

Memorandum

September 27, 2024

- To: Jenna Harlacher and Kathleen Leonard, National Oceanic and Atmospheric Administration
- From: Merri Martz, Brianna Blaud, and Delaney Inman, Anchor QEA
- cc: Brad Ryan, Municipality of Skagway

Re: Incidental Harassment Authorization Renewal Request, Skagway Ore Terminal Redevelopment Project

Introduction

This memorandum has been prepared to request a renewal of the Incidental Harassment Authorization (IHA) for replacement of the Skagway Ore Peninsula Dock in Skagway, Alaska, approved by the National Oceanic and Atmospheric Administration (NOAA) on August 29, 2023, that is valid from October 1, 2023, through September 30, 2024 (Season 1; NOAA 2023). Note that on March 15, 2024, an IHA modification request was submitted to request Level A and B take for northern fur seal. This request was approved and issued on April 30, 2024 (NOAA 2024). This request for renewal is for a second season (Season 2) to complete the work previously authorized by the IHA.

The Municipality of Skagway (MOS) has partially completed the replacement of the Skagway Ore Terminal. The purpose of the project is to 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 project 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 MOS.

Description of Specified Activity Under Renewal

The approved IHA allowed for the following pile-related activities during Season 1:

- Removal of 423 timber piles and 269 steel piles ranging from 10.75 to 30 inches in diameter via vibratory hammer
- Installation of 206 steel piles less than 30 inches in diameter (including 36 temporary piles) and 74 steel piles greater than or equal to 30 inches in diameter via vibratory and impact pile driving.

Work completed in Season 1 is summarized in Table 1. The proposed work for this Season 2 IHA renewal is a subset of the work that was previously authorized, because not all authorized work was completed during the originally authorized year. The proposed activities for Season 2 include installing two 24-inch-diameter steel piles using a vibratory and impact hammer and removing

10 timber piles less than 24-inches in diameter with a vibratory hammer to stabilize an existing fender. The proposed Season 2 activities are necessary to support safe fuel barge mooring. Additional remaining work (i.e., from the original IHA application) is expected to be completed under a new IHA once additional project funding has been obtained. The locations of the completed and remaining work are shown in Attachment 1.

Table 1Summary of Work Completed in Season 1 and Remaining

Pile Type	Installation or Removal Method	Quantity Installed or Removed in Season 1	Quantity Remaining		
Removal (Permanent I					
14-inch Timber Piles	Vibratory	156	267		
<30-Inch Steel Piles	Vibratory	213	56		
Removal (Temporary I	Piles)				
24-Inch Steel Piles	Vibratory	16	20ª		
	Total Removal	385	335		
Installation (Permaner	nt Piles)				
24-Inch Steel Piles	Vibratory and Impact	20	150		
30-Inch Steel Piles ^b	Vibratory and Impact	2	0		
36-Inch Steel Piles	Vibratory and Impact	34	21		
42-Inch Steel Piles	Vibratory and Impact	11	0		
48-Inch Steel Piles	Vibratory and Impact	6	0		
Installation (Tempora	Installation (Temporary Piles)				
24-Inch Steel Piles	Vibratory and Impact	28	8		
	Total Installation	101	181		

Notes:

a. Twelve of the temporary piles remain installed and will have to be removed. The other eight temporary piles will be installed and removed in subsequent seasons.

b. Two 30-inch steel piles were installed that replace two of the proposed 36-inch steel piles, and were monitored the same as for 36-inch piles.

As summarized in Table 1, Season 1, the following work was completed:

- Vibratory removal of 156 timber piles
- Vibratory installation or removal of 51 steel piles 36, 42, and 48 inches in diameter and 279 steel piles 24 and 30 inches in diameter
- Impact installation or proofing of 51 steel piles 36, 42, and 48 inches in diameter and 50 steel piles 24 and 30 inches in diameter

The remaining work includes the following:

• Vibratory removal of 267 timber piles

- Vibratory removal of 56 permanent steel piles <30-inches in diameter and 20 temporary steel piles 24-inches in diameter
- Vibratory installation of 21 steel piles 36 inches in diameter and 158 steel piles 24 inches in diameter (including 8 temporary piles)
- Impact installation or proofing of 21 steel piles 36 inches in diameter and 158 steel piles 24 inches in diameter

Work proposed to be completed in Season 2 includes the following subset of the work:

- Vibratory removal of 10 timber piles less than 24 inches in diameter
- Vibratory installation and impact installation or proofing of two 24-inch-diameter steel piles

Dates, Duration, and Specified Geographic Area

Pile removal and installation will occur during daylight hours. The length of daylight hours will vary over the work window and will range from approximately 6 hours in December to over 13 hours in March. The work will include periods of vibratory removal of timber piles, vibratory installation and impact installation of steel piles.

It is anticipated that the proposed pile activities for Season 2 would be completed in approximately 4 days (2 days for pile installation and 2 days for pile removal).

Monitoring Results for Originally Authorized Work

As part of the originally authorized IHA, Season 1 in-water pile activity occurred at the Skagway Ore Terminal across 145 workdays between October 7, 2023, and April 27, 2024. On most days, pile activity took place periodically throughout the monitoring period, with breaks in hammer activity ranging from fewer than 30 minutes to several hours.

A total of one hundred and fifty-six 14-inch timber piles and 213 steel piles ranging between 20 and 30 inches were removed using a vibratory hammer. A total of 101 steel piles were installed with a combination of vibratory and impact hammer. Of the 101 steel piles installed, 20 piles were 24-inch steel, 2 piles were 30-inch steel, 34 piles were 36-inch steel, 11 piles were 42-inch steel, and 16 piles were 48-inch steel. The removal of timber piles occurred for 8 days, and the removal of steel piles occurred for 22 days. The installation of steel piles 24 and 30 inches occurred on 21 days, and the installation of 36-, 42-, and 48-inch steel piles occurred on 70 days. On some days, multiple activities occurred on a single day.

The "Skagway Ore Terminal Redevelopment Project (POA-2022-00341) Marine Mammal Monitoring Report" (Marine Mammal Monitoring Report) for Season 1 is attached to this renewal request (Attachment 2) and further describes the results of the monitoring effort.

The final IHA for the Skagway Ore Terminal Redevelopment Project included acoustic monitoring of the installation and removal of all pile types. However, this proposed renewal will use the source sound levels used for the originally authorized IHA for consistency and because not all types of piles were monitored during Season 1 (Table 2).

Table 2 Source Sound Levels (Pile Driving with Impact Hammer)

		Source Sound (at 10 m), Season 1		Source Sound (at 10 m), Season 2 ¹	
Pile Type	Construction Method	Peak Sound (dB)	RMS (dB)	Peak Sound (dB)	RMS (dB)
Timber Piles	Vibratory	n/a	158	n/a	158
Up to 30-Inch Steel Piles	Vibratory	n/a	159	n/a	159
36-, 42-, and 48-Inch Steel Piles	Vibratory	n/a	170	n/a²	n/a²
24-Inch Steel Piles	Impact	210	189	210	189
36-, 42-, and 48-Inch Steel Piles	Impact	210	193	n/a²	n/a²

Notes:

1. Sound levels were measured by the near-filed hydrophone; values presented are the median values collected during monitoring.

2. No piles greater than 24 inches in diameter will be installed or removed during Season 2.

dB: decibel

n/a: not applicable

m: meter

The new NOAA draft spreadsheet has been used to calculate the Level A Exclusion Zones. The updated Level A Exclusion Zones and Level B Harassment Zones based on the source sounds presented in Table 2 are shown in Figures 2 through 4 and Table 4 for each species hearing group and pile activity. Because all piles to be installed or removed in Season 2 are 24 inches in diameter or smaller, the updated Level A Exclusion Zones and Level B Harassment Zones are not included for pile activities for piles greater than 24 inches in diameter.

Take Estimates

Throughout the monitoring period, six of the eight potential marine mammal species were observed: Steller sea lion, harbor seal, killer whale, humpback whale, northern fur seal, and Dall's porpoise. Three species were observed in the Level B Harassment Zone during pile removal. Total Level B takes documented during monitoring include 78 Steller sea lions, 246 harbor seals, and 3 northern fur seals. Only harbor seal had documented Level A takes, with 21 takes. The general locations where marine mammals were observed during this monitoring season are presented in Attachment 2.

During monitoring, the number of takes documented for Steller sea lions, harbor seals, and northern fur seals was considerably below the maximum number of Level B takes authorized for these species in

the Project IHA and Amended IHA (NOAA 2023, 2024). Note that the northern fur seal did not have authorized take when the species was observed in the Level B Harassment Zone. On March 15, 2024, an IHA modification request was submitted to request Level A and B take for northern fur seal. This request was approved and issued on April 30, 2024. All Level B takes and observations of this species occurred before the approval of the Amended IHA.

The total number of Level A and Level B takes for Season 1 were only a fraction of what were authorized in the IHA. Level B takes were only 2.2% of authorized take for killer whale, 7.1% of authorized take for humpback whale, 25.5% of authorized take for Steller sea lion, 6.7% of authorized take for northern fur seal, and 8.0% of authorized take for harbor seal takes. As stated previously, only harbor seal had documented Level A takes, and actual take was only 10.9% of the authorized takes for the species.

The authorized takes in the approved IHA and the actual takes are shown in Table 3, and the authorized Level A and Level B zones are shown in Table 4.

Table 3Authorized Incidental Take and Actual Take, Season 1

Species	Stock	Authorized Take by Level B Harassment	Actual Level B Take, Season 1	Authorized Take by Level A Harassment	Actual Level A Take, Season 1
Dall's porpoise (Phocoenoides dalli)	Eastern North Pacific	193	0	43	0
Harbor porpoise (Phocoena phocoena)	Alaska	75	0	17	0
Killer whale (Orcinus orca)	Eastern North Pacific, Northern Residents, Southeast Alaska; Eastern North Pacific, Alaska Residents; West Coast Transients; and Gulf, Aleutian, Bering Transients	90	2	2	0
Humpback Whale (<i>Megaptera novaeangliae</i>)	Central North Pacific Stock (Hawaii DPS)	14	1	2	0
Minke Whale (Balaenoptera acutorostrata)	Alaska	6	0	2	0
Steller sea lion (<i>Eumetopias jubatus</i>)	Eastern U.S. Stock and Western U.S. Stock	270	69	2	0
Northern Fur Seal (Callorhinus ursinus)	United States	45	3ª	2	0
Harbor seal (Phoca vitulina)	Alaska – Lynn Canal/Stephens Passage	2,760	233	193	21

Note:

a. Northern fur seal did not have authorized take when observed; an IHA Amendment Request was submitted on March 15, 2024, and issued on April 30, 2024. DPS: distinct population segment

This renewal requests a change in the Level A Exclusion Zones and Level B Harassment Zones for vibratory removal/installation of steel piles less than 30 inches and impact pile driving for all steel piles based on the draft NOAA calculator (NMFS 2024). Table 4 describes the proposed Level A and Level B zones. Attachment 3 of this report provides the calculations for the proposed shutdown and harassment zones.

Table 4

Exclusion Zone and Level B Harassment Zone Monitoring Thresholds, by Species Group and Pile Activity ^a

Zone Threshold ^a	Distance Zone Extends from Source Sound (m) ^b	Hearing Group
Vibratory Removal of Timber Piles		
	5	Low-Frequency Cetaceans
	2	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	4	Very High-Frequency Cetaceans
	6	Phocid Pinnipeds
	2	Otariid Pinnipeds
Level B Harassment Threshold (Take)	3,415	All Cetaceans and Pinnipeds
Vibratory Installation and Removal (24-In	nch Steel Piles)	
	6	Low-Frequency Cetaceans
	2	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	5	Very High-Frequency Cetaceans
	7	Phocid Pinnipeds
	2	Otariid Pinnipeds
Level B Harassment Threshold (Take)	3,981	All Cetaceans and Pinnipeds
Impact Installation (24-Inch Steel Piles)		
	1,970	Low-Frequency Cetaceans
	251	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	3,049	Very High-Frequency Cetaceans
	1,750	Phocid Pinnipeds
	653	Otariid Pinnipeds
Level B Harassment Threshold (Take)	858	All Cetaceans and Pinnipeds

Notes:

a. Refer to Attachment 3 for proposed shutdown and harassment zone calculations; zones are shown in Figures 2 through 4

b. Rounded up to nearest whole number

m: meter

Sources: NOAA 2018; NOAA 2023

The requested take for the eight authorized species has been updated to reflect the remaining pile activities, anticipated duration and zones for Season 2. As stated previously, the location of

remaining and completed pile activities are included as Attachment 1. The methods and rationale for estimating take used in the original IHA application and modification are applied here and shown in Table 5.

Table 5		
Summary of Re	quested 1	Гakes

Species	Stock	Level A Take	Level B Take	Stock Abundance	Percent of Stock
Dall's porpoise (Phocoenoides dalli)	Eastern North Pacific	2	6	13,110	0.06
Harbor porpoise (Phocoena phocoena)	Alaska	1	2	1,057	0.28
Killer whale (Orcinus orca)	Eastern North Pacific, Northern Residents, Southeast Alaska; Eastern North Pacific, Alaska Residents; West Coast Transients; and Gulf, Aleutian, Bering Transients	2	10	302 + 2,347 + 349 + 587 = 3,585	0.33
Humpback Whale (<i>Megaptera novaeangliae</i>)	Central North Pacific Stock (Hawaii DPS)	1	2	10,103	0.03
Minke Whale (Balaenoptera acutorostrata)	Alaska	1	1	Unknown	Unknown
Steller sea lion (Eumetopias jubatus)	Eastern U.S. Stock and Western U.S. Stock	1	15	77,149 + 52,932 = 130,081	0.012
Northern Fur Seal (Callorhinus ursinus)	United States	1	4	626,128	0.00079
Harbor seal (Phoca vitulina)	Alaska – Lynn Canal/Stephens Passage	15	75	13,338	0.60

Monitoring and Reporting

Marine mammal monitoring and reporting will be completed and submitted for Season 2 in the same manner as outlined in the approved original and modified IHA for Season 1 and the approved marine mammal monitoring plan (NOAA 2023; NOAA 2024; Anchor QEA 2023). Marine mammal monitoring will be conducted during in-water pile driving and removal and will occur in the locations shown in Figure 5. The Skagway Ore Terminal Redevelopment Project (POA-2022-00341) Marine Mammal Monitoring Season 2 Report will be drafted following the conclusion of the second season of

construction and will include a description of the pile-driving and removal activities, the monitoring effort, total takes, takes by day, Stop Work Orders for each species, and information on observed behavior for all work that occurs during the next construction season. This report will be submitted to the NOAA Office of Protected Resources at the end of the construction.

