Application for Marine Mammal Protection Act Incidental Harassment Authorizations

Tongass Narrows Project

(Ketchikan-Gravina Island Access, Revilla New Ferry Berth, & New Gravina Island Shuttle Ferry Berth Projects)

State Project #s: SFHWY00085, SFHWY00109, SEIS - 67698

Submitted to:
National Marine Fisheries Service
Office of Protected Resources
1315 East-West Highway
Silver Spring, Maryland 20910-3226

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

Prepared by:
HDR
2525 C Street, Suite 500
Anchorage, AK 99503

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

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Acronyms and Abbreviations

ADF&G	Alaska Department of Fish and Game
dB	decibels
dBA	A-weighted decibels
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOT&PF	Alaska Department of Transportation and Public Facilities
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FR	*Federal Register*
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
LOA	Letter of Authorization
µPa	microPascals
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Pa	Pascals
PTS	permanent threshold shift
rms	root mean square
ROD	Record of Decision
SEIS	Supplementary Environmental Impact Statement
SEL	sound exposure level
SEL_{cum}	cumulative Single Strike Equivalent
SPL	sound pressure level
SSL	sound source level
TL	transmission loss
TTS	temporary threshold shift
USACE	United States Army Corps of Engineers
USC	United States Code

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1 DESCRIPTION OF ACTIVITIES

1.1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) requests two Incidental Harassment Authorizations (IHAs) for the take of small numbers of marine mammals incidental to construction associated with the Tongass Narrows Project (Project). The Project consists of six distinct marine components. Four components are part of the Ketchikan-Gravina Access Project and were addressed in the Gravina Access Project Final Supplemental Environmental Impact Statement (SEIS; Federal Highway Administration [FHWA] 2017). The other two components are the Revillagigedo (Revilla) New Ferry Berth and Upland Improvements project and the New Gravina Island Shuttle Ferry Berth/Related Terminal improvements project. The marine construction associated with these Project components will occur during two distinct year-long phases. The first phase (Phase 1) is scheduled to begin in 2020 and the second phase (Phase 2) is scheduled to begin in 2021 (Table 1-1). The DOT&PF requests one IHA for each distinct phase of the Project.

Table 1-1. Name and DOT&PF Project Number for each Project Component

Phase 1 Construction Components	Project Number
Non-SEIS	
KTN Revilla New Ferry Berth and Upland Improvements	SFHWY00085
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements	SFHWY00109
SEIS	
KTN Gravina Airport Ferry Layup Facility	SEIS - 67698
KTN Gravina Freight Facility	SEIS - 67698
Phase 2 Construction Components	**Project Number**
SEIS	
KTN Revilla Refurbish Existing Ferry Berth Facility	SEIS - 67698
KTN Gravina Refurbish Existing Ferry Berth Facility	SEIS - 67698

Note: KTN = Ketchikan; SEIS = Supplementary Environmental Impact Statement

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) regulations governing the issuance of IHAs and Letters of Authorization (LOAs) permitting the incidental take of marine mammals under certain circumstances are codified in 50 Code of Federal Regulations (CFR) Part 216, Subpart I (Sections 216.101–216.108). The Marine Mammal Protection Act (MMPA) defines “take” to mean “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal” (16 United States Code [USC] Chapter 31, Section 1362 (13)). Section 216.104 sets out 14 specific items that must be addressed in requests for rulemaking and renewal of regulations pursuant to Section 101(a)(5) of the MMPA. The 14 items are addressed in Sections 1 through 14 of this application for an IHA, and include the following:

1. Description of Specified Activity
2. Dates and Duration, Specified Geographic Region
3. Species and Numbers of Marine Mammals

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

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

1.2 Project Purpose and Need

The Tongass Narrows Project is located in Tongass Narrows in the City of Ketchikan, Alaska, in Southeast Alaska (Figure 1-1). The six Project components share some similarities in construction methodology, schedule, and purpose. Four of the six components are located on Gravina Island adjacent to the Ketchikan International Airport. The other two components are located immediately across Tongass Narrows on Revilla Island, approximately 2.6 miles north of downtown Ketchikan. All six Project components are located within approximately 0.5 mile of one another within the City of Ketchikan (Figure 1-2). The four Project components that were part of the SEIS share the same purpose and need described in that document, which is to (1) improve access to developable land on Gravina Island, (2) improve access to the Ketchikan International Airport, and (3) facilitate economic development in the Ketchikan Gateway Borough (specifically on Gravina Island).

The two new ferry berths (Gravina and Revilla Island Airport Shuttle Ferry Berths), which were not part of the SEIS and Record of Decision (ROD; FHWA 2017), will be constructed in order to provide redundancy to the existing ferry berths. The airport ferry system operated by the Ketchikan Gateway Borough is the only public access link from Revilla Island to Gravina Island and Ketchikan International Airport. The existing ferry berths on Gravina and Revilla Islands are a vital element to maintaining that link. The existing ferry berth at the terminal on Revilla Island is nearing the end of its useful life and is periodically out-of-service for repairs and maintenance. The new facilities will allow for multiple shuttle ferries and a back-up berthing facility, will be constructed to current standards, and will improve reliability of that transportation system.

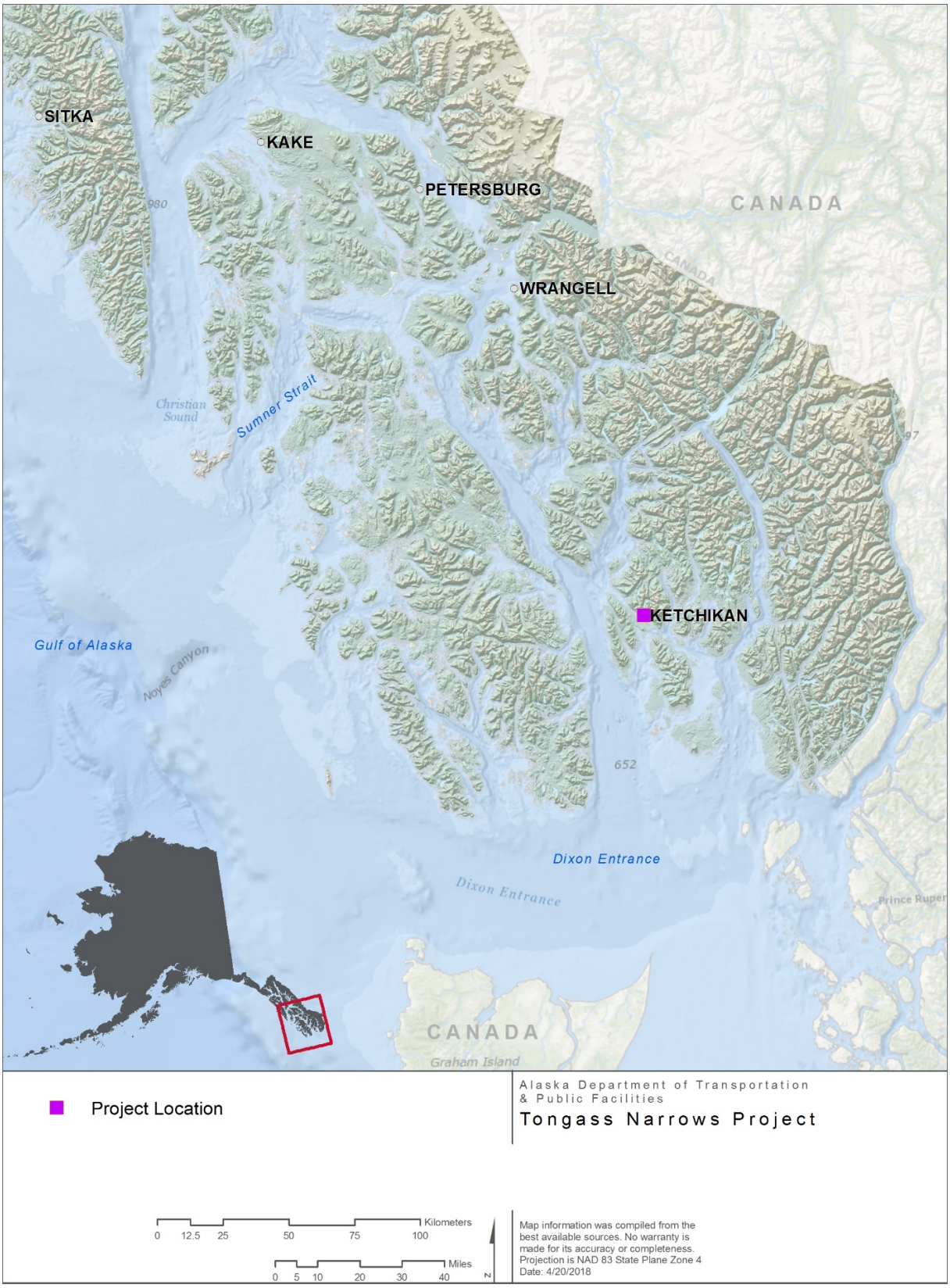

Figure 1-1. Site Location and Vicinity

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Figure 1-2. Tongass Narrows Project Area

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1.3 Project Activities

Proposed activities included as part of the Project with potential to affect marine mammals include the noise generated by drilling of rock sockets into bedrock for steel pipe piles, vibratory removal of steel pipe piles, vibratory installation of sheet piles, and vibratory and impact installation of steel pipe piles. Such in-water activities could result in harassment to marine mammals as defined under the MMPA of 1972, as amended in 2007 (16 USC 31). Each phase of the Project will include different activities that are described in detail in the following sections.

Above-water work will consist of the installation of concrete or steel platform decking panels, transfer bridges, dock-mounted fenders, pedestrian walkways, gangways, and utility lines. Upland construction activities will consist of new terminal facilities, staging areas, parking lot expansions, new roadways, retaining walls, stairways, and pedestrian walkways. No in-water noise is anticipated in association with above-water and upland construction activities.

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

1.3.1 Phase 1

Project Components

Each of the four permanent Project components in Phase 1 will include installation of steel pipe piles that are 18, 24, or 30 inches in diameter (Table 1-2). Temporary piles installed and removed during Phase 1 to support templates for permanent piles will be a maximum of 20 inches in diameter (Table 1-3). Two of the components (Revilla and Gravina New Ferry Berths) will require the installation of steel sheet piles that will comprise the bulkhead abutments and are 27.6 or 30.3 inches in width (Table 1-2). Pile installation methods will include vibratory and impact installation, as well as drilling of rock sockets and tension anchors (Gravina Island components only), as described below. Pile installation will occur in waters ranging in depth from less than 1 meter (3.3 feet) nearshore to approximately 20 meters (66 feet), depending on the structure and location. Plan drawings of all Project components are provided in Appendix A.

The estimated installation and removal rates for Phase 1 are 1.5 permanent pipe piles per day, 10 permanent sheet piles per day, and 4 to 6 temporary piles per day. Different types of piles may be installed or removed within a day.

Table 1-2. Numbers and Types of Piles to be Installed for each Project Component and Structure during Phase 1

Project Component / Pile Type	Structural Feature	Number of Piles	Number of Rock Sockets	Number of Tension Anchors	Average Vibratory Duration Per Pile (minutes)	Average Drilling Duration for Rock Sockets Per Pile (minutes)	Impact Strikes Per Pile	Estimated Total Number of Hours	Production Rate (Range)	Days of Installation
Revilla New Ferry Berth and Upland Improvements										
24" Pile Diameter	Approach Trestle	45	0	16	30	N/A	200	45	1.5 (1–3)	30
	Bridge Abutment	5	0	0	30	N/A	200	5	1.5 (1–3)	3
	Floating Fender Dolphin	15	0	9	30	N/A	200	15	1.5 (1–3)	10
30" Pile Diameter	Steel Float	10	0	10	30	N/A	200	10	1.5 (1–3)	7
	Stern Dolphin	8	0	4	30	N/A	200	8	1.5 (1–3)	5
AZ 14-770 Sheet Pile	Bulkhead Retaining Wall[a]	55	N/A	N/A	15	N/A	N/A	14	6 (6–12)	9
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements										
24" Pile Diameter	Steel Float	12	4	12	15	120	50	33	1.5 (1–3)	8
	Approach Trestle	34	34	4	15	120	50	94	1.5 (1–3)	23
	Bridge Abutment	5	5	0	15	120	50	14	1.5 (1–3)	3
	Floating Fender Dolphin	15	9	9	15	120	50	41	1.5 (1–3)	10
30" Pile Diameter	Stern Dolphin	8	4	4	15	180	50	30	1.5 (1–3)	5
AZ 19-700 Sheet Pile	Bulkhead Retaining Wall[b]	80	N/A	N/A	15	N/A	N/A	20	6 (6–12)	12
Gravina Airport Ferry Layup Facility										
18" Pile Diameter	Bridge Abutment	3	0	0	15	N/A	50	2	1.5 (1–3)	2

Project Component Pile Type	Structural Feature	Number of Piles	Number of Rock Sockets	Number of Tension Anchors	Average Vibratory Duration Per Pile (minutes)	Average Drilling Duration for Rock Sockets Per Pile (minutes)	Impact Strikes Per Pile	Estimated Total Number of Hours	Production Rate (Range)	Days of Installation
30” Pile Diameter	Side-Restraint Dolphin (South)	6	6	4	15	180	50	23	1.5 (1–3)	4
	Side-Restraint Dolphin (North)	6	6	6	15	180	50	23	1.5 (1–3)	4
Gravina Freight Facility										
20” Pile Diameter	Rubber Tire Fender	6	0	6	15	N/A	50	2	1.5 (1–3)	4
24” Pile Diameter	Rubber Tire Fender	3	3	3	15	120	50	3	1.5 (1–3)	2
30” Pile Diameter	Breasting Dolphins	4	2	4	15	180	50	75	1.5 (1–3)	3
	TOTAL PILES	**320**	**73**	**91**						**144**

[a] Total length of sheet pile bulkhead retaining wall is approximately 140 linear feet.
[b] Total length of sheet pile bulkhead retaining wall is approximately 185 linear feet.
Note: Production Rate is the estimated average number of piles installed per day. These are conservative estimates used to generate a time schedule. More realistic estimates of pile installation rate (one, two, or three piles per day) are presented in Table 6-5. Days of Installation do not sum to 144 due to rounding.

Table 1-3. Numbers of Temporary Piles to be Installed and Removed for each Project Component and Structure during Phase 1

Project Component	Number of Temporary Piles	Average Vibratory Duration Per Pile for Installation (minutes)	Average Vibratory Duration Per Pile for Removal (minutes)	Days of Installation	Days of Removal	Piles per day
Revilla New Ferry Berth and Upland Improvements	12	15	15	2 to 3	2 to 3	4 to 6
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements	12	15	15	2 to 3	2 to 3	4 to 6
Gravina Airport Ferry Layup Facility	8	15	15	1 to 2	0.75 to 2	4 to 6
Gravina Freight Facility	12	15	15	2 to 3	2 to 3	4 to 6
TOTAL	**44**	**660 (11 hours)**	**660 (11 hours)**	**7-11**	**7-11**	

Revilla New Ferry Berth and Upland Improvements

The new Revilla Island airport shuttle ferry berth will be constructed immediately adjacent to the existing Revilla Island Ferry Berth (Figure 1-2). It is the only Phase 1 component that will occur on Revilla Island. It will be located in Section 23 of Township 75 South, Range 90 East (Lat: 55° 21’ 32.9”N, Lon: 131° 42’ 9.8”W). The new ferry berth will consist of a 7,400-square-foot pile-supported approach trestle at the shore side of the ferry terminal and a 1,500-square foot pile-supported approach trestle extension located landside and north of the new approach trestle. A 25-foot by 142-foot steel transfer bridge with vehicle traffic lane and separated pedestrian walkway will extend from the trestle to a new 2,200-square-foot steel float and apron. The steel float will be supported by three guide pile dolphins. A bulkhead retaining wall will be constructed at the transition from uplands to the approach trestle. Two new stern berth dolphins with fixed hanging fenders and three new floating fender dolphins will be constructed to moor vessels. The new apron will be supported by three new guide pile dolphins. Water depths at the dolphins will reach approximately 60 feet. Upland improvements will include reconstruction of terminal facilities, installation of utilities, and construction of improvements to existing staging/parking areas.

Gravina Island Shuttle Ferry Berth/Related Terminal Improvements

The new Gravina Island airport shuttle ferry berth will be constructed immediately adjacent to the existing Gravina Island Ferry Berth (Figure 1-2). It will be located in Section 22 of Township 75 South, Range 90 East (Lat: 55° 21’ 24.5”N, Lon: 131° 42’ 28.6”W). The new facility will consist of an approximately 7,000-square-foot pile-supported approach trestle at the shore side of the ferry terminal. A 25-foot by 142-foot steel transfer bridge with vehicle traffic lane and separated pedestrian walkway will lead to a new 2,200-square-foot steel float and apron. The steel float will be supported by three new guide pile dolphins. Ferry berthing will be supported by two new stern berth dolphins and three new floating fender dolphins. To support the new facility,

a new bulkhead retaining wall will be constructed between the existing ferry berth and the new approach trestle. A new fill slope measuring approximately 21,200 square feet will be constructed west of the approach trestle. Upland improvements include widening of the ferry approach road, retrofits to the existing pedestrian walkway, installation of utilities, and construction of a new employee access walkway.

Gravina Airport Ferry Layup Facility

Improvements to the Gravina Island Ferry layup dock facility will occur in the same location as the existing layup dock facility in Section 23, Township 75 South, Range 90 East (Lat: 55°21'16.12"N, Lon: 131°42'15.18"W; Figure 1-2). The current layup dock is in disrepair and needs to be replaced. The new facility will accommodate layup and maintenance of the airport ferry system. The existing 265-foot-long floating dock, mooring structures, and transfer bridge will be removed. A new 250-foot by 85-foot concrete or steel floating dock will be constructed in its place. The floating dock will be restrained by two side-restraint float dolphins and three corner/mid-restraint float dolphins. A new 20-foot by 140-foot steel transfer bridge will provide access to the floating dock. It will be necessary to remove, relocate, and replenish the existing rock slope, demolish the existing concrete abutment, and construct a new pile-supported bridge abutment.

Gravina Freight Facility

The new Gravina Island heavy freight mooring facility will be constructed in the same location as the existing barge offload facility in Section 23, Township 75 South, Range 90 East (Lat: 55°21'11.49"N Lon: 131°42'9.40"W; Figure 1-2). This facility will provide improved access to Gravina Island for highway loads that cannot be accommodated by the shuttle ferry. The existing ramp will be widened and re-graded both above and below the high tide line. A new concrete plank or asphalt pavement ramp will be constructed in its place. Five breasting dolphins and one mooring dolphin will be constructed to support barge docking and will include pedestrian walkways for access by personnel. In addition, two new pile-supported mooring line structures will be constructed above the high tide line.

In-Water Activities

Four methods of pile installation are anticipated. These include vibratory and impact hammers, down-hole drilling of rock sockets, and installation of tension anchors at some locations (Figure 1-3). Most piles will be installed vertically (plumb), but some will be installed at an angle (battered). Tension anchors will be used to secure some piles to the bedrock to withstand uplift forces. Rock sockets will be drilled at other locations where overlying sediments are too shallow to adequately secure the bottom portion of the pile. Some piles will be seated in rock sockets as well as anchored with tension anchors (Table 1-2). A vibratory hammer will be used to install 44 temporary template piles, no greater than 20 inches in diameter, to a depth of 25 feet or less (Table 1-3). The total duration of vibratory installation and subsequent removal of temporary piles will be approximately 44 hours spread over multiple days, and will take place within the same days as permanent pile installation. Installation and removal of temporary piles is therefore not anticipated to add to the overall estimated 144 days of pile installation and removal for Phase 1.

The steel sheet piles for the bulkheads are of a Z-shape. Each pile is approximately 28 to 30 inches wide, and they interlock together to form a continuous wall. These sheet piles will be installed into the existing ground at elevations varying from +8 inches to +26 inches mean lower low water. Most of this work is expected to be done at lower tides so that in-water pile driving work is minimized. However, some installation work below the tidal elevations (in water) can be

expected. The ground where the sheet piles will be installed is comprised of existing rubble mound slopes. Some excavation work will be needed to temporarily remove the large rocks prior to driving the sheet piles.

Vibratory and Impact Pile-Driving Methods

Installation of steel piles through the sediment layer will be done using vibratory or impact methods. Depending on the location, the pile will be advanced to refusal at bedrock. Where sediments are deep and rock socketing or anchoring is not required, the final approximately 10 feet of driving will be conducted using an impact hammer so that the structural capacity of the pile embedment can be verified. Where sediments are shallow, an impact hammer will be used to seat the piles into competent bedrock before rock drilling begins. The pile installation methods used will depend on sediment depth and conditions at each pile location. The sheet pile abutment bulkheads for the new Revilla and Gravina ferry berths will be installed using vibratory hammer methods.

Rock Sockets

Rock sockets consist of inserting the pile in a drilled hole into the underlying bedrock after the pile has been driven through the overlying softer sediments to refusal by vibratory or impact methods. The pile is advanced farther into this drilled hole to properly secure the bottom portion of the pile into the rock. The depth of the rock socket varies, but 10–15 feet is commonly required. The diameter of the rock socket is slightly larger than the pile being driven. Rock sockets are constructed utilizing both rotary and percussion-type drill devices. These devices consist of a drill bit that drills through the bedrock using both rotary and pulse impact mechanisms. This breaks up the rock to allow removal of the fragments and insertion of the pile. The pile is usually advanced at the same time that drilling occurs. Drill cuttings are expelled from the top of the pile using compressed air. It is estimated that drilling rock sockets into the bedrock will take about 1–3 hours per pile. Some piles will be seated in rock sockets as well as anchored with tension anchors (Table 1-2).

The steel sheet piles for the bulkheads are of a Z-shape. Each pile is approximately 28 to 30 inches wide, and they interlock together to form a continuous wall. These sheet piles will be installed into the existing ground at elevations varying from +8 inches to +26 inches mean lower low water. Most of this work is expected to be done at lower tides so that in-water pile driving work is minimized. However, some installation work below the tidal elevations (in water) can be expected. The ground where the sheet piles will be installed is comprised of existing rubble mound slopes. Some excavation work will be needed to temporarily remove the large rocks prior to driving the sheet piles.

Source noise levels in the water column due to rock socket drilling are not entirely known. There are several variables that influence noise levels, including the depth and nature of the overlying sediments and the depth of the socket itself as it extends into the bedrock. The rock drilling occurs below the overlying sediments and bedrock and some sound attenuation likely occurs. Based on past noise studies (DOT&PF, Kodiak Pier 1, as reported in Denes et al. 2016), underwater noise from rock socket construction is currently assumed to be relatively similar to vibratory pile driving.

Tension Anchors

Tension anchors are installed within piles that are drilled into the bedrock below the elevation of the pile tip, after the pile has been driven through the sediment layer to refusal. A 6- or 8-inch diameter steel pipe casing is inserted inside the larger diameter production pile. A rock drill is

inserted into the casing, and a 6- to 8-inch-diameter hole is drilled into bedrock with rotary and percussion drilling methods. The drilling work is contained within the steel pile casing and the steel pipe pile. The typical depth of the drilled hole varies, but 20–30 feet is common. Rock fragments will be removed through the top of the casing with compressed air. A steel rod is then grouted into the drilled hole and affixed to the top of the pile. The purpose of a rock anchor is to secure the pile to the bedrock to withstand uplift forces. Table 1-2 indicates the expected number and locations where tension anchors are required. Figure 1-3 depicts a schematic of rock socket and tension anchor drilling techniques.

Underwater noise from rock anchor construction is typically low. The bedrock is overlain with sediments, and will attenuate noise production from drilling and reduce noise propagation into the water column. Additionally, the casing used during drilling is inside the larger diameter pile, further reducing noise levels (82 *Federal Register* [FR] 34632, IHA for the Gary Paxton Industrial Park Dock Modification Project in Sitka, Alaska; 83 FR 12152, proposed IHA for the City Dock and Ferry Terminal Improvements Project in Tenakee Springs, Alaska).

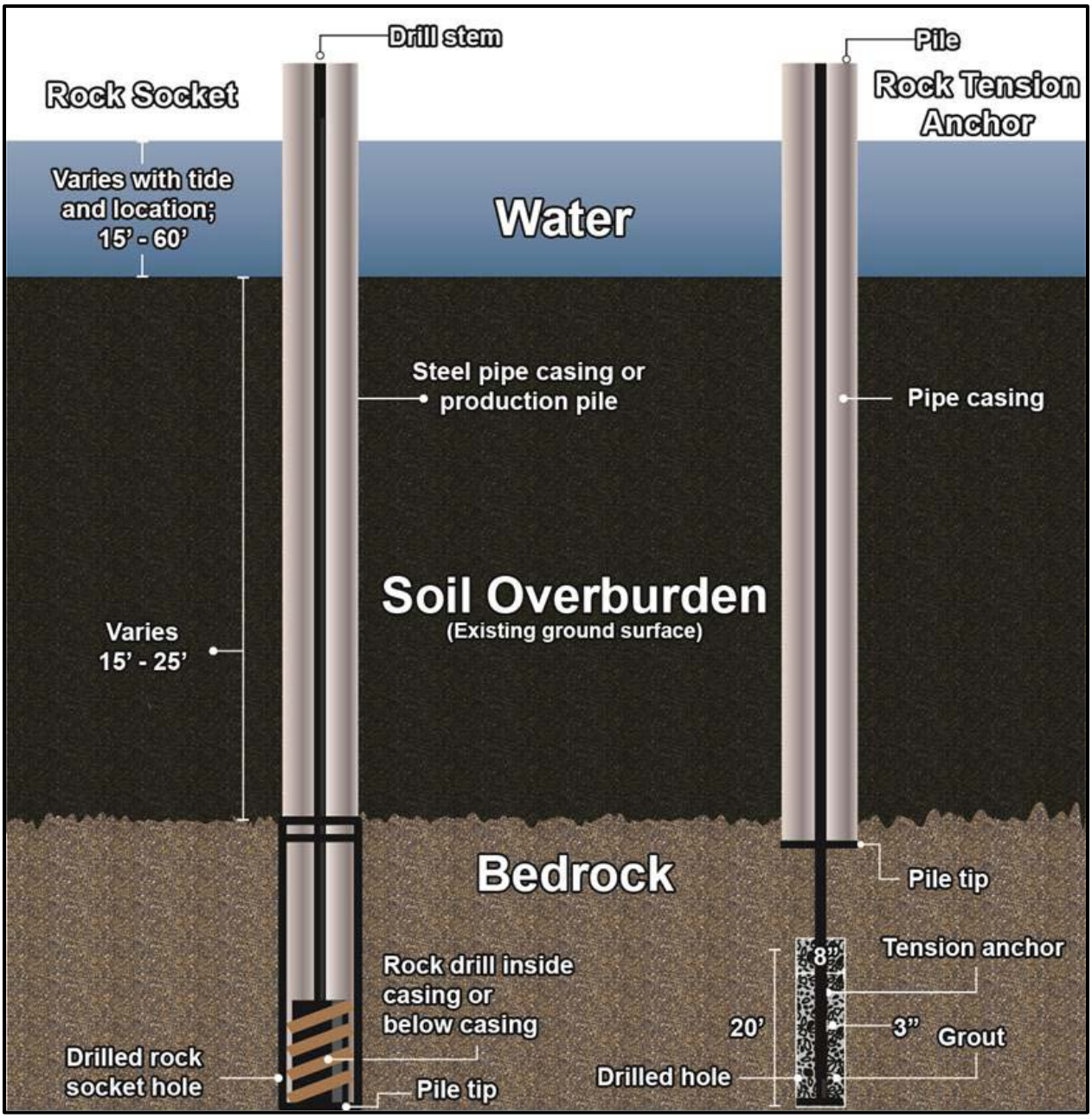

Figure 1-3. Schematic of Down-hole Drilling Method and Tension Anchor

1.3.2 Phase 2

Project Components

The two Project components in Phase 2 will include installation and removal of steel pipe piles that are 16, 20, 24, and 30 inches in diameter (Table 1-4). Methods for vibratory and impact installation of temporary and permanent piles, drilling of rock sockets, and installation of tension anchors will be consistent with those described above in Section 1.3.1 (In-water Activities). The estimated installation and removal rate for Phase 2 is 1.5 pipe piles per day.

Table 1-4. Number of Piles to be Installed and Removed for each Project Component and Structure during Phase 2

Project Component / Pile Type	Structural Feature	Number of Piles	Number of Rock Sockets	Number of Tension Anchors	Average Vibratory Duration Per Pile (minutes)	Average Drilling Duration for Rock Sockets Per Pile (minutes)	Impact Strikes Per Pile	Estimated Total Number of Hours	Production Rate (Range)	Days of Installation and Removal
Revilla Refurbish Existing Ferry Berth Facility										
24" Pile Diameter	Floating Fender Dolphin	1			30		50	1	1	1
24" Pile Diameter	Remove Floating Fender Dolphin Pile	1			30		N/A	1	1	1
Gravina Refurbish Existing Ferry Berth Facility										
24" Pile Diameter	Floating Fender Dolphin	15			15		50	11	1.5 (1-3)	10
30" Pile Diameter	Breasting Dolphins	8	3	12	15	180	50	6	1.5 (1-3)	7
16" Pile Diameter	Remove Existing Dolphins	12			15		N/A	2	1.5 (1-3)	8
TOTAL PILES		**24 install + 13 remove**								**27**

Note: Production Rate is the estimated average number of piles installed or removed per day.

One 24-inch-diameter pile will be installed at the existing Revilla ferry berth. Fifteen 24-inch diameter piles and eight 30-inch-diameter piles will be installed at the existing Gravina ferry berth. A total of 10 piles will be removed to accommodate upgrades to the existing Revilla Island and Gravina Island ferry berths. One 24-inch pile will be removed from the floating fender dolphin at the existing Revilla ferry berth. The nine 16-inch-diameter piles that support the three existing dolphins at the Gravina ferry berth will also be removed. It is anticipated that, when possible, existing piles will be extracted by directly lifting them with a crane. A vibratory hammer will be used if necessary to extract piles that cannot be directly lifted. Installation of sheet piles and tension anchor drilling is not planned during Phase 2.

Each of the components included in Phase 2 is described in the following sections.

