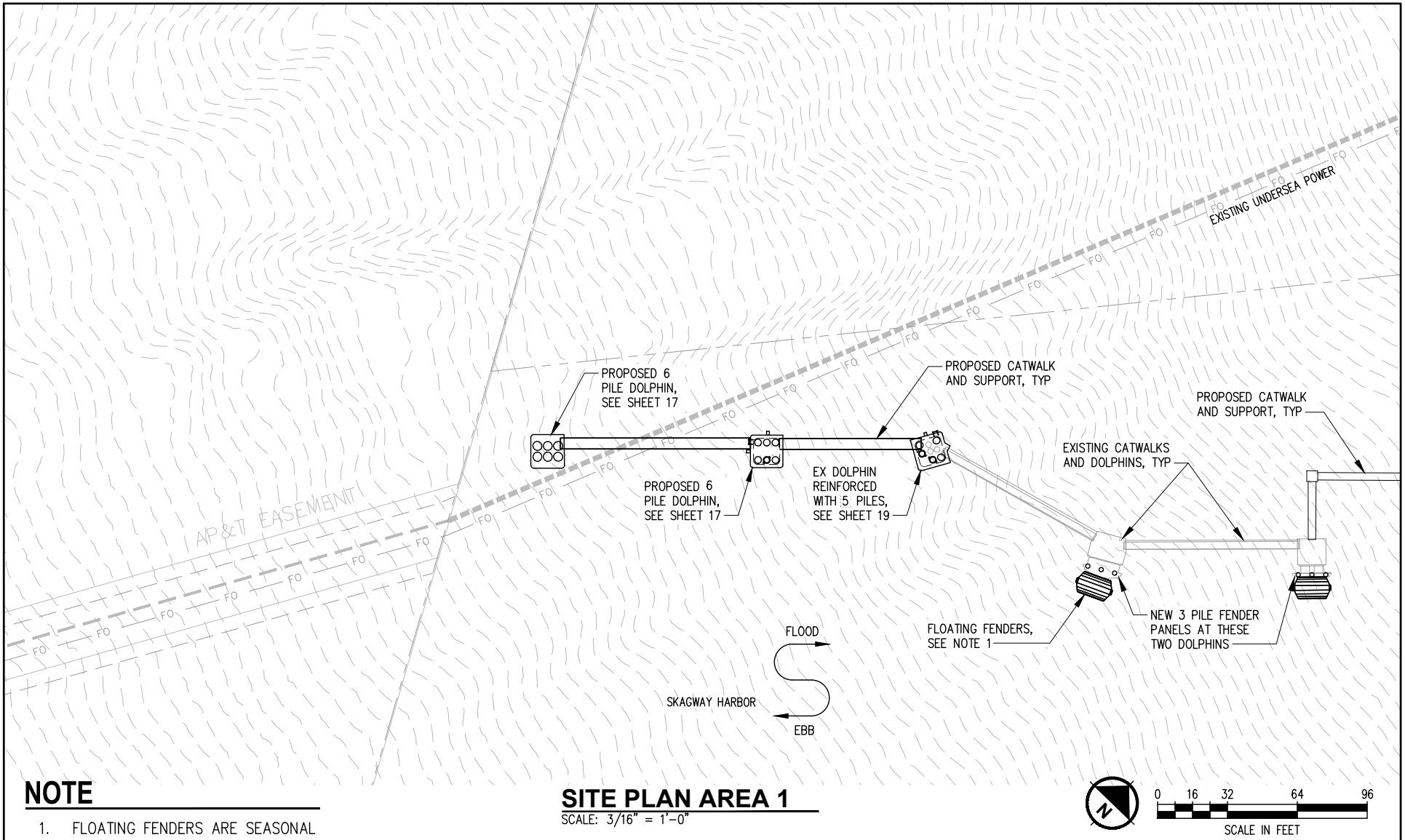
ORE TERMINAL REDEVELOPMENT

PROPOSED SITE PLAN

DATE: 11/18/2022

SHEET: 10 OF 19

Plotted: Nov 17, 2022 – 1:08pm dyu Layout: 10-PROPOSED SITE PLAN
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_10_Proposed Site Plan.dwg



NOTE

1. FLOATING FENDERS ARE SEASONAL

SITE PLAN AREA 1

SCALE: 3/16" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

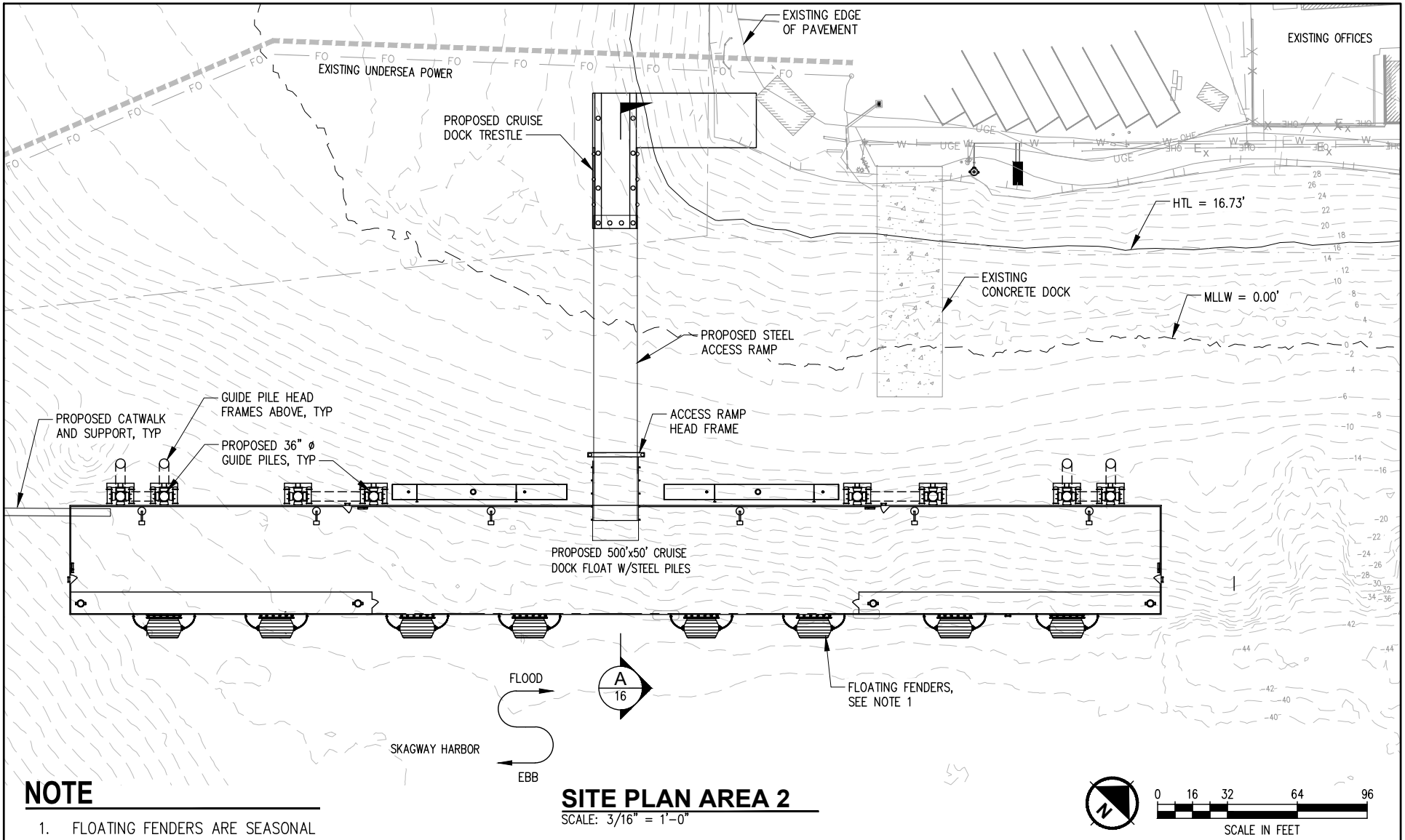
ORE TERMINAL REDEVELOPMENT

SITE PLAN AREA 1

DATE: 11/18/2022

SHEET: 11 OF 19

Plotted: Nov 17, 2022 – 1:08pm dyu Layout: 11-SITE PLAN AREA 1
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_11_Site Plan Area 1.dwg