References

- Anchor QEA, 2023. Marine Mammal Monitoring Plan: Skagway Ore Terminal Redevelopment Project. December 2023.
- Caltrans (California Department of Transportation), 2020. *Technical Guidance for the Assessment of Hydroacoustic Effects of Pile Driving on Fish (2020 Update)*. California Department of Transportation, Division of Environmental Analysis. October 2020.
- NMFS (National Marine Fisheries Service), 2024. 2024 Update to Technical Guidance for Assessing the Effects of Anthropogenic Noise in Marine Mammal Hearing: Underwater and In-Air Thresholds for Onset of Auditory Injury and Temporary Threshold Shifts (Version 3.0). National Marine Fisheries Service. Available at: https://www.fisheries.noaa.gov/s3/2024-05/NMFSAcousticGuidance-2024DRAFTBLANKUSERSPREADSHEET-OPR1.xlsx.
- NOAA (National Oceanic and Atmospheric Administration), 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound in Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts.
 Silver Springs, Maryland: Office of Protected Resources, National Marine Fisheries Service.
 NOAA Technical Memorandum NMFS-OPR-59. April 2018. Available at: https://www.fisheries.noaa.gov/resource/document/technical-guidance-assessing-effectsanthropogenic-sound-marine-mammal-hearing.
- NOAA, 2023. Marine Mammal Protection Act Incidental Harassment Authorization for the Skagway Ore Terminal Redevelopment Project. September 5, 2023.
- NOAA, 2024. Marine Mammal Protection Act Skagway Ore Peninsula Redevelopment Project Modified Incidental Harassment Authorization. May 3, 2024.

Figures

Figure 1	Vicinity Map
Figure 2	Vibratory Installation and Removal of 30-Inch and Smaller Piles
Figure 3	Exclusion and Harassment Zones for Timber Pile Vibratory Removal
Figure 4	Impact Installation of 24-inch Steel Piles
Figure 5	Marine Mammal Monitoring Locations

Attachments

Attachment 1	Locations of Completed and Remaining Work
Attachment 2	Skagway Ore Terminal Redevelopment Project (POA-2022-00341) Marine Mammal Monitoring Season 1 Report
Attachment 3	NMFS User Spreadsheet for Project Activities

Figures





Vicinity Map Updated Incidental Harassment Authorization Renewal Request Skagway Ore Terminal Redevelopment Project

Figure 1



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Figure 2 Vibratory Installation and Removal of 30-inch and Smaller Piles





- Low-Frequency Cetaceans (17 feet / 5 meters)
- High-Frequency Cetaceans (7 feet / 2 meters)
- Very High-Frequency Cetaceans (13 feet / 4 meters)
- Phocid Pinnipeds (20 feet / 6 meters)
- Otariid Pinnipeds (7 feet / 2 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (11,204 feet / 3,415 meters)

the dashed line.

In instances where exclusion zone threshold is less than 10 meters, stop work will be initiated at the 10 m threshold.
Basemap: Esri World Topographic Map and Esri World Imagery



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Figure 3 **Exclusion and Harassment Zones for Timber Pile Vibratory Removal**



LEGEND:

Hammer Location

Level A Exclusion Zone

- Low-Frequency Cetaceans (6,465 feet / 1,970 meters)
- High-Frequency Cetaceans (825 feet / 251 meters)
- Very High-Frequency Cetaceans (10,004 feet / 3,049 meters)
- Phocid Pinnipeds (5,743 feet / 1,750 meters)
- Otariid Pinnipeds (2,141 feet / 653 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (2,814 feet / 858 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. Basemap: Esri World Topographic Map and Esri World Imagery



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Figure 4 Impact Installation of 24-inch Steel Piles



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Figure 5 Marine Mammal Monitoring Locations

Attachment 1 Locations of Completed and Remaining Work



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1601 5th Avenue, Suite 1300 Soattle Washington 99101		
(206) 382-0600 Fax (206) 382-0500		



Attachment 2 Skagway Ore Terminal Redevelopment Project (POA-2022-00341) Season 1 Marine Mammal Monitoring Report

Memorandum

August 12, 2024

- To: Brad Ryan, Municipality of Skagway
- From: Brianna Blaud and Delaney Inman, Anchor QEA
- cc: Jenna Harlacher, National Oceanic and Atmospheric Administration; Kathleen Leonard, National Marine Fisheries Service

Re: Skagway Ore Terminal Redevelopment Project (POA-2022-00341) Marine Mammal Monitoring Report

This report provides the marine mammal monitoring results for in-water work occurring between October 7, 2023, and April 27, 2024, for the Skagway Ore Terminal Redevelopment Project (Project). The Skagway Ore Terminal is located on the Port of Skagway waterfront in Skagway, Alaska (Figure 1). In compliance with the Endangered Species Act and the Marine Mammal Protection Act, marine mammal monitoring was conducted during all in-water pile removal and installation activities for the Project. Monitoring data are providing in Attachment A. As part of the Marine Mammal Protection Act compliance, the National Oceanic and Atmospheric Administration (NOAA) issued an Incidental Harassment Authorization (IHA) for in-water pile removal and installation, which allows take of marine mammals by harassment incidental to pile removal activities at the Skagway Ore Terminal.

Marine Mammal Monitoring Methods

Marine mammal monitoring methods and protocols were established per agency guidelines and permits, based on information in the following Project monitoring plan and permit documents:

- Request for Incidental Harassment Authorization: Skagway Ore Terminal Redevelopment Project (Anchor QEA 2023a)
- Marine Mammal Monitoring Plan for the Skagway Ore Terminal Redevelopment Project (MMMP; Anchor QEA 2023b)
- Marine Mammal Protection Act Incidental Harassment Authorization for the Skagway Ore Terminal Development Project (NOAA 2023)
- Skagway Ore Peninsula Redevelopment Project Incidental Harassment Authorization Amendment Request (Anchor QEA 2024)
- Skagway Ore Terminal Redevelopment Project Acoustic Monitoring Report (Attachment B)

Under the 2023 IHA, the Project was required to monitor for seven species (NOAA 2023). Additionally, following sightings of a northern fur seal yearling on January 8, 9, 10, and 24 and February 3, 9, and 12, 2024, the Project monitored for northern fur seal and requested an IHA amendment in March 2024 (Anchor QEA 2024). The eight species, including northern fur seal, are organized into the following five functional hearing groups:

- High-Frequency Cetaceans (Porpoises)
 - Dall's porpoise (Phocoenoides dalli)
 - Harbor porpoise (Phocoena phocoena)
- Mid-Frequency Cetaceans (Dolphins and Whales)
 - Killer whale (Orcinus orca)
- Low-Frequency Cetaceans (Whales)
 - Humpback whale (*Megaptera novaeangliae*)
 - Minke whale (*Balaenoptera acutorostrata*)
- Otariid Pinnipeds (Sea Lions/Eared)
 - Steller sea lion (Eumetopias jubatus)
 - Northern fur seal (Callorhinus ursinus)
- Phocid Pinnipeds (Seals/Earless)
 - Harbor seal (*Phoca vitulina*)

The monitoring area included an Exclusion Zone (Level A Take) and a Harassment Zone (Level B Take) for each group. The two zones varied by pile type, pile installation method, and marine mammal functional hearing group. The Exclusion Zone was composed of areas where a Stop Work Order was to be issued if species were present or approaching the zone. Within the Level B Harassment Zones, marine mammals were closely monitored, take was documented, and work was allowed to continue. Exclusion Zones and Level B Harassment Zones were established for each hearing group based on the following types of in-water pile removal construction activity:

- Vibratory removal of timber piles
- Vibratory installation and removal of steel piles up to 30 inches
- Vibratory installation and removal of 36-, 42-, and 48-inch steel piles
- Impact installation of steel piles up to 30 inches
- Impact installation of 36-, 42-, and 48-inch steel piles

The Exclusion Zones and Level B Harassment Zones implemented are presented in Table 1 and shown in Figure 2 for vibratory removal of timber piles, Figure 3 for vibratory installation and removal of steel piles up to 30 inches, Figure 4 for vibratory installation and removal of 36-, 42-, and 48-inch steel piles, Figure 5 for impact installation of steel piles up to 30 inches, and Figure 6 for impact installation of 36-, 42-, and 48-inch steel piles.

Table 1Exclusion Zone and Level B Harassment Zone Monitoring Thresholds, by Species Group andPile Activity

Zone Threshold	Distance Zone Extends from Source Sound (m) ^a	Species Group
Vibratory Removal of Tim	ber Piles	
	25	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	10	Mid-Frequency Cetaceans, Otariid Pinnipeds, and Phocid Pinnipeds
	15	Low-Frequency Cetaceans
Level B Harassment Threshold (Take)	3,415	All Cetaceans and Pinnipeds
Vibratory Installation and	Removal (up to 30-Inch Steel Piles)	1
	20	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	10	Mid-Frequency Cetaceans, Otariid Pinnipeds, and Phocid Pinnipeds
	15	Low-Frequency Cetaceans
Level B Harassment Threshold (Take)	3,985	All Cetaceans and Pinnipeds
Vibratory Installation and	Removal (36-, 42-, and 48-Inch Steel Piles)	
	100	High-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	10	Mid-Frequency Cetaceans, Otariid Pinnipeds
	70	Low-Frequency Cetaceans
	40	Phocid Pinnipeds
Level B Harassment Threshold (Take)	16,300 ^b	All Cetaceans and Pinnipeds
Impact Installation (24-Inc	h Steel Piles)	
	1,485	High-Frequency Cetaceans
	45	Mid-Frequency Cetaceans
Level A Exclusion Zone (Stop Work Order)	1,250	Low-Frequency Cetaceans
	50	Otariid Pinnipeds
	670	Phocid Pinnipeds
Level B Harassment Threshold (Take)	860	All Cetaceans and Pinnipeds
Impact Installation (36-, 4	2-, and 48-Inch Steel Piles)	
	2,795	High-Frequency Cetaceans
	85	Mid-Frequency Cetaceans
Level A Exclusion Zone	2,350	Low-Frequency Cetaceans
	95	Otariid Pinnipeds
	1,260	Phocid Pinnipeds

Zone Threshold	Distance Zone Extends from Source Sound (m) ^a	Species Group
Level B Harassment Threshold (Take)	1,585	All Cetaceans and Pinnipeds

Notes:

a. Rounded up to nearest whole number

b. Shoreline of Taiya Inlet obstructs sound transmission and limits the extent of the Level B Harassment Zone Sources: NOAA 2018; NOAA 2023

Monitoring was performed by three Protected Species Observers (PSOs), including two land-based PSOs and one boat-based PSO, for vibratory installation and removal of steel piles less than 30 inches in diameter and for vibratory removal of timber piles, as shown in Figures 2, 3, 5, and 6.

For all monitoring events, the lead PSO (i.e., the Monitoring Coordinator [MC]) was located at the best viewing point adjacent to the construction site (typically at the Railroad Dock) to survey the nearshore environment immediately surrounding active pile-related construction. The additional land-based PSO was located northwest from the construction site at Yakutania Point, and the final PSO was located on a moving boat to provide full coverage by observing the farther reaches of the Level A Exclusion and Level B Harassment Zones for this activity.

Four PSOs were required for vibratory installation and removal of the 36-, 42-, and 48-inch steel piles, the three locations described previously plus an additional land-based PSO located approximately halfway down Taiya Inlet at Kasidaya Creek. For this activity, which covers a larger monitoring area, the boat-based observer monitored the outer third of the Level B Harassment Zone. These zones are shown in Figure 4.

Trained PSOs for this Project used binoculars to search the monitoring zones for the presence of marine mammals during pile removal activities. Observations and positions of marine mammals were recorded on a daily electronic form within Esri's Survey123 application on each observer's phone, which was developed prior to program implementation for efficient and consistent data collection. The following data were collected:

- Date
- Time observation begins and ends
- Site
- Construction activity during monitoring period
- Weather conditions and environmental conditions that could deter or prevent marine mammal detections
- Identification and number of marine mammal species observed
- Location of marine mammals observed
- Observable species behavior during pile removal activities

- Monitoring zone at time of observation
- Distances from pile activities to marine mammals
- Communication between the observers and the contractor or the Municipality of Skagway (MOS)
- Reason observation was or was not recorded as take, if applicable

The locations of marine mammal sightings were also noted, shown in Figures 7 and 8. Take numbers were tallied each day to ensure the Project did not exceed the authorized number of incidental takes for each species.

Skagway Ore Terminal Redevelopment Project Marine Mammal Monitoring Results

Marine mammal monitoring during pile removal and installation activities was performed by trained PSOs for the Project between October 7, 2023, and April 27, 2024. There were several breaks in pile driving during this period, notably there was no pile removal or installation work, and therefore no monitoring occurred on the following dates:

- October 15 to 26, 2023
- October 30 to 31, 2023
- November 4 to 6, 2023
- November 8 to 14, 2023
- November 16, 2023*1
- November 18 to 28, 2023
- December 8 to 9, 2023
- December 11 to 13, 2023
- December 14, 2023*
- December 15 to 17, 2023
- December 19, 2023
- December 22, 2023 to January 4, 2024
- January 11, 2024*
- January 12, 2024
- January 17 to 21, 2024*
- January 27, 2024*
- February 10, 2024*

- February 15, 2024
- February 22, 2024^{*}
- February 24, 2024
- February 28, 2024*
- March 3, 2024*
- March 7 to 8, 2024
- March 14, 2024*
- March 18 to 20, 2024
- March 28, 2024
- March 31, 2024
- April 2 to 5, 2024
- April 7, 2024
- April 9 to 14, 2024
- April 16, 2024
- April 19, 2024
- April 23 to 26, 2024

¹ An asterisk denotes pile driving was scheduled but called off due to high winds.