Revilla Refurbish Existing Ferry Berth Facility

Improvements to the existing Revilla Island Ferry Berth will include the following: (1) replace the transfer bridge, (2) replace rubber fender elements and fender panels, (3) replace one 24-inch pile on the floating fender dolphin, and (4) replace the bridge float with a concrete or steel float of the same dimensions. Construction of the transfer bridge, bridge float, and fender elements will occur above water. The only in-water work will be pile installation and removal associated with construction of the dolphins. No temporary piles will be installed or removed during this component of the project.

Gravina Refurbish Existing Ferry Berth Facility

Improvements to the existing Gravina Island Ferry Berth will include the following: (1) replace the transfer bridge, (2) remove the catwalk and dolphins, (3) replace the bridge float with a concrete or steel float of the same dimensions, (4) construct a floating fender dolphin, and (5) construct four new breasting dolphins. Construction of the transfer bridge, catwalk, and bridge float will occur above water. The only in-water work will be pile installation and removal associated with construction of the dolphins. A vibratory hammer will be used to install and remove 12 temporary template piles, no greater than 20 inches in diameter, to a depth of 25 feet or less (Table 1-5). The total duration of vibratory installation and subsequent removal of temporary piles will be approximately 6 hours spread over multiple days, and will take place within the same days as permanent pile installation. Installation and removal of temporary piles is therefore not anticipated to add to the overall estimated 27 days of pile installation and removal for Phase 2.

Table 1-5. Number of temporary piles to be installed and removed for each Project Component and Structure during Phase 2

Project Component	Number of Temporary Piles	Average Vibratory Duration Per Pile for Installation (minutes)	Average Vibratory Duration Per Pile for Removal (minutes)	Days of Installation	Days of Removal	Piles per day
Revilla Refurbish Existing Ferry Berth Facility	0	0	0	0	0	0
Gravina Refurbish Existing Ferry Berth Facility	12	15	15	2 to 3	2 to 3	4 to 6
TOTAL	**12**	**180 (3 hours)**	**180 (3 hours)**	**2 to 3**	**2 to 3**	

1.4 Applicable Permits/Authorizations

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

- United States Army Corps of Engineers (USACE) Section 10 of the Rivers and Harbors Act of 1899
- Section 404 of the Clean Water Act (CWA)
- Section 401 of the CWA
- NMFS Endangered Species Act (ESA) Section 7 Consultation

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2 DATES, DURATION, AND GEOGRAPHICAL REGION OF ACTIVITIES

2.1 Dates and Durations of Activities

In-water construction of Phase 1 is scheduled to begin in March 2020 and continue through February 2021(see Table 2-1). In-water construction of Phase 2 is scheduled to begin in March 2021 and continue through February 2022. Construction activities may occur at multiple sites simultaneously; however, in-water pile installation/removal (including drilling) will not occur simultaneously at one or more component sites, based on proposed avoidance and minimization measures (Section 11). Pile installation will occur intermittently over the work period, for durations of minutes to hours at a time. Work schedule is dependent on weather, construction and mechanical delays, protected species shutdowns, and other potential delays and logistical constraints. Substantial shore-side (above-water) construction will also occur intermittently during each phase. Construction will occur 7 days per week and only during daylight hours.

Pile installation and removal can occur at variable rates, from a few minutes one day to several hours the next. We anticipate that from 2 to 3 piles could be installed per day. In order to account for inefficiencies and delays, we have estimated an installation/removal rate of 1.5 pipe piles per day and 10 sheet piles per day. As shown in Table 1-1 and Table 1-2, Phase 1 will require approximately 144 days of pile installation, and Phase 2 will require approximately 23 days of pile installation (and removal). We anticipate that construction of Phase 1 will occur over the course of 12 months. The IHA for Phase 1 is requested for 1 year, from 01 March 2020 through 28 February 2021. We anticipate that Phase 2 will occur over the course of 5 months. Because the exact dates of construction of Phase 2 are not certain, the IHA for Phase 2 is also requested for 1 year, from 01 March 2021 through 28 February 2022.

It is critical to DOT&PF that authorization for this Project is granted in an expedient manner to meet Project deadlines, secure vital federal funding assistance, and avoid delays or interruptions in ferry service to the airport.

Table 2-1. Anticipated Marine Construction Periods for each Project Component

Project Component	Year	2020												2021												2022											
	Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Phase 1																																					
KTN Revilla New Ferry Berth and Upland Improvements																																					
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements																																					
KTN Gravina Airport Ferry Layup Facility																																					
KTN Gravina Freight Facility																																					
Phase 2																																					
KTN Revilla Refurbish Existing Ferry Berth Facility																																					
KTN Gravina Refurbish Existing Ferry Berth Facility																																					

2.2 Geographical Setting

The Tongass Narrows Project is located within the City of Ketchikan, Alaska (Figure 1-1 and Figure 1-2). The new Revilla Island Airport Shuttle Ferry Berth will be constructed immediately adjacent to the existing Revilla Island Ferry Berth at 55° 21' 32.9"N, Lon: 131° 42' 9.8"W. The new Gravina Island Airport Shuttle Ferry Berth will be constructed immediately adjacent to the existing Gravina Island Ferry Berth at 55° 21' 24.5"N, Lon: 131° 42' 28.6"W. Improvements to the Gravina Island Ferry Layup Dock will occur in the same location as the existing layup dock facility at 55°21'16.12"N, Lon: 131°42'15.18"W. The new Gravina Island Heavy Freight Mooring Facility will be constructed in the same location as the existing barge offload facility at 55°21'11.49"N Lon: 131°42'9.40"W. Ketchikan is part of the Ketchikan Gateway Borough Census Area. Ketchikan is Alaska's fifth largest city, with a population of approximately 8,125 (DCCED 2017).

2.2.1 Physical Environment

Tongass Narrows is an approximately 13-mile-long, north-south-oriented marine channel situated between Revilla Island to the east and Gravina Island to the west. In the vicinity of the Project, Tongass Narrows is as little as 300 meters (984 feet) wide. The majority of the City of Ketchikan is located on Revilla Island. Marine facilities include fish processing plants, small boat harbors, cruise ship and ferry terminals, float plane docks, a dry dock, shipyard, and other infrastructure. Ketchikan International Airport is located on Gravina Island. The airport averaged 43 aircraft operations per day in 2011 and offers multiple commercial flights per day.

Tongass Narrows is generally characterized by strong tidal currents and by steep bedrock or coarse gravel-cobble-boulder shoreline. Lower intertidal and shallow subtidal areas are often sandy or mixed gravel, sand, and shell, with varied amounts of silt. At other areas, however, such as at rocky points and along the northwestern shore of Pennock Island, bedrock slopes steeply to subtidal depths. Subtidal habitats are a mix of bedrock outcrops or ledges, boulder-cobble slopes, and, where lower slopes permit, sandy gravel bottoms, often mixed with significant amounts of shell debris, similar to intertidal habitats.

Several small natural coves and areas protected by constructed breakwaters provide wave and current protection for marine habitats with sand or gravel bottoms with some areas of eelgrass (*Zostera marina*) beds. Extensive areas of riprap bank protection and fill occur along the northeastern shoreline of the City of Ketchikan. Construction of numerous buildings and docks on pilings over the intertidal and shallow subtidal zone has significantly modified the shorelines in these areas. Shoreline protection activities have similarly modified about 1 mile of the shoreline of Gravina Island in the vicinity of the airport and airport ferry terminal.

Water depths reach approximately 49 meters (160 feet) in the middle of the Tongass Narrows between the airport and town, but generally do not exceed 18 meters (60 feet) where piles will be installed. The channel bottom slopes at about 2H:1V (horizontal:vertical) from opposite shores. Geologic conditions in the vicinity of the Project were evaluated by CH2M in 2017 (CH2M 2018). The substrate consists of approximately 18 to 23 meters (60 to 75 feet) of very loose to very dense granular deltaic or alluvial sand and gravel. At approximately 18 to 23 meters (60 to 75 feet) below the mudline, the substrate transitions to phyllite bedrock (CH2M 2018).

2.2.2 Acoustic Environment

Ongoing vessel activities throughout Tongass Narrows, land-based industrial and commercial activities, and regular aircraft operations result in elevated in-air and underwater sound conditions in the Project area that increase with proximity to the Project component sites. While ambient in-air sound levels in Ketchikan are estimated at between 55 and 65 A-weighted decibels (dBA; FHWA 2017), and ambient underwater sound levels range between 120 and 130 decibels (dB; Warner and Austin 2016a), sound levels likely vary seasonally, with elevated levels during summer when the tourism and fishing industries are at their peaks. The shoreline and underwater portions of the Project area are highly modified by existing dock structures and past dredging.

The mean underwater ambient sound levels near Ketchikan were recorded at approximately 125 dB (Warner and Austin 2016a). However, in the portions of Tongass Narrows removed from the industrial and commercial noise of Ketchikan, it is possible that ambient sound levels approach 120 dB. Harassment of marine mammals could occur during exposure to underwater sound levels in excess of ambient, which, in the Project area, likely ranges from 120 to 125 dB. NMFS recommends a default underwater background or ambient noise level of 120 dB, which will be used for this Project.

3 SPECIES AND ABUNDANCE OF MARINE MAMMALS

The marine waters of Southeast Alaska support many species of marine mammals, including pinnipeds and cetaceans; however, the number of species occurring regularly near the Project area is limited. According to the Final EIS for the Ketchikan-Gravina Island Access Project (FHWA 2017), the following eight species could occur within the Project area: Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), and minke whale (*Balaenoptera acutorostrata*; Table 3-1). The Alaska Protected Resources Division of NMFS provides an online, interactive mapping tool used to identify species protected by the MMPA based on broadly generalized species ranges (NOAA 2018). This tool identified the eight species listed above, as well as gray whales (*Eschrichtius robustus*) and fin whales (*Balaenoptera physalus*). However, it is unlikely that these species would occur in the Project area; recent NMFS IHAs for activities in Tongass Narrows have not included these species and therefore they are not discussed further in this document. Each of the marine mammal species that may occur in the Project area is discussed in more detail in the following sections, and the abundance and potential exposure of these species are summarized at the end of this section.

When available, peer-reviewed scientific publications are used to quantitatively estimate marine mammal abundance in the Project area. However, scientific surveys and resulting data such as population estimates, densities, or other quantitative information are lacking for most marine mammal populations and most areas of Southeast Alaska. Therefore, qualitative information was gathered from discussions with knowledgeable local people in the Ketchikan area, including biologists, the harbormaster, a tour operator, and other individuals familiar with marine mammals in the Tongass Narrows area. Throughout the following sections, the anecdotal reports refer to information obtained from discussions with these individuals. People who were interviewed include:

- Dan Berg, Senior Harbormaster, City of Ketchikan
- Gary Freitag, Alaska Sea Grant Marine Advisory Program Agent, Ketchikan
- Eric Lunde, Operations Manager and vessel captain, Allen Marine Tours, Ketchikan
- Andrew Mathews, NOAA Fisheries Law Enforcement officer, Ketchikan
- Boyd Porter, Wildlife Management Biologist, Alaska Department of Fish & Game (ADF&G), Ketchikan
- Bo Meredith, Assistant Management Biologist, Commercial Fisheries Division, ADF&G, Ketchikan

Descriptions of each species and its presence in the Project area are provided in Section 4.

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

Species	Abundance (Population/Stock)	MMPA Designation	ESA Listing	Occurrence in Project Area
Steller sea lion	41,638 (Eastern DPS)	Protected	None	Common
	53,303 (Western DPS)	Depleted & Strategic	Endangered	Unlikely[a]
Harbor seal	31,634 (Clarence Strait)	Protected	None	Common
Harbor porpoise	11,146 (Southeast Alaska)	Strategic	None	Rare
Dall's porpoise	83,400 (Alaska)	Protected	None	Rare
Pacific white-sided dolphin	26,880 (North Pacific)	Protected	None	Rare
Killer whale (Orca)	2,347 (Eastern North Pacific Alaska Resident)	Protected	None	Occasional
	261 (Northern Resident)	Protected	None	Occasional
	243 (West Coast Transient)	Protected	None	Rare
Gray whale	20,990 (Eastern North Pacific)	Protected	None	Unlikely[a]
Fin whale	2,554 (Northeast Pacific)	Depleted	Endangered	Unlikely[a]
Minke whale	Unknown (Alaska)	Protected	None	Rare
Humpback whale	11,398 (Hawaii DPS)	Protected	None	Common
	3,264 (Mexico DPS)	Protected	Threatened	Rare

Sources: Humpback whale abundance estimates: Wade et al. 2016. Gray whale abundance estimate: Carretta et al. 2018. All other abundance estimates: Muto et al. 2018.

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

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

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

4.1 Steller Sea Lion

4.1.1 Status and Distribution

Steller sea lions were listed as threatened range-wide under the ESA on November 26, 1990 (55 FR 49204). Steller sea lions were subsequently partitioned into the western and eastern Distinct Population Segments (DPSs; western and eastern stocks) in 1997 (62 FR 24345). The eastern DPS remained classified as threatened until it was delisted in November 2013. The current minimum abundance estimate for the eastern DPS of Steller sea lions is 41,638 individuals (Muto et al. 2018). The western DPS (those individuals west of 144° W longitude or Cape Suckling, Alaska) was upgraded to endangered status following separation of the DPSs, and it remains endangered today.

4.1.2 Presence in Project Area

The nearest known Steller sea lion haulout is located approximately 17 miles west/northwest of Ketchikan on Grindall Island (Figure 4-1). Summer counts of adult and juvenile sea lions at this haulout since 2000 have averaged approximately 191 individuals, with a range from 6 in 2009 to 378 in 2008. Only two winter surveys of this haulout have occurred. In March 1993, a total of 239 individuals were recorded, and in December 1994, a total of 211 individuals were recorded. No sea lion pups have been observed at this haulout during surveys. Although this is a limited sample, it suggests that abundance may be consistent year-round at the Grindall Island haulout.

No systematic studies of sea lion abundance or distribution have occurred in Tongass Narrows. Anecdotal reports suggest that Steller sea lions may be found in Tongass Narrows year-round, with an increase in abundance from March to early May during the herring spawning season, and another increase in late summer associated with salmon runs. Overall sea lion presence in Tongass Narrows tends to be lower in summer than in winter (FHWA 2017). During summer, Steller sea lions may aggregate outside the Project area, at rookery and haulout sites. Monitoring during construction of the Ketchikan Ferry Terminal in summer (16 July through 17 August 2016) did not record any Steller sea lions (DOT&PF 2015).

Marine mammal monitoring was conducted during construction of the Icy Strait Point Cruise Ship Terminal in Hoonah, Alaska, between 01 June 2015, and 25 January 2016. Steller sea lions were observed on 47 of the 135 days of monitoring. Although sea lions were observed during all times of the year, observations peaked between late August and mid-October (Berger ABAM 2016). Although Hoonah is approximately 240 miles from Ketchikan, these data support similar estimates described above and are an example of how abundance can fluctuate throughout the season.

Sea lions are known to transit through Tongass Narrows while pursuing prey. Steller sea lions are known to follow fishing vessels, and may congregate in small numbers at seafood processing facilities and hatcheries or at the mouths of rivers and creeks containing hatcheries, where large numbers of salmon congregate in late summer. Three seafood processing facilities are located east of the proposed berth location on Revilla Island, and two salmon hatcheries operated by ADF&G are located east of the Project area. Steller sea lions may aggregate near the mouth of Ketchikan Creek, where a hatchery upstream supports a summer salmon run. The Creek mouth is more than 4 kilometers (2.5 miles) from both ferry berth sites, and is positioned behind the cruise ship terminal and within the small boat harbor. In addition to these locations,

anecdotal information from a local kayaking company suggests that there are Steller sea lions present at Gravina Point, near the southwest entrance to Tongass Narrows.

On average, Steller sea lions occur in Tongass Narrows about once or twice per week. Steller sea lions in this area travel as single animals or in groups that typically range in size from 6 to 10 individuals (Freitag 2017 as cited in 83 FR 22009), and maximum group sizes could reach 80 animals (HDR 2003).

4.1.3 Life History

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods, including Atka mackerel (*Pleurogrammus monopterygius*), Pacific herring (*Clupea pallasi*), walleye pollock (*Gadus chalcogramma*), capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific cod (*Gadus macrocephalus*), salmon (*Oncorhynchus* spp.), and squid (*Teuthida* spp.) (Jefferson et al. 2008; Wynne et al. 2011). Steller sea lions do not generally eat every day, but tend to forage every 1–2 days and return to haulouts to rest between foraging trips (Merrick and Loughlin 1997; Rehberg et al. 2009). The foraging habits of Steller sea lions using Tongass Narrows are not well known, but it is reasonable to assume that they disperse in many directions to obtain food.

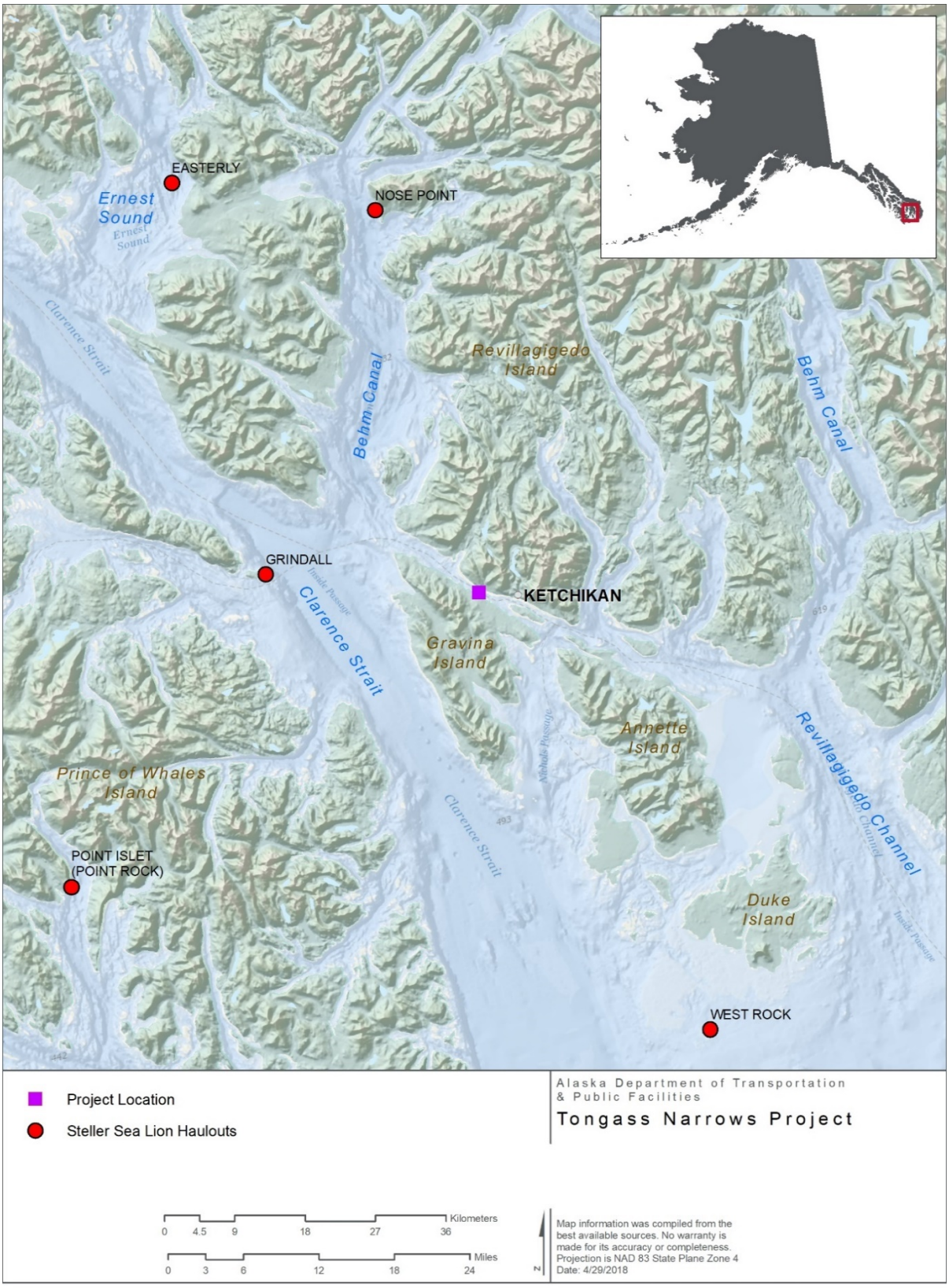

Figure 4-1. Steller Sea Lion Haulouts Located Nearest to the Project Area

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4.2 Harbor Seal

4.2.1 Status and Distribution

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands. In 2010, harbor seals in Alaska were partitioned into 12 separate stocks based largely on genetic structure (Allen and Angliss 2010). Harbor seals in Tongass Narrows are recognized as part of the Clarence Strait stock, which is increasing in population size (Muto et al. 2018).

Harbor seals are not designated as strategic or depleted under the MMPA and are not listed under the Endangered Species Act (ESA), but like all marine mammals, they are protected under the MMPA. The status of all 12 stocks of harbor seals identified in Alaska relative to their optimum sustainable population size is unknown. The current statewide abundance estimate for Alaskan harbor seals is 205,090, based on aerial survey data collected during 1998–2011. The most recent abundance estimate for the Clarence Strait stock is 31,634 individuals, based on surveys in 2011 (Muto et al. 2018). The stock added an estimated 921 seals per year between 2007 and 2011, and there is a probability of 0.21 that the stock will decrease (Muto et al. 2018).

4.2.2 Presence in Project Area

No systematic studies of harbor seal abundance or distribution have occurred in Tongass Narrows. Aerial surveys conducted only in August 2011 did not record any harbor seal haulouts in Tongass Narrows, but several haulouts were located on the outer shores of Gravina Island (London et al. 2015). There is no known harbor seal haulout in Tongass Narrows. Harbor seals have been observed hauled out on docks in Ketchikan Harbor, but this behavior is generally considered unsafe and is discouraged by Ketchikan residents and Harbor employees.

Anecdotal observations indicate that harbor seals are common in Tongass Narrows, although no data exist to quantify abundance. Two salmon hatcheries operated by ADF&G are located east of the Project area. Like Steller sea lions, harbor seals may aggregate near the mouth of Ketchikan Creek when salmon are running in summer. The creek mouth is more than 4 kilometers (2.5 miles) from the Project component sites, and is positioned behind both the cruise ship terminal and within the small boat harbor.

No seasonal pattern of harbor seal abundance has been observed in Tongass Narrows; harbor seals are present year-round. Based on reports from local residents (Section 3), from one to three harbor seals on average can be observed in Tongass Narrows on most days throughout the year. This is in addition to those that are regularly observed at the fish hatcheries.

4.2.3 Life History

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

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

4.3 Harbor Porpoise

4.3.1 Status and Distribution

In the eastern North Pacific Ocean, the harbor porpoise ranges from Point Barrow, along the Alaska coast, and down the west coast of North America to Point Conception, California. In Alaska, harbor porpoises are currently divided into three stocks, based primarily on geography: the Bering Sea stock, the Southeast Alaska stock, and the Gulf of Alaska stock. The Southeast Alaska stock ranges from Cape Suckling to the Canadian boundary (Muto et al. 2018). Only the Southeast Alaska stock is considered in this application because the other stocks occur outside the geographic area under consideration. Harbor porpoises frequent primarily coastal waters in Southeast Alaska (Dahlheim et al. 2009) and occur most frequently in waters less than 100 meters (328 feet) deep (Hobbs and Waite 2010).

Harbor porpoises are neither designated as depleted under the MMPA nor listed under the ESA, but the Southeast Alaska stock is denoted as “strategic” under the MMPA. The “strategic” designation indicates that the stock is declining, or human-caused mortality exceeds the potential biological removal level. The current minimum population estimate for harbor porpoises in the Southeast Alaska stock is 975 individuals, based on estimates completed in 1997 (Muto et al. 2018). No reliable information is available to determine trends in abundance.

4.3.2 Presence in Project Area

Abundance data for harbor porpoises in Southeast Alaska were collected during 18 seasonal surveys spanning 22 years, from 1991 to 2012 (Dahlheim et al. 2015). The Project area and Tongass Narrows fall within the Clarence Strait to Ketchikan region, as identified by this study for the survey effort. Harbor porpoise densities in this region in summer were low, ranging from 0.01 to 0.02 harbor porpoises/square kilometer.

Studies of harbor porpoises reported no evidence of seasonal changes in distribution for the inland waters of Southeast Alaska (Dahlheim et al. 2009). Their small overall size, lack of a visible blow, low dorsal fins and overall low profile, and short surfacing time make them difficult to spot (Dahlheim et al. 2015), likely reducing identification and reporting of this species, and these estimates therefore may be low.

Harbor porpoises were observed on 19 days during 135 days of monitoring in Hoonah, Alaska, primarily between June and September (Berger ABAM 2016). Icy Strait was identified as an area with relatively high densities of harbor porpoises in the Dahlheim et al. (2015) study, and the Ketchikan area densities are expected to be much lower. This is supported by anecdotal estimates of harbor porpoise abundance.

Anecdotal reports (from locals listed in Section 3) specific to Tongass Narrows indicate that harbor porpoises are rarely observed in the Project area, and actual sightings are less common than the density calculation predicts. Harbor porpoises prefer shallower waters (Dahlheim et al. 2015) and generally are not attracted to areas with elevated levels of vessel activity and noise such as Tongass Narrows. Harbor porpoises are expected to be encountered in the Project area only a few times per year. Freitag (2017 as cited in 83 FR 22009) observed harbor

porpoises in Tongass Narrows zero to one time per month and NMFS (83 FR 22009) has estimated that one group of harbor porpoises would enter Tongass Narrows each month.

4.3.3 Life History

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

Calving occurs from May to August; however, this can vary by region. Harbor porpoises are often found traveling alone, or in small groups less than 10 individuals (Schmale, 2008). According to aerial surveys of harbor porpoise abundance in Alaska conducted in 1991–1993, mean group size in Southeast Alaska was calculated to be 1.2 animals (Dahlheim et al. 2000).

4.4 Dall's Porpoise

4.4.1 Status and Distribution

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

Dall's porpoises, like all marine mammals, are protected under the MMPA, but this species is not listed under the ESA. Insufficient data are available to estimate current population trends, but the species is considered reasonably abundant. The current population estimate for the species is 1.2 million, and the Alaska stock was last estimated at 83,400 individuals in 1993 (Muto et al. 2018).

4.4.2 Presence in Project Area

No systematic studies of Dall's porpoise abundance or distribution have occurred in Tongass Narrows; however, surveys for cetaceans throughout Southeast Alaska were conducted between 1991 and 2007 (Dahlheim et al. 2009). The species is generally found in waters in excess of 600 feet (183 meters) deep (Dahlheim et al. 2009), which do not occur in Tongass Narrows. Group sizes are generally on the order of two to four individuals (Suzuki et al. 2016), although Freitag (2017, as cited in 83 FR 22009) suggested group sizes near Ketchikan range from 10 to 15 individuals. Although two individuals were observed near Hoonah during monitoring of the Icy Strait Point cruise ship terminal, both were in deeper offshore waters (Berger ABAM 2016) dissimilar to habitat found in the Project area.

Anecdotal reports suggest that Dall's porpoises are found northwest of Ketchikan near the Guard Islands, where waters are deeper, as well as in deeper waters to the southeast of Tongass Narrows. Should Dall's porpoises occur in the Project area, they would likely be present in March or April, given past observations in the region. Despite generalized water depth preferences, Dall's porpoises may occur in shallower waters. This species has a tendency to bow-ride with vessels and may occur in the Project area incidentally a few times per year.

4.4.1 Life History

Dall's porpoises generally occur in groups of 2 to 20 individuals, but have also been recorded in groups numbering in the hundreds. In Alaska, the average group size ranges from 2.7 to 3.7 (Wade et al. 2003). Common prey includes a variety of small, schooling fishes (such as

herrings, anchovies, mackerels, and sauries) and cephalopods. Dall's porpoises may migrate between inshore and offshore areas and make latitudinal movements or short seasonal migrations, but these movements are generally not consistent (Jefferson 2009). Dall's porpoises are susceptible to incidental bycatch in fishing gear such as drift nets, gillnets, and trawls.

4.5 Pacific White-sided Dolphin

4.5.1 Status and Distribution

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

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

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

4.5.2 Presence in Project Area

Scientific studies and data are lacking relative to the presence or abundance of Pacific white-sided dolphins in or near Tongass Narrows. Although they generally prefer deeper and more-offshore waters, anecdotal reports suggest that Pacific white-sided dolphins have previously been observed in Tongass Narrows, although they have not been observed entering Tongass Narrows or nearby inter-island waterways in 15–20 years.

Pacific white-sided dolphins are rare in the inside passageways of Southeast Alaska. Most observations occur off the outer coast or in inland waterways near entrances to the open ocean. According to Muto (2018), aerial surveys in 1997 sighted one group of 164 Pacific white-sided dolphins in Dixon entrance to the south of Tongass Narrows. Surveys in April and May from 1991 to 1993 identified Pacific white-sided dolphins in Revillagigedo Channel, Behm Canal, and Clarence Strait (Dahlheim and Towell 1994). These areas are contiguous with the open ocean waters of Dixon Entrance. This observational data, combined with anecdotal information, indicates there is a rare, however, slight potential for Pacific white-sided dolphins to occur in the Project area.

4.5.3 Life History

Pacific white-sided dolphins prey on squid and small schooling fish such as capelin, sardines, and herring (Morton 2006). They are known to work in groups to herd schools of fish, and can dive underwater for up to 6 minutes to feed (Morton 2006). Group sizes have been reported to range from 40 to over 1,000 animals, but groups of between 10 and 100 individuals (Stacey and Baird 1991, NMFS, no date) occur most commonly. Seasonal movements of Pacific white-sided

dolphins are not well understood, but there is evidence of both north-south seasonal movement (Leatherwood et al. 1984) and inshore-offshore seasonal movement (Stacey and Baird 1991).

4.6 Killer Whale

4.6.1 Status and Distribution

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

There are three distinct ecotypes, or forms, of killer whales recognized: Resident, Transient, and Offshore. The three ecotypes differ morphologically, ecologically, behaviorally, and genetically. Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized within the Pacific U.S. Exclusive Economic Zone. This application considers only the Eastern North Pacific Alaska Resident stock (Alaska Resident stock), Eastern North Pacific Northern Resident stock (Northern Resident stock), and West Coast Transient stock, because all other stocks occur outside the geographic area under consideration (Muto et al. 2018). None of these three stocks of killer whales are designated as depleted or strategic under the MMPA, or listed as threatened or endangered under the ESA.