NOTE

1. FLOATING FENDERS ARE SEASONAL

SITE PLAN AREA 2

SCALE: 3/16" = 1'-0"

0 16 32 64 96

SCALE IN FEET

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

SITE PLAN AREA 2

DATE: 11/18/2022

SHEET: 12 OF 19

Plotted: Nov 17, 2022 - 1:08pm dyu Layout: 12-SITE PLAN AREA 1
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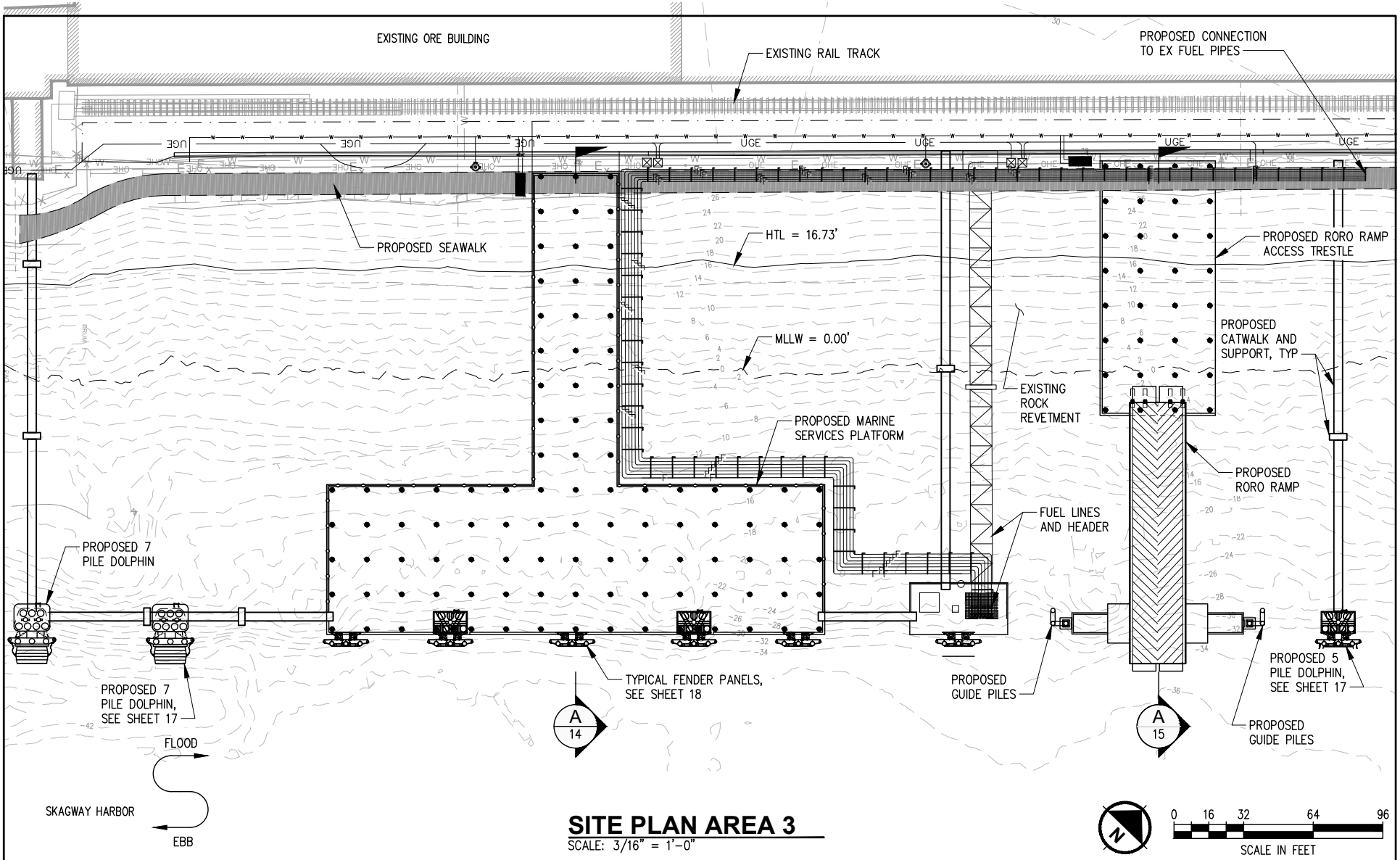


SITE PLAN AREA 3

SCALE: 3/16" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

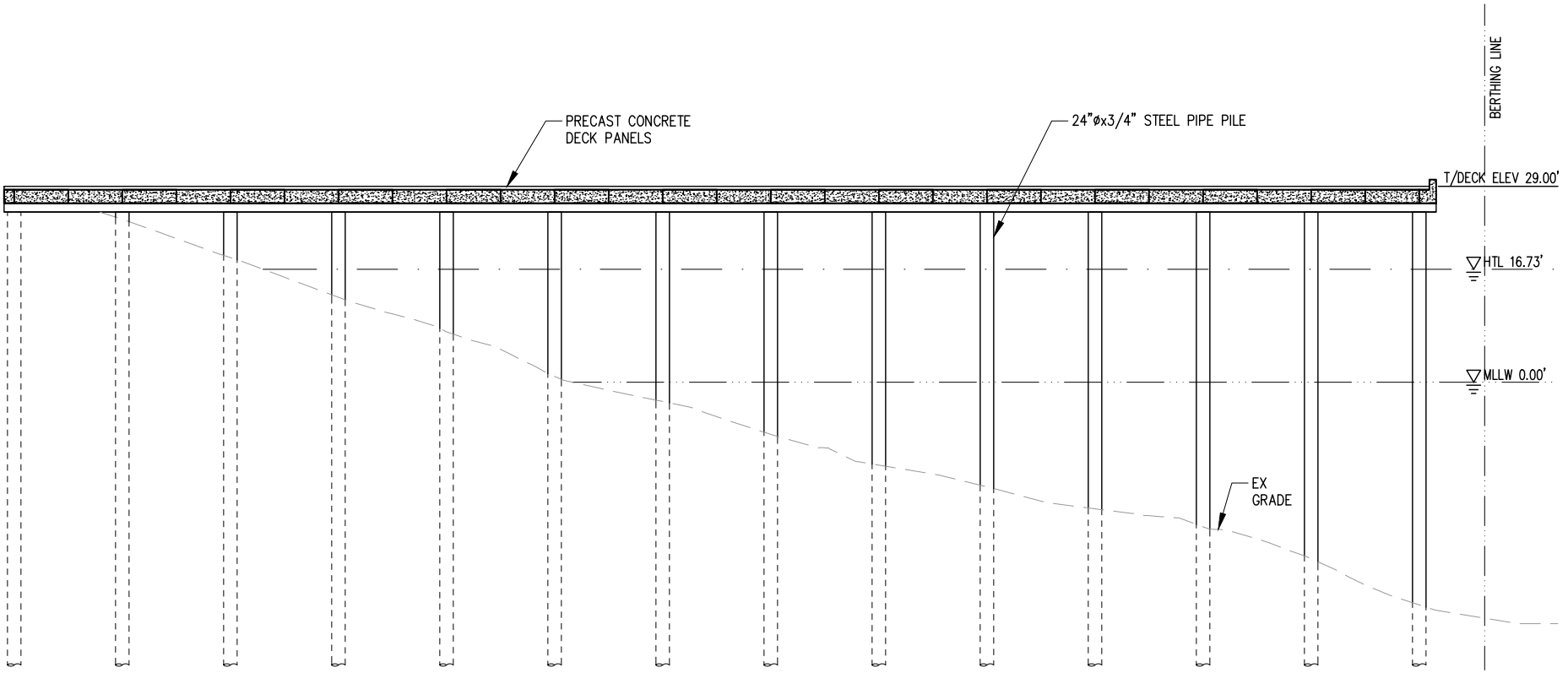
ORE TERMINAL REDEVELOPMENT

SITE PLAN AREA 3

DATE: 11/18/2022

SHEET: 13 OF 19

Plotted: Nov 17, 2022 – 1:09pm dyu Layout: 13-SITE PLAN AREA 3
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_13_Site Plan Area 3.dwg



