Request for an Incidental Harassment Authorization

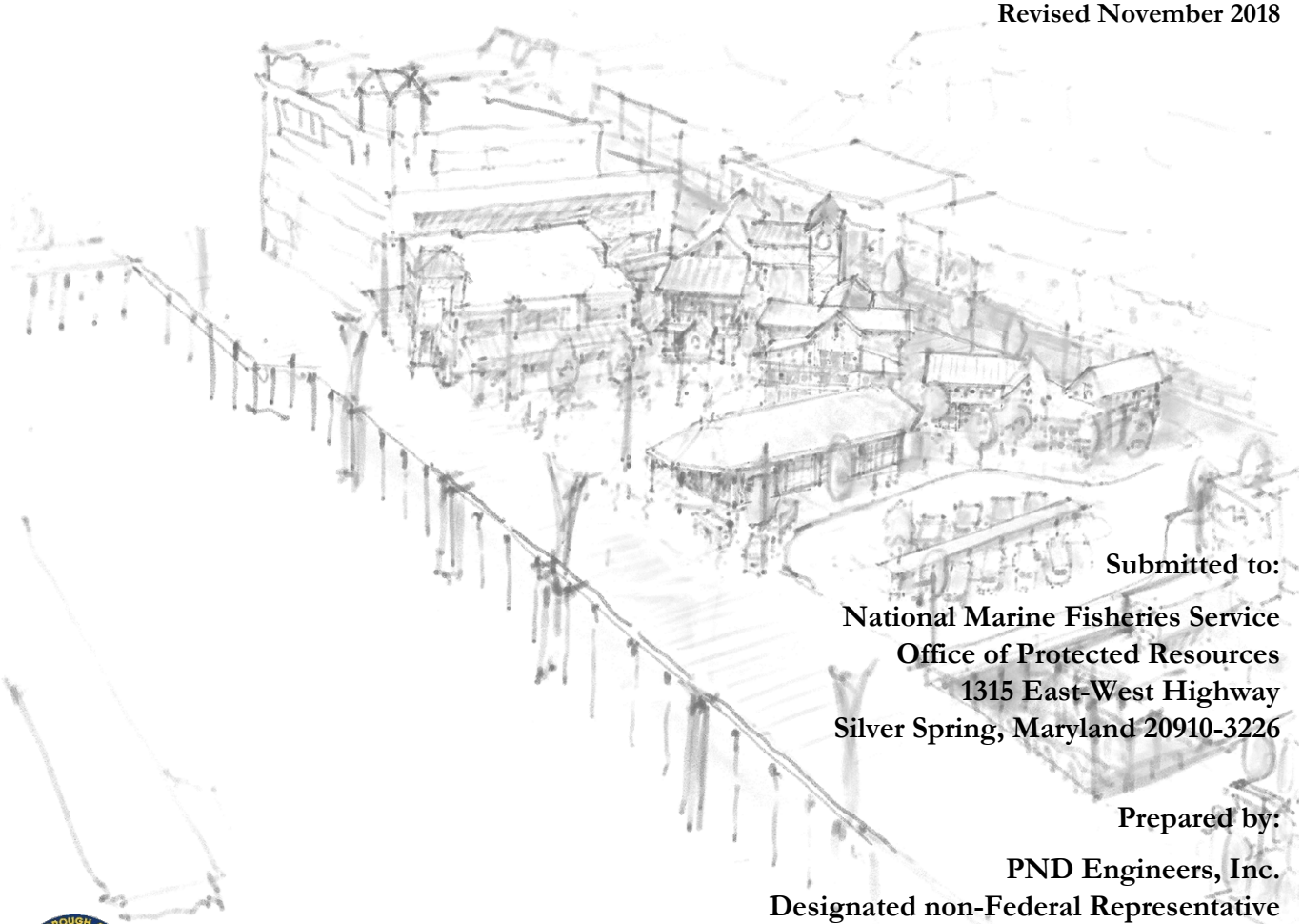
Under the Marine Mammal Protection Act

for the

Downtown Waterfront Improvements Project

City and Borough of Juneau, Alaska
Docks and Harbors

Revised November 2018



Submitted to:

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

Prepared by:

PND Engineers, Inc.
Designated non-Federal Representative
9360 Glacier Highway, Suite 100
Juneau, Alaska 99801
(907) 586-2093

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

- ADEC Alaska Department of Environmental Conservation
- ADF&G Alaska Department of Fish and Game
- BMP best management practice
- CBJ City and Borough of Juneau
- CM cubic meters
- CWA Clean Water Act
- CV coefficient of variation
- CY cubic yards
- dB decibel
- DPS distinct population segment
- EA each
- eDPS Eastern Distinct Population Segment
- ESCA Endangered Species Conservation Act
- ESA Endangered Species Act
- FR Federal Register
- HTL high tide line
- Hz hertz
- IHA Incidental Harassment Authorization
- mDPS Mexico Distinct Population Segment
- MHW mean high water
- MLLW mean lower low water
- MMMP Marine Mammal Monitoring Plan
- MMPA Marine Mammal Protection Act
- MSE Mechanically Stabilized Earth
- NMFS National Marine Fisheries Service
- NOAA National Oceanic and Atmospheric Administration
- PND PND Engineers, Inc.
- PTS permanent threshold shift
- RMS root mean square
- SEL Sound Exposure Level
- SEL_{CUM} Cumulative Sound Exposure Level
- SFT square feet
- SPAR Spill Protection and Response
- SPL sound pressure level
- SQM square meter
- SSL Steller Sea Lion
- TTS temporary threshold shift
- USACE United States Army Corps of Engineers
- USFWS United States Fish and Wildlife Service
- wDPS Western Distinct Population Segment
- WSDOT Washington State Department of Transportation
- WFA Weighting Factor Adjustment

1 Description of the Activity

1.1 Introduction

The City and Borough of Juneau Docks and Harbors (CBJ) is proposing improvements to the downtown waterfront within Gastineau Channel in Juneau, Alaska to accommodate the needs of the growing cruise ship visitor industry and its passengers while creating a waterfront that meets the expectations of a world-class facility. The project will meet the needs of an expanding cruise ship industry and its passengers by creating ample open space thereby decreasing congestion and improving pedestrian circulation.

The popularity of Juneau as a visitor destination has grown dramatically in recent years, and over 90% of tourists arrive via cruise ships. The projected number of cruise ship visitors to Juneau in 2019 is 1.31 million, a 50% increase from 2010 (CBJ 2018). As the number of visitors increase it is necessary for the CBJ to safely distribute large volumes of people through the downtown corridor. South Franklin Street is narrow and the corridor is heavily congested. Due to the steep terrain behind Juneau there is not room to expand away from the waterfront. On the downtown waterfront, one last piece of prime privately and publicly held real estate remains undeveloped. The Downtown Waterfront Improvements project will help to reduce congestion in downtown Juneau by creating more open space to efficiently disperse the large volume of people and increase the safety of pedestrians in downtown Juneau.

The project was vetted as part of the CBJ Marine Park to Taku Dock Urban Design Plan (UDP) through an extensive public involvement process to address the needs of a growing visitor industry while creating a world-class experience for cruise passengers.

The proposed project will occur in marine waters that support several marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of all marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101(a)(5)(D) of the MMPA allows for the issuance of an Incidental Harassment Authorization (IHA), provided an activity results in negligible impacts to marine mammals and would not adversely affect subsistence use of these animals. The project timing and location may result in marine mammals protected under the MMPA being exposed to sound levels above allowable noise harassment thresholds.

1.2 Project Description

The proposed Downtown Waterfront Improvements project will construct a pile supported deck along the waterfront to meet the needs of an expanding cruise ship industry and its passengers by creating ample open space thereby decreasing congestion and improving pedestrian circulation.