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

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

4.6.2 Presence in Project Area

No systematic studies of killer whales have been conducted in or around Tongass Narrows. Killer whales were observed infrequently (11 of 135 days) during monitoring in Hoonah, and most were recorded in deeper, offshore waters (Berger ABAM 2016). Anecdotal reports suggest that large pods of killer whales (as many as 80 individuals, but generally between 25 and 40 individuals) are not uncommon in May, June, and July when the king salmon are running. During the rest of the year, killer whales occur irregularly in pods of 6 to 12 or more individuals. Large pods would be indicative of the Alaska resident population, which travels and hunts in large social groups.

Although killer whales may occur in large numbers, they generally form large pods and would incur fewer work stoppages than their numbers suggest. Killer whales tend to transit through Tongass Narrows, and do not linger in the Project area. Killer whales are observed on average about once every 2 weeks in Tongass Narrows, and abundance increases between May and

July. NMFS (83 FR 22009) has estimated that one group of killer whales is present in Tongass Narrows once a month.

4.6.3 Life History

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

Transient killer whales are often found in long-term stable social units (pods) of 1 to 16 whales. Average pod sizes in Southeast Alaska were 6.0 in spring, 5.0 in summer, and 3.9 in fall. Pod sizes of transient whales are generally smaller than those of resident social groups. Resident killer whales occur in larger pods, ranging from 7 to 70 whales that are seen in association with one another more than 50 percent of the time (Dahlheim et al. 2009; NMFS 2016b). In Southeast Alaska, resident killer whale mean pod size was approximately 21.5 in spring, 32.3 in summer, and 19.3 in fall (Dahlheim et al. 2009).

4.7 Humpback Whale

4.7.1 Status and Distribution

Humpback whales worldwide were designated as "endangered" under the Endangered Species Conservation Act in 1970, and were listed under the ESA at its inception in 1973. However, on 08 September 2016, NMFS published a final decision that changed the status of humpback whales under the ESA (81 FR 62259), effective 11 October 2016. The decision recognized the existence of 14 DPSs based on distinct breeding areas in tropical and temperate waters. Five of the 14 DPSs were classified under the ESA (4 endangered and 1 threatened), while the other 9 DPSs were delisted. Humpback whales found in the Project area are predominantly members of the Hawaii DPS, which is not listed under the ESA. However, based on a comprehensive photo-identification study, members of the Mexico DPS, which is listed as threatened, are known to occur in Southeast Alaska. Members of different DPSs are known to intermix on feeding grounds; therefore, all waters off the coast of Alaska should be considered to have ESA-listed humpback whales. Approximately 6.1 percent of all humpback whales in Southeast Alaska and northern British Columbia are members of the Mexico DPS, while all others are members of the Hawaii DPS (Wade et al. 2016).

The DPSs of humpback whales that were identified through the ESA listing process do not necessarily equate to the existing MMPA stocks. The stock delineations of humpback whales under the MMPA are currently under review. Until this review is complete, NMFS considers humpback whales in Southeast Alaska to be part of the Central North Pacific stock, with a status of endangered under the ESA and designations of strategic and depleted under the MMPA (Muto et al. 2018). The current estimate of population size for the Central North Pacific stock is 10,103 humpback whales (Muto et al. 2018).

Humpback whales experienced large population declines due to commercial whaling operations in the early twentieth century. Barlow (2003) estimated the population of humpback whales at approximately 1,200 animals in 1966. The population in the North Pacific grew to between 6,000 and 8,000 by the mid-1990s. Current threats to humpback whales include vessel strikes, spills, climate change, and commercial fishing operations (Muto et al. 2018).

Humpback whales are found throughout Southeast Alaska in a variety of marine environments, including open-ocean, near-shore waters, and areas with strong tidal currents (Dahlheim et al.

2009). Most humpback whales are migratory and spend winters in the breeding grounds off either Hawaii or Mexico. Humpback whales generally arrive in Southeast Alaska in March and return to their wintering grounds in November. Some humpback whales depart late or arrive early to feeding grounds, and therefore the species occurs in Southeast Alaska year-round (Straley 1990). Across the region, there have been no recent estimates of humpback whale density.

4.7.2 Presence in Project Area

No systematic studies have documented humpback whale abundance near Ketchikan. Anecdotal information suggests that this species is present in low numbers year-round in Tongass Narrows, with the highest abundance during summer and fall. Anecdotal reports suggest that humpback whales are seen only once or twice per month, while more recently it has been suggested that the occurrence is more regular, such as once per week on average, and more seasonal. Humpbacks observed in Tongass Narrows are generally alone or in groups of one to three individuals. Most humpback whales depart Alaska for their breeding grounds in October and November, and return in March and April. In August 2017, groups of six individuals were observed passing through Tongass Narrows several times per day, for several days in a row. Local residents reported that such high abundance is common in August and September. NMFS reported that airport ferry personnel, in 2018, observed a lone humpback whale in the area every few days for several months and a group of two humpback whales every other week (NMFS 2019).

A total of 226 humpback whales were recorded as takes during 135 days of monitoring in Hoonah, Alaska. As many as 18 whales were observed in a single day, but the 90th percentile of individuals per day was approximately 7. Humpback whales were observed on 84 of the 135 days and were most often seen as lone individuals, or in small groups. An average of 2 individuals was recorded as take each day of the construction program. Assuming an average group size of 2 individuals, an average of one group entered the harassment zone each day. Abundance of humpback whales did not appear to change substantially with time; however, there was a noticeable increase in activity during September and October (Berger ABAM 2016). Although Hoonah is approximately 240 miles north of Ketchikan near an area of known humpback concentrations, these data support anticipated levels of abundance in Ketchikan as recently reported by interviewed locals.

In the Biological Opinion provided for this project, NMFS assumed the occurrence of humpback whales in the Project area be two individuals twice per week year-round. The assumption was based on differences in abundance throughout the year, recent observations of larger groups of whales present during summer, and a higher than average frequency of occurrence in recent months (NMFS 2019).

4.7.3 Life History

Southeast Alaska is considered a biologically important area for feeding humpback whales between March and May (Ellison et al. 2012). Most humpback whales migrate to other regions during the winter to breed, but rare events of over-wintering humpbacks have been noted, (Straley 1990, S. Lewis, pers. comm.). It is thought that those humpbacks that remain in Southeast Alaska do so in response to the availability of winter schools of fish prey (Straley 1990). In Alaska, humpback whales filter feed on tiny crustaceans, plankton, and small fish such as walleye pollock, Pacific sand lance, herring (*Clupea pallasii*), eulachon (*Thaleichthys pacificus*), and capelin (Witteveen et al. 2012). It is common to observe groups of humpback

whales cooperatively bubble feeding. Group sizes in Southeast Alaska generally range from one to four individuals (Dahlheim et al. 2009).

4.8 Minke Whale

4.8.1 Status and Distribution

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

The International Whaling Commission has identified three stocks in the North Pacific: one near the Sea of Japan, a second in the rest of the western Pacific (west of 180°W), and a third, less concentrated stock, found throughout the eastern Pacific. NOAA further splits this third stock between Alaska whales and resident whales of California, Oregon, and Washington (Muto et al. 2018). Minke whales are found in all Alaska waters. There are no population estimates for minke whales in Alaska. Surveys in Southeast Alaska have consistently identified individuals throughout inland waters in low numbers (Dahlheim et al. 2009).

4.8.2 Presence in Project Area

Minke whales in Southeast Alaska are part of the Alaska stock (Muto et al. 2018). Dedicated surveys for cetaceans in Southeast Alaska found that minke whales were scattered throughout inland waters from Glacier Bay and Icy Strait to Clarence Strait, with small concentrations near the entrance of Glacier Bay (Dahlheim et al. 2009). All sightings were of single minke whales, except for a single sighting of multiple minke whales. Surveys took place in spring, summer, and fall, and minke whales were present in low numbers in all seasons and years. No information appears to be available on the winter occurrence of minke whales in Southeast Alaska. Minke whales are expected to occur in Tongass Narrows no more than once per year.

4.8.3 Life History

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

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

5.1 Incidental Harassment Authorization

Under Section 101(a)(5)(D) of the MMPA, the DOT&PF requests two IHAs for the take of small numbers of marine mammals, incidental to construction associated with Phase 1 and Phase 2 of the Tongass Narrows Project in Ketchikan, Alaska. The DOT&PF requests two IHAs for incidental take of marine mammals described within this application. The IHA for Phase 1 is requested for 01 March 2020 to 28 February 2021, and the IHA for Phase 2 is requested from 01 March 2021 to 28 February 2022. The DOT&PF is not requesting an LOA at this time because the activities described herein are not expected to rise to the level of serious injury or mortality, which would require an LOA.

5.2 Take Authorization Request

The DOT&PF requests the issuance of two IHAs for Level B take (behavioral harassment) of Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, Pacific white-sided dolphins, killer whales, humpback whales, and minke whales that may occur during the Project. In addition, DOT&PF requests Level A take (injury) of harbor seals, Dall's porpoises, and harbor porpoises that may occur incidentally during the Project. Several of the species for which take is requested are uncommon in the Project area. The request for a small number of take for each species that is rarely or occasionally observed in the Project area reduces the risk of the Project being shut down if one of these species enters the Level B harassment zone during pile installation.

The methodology described in Section 6 estimates potential noise exposures of marine mammals resulting from pile installation and removal in the marine environment. Given that Phase 1 and Phase 2 of the Project would employ largely the same marine activities, most of the discussion in Section 6 applies to both phases of the Project. Estimation of potential exposures tends to provide an overestimation of exposures because all animals are assumed to be available to exposure while piles are being installed, and the formulas used to estimate transmission loss use idealized parameters. Additionally, this approach assumes that no individuals avoid the area and that all exposed individuals are "taken," contributing to an overestimation of "take."

The analysis for the Project predicts 3,597 potential exposures to Level B harassment during Phase 1 and 836 potential exposures to Level B harassment during Phase 2 (see Section 6 for estimates of exposures by species and phase). In addition, the analysis for the Project predicts 48 potential Level A exposures during Phase 1 and 34 potential Level A exposures during Phase 2. The DOT&PF's mitigation measures for the Project (Section 11) include monitoring of Level B and Level A harassment zones prior to the initiation of pile installation, and "soft starts" or ramp-up procedures designed to allow marine mammals to leave the Project area before noise levels reach the threshold for harassment. These mitigation measures decrease the likelihood that marine mammals will be exposed to sound pressure levels that would cause harassment, although the amount of that decrease cannot be quantified.

The DOT&PF does not expect that all potential exposures to Level B and Level A harassment will result from Project activities. However, to allow for uncertainty regarding the exact mechanisms of the physical and behavioral effects, and as a conservative approach, the

DOT&PF is requesting authorization for incidental harassment of 3,645 marine mammals during Phase 1 and 870 marine mammals during Phase 2. As described in Section 6.6, most takes are expected to result from repeated exposures of a small number of individuals.

5.3 Method of Incidental Taking

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

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

6 TAKE ESTIMATES FOR MARINE MAMMALS

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

6.1 In-Air and Underwater Sound Descriptors

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

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

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

Transmission loss is the accumulated decrease in acoustic intensity as an acoustic pressure wave propagates outwards from a source such as a pile during installation. The intensity of the sound at its source is reduced because it spreads as it moves away from the source. Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion bounded by the bottom sediment and water surface, such as shallow water, resulting in a 3-dB reduction per doubling of distance. Spherical spreading occurs when the source encounters little to no refraction or reflection from boundaries (e.g., bottom, surface), such as in deep water, resulting in a 6-dB reduction per doubling of distance.

Table 6-1. Definitions of Some Common Acoustical Terms

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

6.2 Applicable Noise Criteria

NMFS published updated Technical Guidance in April 2018 that identifies the received levels, or thresholds, above which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for underwater anthropogenic noise sources (i.e., Level A harassment; NMFS 2018). The 2018 guidance contains the same criteria included in the 2016 guidance (NMFS 2016b). To assess Level B harassment levels, NMFS continues to use its interim criteria.

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

6.2.1 Level A Harassment

For underwater noise exposure, this IHA application uses the 2018 Technical Guidance for assessing Level A harassment. Received levels, or thresholds, above which individual marine mammals are predicted to experience permanent changes in their hearing sensitivity (or a permanent threshold shift [PTS]) due to underwater anthropogenic sound sources have also been weighted by functional hearing groups as defined in the Technical Guidance (Table 6-2; NMFS 2018). Under the 2018 Technical Guidance, these levels are considered thresholds for Level A (injury) harassment. Calculation of Level A harassment isopleth distances based on PTS onset acoustic thresholds requires information on characteristics of the sound and the local environment.

Table 6-2. Summary of Permanent Threshold Shift Onset Acoustic Thresholds for Assessing Level A Harassment of Marine Mammals from Exposure to Noise from Continuous and Pulsed Underwater Sound Sources

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

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

Source: NMFS 2018.

6.2.2 Level B Harassment

To assess Level B harassment levels, this document uses the NMFS interim criteria for exposure of marine mammals to various underwater sound sources. For impulse sounds (e.g., impact pile installation), the Level B harassment threshold is set at an SPL value of 160 dB re 1 µPa rms. For non-pulsed and continuous sounds (e.g., vibratory pile installation), the Level B harassment threshold is set at an SPL of 120 dB re 1 µPa rms.

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

6.3 Description of Noise Sources

The Project would increase existing in-air and underwater acoustic levels of Tongass Narrows and part of Ketchikan Harbor, which are part of a high-use industrial area with frequent marine vessel traffic and associated activities. The soundscape in the vicinity of the Project includes existing ambient sound, plus construction noise from the Project. The primary component of the Project that may affect marine mammals is the noise generated by drilling of rock sockets, vibratory removal of piles, vibratory installation of sheet piles, and vibratory and impact installation of steel piles. Refer to Section 1.3 for a description of these pile installation techniques. Other activities associated with the Project (e.g., upland and above-water construction activities, vessel activities, placement of fill, and tension anchor drilling) do not produce in-air or underwater noise levels expected to exceed Level A or Level B harassment levels for any marine mammal hearing group.

6.3.1 Ambient Sound

Ambient (or background) sound is composed of sound from many sources and from multiple locations (Richardson et al. 1995). In general, ambient sound levels in the marine environment are variable over time due to a number of biological, physical, and anthropogenic (e.g., man-made) sources. Ambient noise can vary with location, time of day, tide, weather, season, and frequency on scales ranging from a second to a year. Underwater sound types in the Project area include physical noise, biological noise, and anthropogenic noise. Physical noise includes noise from waves at the water surface, rain, and currents; moving rocks, sediment, and silt; and atmospheric noise. Biological sound includes vocalizations and other sounds produced by marine mammals, fishes, seabirds, and invertebrates. Anthropogenic noise includes noise from vessels (small and large), shore-based processing plants, marine fueling facilities, ferry and barge cargo loading/unloading operations, maintenance dredging, aircraft overflights, construction noise, and other sources, which produce varying noise levels and frequency ranges (Table 6-3).

Table 6-3. Representative Noise Levels of Anthropogenic Sources of Noise Commonly Encountered in Marine Environments

Noise Source	Frequency Range (Hz)	Underwater Noise Level (dB rms re 1 µPa)	Reference
Small vessels	250–1,000	151 dB at 1 meter	Richardson et al. (1995)
Tug docking gravel barge	200–1,000	149 dB at 100 meters	Blackwell and Greene (2002)
Container/cruise ship	100–500	180 dB at 1 meter	Richardson et al. (1995)
Dredging operations	50–3,000	120–140 dB at 500 meters; 156.9 dB at 30 meters	URS (2007); SFS (2009)

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

Ongoing vessel activities throughout Tongass Narrows, land-based industrial and commercial activities, and regular aircraft operations result in elevated in-air and underwater sound conditions in the Project area that increase with proximity to the component sites. Sound levels likely vary seasonally, with elevated levels during summer, when the tourism and fishing industries are at their peaks.

The mean underwater ambient sound levels near Ketchikan were recorded at approximately 125 dB (Warner and Austin 2016a). However, in the portions of Tongass Narrows removed from the industrial and commercial noise of Ketchikan, it is possible that ambient sound levels approach 120 dB. The 120 dB rms ambient sound level is also used by NMFS as the default for regulatory purposes, including incidental take estimation under the MMPA, and will be used for this Project.

6.3.2 Underwater Noise Levels

Pile Installation/Removal Noise Levels

The Project includes vibratory and impact pile installation of steel pipe piles and sheet piles, removal of steel pipe piles, and drilling of rock sockets into bedrock for steel pipe piles. Sound source levels (SSLs) for each type of activity were estimated using empirical measurements from similar projects in Ketchikan, elsewhere in Alaska, or outside of Alaska (Table 6-4).

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

Method and Pile Type	Sound Source Level at 10 meters			Literature Source
Vibratory Hammer	**dB rms**			
30-inch steel piles	162			Denes et al. 2016
24-inch steel piles	161			Navy 2015
20-inch steel piles	161			Navy 2015
18-inch steel piles	161			Navy 2015
16-inch steel piles	161			Navy 2015
27.6-inch sheet pile	160			Caltrans 2015
30.3-inch sheet pile	160			Caltrans 2015
Drilling Rock Sockets	**dB rms**			
All pile diameters	166			Denes et al. 2016, Table 72
Impact Hammer	**dB rms**	**dB SEL**	**dB peak**	
30-inch steel piles	195	181	209	Denes et al. 2016, Table 72
24-inch steel piles	190	177	203	Caltrans 2015
18-inch steel piles	190	177	203	Caltrans 2015

Note: It is assumed that noise levels during pile installation and removal are similar. Use of an impact hammer will be limited to 5-10 minutes per pile, if necessary. It is assumed that drilling produces the same SSL regardless of down-hole diameter. SEL = sound exposure level; dB peak = peak sound level; rms = root mean square

6.3.3 In-Air Noise Levels

The Washington State Department of Transportation (WSDOT) recorded airborne noise levels from impact installation of 30-inch piles in December 2015 at the Vashon Ferry Terminal near Seattle, Washington (WSDOT 2018). In-air noise levels during impact installation were 110 dBA as measured at 50 feet (15.24 meters). This value was chosen as a conservative estimate for impact installation of 30-inch-diameter steel piles for the Project. Noise monitoring and transportation noise modeling were conducted for nine receptor sites in Ketchikan as part of the SEIS impact analysis. The average modeled ambient in-air noise levels at these nine sites was 58 dBA (FHWA 2017). For the purposes of this analysis, we have adopted 58 dBA as the expected background, or ambient, in-air sound levels in Ketchikan. To determine the distance

in-air construction noise will travel before it attenuates to the ambient sound level, the following equation is used:

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

where D is the distance from the noise source, D_o is the reference measurement distance (50 feet [15.24 meters] in this case), and α is the transmission loss per doubling of distance (estimated at 20 dBA for hard site conditions [over water]). Based on this model, in-air noise from impact installation of 30-inch piles could extend up to 3.8 miles (6.1 kilometers) from the noise source over open water until it is no longer discernible above estimated ambient sound levels.

6.4 Distances to Sound Thresholds

6.4.1 Underwater Noise

Vibratory and impact pile installation and drilling of rock sockets will generate underwater noise that could potentially disturb marine mammals in the Project area. Ambient underwater sound levels were assumed to be 120 dB rms for this evaluation (Section 6.3.1). The SSLs for pile installation were estimated by using the results of measurements from the best available and most relevant sound source verification studies (Table 6-5).

Transmission loss (TL) coefficients measured at other ports in coastal Alaska ranged from 14.6 to 21.9 (Denes et al. 2016; MacGillivray et al. 2015; Warner and Austin 2016b). However, NMFS typically recommends a default practical spreading loss coefficient of 15 as described by Davidson (2004) and Thomsen et al. (2006) when site-specific empirical data are unavailable. Using a TL coefficient of 15 produces conservative estimates of harassment thresholds for the Project.

Level A Harassment

Sound propagation and the distances to the sound isopleths defined by NMFS for Level A harassment of marine mammals under the current Technical Guidance were estimated using the User Spreadsheet developed by NMFS for this purpose (NMFS 2018). The method uses estimates of SPL and duration of the activity to calculate the threshold distances at which a marine mammal exposed to those values would experience a PTS. Differences in hearing abilities among marine mammals are accounted for by use of weighting factor adjustments for the five functional hearing groups (NMFS 2016b). Pulse duration from the SSV studies used for source level estimates are unknown. All necessary parameters were available for the SEL_{cum} (cumulative Single Strike Equivalent) method for calculating isopleths, and therefore this method was selected. The SEL_{cum} method resulted in isopleths that were larger than those calculated using the peak source level method, and therefore the SEL_{cum} isopleths were selected for the Project.

The number of strikes per pile during impact installation is not expected to exceed 50 per pile at Project components on Gravina Island. The number of strikes per pile during impact installation at Project components on Revilla Island is not expected to exceed 200.

To account for potential variations in daily productivity during impact installation, isopleths were calculated for different numbers of piles that could be installed each day (Table 6-5). Should the Contractor expect to install fewer piles in a day than the maximum anticipated, the Level A harassment zones would be smaller. At the beginning of each day, the Contractor will determine how many piles are expected to be installed that day, and the corresponding Level A zones

(Table 6-5) will be monitored. For example, if the Contractor expects to install three piles using an impact hammer, then the Level A zones for this installation method, pile size, and number of piles will be monitored. If, after the first pile, no marine mammals have been observed within their respective Level A zones, then the zones monitored during installation of the second pile would be those for a two-pile day. Since no marine mammal would have been exposed to noise during the first pile, then no marine mammal would experience noise accumulation. Likewise, if no marine mammals have been observed within their respective Level A zones during installation of the second pile, then the zones monitored during installation of the third pile would be those for a single-pile day. If a marine mammal is exposed to Level A noise levels, then Level A take will be documented, and the larger zones will continue to be monitored. To ensure that marine mammal observations can be conducted appropriately, the Level A distances are provided in Table 6-5 for both strike rates and three production rates (one, two, or three piles per day).

To avoid and minimize incidental Level A exposure of marine mammals, in-water work will cease prior to a marine mammal entering the Level A harassment isopleth specific to the species and in-water activity (including production rate) underway (Table 6-5). The largest Level A harassment zones during Phase 1 are shown in Figure 6-2 and Figure 6-4. The largest Level A harassment zones during Phase 2 are shown in Figure 6-6 and Figure 6-8. A 10-meter minimum shutdown zone will be implemented for all species and activity types to prevent direct injury of marine mammals. To avoid unauthorized Level A take, if Level A take numbers are approaching authorized levels, shutdown will be implemented before individuals reach the Level A zones.

Table 6-5. Calculated Distances to Level A Harassment Isopleths during Pile Installation and Removal

Activity	Pile Diameter(s)	Minutes per Pile or Strikes per Pile	Piles Installed or Removed per day	Level A Harassment Isopleth Distance (meters)				
				Cetaceans			Pinnipeds	
				LF	MF	HF	PW	OW
Vibratory Installation	30-inch	30 Minutes	3	11	<1	15	6	<1
	24-inch, 20-inch; 18-inch	15-30 Minutes	3	9	<1	13	5	<1
	27.6-inch sheet pile, 30.3-inch sheet pile	15 Minutes	10	11	1	16	7	<1
Vibratory Removal	24-inch, 16-inch	30 Minutes	5	13	1	19	8	<1
Drilling Rock Sockets	30-inch	180 Minutes	3	66	4	58	36	3
	24-inch, 18-inch	120 Minutes	3	51	3	45	27	2
Impact Installation	30-inch	50 Strikes	3	208	8	247	111	9
		50 Strikes	2	159	6	189	85	7
		50 Strikes	1	100	4	119	54	4
		200 Strikes	3	523	19	623	280	21
		200 Strikes	2	399	15	476	214	16
		200 Strikes	1	252	9	300	135	10
Impact Installation	24-inch	50 Strikes	3	113	4	134	61	5
		50 Strikes	2	86	3	102	46	4
		50 Strikes	1	54	2	65	29	3
		200 Strikes	3	283	11	337	152	11
		200 Strikes	2	216	8	258	116	9
		200 Strikes	1	136	5	162	73	6
Impact Installation	18-inch	50 Strikes	3	113	4	134	61	5
		50 Strikes	2	86	3	102	46	4
		50 Strikes	1	54	2	65	29	3

Note: a 10-meter shutdown zone will be implemented for all species and activity types to prevent direct injury of marine mammals.

Level B Harassment

Sound propagation and distances to the sound isopleths defined by NMFS for Level B harassment of marine mammals were estimated using the practical spreading loss model. The source levels for pile installation and removal were estimated using the results of measurements from the best available and most relevant sound source verification studies (Table 6-5).

The attenuation of underwater noise (transmission loss) is estimated using the practical spreading loss model. The formula for transmission loss (TL) is:

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

where R is the distance from the source, D is the distance of the known or measured noise level, and X is the TL coefficient. NMFS typically recommends a TL coefficient of 15 dB per tenfold increase in distance when site-specific empirical data are unavailable (i.e., 15 log10 in this case). This model, based on the default practical spreading loss assumption and NMFS preferred TL coefficient, can be rearranged to estimate the distances to the Level B harassment thresholds as follows:

$$R = D * 10^{(TL/15)}$$

where TL is the difference between the SSL and the Level B harassment threshold (120 dB or 160 dB). Distances to the Level B harassment isopleths vary by pile size and installation method (Table 6-6).

Land forms (including causeways, breakwaters, islands, and other land masses) are impenetrable by underwater sound, and create shadows where noise from construction is not audible. In Tongass Narrows, noise from the Project will be blocked by the island on each side of the channel. Sound shadows will also be created behind the harbor breakwater, Pennock Island, and Peninsula Point. The Level B harassment zones during Phase 1 of the Project are shown in Figure 6-1 through Figure 6-4. The Level B harassment zones during Phase 2 of the Project are shown in Figure 6-5 through Figure 6-8; Figure 6-3 also indicates the approximate harassment zone for drilling during Phase 2.

Table 6-6. Distances to Level B Harassment Isopleths for Different Pile Sizes and Types and Methods of Installation/Removal

Method and Pile Type	Distance to Level B Isopleth (meters)
Vibratory Hammer (Level B Isopleth = 120 dB)	
30-inch steel piles	6,310
24-inch steel piles	5,412
20-inch steel piles	5,412
18-inch steel piles	5,412
16-inch steel piles	5,412
27.6-inch sheet piles	4,642
30.3-inch sheet piles	4,642
Drilling Rock Sockets (Level B Isopleth = 120 dB)	
All pile types	12,023
Impact Hammer (Level B Isopleth = 160 dB)	
30-inch steel piles	2,154
24-inch steel piles	1,000

Method and Pile Type	Distance to Level B Isopleth (meters)
18-inch steel piles	1,000

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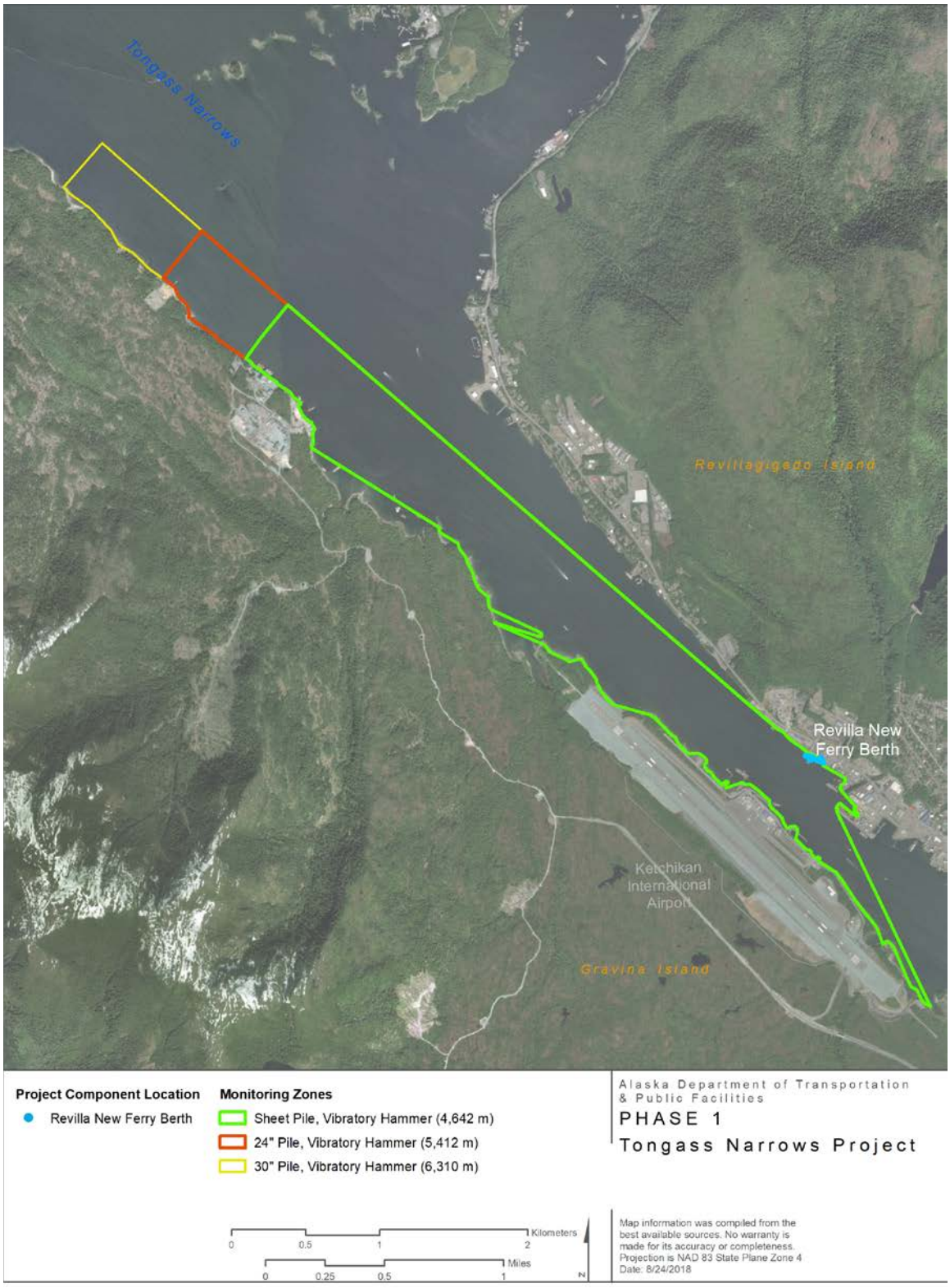