Overall, removal and installation of steel and timber piles occurred for a total of 145 days between October 7, 2023, and April 27, 2024. On most days, pile activity took place periodically throughout the monitoring period, with breaks in hammer activity ranging from fewer than 30 minutes to several hours.

Table 2 summarizes the pile activity completed in Season 1 and the quantity remaining to be completed in a subsequent season. A total of one hundred and fifty-six 14-inch timber piles and 213 steel piles ranging between 10.75 and 30 inches were removed using a vibratory hammer. A total of 101 steel piles were installed with a combination of vibratory and impact hammer. Of the 101 steel piles installed, 73 were permanent piles, which included twenty 24-inch steel piles, two 30-inch steel piles, thirty-four 36-inch steel piles, eleven 42-inch steel piles, and six 48-inch steel piles. Additionally, 28 template 24-inch steel piles were installed; 16 of them were removed in Season 1. This activity is summarized below in Table 2. The removal of timber piles occurred for 8 days, and the removal of steel piles occurred for 22 days. The installation of steel piles less than 30 inches occurred on 21 days, and the installation of 36-, 42-, and 48-inch steel piles occurred on 70 days. On some days, multiple activities occurred on a single day.

Pile Type	Installation or Removal Method	Quantity Installed or Removed	Quantity Remaining		
Removal (Permanent Pil	es)				
14-inch Timber Piles	Vibratory	156	267		
20 to 30-Inch Steel Piles	Vibratory	213	56		
Removal (Temporary Pil	es)				
24-Inch Steel Piles	Vibratory	16	20ª		
	Total Removal	385	335		
Installation (Permanent	Piles)				
24-Inch Steel Piles	Vibratory and Impact	20	150		
30-Inch Steel Piles	Vibratory and Impact	2	0		
36-Inch Steel Piles	Vibratory and Impact	34	21		
42-Inch Steel Piles	Vibratory and Impact	11	0		
48-Inch Steel Piles	Vibratory and Impact	6	0		
Installation (Temporary	Installation (Temporary Piles)				
24-Inch Steel Piles	Vibratory and Impact	28	8		
	Total Installation	101	181		

Table 2

Summary	of Pile	Activity	Completed in	Season	1
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Note:

a. Twelve of the temporary piles remain installed and will have to be removed. The other eight temporary piles will be installed and removed next season.

Throughout the monitoring period, six of the eight potential marine mammal species were observed: Steller sea lion, harbor seal, killer whale, humpback whale, northern fur seal, and Dall's porpoise. Four species were observed in the Level B Harassment Zone during pile removal. Total Level B takes documented during monitoring include 69 Steller sea lions, 233 harbor seals, 3 northern fur seals, 2 killer whales, and 1 humpback whale. Only harbor seals had documented Level A takes, with 21 takes. The general locations where marine mammals were observed during this monitoring season are presented in Figures 7 and 8.

During monitoring, the number of takes documented for Steller sea lions, harbor seals, and northern fur seals was considerably below the maximum number of Level B takes authorized for these species in the Project IHA and Amended IHA (NOAA 2023, 2024). Note that the northern fur seal did not have authorized take when the species was observed in the Harassment Zone. On March 15, 2024, an IHA modification request was submitted to request Level A and B take for northern fur seal. This request was approved and issued on April 30, 2024. All Level B take and observations of this species occurred before the approval of the Amended IHA.

Table 3 compares documented take per species to the amount of authorized Level A and Level B takes.

Species	Documented	IHA-Authorized	Documented	IHA-Authorized
Species	LeverAlake	Level A Take	Level D Take	Level D Take
Dall's Porpoise	0	43	0	193
Harbor Porpoise	0	17	0	75
Killer Whale	0	2	2	90
Humpback Whale ^a	0	2	1	14
Minke Whale	0	2	0	6
Steller Sea Lion	0	2	69	270
Northern Fur Seal	0	2	3 ^b	45
Harbor Seal	21	193	233	2,760

Table 3 Take Per Species

Notes:

a. Humpback whale take is a combination of two stocks, the Hawaii and Mexico-North Pacific stocks.

b. Northern fur seal did not have authorized take when observed; an IHA Amendment Request was submitted on March 15, 2024, and issued on April 30, 2024.

Information on Non-Compliance

Unexpected Presence of Northern Fur Seal: On January 8, 2024, a northern fur seal yearling was observed by a PSO from the construction site monitoring location. The individual was observed again on January 9 and 10, 2024, and was tracked by an MOS vessel until the northern fur seal left the Project area. The vessel maintained a 100-yard distance and shut down the engine when the

northern fur seal approached the vessel. The northern fur seal was observed grooming and swimming but did not appear to be actively foraging. Northern fur seals have not been previously observed in Skagway and were not expected to appear in the Project area; therefore, no take for the species was requested in the original IHA. As stated previously, this resulted in a small unauthorized take of the species when it unexpectedly appeared in the Level B zone, and subsequently, an IHA amendment request was submitted.

When the northern fur seal was observed, Anchor QEA and MOS immediately initiated communication with NOAA to discuss how to ensure the animal's safety while in the area. Northern fur seal biologists and marine mammal veterinarians deemed that the individual was in normal body condition and behaving normally. Facilitated movement of the northern fur seal was not approved, and there was no authorized take for this species at the time, so Project work was shut down until the northern fur seal left the Project area by its own volition.

Impact Driving Without Soft Start: On December 6, the contractor conducted pile-driving analyzer (PDA) testing using an impact hammer without a soft start against the advice and recommendations of the MC and MOS. The non-compliance was documented and reported to NOAA in the December Monthly Report. For additional PDA testing, the following best practices were used when soft start on the testing pile were not feasible:

- Conducting a soft start on a nearby or adjacent pile, then moving to the pile of interest for the PDA test
- Scheduling the test to take place after the contractor used the impact hammer for another pile installation and conducting the test within 30 minutes of previous impact hammer use
- Installing a separate pile to be removed later, which the contractor could use for soft start

Missed Timber Pile Removal: The issued IHA for this Project included acoustic monitoring of the installation and removal of all pile types. Due to faster-than-anticipated removal of the timber piles, the contractor completed timber pile removal 10 days sooner than was planned. This resulted in the acoustic monitoring team being unable to reach Skagway before the completion of this activity, precluding them from collecting measurements for this specific pile activity. Further, removal of each pile took a maximum of 5 minutes, so acoustic monitoring could only have occurred for a few seconds at a time. This deviation was discussed with and approved by NOAA staffers. Extra acoustic monitoring occurred on other pile types, and an addendum to the MMMP was submitted to reflect these changes.

Stop Work Initiation

On 16 days when pile installation or removal activity was planned, high winds resulted in environmental conditions that warranted a stop or delay of pile removal activities because marine mammal species could not be observed. Pile activity was delayed or modified on 23 days due to marine mammal activity. A summary of delays or stop-work initiation associated with marine mammal activity is as follows:²

- On November 30, 2023, the soft-start period for the impact installation of 36-inch piles began at 0900, work was delayed for 14 minutes at 0901 when three harbor seals surfaced just inside the shutdown zone. The three harbor seals were observed leaving the shutdown zone at 0915. Pile driving resumed at 0916. Three Level A harbor seal takes occurred during this time.
- On December 6, 2023, the contractor was prepared to begin work at 0952, and the Harassment Zone was not clear until 1002. There was a 10-minute construction delay as a result. As a result of these modifications, no takes occurred on this day.
- On December 20, 2023, four harbor seals were observed within the shutdown zone at 1547 while the hammer was being set up. Work was delayed until sunset due to harbor seal presence in the shutdown zone until in-water work was called off for the day at 1625. As a result of these modifications, no Level A takes occurred on this day.
- On January 9, 2024, a northern fur seal juvenile, described in detail previously was sighted and forced a shutdown of the Project at 0850. The northern fur seal was spotted throughout the day inside the shutdown zone for otariid pinnipeds. The shutdown continued for the rest of the day. MOS City Manager made the decision at 1355 to end the possibility of in-water work and stand down the marine mammal monitoring watch until the following day. One Level B northern fur seal take occurred during this time.
- On January 10, 2024, the northern fur seal juvenile was sighted again within the shutdown zone and forced a shutdown of the Project at 0954. The species had completely left the monitoring zone at 1345, and construction resumed. One Level B northern fur seal take occurred during this time.
- On January 13, 2024, the impact installation of 42-inch steel piles was delayed due to a harbor seal sighting in the shutdown zone at 1255, before pile activity began. The harbor seal was not sighted again, and work resumed at 1311. As a result of this delay, no pile driving occurred while the harbor seal was in the zone, thus no takes occurred during this period.
- On January 22, 2024, the impact installation of 42-inch steel piles was shut down due to a harbor seal sighting in the shutdown zone at 1438 while pile driving was occurring. The harbor seal was not sighted again, and work resumed at 1507. One Level A harbor seal take occurred during this time.
- On January 23, 2024, during vibratory removal of 36-inch steel piles, there was a 2-minute shutdown of pile activity from 1200 to 1202 while the MC confirmed essential operations information with PSOs. This shutdown was not due to the presence of a protected species, thus, no take occurred.

² Note that take occurred without shutdown on several occasions when animals immediately left the zone before shutdown procedures could be initiated or when animals were observed in the shutdown zone immediately after pile activity stopped.

- On January 24, 2023, no in-water work occurred due to the presence of a northern fur seal heading toward the site. As a result of these modifications, no takes occurred during this period.
- On January 29, 2024, no in-water work occurred due to sightings of seven harbor seals in the shutdown zone between 0836 and 1027. As a result of these modifications, no takes occurred during this period.
- On February 1, 2024, impact installation of 36-inch piles was delayed for 11 minutes at 1229 when two harbor seals surfaced in the shutdown zone. The two harbor seals were observed leaving the shutdown zone at 1239. Pile driving resumed at 1240. As a result of these modifications, no takes occurred during this period.
- On February 2, 2024, impact installation of 36-inch piles was delayed for 10 minutes at 0923 when two harbor seals surfaced in the shutdown zone. The two harbor seals were observed leaving the shutdown zone at 0932. Pile driving resumed at 0933. Two Level A takes of harbor seal occurred during this time period. Note that the two harbor seals entered the shutdown zone for only one impact blow.
- On February 3, 2024, the impact installation of 36-inch steel piles was delayed for 99 minutes due to a harbor seal sighting in the shutdown zone at 1355. The clear was given when the seal had not been observed for 15 minutes, and work resumed at 1534.
- On February 12, 2024, vibratory installation of 24-inch template pile was delayed for 3 minutes due to a northern fur seal sighting at 0741 in the zone prior to the start of pile activity. The clear was given when the seal had not been sighted for 15 minutes and work was cleared at 0818. As a result of these modifications, no takes occurred during this period.
- On February 14, 2024, the impact installation of 48-inch steel piles was delayed for 268 minutes due to several harbor seals resting in the Exclusion Zone at 0907. The clear was given when the seals were out of the shutdown zone for 15 minutes, and work resumed at 1335. As a result of these modifications, no takes occurred during this period.
- On February 17, 2024, the impact installation of 48-inch steel piles was delayed for 13 minutes due to several harbor seals resting in the Exclusion Zone at 1503. The contractor switched to vibratory installation of 24-inch steel piles, allowing work to continue at 1516. A second delay occurred at 1618 when a harbor seal and a Steller sea lion were observed in the shutdown zone. Impact installation resumed at 1643 when the harbor seal was observed leaving the shutdown zone and the Steller sea lion was observed outside of and heading away from the shutdown zone. Eight total Level B takes of harbor seal occurred due to vibratory pile driving, five at 1530 and three at 1605. Two Level B takes of Steller sea lion occurred at 1544 during vibratory pile driving. An additional Level B take of Steller sea lion and two Level A takes of harbor seal occurred at 1743 and 1151, respectively, unrelated to the described shutdown during impact pile driving because they did not occur during active pile driving.

- On February 19, 2024, the impact installation of 48-inch steel piles was delayed for 43 minutes due to several harbor seals sighted in the shutdown zone at 1503. The clear was given when the seals were observed leaving the zone, and work resumed at 1707. As a result of these modifications, no takes occurred during this period.
- On February 26, 2024, the impact installation of 48-inch steel piles was delayed for 95 minutes due to several harbor seals sighted in the shutdown zone at 0755. The clear was given when the seals were observed leaving the zone, and work resumed at 0930. A shutdown occurred at 1131 when three harbor seals were observed moving toward the shutdown zone, and work resumed at 1146 after they were not observed for 15 minutes. Work was shut down before the harbor seals entered the zone, so no take occurred.
- On March 12, 2024, the vibratory installation of 36-inch steel piles was delayed for 47 minutes due to three harbor seals sighted in the shutdown zone at 0730, before pile driving began. The clear was given when the seals were observed leaving the zone, and work began at 0817. As a result of this delay, no pile driving occurred while the harbor seals were in the zone, thus no takes occurred during this period.
- On March 15, 2024, the impact installation of 36-inch steel piles was delayed for 189 minutes due to several harbor seals being sighted in the shutdown zone at 1030. No pile driving activity was occurring during the sighting. The clear was given when the harbor seals were observed leaving the zone, and work resumed at 1339. As a result of this delay, no pile driving occurred while the harbor seals were in the zone, thus no takes occurred during this period.
- On March 24, 2024, the impact installation of 36-inch steel piles was shut down at 1735 due to several harbor seals being sighted in the shutdown zone. The harbor seals remained in the zone until the contractor ended the workday at 1835. Two Level A takes of harbor seals occurred as a result of this activity.
- On March 25, 2024, the impact installation of 36-inch steel piles was delayed or shut down for a total of 67 minutes due to the presence of several harbor seals in the shutdown zone. The first delay began at 0800 when a harbor seal was spotted in the shutdown zone. The shutdown zone was declared clear at 0820 until another harbor seal was spotted in the shutdown zone at 0832, restarting the delay until 0914, when work began. Because work had not started before this time, no take was documented during these delays. Shutdown then occurred when a harbor seal surfaced in the shutdown zone during impact pile driving at 0958, resulting in one Level A take. The harbor seal was observed leaving the shutdown zone at 1003, and pile driving resumed.
- On March 26, 2024, the impact installation of 24-inch steel piles was delayed for 2 minutes due to several harbor seals being sighted in the shutdown zone at 1038. Because work had not started yet, no take was documented during this delay. Preparations for impact pile driving were complete at 1133, and the clear was given when the harbor seals were observed

leaving the zone, and work resumed at 1135. As a result of this delay, no takes occurred during this period.