PROPOSED MARINE SERVICES PLATFORM
SECTION A

A / 11

SCALE: 1/2" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

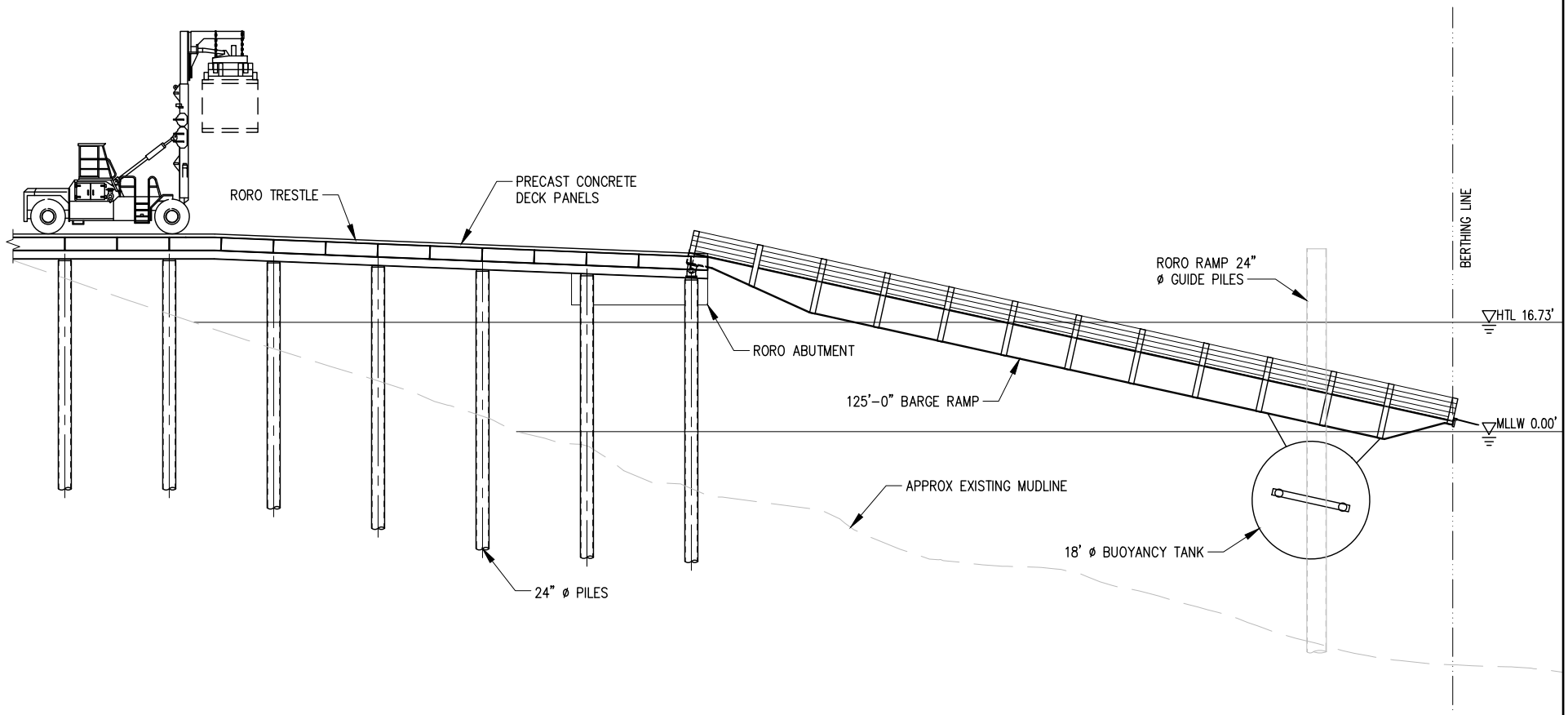
ORE TERMINAL REDEVELOPMENT

MARINE SERVICES PLATFORM

DATE: 11/18/2022

SHEET: 14 OF 19

Plotted: Nov 17, 2022 – 1:09pm dyu Layout: 14-MARINE SERVICES PLATFORM
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_14_Marine Services Platform.dwg