Figure 6-1. Level B Harassment Isopleths during Vibratory Pile Installation at Project Components Located on Revilla Island in Phase 1

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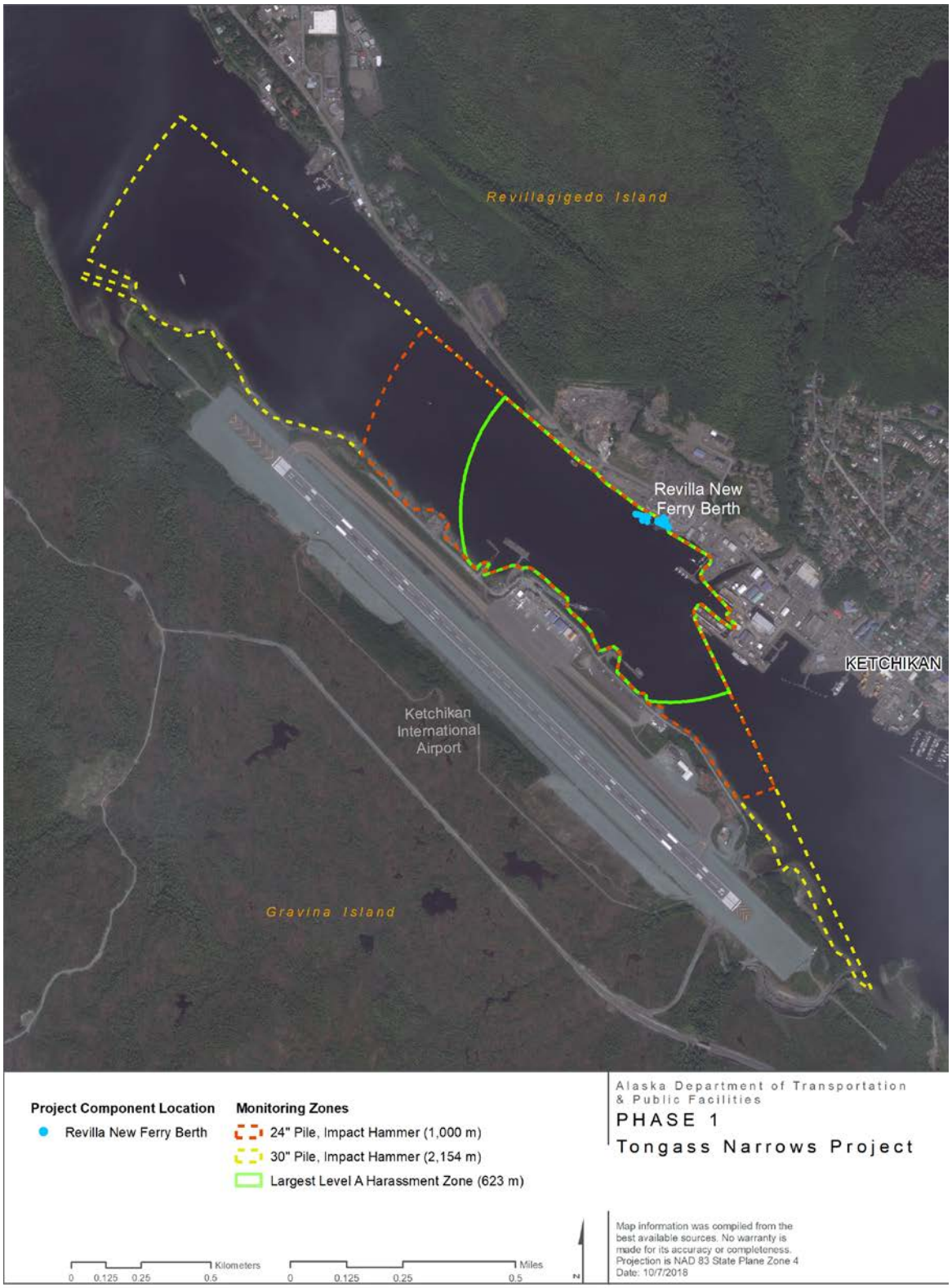

Figure 6-2. Level A Harassment Isopleths during Vibratory and Impact Pile Installation and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Revilla Island in Phase 1

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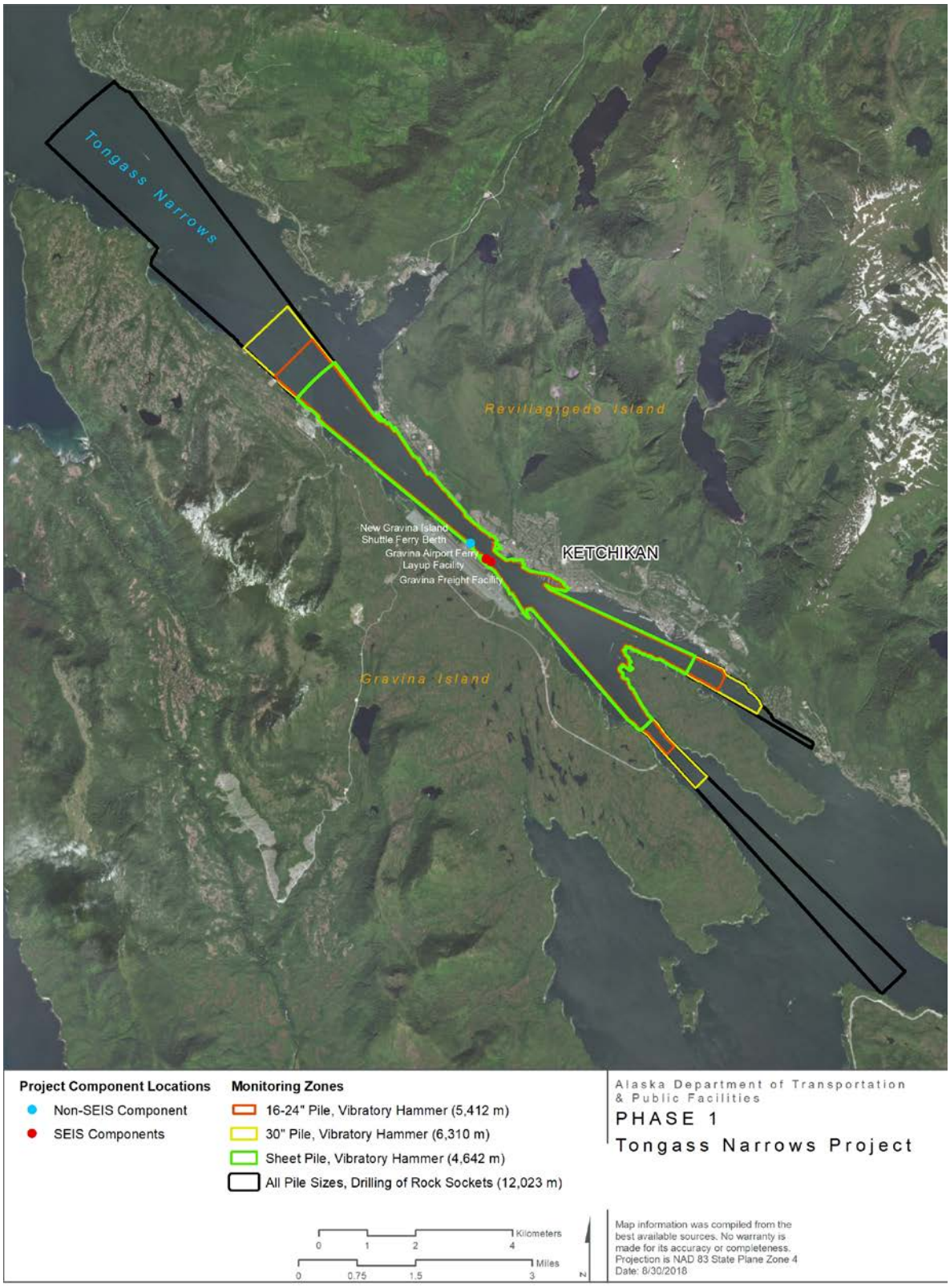

Figure 6-3. Level B Harassment Isopleths during Vibratory Pile Installation and Drilling of Rock Sockets at Project Components Located on Gravina Island in Phase 1

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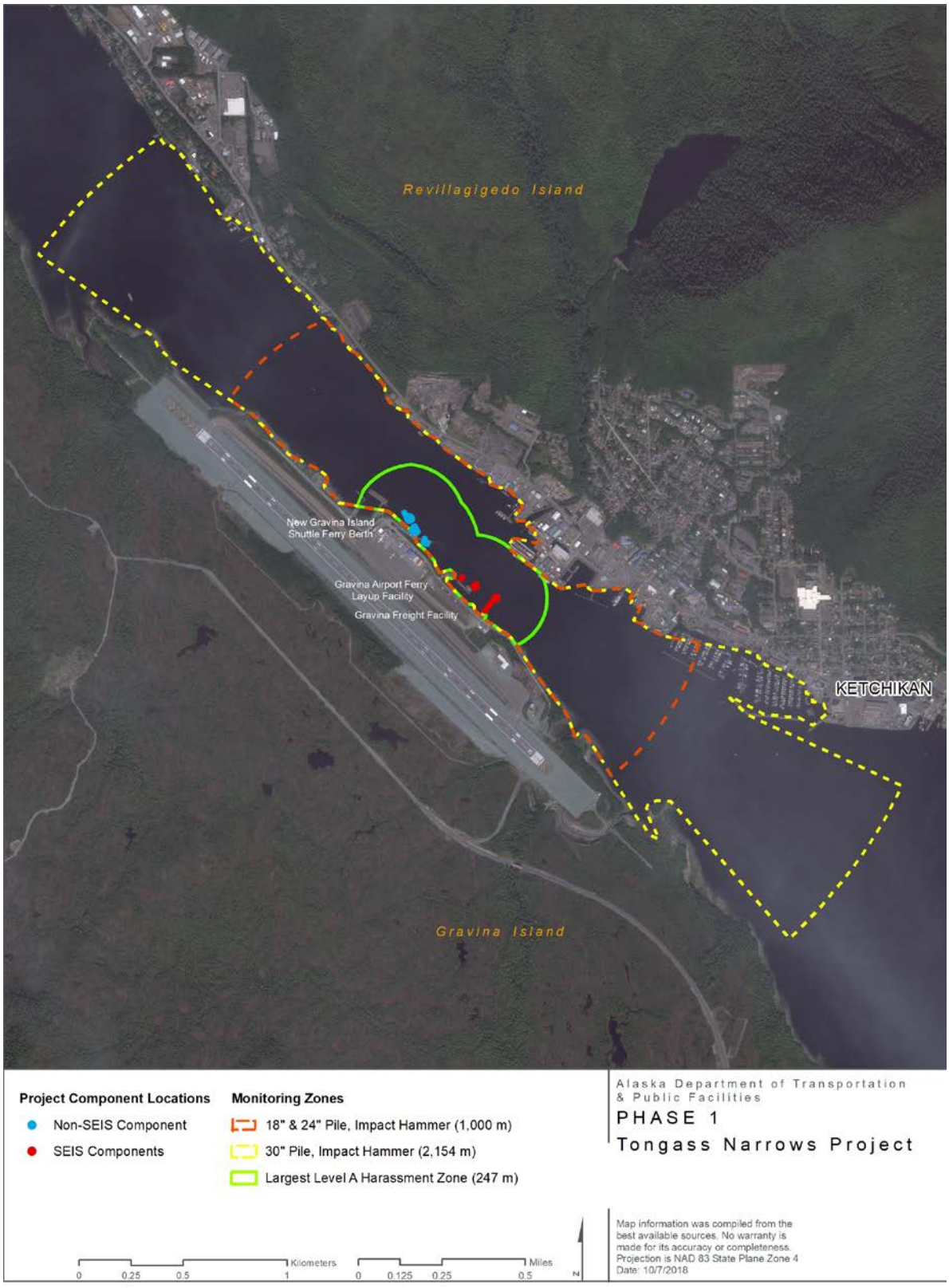

Figure 6-4. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Gravina Island in Phase 1

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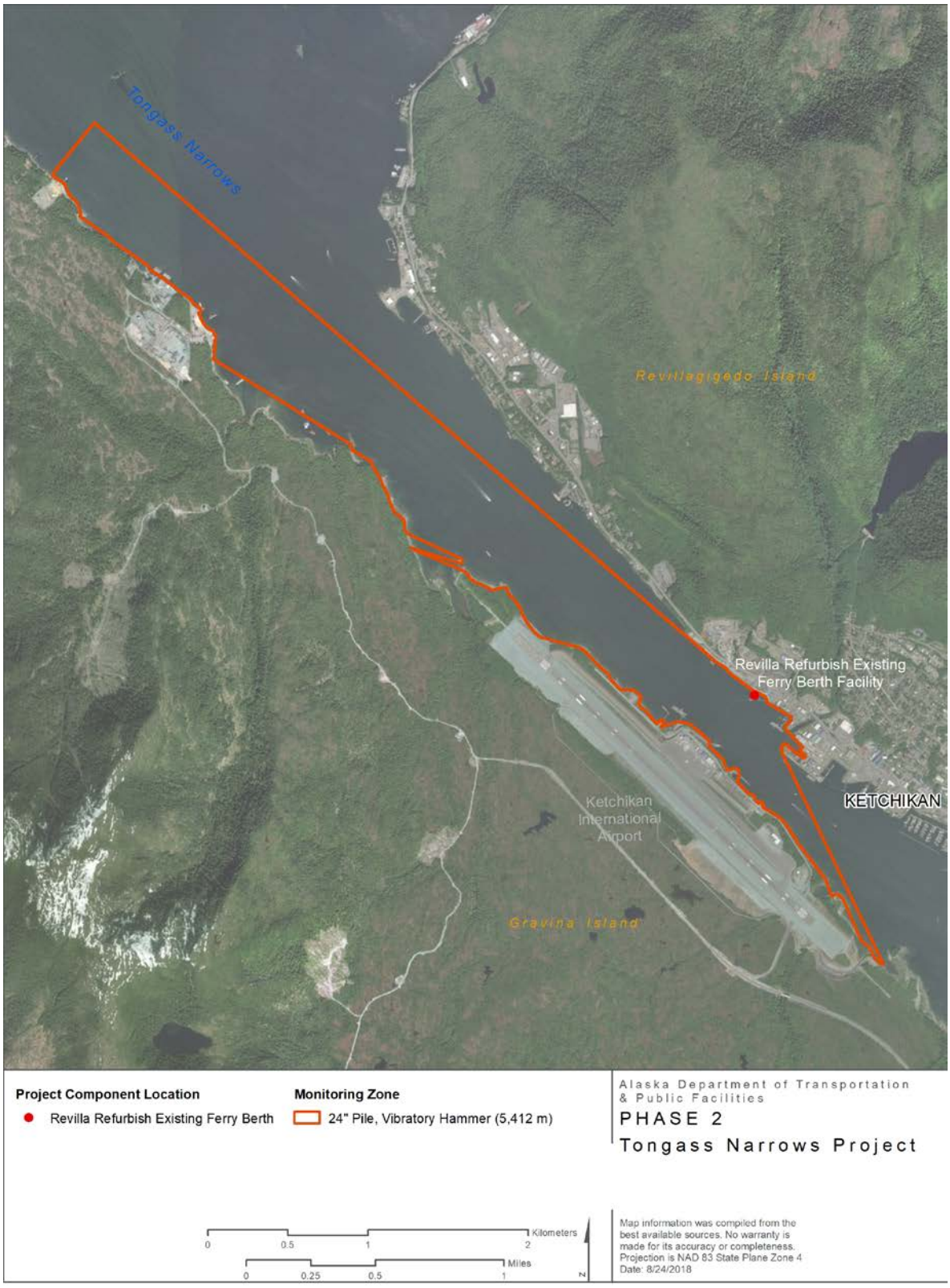

Figure 6-5. Level B Harassment Isopleth during Vibratory Pile Installation and Removal at Project Components Located on Revilla Island in Phase 2

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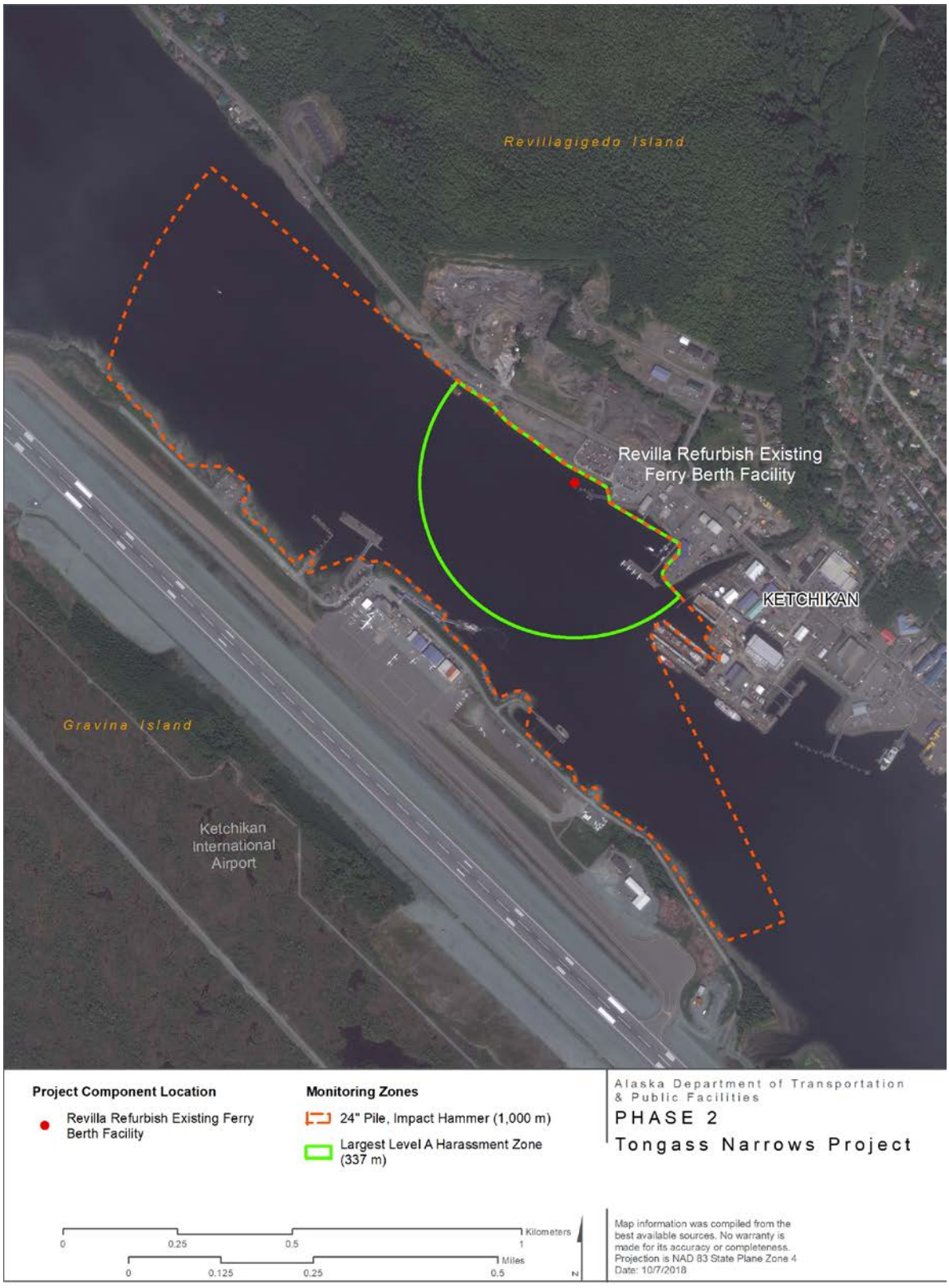

Figure 6-6. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Revilla Island in Phase 2

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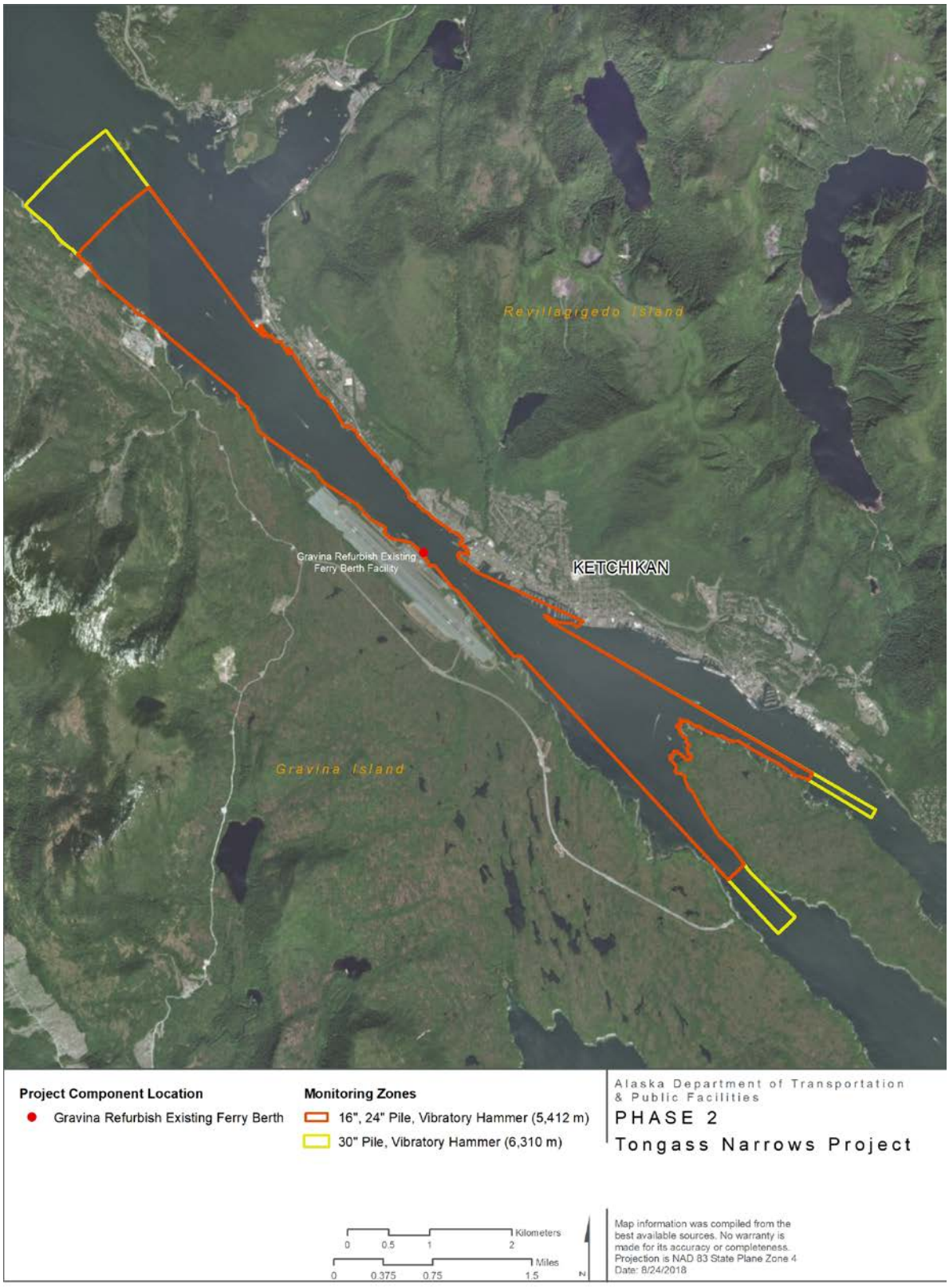

Figure 6-7. Level B Harassment Isopleths during Vibratory Pile Installation and Removal at Project Components Located on Gravina Island in Phase 2

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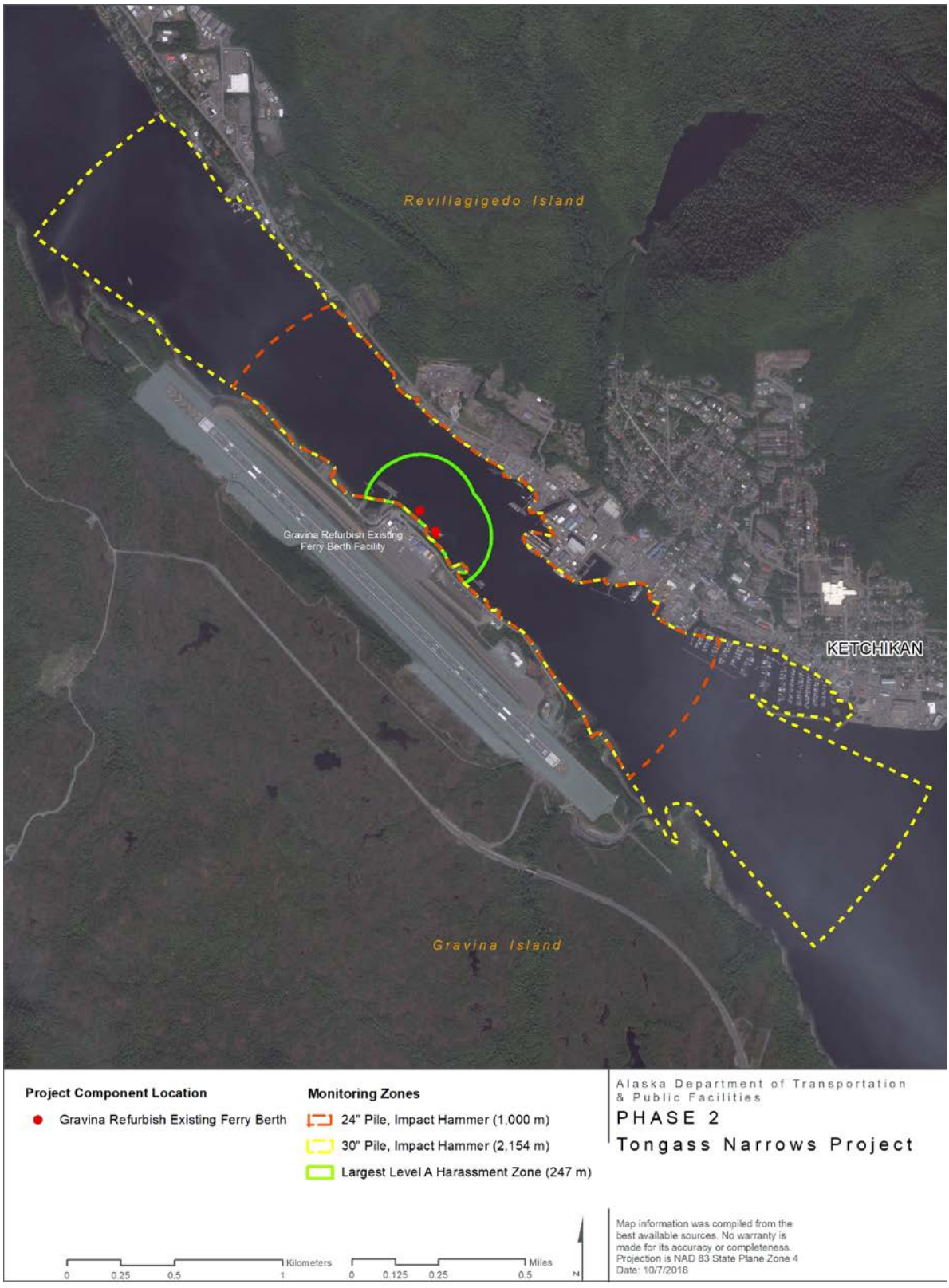

Figure 6-8. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Gravina Island in Phase 2

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6.4.2 Airborne Noise

Pinnipeds can be affected by in-air noise when they are hauled out. Loud noises can cause hauled-out pinnipeds to panic back into the water, leading to disturbance and possible injury. For airborne sound exposure of hauled-out pinnipeds, NMFS uses criteria for Level B harassment of 90 dB re 20 µPa rms for harbor seals and 100 dB re 20 µPa rms for all other pinnipeds, including Steller sea lions.

The spherical spreading model described in Section 6.3.3 was revised to estimate noise threshold distances from the maximum anticipated in-air noise source level. The revised equation replaced ambient sound level with NMFS defined noise thresholds as follows:

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

Given the conservative source level of 110 dBA chosen for impact pile installation of 30-inch steel piles, the calculated isopleths for in-air noise can be used for all pile sizes and types associated with the Project. Installation of smaller piles is generally assumed to produce lower sound levels than installation of larger piles. The estimated distance to the airborne sound level threshold from pile installation of all pile types and sizes for the Project is 152 meters for seals and 48 meters for Steller sea lion (Table 6-7).

Table 6-7. Distances to which Airborne Sound will Attenuate to NMFS Threshold for Level B Harassment

Method, pile type	Harbor Seals (90 dB)	Other Pinnipeds (100 dB)
Impact Hammer		
All Project piles	152 meters (500 feet)	48 meters (157 feet)

6.5 Estimated Takes

Estimated exposure and take of marine mammals associated with the Project is based on presence/absence, distribution, and abundance information presented in Section 4. Take of marine mammals is requested separately for Phase 1 and Phase 2 of the Project and is distinguished in the following sections.

6.5.1 Steller Sea Lion

Steller sea lion abundance in the Project area is not well known. No systematic studies of Steller sea lions have been conducted in or near the Project area. Steller sea lions are known to occur year-round and local residents report observing Steller sea lions about once or twice per week. Abundance appears to increase during herring runs (March to May) and salmon runs (July to September). Group sizes may reach 6 to 10 individuals (Freitag 2017 as cited in 83 FR 22009). Tongass Narrows represents an area of high anthropogenic activity that sea lions would normally avoid, but at least three seafood processing plants and two fish hatcheries may be attractants to these opportunistic scavengers and predators. Sea lions are generally unafraid of humans when food sources are available. For these reasons, we conservatively estimate that one large group of Steller sea lions may be exposed to Project-related underwater noises once per day, but this exposure rate may as much as double during periods of increased abundance associated with the herring and salmon runs.

The largest Level A harassment zone for otariid pinnipeds extends 21 meters from the noise source; therefore, because the Project will implement a minimum of a 10-meter shutdown zone

during all pile installation, no Level A take is requested for Steller sea lions. Although a 10-meter shutdown zone will be implemented during pile installation and removal, Level A take would not occur until an individual crossed the Level A harassment isopleth specific to the species and in-water activity underway (Table 6-5).

The in-air Level B harassment zone extends 48 meters from the noise source. No Steller sea lions are known to haul out within 48 meters of any of the Project component locations; therefore, exposure of hauled out Steller sea lions to in-air noise is not anticipated.