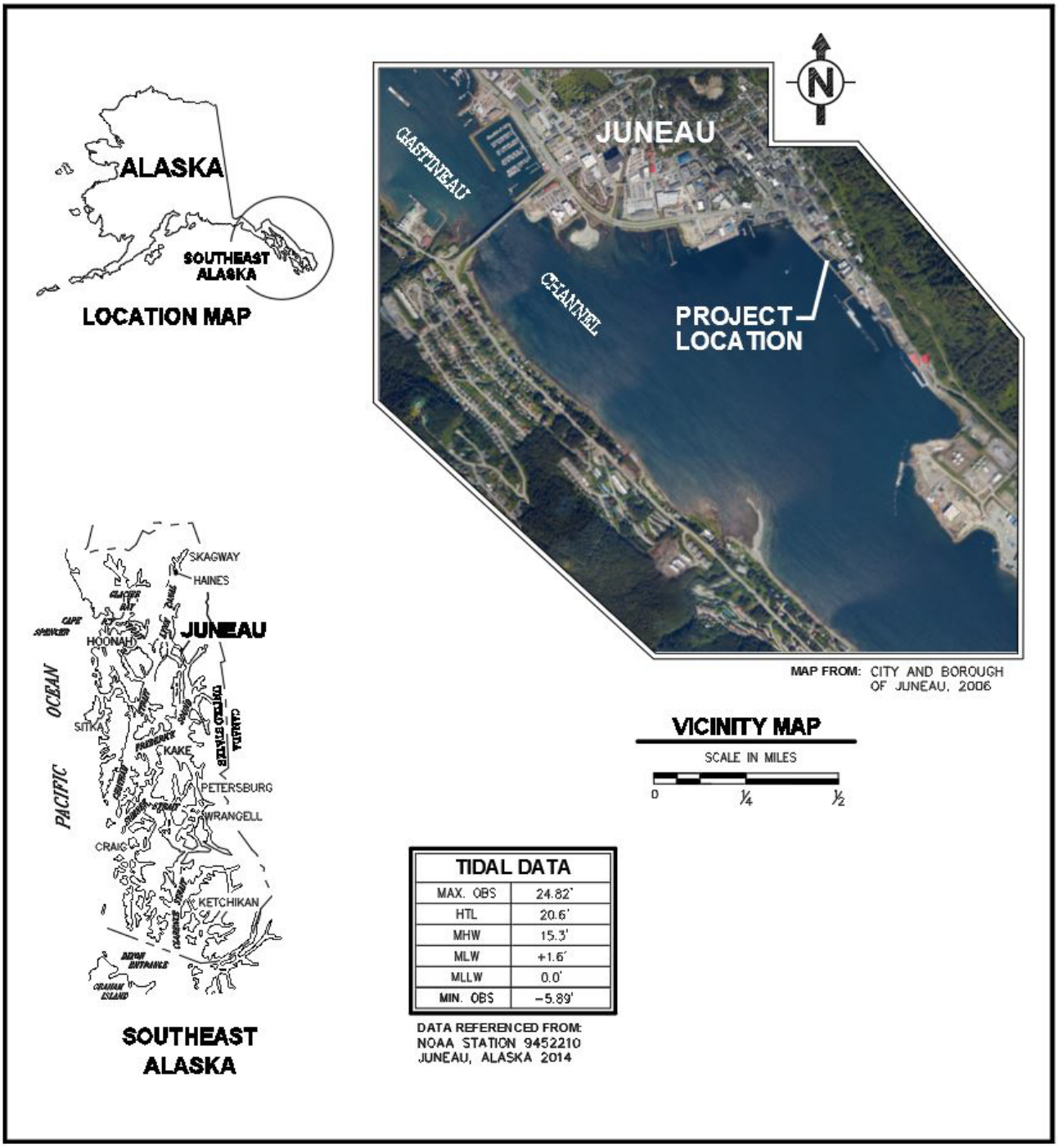


Figure 1 – Project Vicinity Map

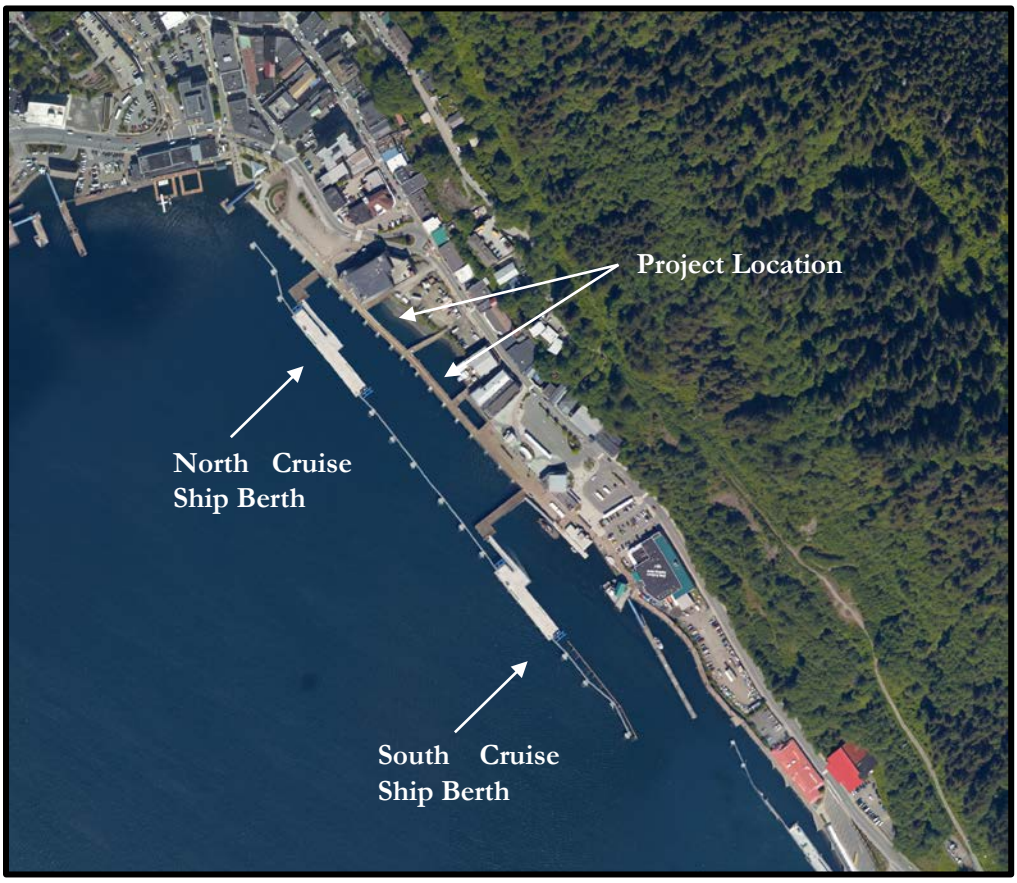


Figure 2 – Project Location

The project improvements (Figures 3 and 4) generally include:

- Demolition of existing timber deck structures, including removal of creosote treated timber piles
- Installation of (42) 16-inch (41-cm), (45) 18-inch (46-cm) and (40) 24-inch (61-cm) steel pipe piles for:
  - Steel pile supported structural timber deck over open space
  - Steel pile supported structural timber deck with ADA compliant ramp adjacent to the existing parking garage
  - Steel pile supported structural timber deck with concrete overlay for transportation staging area
  - Steel pile supported cast in place concrete retaining wall for connection to shore and erosion protection
- Installation of (87) 18-inch (46-cm) or smaller temporary template piles
- Transportation staging area
- Covered canopy at transportation staging area
- Steel framed multi-use covered shelter with restrooms founded on pile supported structural deck
- New driveway onto South Franklin Street
- Site grading of publically funded improvements including backfilling of retaining wall
- Water, sewer, storm drain and fire suppression utilities with connections within South Franklin Street
- Electrical power service and area lighting
- Water and sewer stub outs for future building connections on the open space deck
- Landscape, planters, site furnishings, signage, guardrails and pedestrian amenities
- Raised stage and stairway on pile supported timber deck

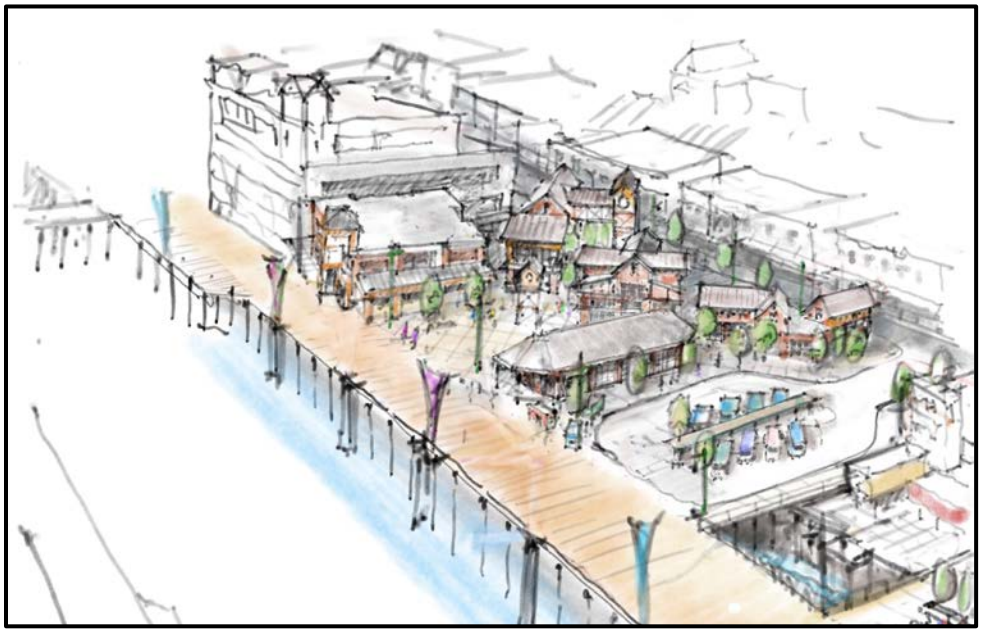


Figure 3 – Artist Rendition of Completed Project

Table 1 – Project Quantities

Item	Size and Type, Location	Total Below HTL El. = 20.6 ft (6.3 m)
Steel Pipe Piles	16-inch (41-cm)	42
	18-inch (46-cm)	45
	24-inch (61-cm)	40
	Temporary Piles 18-inch (46-cm) or smaller	87
Timber Pile Removal	Unknown/Varies; Beneath Existing Approach Docks	Approximately 100[1]
Steel Pile Removal	Temporary Piles 18-inch (46-cm) or smaller	87
Armor Rock	Class II; Base of Retaining Wall	700 CY
Timber Decking	Over Piles	0
Concrete Decking	Over Piles	0
Retaining Wall	Concrete; tie in for new decking and uplands	500 CY
Backfill	Class A Shot Rock; Behind Retaining Wall	2,5000 CY
Utility Improvements	Storm Drain, Water System, Fire Suppression System, Power, Area Lighting and Surveillance Cameras; Uplands	0
Transportation Staging Area	Uplands	0
Covered Shelter, including restrooms and covered shelter	Uplands	0
Canopy	Transportation Staging Area; Uplands	0

[1] Exact number of existing piles is unknown as there are a number of piles from various foundations present. It is estimated that approximately 100 timber piles will be removed.