A/11 PROPOSED RORO RAMP SECTION

SCALE: 1/2" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

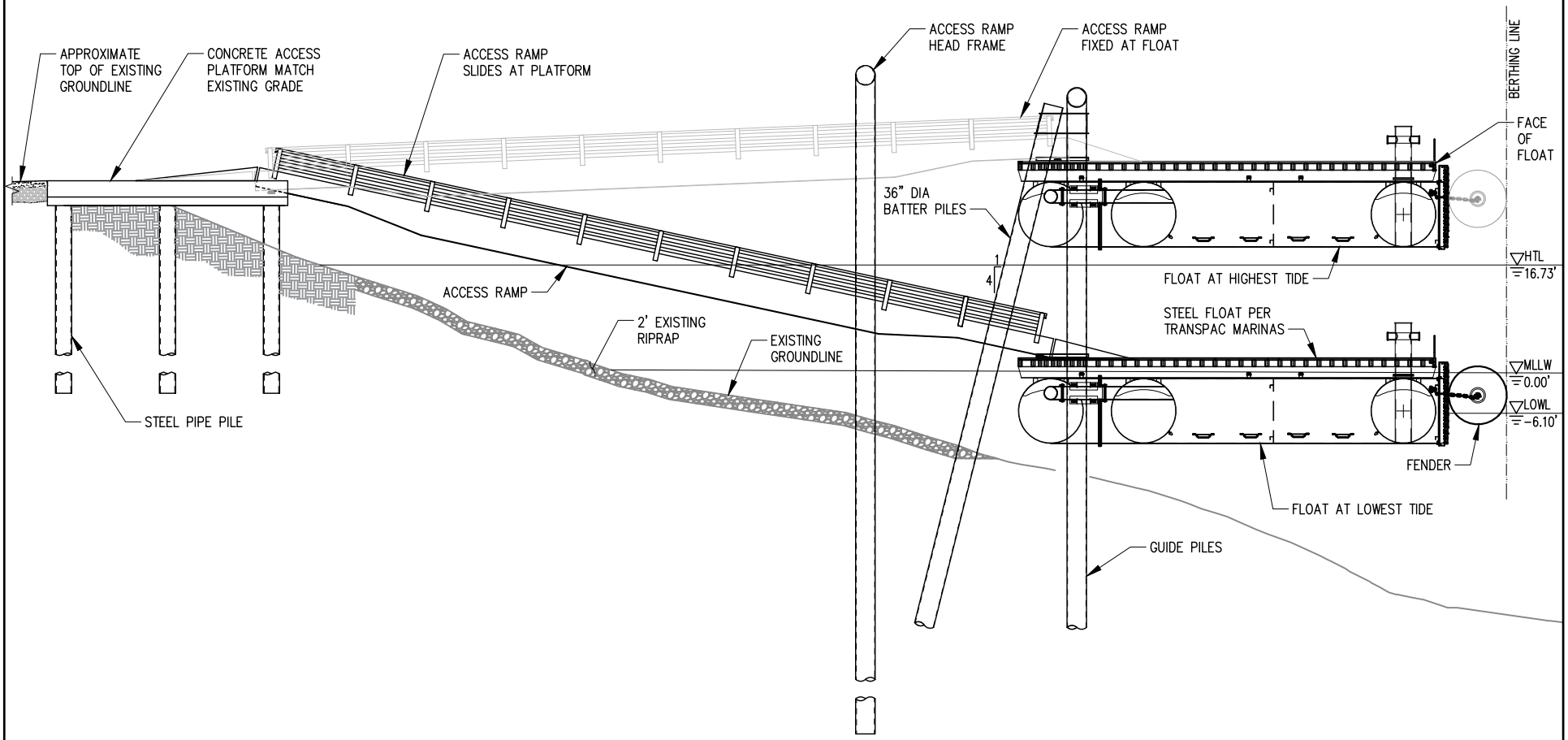
ORE TERMINAL REDEVELOPMENT

RORO RAMP AND ACCESS TRESTLE

DATE: 11/18/2022

SHEET: 15 OF 19

Plotted: Nov 17, 2022 - 1:09pm dyu Layout: 15-RORO RAMP AND ACCESS TRESTLE
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_15_RoRo Ramp & Access Trestle.dwg



A/10 **TYPICAL SECTION - PROPOSED FLOAT**

SCALE: 1/2" = 1'-0"

NOTE

1. FLOATING FENDERS ARE SEASONAL

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

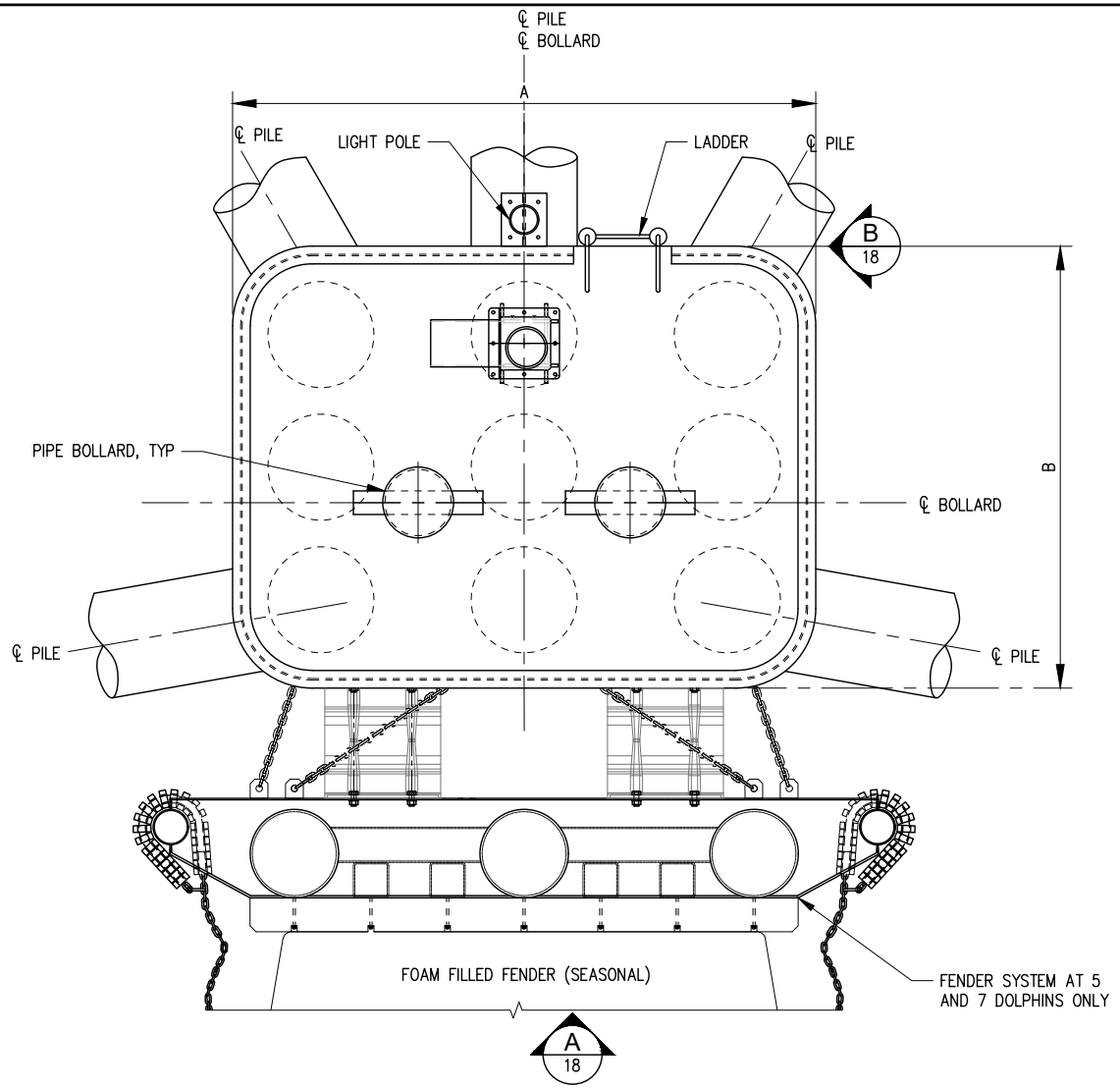
ORE TERMINAL REDEVELOPMENT

TYPICAL FLOAT SECTION

DATE: 11/18/2022

SHEET: 16 OF 19

Plotted: Nov 17, 2022 - 1:09pm dyu Layout: 16-TYPICAL DOLPHIN ELEVATION
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_16_Typical Float Section.dwg



MOORING DOLPHIN STRUCTURE DIMENSIONS		
# OF PILES	A	B
5	16'-6"	12'-6"
6	15'-6"	15'-6"
7	16'-6"	12'-6"
9	15'-0"	15'-0"