Phase 1

During Phase 1, we anticipate that one large group (10 individuals) may be exposed to Project-related underwater noise once per day. However, as discussed above, we anticipate that exposure may be as much as twice this rate during March, April, May, July, August, and September. Therefore, we anticipate that two large groups (20 individuals) may be exposed to Project-related underwater noise per day during these months, or during half of Phase 1. Therefore, we estimate a total of 2,160 potential exposures of Steller sea lions (i.e., 1 group of 10 sea lions per day x 72 days [or half of Phase 1] + 2 groups of 10 sea lions per day x 72 days = 2,160 sea lions).

Phase 2

During Phase 2, we anticipate Steller sea lions would be exposed at the same rate as during Phase 1. Therefore, we anticipate that one large group (10 individuals) may be exposed to Project-related underwater noise once per day, with an increase to 2 large groups per day in March, April, May, July, August, and September. It is unknown at this time during which months construction of Phase 2 will occur. To account for increased potential exposure during herring and salmon runs, we predict that half of construction of Phase 2 would occur during this time and half would occur outside of this time period, Therefore, we estimate a total of 360 potential exposures of Steller sea lions (i.e., 1 group of 10 sea lions per day x 13.5 days [or half of Phase 2] + 2 groups of 10 sea lions per day x 13.5 days = 405 sea lions).

6.5.2 Harbor Seal

Harbor seal densities in the Project area are not well known. No systematic studies of harbor seals have been conducted in or near the Project area. They are known to occur year-round with little seasonal variation in abundance (Freitag 2017 as cited in 83 FR 22009) and local residents estimate that there are about 1 to 3 harbor seals in Tongass Narrows every day, in addition to those that congregate near the seafood processing plants and fish hatcheries. NMFS (83 FR 22009) has indicated that the maximum group size in Tongass Narrows is three individuals. Harbor seals are known to be curious and may approach novel activity. For these reasons we conservatively estimate that up to two groups of 3 harbor seals could be exposed to Project-related underwater noise each day.

The largest Level A harassment zone for phocid pinnipeds extends 280 meters from the noise source (Table 6-5). Although it is unlikely that harbor seals would enter the Level A harassment zone without detection while underwater activities are underway, it is possible that harbor seals may approach and enter the Level A zone undetected. For this reason, DOT&PF requests Level A take to safeguard against the possibility of marine mammal observers not being able to detect a harbor seal within the Level A harassment zone (Table 6-5).

The in-air Level B harassment zone for harbor seals extends 152 meters from the noise source. No harbor seals are known to haul out within 152 meters of any of the Project component locations; therefore, exposure of hauled out harbor seals to in-air noise is not anticipated.

Phase 1

During Phase 1, we anticipate that two groups of 3 individuals could be exposed to Project-related underwater noise once per day for a total of 864 harbor seals (i.e., 6 individuals per day x 144 days = 864 seals).

During Phase 1, it is possible, but unlikely, that harbor seals may enter the Level A harassment zone for phocid pinnipeds. Therefore, we request Level A take for a total of six groups (18 individuals) during Phase 1.

Phase 2

During Phase 2, we anticipate that two groups of 3 individuals could be exposed to Project-related underwater noise once per day for a total of 162 harbor seals (i.e., 6 individuals per day x 27 days = 162 seals).

During Phase 2, we anticipate that three groups of 3 individuals could enter the Level A harassment zone without detection. Therefore, we request Level A take of 9 harbor seals during Phase 2.

6.5.3 Harbor Porpoise

Harbor porpoises are non-migratory; therefore, our exposure estimates are not dependent on season. Freitag (2017 as cited in 83 FR 22009) observed harbor porpoises in Tongass Narrows zero to one time per month. NMFS (83 FR 22009) has estimated that one group of harbor porpoises would enter Tongass Narrows each month. DOT&PF will adopt this exposure rate in the following exposure estimations.

The largest Level A harassment zone for harbor porpoises extends 623 meters from the noise source during impact installation of 30-inch piles (Table 6-5). Because harbor porpoises move quickly and elusively, it is possible that harbor porpoises may enter the Level A harassment zone (Table 6-5) without detection. As such, DOT&PF will request small numbers of Level A take for harbor porpoises during each phase of the Project.

Phase 1

During Phase 1, we estimate that two groups of harbor porpoises could be exposed to Project-related underwater noise each month for a total of 120 harbor porpoises (i.e., 2 groups of 5 per month x 12 months = 120 harbor porpoises).

During Phase 1, we anticipate that one group of 5 individuals may enter the Level A harassment zone undetected approximately once during every 4 months of construction, for a total of 15 potential Level A exposures.

Phase 2

During Phase 2, we estimate that two groups of harbor porpoises may be exposed to Project-related underwater noise each month for a total of 50 individuals (i.e., 2 groups of 5 per month x 5 months = 50 harbor porpoises).

During Phase 2, we anticipate that two groups of 5 individuals may enter the Level A harassment zone undetected approximately once during the 5 months of construction, for a total of 10 potential Level A exposures.

6.5.4 Dall's Porpoise

Dall's porpoises are expected to only occur in the Project area a few times per year. This species is non-migratory; therefore, our exposure estimates are not dependent on season. We anticipate approximately one observation of one large Dall's porpoise pod (15 individuals) in the Project area each month during construction. Shutdown protocol and implementation of Level A zones will be the same for Dall's porpoises as for harbor porpoises and other high-frequency cetaceans (e.g., Section 6.5.3).

The largest Level A harassment zone for Dall's porpoises extends 623 meters from the noise source during impact installation of 30-inch piles (Table 6-5). Because Dall's porpoises move quickly and elusively, it is possible that Dall's porpoises may enter the Level A harassment zone (Table 6-5) without detection. As such, DOT&PF will request small numbers of Level A take for Dall's porpoises during each phase of the Project.

Phase 1

During Phase 1, we estimate that 180 Dall's porpoises could be exposed to Project-related underwater noise (i.e., 15 individuals per month x 12 months of construction = 180 total potential exposures).

During Phase 1, we anticipate that one group of 15 individuals may enter the Level A harassment zone undetected during construction.

Phase 2

During Phase 2, we estimate that 75 Dall's porpoises could be exposed to Project-related underwater noise (i.e., 15 individuals per month x 5 months of construction = 75 individuals).

During Phase 2, we anticipate that one group of 15 individuals may enter the Level A harassment zone undetected during construction.

6.5.5 Pacific White-sided Dolphin

Pacific white-sided dolphins do not generally occur in the shallow, inland waterways of Southeast Alaska. There are no records of this species occurring in Tongass Narrows, and it is uncommon for individuals to occur in the Project area. However, recent fluctuations in distribution and abundance decrease the certainty in this prediction. In order to reduce risk to the Project, we conservatively predict that one large group (50 individuals) of Pacific white-sided dolphins may be exposed to Level B harassment noise during each phase of the Project.

6.5.6 Killer Whale

Killer whales are observed in Tongass Narrows irregularly with peaks in abundance between May and July. NMFS has estimated killer whale presence in Tongass Narrows at one pod per month. We estimate that one pod of 12 individuals may be exposed to Project-related underwater noise every month except between May and July, when two pods of 12 individuals may be exposed. No Level A take is requested for killer whales.

Phase 1

During Phase 1, we predict that a total of 180 killer whales may be exposed to Project-related underwater noise (i.e., 12 exposures per month x 9 months + 24 exposures per month x 3 months = 180 whales).

Phase 2

During Phase 2, it is not currently known during which months construction will occur. We conservatively predict that 3 of the 5 months of Phase 2 construction would occur during May, June, and July. Therefore, a total of 96 killer whales may be exposed to Project-related underwater noise (i.e., 12 exposures per month x 2 months + 24 exposures per month x 3 months = 96 whales).

6.5.7 Humpback Whale

As discussed in Section 4.8.2, locals have observed humpback whales about once per week, on average, in Tongass Narrows. NMFS (2019) has predicted approximately one group of two individuals would be present in Tongass Narrows twice each week. Based on the available information synthesized in Section 4.8.2, the DOT&PF predicts that one group of two individuals may be exposed to Project-related underwater noise twice each week during the Project.

The largest Level A harassment zone for humpback whales extends 523 meters from the noise source during impact installation of 30-inch piles (Table 6-5). Marine mammal monitoring will minimize the potential for Level A harassment of humpback whales. All pile installation/removal will be shut down prior to a humpback whale entering the Level A harassment zone. No Level A take is requested for humpback whales.

Phase 1

Based on the estimated occurrence rate of 1 group of 2 individuals twice each week and an anticipated timeframe of pile driving to occur over the course of 144 days (Table 1-2), NMFS determined that 5 Mexico DPS humpback whales may be exposed to Project-related underwater noise during Phase 1 (NMFS 2019). Using the estimate that 6.1 percent of the total humpback population in Southeast Alaska is from the Mexico DPS, a total of 82 humpback whales (5/0.061 = 81.96, rounded up to 82 whales) may be exposed to Project-related underwater noise during Phase 1.

Phase 2

Based on the estimated occurrence rate of 1 group of 2 individuals twice each week and an anticipated timeframe of pile driving to occur over the course of 27 days (Table 1-4), NMFS determined 1 Mexico DPS humpback whales may be exposed to Project-related underwater noise during Phase 2 (NMFS 2019). Using the estimate that 6.1 percent of the total humpback population in Southeast Alaska is from the Mexico DPS, a total of 17 humpback whales (1/0.061 = 16.39, rounded up to 17 whales) may be exposed to Project-related underwater noise during Phase 2.

6.5.8 Minke Whales

Minke whales may be present in Tongass Narrows year-round. Their abundance throughout Southeast Alaska is very low, and anecdotal reports have not included minke whales near the Project area. However, minke whales are distributed throughout a wide variety of habitats and could occur near the Project area. Freitag (2017 as cited in 83 FR 22009) and NMFS (83 FR 22009) estimate that a group of three whales may occur near or within Tongass Narrows every 4 months.

Shut down protocol and implementation of Level A harassment zones will be the same for minke whales as for humpback whales and other low-frequency cetaceans. No Level A take is requested for minke whales.

Phase 1

Based on the estimated occurrence rate of three individuals every four months, we predict that 9 minke whales (i.e., 3 animals in a group x 1 group every 4 months = 9 individuals in 12 months) may be exposed during the 12 month duration of Phase 1.

Phase 2

Based on the estimated occurrence rate of three individuals every 4 months, we conservatively predict that 6 minke whales may be exposed to Project-related underwater noise during the 5-month duration of Phase 2.

6.6 All Marine Mammal Takes Requested

6.6.1 Phase 1

The analysis of marine mammal take for Phase 1 predicts 3,597 potential exposures of marine mammals to Level B harassment and 48 potential exposures of marine mammals to Level A harassment (Table 6-8).

Table 6-8. Summary of the Estimated Numbers of Marine Mammals Potentially Exposed to Level B Harassment Sound Levels during Phase 1

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B)	Stock Abundance	Percent of Population
Steller sea lion	Eastern DPS	2,160	0	2,160	41,638	5.2
Harbor seal	Clarence Strait	846	18	864	31,634	2.7
Harbor porpoise	Southeast Alaska	105	15	120	11,146	1.1
Dall's porpoise	Alaska	165	15	180	83,400	0.2
Pacific white-sided dolphin	North Pacific	50	0	50	26,880	0.2
Killer whale	Alaska Resident	180	0	180	2,347	7.7[a]
	Northern Resident				261	69.0[a]
	West Coast Transient				243	74.1[a]
Humpback whale	Hawaii DPS	77	0	77	11,398	0.7[b]
	Mexico DPS	5	0	5	3,264	0.2[b]
Minke whale	Alaska	9	0	9	Unknown	N/A
Total	**N/A**	**3,597**	**48**	**3,645**	**N/A**	**N/A**

Note: DPS = distinct population segment.

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

[b] Assumes that 6.1 percent of humpback whales exposed are members of the Mexico DPS (Wade et al. 2016).

6.6.2 Phase 2

The analysis of marine mammal take for Phase 2 predicts 836 potential exposures of marine mammals to Level B harassment and 34 potential exposures of marine mammals to Level A harassment (Table 6-9).

Table 6-9. Summary of the Estimated Numbers of Marine Mammals Potentially Exposed to Level B Harassment Sound Levels during Phase 2

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B)	Stock Abundance	Percent of Population
Steller sea lion	Eastern DPS	405	0	405	41,638	1.0
Harbor seal	Clarence Strait	162	9	171	31,634	0.5
Harbor porpoise	Southeast Alaska	40	10	50	11,146	0.4
Dall's porpoise	Alaska	60	15	75	83,400	0.1
Pacific white-sided dolphin	North Pacific	50	0	50	26,880	0.2
Killer whale	Alaska Resident	96	0	96	2,347	4.1[a]
	Northern Resident				261	36.8[a]
	West Coast Transient				243	39.5[a]
Humpback whale	Hawaii DPS	16	0	16	11,398	0.1[b]
	Mexico DPS	1	0	1	3,264	<0.1[b]
Minke whale	Alaska	6	0	6	Unknown	N/A
Total	**N/A**	**836**	**34**	**870**	**N/A**	**N/A**

Note: DPS = distinct population segment

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

[b] Assumes that 6.1 percent of humpback whales exposed are members of the Mexico DPS (Wade et al. 2016).

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7 DESCRIPTION OF POTENTIAL IMPACTS OF THE ACTIVITY ON MARINE MAMMALS

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

7.1 Assessment of Potential Acoustic Impacts

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

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

7.1.1 Zone of Hearing Loss, Discomfort, or Injury

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

Kastak and Schusterman (1995) tested in-air auditory thresholds by exposing a harbor seal inadvertently to broadband construction noise for 6 days, with intermittent exposure averaging 6 to 7 hours per day. When the harbor seal was tested immediately upon cessation of the noise, a TTS of 8 dB at 100 Hz was evident. Following 1 week of recovery, the harbor seal's hearing threshold was within 2 dB of its original level.

Pure-tone sound detection thresholds were obtained in-water for harbor seals before and immediately following exposure to octave-band noise (Kastak et al. 1999). Test frequencies

ranged from 100 Hz to 2 kilohertz (kHz), and octave-band sound exposure levels (SELs) were approximately 60 to 75 dB SEL. Each harbor seal was trained to dive into a noise field and remain stationed underwater during a noise-exposure period that lasted a total of 20 to 22 minutes. The average threshold shift relative to baseline thresholds for the harbor seals following noise exposure was 4.8 dB, and the average shift following the recovery period was 20.8 dB (Kastak et al. 1999). Therefore, PTS and TTS as a result of the Project are not expected to occur in any marine mammal species, because source levels of pile installation are lower than those in the above-referenced TTS studies, and implementation of mitigation measures will help avoid potential close approach of animals to activities that could result in Level A takes (i.e., injury/mortality).

7.1.2 Zone of Masking

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

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

The Project is within an existing active harbor area with regular vessel activity, including recreational craft, local ferries and tourist cruises, commercial fishing vessels, and twice-weekly arrivals and departures of an Alaska state ferry. It is likely that marine mammals in the Project area have become habituated to increased noise levels. Implementation of the proposed mitigation measures (Section 11) will reduce impacts on marine mammals, with any minor masking occurring near the sound source, if at all.

7.1.3 Zone of Responsiveness

This is the area within which marine mammals react behaviorally or physiologically from exposure to increased noise levels. The level of effect is dependent on the acoustical characteristics of the noise, current physical and behavioral state of the animals, ambient noise levels and environmental conditions, and context of the sound (e.g., if it sounds similar to a predator; Richardson et al. 1995; Southall et al. 2007). Behavioral effects that are temporary may indicate that the animal has simply heard a sound, and the effect may not be long-term (Southall et al. 2007). Behavioral and physiological effects described here will be considered Level B harassment.

Responses from marine mammals in the presence of pile installation activity might include a reduction of acoustic activity, a reduction in the number of individuals in the area, and avoidance of the area. Of these, temporary avoidance of the noise-impacted area is the most common response. Avoidance responses may be initially strong if the marine mammals move rapidly away from the source or weak if movement is only slightly deflected away from the source. Noise from pile installation could potentially displace marine mammals from the immediate area

of the activity; however, they would likely return after pile installation is completed, as demonstrated by a variety of studies on temporary displacement of marine mammals by industrial activity (reviewed in Richardson et al. 1995). Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile installation, and have already been taken into account in the exposure analysis.

7.1.4 Zone of Audibility

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

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

7.2 Conclusions Regarding Impacts to Species or Stocks

Incidental take is expected to result in only short-term changes in behavior, such as avoidance of the Project area, changes in swimming speed or direction, and changes in foraging behavior. Such impacts are unlikely to have any effect on recruitment or survival and, therefore, would have a negligible impact on the affected stocks of Steller sea lions, harbor seals, harbor porpoises, Dall’s porpoises, killer whales, humpback whales, and minke whales. Implementation of mitigation measures proposed in Section 11 is likely to minimize most potential adverse underwater impacts to individual marine mammals from pile installation activities. Impacts to individual Steller sea lions, harbor seals, harbor porpoises, Dall’s porpoises, killer whales, humpback whales, and minke whales are expected to be small and of short duration. Nevertheless, some level of disturbance impact is unavoidable. The expected level of unavoidable impact (defined as an acoustic or harassment “take”) is defined in Section 6.

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

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8 DESCRIPTION OF POTENTIAL IMPACTS TO SUBSISTENCE USES

Alaska Natives have traditionally harvested subsistence resources in Southeast Alaska for many hundreds of years, particularly large terrestrial mammals, marine mammals, salmon, and other fish (ADF&G 1997). Harbor seals are the marine mammal species most regularly harvested for subsistence by households in Ketchikan and Saxman. Eighty harbor seals were harvested by Ketchikan residents in 2007, which ranked fourth among all communities in Alaska that year for harvest of harbor seals. Thirteen harbor seals were harvested by Saxman residents in 2007. Hunting usually occurs in October and November (ADF&G 2009). In 2008, two Steller sea lions were harvested by Ketchikan-based subsistence hunters, but this is the only record of sea lion harvest by residents of either Ketchikan or Saxman. The ADF&G has not recorded harvest of cetaceans from either community (ADF&G 2018).

Approximately 17 percent of Ketchikan residents and 51 percent of Saxman residents identify as Alaska Native. There are approximately 10 households in Ketchikan that subsistence hunt, while there are approximately 110 such households in Saxman. Based on data from 1999, marine mammals account for approximately 5.1 percent (6,978 pounds) of all subsistence harvest in Saxman (ADF&G 2018).

All Project activities will take place within the industrial area of Tongass Narrows immediately adjacent to Ketchikan where subsistence activities do not generally occur. The Project will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away. Some minor, short-term disturbance of the harbor seals could occur, but this is not likely to have any measureable effect on subsistence harvest activities in the region. No changes to availability of subsistence resources will result from Project activities.

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9 DESCRIPTION OF POTENTIAL IMPACTS TO MARINE MAMMAL HABITAT

9.1 Effects of Project Activities on Marine Mammal Habitat

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

Although Southeast Alaska in its entirety is listed as a Biologically Important Area for humpback whales, the Project area does not contain particularly high value habitat and is not unusually important for the species. Furthermore, mitigation measures (Section 11), such as marine mammal monitoring, would limit the number of humpback whales exposed to underwater noise as a result of the Project. Avoidance of the Project area by humpback whales is possible, but would be temporary and intermittent in duration.

9.2 Effects of Project Activities on Marine Mammal Prey Habitat

Essential Fish Habitat (EFH) has been designated within the Project area for all five species of salmon (i.e., chum salmon, pink salmon, coho salmon, sockeye salmon, and Chinook salmon; NMFS 2017), which are common prey of marine mammals. Adverse effects on EFH are not expected. Fish populations in the Project area that serve as marine mammal prey could be temporarily affected by noise from in-water pile installation. The frequency range in which fish generally perceive underwater sounds is 50 to 2,000 Hz, with peak sensitivities below 800 Hz (Popper and Hastings 2009). Fish behavior or distribution may change, especially with strong and/or intermittent sounds that could potentially harm fish. High underwater SPLs have been documented to alter behavior; cause hearing loss; and injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005).

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

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

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

The potential impacts of the Project on marine mammal habitat are discussed in Section 9. The effects of the Project on marine mammal habitat are expected to be short-term and minor. Permanent loss of habitat is limited to the footprint of the piles and areas of fill placement. Only the two new ferry berths (Revilla and Gravina Island new ferry berths; see Section 1) would be located in areas without existing facilities. The other four Project components would generally be located in the same locations as existing facilities, with limited amounts of new fill and numbers of piles. One potential impact on marine mammals associated with the Project could be a temporary loss of habitat because of elevated noise levels. Displacement of marine mammals by noise would not be permanent and would not have long-term effects. The Project is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations, because pile installation/removal and other noise sources will be temporary and intermittent.

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11 MITIGATION MEASURES

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

11.1 Pile Installation and Associated Activities

Pile installation mitigation measures include:

- The Project was re-designed in 2018 to reduce the diameter of piles and use relatively small-diameter piles, which will avoid the elevated noise impacts and large harassment zones associated with larger piles.
- Although construction of more than one component may occur during the same time frame, pile installation/removal (including use of vibratory or impact hammers, and rock socket drilling) will not occur simultaneously at more than one component location.
- Marine Mammal Observers (MMOs) will be employed as described in Section 13.
- If a marine mammal approaches within 10 meters of a Project vessel (e.g., barge, tugboat), the vessel shall reduce speed to the minimum level required to maintain safe steerage and working conditions until the marine mammal is at least 10 meters away from the vessel.
- Pile installation, proofing, and removal will occur only during daylight hours, when visual monitoring of marine mammals can be conducted.
- Before impact proofing occurs, the Contractor will employ a ramp-up procedure to minimize impacts. The following guidelines will be employed by the Contractor:
    - If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone.
    - To avoid unauthorized Level A take, if Level A take numbers are approaching authorized levels, shutdown will be implemented before individuals reach the Level A zones.
    - If a marine mammal is present in the Level B harassment zone, ramping up may begin and a Level B take will be recorded. Ramping up may occur when these species are in the Level B harassment zone, whether they enter the Level B zone from the Level A zone or from outside the Project area.
    - If a marine mammal is present in the Level B harassment zone, the Contractor may elect to delay ramping up to avoid a Level B take. To avoid a Level B take, ramping

up will begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the Level B harassment zone.

- No vibratory soft start is required.
- A minimum 10-meter shutdown zone will be implemented for all species and activity types to prevent direct injury of marine mammals.
- Shutdown zones have been rounded up relative to the calculated Level A harassment zones (Table 11-1) to assist MMOs in effectively shutting down before individuals could cross into their respective Level A zones.
- If a marine mammal is entering or is observed within a shutdown zone, pile installation and removal must be halted or delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; or 15 minutes have passed without subsequent detections of the animal.

11.2 Harassment Zones

Modeling results for Level A and Level B harassment zones discussed in Section 6 were used to develop mitigation measures for pile installation and removal. During pile installation and removal, the shutdown zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level A (injury) harassment criteria (see Table 6-5). In addition, a 10-meter shutdown zone will be implemented for all species and all activity types to prevent direct contact and injury of marine mammals with construction equipment.

For those marine mammals for which Level B take has not been requested, in-water pile installation/removal and drilling will shut down immediately when the animals are sighted. If a marine mammal authorized for Level B take is present in the Level B harassment zone, in-water activities may continue, and a Level B take will be recorded. Pile installation and rock socket drilling may occur when these species are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone (if relevant), or from outside the Project area. If Level B take reaches the authorized limit, then pile installation will be stopped as these species approach, to avoid additional take of these species.

Implementation of the above mitigation measures will be completed by MMOs as described in Section 13.

Table 11-1. Shutdown Zones for All Species

Activity	Pile Diameter(s)	Minutes per Pile or Strikes per Pile	Piles Installed or Removed per day	Level B Harassment Isopleth Distance (meters)	Shutdown Distance (meters)				
					Cetaceans			Pinnipeds	
					LF	MF	HF	PW	OW
Vibratory Installation	30-inch	30 Minutes	3	6,310	50				
	24-inch, 18-inch	30 Minutes	3	5,412					
	27.6-inch sheet pile, 30.3-inch sheet pile	15 Minutes	10	4,642					
Vibratory Removal	24-inch, 16-inch	30 Minutes	5	5,412					
Drilling Rock Sockets	30-inch	180 Minutes	3	12,023	70	50	60	50	
	24-inch, 18-inch	120 Minutes	3		60	50			
Impact Installation	30-inch	50 Strikes	3	2,154	250	50	250	150	50
		50 Strikes	2		200		200	100	
		50 Strikes	1		100		150	100	
		200 Strikes	3		550		650	300	
		200 Strikes	2		400		500	250	
		200 Strikes	1		300		300	150	
Impact Installation	24-inch	50 Strikes	3	1,000	150		150	100	
		50 Strikes	2		100		150	50	
		50 Strikes	1		100		100	50	
		200 Strikes	3		300		350	200	
		200 Strikes	2		250		300	150	
		200 Strikes	1		150		200	100	
Impact Installation	18-inch	50 Strikes	3		150		150	100	
		50 Strikes	2		100		150	50	
		50 Strikes	1		100		100	50	

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12 MEASURES TO REDUCE IMPACTS TO SUBSISTENCE USERS

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

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13 MONITORING AND REPORTING

Monitoring measures will be implemented along with mitigation measures (Section 11) to avoid and minimize impacts on marine mammals during the Project, as discussed in detail in the Marine Mammal Monitoring Plan (Appendix B), which will be submitted prior to issuance of the IHA. The monitoring plan will focus on visual observations.

Trained MMOs will collect sighting data and behavioral responses to construction for all marine mammals observed within the harassment zones during construction. In-water pile installation/removal and rock socket drilling will be shut down if marine mammals for which no take has been authorized are observed approaching the Level B harassment zone. In-water work will remain shut down until marine mammals for which no take has been authorized have left the harassment zone. For marine mammals for which take authorization has been received, pile installation may continue if the marine mammal enters the Level B harassment zone and take is documented.

Trained or experienced observers will be present during all pile installation and removal using impact and vibratory methods and rock socket drilling. Observers must be able to positively identify the marine mammals in the area and have prior training or expertise in monitoring and surveying marine mammals, with credentials available for review. Observers must maintain verbal contact with construction personnel to immediately call for a halt of pile installation operations to avoid exposures to noise, as described in Section 11.2.

13.1 MMO Qualifications

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

- MMOs will be independent observers (i.e., not construction personnel).
- At least one MMO must have prior experience working as an observer.
- Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience.
- Two or more MMOs will be responsible for monitoring each Project component. One MMO will be designated as the lead MMO or monitoring coordinator. The lead MMO must have prior experience working as an observer.
- MMOs must have:
    - The ability to conduct field observations and collect data according to assigned protocols.
    - Experience or training in the field identification of marine mammals, including the identification of behaviors.
    - Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
    - Writing skills sufficient to prepare a report of observations, including, but not limited to:
        - The number, species, and behavior of marine mammals observed

  - Dates and times when in-water construction activities were conducted
  - Dates and times when in-water construction activities were suspended to avoid potential harassment of marine mammals observed within the harassment zone
- The ability to communicate orally, by radio, or in person with Project personnel to provide real-time information on marine mammals observed in the area.

13.2 Observations

MMOs will be positioned at the best practical vantage point(s). Observation points are available from the Tongass Highway and Gravina Airport Access Road. It is possible to observe the entire width of Tongass Narrows with unaided eyes. MMOs will monitor for any humpback whales or other marine mammals entering the given monitoring zones from the north or south. The position(s) may vary based on construction activity and location of piles or equipment. At least one of the monitoring locations will have the following characteristics:

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

This central position will generally be staffed by the lead MMO, who will monitor the shutdown zones and communicate with construction personnel about shutdowns and take management. The MMO at this location will be able to see at least a 600-meter radius, which exceeds the largest Level A zone, around the construction site. Walking or otherwise moving around the construction site may be helpful for monitoring the shutdown zones in their entirety. MMOs stationed along the road system will watch for marine mammals entering and leaving Tongass Narrows and will alert the lead MMO of the number and species sighted, so that no unexpected marine mammals will approach the construction site. This will avoid and minimize Level A take of all species.

The MMOs will begin observations 30 minutes prior to the start of pile installation/removal. At least two MMOs will be available to observe during rotating shifts of 4–6 hours, or as needed, each day to prevent fatigue.

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

Specific aspects and protocols of observations will also include:

- If waters exceed a sea-state that restricts the MMO’s ability to make observations within the Level A harassment zone of pile driving (e.g., excessive wind or fog), pile installation and removal will cease. Pile driving will not be initiated until the entire Level A harassment zone is visible.
- If any marine mammal species not authorized for take is encountered during pile installation or removal and is likely to be exposed to Level B harassment, then in-water pile installation or removal will cease and the observations will be reported to NMFS' Office of Protected Resources.

- When a marine mammal is observed, its location will be determined using a rangefinder to verify distance and a GPS or compass to verify heading.
- The MMOs will record any authorized cetacean or pinniped present during monitoring and the harassment zone within which it is located, if applicable. The harassment zones are shown in Table 6-5 and Table 6-6 and Figure 6-1.
- Ongoing in-water pile installation/removal and drilling may be continued during periods when conditions such as low light, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone. MMOs will continue to monitor the visible portion of the Level B harassment zone throughout the duration of pile installation and removal.

13.3 Data Collection

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

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

13.4 Reporting

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

In general, reporting will include:

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

- Times when work was stopped and resumed due to the presence of marine mammals
- Results, which include the detections of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within the Level A and Level B harassment zones
- A refined take estimate based on the number of marine mammals observed during the course of construction

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

14 SUGGESTED MEANS OF COORDINATION

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

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

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15 LITERATURE CITED

ADF&G (Alaska Department of Fish and Game). 1997. Overview of information about subsistence uses of marine mammals in Aleutian/Pribilof Islands communities. Unpublished report. Available at http://www.subsistence.adfg.state.ak.us/download/download/mmap.pdf. Accessed 28 September 2017.

ADF&G. 2009. The subsistence harvest of harbor seals and sea lions by Alaska Natives in 2007. Technical Paper No. 345 from Alaska Department of Fish and Game, Division of Subsistence and Alaska Native Harbor Seal Commission. Available at: http://www.adfg.alaska.gov/techpap/TP345.pdf

ADF&G. 2018. Subsistence in Alaska: Harvest Data and Reports. Available at: http://www.adfg.alaska.gov/index.cfm?adfg=subsistence.harvest Accessed: August 2018

Allen, B.M., and R.P. Angliss. 2010. Alaska marine mammal stock assessments, 2009. NOAA Technical Memorandum NMFS-AFSC-233. National Marine Fisheries Service, Seattle, WA.