 On March 27, 2024, the impact installation of 36-inch steel piles was shut down at 0658 due to several harbor seals being sighted approaching and then entering the shutdown zone. The last harbor seal was observed exiting the shutdown zone at 1205, resulting in a 307-minute shutdown. All harbor seal sightings occurred during the soft-start procedure of impact pile driving, and no takes occurred during this period.

Marine Mammal Observations

Table 4 and Tables A-1, A-2, and A-3 in Attachment A summarize marine mammal observations during and between periods of pile activity.

Table 4

Species	Pile Activity	Number of Observations	Total Animals ¹	Mean Observation Duration in Minutes (min, max)	Mean Group Size (min, max)	Closest Distance to Pile (m)
Dall's Impac install No pile activity	Vibratory removal					
	Vibratory install					
	Impact install					
	No pile activity	2	10	12 (9, 15)	6.50 (3, 10)	11,200
Killer Vibrat Killer insta whale Impa insta No p activi	Vibratory removal					
	Vibratory install	1	2	6	2 (2, 2)	800
	lmpact install					
	No pile activity	15	25	22.67 (1, 89)	3.80 (1, 12)	500
	Vibratory removal	6	1	16 (1, 62)	1 (1, 1)	275
Humpback _ whale _	Vibratory install					
	Impact install					
	No pile activity	1	1	85	1 (1, 1)	400
Steller sea lion	Vibratory removal	10	13	13.00 (1, 29)	1.67 (1, 4)	300

Summary of Marine Mammal Observations

Species	Pile Activity	Number of Observations	Total Animals ¹	Mean Observation Duration in Minutes (min, max)	Mean Group Size (min, max)	Closest Distance to Pile (m)
	Vibratory install	46	32	24.92 (1, 302)	1.5 (1, 4)	100
	Impact install	13	16	7.67 (1, 25)	1.87 (1, 5)	300
	No pile activity	228	192	9.68 (<1, 305)	1.44 (1, 7)	20
	Vibratory removal	2	2	2.50 (<1, 5)	1 (1, 1)	400
Northern fur seal	Vibratory install					
	Impact install	1	1	6	1 (1, 1)	300
	No pile activity	4	2	6.50 (2, 16)	1 (1, 1)	280
	Vibratory removal	37	48	16.35 (<1, 148)	2.08 (1 ,8)	250
Harbor	Vibratory install	62	109	35.53 (1, 216)	3.58 (1, 13)	210
seal	Impact install	30	77	18.50 (<1, 130)	4.53 (1, 15)	250
	No pile activity	252	369	20.72 (<1, 236)	2.62 (1, 13)	11
	Total	704	599	17.86 (<1, 305)		

Notes:

1. Repeated sightings of same animal on same day counted only once to account for total number of animals observed.

--: not applicable

Dall's Porpoise

A total of 10 Dall's porpoises were observed during the first season of construction activity. Sightings for Dall's porpoise occurred on November 1, 2023. The two observations included a group of 3 and a group of 10, observed 2 hours apart during a period of no pile activity. The group of 10 was observed foraging, whereas the group of 3 that had separated from the original group was observed later and was swimming away from the monitoring zone. The PSO had a high confidence in the marine mammal identification, and all individuals observed were adults.

Dall's porpoise information from the daily monitoring forms is presented in Tables A-1, A-2, and A-3 in Attachment A. Table 5 summarizes Dall's porpoise takes per monitoring site during monitoring. No take of Dall's porpoise was documented at any monitoring site.

Monitoring Site	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	0
Construction Site	0	0
Yakutania	0	0
Kasidaya	0	0
Total	0	

Table 5Summary of Dall's Porpoise Takes per Monitoring Site

Killer Whales

Killer whales were observed from all monitoring positions, and the PSOs had a high level of confidence in the marine mammal identification. Unless otherwise indicated in the following list and in Table A-1, the sightings are assumed to be adults:

- November 30, 2023: one adult male and two adult females or juvenile males
- December 7, 2023: one adult female and baby
- February 27, 2024: one adult male and three adult females

Behaviors during observations were dominated by swimming, with one incident of foraging observed (January 28, 2024). Of the 16 observations of killer whales, 15 were of groups of two or more individuals, with the maximum number in a group of 12. Individuals ranged from 500 to 12,300 meters (m) from the pile location, with an average distance of 3,575 m. All but one of the sightings of killer whales occurred during periods of no pile activity, for which no reaction was observed.

Killer whale Level B take only occurred at the construction monitoring site and only on one day, April 20, 2024. Two Level B takes were documented. All remaining monitoring sites had no takes. There were no observable changes in killer whale behavior during pile activity. In addition to the two killer whale Level B takes documented during the monitoring, 25 killer whales were observed during the monitoring period that were not documented takes because they were observed during a period of no pile activity.

Killer whale information from the daily monitoring forms is presented in Tables A-1, A-2, and A-4 in Attachment A. Table 6 summarizes killer whale takes per monitoring site during monitoring.

Monitoring Site	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	0
Construction Site	2	0–2
Yakutania	0	0
Kasidaya	0	0
Total	2	

Table 6Summary of Killer Whale Takes Per Monitoring Site

Humpback Whale

Sightings for humpback whales occurred on two dates: October 11, 2023, and April 1, 2024. Both sightings were of a single individual. The October sighting was of a juvenile, and the April sighting was of an adult. The PSOs had high confidence in the identification of both individuals as humpback whales. There was no pile activity during the October observation, and the juvenile was observed swimming from north of Yakutania to south out of the monitoring zone.

One Level B take of humpback whale was documented at the construction site monitoring site on April 1, 2024. All remaining monitoring sites had no takes. During the April sighting, the humpback whale was observed feeding in wide circles, alternating feeding periods with resting periods over the course of the observation in the Project area, and showed no reaction to vibratory pile removal. There were no observable changes in humpback whale behavior during pile activity.

Humpback whale information from the daily monitoring forms is presented in Tables A-1, A-2, and A-5 in Attachment A. Table 7 summarizes humpback whale takes per monitoring site during monitoring.

Monitoring Site	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	0
Construction Site	1	0–1
Yakutania	0	0
Kasidaya	0	0
Total	1	

Table 7Summary of Humpback Whale Takes per Monitoring Site

Steller Sea Lion

Most sightings for Steller sea lions were observed from the Yakutania monitoring station around Yakutania and in or near the mouth of the Skagway River. Unless otherwise indicated in Table A-1, all sightings are assumed to be adults, and the PSOs had a high confidence in Steller sea lion identification. Foraging behavior was documented from the boat, construction site, and Yakutania. Other observed behaviors include swimming and resting. Of the 292 observations of Steller sea lions during pile activity, 74 observations consisted of groups of two or more Steller sea lions with the maximum number in a group of . Individuals ranged from 20 to 10,000 m from the pile, with an average distance of 599 m. The Steller sea lion observed 20 m from the pile occurred during a period of no pile activity.

There were 64 observations of Steller sea lions during pile activity, during which most observed Steller sea lions had no reaction to vibratory or impact hammer use. Notes on observed reactions include raising heads out of the water, more frequent surfacing, changes in swimming direction, and leaving the area.

The number of Steller sea lion Level B takes from all four monitoring sites combined ranged from zero to six per day, with a per-day average of 0.48. There were 66 monitoring days when no Steller sea lion takes were documented. 66.7 percent (46 of the 69) of Stellar sea lion Level B takes occurred at the Yakutania Monitoring Site (Figures 7 and 8), near the mouth of the Skagway River.

In addition to the 69 Steller sea lion takes documented during the monitoring, 192 Steller sea lions were observed during the monitoring period that were not documented takes because they were observed more than 30 minutes outside of pile removal activity or outside the Level B Harassment Zone or were previously observed as a Level B take.

Steller sea lion information from the daily monitoring forms is presented in Tables A-1, A-2, and A-6 in Attachment A. Table 8 summarizes Steller sea lion takes per monitoring site during monitoring.

Monitoring Site	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	0
Construction Site	23	0–6
Yakutania	46	0–6
Kasidaya	0	0
Total	69	

Table 8Summary of Steller Sea Lion Takes per Monitoring Site

Northern Fur Seal

During the initial observation, confidence was low in the identity of the marine mammal; however, the team reached out to NOAA and confirmed the identity. The PSOs had high confidence in northern fur seal identification during all subsequent sightings. There were seven sightings of a single individual (no groups observed) that occurred on five dates. Repeated sightings of the same individual on the same day were counted as a single individual. All sightings of the northern fur seal were of a yearling (juvenile) and were possibly repeated sightings of the same individual across different dates, given that they had not previously been observed in Skagway, and included observations from all monitoring stations. Behavior during observations included swimming, resting, or grooming. No foraging activity was observed from any of the stations, and the most frequent location of the sightings were in or just outside of Skagway Harbor. Of the seven sightings of northern fur seal, three occurred during pile activity, but there were no observable reactions to impact or vibratory hammer use.

Three unauthorized Level B (based on the otariid monitoring zone) takes of northern fur seal were documented at the construction site monitoring site, with one Level B take per day, on January 8, 9, and 10, 2024. All remaining monitoring sites had no takes.

Northern fur seal information from the daily monitoring forms is presented in Tables A-1, A-2, and A-7 in Attachment A. Table 9 summarizes northern fur seal takes per monitoring site during monitoring.

Monitoring Site	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	0
Construction Site	3	0–1
Yakutania	0	0
Kasidaya	0	0
Total	3	

Table 9Summary of Northern Fur Seal Takes per Monitoring Site

Note:

Northern fur seal did not have authorized take when observed; an IHA Amendment Request was submitted on March 15, 2024, and issued on April 30, 2024.

Harbor Seals

Harbor seals were sighted most frequently from the Yakutania monitoring station around Yakutania Point and in or near the mouth of the Skagway River. All harbor seals observed were assumed to be adults, and the PSOs had high confidence in the identification of all harbor seals observed. Behavior
during observations included a mix of foraging, swimming, or resting. All foraging behavior was observed near the mouth of or within the Skagway River. Of the 381 observations, 204 observations consisted of groups 2 or more harbor seals, with the maximum number in a group of 15. Individuals ranged from 11 to 50,000 m from the pile, with an average distance of 613 m. The harbor seal observed 11 m from the pile occurred during a period of no pile activity.

There were 129 observations of harbor seals during pile activity, during which most observed harbor seals had no reaction to vibratory or impact hammer use. Harbor seals showed a reaction to pile activity in 18 observations during both vibratory and impact pile driving of 36- and 42-inch piles, which included swimming away from the pile activity, stopping their resting to swim, or splitting of groups (some remained resting while others swam away). There were no observable changes in harbor seal behavior during vibratory pile removal or the installation and removal of piles less than 30 inches.

Harbor seal Level B takes from all four monitoring sites combined ranged from 0 to 20 per day, with a per-day average of 1.7. There were 58 monitoring days when no harbor seal takes were documented. Most of the harbor seal Level B takes (221 of 233; 94.8 percent) and the largest single-day number (20) from one monitoring site occurred at the Yakutania monitoring site near the Skagway River. All 21 Level A takes for harbor seal occurred at Yakutania.

In addition to the 233 harbor seal Level B takes documented during the monitoring, 370 harbor seals were observed during the monitoring period that were not documented takes because they were observed more than 30 minutes outside of pile removal activity or outside the Level B Harassment Zone or were previously observed as a Level B take.

Harbor seal information from the daily monitoring forms is presented in Tables A-1, A-2, and A-8 in Attachment A. Table 10 summarizes harbor seal takes per monitoring site during monitoring.

Monitoring Site	Total Level A Takes	Total Level B Takes	Minimum and Maximum Number of Level B Takes per Day During Monitoring Days
Boat	0	2	0–1
Construction Site	0	10	0–1
Yakutania	21	221	0–20
Kasidaya	0	0	0
Total	21	233	

Table 10Summary of Harbor Seal Takes per Monitoring Site

Skagway Ore Terminal Redevelopment Project Supporting Details

Detailed data collected during Project monitoring are presented in Attachment A, as follows:

- Table A-1 provides a daily summary of the daily log kept by the MC located at the Project site.
- Table A-2 provides a daily summary of pile removal activity, weather conditions during the monitoring period, marine mammal species observed, time and duration of observations, distance from pile removal activities, and species behavior.
- Table A-3 provides a daily summary of Dall's porpoise Level B takes, observations that did not include takes, and the totals.
- Table A-4 provides a daily summary of killer whale Level B takes, observations that did not include takes, and the totals.
- Table A-5 provides a daily summary of humpback whale Level B takes, observations that did not include takes, and the totals.
- Table A-6 provides a daily summary of Steller sea lion Level B takes, observations that did not include takes, and the totals.
- Table A-7 provides a daily summary of northern fur seal Level B takes, observations that did not include takes, and the totals.
- Table A-8 provides a daily summary of harbor seal Level B takes, observations that did not include takes, and the totals.

As noted in Table A-2 and in this report, some monitoring days included fog, rain, sun glare, and wind conditions that made monitoring more challenging than during clear weather periods. This resulted in stop-work events on three occasions mentioned previously, but work continued as long as marine mammal observations could be made and health and safety of PSOs was assured. In addition, monitoring was conducted during a range of tidal cycles. The number of observations and delays increased at the Yakutania monitoring position during low tide when harbor seals and Steller sea lions rested at the mouth of the Skagway River.

References

- Anchor QEA, 2023a. Request for Incidental Harassment Authorization: Skagway Ore Terminal Redevelopment Project. April 2023.
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- Anchor QEA, 2024. Skagway Ore Peninsula Redevelopment Project Incidental Harassment Authorization Amendment Request. March 15, 2024.