1 / – **TYPICAL MOORING DOLPHIN PLAN**

SCALE: 3/16" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

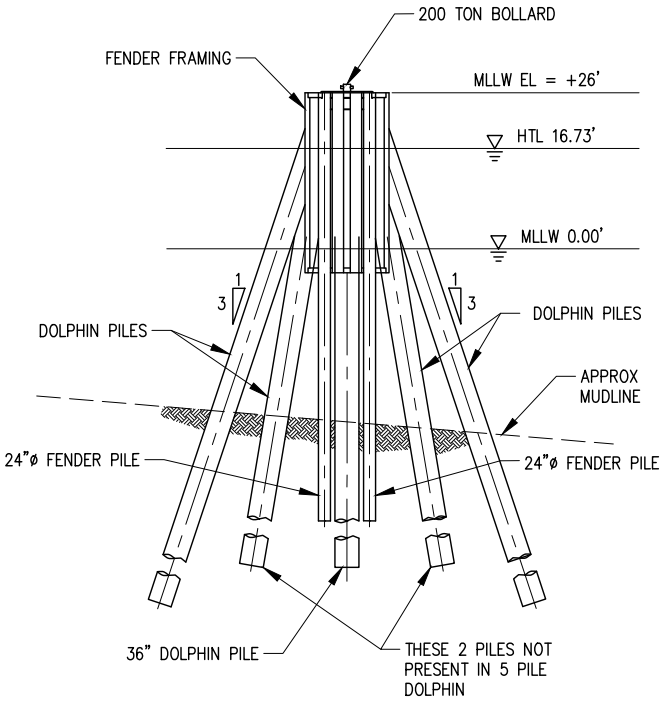
ORE TERMINAL REDEVELOPMENT

TYPICAL MOORING DOLPHIN PLAN

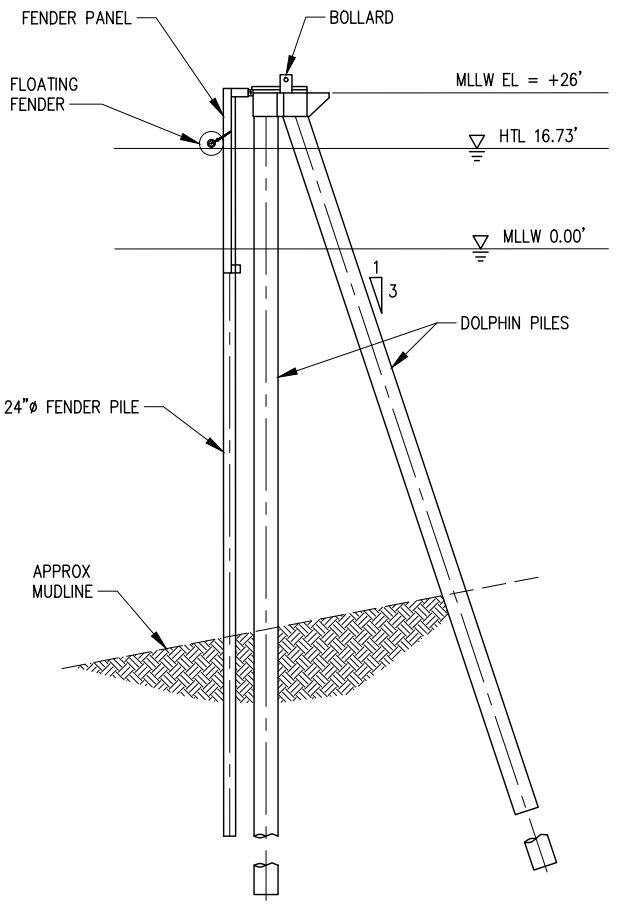
DATE: 11/18/2022

SHEET: 17 OF 19

Plotted: Nov 17, 2022 – 1:09pm dyu Layout: 17-REPLACEMENT DOLPHIN PLAN
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_17_Typical Mooring Dolphin Plan.dwg



A 17 **REPLACEMENT DOLPHIN ELEVATION**
SCALE: 1/32" = 1'-0"



B 17 **REPLACEMENT DOLPHIN SECTION**
SCALE: 1/32" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

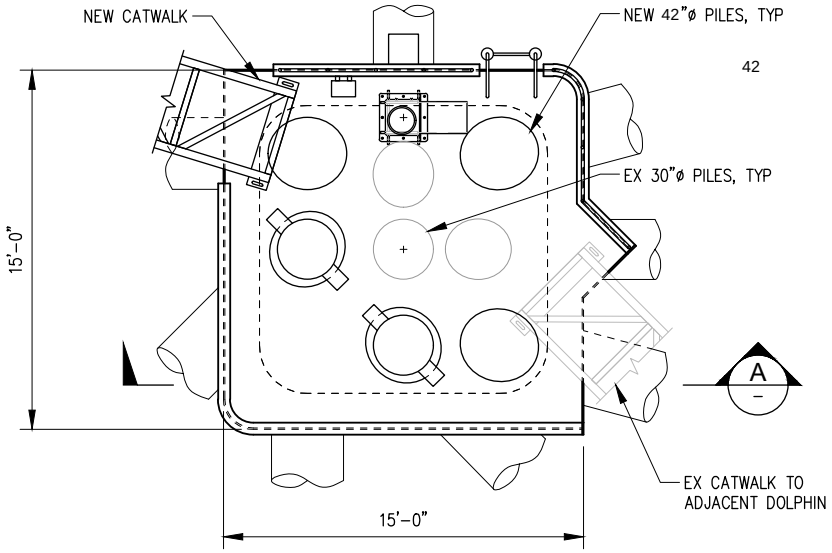
ORE TERMINAL REDEVELOPMENT

REINFORCED DOLPHIN ELEVATION AND SECTION

DATE: 11/18/2022

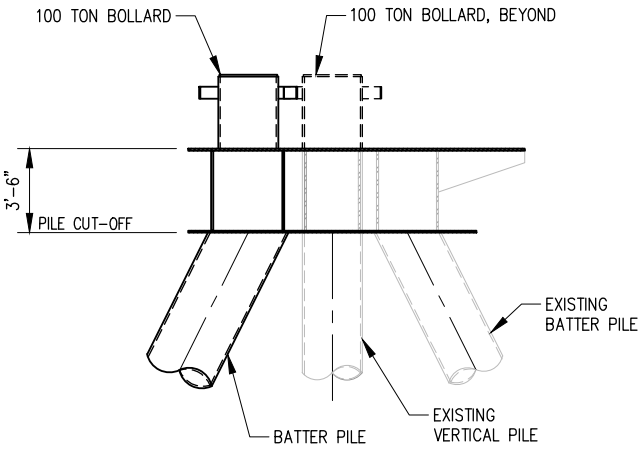
SHEET: 18 OF 19

Plotted: Nov 17, 2022 - 1:09pm dyu Layout: 18-REPLACEMENT DOLPHIN ELEVATION & SECTION
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set - 8.5x11\Permit Set_11-11-2022\2100135_18_Replacement Dolphin Elevation & Section.dwg



MOORING DOLPHIN DETAIL

SCALE: 1-1/2" = 1'-0"



REINFORCED DOLPHIN SECTION

SCALE: 1-1/2" = 1'-0"

IN: SKAGWAY HARBOR, ALASKA

AT: ORE DOCK TERMINAL

CITY: SKAGWAY **COUNTY:**

STATE: ALASKA **PARCEL #:**

APPLICATION BY: MUNICIPALITY OF SKAGWAY

PURPOSE: REPLACE DOCK AND SUPPORTING STRUCTURES

SECTION: 14 **LAT:** N 59 27' 2.44"

TOWNSHIP: 28 S **LONG:** W 135 19' 36.45"

RANGE: 59 E, COPPER RIVER MERIDIAN **DATUM:** MLLW

ORE TERMINAL REDEVELOPMENT

REIN□ORCED DOLPHIN PLAN AND SECTION

DATE: 11/18/2022

SHEET: 19 OF 19

Plotted: Nov 17, 2022 – 1:36pm dyu Layout: 19-DOLPHIN SECTIONS
M:\2021\2100135 Skagway Ore Peninsula Multi-use Dock\Drawings\Current\Permit Set – 8.5x11\Permit Set_11-11-2022\2100135_19_Reinforced Dolphin Pan & Section.dwg

Appendix B
Noise Analysis

Source Sound Levels, Spreadsheet Inputs, and Assumptions

Impact Pile Driving, Steel

24-Inch Steel Piles

The inputs to the NMFS spreadsheet for method E.1-1 for calculating PK and SEL_{cum} (using RMS SPL source level) for impact pile driving of steel piles 24 inches in diameter, and related Project assumptions, are as follows:

- Weighting Factor Adjustment (kHz): 2
  - The default value was chosen due to a lack of Project-specific information.

- Source Level (SEL_{cum} RMS SPL): 189 dB RMS
  - For impact installation of steel piles, 189 dB (RMS at 10 meters) is used as the estimated SPL for calculating isopleths. This value was measured by CalTrans (2020) during impact installation of 24-inch round steel piles in Francisco Bay, California, as part of the Rodeo Dock Repair Project. This source most closely corresponds to the 24-inch piles that will be installed as part of the Project compared to other references available for different sized piles or different areas.
  - CalTrans (2020) reports the median SPL (RMS at 10 meters) for a pile ("Steel Pipe") driven with an unattenuated Diesel Impact (Delmag D36-32) hammer. We assume 189 dB is an appropriate surrogate value to use in this application because the pile widths are the same and site-specific sound sources are not available.