Barlow, J. 2003. Preliminary estimates of the abundance of cetaceans along the U.S. west coast: 1991_2001. Southwest Fisheries Science Center Administrative Report LJ_03_03. Available from SWFSC, 8604 La Jolla Shores Dr., La Jolla CA 92037.

Berger ABAM 2016. Icy Strait Point Cruise Ship Terminal Marine Mammal Monitoring Summary Report. Prepared for Huna Totem Corporation, Hoonah, Alaska. Prepared by BergerADAM, Vancouver, Washington. February 2016.

Bjørge, A., and K.A. Tolley. 2009. Harbor porpoise *Phocoena phocoena*. *In* W. F. Perrin, B. Würsig, and J. G. M. Thewissen (Editors), *Encyclopedia of marine mammals*, 2nd ed., pp. 530–532. Academic Press, New York.

Blackwell, S.B. 2005. Underwater measurements of pile-driving sounds during the Port MacKenzie dock modifications, 13-16 August 2004. Rep. from Greeneridge Sciences, Inc., Goleta, CA, and LGL Alaska Research Associates, Inc., Anchorage, AK, in association with HDR Alaska, Inc., Anchorage, AK, for Knik Arm Bridge and Toll Authority, Anchorage, AK, Department of Transportation and Public Facilities, Anchorage, AK, and Federal Highway Administration, Juneau, AK.

Blackwell, S.B., and C.R. Greene, Jr. 2002. Acoustic measurements in Cook Inlet, Alaska, during August 2001. Greeneridge Rep. 271-2. Prepared by Greeneridge Sciences, Inc., Santa Barbara, CA, for National Marine Fisheries Service, Anchorage, AK.

Boveng, P.L., J.M. London, and J.M. Ver Hoef. 2012. Distribution and abundance of harbor seals in Cook Inlet, Alaska. Task III: Movements, marine habitat use, diving behavior, and population structure, 2004-2006. Final Report. BOEM Report 2012-065. Bureau of Ocean Energy Management, Alaska Outer Continental Shelf Region, Anchorage, AK.

Caltrans. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish: Appendix I – Compendium of Pile Driving Sound Data. Updated November 2015.

Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell., and R.L. Brownell Jr. 2018. U.S. Pacific Marine Mammal Stock Assessments: 2017. U.S. Department of Commerce. NOAA. Technical Memorandum NMFS-SWFSC-602.

CH2M. 2018. Draft-Geotechnical Report, Ketchikan-Revilla Airport Shuttle Ferry Berth. Prepared for State of Alaska Department of Transportation and Public Facilities South-coast Region. 2 February 2018.Dahlheim, M.E., P.A. White, and J.M. Waite. 2008. Cetaceans of Southeast Alaska: distribution and seasonal occurrence. *Journal of Biogeography* 36:410–426.

Dahlheim, M., A. York, R. Towell, J. Waite, and J. Breiwick. 2000. Harbor porpoise (Phocoena phocoena) abundance in Alaska: Bristol Bay to Southeast Alaska, 1991-1993. Marine Mammal Science 16:28-45.

Dahlheim, M.E., P.A. White, and J.M. Waite. 2009. Cetaceans of Southeast Alaska: distribution and seasonal occurrence. *Journal of Biogeography* 36:410–426.

Dahlheim, M.E., A.N. Zerbini, J.M. Waite, and A.S. Kennedy. 2015. Temporal changes in abundance of harbor porpoise (*Phocoena phocoena*) inhabiting the inland waters of Southeast Alaska. Fishery Bulletin 113(3): 242-255.

Dahlheim, M.E., and R.G. Towell. 1994. Occurrence and distribution of Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) in southeastern Alaska, with notes on an attack by killer whales (*Orcinus orca*). Marine Mammal Science 10(4): 458-464.

Davidson, M. 2004. Transmission loss. Pages lecture structure obtained from website in IOM Studies, editor. University of Plymouth, Drake Circus, Plymouth, Devon, UK.

DCCED (Alaska Department of Commerce, Community, and Economic Development). 2017. Community Details: Ketchikan. https://www.commerce.alaska.gov/dcra/DCRAExternal/community/Details/1bf4ffe8-2534-4163-8660-078cc02feb1a Accessed: August 2018.

Denes, S. L., G.J. Warner, M.E. Austin, and A.O. MacGillivray. 2016. Hydroacoustic Pile Driving Noise Study – Comprehensive Report. Document 001285, Version 1.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation & Public Facilities.

Ellison, W.T., B.L. Southall, C.W. Clark, and A.S. Frankel. 2012. A new context-based approach to assess marine mammal behavioral responses to anthropogenic sounds. *Conservation Biology* 26:21-28.

FHWA (Federal Highway Administration). 2017.Gravina Access Project Record of Decision and Final Supplemental Environmental Impact Statement. DOT&PF Project No: 67698. Federal Project No: ACHP-0922(5). Prepared for DOT&PF (Alaska Department of Transportation and Public Facilities) by HDR Inc.

Freitag, G. 2001. Marine Mammal Monitoring, Final Report. Ketchikan Transfer Facility Pile Driving Operations. Project MGS-003(67)67857. Prepared by Oceanic Services of Southeast Alaska (OSSA).

Hastings, M.C., and A.N. Popper. 2005. Effects of sound on fish. Technical report for Jones and Stokes to California Department of Transportation.

HDR. 2003. Gravina Access Project Threatened and Endangered Species Biological Assessment for Humpback Whale and Steller Sea Lion Updated November 2003. As viewed November 2017 at http://dot.alaska.gov/sereg/projects/gravina_access/documents.shtml

Hobbs, R.C., and J.M. Waite. 2010. Abundance of harbor porpoise (*Phocoena phocoena*) in three Alaskan regions, corrected for observer errors due to perception bias and species misidentification, and corrected for animals submerged from view. Fisheries Bulletin 108(3): 251-267.

Jefferson, T.A., M.A. Webber, and R.L. Pitman. 2008. Marine Mammals of the World: a Comprehensive Guide to their Identification. Academic Press, Elsevier, UK.

Jefferson, T.A. 2009. Dall's porpoise *Phocoenoides dalli*. *In* W.F. Perrin, B. Würsig, and J.G. M. Thewissen (Editors), *Encyclopedia of marine mammals*, 2nd ed., pp. 296–298. Academic Press, New York.

Kastak, D., and R.J. Schusterman. 1995. Aerial and underwater hearing thresholds for 100 Hz pure tones in two pinniped species. *In* R.A. Kastelein, J.A. Thomas, and P.E. Nachtigall (Editors), *Sensory systems of aquatic mammals*. De Spil Publishing, Woerden, Netherlands.

Kastak, D., R.J. Schusterman, B.L. Southall, and C.J. Reichmuth. 1999. Underwater temporary threshold shift induced by octave-band noise in three species of pinniped. *Journal of the Acoustical Society of America* 106(2):1142-1148.

Kastelein, R. A., R. van Schie, W.C. Verboom, and D. de Haan, 2005. Underwater hearing sensitivity of a male and a female Steller sea lion (Eumetopias jubatus), Journal of the Acoustical Society of America 118, 1820–1829.Ketten, D. 1998. Marine mammal auditory systems: A summary of audiometric and anatomical data and its implications for underwater acoustic impacts. NOAA Technical Memorandum NMFS-SWFSC-256. National Marine Fisheries Service, La Jolla, CA.

Leatherwood, S., R.R. Reeves, A.E. Bowles, B.S. Stewart, and K.R. Goodrich. 1984. Distribution, seasonal movements, and abundance of Pacific white-sided dolphins in the eastern North Pacific. *Scientific Reports of the Whales Research Institute* 35:129–157.

London, J.M., K.M. Yano, D.E. Withrow, J.K. Jansen, S.P. Dahle, H.L. Ziel, G.M. Brady, M.F. Cameron, J.M. Ver Hoef, and P.L. Boveng. 2015. Aerial survey counts of harbor seals in Coastal Alaska (2004-2011). Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration. Dataset available from: https://jmlondon.shinyapps.io/akpvsurveys-app/ Accessed on 27 July 2016.

Lowry, L.F., K.J. Frost, J.M. Ver Hoef, and R.A. DeLong. 2001. Movements of satellite-tagged subadult and adult harbor seals in Prince William Sound, Alaska. *Marine Mammal Science* 17:835-861.

MacGillivray, A., G. Warner, and C. McPherson. 2015. *Alaska DOT Hydroacoustic Pile Driving Noise Study: Kake Monitoring Results*. JASCO Document 01093, Version 1.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation and Public Facilities.

Merrick R.L., and T.R. Loughlin. 1997. Foraging behavior of adult female and young-of-the-year Steller sea lions in Alaskan waters. *Canadian Journal of Zoology* 75:776–786.

Morton, A. 2006. Occurrence, photo-identification and prey of Pacific white-sided dolphins (*Lagenorhyncus obliquidens*) in the Broughton Archipelago, Canada 1984-1998. Marine Mammal Science 16: 89-93.

Muto, M.M., V.T. Helker, R.P. Angliss, B.A. Allen, P.L. Boveng, J.M. Breiwick, M.F. Cameron, P.J. Clapham, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.E.W. Shelden, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini. 2018. Alaska marine mammal stock assessments, 2017. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-AFSC-378, 382p.

Navy (U.S. Department of the Navy). 2012. Acoustic monitoring report Test Pile Program. Prepared for Naval Base Kitsap at Bangor, WA. Prepared by Illingworth and Rodkin, Inc., 27 April 2012.

Navy. 2015. Proxy source sound levels and potential bubble curtain attenuation for acoustic modeling of nearshore marine pile driving at Navy installations in Puget Sound. Prepared by Michael Slater, Naval Surface Warfare Center, Carderock Division, and Sharon Rainsberry, Naval Facilities Engineering Command Northwest. Revised January 2015.

NMFS (National Marine Fisheries Service). 2016a. Killer whale (*Orcinus orca*). NOAA Fisheries, Office of Protected Resources. Available from: http://www.nmfs.noaa.gov/pr/species/mammals/whales/killer-whale.html Accessed on 28 July 2016.

NMFS 2016b. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-55.

NMFS 2017. Essential Fish Habitat (EFH) Mapper. Available from: http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html. Accessed on 28 September 2017.

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

NMFS 2019. Endangered Species Act Section 7 Biological Opinion for Construction of the Tongass Narrows Project (Gravina Access). National Marine Fisheries Service, Alaska Region, Juneau, AK. February 6, 2019.

NOAA (National Oceanic and Atmospheric Administration). 2018. Alaska Protected Resources Division Species Distribution Mapper. Available from: https://alaskafisheries.noaa.gov/portal/apps/webappviewer/index.html?id=0c4a81f75310491d9010c17b6c081c81/ Accessed: August 2018NRC (National Research Council). 2003. *Ocean noise and marine mammals*. National Academies Press, Washington, DC.

Orr, A.J., A.S. Banks, S. Mellman, H.R. Huber, R.L. DeLong, and R.F. Brown. 2004. Examination of the foraging habits of Pacific harbor seal (*Phoca vitulina richardsi*) to describe their use of the Umpqua River, Oregon, and their predation on salmonids. *Fishery Bulletin* 102:108-117.

Payne, P.M., and L.A. Selzer. 1989. The distribution, abundance and selected prey of the harbor seal, *Phoca vitulina concolor*, in southern New England. *Marine Mammal Science* 5(2):173-192.

Popper, A.N., and M.C. Hastings. 2009. The effects of anthropogenic sources of sound on fishes. *Journal of Fish Biology*: 455-489.

Rehberg, M.J., R.D. Andrews, U.G. Swain, and D.G. Calkins. 2009. Foraging behavior of adult female Steller sea lions during the breeding season in Southeast Alaska. *Marine Mammal Science* 25:588–604.

Richardson, W.J., C.R. Greene, C.I. Malme, and D.H. Thomson. 1995. *Marine Mammals and Noise.* Academic Press, Inc., San Diego, CA.

Schmale, C. 2008. Harbor Porpoise. ADF&G Species Information Sheet available from: https://www.adfg.alaska.gov/static/education/wns/harbor_porpoise.pdf. Accessed: August 2018.

SFS (Scientific Fishery Systems, Inc.). 2009. Port of Anchorage Marine Terminal Development Project: 2008 underwater noise survey during construction pile driving. Prepared for U.S. Department of Transportation, Maritime Administration, Washington, DC; the Port of Anchorage, Anchorage; and Integrated Concepts and Research Corporation, Anchorage, AK.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals* 33(4):411–521.

Stacey, P. J. & Baird, R. W. (1991) Status of the Pacific white-sided dolphin, *Lagenorhynchus obliquidens*, in Canada. Canadian Field-Naturalist 105, 219–232.Straley, J. 1990. Fall and winter occurrence if humpback whales (*Megaptera novaeangliae*) in Southeastern Alaska. *Reports of the International Whaling Commission* (Special Issue 12): 319-323.

Suzuki, S., K. Sekiguchi, Y. Mitani, H. Onishi, and T. Kamito. 2016. Distribution of Dall's Porpoise, *Phocoenoides dalli*, in the North Pacific and Bering Sea. Based on T/S *Oshoro Maru* 2012 Summer Cruise Data. *Zoological Science*, 33(5):491-496.

Swain, U., J. Lewis, G. Pendleton, and K. Pitcher. 1996. Movements, haulout, and diving behavior of harbor seals in southeast Alaska and Kodiak Island. *In* Annual Report: Harbor seal investigations in Alaska, pp. 59–144. NOAA Grant NA57FX0367. Alaska Department of Fish and Game, Division of Wildlife Conservation. Douglas, AK.

Thomsen, F., K. Ludemann, R. Kafemann, and W. Piper. 2006. Effects of offshore wind farm noise on marine mammals and fish. Corie, Ltd., Hamburg, Germany.

Tollit, D.J., S.P.R. Greenstreet, and P.M. Thompson. 1997. Prey selection by harbor seals (*Phoca vitulina*) in relation to variations in prey abundance. *Canadian Journal of Zoology* 75:1508–1518.

URS (URS Corporation). 2007. Port of Anchorage Marine Terminal Development Project underwater noise survey test pile driving program, Anchorage, Alaska. Report prepared for Integrated Concepts and Research Corporation, Anchorage, AK.

Verboom, W.C., and R. Kastelein. 2004. Structure of harbor porpoise (*Phocoena phocoena*) acoustic signals with high repetition rates. *In* J.A. Thomas, W.E. Pritchett, C. Moss, and

M. Vater (Editors), *Echolocation in bats and dolphins*, pp. 40–42. University of Chicago Press, Chicago, IL.

Wade, P.R., J.W. Durban, J.M. Waite, A.N. Zerbini, and M.E. Dahlheim. 2003. Surveying killer whale abundance and distribution in the Gulf of Alaska and Aleutian Islands. *AFSC Quarterly Report*, October-November-December 2003.

Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Falcone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urbán R., D. Weller, B.H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia.

Warner, G., and M. Austin. 2016a. Alaska DOT Hydroacoustic Pile Driving Noise Study: Ketchikan Monitoring Results. JASCO Document 01167, Version 1.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation and Public Facilities.

Warner, G., and M. Austin. 2016b. Alaska DOT Hydroacoustic Pile Driving Noise Study: Kodiak Monitoring Results. JASCO Document 01167, Version 2.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation and Public Facilities.

Witteveen, B.H., G.A.J. Worthy, R.J. Foy, K.M. and Wynne. 2012. Modeling the diet of humpback whales: An approach using stable carbon and nitrogen isotopes in a Bayesian mixing model. *Marine Mammal Science*, 28:E233–E250.

WSDOT (Washington State Department of Transportation). 2018. Biological Assessment Preparation for Transportation Projects - Advanced Training Manual. Available online at https://www.wsdot.wa.gov/Environment/Biology/BA/BAguidance.htm#Manual

Wynne, K.W., R. Foy, and L. Buck. 2011. Gulf Apex Predator-prey Study (GAP): FY2004-06 Standardized Comprehensive Report NOAA Federal Program http://seagrant.uaf.edu/map/gap/reports/GAP-04-06_Final.pdf

Wynne, K.W. 2012. *Guide to Marine Mammals of Alaska*. Alaska Sea Grant College Program, Fairbanks, Alaska, 3rd edition, 2007.

Zerbini, A.N., J.M. Waite, J.L. Laake, and P.R. Wade. 2006. Abundance, trends, and distribution of baleen whales off Western Alaska and the Central Aleutian Islands. *Deep-Sea Research* 53:1772-1790.

Appendix A
Project Site Plan Drawings

SFHWY00085

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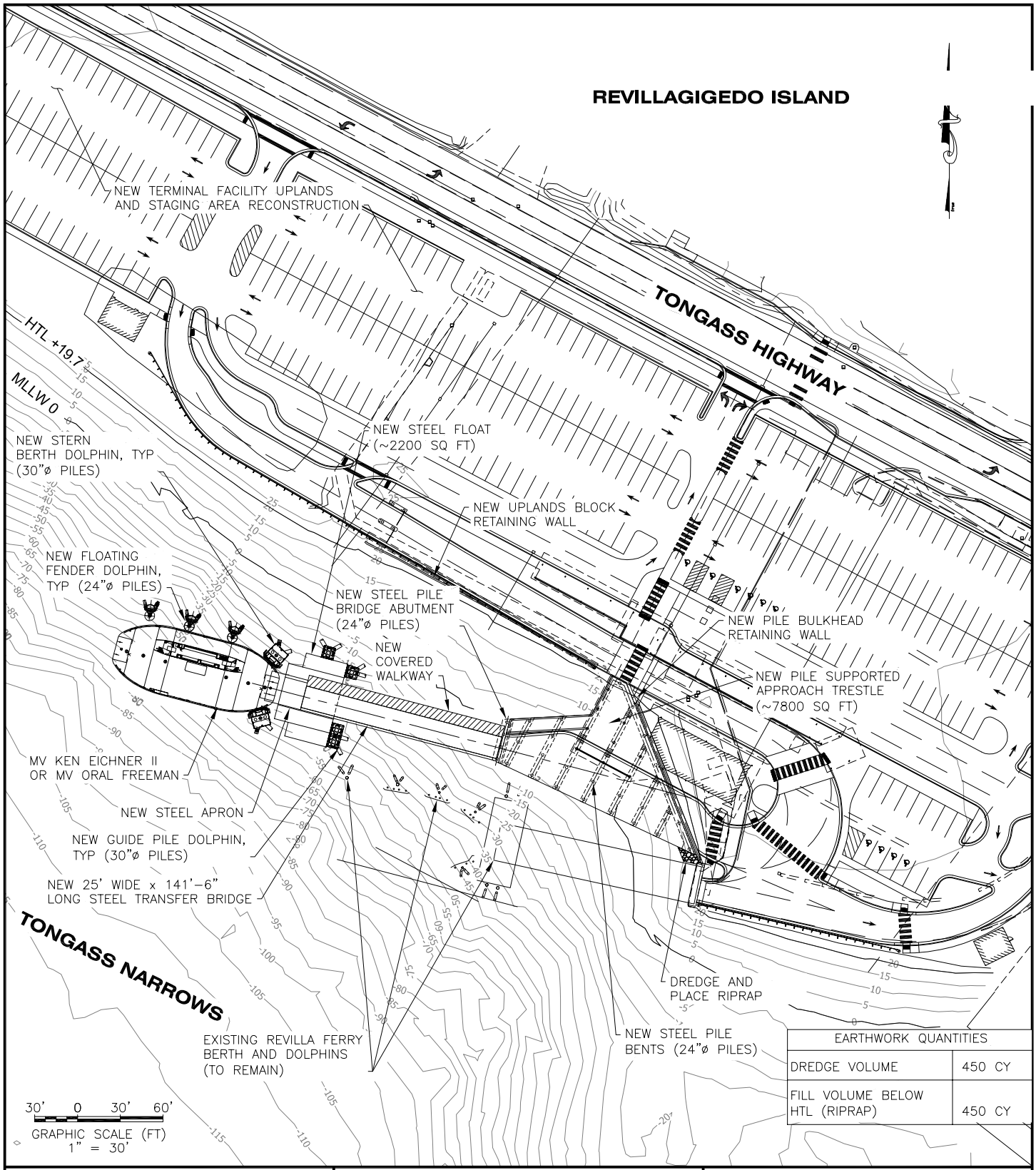

EARTHWORK QUANTITIES	
DREDGE VOLUME	450 CY
FILL VOLUME BELOW HTL (RIPRAP)	450 CY

PROJECT PURPOSE:
NEW FERRY TERMINAL BERTH

ADJACENT PROPERTY OWNERS:
STATE OF ALASKA

PROPOSED SITE PLAN

APPLICATION BY:
STATE OF ALASKA
DEPT. OF TRANSPORTATION & PUBLIC FACILITIES
SOUTHCOAST REGION
DESIGN & ENGINEERING SERVICES

KETCHIKAN
REVILLA AIRPORT SHUTTLE FERRY BERTH
PROJECT NO. 0003209

AT: TONGASS NARROWS
LOCATED IN: S23 T75S R90E CRM
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LONG: 131° 42' 9.8"
DATE: JULY 2018 SHEET 4 OF 8

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SFHWY00109

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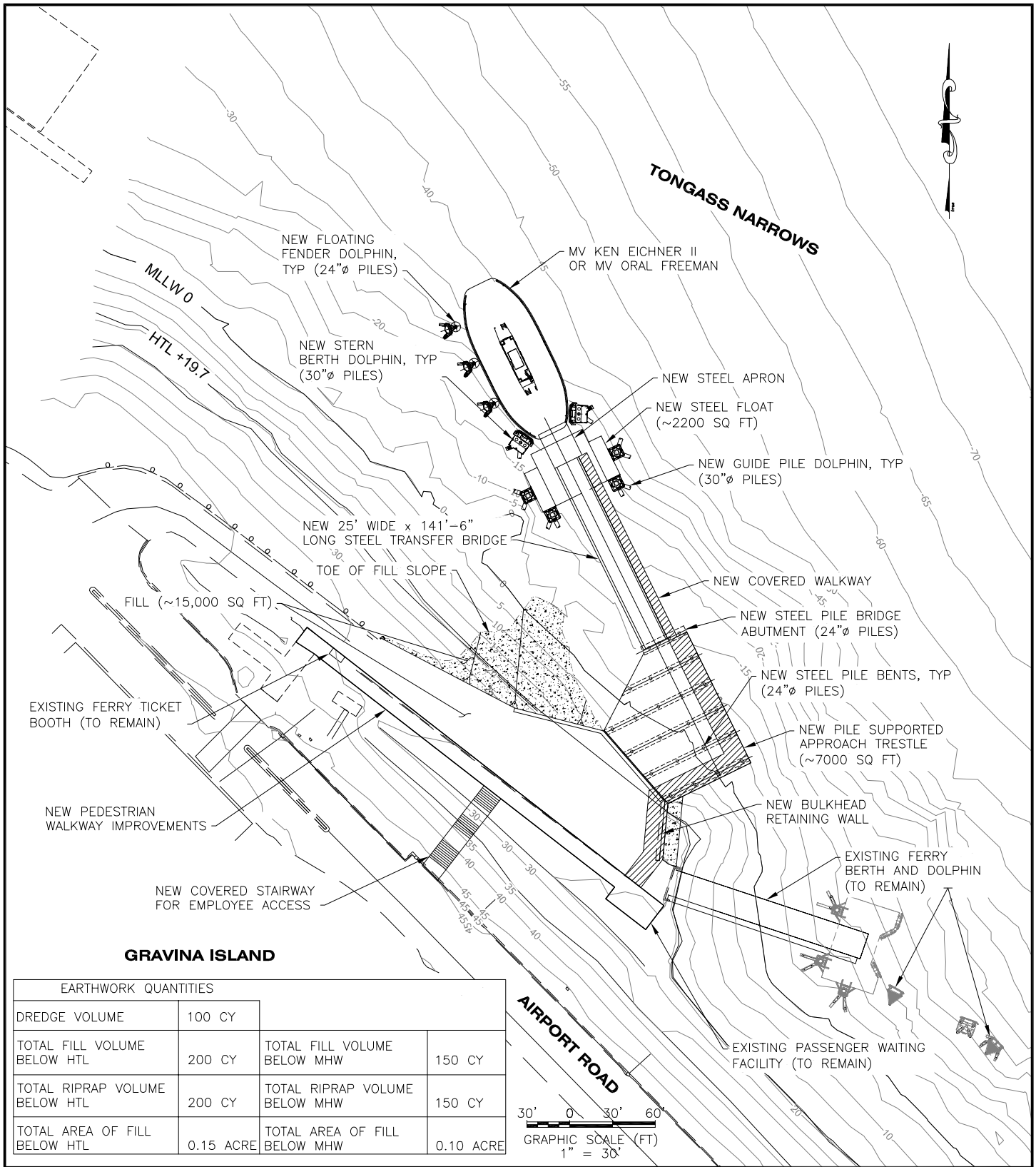

EARTHWORK QUANTITIES			
DREDGE VOLUME	100 CY		
TOTAL FILL VOLUME BELOW HTL	200 CY	TOTAL FILL VOLUME BELOW MHW	150 CY
TOTAL RIPRAP VOLUME BELOW HTL	200 CY	TOTAL RIPRAP VOLUME BELOW MHW	150 CY
TOTAL AREA OF FILL BELOW HTL	0.15 ACRE	TOTAL AREA OF FILL BELOW MHW	0.10 ACRE

PROJECT PURPOSE:
NEW FERRY TERMINAL BERTH

ADJACENT PROPERTY OWNERS:
STATE OF ALASKA

PROPOSED SITE PLAN

APPLICATION BY:
STATE OF ALASKA
DEPT. OF TRANSPORTATION & PUBLIC FACILITIES
SOUTHCOAST REGION
DESIGN & ENGINEERING SERVICES

KETCHIKAN
GRAVINA AIRPORT SHUTTLE FERRY BERTH
PROJECT NO. 0003213

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LOCATED IN: S22 T75S R90E CRM
LAT: 55° 21' 24.5"
LONG: 131° 42' 28.6"
DATE: JULY 2018 SHEET 4 OF 8

Friday, July 13, 2018 8:09:08 AM

67698

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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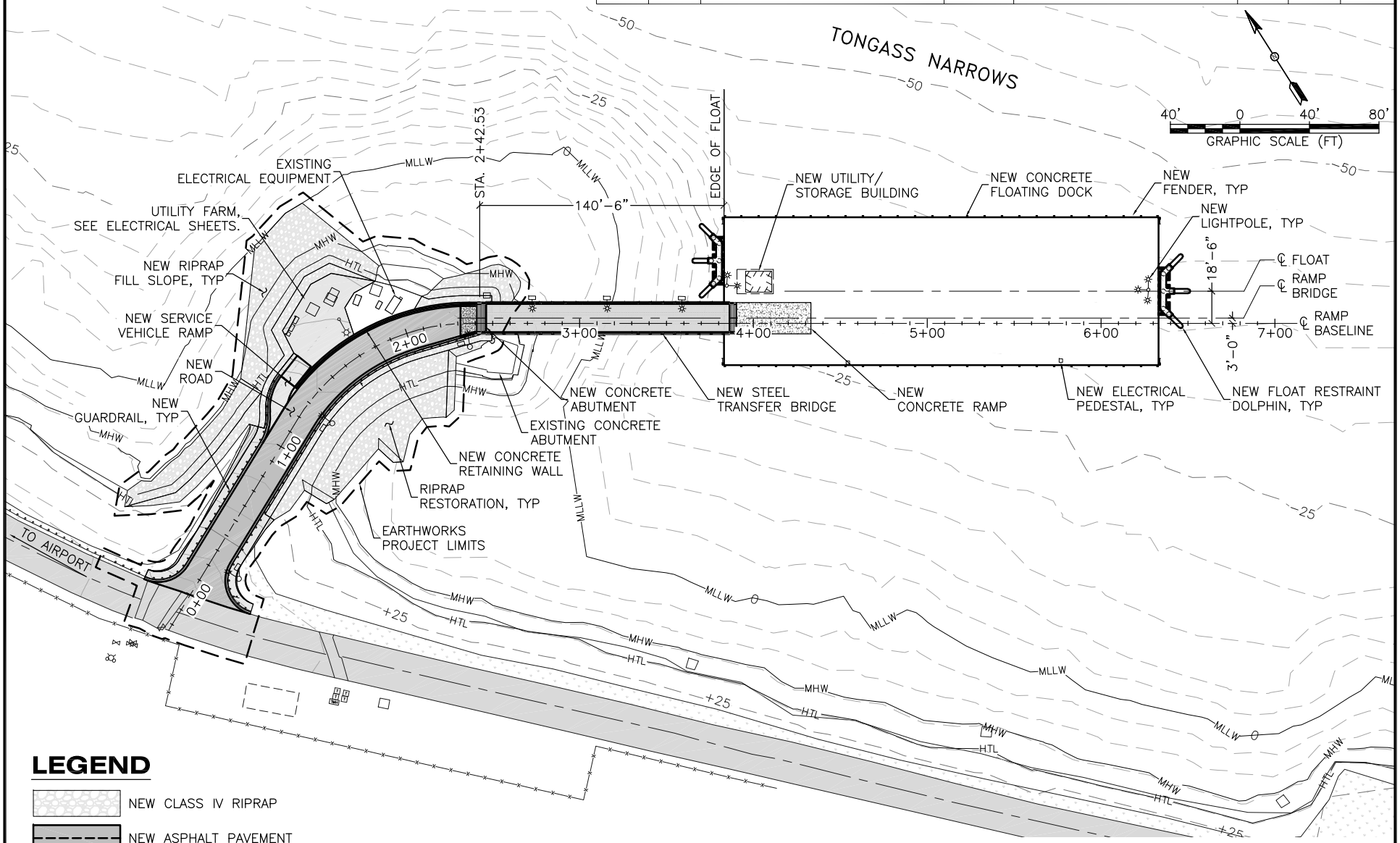

LEGEND

- NEW CLASS IV RIPRAP
- NEW ASPHALT PAVEMENT
- NEW GRAVEL SURFACING
- EXISTING GRAVEL SURFACE
- EXISTING GUARDRAIL
- EARTHWORKS PROJECT LIMITS
- BASELINE