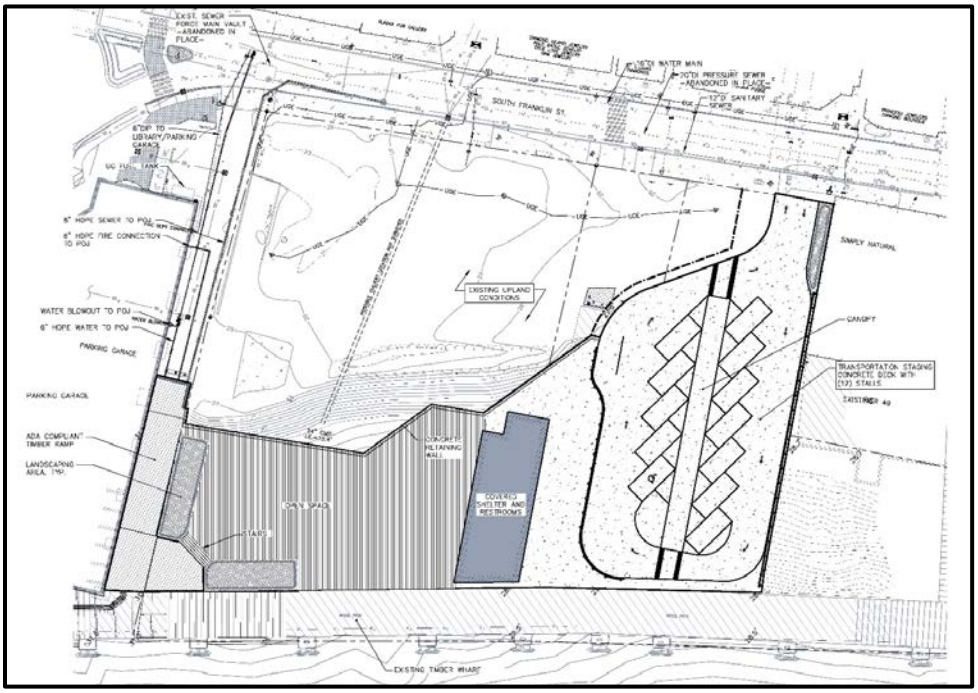


Figure 4 – Site Plan

Table 2 – In-Water Pile Driving Summary

Activity	# piles	Pile Type	Method	Average Piles/day[1]	Driving Days[2]	Strike/pile or seconds/pile)
Timber Pile Removal	~ 100	Timber, unknown diameter	Vibratory	10	10	900
Pile Supported Deck	42	Steel; 16-inch (41-cm)	Vibratory	5	9	5,400
			Impact	5	9	150
	45	Steel; 18-inch (46-cm)	Vibratory	5	9	5,400
			Impact	5	9	150
Temporary Pile Installation	87	Steel; 18-inch (46-cm) or smaller	Vibratory	5	18	5,400
Temporary Pile Removal	87	Steel; 18-inch (46-cm) or smaller		5	18	900

[1] Average piles per day and driving duration are the best estimates based on similar project experience from an adjacent project at the Juneau Port Customs Visitor Center, however actual number of piles per day, driving duration and driving days are subject to change based on the actual field conditions encountered and the contractor's means and methods.
[2] It is anticipated that the contractor will use the vibratory hammer to install up to 5 piles per day to the extent possible and come back a day or two later and finish installing the piles with an impact hammer, however this is dependent on the contractor's means and methods.

1.3 Construction Methods

1.3.1 Demolition

Demolition of the existing timber approach dock and removal of creosote treated timber piles will be performed with track excavators, loaders, cranes, vibratory hammer (for pile removal), various hand tools and labor forces. Vibratory pile removal will generally consist of clamping the vibratory hammer to the pile and vibrating the hammer while extracting the pile. The pile is then completely removed from the water by hoisting with the crane and placing on the uplands. The Contractor will be required to dispose of demolished items in accordance with all federal, state, and local regulations. Creosote treated timber piles will be disposed of at an approved uplands facility.

1.3.2 Concrete Retaining Wall

The concrete retaining wall will be the first phase of construction for this project. The retaining wall will be supported on 24-inch (61-cm) diameter galvanized steel piles spaced approximately 10 feet (3 meters) on center. The contractor will begin construction be excavating the existing material on the slope to the bottom of footing elevation. The existing material will be over excavated to allow access to the underside of the piles to weld pile caps to the top of the pile after it is driven and to place stabilizing rock material at the base of the wall. Once the excavation is complete, a crane will be utilized to drive the 24-inch (61-cm) diameter piles to bedrock with a vibratory hammer. Once a number of piles have been installed, as many as can be reached from a single crane location, will be driven to refusal with a double acting diesel impact hammer. The impact hammer will be sized to meet the required compressive capacity of the piles. The pile cap plates will be welded to the piles after pile driving is complete. Pile driving for 24-inch (61-cm) piles will be restricted to times with tide elevations below the ground elevation to prevent sound transmission in the water.

After pile driving operations, the grade below the concrete wall footing will be raised to final elevations with clean rock materials and compaction of the soil will be completed in lifts with a plate compactor. The concrete wall footing will then be formed and cast during periods of low tides. The vertical wall will then be formed and cast, also working around tides such that work is conducted out of the water.

Once the wall has developed sufficient strength to retain soil, the contractor will begin back fill operations using clean 6-inch (15.3-cm) minus shot rock backfill. At the top of the fill, a 6-inch (15.3-cm) thick cap of base course material will be used to prepare the surface for a concrete slab on grade.

The existing armor rock slope in front of the new concrete retaining wall will be returned to its original condition using new armor rock material placed using an excavator staged on the shore side of the new retaining wall. Armor rock will be designed with material sizes to prevent soil erosion from below the new concrete retaining wall. Work will be conducted during low tides so the operator can observe the placement of armor rock. The armor rock will also be placed prior to construction of the pile supported deck adjacent to the new retaining wall to allow for equipment access.

1.3.3 Pile Supported Deck

The new steel pile supported timber and concrete deck will be constructed after the concrete retaining wall has been completed to provide material and equipment staging for the crane. Once staged a large crane will be used to drive the majority of the steel piles for the deck. It is anticipated temporary piles will be driven in order to create a template for permanent piles and will be removed using a vibratory hammer once permanent piles are in place. The crane will use a vibratory hammer to drive 16-inch (41-cm) and 18-inch (46-cm) steel piles to bedrock per the pile foundation plan. Once a number of piles have been driven with the vibratory hammer, the double acting diesel impact hammer will be used to seat the piles into the bedrock surface. The impact hammer

will be sized to meet the required compressive capacity of the piles. The process will reduce the need for sustained impact driving, driving piles only 1-3 feet (0.3-0.9 m) and reducing the required number of blows with the impact hammer.

Once piles have been driven to refusal, a steel pile cap will be welded to the tops of the piles. Once a few caps have been installed, the timber glue laminated stringers will be bolted to the pile caps. Prior to installing the deck, if the crane was not able to reach any piles from shore, a smaller truck crane may be used on the timber stringers to reach the remaining piles.

The timber and concrete deck systems will be placed after all piles, caps, and stringers are installed. Timber decking will be set and nailed in place. Forms will be built and concrete will be poured for the concrete deck. The 6-inch (15.3-cm) concrete deck will act as a rigid diaphragm tying the dock lateral load into the new concrete retaining wall.

2 Dates, Duration, and Region of Activity

2.1 Dates

Construction of the Downtown Waterfront Improvements project is planned to occur between May 15, 2019 and August 31, 2020. CBJ is requesting an IHA for one year with an effective date of June 15, 2019 as in-water work will not proceed until June 15 or later and it is anticipated all in-water work will be completed prior to June 15, 2020. CBJ proposes to use the following general construction sequence, subject to adjustment by the construction contractor's means and methods:

Construction Phase (2019-2020):

- Mobilization of equipment
- Begin demolition that can be completed out of the water
- Uplands pile driving for retaining wall
- Construct forms and pour concrete for retaining wall
- Finish remaining demolition and disposal
- In-water pile driving for decking
- Deck Installation
- Utility Installation
- Demobilization of equipment

2.2 Duration

Onsite work is expected to occur between May 15, 2019 and August 31, 2020, with IHA authorization from June 15, 2019 through June 15, 2020. In winter months, shorter 8-hour to 10-hour workdays in available daylight are anticipated. To be conservative, 12-hour work days were used to analyze cumulative effects of construction noise in Section 5. The daily construction window for pile driving will begin no sooner than 15 minutes after sunrise to allow for initial marine mammal monitoring to take place and will end 15 minutes before sunset to allow for pre- and post-activity monitoring. (These protocols are discussed in detail in Section 11).

2.3 Region of Activity

The project site is located within Section 23, Township 41 South, Range 67 East of the Copper River Meridian; USGS Quad Map Juneau B-2 SE; Latitude 58° 17' 51" North, Longitude 134° 24' 13" West; CBJ Tax Parcel IDs 1C070K830036, 1C070K830037, 1C070K830038 and 1C070K830039; in Juneau, Alaska.

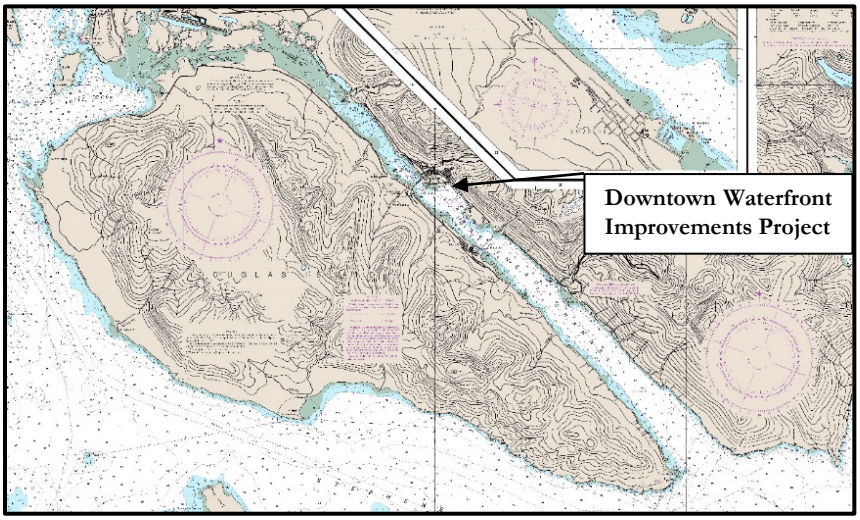


Figure 5 – Region of Activity

3 Species and Number of Marine Mammals

Known distribution ranges of a number of marine mammal species, subspecies, or distinct population segments (DPSs) encompass the portion of Gastineau Channel in which the proposed project will occur. The species are listed in Table 3 along with their stock or population, their occurrence in the project area, and their estimated abundance. It is highly unlikely that several of these species will be observed in the project area due to the high volume of vessel traffic in Gastineau Channel, particularly during summer months.