- Number of piles per day: 5
  - The engineering design team anticipates that the contractor will complete installation of the 24-inch steel piles below MHHW/HTL in 38 days. The five piles per day input combined with other conservative inputs (189 dB, and 700 strikes) is therefore an overall conservative estimate for any of the impact pile driving scenarios that are expected to occur during this Project.

- Strike Duration (seconds): 0.1 seconds (100 ms)
  - Per NOAA manual because no site- or Project-specific information is available.

- Number of strikes per pile: 700
  - The engineering design team estimates that each steel pile will take 700 strikes to install. While the strikes per pile will likely vary based on substrate at each pile-driving location, 700 is used as a conservative average for estimating strikes per pile for Project activities.

- Propagation: 15
  - A practical spreading value of 15 is used because the water in the Project area increases with depth further from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical conditions.

- Distance of source level measurement (meters)—input for SEL_{cum} and PK tables: 10
  - This value is from the CalTrans manual measurements.

- Source Level (PK SPL): 207
  - CalTrans (2020) reports the median peak SPL (RMS at 10 meters) for a pile ("CISS Steel Pipe") driven with an unattenuated Diesel Impact (Delmag D36-32) hammer. Same assumptions as SEL_{cum} source level, above.

36-, 42-, and 48-Inch Steel Piles

The inputs to the NMFS spreadsheet for method E.1-1 for calculating PK and SEL_{cum} (using RMS SPL source level) for impact pile driving of steel piles 36 inches in diameter, and related Project assumptions, are as follows:

- Weighting Factor Adjustment (kHz): 2
  - The default value was chosen due to a lack of Project-specific information.

- Source Level (SEL_{cum} RMS SPL): 193 dB RMS
  - For impact installation of steel piles, 193 dB (RMS at 10 meters) is used as the estimated SPL for calculating isopleths. This value was measured by CalTrans (2020) during impact installation of 36-inch round steel piles in Eureka, California, as part of the CalTrans Humbolt Bay Project. This source most closely corresponds to the 36-inch piles that will be installed as part of the Project compared to other references available for different sized piles or different areas. This value was also the loudest of the values measured during the driving of 48-inch steel CISS piles at Geyserville Bridge in Russian River, California. Thus, we used 193 dB as a conservative value for 36, 42, and 48-inch steel piles.
  - CalTrans (2020) reports the median SPL (RMS at 10 meters) for a pile ("CISS Steel Pipe") driven with an unattenuated Diesel Impact (Delmag D36-32 hammer for 36-inch piles and a Del Mag D100-13 for 48-inch piles) hammer. We assume 193 dB is an appropriate surrogate value to use in this application because the pile widths are the same and site-specific sound sources are not available.

- Number of piles per day: 2
  - The engineering design team anticipates that the contractor will complete installation of the 63 36-, 42-, and 48-inch steel piles below MHHW/HTL in 39 days. The two piles per day input combined with other conservative inputs (193 dB, and 1,800) is therefore an overall conservative estimate for any of the impact pile driving scenarios that are expected to occur during this Project.

- Strike Duration (seconds): 0.1 seconds (100 ms)
  - Per NOAA manual because no site- or Project-specific information is available.

- Number of strikes per pile: 1,800
  - The engineering design team estimates that each steel pile will take a maximum of 1,800 strikes to install. While the strikes per pile will likely vary based on substrate at each pile-driving location, 1,800 is used as a conservative average for estimating strikes per pile for Project activities.

- Propagation: 15
  - A practical spreading value of 15 is used because the water in the Project area increases with depth further from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical conditions.

- Distance of source level measurement (meters)—input for SEL_{cum} and PK tables: 10
  - This value is from the CalTrans manual measurements.

- Source Level (PK SPL): 212.5 dB
  - CalTrans (2020) reports the median peak SPL (RMS at 10 meters) for a pile ("CISS Steel Pipe") driven with an unattenuated Diesel Impact (Delmag D36-32) hammer. Same assumptions as SEL_{cum} source level, above.

  - The median peak for the 48-inch piles at Geyserville Bridge was 205 dB, we used 212.5 dB as a conservative value.

Vibratory Pile Driving and Removal, Steel

10.75- through 30-Inch Steel Piles

The inputs to the NMFS spreadsheet for method A.1 (stationary source: non-impulsive, continuous) for calculating isopleths for vibratory installation and removal of up-to-30-inch round steel piles, and related Project assumptions, are as follows:

- Weighting Factor Adjustment (kHz): 2.5

  - The default value was chosen due to a lack of Project-specific information.

- Source Level (RMS SPL): 159
  - For vibratory steel installation and removal, an SPL of 159 dB (RMS at 10 meters) is used as the source sound level. This corresponds to measurements from the WETA Maintenance Facility improvement projects in San Francisco. The value of 159 dB is the mean SPL calculated at 10 meters. The source level of vibratory pile driving of 36-inch steel piles is conservatively used as the estimate for 24-inch piles in this Project.
  - We assume 159 dB is an appropriately conservative surrogate value to use in this application because the pile widths for this Project are the same or slightly smaller and site-specific sound sources are not available.

- Number of piles within 24-hour period: 5
  - The engineering design team anticipates that the contractor will install/remove approximately 5 steel piles per day. Though it would likely vary based on daily conditions and often be fewer than 5 piles, we assume 5 is a conservative estimate of the number of piles that might be installed in a 24-hour period.

- Duration to drive a single pile (minutes): 45
  - The engineering design team anticipates that the contractor will take an average of 45 minutes or less to drive or remove each steel pile.

- Propagation (xLogR): 15
  - A practical spreading value of 15 is used because the water in the Project area increases with depth further from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical conditions. Propagation of sound in Skagway Harbor is unmodeled. Transmission loss coefficients reported in Denes et al. (2016) do not apply because propagation is site-specific.

- Distance from source level measurement (meters): 10
  - Table I.2-1a of the CalTrans (2020) report notes that the modeled distance from vibratory steel driving of 36-inch piles is 10 meters for the 159 dB measurement.

36-, 42-, and 48-Inch Steel Piles

The inputs to the NMFS spreadsheet for method A.1 (stationary source: non-impulsive, continuous) for calculating isopleths for vibratory installation and removal of 36, 42, and 48-inch round steel piles, and related Project assumptions, are as follows:

- Weighting Factor Adjustment (kHz): 2.5
  - The default value was chosen due to a lack of Project-specific information.

- Source Level (RMS SPL): 170
  - For vibratory steel installation and removal of 72-inch piles, an SPL of 170 dB (RMS at 10 meters) is used as the source sound level. This corresponds to measurements from the Richmond Inner Harbor Project in Richmond, California. The value of 170 dB is the mean SPL calculated at 10 meters. The source level of vibratory pile driving of 72-inch steel piles is conservatively used as the estimate for 36, 42, and 48-inch piles in this Project.
  - We assume 170 dB is an appropriately conservative surrogate value to use in this application because the pile widths for this Project are the same or slightly smaller and site-specific sound sources are not available.

- Number of piles within 24-hour period: 5
  - The engineering design team anticipates that the contractor will install/remove approximately 5 steel piles per day. Though it would likely vary based on daily conditions and often be fewer than 5 piles, we assume 5 is a conservative estimate of the number of piles that might be installed in a 24-hour period.

- Duration to drive a single pile (minutes): 45
  - The engineering design team anticipates that the contractor will take an average of 45 minutes or less to drive or remove each steel pile.

- Propagation (xLogR): 15
  - A practical spreading value of 15 is used because the water in the Project area increases with depth further from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical conditions. Propagation of sound in Skagway Harbor is unmodeled. Transmission loss coefficients reported in Denes et al. (2016) do not apply because propagation is site-specific.

- Distance from source level measurement (meters): 10
  - Table I.2-2 of the CalTrans (2015) report notes that the modeled distance from vibratory steel driving of up to 72-inch piles is 10 meters for the 170 dB measurement.