PRELIMINARY DESIGN (25%) SUBMITTAL

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

KETCHIKAN GRAVINA AIRPORT LAYUP FACILITY

NEW SITE PLAN

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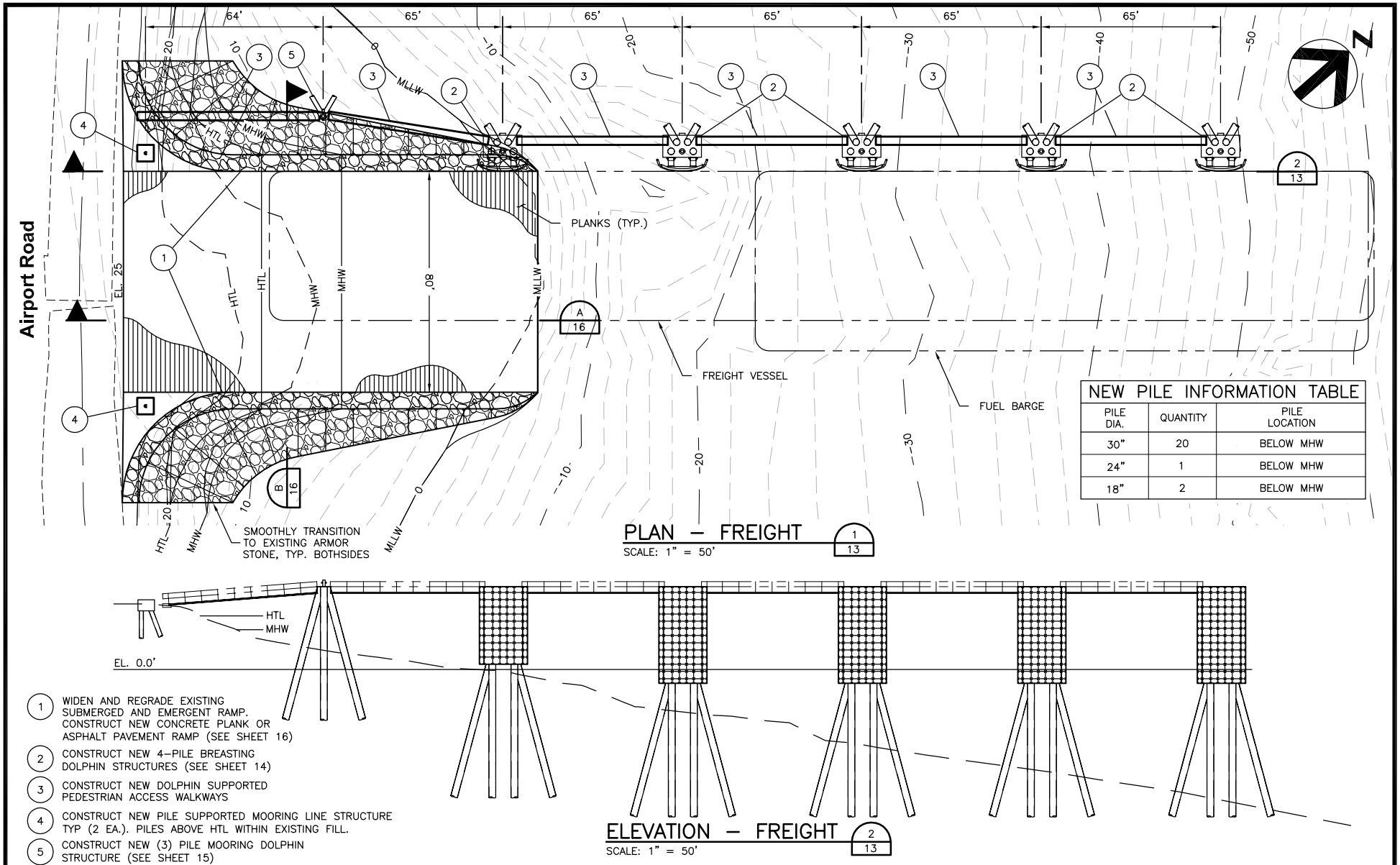


NEW PILE INFORMATION TABLE		
PILE DIA.	QUANTITY	PILE LOCATION
30"	20	BELOW MHW
24"	1	BELOW MHW
18"	2	BELOW MHW

1. WIDEN AND REGRADE EXISTING SUBMERGED AND EMERGENT RAMP. CONSTRUCT NEW CONCRETE PLANK OR ASPHALT PAVEMENT RAMP (SEE SHEET 16)
2. CONSTRUCT NEW 4–PILE BREASTING DOLPHIN STRUCTURES (SEE SHEET 14)
3. CONSTRUCT NEW DOLPHIN SUPPORTED PEDESTRIAN ACCESS WALKWAYS
4. CONSTRUCT NEW PILE SUPPORTED MOORING LINE STRUCTURE TYP (2 EA.). PILES ABOVE HTL WITHIN EXISTING FILL.
5. CONSTRUCT NEW (3) PILE MOORING DOLPHIN STRUCTURE (SEE SHEET 15)

ADJACENT LANDOWNERS: SEE ATTACHED TABLE

LOCATION: SEC 16, 22, 23, 26, 27, 35 and 36 T75S R90E
SEC 01 T76S R90E
SEC 29, 30, 31, 32 T75S R91E
SEC 06 T76S R91E
Copper River Meridian, Alaska

Gravina
Heavy Freight Barge Mooring Facility

SCALE AS NOTED

APPLICATION BY:

State of Alaska Department of Transportation and Public Facilities
6860 Glacier Highway
Juneau, AK 99801–7999

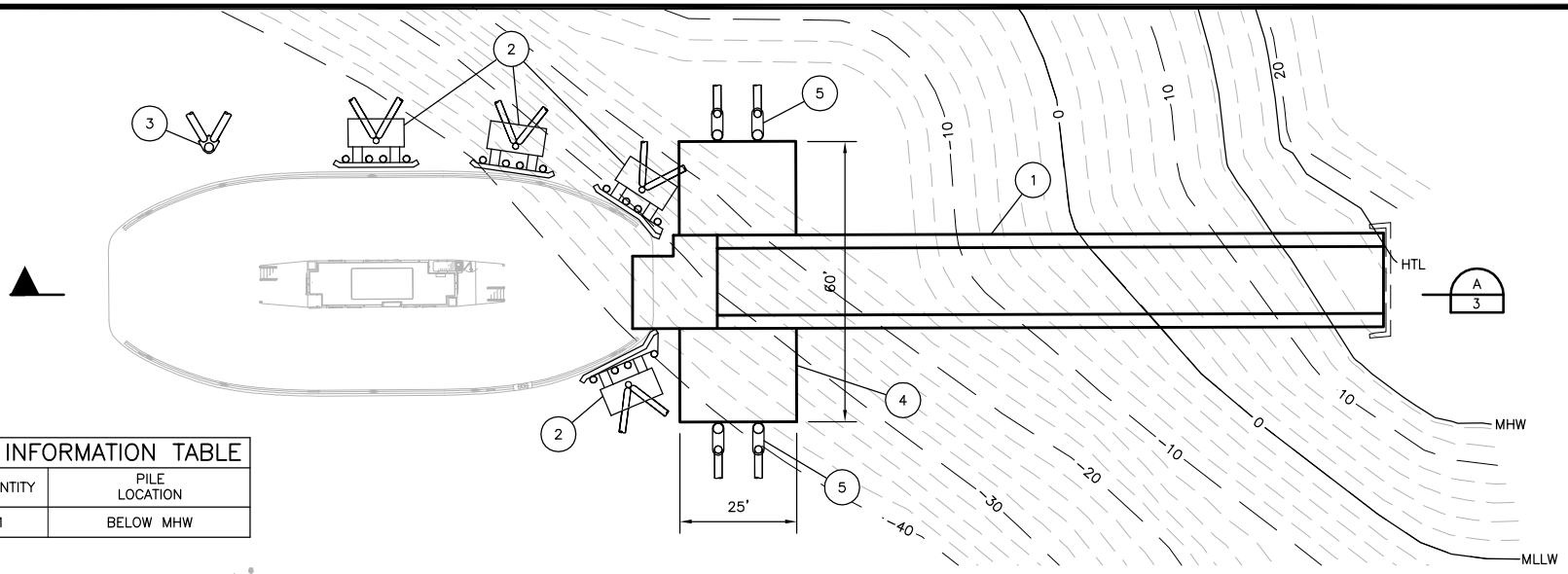
GRAVINA ACCESS PROJECT
POA: 9-2000-0152
Tongass Narrows

IN: TONGASS NARROWS

AT: KETCHIKAN, ALASKA

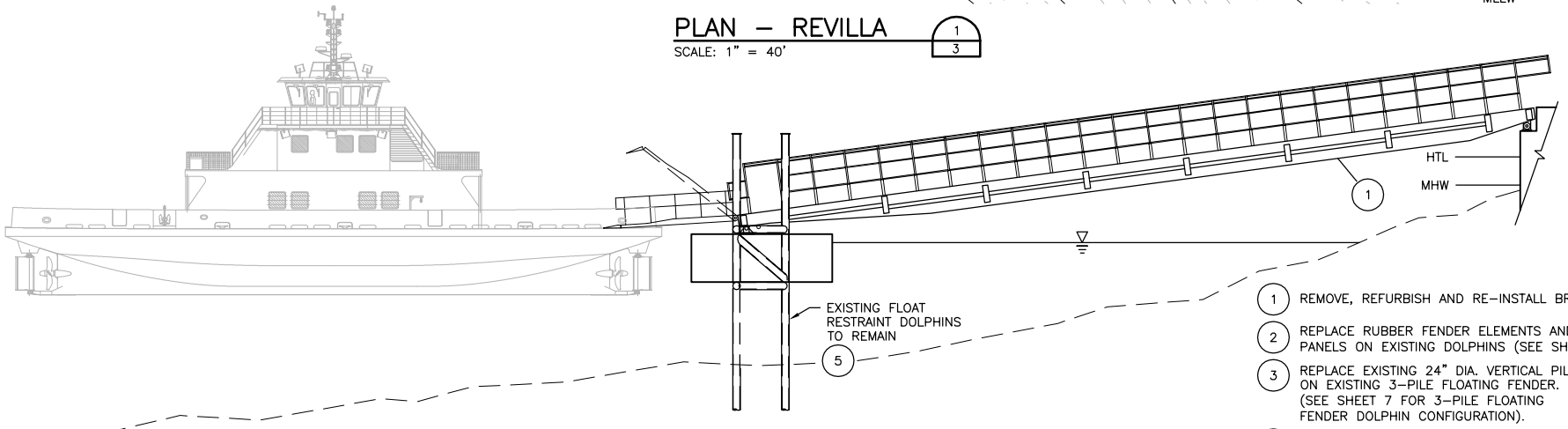
SHEET 13 of 28 DATE: March 17, 2017

67698



NEW PILE INFORMATION TABLE		
PILE DIA.	QUANTITY	PILE LOCATION
24"	1	BELOW MHW

PLAN – REVILLA
SCALE: 1" = 40'



ELEVATION – REVILLA
SCALE: 1" = 30'

1. REMOVE, REFURBISH AND RE–INSTALL BRIDGE.
2. REPLACE RUBBER FENDER ELEMENTS AND FENDER PANELS ON EXISTING DOLPHINS (SEE SHEET 4).
3. REPLACE EXISTING 24" DIA. VERTICAL PILE ON EXISTING 3–PILE FLOATING FENDER. (SEE SHEET 7 FOR 3–PILE FLOATING FENDER DOLPHIN CONFIGURATION).
4. REPLACE BRIDGE FLOAT W/ CONCRETE OR STEEL FLOAT WITH SIMILAR DIMENSIONS.
5. EXISTING PILE RESTRAINT DOLPHINS TO REMAIN.

ADJACENT LANDOWNERS: SEE ATTACHED TABLE

LOCATION: SEC 16, 22, 23, 26, 27, 35 and 36 T75S R90E
SEC 01 T76S R90E
SEC 29, 30, 31, 32 T75S R91E
SEC 06 T76S R91E
Copper River Meridian, Alaska

Revilla
Airport Ferry Berth Improvements

SCALE AS NOTED

APPLICATION BY:

State of Alaska Department of Transportation and Public Facilities
6860 Glacier Highway
Juneau, AK 99801–7999

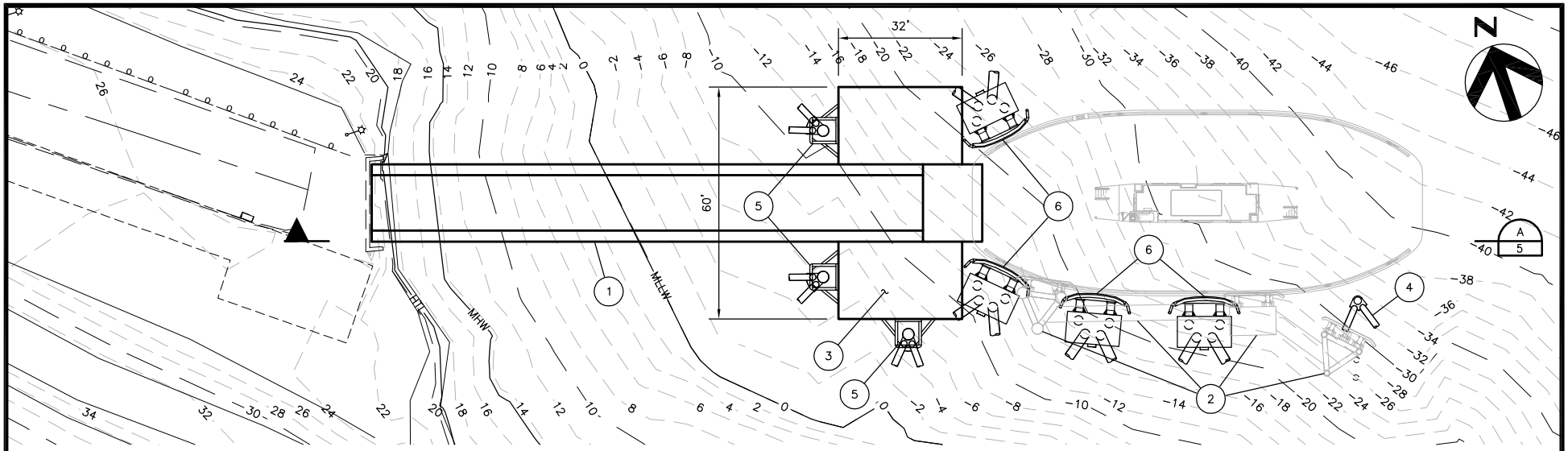
GRAVINA ACCESS PROJECT
POA: 9-2000-0152
Tongass Narrows

IN: TONGASS NARROWS

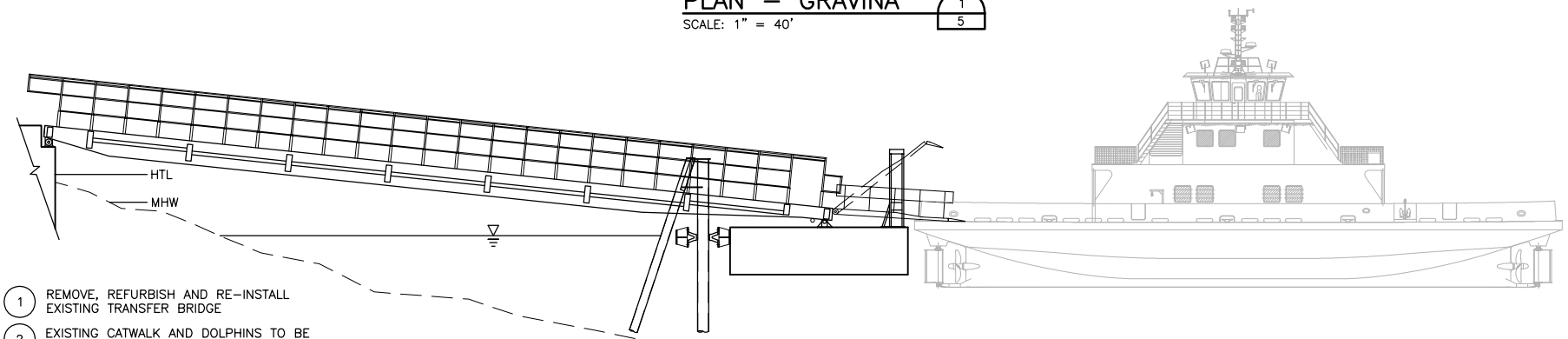
AT: KETCHIKAN, ALASKA

SHEET 3 of 28 DATE: March 17, 2017

67698



PLAN – GRAVINA (1/5)
SCALE: 1" = 40'



1. REMOVE, REFURBISH AND RE–INSTALL EXISTING TRANSFER BRIDGE
2. EXISTING CATWALK AND DOLPHINS TO BE REMOVED
3. REPLACE BRIDGE FLOAT W/ CONCRETE OR STEEL FLOAT WITH SIMILAR DIMENSIONS.
4. CONSTRUCT NEW 3–PILE FLOATING FENDER DOLPHIN (SEE SHEET 7)
5. EXISTING FLOAT RESTRAINT DOLPHINS TO REMAIN
6. CONSTRUCT NEW 4–PILE BREASTING DOLPHIN STRUCTURES (SEE SHEET 6)

ELEVATION – GRAVINA (A/5)
SCALE: 1" = 30'

NEW PILE INFORMATION TABLE

PILE DIA.	QUANTITY	PILE LOCATION
30"	16	BELOW MHW
24"	1	BELOW MHW
18"	2	BELOW MHW

ADJACENT LANDOWNERS: SEE ATTACHED TABLE

LOCATION: SEC 16, 22, 23, 26, 27, 35 and 36 T75S R90E
SEC 01 T76S R90E
SEC 29, 30, 31, 32 T75S R91E
SEC 06 T76S R91E
Copper River Meridian, Alaska

Gravina Airport Ferry Berth Improvements

SCALE AS NOTED

APPLICATION BY:

State of Alaska Department of Transportation and Public Facilities
6860 Glacier Highway
Juneau, AK 99801–7999

GRAVINA ACCESS PROJECT
POA: 9-2000-0152
Tongass Narrows

IN: TONGASS NARROWS

AT: KETCHIKAN, ALASKA

SHEET 5 of 28 DATE: March 17, 2017

Appendix B
Marine Mammal Monitoring and Mitigation Plan

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Marine Mammal Monitoring and Mitigation Plan

Tongass Narrows Project

(Ketchikan-Gravina Island Access, Revilla New Ferry Berth, & New Gravina Island Shuttle Ferry Berth Projects)

Submitted to:
National Marine Fisheries Service
Office of Protected Resources
1315 East-West Highway
Silver Spring, Maryland 20910-3226

State Project #s: SFHWY00085, SFHWY00109, SEIS - 67698

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

Prepared by:
HDR
2525 C Street, Suite 500
Anchorage, Alaska 99503

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CONTENTS

Tables

Figures

Acronyms and Abbreviations

DOT&PF	Alaska Department of Transportation & Public Facilities
ESA	Endangered Species Act
FR	*Federal Register*
IHA	Incidental Harassment Authorization
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
PSO	Protected Species Observer
QA	Quality Assurance
QC	Quality Control

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1.0 INTRODUCTION

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

The overall goal of the Marine Monitoring and Mitigation Plan is to comply with the MMPA and ESA during in-water pile installation and removal associated with the Project by monitoring the Project area and documenting all marine mammals potentially exposed to noise at or above established thresholds; minimizing impacts to marine mammals through mitigation measures such as shutting down activities when marine mammals enter shutdown zones; and collecting data pertaining to takes, occurrence, and behavior of marine mammals in the Project area.

1.1 Project Description

The Project consists of six distinct marine components. Four components are part of the Ketchikan-Gravina Access Project. The other two components are the Revillagigedo (Revilla) New Ferry Berth and Upland Improvements project and the New Gravina Island Shuttle Ferry Berth/Related Terminal improvements project (**Figure 1-1**). The marine construction associated with these Project components will occur during two distinct year-long phases. The first phase (Phase 1) is scheduled to begin in 2020 and the second phase (Phase 2) is scheduled to begin in 2021.

The Project will involve removal of some of the existing piles and structure, and the installation of new piles and structure in the marine environment. Proposed activities include drilling of rock sockets into bedrock for steel pipe piles, vibratory removal of steel pipe piles, vibratory and impact installation of steel pipe piles, and vibratory installation of sheet piles. See the Project IHA application for design and construction details.

The Project has the potential to generate elevated levels of underwater and in-air noise that could exceed Level A (injury) and Level B (disturbance) harassment thresholds established by NMFS under the revised Technical Guidance (NMFS 2018) and the interim criteria (70 *Federal Register* [FR] 1871-1875), respectively. Level A harassment means any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment means any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but that does not have the potential to injure a marine mammal or marine mammal stock in the wild.

1.2 Protected Marine Mammals

Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), harbor porpoises (*Phocoena phocoena*), Dall's porpoises (*Phocoenoides dalli*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), killer whales (*Orcinus orca*), minke whales (*Balaenoptera acutorostrata*), and humpback whales (*Megaptera novaeangliae*), including the ESA-listed

Mexico Distinct Population Segment of humpback whales, may occur in the Project area; a small number of Level B takes was authorized for these marine mammals (see Project IHA). Additionally, a small number of Level A takes was authorized for harbor seals, harbor porpoises, and Dall's porpoises (see Project IHA).

Figure 1-1. Project Location

2.0 MARINE MAMMAL MONITORING AND MITIGATION MEASURES

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

2.1 Level A and Level B Harassment Zones

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

Distances to the Level A and Level B harassment thresholds, as defined by sound isopleths, vary by functional hearing group, pile size, duration of installation, and pile-installation method (**Table 2-1**). Figures illustrating the corresponding Level A and Level B harassment zones for the different numbers and types of piles, as well as installation methods, are provided (**Figure 2-1** through **Figure 2-8**).

Shutdown zones have been defined for the Project to reduce the number of Level A zones and simplify implementation at the Project site by MMOs, and to further reduce the likelihood of Level A take (**Table 2-2**). Like Level A zones, shutdown zones may differ by pile installation method and species functional hearing group (**Table 2-2**). Every effort will be made to shut down before marine mammals enter the shutdown zones. If the Level A isopleth for a species is smaller than the defined shutdown zone, take of that species will not occur unless individuals enter their respective Level A harassment zones. Level A take was requested for harbor seals, harbor porpoises, and Dall's porpoises, but will be avoided when possible.

In addition, a 10-meter shutdown zone will be implemented for all species and all activity types to prevent direct contact of marine mammals with construction equipment.

Table 2-1. Level A and Level B Harassment Zones for All Species

Activity	Pile Diameter(s)	Minutes per Pile or Strikes per Pile	Piles Installed or Removed per day	Level B Harassment Isopleth Distance (meters)	Level A Harassment Isopleth Distance (meters)				
					Cetaceans			Pinnipeds	
					LF	MF	HF	PW	OW
Vibratory Installation	30-inch	30 Minutes	3	6,310	11	<1	15	6	<1
	24-inch, 18-inch	30 Minutes	3	5,412	9	<1	13	5	<1
	27.6-inch sheet pile, 30.3-inch sheet pile	15 Minutes	10	4,642	11	1	16	7	<1
Vibratory Removal	24-inch, 16-inch	30 Minutes	5	5,412	13	1	19	8	<1
Drilling Rock Sockets	30-inch	180 Minutes	3	12,023	66	4	58	36	3
	24-inch, 18-inch	120 Minutes	3		51	3	45	27	2
Impact Installation	30-inch	50 Strikes	3	2,154	208	8	247	111	9
		50 Strikes	2		159	6	189	85	7
		50 Strikes	1		100	4	119	54	4
		200 Strikes	3		523	19	623	280	21
		200 Strikes	2		399	15	476	214	16
		200 Strikes	1		252	9	300	135	10
Impact Installation	24-inch	50 Strikes	3	1,000	113	4	134	61	5
		50 Strikes	2		86	3	102	46	4
		50 Strikes	1		54	2	65	29	3
		200 Strikes	3		283	11	337	152	11
		200 Strikes	2		216	8	258	116	9
		200 Strikes	1		136	5	162	73	6
Impact Installation	18-inch	50 Strikes	3		113	4	134	61	5
		50 Strikes	2		86	3	102	46	4
		50 Strikes	1		54	2	65	29	3

Table 2-2. Level B Harassment and Shutdown Zones (Rounded up to the Nearest 50-meters) for All Species

Activity	Pile Diameter(s)	Minutes per Pile or Strikes per Pile	Piles Installed or Removed per day	Level B Harassment Isopleth Distance (meters)	Shutdown Distance (meters)				
					Cetaceans			Pinnipeds	
					LF	MF	HF	PW	OW
Vibratory Installation	30-inch	30 Minutes	3	6,310	50				
	24-inch, 18-inch	30 Minutes	3	5,412					
	27.6-inch sheet pile, 30.3-inch sheet pile	15 Minutes	10	4,642					
Vibratory Removal	24-inch, 16-inch	30 Minutes	5	5,412					
Drilling Rock Sockets	30-inch	180 Minutes	3	12,023	70	50	60	50	
	24-inch, 18-inch	120 Minutes	3		60	50			
Impact Installation	30-inch	50 Strikes	3	2,154	250	50	250	150	50
		50 Strikes	2		200		200	100	
		50 Strikes	1		100		150	100	
		200 Strikes	3		550		650	300	
		200 Strikes	2		400		500	250	
		200 Strikes	1		300		300	150	
Impact Installation	24-inch	50 Strikes	3	1,000	150		150	100	
		50 Strikes	2		100		150	50	
		50 Strikes	1		100		100	50	
		200 Strikes	3		300		350	200	
		200 Strikes	2		250		300	150	
		200 Strikes	1		150		200	100	
Impact Installation	18-inch	50 Strikes	3		150		150	100	
		50 Strikes	2		100		150	50	
		50 Strikes	1		100		100	50	

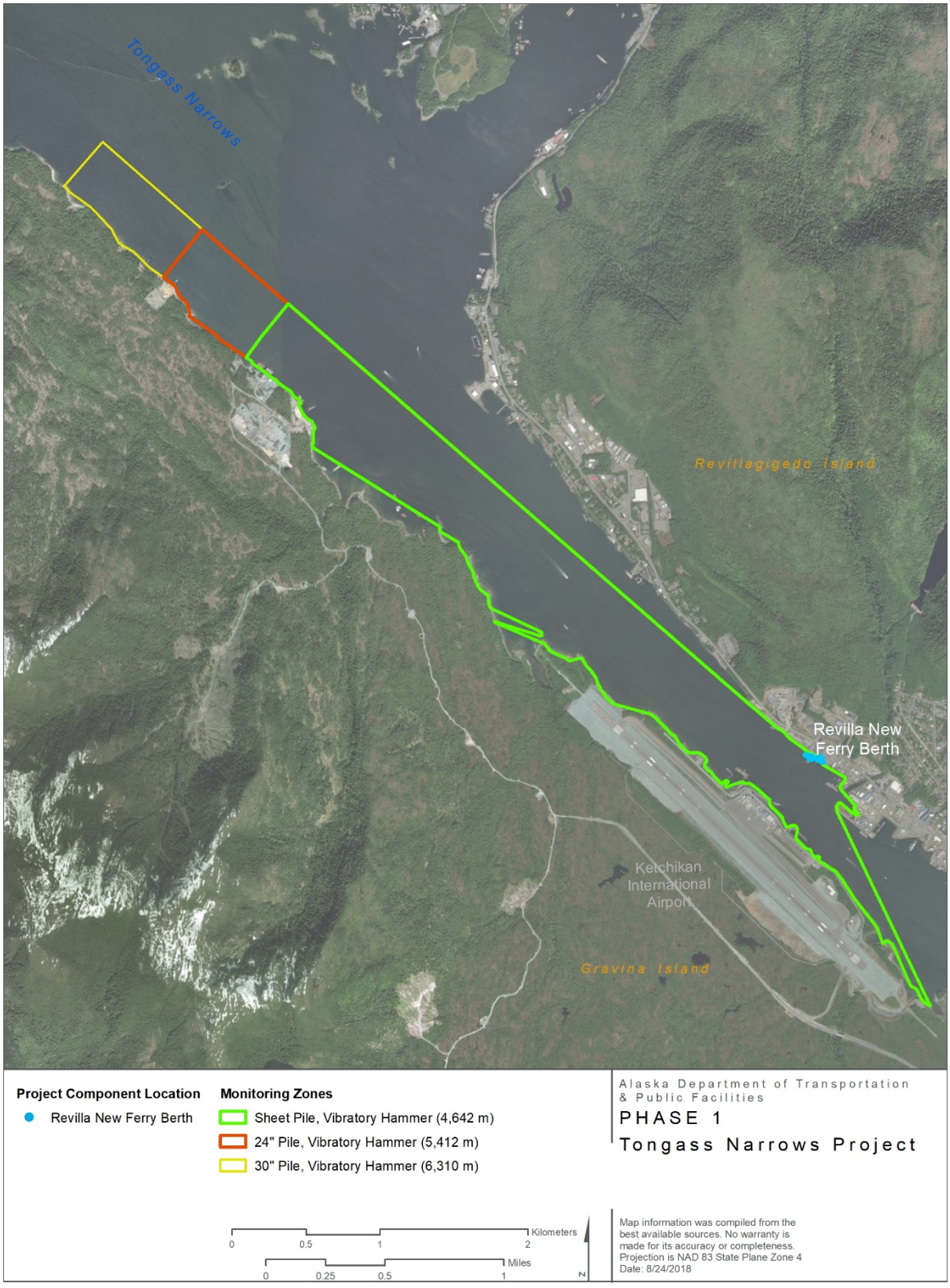

Figure 2-1. Level B Harassment Isopleths during Vibratory Pile Installation at Project Components Located on Revilla Island in Phase 1

Figure 2-2. Level A Harassment Isopleths during Vibratory and Impact Pile Installation and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Revilla Island in Phase 1