The Alaska Protected Resources Division Species Distribution mapper lists the humpback whale, Steller sea lion, harbor seal, Dall's porpoise, harbor porpoise, killer whale, pacific white sided dolphin and minke whale as species with a range which may extend into the action area. However there are no know sightings of pacific white sided dolphins or minke whales in the action area. Further, surveys conducted between 1991 and 2007 did not see any pacific white sided dolphins in the Juneau area, sightings were further south and along coastal waters (Dahlheim *et al.* 2009). Minke whales were encountered infrequently throughout the surveys, sighted only 31 times, scattered throughout inland waters, with the highest concentrations found near Glacier Bay (Dahlheim *et al.* 2009). While there were two sightings south of the project area in Stephen's Passage, one was in the spring and one in summer. No known sightings have occurred in the Juneau area. There are no known sightings of Dall's porpoises or harbor porpoises within the action area and sightings are unlikely to occur due to the large amount of vessel traffic in the area.

Due to the low likelihood of sightings of Dall's porpoise, harbor porpoise, minke whale and pacific white sided dolphin at the project site and within applicable Level A and B harassment zones; these species are not included under this request. Shutdown zones will be implemented should one of these species be present in the action area.

The humpback whale, Steller sea lion and killer whale are species which are known to transit the area infrequently throughout the year. These species are not known to stay within the action area and shutdown zones will be implemented when these species are present. Project-related disturbances will not be detectable at the nearest known Steller sea lion haulouts.

Harbor seals are known to be residents of the project area and thus are the only species of concern within National Marine Fisheries Service (NMFS) jurisdiction that are included in this request. No further descriptions of the other marine mammals are included in this IHA application. Descriptions of the harbor seal are provided in Section 4. Measures to avoid impacts to all species not covered are discussed in Section 11.

Table 3 – Species with ranges extending into the project site

Species	Estimated Abundance[1]/ Stock	MMPA Status	ESA Status	Occurrence In/Near Project During Winter[2]
Humpback whale ***(Megaptera novaeangliae)***	10,103 (Entire Central North Pacific Stock)	Depleted, Strategic Stock	Threatened (Mexico DPS) & Not Listed	Rare
Steller sea lion (Eumetopias jubatus)	41,638 (Entire US Eastern Stock)	Protected, Nonstrategic Stock	Delisted in 2013	Infrequent
	53,303 (Entire US Western Stock)	Depleted, Strategic Stock	Endangered	Rare
Harbor seal ***(Phoca vitulina)***	9,478 (Lynn Canal/ Stephens Passage)	Protected, Nonstrategic Stock	Not Listed	Common
Dall's porpoise ***(Phocoenoides dalli)***	83,400 (Entire Alaska Stock)	Protected, Nonstrategic Stock	Not Listed	Rare
Harbor porpoise ***(Phocoena phocoena)***	975 (Southeast Alaska)	Protected, Strategic Stock	Not Listed	Rare
Killer whale ***(Orcinus orca)***	261 (Eastern North Pacific, Northern Residents)	Protected, Nonstrategic Stock	Not Listed	Infrequent
	2,347 (Eastern North Pacific, Alaska Residents)			
	243 (West Coast Transients)			

[1] Abundance estimates are from the most recent published stock report (NOAA 2016).

[2] Rare: Few or no confirmed sighting, or the distribution of the species is near enough to the area the species could occur there. Infrequent: Confirmed, but irregular sightings. Common: Confirmed and regular sightings of the species.

4 Affected Species Status and Distribution

This section describes the status, distribution and behavior for the affected species/stocks of marine mammals likely to be affected by the proposed project.

4.1 Harbor Seal (*Phoca vitulina*)

4.1.1 Status

The harbor seal is protected under the MMPA but is not listed as a strategic or depleted species under the MMPA (Muto *et al.* 2017). The Harbor seal is not listed as threatened or endangered under the ESA.

The total statewide abundance estimate is 205,090 seals based on surveys taken between 1998 and 2011 (Muto *et al.* 2017). In the northeast Pacific, twelve stocks of harbor seals have been identified by NMFS, ranging from Baja California to the Aleutians and north to Cape Newman and the Pribilof Islands (Allen and Angliss 2014). Within Alaska there are a total of 12 stocks of harbor seals ranging along the coastal waters from the eastern coast of the Aleutian Islands to Cape Muzon in Southeast Alaska.

The Lynn Canal/Stephens Passage stock is found in the project area waters. The current population estimate for the Lynn Canal/Stephens Passage stock is 9,478 individuals, and the five-year trend estimate is -176. The probability of decrease of this stock is 0.71, suggesting that the stock is declining, however 9 of the 11 Alaska harbor seal stocks are showing a trend of increasing populations (Muto *et al.* 2017). Only the Lynn Canal/Stephens Passage stock is considered in this application as it is the only stock present within the project area.

4.1.2 Distribution

Harbor seals are found in coastal and estuarine waters ranging from Baja California to the eastern Aleutian Islands of Alaska. Harbor seals often inhabit nearshore coastal waters and are considered non-migratory, typically staying within 15 to 31 miles of their home. Typically harbor seals will stay within 16 miles (25 km) of shore, but they have been found up to 62 miles (100 km) from the shore. Harbor seal movement is highly variable, with no seasonal patterns identified. (Kinkhart *et al.* 2008)

Up to 44% of their time is spent hauled out, with hauling out occurring more often during the summer (Pitcher and Calkins 1979; Kinkhart *et al.* 2008). Harbor seals typically haul out in groups of 30 or less but have been known to rarely haul out in numbers of several hundred. There are no defined haulout locations for harbor seals as harbor seals will haul out where conditions are preferable to rest, give birth, and/or molt (Sease 1992).

Harbor seals use a variety of terrestrial sites to haul out for resting (year-round), pupping (May-July), and molting (August-September) including tidal and intertidal reefs, beaches, sand bars, and glacial/sea ice (Sease 1992; Kinkhart *et al.* 2008). Some sites have traditional/historic value for pupping and molting while others are used as temporary resting sites during seasonal foraging trips.

4.1.3 Project Area

Harbor seals are common in the inside passages of southeastern Alaska. They are residents of the action area and can occur year-round, on any given day within the action area. See Section 6.3 for observations and estimates of harbor seals within the action area.

4.1.4 Reproduction and Breeding

In Alaska harbor seals typically give birth to single pups between May and mid-July (Kinkhart *et al.* 2008). Pupping and weaning coincide with the summer haulout and the weaning process is completed by July (Sease 1992). The birthing location of harbor seal pups occurs at many different haul-out sites and is not restricted to a few major rookeries (Kinkhart *et al.* 2008).

4.1.5 Diving and Foraging

Harbor seals commonly dive to depths that are less than 65 feet (20 m) but are capable of reaching depths of up to 1640 feet (500 meters). Harbor seals can remain submerged for over 20 minutes, although most dives are less than 4 minutes long (Kinkhart *et al.* 2008) with approximately 90% of dives being less than seven minutes (Gjertz *et al.* 2001; Eguchi and Harvey 2005). The maximum recorded dive time is 32 minutes (Eguchi and Harvey 2005)

Harbor seals commonly eat walleye pollock (*Theragra chalcogramma*), octopus (*Octopus spp.*), capelin (*Mallotus villosus*), herring (*Clupea pallasii*), and pacific cod (*Gadus macrocephalus*). Pups usually eat small fishes (Pitcher and Calkins 1979).

4.1.6 Hearing Ability

The hearing range of harbor seals extends above 60 kHz (Jacobs and Terhune 2002) although their hearing is most acute below 60 kHz (Kastelein *et al.* 2009). Harbor seals are more sensitive to lower frequency sounds with the highest sensitivity occurring at 32 kHz in water and 12 kHz in air (Terhune and Turnball 1995, Kastak and Schusterman 1998, Wolski *et al.* 2003). Harbor seals are considered part of the Phocid Pinniped hearing group (NMFS 2016).

5 Type of Incidental Take Authorization Requested

Under Section 101(a)(5)(D) of the MMPA, CBJ requests an IHA for takes by Level B harassment (i.e., behavioral disturbance or temporary [hearing] threshold shift) (NMFS 2018b) during certain operations associated with the construction of the proposed project. CBJ requests an IHA for one year with an effective date of June 15, 2019. However, while in-water work will not begin until June 15, 2019 onsite work is scheduled to begin in May of 2019. If work is not completed at the end of that period, CBJ would request an IHA renewal.

Take is requested for the following activities;

- Vibratory and impact pile installation activities (as described in Section 1.3 and combined with the mitigation measures described in Section 11) have the potential to take permitted marine mammals by Level B harassment resulting in behavioral disturbance due to the effects of increased underwater noise levels.

The noise levels and potential impact isopleths that are expected to result from the construction of this project are described in detail in the sections below. Mitigation measures (including operational shutdown and monitoring zones) will be incorporated into the project to minimize the potential for unauthorized injury or harassment. Protocols for observations and mitigation methods are discussed in detail in Section 11 and in Appendix B – Marine Mammal Monitoring Plan. Takes of non-permitted species will be prevented by the mitigation measures described in Section 11.