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Figures





Figure 1 **Vicinity Map** Marine Mammal Monitoring Report Skagway Ore Terminal Redevelopment Project



LEGEND: NOTES: Level A Exclusion Zones will be adjusted as needed, based on location of hammer operations. Level B Harassment Zone extends from the end of the Hammer Location Land-Based Monitoring Location Level A Exclusion Zone for each hearing group to the Moving Monitoring Location (Boat) dashed line. asned line. 3. In instances where exclusion zone threshold is less than 10 meters, stop work will be initiated at the 10-meter threshold. 4. Basemap: Esri World Topographic Map 5. Aerial Imagery: Esri (2024) Level A Exclusion Zone High-Frequency Cetaceans (65 feet/20 meters) Mid-Frequency Cetaceans; Otariid Pinnipeds; Phocid Pinnipeds (35 feet/10 meters) Low Frequency Cetaceans (50 feet/15 meters) Level B Harassment Zone 0.5 All Cetaceans and Pinnipeds (13,075 feet/3,985 meters) Miles

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Exclusion and Harassment Zones for Steel Pile Vibratory Installation and Removal of 30-Inch and Smaller Piles

Marine Mammal Monitoring Report Skagway Ore Terminal Redevelopment Project

Figure 2



Level A Exclusion Zone

- High-Frequency Cetaceans (85 feet/25 meters)
- Mid-Frequency Cetaceans; Otariid Pinnipeds; Phocid Pinnipeds (35 feet/10 meters)
- Low-Frequency Cetaceans (50 feet/15 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (11,205 feet/3,415 meters)

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Figure 3 **Exclusion and Harassment Zones for Timber Pile Vibratory Removal**

Marine Mammal Monitoring Report Skagway Ore Terminal Redevelopment Project

In instances where exclusion zone threshold is less than
 In instances where exclusion zone threshold is less than
 meters, stop work will be initiated at the 10-meter
 threshold.
 Basemap: Esri World Topographic Map
 Aerial Imagery: Esri (2024)





- Hammer Location
- Land-Based Monitoring Location



Moving Monitoring Location (Boat)

Level A Exclusion Zone

- High-Frequency Cetaceans (330 feet/100 meters)
- Mid-Frequency Cetaceans; Otariid Pinnipeds (35 feet/10 meters)
- Low-Frequency Cetaceans (230 feet/70 meters)
- Phocid Pinnipeds (135 feet/40 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (70,670 feet/21,545 meters)

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Figure 4 Exclusion and Harassment Zones for Steel Pile Vibratory Installation and Removal of 36-, 42-, and 48-Inch Piles

Marine Mammal Monitoring Report Skagway Ore Terminal Redevelopment Project

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-meter threshold. 4. Basemap: Esri World Topographic Map 5. Aerial Imagery: Esri (2024)







- Hammer Location
- Land-Based Monitoring Location

Level A Exclusion Zone

- High-Frequency Cetaceans (4,875 feet/1,485 meters)
- Mid-Frequency Cetaceans (150 feet/45 meters)
- Low-Frequency Cetaceans (4,100 feet/1,250 meters)
- Otariid Pinnipeds (165 feet/50 meters)
- Phocid Pinnipeds (2,200 feet/670 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (2,825 feet/860 meters)

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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. Basemap: Esri World Topographic Map 4. Aerial Imagery: Esri (2024)



Figure 5 **Exclusion and Harassment Zones for 24-Inch Steel Pile Impact Driving**





- Hammer Location
- Land-Based Monitoring Location

Level A Exclusion Zone

- High-Frequency Cetaceans (9,170 feet/2,795 meters)
- Mid-Frequency Cetaceans (280 feet/85 meters)
- Low-Frequency Cetaceans (7,710 feet/2,350 meters)
- Otariid Pinnipeds (315 feet/95 meters)
- Phocid Pinnipeds (4,135 feet/1,260 meters)

Level B Harassment Zone

All Cetaceans and Pinnipeds (5,200 feet/1,585 meters)

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- **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. Basemap: Esri World Topographic Map 4. Aerial Imagery: Esri (2024)



Figure 6 Exclusion and Harassment Zones for 36-, 42-, and 48-Inch Steel Pile Impact Driving





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Figure 7 Monitoring Locations and Marine Mammal Sightings in Skagway Harbor



- Hammer Location
 Land-Based Monitoring Location
 Dall's Port
 Moving Monitoring Location (Boat)
 Hamber
 Killer With
 Minke With
 Northern
 Stellar Structure
- Marine Mammal Sightings
 Dall's Porpoise (High-Frequency Cetaceans)
 Harbor Seal (Phocid/Earless)
 Humpback Whale (Low-Frequency Cetaceans)
 - Killer Whale (Mid-Frequency Cetaceans)
 - Minke Whale (Low-Frequency Cetaceans)
 - A Northern Fur Seal (Otariid/Eared)
 - Stellar Sea Lion (Otariid/Eared)

NOTE: 1. Aerial imagery: Esri (2024)



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Figure 8 Monitoring Locations and Marine Mammal Sightings in Taiya Inlet

Attachment A Monitoring Data

Provided as Excel files.

Attachment B Acoustic Monitoring Report

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1.0 14-INCH PILE REMOVAL

January 10, 2024Airborne Sound Levels, RMS dB re: 20 μPaMinimumMaximumMedian8510591

PILE – 2

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak				RMS				SEL					- SEI
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						148	135	3.0	144	145	158	145	3.0	154	155	167
LF Cetacean						140	122	3.6	136	136	150	132	3.6	146	146	158
MF Cetacean	160	154	27	161	158	141	128	3.1	138	138	151	138	3.1	148	148	161
HF Cetacean	109	154	3.7			142	129	3.0	139	139	152	139	3.0	149	149	161
PW						138	120	3.5	132	132	148	130	3.5	142	142	155
OW						138	118	3.7	132	130	148	128	3.7	142	140	154
						Far	-Field H	lydropl	none							
Unweighted						149	133	3.9	146	144	159	143	3.9	156	154	168
LF Cetacean						134	118	3.5	131	130	144	128	3.5	141	140	153
MF Cetacean	165	151	25	157	155	143	127	3.9	139	138	153	137	3.9	149	148	162
HF Cetacean	201	101	ა.5	157	100	143	128	3.9	140	139	153	138	3.9	150	149	162
PW						134	118	3.9	131	129	144	128	3.9	141	139	153
OW]					133	116	3.9	128	127	143	126	3.9	138	137	151



PILE – 3 January 10, 2024

1	Airborne Sound Level	ls, RMS dB re: 20 μPa	
	Minimum	Maximum	Median
	78	101	85

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak				RMS				SEL					09EI
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						146	138	3.3	142	140	156	148	3.3	152	150	157
LF Cetacean					162	138	129	3.8	134	130	148	139	3.8	144	140	149
MF Cetacean	171	160	10	167		140	132	3.3	137	134	150	142	3.3	147	144	151
HF Cetacean		71 160	4.8	107		140	133	3.3	137	135	150	143	3.3	147	145	152
PW						136	127	3.8	132	128	146	137	3.8	142	138	147
OW						136	126	4.3	132	127	146	136	4.3	142	137	147
						Far	-Field H	lydropl	none							
Unweighted						137	133	1.8	135	134	147	143	1.8	145	144	150
LF Cetacean						128	121	2.9	125	123	138	131	2.9	135	133	140
MF Cetacean	150	150	1.6	150	150	131	127	1.8	129	128	141	137	1.8	139	138	144
HF Cetacean	155	53 150	1.0	152	155	132	127	1.8	130	128	142	137	1.8	140	138	144
PW	PW OW					124	119	2.4	121	119	134	129	2.4	131	129	136
OW						123	116	2.8	120	117	133	126	2.8	130	127	134



1448 Elliott Ave W, Seattle, WA 98119 (206) 378-0569

PILE – 4 January 10, 2024

1	Airborne Sound Level	ls, RMS dB re: 20 μPa	
	Minimum	Maximum	Median
	81	103	88

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS				SEL					09EI	
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						144	123	7.7	140	137	154	133	7.7	150	147	159
LF Cetacean				104	159	136	112	8.4	132	128	146	122	8.4	142	138	151
MF Cetacean	171	111	0.2			138	117	7.9	135	131	148	127	7.9	145	141	154
HF Cetacean		141	9.2	104		139	118	7.8	135	132	149	128	7.8	145	142	154
PW]					135	111	8.3	130	126	145	121	8.3	140	136	150
OW						135	111	8.3	130	125	145	121	8.3	140	135	149
						Far	-Field H	lydropl	none							
Unweighted						137	124	4.2	135	134	147	134	4.2	145	144	154
LF Cetacean						126	109	6.0	122	119	136	119	6.0	132	129	141
MF Cetacean	150	120	6.0	150	146	131	118	4.2	128	128	141	128	4.2	138	138	147
HF Cetacean	100	6 138	0.0	150	140	132	119	4.2	129	128	142	129	4.2	139	138	148
PW						124	110	4.6	121	119	134	120	4.6	131	129	140
OW						123	109	4.8	119	117	133	119	4.8	129	127	138





PILE – 5 January 10, 2024

Airborne Sound Level	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
82	100	91

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS				SEL					09EI	
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	COLL
						Near	r-Field I	Hydrop	hone							
Unweighted						154	142	4.3	150	150	164	152	4.3	160	160	173
LF Cetacean					160	147	134	4.9	142	139	157	144	4.9	152	149	165
MF Cetacean	171	152	51	165		148	135	4.3	144	144	158	145	4.3	154	154	166
HF Cetacean		155	5.4	165		149	136	4.3	145	144	159	146	4.3	155	154	167
PW						143	129	4.8	138	136	153	139	4.8	148	146	161
OW						143	128	5.3	138	134	153	138	5.3	148	144	160
						Far	Field H	lydropl	hone							
Unweighted						149	141	3.1	146	147	159	151	3.1	156	157	169
LF Cetacean						139	128	3.8	135	133	149	138	3.8	145	143	157
MF Cetacean	150	150	2.2	156	155	143	134	3.1	140	141	153	144	3.1	150	151	162
HF Cetacean	159	59 150	3.3	150	155	144	135	3.1	141	142	154	145	3.1	151	152	163
PW						135	126	3.4	132	133	145	136	3.4	142	143	154
OW						134	124	3.7	130	130	144	134	3.7	140	140	152



PILE – 6 January 10, 2024

4	Airborne Sound Level	ls, RMS dB re: 20 μPa	
	Minimum	Maximum	Median
	84	107	92

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS				SEL					09EL
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						146	138	1.3	144	144	156	148	1.3	154	154	171
LF Cetacean				157	157	138	129	1.7	135	134	148	139	1.7	145	144	162
MF Cetacean	160	150	1.6			140	133	1.2	138	138	150	143	1.2	148	148	165
HF Cetacean	102	153	1.6			140	133	1.2	138	138	150	143	1.2	148	148	166
PW						134	129	1.2	132	132	144	139	1.2	142	142	160
OW						134	128	1.4	131	131	144	138	1.4	141	141	159
						Far	-Field H	lydropl	none							
Unweighted						146	138	1.2	144	144	156	148	1.2	154	154	171
LF Cetacean						131	122	1.6	129	129	141	132	1.6	139	139	157
MF Cetacean	150	150	1.2	150	150	140	131	1.2	137	138	150	141	1.2	147	148	165
HF Cetacean	100	56 150	1.2	155	152	140	132	1.2	138	138	150	142	1.2	148	148	166
PW						131	123	1.0	128	128	141	133	1.0	138	138	156
OW						128	121	0.9	126	126	138	131	0.9	136	136	154



Sound Pressure during Pile Driving

2.0 24-INCH PILE REMOVAL

PILE – 1 January 10, 2024

Airborne Sound Leve	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
89	112	97

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS					SEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	COLL
						Nea	r-Field I	Hydrop	hone							
Unweighted						165	153	2.6	160	160	175	163	2.6	170	170	194
LF Cetacean]			177	174	159	140	3.8	153	153	169	150	3.8	163	163	187
MF Cetacean	100	164	47			159	146	2.7	154	154	169	156	2.7	164	164	188
HF Cetacean	189 164	104	4.7			159	147	2.6	155	154	169	157	2.6	165	164	189
PW]					157	139	3.7	150	149	167	149	3.7	160	159	184
OW]					158	137	4.3	150	149	168	147	4.3	160	159	184

Note: Measurement distances normalized to 33 feet (10 meters) and sound levels from far-field hydrophone have been excluded due to an equipment malfunction.