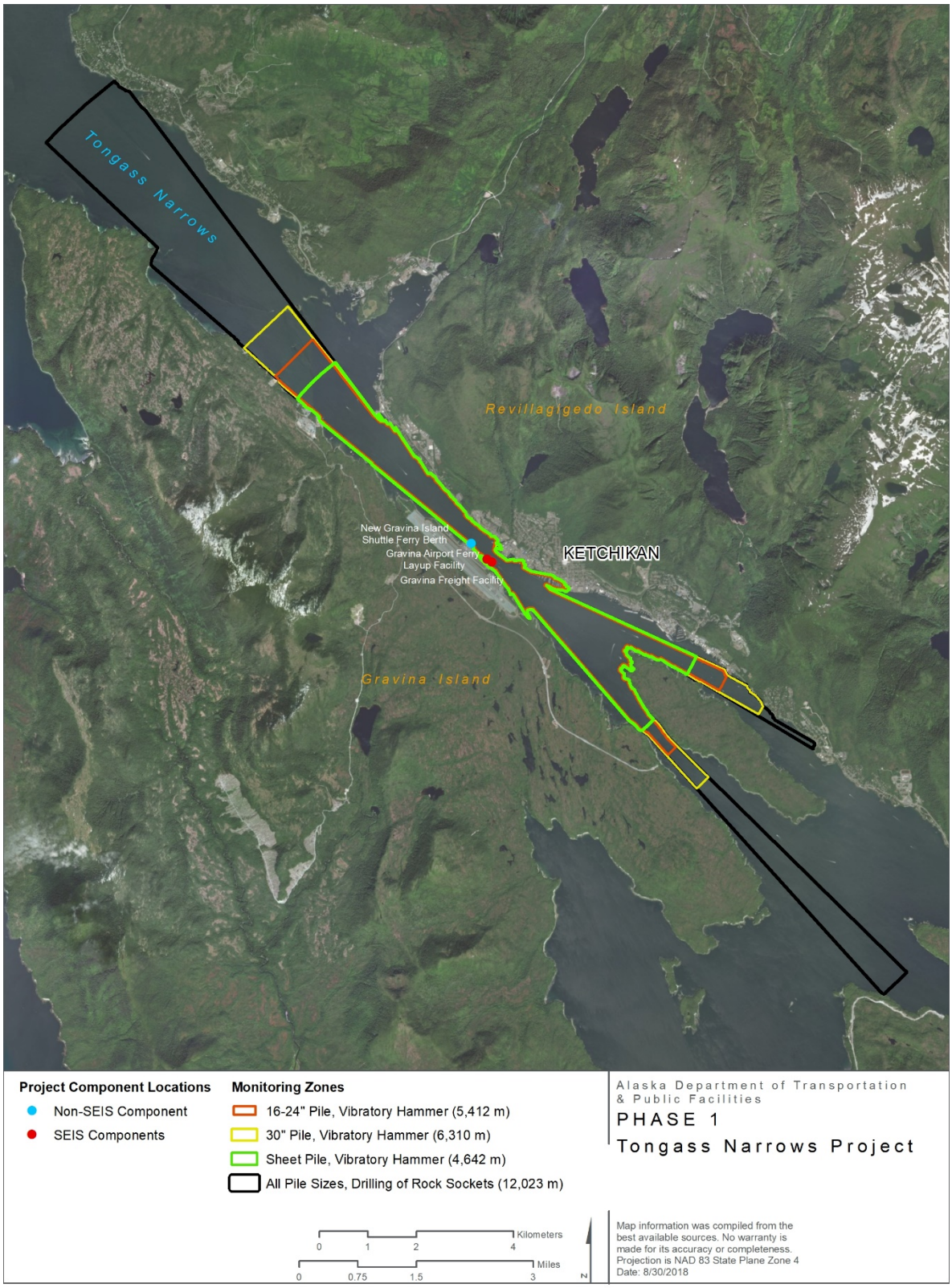

Figure 2-3. Level B Harassment Isopleths during Vibratory Pile Installation and Drilling of Rock Sockets at Project Components Located on Gravina Island in Phase 1

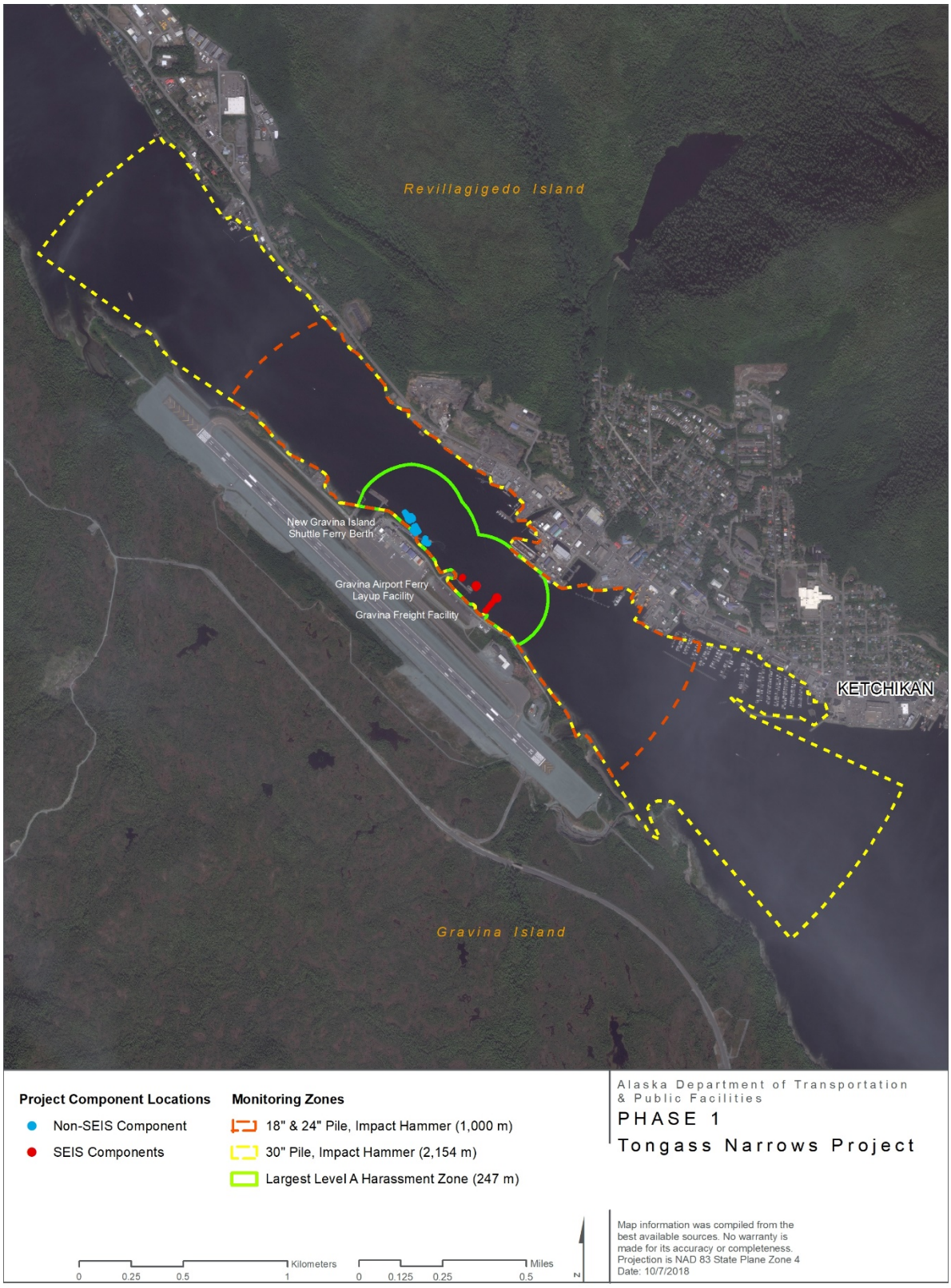

Figure 2-4. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Gravina Island in Phase 1

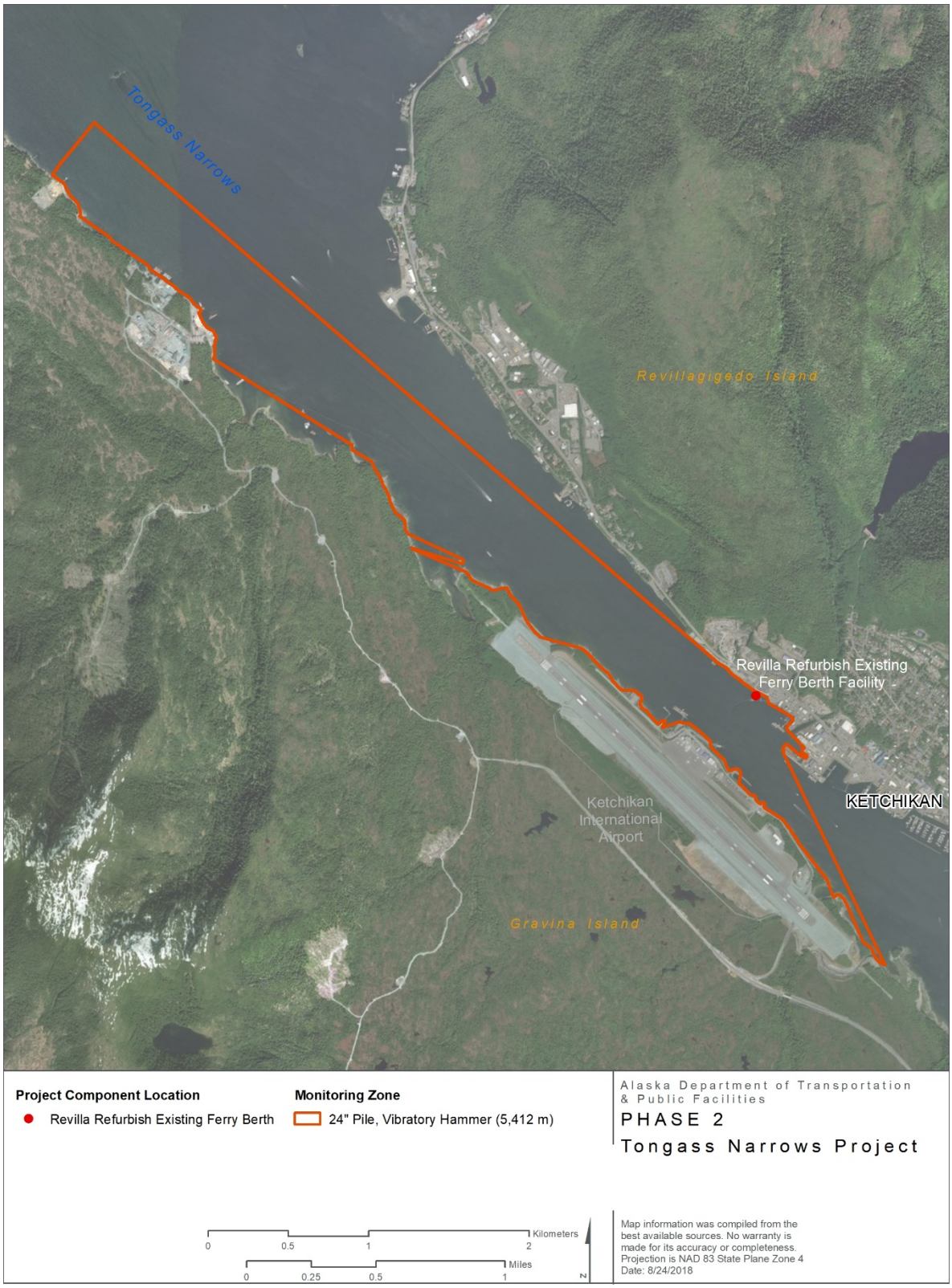

Figure 2-5. Level B Harassment Isopleth during Vibratory Pile Installation and Removal at Project Components Located on Revilla Island in Phase 2

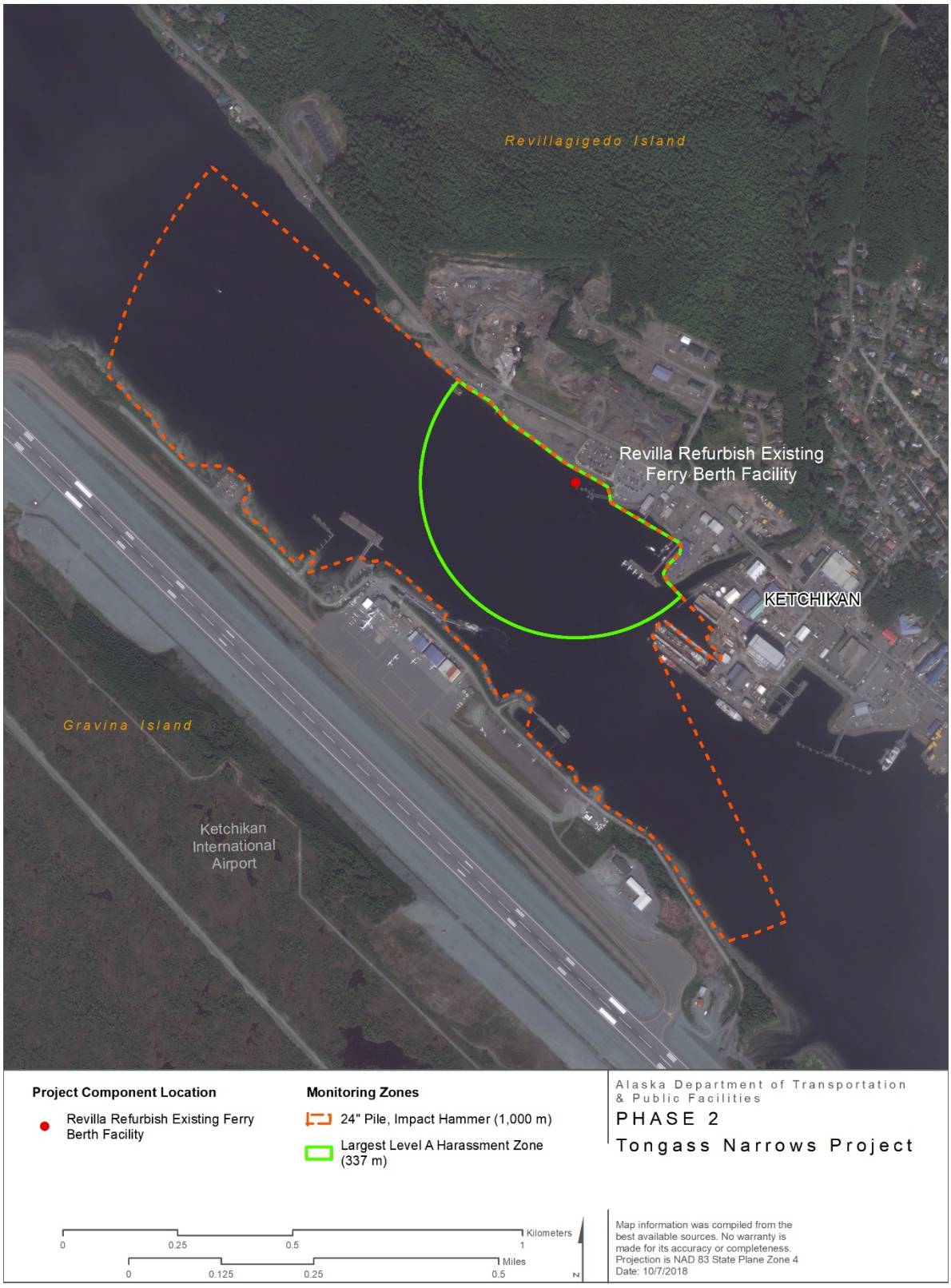

Figure 2-6. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Revilla Island in Phase 2

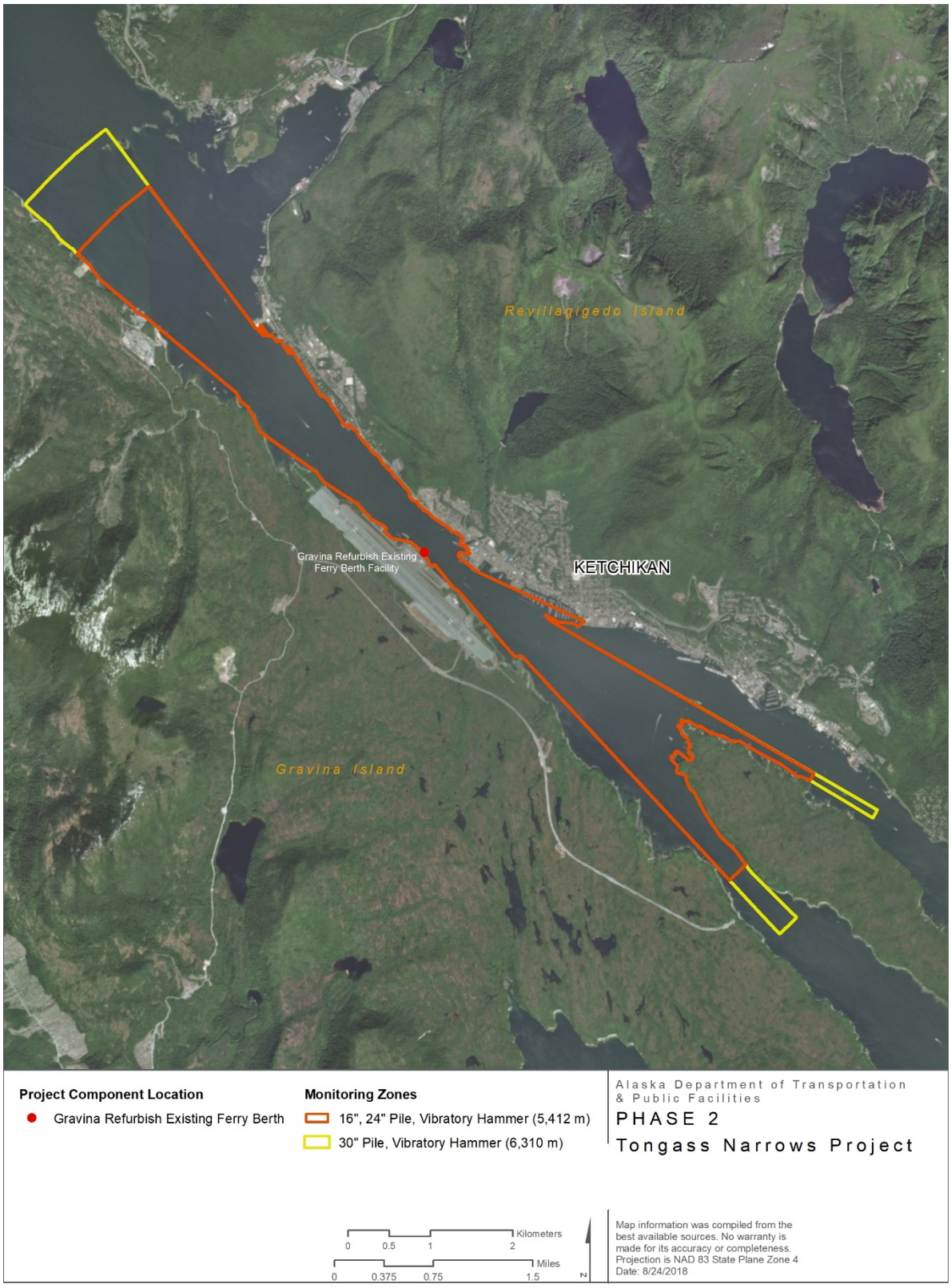

Figure 2-7. Level B Harassment Isopleths during Vibratory Pile Installation and Removal at Project Components Located on Gravina Island in Phase 2

Figure 2-8. Level A and Level B Harassment Isopleths during Impact Pile Installation at Project Components Located on Gravina Island in Phase 2

2.2 Marine Mammal Monitoring

To minimize potential impacts of Project activities on marine mammals, MMOs (also known as Protected Species Observers or PSOs) will be present during all pile installation and removal using impact and vibratory methods and rock socket drilling. The MMOs' primary responsibilities will be to search for, monitor, document, and track marine mammals.

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

2.2.1 Positioning

MMOs will be positioned at the best practical vantage point(s). Observation points are available from the Tongass Highway and Gravina Airport Access Road. It is possible to observe the entire width of Tongass Narrows with unaided eyes.

The position(s) may vary based on construction activity and location of piles or equipment. At least one of the monitoring locations will have an unobstructed view of the pile being driven and an unobstructed view of the Level A harassment and shutdown zones. This central position generally will be staffed by the lead MMO, who will monitor the Level A shutdown zones and communicate with construction personnel about shutdowns and take management. The MMO at this location will be able to see at least a 650-meter radius, which exceeds the largest Level A zone, around the construction site. Walking or otherwise moving around the construction site may be helpful for monitoring the shutdown zones in their entirety.

MMOs stationed along the road system will watch for marine mammals entering and leaving Tongass Narrows. MMOs will monitor for marine mammals approaching the Level B harassment zones from the north or south, and will alert the lead MMO of the number and species sighted, so that no unexpected marine mammals approach the construction site.

To aid in choosing the best practical vantage points, the following method will be employed: Prior to start, the lead MMO will stand at the construction site to monitor the Level A zones while two or more MMOs will start at the Project site and travel in opposite directions along Tongass Narrows until they have reached the edge of the appropriate Level B zone. At this point, the MMOs will identify suitable observation points from which to observe the width of Tongass Narrows for the duration of pile installation and removal.

Suitable observation points are plentiful along the shoreline of Tongass Narrows, including along the North and South Tongass Highway and along the Gravina Island Highway, both north and south of the airport. MMOs will be responsible for observing only the width of Tongass Narrows rather than the entirety of the Level B zone because any marine mammals entering the Level B zone will need to pass by one of these two MMOs. All MMOs will be in constant radio contact with one another, and the lead MMO will be in contact with the construction team to request a work stoppage, if necessary.

2.2.2 Daily Monitoring Protocols

The MMOs will begin observations 30 minutes prior to the start of pile installation and removal (includes the start of the day and any break in activity longer than 30 minutes). At least two MMOs will be available to observe during rotating shifts of 4 to 6 hours, or as needed, each day

to prevent fatigue. MMOs will not perform duties as an MMO for more than 12 hours in a 24-hour period.

Specific aspects and protocols of observations will include:

- Ongoing in-water pile installation and removal and drilling may be continued during periods when conditions such as low light, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone. MMOs will continue to monitor the visible portion of the Level B harassment zone throughout the duration of pile installation and removal.
- If waters exceed a sea state that restricts the MMO's ability to make observations within the Level A harassment zones (e.g., excessive wind or fog), pile installation and removal will cease. Pile driving will not be re-initiated until the entire relevant Level A harassment zones are visible.
- If any marine mammal species not authorized for take is encountered during in-water pile installation or removal, pile installation or removal will cease and take will be avoided.
- When a marine mammal is observed, its location will be determined using a rangefinder to verify distance and a GPS or compass to verify heading.
- Authorized Level B and Level A take will be documented and recorded as it occurs.

2.3 Mitigation Measures for In-water Pile Installation and Removal

The complete list of required avoidance, minimization, and mitigation measures can be found in the Project IHA. Avoidance and minimization measures described here include soft starts, establishment of Level A and Level B harassment zones, and marine mammal monitoring. To minimize the effects of in-water pile installation and removal on marine mammals, the following measures will be observed:

- Pile installation, proofing, and removal will occur only during daylight hours, when visual monitoring of marine mammals can be conducted.
- Shutting down pile installation or removal when a marine mammal is approaching or observed within a defined Level A or Level B harassment zone will be used to avoid take.
- If a marine mammal authorized for Level B take is present in the Level B harassment zone, in-water pile installation and removal may continue, and a Level B take will be recorded. Pile installation and rock socket drilling may occur when these species are in the Level B harassment zone, whether they entered the Level B zone from the Level A zone (if relevant), or from outside the Project area.
- If Level A or Level B take for a species reaches the authorized limit, pile installation will be stopped as individuals of this species approach the relevant zones, to avoid additional take of this species.
- For those marine mammal species for which Level B take has not been requested, in-water pile installation and removal and drilling will shut down before they enter the Level B harassment zone to avoid unauthorized Level B take.

- If a marine mammal is entering or is observed within an established shutdown zone (Table 2-2), pile installation and removal must be halted or delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; or 15 minutes have passed without subsequent detections of the animal.
- For impact pile installation, the Contractor will provide an initial set of three strikes from the impact hammer at reduced energy, followed by a 1-minute waiting period, and then two subsequent three-strike sets. This soft start will be applied prior to the beginning of pile installation each day or after an impact hammer has been idle for more than 30 minutes. No vibratory soft start is required.
- If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal leaves the Level A harassment zone. Ramping up and pile installation or removal will begin only after the MMO has determined, through sighting, that the animal has moved outside the Level A harassment zone.
- If a marine mammal is present in the Level B harassment zone, ramping up may begin and a Level B take will be recorded. Ramping up may occur when these species are in the Level B harassment zone, whether they enter the Level B zone from the Level A zone or from outside the Project area.
- If a marine mammal is present in the Level B harassment zone, the Contractor may elect to delay ramping up to avoid a Level B take. To avoid a Level B take, ramping up will begin only after the MMO has determined, through sighting, that the animal has moved outside the Level B harassment zone.
- If a marine mammal approaches within 10 meters of a Project vessel (e.g., barge, tugboat), the vessel shall reduce speed to the minimum level required to maintain safe steerage and working conditions until the marine mammal is at least 10 meters away from the vessel.

3.0 MARINE MAMMAL OBSERVER QUALIFICATIONS

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

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

- MMOs will be independent observers not engaged in construction activities.
- MMOs' visual acuity (correction is permissible) will be sufficient to allow detection and identification of marine mammals at the water's surface; use of binoculars may be necessary to correctly identify a sighting to species.
- MMOs will demonstrate ability to conduct field observations and collect data according to assigned protocols (this may include academic training and/or previous field experience).
- MMOs will have documented marine mammal monitoring experience or training, or an undergraduate degree in biological science or a related field. Project-specific training for this Project will meet the training requirement if the MMO has experience identifying

marine mammals to species.

- MMOs will have sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
- MMOs will have the ability to communicate orally, by radio or in person, with project personnel about marine mammals observed in the area.
- MMOs will have the ability to collect the required marine mammal observation data as detailed in Section 4.0.

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

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

- Education in wildlife observation techniques from a university, college, or other formal education program, and
- Previous professional marine mammal observation experience.

4.0 DATA COLLECTION

4.1 Environmental Conditions and Construction Activity

MMOs will use the environmental conditions and construction activities log to document environmental conditions, types of construction activities, and other human activity in the area (Attachment 1). Environmental conditions will be recorded at the beginning and end of every monitoring period and at every half hour, or as conditions change. Data collected will include MMO names, location of the observation station, time and date of the observation, weather conditions, air temperature, sea state, cloud cover, visibility, glare, tide, and ice coverage (if applicable).

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

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

4.2 Sightings

Each marine mammal observation will be documented on a Marine Mammal Sighting Form consisting of a data page/table and a schematic map of the location of the observed animal (Attachment 1). Sightings data will include start and end times of each sighting; number of individuals; sex and age class, if possible; behavior and movement; distances from Project activities to the sighting; type of in-water activity at the time of sighting; and if and when Project activities were stopped in response to the sighting (**Table 4-1**). MMOs will record whether no

take occurred or a Level A and/or Level B take occurred, including the number of marine mammals and species taken. To the extent practicable, the MMOs will record behavioral observations that may make it possible to determine if the same or different individuals are taken as a result of Project activities over the course of a single day. When marine mammals are sighted, MMOs should delegate responsibilities so that one or more MMOs continue to scan the water to identify other marine mammals that may enter the area, while another MMO continues to monitor and track the first sighting.

Table 4-1. Data Attributes and Definitions

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

Data Attribute	Attribute Definition and Units Collected
Change in behavior	Changes in behavior; indicate and describe
Group cohesion	Orientation of animals within the group and the distance between animals

4.3 Equipment

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

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

4.4 Quality Assurance and Quality Control

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

4.5 Marine Mammal Monitoring Data Management

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

5.0 REPORTING

5.1 Notification of Intent to Commence Construction

DOT&PF will inform the NMFS Office of Protected Resources and the NMFS Alaska Region Protected Resources Division one week prior to commencing pile installation and removal (Julie Scheurer, 907-586-7111, Julie.Scheurer@noaa.gov).

5.2 Reporting

During construction, DOT&PF will submit brief monthly reports, which summarize PSO observations and recorded takes, to the NMFS Alaska Region Protected Resources Division. The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by close of business on the tenth day of the month following the end of the reporting period (*e.g.*, the monthly report covering September 1–30, 2020, would be submitted

to NMFS by close of business on October 10, 2020). The monthly reports will be submitted by DOT&PF via email to Julie.Scheurer@noaa.gov.

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

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

- Numbers of days of observations
- Lengths of observation periods
- Locations of observation station(s) used and dates when each location was used
- Numbers, species, dates, group sizes, and locations of marine mammals observed
- Distances to marine mammal sightings, including closest approach to construction activities
- Descriptions of observable marine mammal behavior in the Level A and Level B harassment zones
- Times of shutdown events, including when work was stopped and resumed due to the presence of marine mammals or other reasons
- Descriptions of the type and duration of any pile installation work occurring and soft start procedures used while marine mammals were being observed
- Details of all shutdown events and whether they were due to the presence of marine mammals, inability to clear the hazard area due to low visibility, or other reasons
- Tables, text, and maps to clarify observations

5.3 Notification of Injured or Dead Marine Mammals

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

The report will include the following information:

- Time, date, and location (latitude/longitude) of the incident
- Detailed description of the incident
- Description of vessel involved (if applicable), including the name, type of vessel, and vessel speed before and during the incident
- Status of all sound source use in the 24 hours preceding the incident
- Environmental conditions (wind speed and direction, wave height, cloud cover, and visibility)

- Description of marine mammal observations in the 24 hours preceding the incident
- Species identification, description, and fate of animal(s) involved
- Photographs or video footage of animals or equipment (if available)

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

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

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

6.0 LITERATURE CITED

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

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ATTACHMENT 1: EXAMPLE DATA FORMS

Marine Mammal Sighting Form

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

Date: **Observer(s):**

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

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

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

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

Project Activities and Harassment Zone

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

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

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

NO SHUT DOWN, *EXPLANATION REQUIRED*:

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

Additional Information (include more detailed information on behavior):

Draw locations on hardcopy map

Daily Environmental Conditions, Construction, and Communication Activity Log

Page _____ of _____

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

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

Weather Conditions: (S) Sunny, (PC) Partly Cloudy, (L) Light Rain, (R) Steady Rain, (F) Fog, (OC)Overcast, (LS) Light Snow, (SN) Snow
Beaufort Scale: (0) Calm (1) ripples- up to 4 in (2) small wavelets- up to 8 in (3) large wavelets- up to 2 ft, (4) small waves- up to 3 ft (5) moderate waves- up to 6 ft (6) large waves- up to 9 ft