5.1 Method of Incidental Taking

The Downtown Waterfront Improvements project includes vibratory and impact pile driving in an area where harbor seals are commonly observed. Planned construction methodologies will temporarily increase the underwater and airborne noise within the project area. This increase in noise has the potential to result in the behavioral disturbance, hearing threshold shifts, or non-serious injury of marine mammals in the vicinity of the construction project.

5.2 Regulatory Thresholds for Marine Mammal Take

Unless otherwise noted, the following notations will be used to express thresholds:

- Peak Sound Pressure Level (SPL_{PK}): The maximum absolute value of the instantaneous sound pressure that occurs during a specified time interval, measured in dB re: 1 µPa (e.g., 198 dB_{PEAK}). (Caltrans 2015)
- Average Root Mean Square Sound Pressure Level (SPL_{RMS}): A decibel measure of the square root of mean square pressure. For pulses, the average of the squared pressures over the time that comprises that portion of the wave form containing 90 percent of the sound energy of the impulse in dB re: 1 µPa (for underwater) and in dB re: 20 µPa is used (e.g., 185 dB_{RMS}). (Caltrans 2015)
- Sound Exposure Level (SEL): The integral over time of the squared pressure of a transient waveform, in dB re: 1 μPa^2–sec. (e.g., 173 dB_{SEL}). This approximates sound energy in the pulse. (Caltrans 2015)
- Cumulative Sound Exposure Level (SEL_{CUM}): Cumulative exposure over the duration of the activity within a 24-hr period. (NMFS 2018)

5.2.1 Updated Cumulative Sound Threshold Guidance, PTS

Determination of the cumulative underwater sound exposure levels (SEL_{CUM}) required to cause PTS in marine mammals within the project area was based on the technical guidelines published by NMFS on August 03, 2016 and revised in April 2018. This guidance considers the duration of the activity, the sound exposure level produced by the source during one working day, and the effective hearing range of the receiving species. Regulatory thresholds for potentially affected species, measured in one-day SEL_{CUM}, are summarized below.

Table 4 – SEL_{CUM} PTS Onset Thresholds. (NMFS 2018)

UNDERWATER - (dB re: 1 μPa^2 s)					
Source	**Low-Frequency (LF) Cetaceans[1]**	**Mid-Frequency (MF) Cetaceans[2]**	**High-Frequency (HF) Cetaceans[3]**	**Phocid Pinnipeds (PW)[4]**	**Otariid Pinnipeds (OW)[5]**
Non-impulsive Noise	199	198	173	201	219
Impulsive Noise	183	185	155	185	203

Calculation of impact isopleths (Section 5.4) under the new guidance utilized the methods presented in Appendix D of the *2018 Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing*

[1] LF Cetaceans include the humpback whale
[2] MF Cetaceans include the killer whale
[3] HF Cetaceans include the Dall's porpoise and harbor porpoise
[4] PW pinnipeds include the harbor seal and Northern fur seal
[5] OW Pinnipeds include the Steller sea lion and California sea lion

and the most recent version of the associated User Spreadsheet Tool (NMFS 2018). The spreadsheet accounts for effective hearing ranges using Weighting Factor Adjustments (WFAs), and this application uses the recommended values therein. Activity durations were estimated based on similar project experience.

5.2.2 Updated Peak Sound Threshold Guidance, TTS and PTS

In addition to thresholds for cumulative noise exposure, onset thresholds for peak sound pressures must be considered for impulsive sources. Peak sound pressure level (SPL_{PK}) is defined as "the greatest absolute instantaneous sound pressure within a specified time interval and frequency band" (NMFS 2018).

Table 5 – SPL_{PK} Thresholds for Impulsive Noise. (NMFS 2018)

UNDERWATER - (dB re: 1 µPa)					
Source	**Low-Frequency (LF) Cetaceans**	**Mid-Frequency (MF) Cetaceans**	**High-Frequency (HF) Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
TTS Onset	213	224	196	212	226
PTS Onset	219	230	202	218	232

5.2.3 Interim Sound Threshold Guidance

The updated guidance described above does not address behavioral disturbance from underwater or airborne noise. The interim sound threshold guidance, previously published by NMFS and summarized in Table 6, will be used for estimating exposure behavioral disturbance isopleths (NMFS 2015).

Airborne noise thresholds have not been established for cetaceans (NMFS 2015), and no adverse impacts are anticipated from airborne noise to cetaceans in the project area.

Table 6 – Behavioral Disturbance Thresholds. (NMFS 2015b)

UNDERWATER - (dB re: 1 µPa)		
Source	**Cetaceans & Pinnipeds**	
Non-impulsive Noise	120	
Impulsive Noise	160	
AIRBORNE - (dB re: 20 µPa)		
Source	**Harbor Seals**	**Other Pinnipeds**
All Source Types	90	100

Per the interim guidance, the practical spreading loss model was used to determine the zones in which pinnipeds and cetaceans have the potential to face disturbance.

The formula for calculating practical spreading loss in *underwater noise* is:

$$TL = GL \times \log \frac{R_1}{R_0}$$

where TL is the transmission loss (dB), GL is the geometric loss coefficient (15 is the only valued allowed without real-time sound source verification), R_1 is the range to the target sound pressure level (m), and R_0 is the distance from the source of the initial measurement (m).

Per the interim guidance, the spherical spreading loss model was used to determine the zones in which pinnipeds and cetaceans have the potential to face behavioral disturbance from airborne noise.

The formula for calculating spherical spreading loss in *airborne noise* is:

$$TL = GL \times \log \frac{R_1}{R_0}$$

where TL is the transmission loss (dB), GL is the geometric loss coefficient (standard value=20), R_1 is the range to the target sound pressure level (m), and R_0 is the distance from the source of the initial measurement (m).

5.3 Sources of Anthropogenic Sound

In the Technical Guidance (NMFS 2018), sound sources are divided as;

- Impulsive: produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay.
- Non-impulsive: produce sounds that can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent) and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do.

5.3.1 Underwater Sources

Vibratory and impact pile driving are the sources of underwater noise for the pile driving noise with estimated durations as outlined in Table 2 over approximately 82 in-water work days. It is possible work will be spread out over a longer time with shorter work days, however this is dependent on the contractor's means and methods. Piles will be installed with a vibratory hammer to the extent possible and then an impact hammer will be utilized as necessary for final driving.

Underwater harassment zones are summarized in Section 5.4. Harbor seals that enter the Level B harassment zone for vibratory pile driving activities will be recorded as potential exposures. If a non-permitted marine mammal is observed approaching the Level B harassment zone, pile driving will shut down.

5.3.1.1 Vibratory Pile Driving and Removal

The closest known measurements of sound levels for vibratory pile work for 16-inch (41-cm) and 18-inch (46-cm) steel piles are from the Kake Ferry Terminal project for vibratory extraction of an 18-inch (46-cm) steel pile. The extraction of 18-inch (46-cm) steel pipe piles using a vibratory hammer resulted in underwater noise levels reaching 156.2 dB_{RMS} at 23 feet (7 m) (Denes *et al.* 2016). Measurements were taken at two piles, each with two hydrophones. One hydrophone was located in close proximity to the pile, 23 feet (7 m) and 33 feet (10 m) for the west and east restraint piles respectively, while the second hydrophone was located approximately 3,773 feet (1,150 m) from the piles for both the east and west restraint piles. Because transmission loss and other site

specific characteristics are assumed to vary, thus the measurement taken closest to the pile is most representative of the source level. Thus, data for the pile with measurements closest to the pile was used.

Sound source data for vibratory installation of 16-inch (41-cm) and 18-inch (46-cm) piles is limited, thus this data was used to estimate sound source levels for the vibratory pile driving of 16-inch (41-cm) and 18-inch (46-cm). The literature review in Appendix H of the AKDOT&PF study (Yurk et al, 2015) showed that vibratory pile removal was actually louder than vibratory pile driving for 24-inch (61-cm) and 48-inch (122-cm) piles driven in the Columbia River. Based on the available data the use of noise levels associated with the pile extraction at Kake are conservative for 16-inch (41-cm) piles and the best available estimate for 18-inch (61-cm) piles. Vibratory removal of timber piles is assumed to be quieter than the removal of steel piles, thus the data used is conservative for the removal of timber piles.

Table 7 – Parameters for Non-Impulsive Continuous Underwater Noise Calculations

Source	Source Type	Pile Size	RMS Sound Pressure Level	Weighting Factor Adjustment	Estimated Duration	
					Hours per Day	Ant. Days of Effort
Vibratory Hammer	Non-impulsive, continuous	Timber Pile Removal	156.2 dB[a] at 23 ft (7 m)	2.5 kHz	2.5	10
		16-inch (41-cm) and 18-inch (46-cm)			7.5	18
		18-inch (46-cm) or smaller (temporary pile installation)			7.5	18
		18-inch (46-cm) or smaller (Temporary pile removal)			1.25	18

([a]Denes et al. 2016)

5.3.1.2 Impact Pile Driving

For impact pile driving of 16-inch (41-cm) and 18-inch (46-cm) piles, sound measurements were used from the literature review in Appendix H of the AKDOT&PF study (Yurk et al. 2015) for 24-inch (61-cm) piles driven in the Columbia River with a diesel impact hammer. To estimate the sound source levels of 16-inch (41-cm) and 18-inch (46-cm) piles data for 24-inch (61-cm) piles were used as the available data for 16-inch piles did not report a peak level, thus these noise levels are conservative.