PILE – 1 (DOLPHIN J) April 15, 2024

Airborne Sound Level	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
93	101	98

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS					09EI					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						174	152	5.3	168	165	184	162	5.3	178	175	197
LF Cetacean						169	144	6.9	162	159	179	154	6.9	172	169	192
MF Cetacean	201	166	0.4	100	100	170	145	5.9	163	160	180	155	5.9	173	170	193
HF Cetacean	201	100	0.4	109	102	170	146	5.7	163	160	180	156	5.7	173	170	193
PW						168	140	7.7	161	157	178	150	7.7	171	167	191
OW						168	140	8.2	162	158	178	150	8.2	172	168	191
						Far	-Field H	lydropl	none							
Unweighted						170	155	4.2	164	162	180	165	4.2	174	172	194
LF Cetacean						164	147	4.8	158	156	174	157	4.8	168	166	188
MF Cetacean	100	105	6.6	101	177	165	149	4.6	159	156	175	159	4.6	169	166	189
HF Cetacean	109	189 165	0.0	101		165	150	4.4	159	157	175	160	4.4	169	167	189
PW						162	142	6.0	156	152	172	152	6.0	166	162	185
OW						163	139	6.9	156	152	173	149	6.9	166	162	185



Sound Pressure during Pile Driving

PILE – 2 (DOLPHIN J) April 15, 2024

Airborne Sound Level	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
96	106	99

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS					SEL					09EI
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						173	160	4.1	169	169	183	170	4.1	179	179	196
LF Cetacean						168	150	5.3	163	162	178	160	5.3	173	172	190
MF Cetacean	100	171	60	190	100	169	154	4.5	164	163	179	164	4.5	174	173	191
HF Cetacean	190		0.0	109	100	169	154	4.4	164	164	179	164	4.4	174	174	191
PW]					167	148	5.6	163	161	177	158	5.6	173	171	190
OW						168	147	5.7	163	162	178	157	5.7	173	172	191
						Far	Field H	lydropl	none							
Unweighted						172	153	5.0	165	164	182	163	5.0	175	174	193
LF Cetacean						166	146	5.2	160	159	176	156	5.2	170	169	187
MF Cetacean	101	165	50	102	100	167	147	5.4	161	160	177	157	5.4	171	170	188
HF Cetacean	191	91 165	5.9	103	102	167	148	5.2	161	160	177	158	5.2	171	170	188
PW						164	142	5.9	159	158	174	152	5.9	169	168	186
OW						164	142	6.0	159	158	174	152	6.0	169	168	186



Sound Pressure during Pile Driving

PILE – 3 (DOLPHIN J) April 15, 2024

Airborne Sound Level	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
92	105	100

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS					SEL					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL	
						Near	r-Field I	Hydrop	hone								
Unweighted						179	161	3.0	176	176	189	171	3.0	186	186	202	
LF Cetacean						173	154	3.2	170	170	183	164	3.2	180	180	197	
MF Cetacean	201	102	20	107	106	176	155	3.6	173	173	186	165	3.6	183	183	199	
HF Cetacean	201	103	3.2	197	190	176	156	3.5	173	172	186	166	3.5	183	182	199	
PW]					174	151	3.8	171	171	184	161	3.8	181	181	197	
OW						174	152	3.7	171	171	184	162	3.7	181	181	197	
						Far	-Field H	lydropl	none								
Unweighted						176	159	3.0	174	174	186	169	3.0	184	184	200	
LF Cetacean						170	153	3.1	168	168	180	163	3.1	178	178	194	
MF Cetacean	100	170	4.0	104	100	173	153	3.5	170	170	183	163	3.5	180	180	197	
HF Cetacean	190	98 179	4.2	194	192	172	154	3.3	170	170	182	164	3.3	180	180	196	
PW						170	148	3.8	168	168	180	158	3.8	178	178	194	
OW						170	148	3.7	168	168	180	158	3.7	178	178	194	



PILE – 4 (DOLPHIN J) April 15, 2024

Airborne Sound Level	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
96	105	100

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS					09EI					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						178	158	6.3	171	168	188	168	6.3	181	178	197
LF Cetacean						173	147	7.4	166	162	183	157	7.4	176	172	192
MF Cetacean	200	167		102	106	174	151	7.1	167	163	184	161	7.1	177	173	193
HF Cetacean	200	107	0.0	192	100	174	152	6.8	167	163	184	162	6.8	177	173	193
PW]					173	144	8.4	165	162	183	154	8.4	175	172	191
OW						173	143	8.5	166	162	183	153	8.5	176	172	192
						Far	-Field H	lydropl	none							
Unweighted						176	155	5.9	169	165	186	165	5.9	179	175	195
LF Cetacean						171	148	6.4	163	159	181	158	6.4	173	169	189
MF Cetacean	200	166	0.4	190	100	172	149	6.8	165	161	182	159	6.8	175	171	191
HF Cetacean	200	200 166	0.4	109	102	172	149	6.5	165	161	182	159	6.5	175	171	191
PW						171	143	8.2	163	159	181	153	8.2	173	169	189
OW						171	141	8.6	163	159	181	151	8.6	173	169	189



Sound Pressure during Pile Driving
PILE – 5 (DOLPHIN J) April 15, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa									
	Minimum	Maximum	Median							
	97	104	99							

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			RMS					SEL					cSEL					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL		
							Near-Field Hydrophone											
Unweighted						177	156	4.8	169	168	187	166	4.8	179	178	195		
LF Cetacean				190	187	171	149	5.6	163	162	181	159	5.6	173	172	189		
MF Cetacean	100	172	61			172	151	5.4	165	163	182	161	5.4	175	173	190		
HF Cetacean	190	1/3	6.4	190	107	172	151	5.2	165	163	182	161	5.2	175	173	190		
PW]					170	146	6.5	163	162	180	156	6.5	173	172	188		
OW						170	146	6.7	163	162	180	156	6.7	173	172	189		
						Far	Field H	lydropl	none									
Unweighted						176	155	5.7	169	167	186	165	5.7	179	177	194		
LF Cetacean						171	148	5.9	163	161	181	158	5.9	173	171	188		
MF Cetacean	100	170	71	100	100	172	149	6.3	164	163	182	159	6.3	174	173	190		
HF Cetacean	199	170	1.1	190	100	172	149	6.1	164	163	182	159	6.1	174	173	190		
PW					•	169	144	7.0	162	161	179	154	7.0	172	171	188		
OW						169	144	7.1	162	161	179	154	7.1	172	171	188		



Sound Pressure during Pile Driving

PILE – 6 (DOLPHIN J) April 15, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa									
	Minimum	Maximum	Median							
	85	101	94							

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		RMS				SEL					cSEL					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	COEL
						Near	-Field H	lydropl	hone							
Unweighted						178	148	6.0	170	165	188	158	6.0	180	175	196
LF Cetacean					189	172	138	6.8	164	160	182	148	6.8	174	170	191
MF Cetacean	202	170	0.5	194		174	142	6.8	166	160	184	152	6.8	176	170	192
HF Cetacean	202	172	9.0			174	143	6.6	166	160	184	153	6.6	176	170	192
PW						172	136	8.0	164	158	182	146	8.0	174	168	190
OW						172	136	8.1	164	159	182	146	8.1	174	169	191
						Far-	Field H	ydroph	one							
Unweighted						180	143	8.6	166	156	190	153	8.6	176	166	193
LF Cetacean						166	136	8.5	158	151	176	146	8.5	168	161	184
MF Cetacean	201	150	10.0	100	170	174	137	9.2	161	152	184	147	9.2	171	162	188
HF Cetacean	201	159	10.9	190	1/0	175	137	9.0	162	152	185	147	9.0	172	162	188
PW						165	131	9.6	157	150	175	141	9.6	167	160	184
OW						164	130	9.5	157	150	174	140	9.5	167	160	183



3.0 24-INCH VIBRATORY PILE DRIVING



PILE – 55

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency	Peak					RMS				SEL					cSEL	
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						171	146	3.8	166	165	181	156	3.8	176	175	196
LF Cetacean						165	141	3.8	161	160	175	151	3.8	171	170	191
MF Cetacean	102	174	2.2	105	183	167	143	4.1	162	161	177	153	4.1	172	171	193
HF Cetacean	192	02 174	3.3	185		167	143	4.0	162	161	177	153	4.0	172	171	193
PW]					166	141	4.0	161	160	176	151	4.0	171	170	191
OW]					166	141	4.0	162	161	176	151	4.0	172	171	192
			•			Far	-Field H	lydropl	none							
Unweighted						160	138	3.3	155	154	170	148	3.3	165	164	185
LF Cetacean]					154	132	3.4	150	149	164	142	3.4	160	159	180
MF Cetacean	470	150	2.2	474	170	155	134	3.6	151	150	165	144	3.6	161	160	181
HF Cetacean	1/8	178 159	3.3	171	170	155	135	3.5	151	150	165	145	3.5	161	160	181
PW	1				-	154	131	3.7	150	149	164	141	3.7	160	159	180
OW]					155	131	3.6	150	150	165	141	3.6	160	160	180



Sound Pressure during Pile Driving

PILE – 56 February 16, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa									
	Minimum	Maximum	Median							
	96	118	105							

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			RMS				SEL					cSEL					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL	
						Nea	Near-Field Hydrophone										
Unweighted						172	155	2.7	164	163	182	165	2.7	174	173	194	
LF Cetacean					180	166	149	2.6	159	158	176	159	2.6	169	168	188	
MF Cetacean	101	176	26	183		169	150	3.2	161	159	179	160	3.2	171	169	190	
HF Cetacean	191	1/0	3.0	103	160	169	150	3.1	160	158	179	160	3.1	170	168	190	
PW						167	148	3.1	159	158	177	158	3.1	169	168	189	
OW						167	149	2.9	159	158	177	159	2.9	169	168	189	
						Far	-Field H	lydropl	none								
Unweighted						161	144	2.5	154	153	171	154	2.5	164	163	183	
LF Cetacean						155	139	2.5	148	147	165	149	2.5	158	157	178	
MF Cetacean	170	164	20	170	160	157	139	2.9	150	148	167	149	2.9	160	158	179	
HF Cetacean	1/0	104	3.0	170	100	157	139	2.8	149	148	167	149	2.8	159	158	179	
PW						156	138	2.8	148	147	166	148	2.8	158	157	177	
OW]					156	139	2.7	148	147	166	149	2.7	158	157	178	



PILE – 57 February 17, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa									
	Minimum	Maximum	Median							
	94	101	96							

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			RMS				SEL					cSEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
Near-Field									hone							
Unweighted						173	157	3.3	167	165	183	167	3.3	177	175	196
LF Cetacean				186	183	168	152	3.2	162	160	178	162	3.2	172	170	191
MF Cetacean	104	176				170	154	3.9	164	161	180	164	3.9	174	171	193
HF Cetacean	194	170	4.4	100	105	169	153	3.8	164	161	179	163	3.8	174	171	192
PW]					168	152	3.8	162	160	178	162	3.8	172	170	191
OW						168	152	3.5	163	160	178	162	3.5	173	170	192
						Far	-Field H	lydropl	none							
Unweighted						162	148	3.1	157	155	172	158	3.1	167	165	186
LF Cetacean						156	141	3.2	151	149	166	151	3.2	161	159	180
MF Cetacean	170	164	25	170	170	159	144	3.7	153	150	169	154	3.7	163	160	182
HF Cetacean	1/0	78 164	3.5	172	170	158	144	3.6	153	150	168	154	3.6	163	160	182
PW						157	142	3.8	151	149	167	152	3.8	161	159	180
OW]					157	142	3.5	151	149	167	152	3.5	161	159	180



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4.0 24-INCH IMPACT PILE DRIVING

February 16, 2024									
Airborne Sound Levels, RMS dB re: 20 μPa									
Minimum	Maximum	Median							
97	117	108							

PILE – 56

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency	Peak					RMS90				SEL					cSEL	
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	COEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						186	175	1.6	183	183	173	162	1.5	170	170	195
LF Cetacean						180	169	1.6	178	178	167	157	1.5	164	164	190
MF Cetacean	201	100	10	100	199	180	169	1.8	178	178	167	157	1.7	164	164	190
HF Cetacean	201	192	1.2	199	199	181	169	1.8	178	178	168	157	1.6	165	165	190
PW]					177	165	2.0	174	174	164	153	1.9	161	161	187
OW						177	165	2.0	174	174	164	153	1.9	161	161	186
						Far	-Field H	lydropł	none							
Unweighted						173	163	1.5	170	170	164	154	1.5	161	161	186
LF Cetacean						167	156	1.6	164	164	157	147	1.6	154	154	180
MF Cetacean	100	175	20	104	104	167	157	1.6	164	165	158	148	1.6	155	155	180
HF Cetacean	100	188 175	2.0	104	104	168	158	1.6	165	165	158	148	1.6	155	156	181
PW]				, -	163	152	1.8	160	160	153	143	1.8	150	151	176
OW						163	152	2.0	159	159	153	142	1.9	150	150	176



PILE – 57 February 17, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa									
	Minimum	Maximum	Median							
	90	108	105							

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak					RMS ₉	0		SEL					oSEI
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						188	177	1.2	184	184	173	163	1.1	171	171	197
LF Cetacean						182	170	1.2	178	178	167	157	1.2	165	165	191
MF Cetacean	200	101	10	100	100	181	170	1.2	178	178	167	157	1.2	165	165	192
HF Cetacean	200	191	1.0	190	190	182	170	1.2	179	179	168	158	1.2	166	166	192
PW]					177	165	1.4	174	174	164	153	1.5	162	162	188
OW						177	165	1.5	174	174	164	153	1.6	162	162	188
						Far	-Field H	lydropl	none							
Unweighted						172	163	1.0	170	170	163	153	1.0	160	160	187
LF Cetacean						166	156	1.1	163	163	156	147	1.1	154	154	180
MF Cetacean	100	177	10	105	105	166	157	1.1	164	164	157	147	1.1	154	154	181
HF Cetacean	100		1.2	100	100	167	157	1.1	164	164	157	148	1.1	155	155	181
PW						162	151	1.3	159	160	152	142	1.3	150	150	176
OW						161	151	1.4	159	159	152	141	1.4	150	150	176



Sound Pressure during Pile Driving

PILE – 55
February 17, 2024

1	Airborne Sound Levels, RMS dB re: 20 μPa										
	Minimum	Maximum	Median								
	90	108	105								

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak					RMS ₉	0				SEL			-051
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						190	182	0.8	187	187	174	168	0.7	172	172	198
LF Cetacean						185	177	0.8	182	181	169	162	0.7	166	166	192
MF Cetacean	202	106	0.0	100	100	183	176	0.8	181	181	168	162	0.8	165	166	192
HF Cetacean	202	190	0.0	190	190	184	176	0.8	181	181	169	162	0.7	166	166	192
PW						178	171	0.8	176	175	164	158	0.8	161	161	188
OW						178	171	0.9	175	175	164	158	0.9	161	161	187
						Far	-Field H	lydropl	none							
Unweighted						173	167	0.7	170	170	164	157	0.7	160	160	187
LF Cetacean						167	160	0.8	163	163	157	151	0.8	154	154	180
MF Cetacean	100	101	1.1	104	102	167	161	0.7	164	164	158	152	0.7	154	154	181
HF Cetacean	109	101	1.4	104	103	168	162	0.7	164	164	158	152	0.7	155	155	181
PW						163	157	0.8	159	159	153	147	0.8	149	149	176
OW						162	156	0.9	158	158	153	146	0.9	149	149	175



Sound Pressure during Pile Driving

5.0 36-INCH PILE REMOVAL

PILE – 1 April 17, 2024

Airborne Sound Leve	Airborne Sound Levels, RMS dB re: 20 μPa											
Minimum	Maximum	Median										
95	106	102										