  -

Vibratory Pile Removal, Timber

The inputs to the NMFS spreadsheet for method A.1 (stationary source: non-impulsive, continuous) for calculating isopleths for vibratory removal of 12-inch timber piles, and related Project assumptions, are as follows:

- Weighting Factor Adjustment (kHz): 2.5

  - The default value was chosen due to a lack of Project-specific information.

- Source Level (RMS SPL): 158
  - For vibratory timber removal, 158 dB (RMS at 10 meters) is used as the source sound level per NOAA's request.
  - We assume 158 dB is an appropriately conservative surrogate value to use in this application because the pile widths for this Project are smaller and site-specific sound sources are not available.

- Number of piles within 24-hour period: 18
  - The engineering design team anticipates that the contractor will remove approximately 12 timber piles in a 24-hour period.

- Duration to remove a single pile (minutes): 21
  - The engineering design team anticipates that the contractor will take an average of 21 minutes or less to remove each timber pile.

- Propagation (xLogR): 15
  - A practical spreading value of 15 is used because the water in the Project area increases with depth further from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical conditions.

- Distance from source level measurement (meters): 10
  - Per measurements from the Pier 62 Project (Greenbusch 2018) for 14-inch timber piles as discussed above.

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Skagway Ore Terminal Redevelopment Project
PROJECT/SOURCE INFORMATION	See references in IHA Application, Appendix A

Please include any assumptions

PROJECT CONTACT	Julia Fitts, Anchor QEA. See cover letter of IHA.

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	Relying on default due to lack of project-specific information

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (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 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E.1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL_{cum}

Source Level (RMS SPL)	189
Number of piles per day	5
Strike Duration$^{\Delta}$ (seconds)	0.1
Number of strikes per pile	700
Duration of Sound Production (seconds)	350
10 Log (duration of sound production)	25.44
Propagation (xLogR)	15
Distance of source level measurement (meters)*	10

$^{\Delta}$Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005

+Unless otherwise specified, source levels are referenced 1 m from the source.

PK

Source Level (PK SPL)	210
Distance of source level measurement (meters)*	10
Source level at 1 meter	225.0

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

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)	**1,245.8**	**44.3**	**1,483.9**	**666.7**	**48.5**
PK Threshold	219	230	202	218	232
PTS PK isopleth to threshold (meters)	**2.5**	**NA**	**34.1**	**2.9**	**NA**

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

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

SEL_{cum}

Source Level (Single Strike SEL)	
Number of strikes per pile	
Number of piles per day	
Propagation (xLogR)	
Distance of single strike SEL measurement (meters)*	

+Unless otherwise specified, source levels are referenced 1 m from the source.

PK

Source Level (PK SPL)	
Distance of source level measurement (meters)*	
Source level at 1 meter	#NUM!

+Unless otherwise specified, source levels are referenced 1 m from the source.

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)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**
PK Threshold	219	230	202	218	232
PTS PK isopleth to threshold (meters)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**

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**

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

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Skagway Ore Terminal Redevelopment Project
PROJECT/SOURCE INFORMATION	See references in IHA Application, Appendix A

Please include any assumptions

PROJECT CONTACT	Julia Fitts, Anchor QEA. See cover letter of IHA.

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	Relying on default due to lack of project-specific information

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (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 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: Choose either E1-1 OR E.1-2 method to calculate isopleths (not required to fill in sage boxes for both)

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL_{cum}

Source Level (RMS SPL)	193
Number of piles per day	2
Strike Duration$^{\Delta}$ (seconds)	0.1
Number of strikes per pile	1800
Duration of Sound Production (seconds)	360
10 Log (duration of sound production)	25.56
Propagation (xLogR)	15
Distance of source level measurement (meters)*	10

$^{\Delta}$Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005

+Unless otherwise specified, source levels are referenced 1 m from the source.

PK

Source Level (PK SPL)	210
Distance of source level measurement (meters)*	10
Source level at 1 meter	225.0

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

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)	**2,345.7**	**83.4**	**2,794.1**	**1,255.3**	**91.4**
PK Threshold	219	230	202	218	232
PTS PK isopleth to threshold (meters)	**2.5**	**NA**	**34.1**	**2.9**	**NA**

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

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

SEL_{cum}

Source Level (Single Strike SEL)	
Number of strikes per pile	
Number of piles per day	
Propagation (xLogR)	
Distance of single strike SEL measurement (meters)*	

+Unless otherwise specified, source levels are referenced 1 m from the source.

PK

Source Level (PK SPL)	
Distance of source level measurement (meters)*	
Source level at 1 meter	#NUM!

+Unless otherwise specified, source levels are referenced 1 m from the source.

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)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**
PK Threshold	219	230	202	218	232
PTS PK isopleth to threshold (meters)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**

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**

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

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Skagway Ore Terminal Redevelopment Project
PROJECT/SOURCE INFORMATION	See references in IHA, Appendix A

Please include any assumptions

PROJECT CONTACT	Julia Fitts, Anchor QEA. See cover letter of IHA.

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)¥	2.5	Relying on default due to lack of project-specific information

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (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 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	159
Number of piles within 24-h period	5
Duration to drive a single pile (minutes)	45
Duration of Sound Production within 24-h period (seconds)	13500
10 Log (duration of sound production)	41.30
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**12.1**	**1.1**	**17.9**	**7.4**	**0.5**

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)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Skagway Ore Terminal Redevelopment Project
PROJECT/SOURCE INFORMATION	See references in IHA, Appendix A

Please include any assumptions

PROJECT CONTACT	Julia Fitts, Anchor QEA. See cover letter of IHA.

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)¥	2.5	Relying on default due to lack of project-specific information

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (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 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	170
Number of piles within 24-h period	5
Duration to drive a single pile (minutes)	45
Duration of Sound Production within 24-h period (seconds)	13500
10 Log (duration of sound production)	41.30
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**65.6**	**5.8**	**97.0**	**39.9**	**2.8**

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)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.0: 2018

KEY

	User Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Skagway Ore Terminal Redevelopment Project
PROJECT/SOURCE INFORMATION	See references in IHA Application, Appendix A

Please include any assumptions

PROJECT CONTACT	Julia Fitts, Anchor QEA. See cover letter of IHA.

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)¥	2.5	Relying on default due to lack of project-specific information

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (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 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

*** BROADBAND Sources: Cannot use WFA higher than maximum applicable frequency (See GRAY tab for more information on WFA applicable frequencies)**

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	158
Number of piles within 24-h period	18
Duration to drive a single pile (minutes)	21
Duration of Sound Production within 24-h period (seconds)	22680
10 Log (duration of sound production)	43.56
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

+Unless otherwise specified, source levels are referenced 1 m from the source.

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring

requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**14.7**	**1.3**	**21.7**	**8.9**	**0.6**

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)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

Anchor QEA Marine Mammal Take Calculator
Made by: Sarah Montgomery

Instructions: This spreadsheet is designed to aid calculations for the Skagway Project. The first section provides the equation for calculating Level B disturbance thresholds. The second section can help with take calculations.