Table 8 – Parameters for Impulsive Underwater Noise Calculations

Source	Source Type	Pile Size	Sound Pressure Level	Peak Level	Single Strike SEL	Weighting Factor Adjustment	Estimated Duration		
							Piles per Day	Strikes Per Pile	Ant. Days of Effort
Impact Hammer	Impulsive	16- and 18-inch	190 dB_{RMS}[a] at 33 ft (10 m)	205 dB	175 B[a] at 33 ft (10 m)	2 kHz	5	150	18

([a]Yurk et al. 2015)

5.3.1.3 Airborne Sources

Data for vibratory driving of 30-inch (76-cm) piles from Laughlin (2010) was measured at 96.4 dB_{L5EQ} at 49.2 feet (15 m). In this case, dB_{L5EQ} (or the 5-minute average continuous sound level) was considered equivalent to dB_{RMS} values, which would be calculated in a similar fashion. Data for airborne sources for 16-, 18- and 24-inch (41-, 46- and 61-cm) piles was not available. Vibratory installation of 16-, 18- and 24-inch (41-, 46- and 61-cm) piles is assumed to create lower noise levels than installation of 30-inch piles, so this value was conservatively used for all vibratory pile driving.

Impact driving noise levels were used from a Washington State Department of Transportation (WSDOT) IHA application citing data collected during the Seattle Test Pile Project. Impact driving of 36-inch (91.5 cm) steel piles resulted in noise levels of 111 dB_{RMS} at 49.2 feet (15 m) (WSDOT 2017). Data for smaller piles was not available and the impact installation of 16-, 18- and 24-inch (41-, 46- and 61-cm) piles is assumed to create lower noise levels than installation of 36-inch (91.5-cm) piles, so this value was conservatively used for all impact pile driving.

Table 9 – Parameters for Airborne Noise Calculations

Source	Source Type	Pile Size	Sound Pressure Level
Vibratory Hammer	Non-impulsive, continuous	16-, 18- and 24-inch	96.4 dB_{L5EQ} at 15 m (50 ft)[a]
Impact Hammer	Impulsive	16-, 18- and 24-inch	111 dB_{RMS} at 15 m (50 ft)[b]

([a]Laughlin 2010; [b]WSDOT 2017)

During pile driving activities the project has the potential to increase airborne noise level. While all 24-inch (61-cm) piles will be driven out of the water there will still be airborne noise associated with the installation of all piles.

Since the in-water area encompassed by the above radii is located entirely within the underwater Level B harassment zone, the harbor seals that come within these areas will already be recorded as a take based on Level B harassment threshold for underwater noise. Shutdown will be implemented for non-permitted pinnipeds before they reach the airborne Level B harassment zones, thus no adverse impacts are anticipated.

During uplands pile installation these zones will be monitored for harbor seals and Steller sea lions. Takes will be recorded if harbor seals are present in these zones and shutdown will be implemented should Steller sea lions or other unpermitted pinnipeds enter the airborne Level B harassment zone.

Airborne noise thresholds have not been established for cetaceans and no adverse impacts are anticipated.

5.4 Calculated Isopleths

Calculated isopleths are outlined in Tables 10 – 12 based on source levels detailed in sections 5.3.1.1 through 5.3.1.4. Table 9 includes PTS isopleths for harbor seals (Phocid pinnipeds) only as they will be the only species permitted to enter the Behavioral Disturbance zone. Shut down procedures, as outlined in Section 11, will be implemented for all other species. A shutdown zone for PTS onset will be implemented for harbor seals.

Table 10 – Calculated Isopleths – Non-Impulsive, Continuous Underwater Sources

Source	Pile Diameter	Source Level	PTS Onset Isopleth	Behavioral Disturbance Isopleth
			Phocid Pinnipeds (OW)	Cetaceans & Pinnipeds
Vibratory Pile Driving (Steel)	16-inch (41-cm)	156.2 dB[a] at 23 ft (7 m)	24 ft (7.3 m)	5950 ft (1815 m)
	18-inch (61-cm)			

([a]Denes et al. 2016)

For this project the PTS onset isopleths are all less than the behavioral disturbance isopleth, thus shutdown zones will be observed for the behavioral disturbance isopleth for all marine mammals except for harbor seals. A shutdown zone for PTS onset will be implemented for harbor seals.

Table 11 – Calculated Isopleths – Impulsive Underwater Sources

Source	Pile Diameter	Source Level	PTS Onset Isopleth					Behavioral Disturbance Isopleth
			Low-Frequency Cetaceans (LF)	Mid-Frequency Cetaceans (MF)	High-Frequency Cetaceans (HF)	Phocid Pinnipeds (PW)	Otariid Pinnipeds (OW)	Cetaceans & Pinnipeds
Impact Pile Driving (Steel)	16- and 18-inch (41- and 46-cm)	175 dB[a] at 33 ft (10 m)	792 ft (241.4 m)	28.2 ft (8.6 m)	943.5 ft (287.6 m)	423.9 ft (129.2 m)	30.8 ft (9.4 m)	3,280 ft (1000 m)

([a]Yurk et al. 2015)

Table 12 – Calculated Isopleths – Airborne Sources

Airborne Noise				
Source	**Source Level**	**Level A Harassment Zone (m)**	**Level B Harassment Zone (m)**	
			Harbor Seals	**Other Pinnipeds**
Vibratory Pile Driving 16-inch, 18-inch and 24-inch	96.4 dB_{L5EQ} at 15 meters[a]	N/A	114.8 ft (35 m)	32.8 ft (10 m)
Impact Pile Driving 16-inch, 18-inch and 24-inch	110 dB_{RMS} at 15 meters[b]	N/A	492.1 ft (150 m)	164.0 ft (50 m)

([a]Laughlin 2010, [b]Laughlin, 2013)

Only impact pile driving has peak sound pressures above the PTS threshold. The distance to the peak threshold is outlined in Table 13. All of these zones are well within all established impact pile driving shutdown zones for all marine mammals and thus are not further considered independently.

Table 13 – Calculated Isopleths – Peak Sound Pressures for Impact Pile Driving

	UNDERWATER - (dB re: 1 µPa)					
Source	**Source Level**	**Low-Frequency (LF) Cetaceans**	**Mid-Frequency (MF) Cetaceans**	**High-Frequency (HF) Cetaceans**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
16- and 18-inch piles	175 dB[a] at 33 ft (10 m)	3.9 feet (1.2 m)	N/A	51.8 feet (15.8 m)	4.6 feet (1.4 m)	N/A

([a]Yurk et al. 2015)

6 Number of Marine Mammals that May Be Affected

The number of marine mammals that may be exposed to harassment thresholds is calculated by estimating the likelihood of a marine mammal being present within a harassment zone during the associated activities. Expected marine mammal presence is determined by past observations and general abundance near the proposed project area during construction.

Based upon the actions described above, their anticipated effect on marine mammals, and number of animals in the project area, we anticipate that a number of animals will be taken by the proposed actions. CBJ is pursuing an IHA for these potential takes. The estimated number of takes are based upon conservative ranges from the best scientific data currently available for these species near the project area. We *do not* anticipate this many takes will occur, as our avoidance and minimization of impacts efforts on the grounds during the construction activity will be informed, deliberate, focused and integrated throughout all levels of project management and monitoring. Further, a large number of sightings are likely to be re-sightings of the same animals, however identifying individuals in-water is likely not feasible.

6.1 Harbor Seal

6.1.1 General Abundance of Seals in Project Area

Harbor seals are residents in the project vicinity and observed within the action area on a regular basis. Typically there are 1-2 harbor seals present near the new Port of Juneau Cruise Ship Berths and can be found there year round (Personal Observation, B. Lambert). Discussions with the local hatchery, located north of the project, indicated harbor seals are commonly seen at the DIPAC hatchery (Katie Harms, Tourism and Education Director, Personal communication 8/17/2018). The recently constructed Port of Juneau Cruise Ship Berth project (located within the Level B harassment isopleth) had a significantly smaller exclusion zone, 200 meters, and did not observe any harbor seals within that zone during pile installation. However, 1-2 harbor seals were observed near the new berths an intermittent basis.

While harbor seals do not have designated haul-outs, there are two locations in the project vicinity that harbor seals are known to use (Figure 6). Both of these sites are located out of the action area (Figure 6). On September 24, 2018 approximately 41 harbor seals were observed hauled out at the sandbar near DIPAC (Figure 7).

Figure 6 – Harbor Seal Haul-outs[1]

[1] Map provided by ADF&G of CF10A and CF07A, two haul-outs recognized by the Marine Mammal Laboratory

Figure 7 – Harbor Seals near DIPAC Hatchery

6.1.2 Onsite Surveys

A series of onsite observations in the action area (Figure 8) were conducted throughout August and September of 2018 (Table 14). The project site presents observational challenges, primarily due to the amount of existing dock infrastructure along the coast of downtown Juneau. Observations of the nearshore area along downtown Juneau are particularly challenging during summer months due the (4) cruise ship berths and the large ships in port from May through September of each year. Observations were attempted from the City Overlook on Douglas Island, however visibility is limited due to vegetation in the area and the nearshore area is blocked with infrastructure and ships. Observations were then conducted from Whale Park, some stationary and some roving along the seawalk to get a better vantage. Due to past observations, the lack of animals observed near Whale Park and conversations with locals it appears are seals commonly within the action near the new Port of Juneau Cruise Ship Berths. Roving observations were then utilized from Whale Park to Taku Dock.