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS					SEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						174	155	3.8	169	168	184	165	3.8	179	178	199
LF Cetacean						169	141	6.3	162	162	179	151	6.3	172	172	193
MF Cetacean	204	160	0.1	104	101	170	148	4.2	163	163	180	158	4.2	173	173	194
HF Cetacean	204	109	9.1	194	191	170	149	4.0	164	163	180	159	4.0	174	173	194
PW]					168	140	6.3	161	160	178	150	6.3	171	170	191
OW						168	139	7.1	161	160	178	149	7.1	171	170	192
						Far	-Field H	lydropl	none							
Unweighted						171	156	3.3	168	168	181	166	3.3	178	178	198
LF Cetacean						165	142	5.1	160	160	175	152	5.1	170	170	191
MF Cetacean	100	160	0.0	100	105	167	149	3.6	162	163	177	159	3.6	172	173	193
HF Cetacean	190	109	0.0	109	100	167	150	3.5	163	163	177	160	3.5	173	173	193
PW]					165	141	5.5	159	158	175	151	5.5	169	168	189
OW						166	139	6.5	159	159	176	149	6.5	169	169	190



Sound Pressure during Pile Driving

6.0 36-INCH VIBRATORY PILE DRIVING

PILE – 53 November 29, 2023

Airborne Sound Leve	ls, RMS dB re: 20 μPa	
Minimum	Maximum	Median
92	104	100

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak					RMS					- 9 E I			
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						175	150	3.8	171	170	185	160	3.8	181	180	205
LF Cetacean]					170	140	4.2	165	165	180	150	4.2	175	175	199
MF Cetacean	201	170	4.2	102		171	144	4.2	167	167	181	154	4.2	177	177	200
HF Cetacean	201	178	4.2	193	191	171	145	4.1	167	167	181	155	4.1	177	177	200
PW						169	137	4.5	165	164	179	147	4.5	175	174	198
OW						170	136	4.5	165	165	180	146	4.5	175	175	199
						Far	Field H	lydropl	none							
Unweighted						175	152	3.5	170	170	185	162	3.5	180	180	204
LF Cetacean						170	141	3.9	164	164	180	151	3.9	174	174	198
MF Cetacean	200	176	4.4	100	100	171	146	3.9	166	166	181	156	3.9	176	176	200
HF Cetacean	200	1/0	4.1	190	100	171	146	3.8	166	166	181	156	3.8	176	176	200
PW						170	139	4.4	164	164	180	149	4.4	174	174	198
OW						170	138	4.3	164	164	180	148	4.3	174	174	198



PILE – 54
November 30, 2023

1	Airborne Sound Levels, RMS dB re: 20 μPa										
	Minimum	Maximum	Median								
	94	105	103								

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency	requency Peak						RMS					SEL					
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL	
						Near	r-Field I	Hydrop	hone								
Unweighted						173	148	5.2	169	169	183	158	5.2	179	179	197	
LF Cetacean						168	140	5.6	163	164	178	150	5.6	173	174	192	
MF Cetacean	100	100	26	190	107	168	143	5.2	164	165	178	153	5.2	174	175	193	
HF Cetacean	199	180	3.0	109	107	169	143	5.2	165	165	179	153	5.2	175	175	193	
PW]					167	139	5.5	162	162	177	149	5.5	172	172	191	
OW						167	139	5.6	163	163	177	149	5.6	173	173	191	
						Far	Field H	lydropl	none								
Unweighted						173	151	4.8	169	169	183	161	4.8	179	179	198	
LF Cetacean						167	141	5.3	164	164	177	151	5.3	174	174	192	
MF Cetacean	100	170	20	190	107	169	146	4.9	165	165	179	156	4.9	175	175	193	
HF Cetacean	190	1/0	3.9	109	107	169	146	4.8	165	165	179	156	4.8	175	175	193	
PW						167	141	5.3	163	163	177	151	5.3	173	173	191	
OW]					168	141	5.4	164	163	178	151	5.4	174	173	192	



PILE – 48	
December 1, 2023	

4	Airborne Sound Levels, RMS dB re: 20 µPa										
	Minimum	Maximum	Median								
	94	102	99								

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency	Peak						RMS					SEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						172	146	2.8	170	170	182	156	2.8	180	180	204
LF Cetacean						167	136	3.1	164	164	177	146	3.1	174	174	198
MF Cetacean	204	170	20	100	100	168	141	3.2	166	166	178	151	3.2	176	176	199
HF Cetacean	204	1/8	2.9	190	189	168	141	3.1	166	166	178	151	3.1	176	176	199
PW						166	136	3.4	163	163	176	146	3.4	173	173	197
OW						166	136	3.3	164	164	176	146	3.3	174	174	197
						Far	-Field H	lydropl	none							
Unweighted						171	150	2.5	169	169	181	160	2.5	179	179	203
LF Cetacean						165	137	2.8	164	164	175	147	2.8	174	174	197
MF Cetacean	100	177	2.0	100	100	168	144	3.0	165	165	178	154	3.0	175	175	199
HF Cetacean	199	199 177	2.9	190	189	168	144	2.9	165	165	178	154	2.9	175	175	199
PW						166	138	3.1	163	164	176	148	3.1	173	174	197
OW						166	137	3.0	164	164	176	147	3.0	174	174	198



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7.0 36-INCH IMPACT PILE DRIVING

	November 30, 2023									
Airborne Sound Level	ls, RMS dB re: 20 μPa									
Minimum	Maximum	Median								
101	107	105								

PILE – 53

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			Peak			RMS90					SEL					- 9 E I
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						194	180	2.5	190	190	179	166	2.1	175	176	202
LF Cetacean						188	174	2.4	184	184	173	160	2.1	169	169	196
MF Cetacean	200	102	25	202	202	188	174	2.4	184	184	173	160	2.1	170	170	196
HF Cetacean	200	193	2.5	203	203	189	174	2.5	185	185	174	161	2.1	170	170	197
PW]					183	169	2.4	180	180	169	156	2.1	165	166	192
OW						183	169	2.5	180	180	169	155	2.2	165	166	192
						Far	Field H	lydropl	none							
Unweighted						198	183	2.2	194	194	182	170	1.9	178	178	205
LF Cetacean						192	177	2.1	187	187	176	164	1.9	172	172	199
MF Cetacean	214	100	26	210	210	192	177	2.2	187	187	176	164	2.0	172	172	199
HF Cetacean	214	14 199	2.0	210	210	192	178	2.2	188	188	177	164	1.9	173	173	199
PW]					187	173	2.3	183	183	172	159	2.1	168	168	195
OW						188	173	2.5	183	183	173	158	2.3	168	168	195



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December 1, 2023										
Airborne Sound Levels, RMS dB re: 20 μPa										
Minimum	Maximum	Median								
102	102 110									

PILE – 54

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS ₉₀					SEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						195	180	2.3	191	190	178	165	1.8	176	175	206
LF Cetacean				204	000	189	174	2.3	186	185	173	159	1.8	170	170	200
MF Cetacean	200	102	24			188	173	2.2	185	184	172	159	1.7	170	170	200
HF Cetacean	200	193	2.4	204	203	189	174	2.2	186	185	173	159	1.7	170	170	200
PW						184	169	1.9	181	180	169	155	1.6	166	166	196
OW						184	168	2.0	181	180	169	155	1.7	166	166	196
						Far	Field H	lydropl	none							
Unweighted						200	178	2.8	193	193	186	164	2.5	178	178	208
LF Cetacean						192	173	2.7	187	187	176	159	2.2	172	172	202
MF Cetacean	011	102	24	200	200	194	172	2.8	187	187	181	159	2.4	172	172	202
HF Cetacean	211	211 192	3.1	209	209	195	173	2.8	188	188	181	159	2.4	173	172	202
PW						187	170	2.4	183	183	175	156	2.0	168	168	198
OW						187	170	2.3	183	183	174	157	1.9	168	168	198



Sound Pressure during Pile Driving

8.0 42-INCH VIBRATORY PILE DRIVING

December 20, 2023												
Airborne Sound Level	Airborne Sound Levels, RMS dB re: 20 μPa											
Minimum	Maximum	Median										
86	86 104 94											

PILE – 13

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			RMS					SEL					-SEI			
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
						Nea	ar-Field	Hydropi	hone							
Unweighted						180	142	8.5	170	162	190	152	8.5	180	172	196
LF Cetacean						174	132	10.2	164	151	184	142	10.2	174	161	190
MF Cetacean	000	100	10.1	100	104	176	136	9.0	165	157	186	146	9.0	175	167	192
HF Cetacean	203	169	10.1	193	184	176	136	8.9	166	157	186	146	8.9	176	167	192
PW]					174	130	10.7	163	149	184	140	10.7	173	159	190
OW]					174	130	11.3	163	147	184	140	11.3	173	157	190
			•			Fai	r-Field H	lydroph	one	•						
Unweighted						178	145	7.9	168	161	188	155	7.9	178	171	194
LF Cetacean]					172	131	9.6	162	151	182	141	9.6	172	161	188
MF Cetacean	200	105	0.0	101	100	174	139	8.3	163	155	184	149	8.3	173	165	190
HF Cetacean	200	0 165	165 9.6	191	182	174	140	8.1	163	155	184	150	8.1	173	165	190
PW	1					171	132	10.0	161	148	181	142	10.0	171	158	187
OW						172	131	10.8	161	146	182	141	10.8	171	156	188



9.0 42-INCH IMPACT PILE DRIVING

December 21, 2023										
Airborne Sound Levels, RMS dB re: 20 μPa										
Minimum	Maximum	Median								
104	109	107								

PILE – 13

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency			RMS90					SEL					0SEI			
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Near	r-Field I	Hydrop	hone							
Unweighted						195	183	1.3	193	193	180	171	1.3	178	178	204
LF Cetacean						190	177	1.5	187	187	174	165	1.3	172	172	198
MF Cetacean	210	100	1 1	200	200	189	177	1.6	186	187	174	165	1.3	172	172	198
HF Cetacean	210	199	1.4	200	200	189	178	1.5	187	187	174	165	1.3	172	173	198
PW]					185	172	2.0	182	182	170	160	1.4	168	168	194
OW						186	172	2.2	182	182	170	160	1.5	168	168	194
						Far	Field H	lydropl	none							
Unweighted						186	176	1.7	184	184	174	164	1.5	171	172	197
LF Cetacean						179	169	1.9	177	177	167	157	1.5	165	165	191
MF Cetacean	201	100	10	107	107	180	170	1.7	178	178	167	158	1.4	165	166	191
HF Cetacean	201	201 189	1.0	197	197	180	170	1.7	178	179	168	159	1.4	166	166	192
PW						175	164	1.8	172	173	162	153	1.5	160	160	186
OW]					174	163	1.8	171	172	162	152	1.5	159	160	185



10.0 48-INCH VIBRATORY PILE DRIVING



Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency		Peak					RMS					SEL				
Range	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	CSEL
						Nea	r-Field I	Hydrop	hone							
Unweighted						178	157	4.8	168	163	188	167	4.8	178	173	194
LF Cetacean						172	149	5.5	162	155	182	159	5.5	172	165	187
MF Cetacean	206	170	6.2	104	107	174	153	5.0	164	158	184	163	5.0	174	168	189
HF Cetacean	200	1/0	0.3	194	107	174	153	4.9	164	159	184	163	4.9	174	169	189
PW]					172	148	5.5	161	155	182	158	5.5	171	165	187
OW						172	148	5.7	162	154	182	158	5.7	172	164	187
						Far	-Field H	lydropl	none			•	•			
Unweighted						178	158	4.6	169	165	188	168	4.6	179	175	194
LF Cetacean						172	150	5.5	162	155	182	160	5.5	172	165	188
MF Cetacean	100	170		100	100	173	153	4.7	164	159	183	163	4.7	174	169	189
HF Cetacean	199	199 176	5.5	189	183	173	153	4.7	164	160	183	163	4.7	174	170	189
PW]					171	149	5.4	161	154	181	159	5.4	171	164	186
OW						172	149	5.6	161	154	182	159	5.6	171	164	187



Sound Pressure during Pile Driving

11.0 48-INCH IMPACT PILE DRIVING

February 17, 2024										
Airborne Sound Levels, RMS dB re: 20 μPa										
Minimum	Maximum	Median								
95	109									

PILE – 3

Airborne Frequency Spectrum, RMS



Underwater Sound Levels, dB re: 1 µPa

Frequency Range	Peak					RMS90					SEL					00EI
	Max	Min	SD	Mean	Med	Max	Min	SD	Mean	Med	Мах	Min	SD	Mean	Med	CSEL
Near-Field Hydrophone																
Unweighted	215	205	1.3	213	214	199	190	1.4	197	197	186	177	0.9	184	185	212
LF Cetacean						192	183	1.4	190	191	180	171	1.0	178	178	205
MF Cetacean						192	183	1.1	190	190	180	171	0.9	178	179	206
HF Cetacean						192	184	1.1	191	191	180	171	0.9	179	179	206
PW						186	178	1.0	185	185	175	166	0.9	174	174	201
OW						186	176	1.1	184	185	175	165	1.0	174	174	201
Far-Field Hydrophone																
Unweighted	218	209	1.4	216	217	204	193	1.9	201	201	189	180	1.1	187	188	214
LF Cetacean						198	186	1.9	195	195	182	173	1.1	181	181	208
MF Cetacean						197	186	1.8	195	195	182	174	1.0	181	181	208
HF Cetacean						198	187	1.8	195	195	183	174	1.1	182	182	209
PW						191	181	1.4	189	189	178	168	1.0	177	177	204
OW						190	180	1.3	188	188	178	168	1.0	176	176	203



1448 Elliott Ave W, Seattle, WA 98119

(206) 378-0569
12.0 VIBRATORY PILE DRIVERS/EXTRACTORS

APE MODEL 150



SPECIFICATIONS	DATA
Eccentric moment	2,200 in-lbs (25 kgm)
Frequency (variable)	0-1,800 vpm
Driving Force	445 - 907.4 kN (50 - 102 US tons)
Amplitude	7 - 20 mm (1/4 in - 3/4 in)
Maximum line pull	711 kN (80 US tons)
Weight (without clamp attachment)	3,084 kg (6,800 lbs)
Suspended weight (w/universal clamp)	3,855 kg (8,500 lbs)
Length with standard clamp	223 cm (88 in)
Width throat	-36 cm (14 in)
Width at widest point	43 cm (17 in)
Height with short suppressor & clamp	109 cm (43 in)
Height with suppressor & 150 clamp	180 cm (71 in)
Hydraulic hose length (standard)	.30 m (100 fl)
Hydraulic hose weight	454 kg (1000 lbs)