Practical spreading loss model for underwater sound

R1=R2x10^[(RMS-backgroundRMS)/log value]
Where, R2 is the distance at which the RMS is measured. Use 15 log per NOAA guidance

12-in Timber Removal Level B Harassment Zone

	value	input	notes
R2 (m)		10	see source sound notes in IH
source sound (dbRMS)		158	
background sound (dbRMS)		120	per NOAA guidance, no oth
log value		15	per NOAA guidance
R1 (m)	**3414.548874**		

Steel Vibratory Installation and Removal Level B Harassment Zone - <30 in

	value	input	notes
R2 (m)		10	see source sound notes in IHA
source sound (dbRMS)		159	
ackground sound (dbRMS)		120	per NOAA guidance
log value		15	per NOAA guidance
R1 (m)	**3981.071706**		

Steel Vibratory Installation and Removal Level B Harassment Zone - 36, 42,and 48 in

	value	input	notes
R2 (m)		10	see source sound notes in IHA
source sound (dbRMS)		170	
background sound (dbRMS)		120	per NOAA guidance
log value		15	per NOAA guidance
R1 (m)	**21544.3469**		

24-inch Steel Impact Installation Level B Harassment Zone

	value	input	notes
R2 (m)		10	see source sound notes in IH
source sound (dbRMS)		189	
ound sound (dbRMS)		160	per NOAA guidance
log value		15	per NOAA guidance
R1 (m)	**857.6958986**		

36, 42, 48-inch Steel Impact Installation Level B Harassment Zone

	value	input	notes
R2 (m)		10	see source sound notes in IHA
source sound (dbRMS)		193	
ckground sound (dbRMS)		160	per NOAA guidance
log value		15	per NOAA guidance
R1 (m)	**1584.893**		

Take estimate calculator

Low frequency ceteceans: humpback whale and minke whale

Use first as an example, then copy and repeat for other species. Level B ZOIs are the same for all species. Level A ZOIs are the same within hearing groups.

Humpback whale

fill in density for each species — *fill in stock size for each species*

ZOI		Activity	Construction Method	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)	Estimated Level B Ta	Stock Size
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.0081	0.10773	10103
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39		0.328536	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95		6.98706	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15		2.470095	
Level B	5	Vibratory	Timber remove	8.06	24		1.566864	
Level A	1	Impact	Steel install (24-inch)	0.93	38		0.286254	
Level A	2	Impact	Steel install (36, 42, 48-inch	2.62	39		0.827658	
Level A	3	Vibratory	Steel install/remove <30 in	0	95		0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15		0	
Level A	5	Vibratory	Timber remove	0	24		0	
						Total Level B Take	**11.460285**	
					Alternatively, use BPJ	Total Level A Take	1.113912	
					This is A+B	Total Take Calculated	**12.574197**	
			This is either the total calculated or a best professional judgement			Requested	16	
						Take as percentage of stock	**0.158368801**	

Minke whale

fill in density for each species — *fill in stock size for each species*

ZOI		Activity	Construction Method	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)	Estimated Level B Ta	Stock Size
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.00169	0.022477	0 stock size unknown
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39		0.0685464	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95		1.457794	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15		0.5153655	
Level B	5	Vibratory	Timber remove	8.06	24		0.3269136	
Level A	1	Impact	Steel install (24-inch)	0.93	38		0.0597246	
Level A	2	Impact	Steel install (36, 42, 48-inch	2.62	39		0.1726842	
Level A	3	Vibratory	Steel install/remove <30 in	0	95		0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15		0	
Level A	5	Vibratory	Timber remove	0	24		0	
						Total Level B Take	**2.3910965**	
						Total Level A Take	0.2324088	
						Total Take Calculated	**2.6235053**	
						Requested	7	
						Take as percentage of stock	**#DIV/0!**	

Mid frequency ceteceans: killer whale

Killer Whale

fill in density for each species — *fill in stock size for each species*

ZOI		Activity	Construction Method	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)	Estimated Level B Ta	Stock Size
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.0041	0.05453	3585
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39		0.166296	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95		3.53666	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15		1.250295	
Level B	5	Vibratory	Timber remove	8.06	24		0.793104	
Level A	1	Impact	Steel install (24-inch)	0.01	38		0.001558	
Level A	2	Impact	Steel install (36, 42, 48-inch	0.02	39		0.003198	
Level A	3	Vibratory	Steel install/remove <30 in	0	95		0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15		0	
Level A	5	Vibratory	Timber remove	0	24		0	
						Total Level B Take	5.800885	
						Total Level A Take	0.004756	
						Total Take Calculated	**5.805641**	
						Requested	92	
						Take as percentage of stock	**2.566248257**	

High frequency ceteceans: porpoises

Harbor porpoise

fill in density for each species — *fill in stock size for each species*

ZOI		Activity	Construction Method	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)	Estimated Level B Ta	Stock Size
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.0473	0.62909	1057
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39		1.918488	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95		40.80098	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15		14.424135	
Level B	5	Vibratory	Timber remove	8.06	24		9.149712	
Level A	1	Impact	Steel install (24-inch)	0.72	38		1.294128	
Level A	2	Impact	Steel install (36, 42, 48-inch	1.09	39		2.010723	
Level A	3	Vibratory	Steel install/remove <30 in	0	95		0	

Level A	4	Vibratory	Steel install/remove >30 in	0	15						0	
Level A	5	Vibratory	Timber remove	0	24						0	
						Total Level B Take					66.922405	
						Total Level A Take					3.304851	
						Total Take Calculated					70.227256	
						Requested					74	
						Take as percentage of stock					7.000946074	

Dall's porpoise

						fill in density for each species					*fill in stock size for each species*
ZOI	**Activity**	**Construction Method**	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)				Estimated Level B Ta	**Stock Size**	
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.121				1.6093	13110
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39					4.90776	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95					104.3746	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15					36.89895	
Level B	5	Vibratory	Timber remove	8.06	24					23.40624	
Level A	1	Impact	Steel install (24-inch)	0.72	38					3.31056	
Level A	2	Impact	Steel install (36, 42, 48-inch	1.09	39					5.14371	
Level A	3	Vibratory	Steel install/remove <30 in	0	95					0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15					0	
Level A	5	Vibratory	Timber remove	0	24					0	
						Total Level B Take				171.19685	
						Total Level A Take				8.45427	
						Total Take Calculated				179.65112	
						Requested				183	
						Take as percentage of stock				1.395881007	

Phocid pinnipeds: seals

Harbor seal

ZOI	**Activity**	**Construction Method**	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)				Estimated Level B Ta	**Stock Size**	
Level B	1	Impact	Steel install (24-inch)	0.35	38	1.73				23.009	13338
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39					70.1688	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95					1492.298	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15					527.5635	
Level B	5	Vibratory	Timber remove	8.06	24					334.6512	
Level A	1	Impact	Steel install (24-inch)	0.86	38					56.5364	
Level A	2	Impact	Steel install (36, 42, 48-inch	2.15	39					145.0605	
Level A	3	Vibratory	Steel install/remove <30 in	0	95					0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15					0	
Level A	5	Vibratory	Timber remove	0	24					0	
						Total Level B Take				2447.6905	
						Total Level A Take				201.5969	
						Total Take Calculated				2649.2874	
						Requested				2654	
						Take as percentage of stock				19.89803569	

Otariid pinnipeds: sea lions

Steller sea lion

ZOI	**Activity**	**Construction Method**	ZOI Area (km2)	Days of Activity in ZOI	Species Density (per km2)				Estimated Level B Ta	**Stock Size**	
Level B	1	Impact	Steel install (24-inch)	0.35	38	0.01229				0.163457	130,081
Level B	2	Impact	Steel install (36, 42, 48-inch	1.04	39					0.4984824	
Level B	3	Vibratory	Steel install/remove <30 in	9.08	95					10.601354	
Level B	4	Vibratory	Steel install/remove >30 in	20.33	15					3.7478355	
Level B	5	Vibratory	Timber remove	8.06	24					2.3773776	
Level A	1	Impact	Steel install (24-inch)	0.01	38					0.0046702	
Level A	2	Impact	Steel install (36, 42, 48-inch	0.03	39					0.0143793	
Level A	3	Vibratory	Steel install/remove <30 in	0	95					0	
Level A	4	Vibratory	Steel install/remove >30 in	0	15					0	
Level A	5	Vibratory	Timber remove	0	24					0	
						Total Level B Take				17.3885065	
						Total Level A Take				0.0190495	
						Total Take Calculated				17.407556	
						Requested				213	
						Take as percentage of stock				0.163744129	