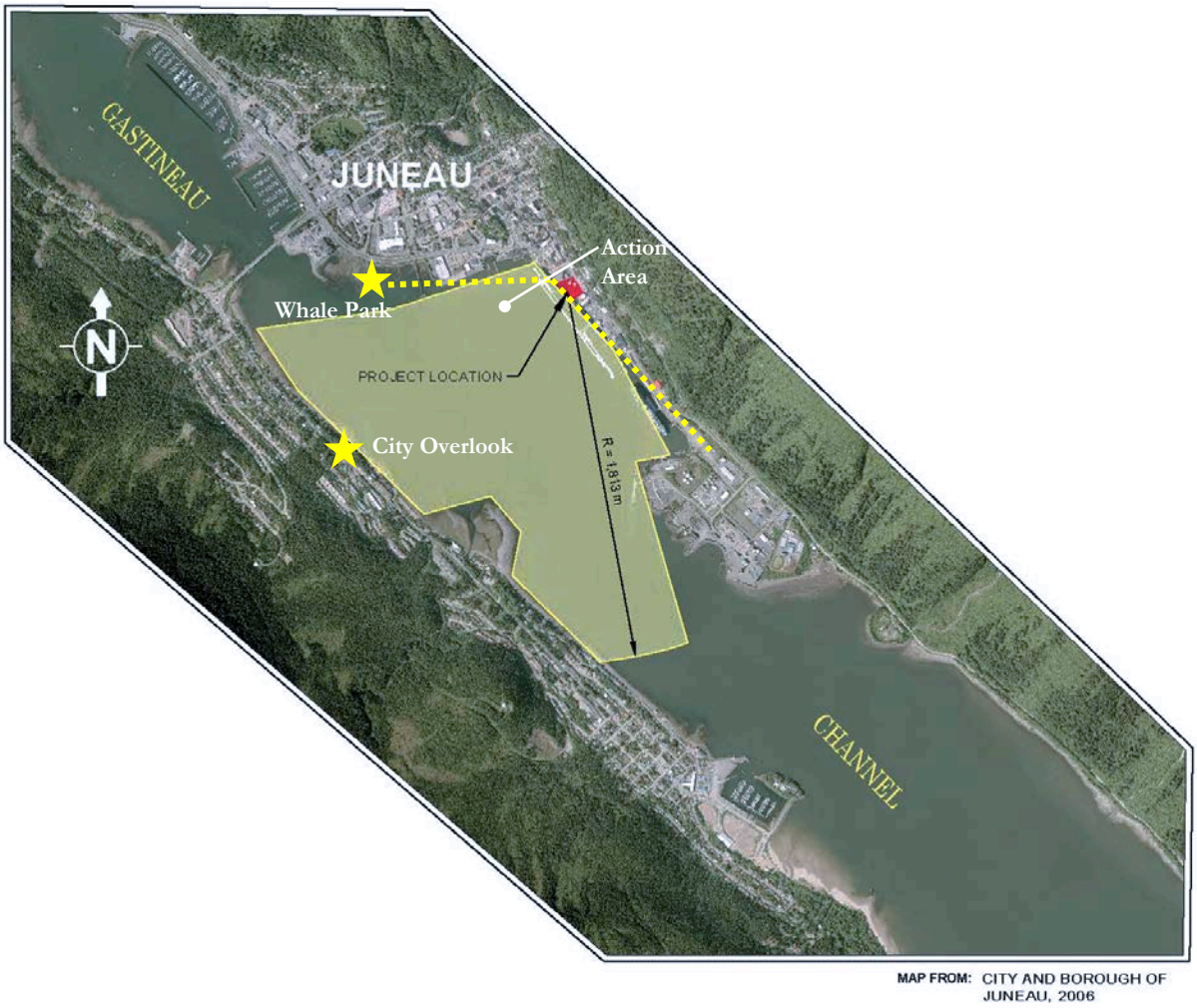


Figure 8 – Action Area

Observations of harbor seals in the project area were sparse, however this is believed to be due to the seasonality. While there were a total of 3 sightings in the project area during August and September, this is not typical of what is observed by locals and on past projects in the vicinity. The smaller amount of harbor seals observed during this time is believed to be to survey timing coinciding with the timing of the coho salmon run. During the observation period reports from local fishermen indicated that harbor seals were present at the DIPAC hatchery which supports a coho salmon run. There are no fish streams supporting coho within the project area so it is likely that during this particular time of year the resident seals typically observed leave intermittently to feed on the salmon runs supported nearby.

Observations were conducted near Gold Creek on August 7th and 8th, during the beginning of the coho run. Gold Creek, which is listed in the ADF&G Anadromous Waters Catalog as having pink and chum salmon present, runs through downtown Juneau. Even though there were salmon were present in the creak there were no harbor observed in the area. During this same period of time harbor seals were observed at the DIPAC hatchery. It is likely that the harbor seals prefer chinook and coho to chum and pink salmon, which are both found at the DIPAC hatchery.

Observations of 1-2 harbor seals in the action area is consistent with what would be anticipated based on past observations, including general observations during the Port of Juneau Cruise Ship Berth construction, local reports and general knowledge of harbor seals in the area. It is also consistent with the number of harbor seals that were observed during 50% of the observation days. Harbor seals are likely drawn to the area near the Port of Juneau Cruise Ship Berths due to the nearby fish processor at Taku Fisheries, however it is believed the coho run may intermittently entice these individuals away during the coho run from mid-July into early October. Therefore it is estimated that up to 2 resident harbor seals may be present at any time during construction.

Table 14 – Observation Summary

Date	Start	End	Total Time (hours)	Location	Sightings	Notes
7-Aug	7:30	8:00	0.50	City Overlook	0	
	10:45	11:30	0.75	City Overlook	0	
8-Aug	7:30	8:15	0.75	Whale Park	0	
	10:45	11:30	0.75	Whale Park	0	
	3:20	4:05	0.75	Whale Park	0	
19-Aug	9:45	10:30	0.75	Roving Near Cruise Ships	2	Observed foraging at 10:11 and 10:16; both observed concurrently during observation; Located near fish processor
31-Aug	4:00	6:00	2.00	Whale Park-Taku Fisheries	1	Observed foraging near the Whale Park statue. Remained in area foraging while observed, however had left area by return from roving observations
				Total	3	

6.1.3 Number of Harbor Seals that may be Affected

Based on these observations, as well as discussions with local fishermen and the DIPAC hatchery, past observations from previous projects and estimates from haul-outs its appears that harbor seals prefer the DIPAC hatchery area as well as areas further south near Sandy Beach and Sheep Creek. These locations both have a sand bar that harbor seals haul-out at low tide and are in close proximity to the DIPAC hatchery or other anadromous fish streams. While Gold Creek is listed in the Alaska Department of Fish and Game Anadromous Waters Catalog – Southeast Alaska as having chum and pink salmon present, however due to flood control modifications, Gold Creek no longer supports spawning (Johnson and Blossom 2018).

Based on observations, discussions with local fishermen and the DIPAC Hatchery it is estimated that an average of 2 individual harbor seals will be within the action area on a regular basis on a given day and that up to 41 could be observed transiting through the action area, based on the maximum number observed hauled out north

of the project site. The determination of estimated takes is on the conservative side; animals are likely to be recorded more than once each day as it likely not possible to determine if they are the same individuals.

Sightings can be estimated on the assumption seals dive and resurface every 4-20 minutes, with most dives being 4 minutes or less (Kinkart *et al* 2008). To estimate the number of sightings an exposure of 2 harbor seals every 4 minutes (15 sightings per hour) during 12-hour work days for the (2) seals that are anticipated to be in the area on a regular basis was used. To be conservative it is estimated that the 41 individuals that may be transiting through the area could be observed daily based on the number of seals observed hauled out (figure 7) as the seals can only exit the hatchery area by travelling back through the project site due to the mudflats to the northeast of the project which are generally impassible. This could result in up to 521 sightings harbor seals every day, which is significantly higher than the number of harbor seals found within Gastineau Channel. It is likely that no more than 43 (2 remaining in the area and up to 41 transiting) individual seals will be in the project area on a given day.

Timber Pile Removal:

$$41\ transiting\ harbor\ seals\ daily + \left(2\ resident\ harbor\ seals * \frac{20\ sightings}{hour} * 2.5\ \frac{hours}{day}\right) = 141\ sightings/day$$

$$Pile\ Removal\ Sightings = \frac{141\ sightings}{day} * 10\ days = 410\ sightings$$

Vibratory Pile Driving:

$$41\ transiting\ harbor\ seals\ daily + \left(2\ resident\ harbor\ seals * \frac{20\ sightings}{hour} * 7.5\ \frac{hours}{day}\right) = 341\ sightings/day$$

$$Pile\ Driving\ Sightings = \frac{341\ sightings}{day} * 36[1]\ days = 12,276\ sightings$$

Impact Pile Driving:

The number of strikes/minute varies throughout the driving process, generally between 35-55 strikes per minute dependent on the hardness of the substrate. To estimate duration a rate of 40 strikes/minute was used. For 5 piles/day at 150 strikes each this results in a duration of approximately 20 minutes of noise generating impact pile driving activities daily.

$$41\ transiting\ harbor\ seals\ daily + \left(2\ resident\ harbor\ seals * \frac{20\ sightings}{hour} * 0.33\ \frac{hours}{day}\right) = 54\ sightings/day$$

$$Impact\ Pile\ Driving\ Sightings = \frac{54\ sightings}{day} * 18\ days = 972\ sightings$$

Temporary Steel Pile Removal:

$$41\ transiting\ harbor\ seals\ daily + \left(2\ resident\ harbor\ seals * \frac{20\ sightings}{hour} * 1.25\ \frac{hours}{day}\right) = 91\ sightings/day$$

$$Pile\ Removal\ Sightings = \frac{91\ sightings}{day} * 18\ days = 1,638\ sightings$$

[1] 18 days for temporary pile installation and 18 days for permanent pile installation

Total Takes:

$$\textbf{\textit{Total daily takes}} = \textbf{41 \textit{transiting harbor seals}} + \textbf{2 \textit{resident harbor seals}} = \textbf{43 \textit{harbor}} \frac{\textbf{\textit{seals}}}{\textbf{\textit{day}}}$$

$$\begin{aligned}\textbf{\textit{Total Takes}} = &\left(\textbf{10 \textit{days pile removal}} * \textbf{43} \frac{\textbf{\textit{seals}}}{\textbf{\textit{day}}}\right) + \left(\textbf{36 \textit{days vibratory pile installation}} * \textbf{43} \frac{\textbf{\textit{seals}}}{\textbf{\textit{day}}}\right) \\ &+ \left(\textbf{18 \textit{days temporary pile removal}} * \textbf{43} \frac{\textbf{\textit{seals}}}{\textbf{\textit{day}}}\right) + (\textbf{18 \textit{days imapct pile installation}} * \textbf{43} \frac{\textbf{\textit{seals}}}{\textbf{\textit{day}}}) \\ &= \textbf{3,526 \textit{takes}}\end{aligned}$$

A combination of vibratory and impact driving will be required for each pile, with just the final driving being completed with an impact hammer. The Level B harassment potential from the proposed activities is **not likely** to result in significant adverse impacts to harbor seals.