APE Model 375 Power Unit



SPECIFICATIONS	DATA	
Engine	Caterpillar C9 ACERT Tier III	
Power (Max)	375 hp (280 kW)	
Operating Speed (No Load)	800 to 2,100 rpm	
Drive Pressure (Max)	4,800 psi (326 bar)	
Drive Flow (Variable)	0 to 135 gpm (513 lpm)	
Clamp Pressure (Max)	4,600 psi (312 bar)	
Clamp Flow	10 gpm (41 lpm)	
Weight	12,600 lbs (5,714 kg)	
Length	110 in (279 cm)	
Width	66 in (168 cm)	
Height	68 in (172 cm)	
Hydraulic Reservoir	350 gal (1.330 liters)	
Fuel Tank	150 gal (570 litters)	

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APE MODEL 200



APE Model 200 Vibratory Driver Extractor

The Worlds Largest Provider of **Foundation Construction Equipment**



SPECIFICATIONS	DATA		
Eccentric Moment	4,400 in-lbs (50.69 kgm)		
Drive Force	170 tons (1,513 kN)		
Frequency Maximum (VPM)	0 - 1,650 vpm		
Max Line Pull	133 tons (1,183 kN)		
Bare Hammer Weight w/o Clamp	12,760 lbs (5,788 kg)		
Throat Width	14.75 in (37 cm)		
Length	104.00 in (264 cm)		
Height w/o Clamp	65.50 in (166 cm)		

APE Model 595 Power Unit

SPECIFICATIONS	DATA	
Engine Type	Caterpillar C15 Tier III	
Horse Power	595 HP (438 kW)	
Drive Pressure	0 - 4,500 psi (310 bar)	
Drive Flow	188 gpm (712 lpm)	
Clamp Pressure	4,800 psi (69,618 bar)	
Clamp Flow	10 gpm (3 lpm)	
Engine Speed	2,100 rpm	
Weight	19,500 lbs (8,845 kg)	
Length	152 in (385 cm)	
Width	82 in (208 cm)	
Height	94 in (239 cm)	
Hydraulic Reservoir	575 gal (2,177 L)	
Fuel Capacity	160 gal (606 L)	



WWW.AMERICANPILEDRIVING.COM (800) 248-8498 ape@americanpiledriving.com

Specifications may vary due to site conditions, specific hammer conditions or product set up. Specifications may change without notice. Consult the factory for details on any specific product (800) 248-8498.

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APE MODEL 300-6



APE Model 300-6 Vibratory Driver Extractor

The Worlds Largest Provider of Foundation Construction Equipment



SPECIFICATIONS	DATA	
Eccentric Moment	8,000 in-lbs (92.17 kgm)	
Drive Force	309 tons (2,751 kN)	
Frequency Maximum (VPM)	0 - 1,650 vpm	
Max Line Pull	185 tons (1.646 kN)	
Bare Hammer Weight w/o Clamp	23,500 lbs (10,659 kg)	
Throat Width	19.50 in (50 cm)	
Length	151.00 in (384 cm)	
Height w/o Clamp	80.00 in (203 cm)	

There is not a power unit recommended with this specific hammer. Excavator mounted units are normally powered by hydraulics on the excavator. Please <u>consult the factory</u> (800) 248-8498 or visit our <u>Locations</u> page for the phone number of the APE branch closest to you.

Specifications may vary due to site conditions, specific hammer conditions or product set up. Specifications may change without notice. Consult the factory for details on any specific product (800) 248-8498.



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APE MODEL 400



SPECIFICATIONS	DATA			
Eccentric moment	13,000 in-lbs (149,78 kgm)			
Frequency (variable)	400-1400 vpm			
Driving Force	3203 kN / 360 US tons			
Amplitude with dual clamps	(dynamic wt: 16,000 lbs.) 40 mm / 1.63 in			
Amplitude with Quad Clamps	(dynamic wt: 27.000 lbs.) 32mm / .962 in			
Maximum line pull	2,224 kN / 250 US lons			
Suspended Weight	(with 17' beam and clamps) 22,226 kg / 49,000 lbs			
Suspended Weight	(w/Quad Clamp System & hoses) 27,669 kg / 61,000 it			
Suspended Weight	(w/sheet clamp & hoses) 17,690 kg / 39,000 lbs			
Length	305 cm / 120 in			
Width throat	66 cm / 26 in			
Width at widest point	66 cm / 26 in			
Height with 8' beam and clamps	244 cm / 96 in			
Height with Quad Clamp System	280 cm / 110 in			
Hydraulic Hose Length (standard)	45 m / 150 ft			

APE Model 1050 Power Unit



SPECIFICATIONS	DATA	
Power Unit Engine	Caterpillar E-series C27 ACERT	
Maximum Power	1050 hp (745kW)	
Operating Speed	800 to 2100 rpm	
Maximum Drive Pressure	5,000 psi (340 bar)	
Drive Flow	0 to 321 gpm (1,219 lpm)	
Clamp Pressure	4,800 psi (326 bar)	
Clamp Pump Flow @ 2200 rpm	6.5 gpm (27 lpm)	
Weight	27,000 lbs (12,247 kg)	
Length	169 in (442 cm)	
Width	82 in (208 cm)	
Height	96 in (244 cm)	

ICE MODEL 44B

ICE[®] Model 44B Hydraulic Vibratory Driver/ Extractor with Model 595G Power Unit



Model 44B	Vibrato	or Specific	cations
the second se			

Eccentric moment	4,400 111-1	15 01	kg-m	
Maximum frequency	18	mqv 00		~ 0
Driving force	207 tor	is 1844	KN	
Centrifugal force	202 tor	s 1789	kN	
Amplitude (free w/o clamp)	1.1 in	28	mm	
Standard line pull for extracting	54 tor	is 483	kN	
Maximum line pull for extracting	80 tor	is 725	kN	1
Weight (no clamp or hoses)	12,450 lbs	5647	kg	
Non-vibrating weight	4,560 lbs	2068	kg	1
Height without clamp (H)	84 in	2134	mm	
Length (L)	98 in	2470	mm	
Width (W)	22 in	560	mm :	, Ø
Throat width (TW)	14.25 in	362	mm	
Hydraulic hose length	150 ft	P 46	m	23
Hydraulic hose weight	1,425 lbs	646	kg	
Height with sheeting clamp* (HH)	122 in	3096	mm	-
Weight with sheeting clamp & 1/2 hoses	* 15,365 lbs	6970	kg \=	
Height with beam & caisson clamps*	110 in	2784	mm	
Weight with beam & caisson clamps*	17,775 lbs	8065	kg	
ee "Clamps and Accessories Manual" for in depth	description	1.5	. 1	-
odel 595G Power Unit Speci	fications			1

Engine	Caterpillar	C15
Power	595 HP	444 kW
Operating speed	1,800 rpm	1800 rpm
Max. motors pressure	5,500 psi	380 bar
Motors flow (no load)	157 gpm	600 lpm
Clamp pressure	4,500 psi	310 bar
Clamp flow	6 gpm	21 lpm
Weight (w/ full fluid & 1/2 fuel)	16,350 lbs	7420 kg
Length	160 in	4040 mm
Width	73 in	1855 mm
Height	100 in	2540 mm
Hydraulic reservoir	430 gal	1630 liter
Fuel capacity	150 gal	570 lite -

International Construction Equipment, Inc. 301 Warehouse Drive Matthews, NC 28104 USA 888-ICE-USA1 / 704-821-8200 sales@iceusa.com / www.iceusa.com

Constant improvement and engineering progress make it necessary that ICE*, Increserve the right to make specification changes without notice. Please consult ICE for the latest available information.

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UV44B_595G_Jan2012

13.0 IMPACT PILE DRIVERS

DELMAG D62-22

Technical Data

Technical Data				the state of the state	
		D36-32	D46-32	D62-22	D80-23
Impact weight (piston)	kg	3600	4600	6200	8000
	Ibs	7,940	10,140	13,640	17,600
Energy per blow max min.	kNm	123-56	166-71	224-107	288-171
	ft-lbs	90,720-41,300	122,435-52,370	165,215-78,920	212,420-126,125
Number of blows	min-1	36-53	35-53	35-50	35-45
Suitable for driving piles	t	2,5-12	3-16	4-30	6-60
(depending on soil and pile)	US tons	2.2-13.2	3.3-17.6	4.4-33.1	6.6-66.1
Consumption					
Diesel oil	l/h	11,5	16	20	25
	gal/h	2.53	3.52	4.4	5.5
Lubricant	l/h	1,5	1,5	2	2,6
	gal/h	0.33	0.33	0.44	0.57
Tank capacity					
Diesel oil tank	l	89	89	98	155
	gal	23.5	23.5	25.9	40.9
Lube tank	l	17	17	31,5	32
	gal	4.5	4.5	8.3	8.5
Max. rope diameter for deflector sheave of tripping device (* reeved twice)	mm	38	38	38	30*
	in	1.5	1.5	1.5	1.2*
Max. inclined pile driving without / with extension		1:5 / 1:1	1:5 / 1:1	1:2/1:1	1:5/1:2
Weight					
Diesel pile hammer	kg	8200	9300	12250	16905
	Ibs	18,060	20,485	26,950	37,190
Tripping device	kg	450	450	450	750
	Ibs	992	992	992	1,650

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DELMAG D100-13

Technical Data				
		D100-13	D150-42	D200-42
Impact weight (piston)	kg	10000	15000	20000
	Ibs	22,000	33,000	44,000
Energy per blow max min.	kNm	360-214	512-329	682-436
	ft-lbs	265,520-157,840	377,630-242,660	503,036-321,580
Number of blows	min-1	35-45	36-45	36-45
Suitable for driving piles	t	7-100	12-160	14-250
(depending on soil and pile)	US tons	7.7-110.2	13.2-176.4	15.4-275.6
Consumption				
Diesel oil	l/h	30	50	60
	gal/h	6.6	11	13.2
Lubricant	l/h	2,6	4,8	5,8
	gal/h	0.57	1	1.3
Tank capacity				
Diesel oil tank	l	155	310	430
	gal	40.9	81.9	113.6
Lube tank	l	32	45	80
	gal	8.5	11.9	21.1
Max. rope diameter for deflector sheave of tripping device (* reeved twice)	mm	30*	36*	36*
	in	1.2*	1.4*	1.4*
Max. inclined pile driving without / with extension	1	1:5/1:2	1:5 / 1:2	1:5 / 1:3
Weight				
Diesel pile hammer	kg	20720	28450	51800
	Ibs	45,585	62,590	113,960
Tripping device	kg	750	1850	1850
	Ibs	1,650	4,070	4,070

Attachment 3 NMFS User Spreadsheet for Project Activities

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

KEY

ction Proponent Provided Information NMFS Provided Information (Technical Guidance) tesultant 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.		

DRAFT TOOL

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value STEP 2: WEIGHTING FACTOR ADJUSTMENT Relying on default due to lack of project-specific information /eighting Factor Adjustment (kHz)[¥] 2

⁴ Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

РК

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based source levels are not available E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

Unweighted SEL_{cum (at measured distance)} = SEL_{ss} 10 Log (# strikes) 217.5

SEL _{cum}	
Single Strike SEL _{ss} (<i>L _{E,p, single strike}</i>) specified at "x" meters (Cell B32)	189
Number of strikes per pile	700
Number of piles per day	1
Transmission loss coefficient	15
Distance of single strike SEL _{ss} (<i>L_{E,p, single}</i> strike) measurement (meters)	10

L _{p,0-pk} specified at "x" meters (Cell G29)	210
Distance of L _{p.0-pk} measurement (meters)*	10
L _{p,0-pk} Source level	225.0

RESULTANT ISOPLETHS*

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

DRAFT -00 U

Hearing Group	Low-Frequency Cetaceans	High-Frequency Cetaceans	Very High- Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinniped 185	
SEL _{cum} Threshold	183	193	159	183		
AUD INJ Isopleth to threshold (meters)	1,970.4	251.4	3,049.2	1,750.4	652.	
PK Threshold	222	230	202	223	230	
AUD INJ PK Isopleth to threshold (meters)	1.6	NA	34.1	1.4	NA	

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

ligh-Frequend Cetaceans

193

#NUM!

230

#NUM!

Low-Frequency Cetaceans

183

#NUM!

222

#NUM!

Hearing Group

SEL_{cum} Threshold

PK Threshold

AUD INJ PK Isopleth to threshold (meters)

AUD INJ Isopleth to thresh (meters)

E.1-2: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

calli	
Sound Pressure Level (<i>L_{rms}</i>), specified at "x" meters (Cell B53)	
Number of piles per day	
Strike (pulse) Duration [∆] (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Transmission loss coefficient	
Distance of sound pressure level (<i>L</i> _{rms}) measurement (meters)	
²⁰ Window that makes up 90% of total cumulative energy	y (5%-95%) based on Madsen 200

L _{p,0-pk} specified at "x" meters (Cell G47)	
Distance of L _{p,0-pk} measurement (meters)⁺	
L p.0-pk Source level	#NUM!

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

Very High-Frequency Cetaceans

159

#NUM!

202

#NUM!

ments 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.

Phocid Pinnipeds

183

#NUM!

223

#NUM!

Otariid Pinnipeds

185

#NUM!

230

#NUM!

RESULTANT ISOPLETHS*



WEIGHTING FUNCTION CALCULATIONS							
	Weighting Function Parameters	Low-Frequency Cetaceans	High-Frequency Cetaceans	Very High- Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
	а	0.99	1.55	2.23	1.63	1.58	
	b	5	5	5	5	5	
	f ₁	0.168	1.73	5.93	0.81	2.53	
TOOL	f ₂	26.6	129	186	68.3	43.8	NOTE: If user decided to override these Adjustment values,
	С	0.12	0.32	0.91	0.29	1.37	they need to make sure to download another copy
	Adjustment (-dB)†	-0.03	-3.45	-21.19	-0.80	-5.23	to ensure the built-in calculations function properly.

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