Table 15 – Estimated Number of Harbor Seal Sightings

Number of Estimated Sightings per Construction Activity				
Species	**Vibratory Timber Pile Removal**	**Vibratory Pile Driving**	**Impact Pile Driving**	**Vibratory Pile Removal Temporary Steel Piles**
	(10 days)	**(36 Days)**	**(18 Days)**	**(18 Days)**
Harbor Seals	410 sightings	12,276 sightings	972 sightings	1,638 sightings
Total Sightings	15,296[1] Sightings			

Using a maximum daily take rate of 43 individuals as a worst case estimate to apply a re-sighting factor the project could **result in up to 3,526 total Level B takes of harbor seals.** This rate caps take at an assumed rate, though sighting rates will include multiple counts of the same individuals. As it is anticipated that many more sightings and re-sightings may be recorded by observers, the project proponents will continue to consult closely with NMFS regarding number of takes incurred throughout the project. The Level B harassment potential is not likely to result in death to any harbor seals.

[1] This number represents the total number of sightings, not the anticipated number of actual takes. While no more than 43 individuals are anticipated it is likely infeasible to distinguish individual harbor seals, particularly when they are not hauled out.

7 Anticipated Impact on Species or Stocks

The proposed project has the potential to impact harbor seals by increasing noise in Gastineau Channel. There is already a significant amount of noise from vessel traffic in the area, particularly from cruise ships from May through September. The area also receives recreational and commercial fishing vessel traffic from Aurora and Harris Harbors and Taku Fisheries, as well as barges travelling to and from the Alaska Marine Lines shipping yard.

Likely effects may include temporary behavioral responses to non-injurious noise from in-water construction activities. Underwater sounds will likely disaggregate schools of forage fish in the Level B harassment area. Harbor seals may experience some energetic cost from short term dispersal of prey, resulting in short term expenditure of energy seeking other sources or waiting for prey to re-aggregate following noise effects.

7.1 Noise

Pinnipeds are sensitive to underwater and airborne noise. Recent studies have shown that even moderate levels of underwater noise can cause a temporary loss in hearing sensitivity in some marine mammals (Kastak *et al.* 2005). Increases in noise levels from in-water activities can reduce a marine mammal's capability to hear other noises, like background noise and noise created by their prey and predators, otherwise known as auditory masking (Southall *et al.* 2007). This results in difficulties with communication, predator avoidance, and prey capture, among others. Anthropogenic sounds can also result in behavioral modification, including changes in foraging and habitat use or separation of mother and infant pairs (Marine Mammal Commission 2007).

Marine mammals can also experience changes in sensitivity to sounds after exposure to intense sounds for long periods. These changes, called threshold shifts, can occur on a temporary or permanent level, depending on the intensity of the sound and length of time to which the animal is exposed to the sound. Typically, temporary threshold shift (TTS) includes impacts to middle-ear muscular activity, increased blood flow, and general auditory fatigue (Southall *et al.* 2007). At the TTS level, the animals do not experience a permanent change in hearing sensitivity and exhibit no signs of physical injury. Permanent threshold shift (PTS) would occur if the animal subjected to the increased sound level did not return to pre-exposure conditions within an order of weeks or if the animal exhibited physical injuries (Southall *et al.* 2007).

The proposed project will have the possibility of resulting in Level B harassment of harbor seals (phocid pinnipeds). Level B harassment is temporary in nature, and the impacts associated with the potential harassment resulting from this project will be temporary. Mitigation measures discussed in Section 11, such as soft start procedures, will be incorporated into the project to minimize the potential for noise related injuries.

8 Anticipated Impact on Subsistence

Subsistence harvest of harbor seals by Alaska Natives is authorized under the MMPA. The proposed Project will occur near but not overlap the subsistence areas in Juneau. The Alaska Department of Fish and Game (ADF&G) was contacted regarding subsistence uses in Gastineau Channel (Ken Marsh, ADF&G Public Information personal communication on 8/21/2018) and it was confirmed that Gastineau Channel is not a subsistence use area for harbor seals. The proposed project will not result in the death or serious injury of any marine mammal. The project is likely to result only in short-term, temporary impacts to pinnipeds. The proposed project is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes in the Juneau area.

9 Anticipated Impact on Habitat

Critical habitat is defined as "specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations for protection" and "specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation." Critical habitat typically supports unique foraging, refugia, or reproductive habitat features.

The project area does not occur within critical habitat for Steller sea lions or humpback whales, the two ESA listed species with range extending into the project area. Harbor seals are not listed under the ESA and do not have designated crtical habitat. Physical impacts to habitat are anticipated to be temporary.

9.1.1 Direct Impacts

Construction activities will likely have temporary impacts on harbor seal habitat through increases in underwater and airborne sound from pile driving. The primary reason that animals would leave habitats in the project area would be due to elevated noise levels.

Harbor seals are known to haulout at two locations near the project (Figure 6), however both area located outside of the action area and construction noise will not impact these haul-outs.

The level of disturbance and habitat alteration in the project area will be insignificant and discountable, especially when considered in relation to activities already taking place in the project area and the apparent tolerance of the resident harbor seals and other marine mammals to these activities. Best management practices and mitigation used to minimize potential environmental effects from project activities are described in Section 11.

While it is possible that pinnipeds and cetaceans may avoid the project area during construction, they are not likely to abandon the site altogether. Despite current background noise levels and facility activities, nearby fish processing activity appears to attract pinnipeds in the action area.

9.1.2 Indirect Impacts

Indirect effects to marine mammals, such as noise-induced dispersal or disaggregation of prey, would be insignificant and discountable due to the temporary nature of the activity. After activities cease each day, it is expected that forage fish will re-aggregate and become more available.

9.1.3 Cumulative Impacts

The sum of these effects is not expected to adversely modify habitat or jeopardize the local populations of marine mammals. No critical habitat has been designated in the action area. Construction impacts relating to increased noise will be temporary in nature and will not have a lasting impact on marine mammals or their habitat in the area.

10 Anticipated Impact of Loss or Modification of Habitat

The proposed project is not likely to result in the permanent loss or modification of harbor seal or other marine mammal habitat.

11 Mitigation Measures

11.1 All Construction Activities

The proposed project avoids impacts as much as practicable, but impacts cannot be avoided entirely as this project is dependent on maritime access by nature. Because the project site is within a heavily modified commercial and industrial area with high levels of noise and ship traffic, particularly from barges, cruise ships and float planes, there is already a high level of ambient noise within the area. The mitigation measures and best management practices (BMPs) that will be implemented are expected to reduce the project's impacts within the action area.

The following measures and BMPs will be incorporated by the applicant in order to minimize potential impacts:

- The proposed improvements will be maintained in a manner that does not introduce any pollutants or debris into the harbor or cause a migration barrier for fish.
- Improvement structures were designed to provide barrier-free migration and vertical movement for marine and estuarine fish in Gastineau Channel.
- Fuels, lubricants, chemicals and other hazardous substances will be stored above the high tide line to prevent spills.
- Oil booms will be readily available for containment should any releases occur.
- To prevent spills or leakage of hazardous material during construction, standard spill-prevention measures will be implemented during construction. The Contractor will provide and maintain a spill clean-up kit on-site at all times.
- The contractor will monitor equipment and gear storage areas for drips or leaks regularly, including inspection of fuel hoses, oil drums, oil or fuel transfer valves and fittings, and fuel storage that occurs at the project site. Equipment will be maintained and stored properly to prevent spills.
- If contaminated or hazardous materials are encountered during construction, all work in the vicinity of the contaminated site will be stopped until a corrective action plan is devised and implemented to minimize impacts on surface waters and organisms in the project area.
- Water quality will be protected by collecting stormwater runoff from the proposed transportation staging area and treating it prior to discharge.
- Turbidity will be minimized by excavating and placing all fill when the tide is below work elevation, such that all fill is effectively placed in the dry.
- All 24-inch (61-cm) piles are located at a +12 feet (3.66 m) MLLW elevation or higher. All 24-inch (61-cm) piles will be driven when the tide is below the pile elevation such that all of the largest project piles are driven out of the water to reduce sound exposure.
- Timing windows will be incorporated and strictly observed during construction activities for all in-water work to minimize potential adverse effects to salmon during critical life stages. In-water work will be timed to avoid those times when eggs are in the gravel and juvenile salmon are out-migrating as stipulated in the permit special conditions.
- A minimum of 2 observers will monitor permitted activities in accordance with protocols reviewed and approved b y NMFS. Shutdown measures will implements for harbor seals approaching the Level

A harassment zone or if any unpermitted species is observed approaching the Level B harassment zone as further detailed in the detailed MMMP found in Appendix B.

11.2 Pile Driving Soft Start Procedures

Soft start procedures shall be used prior to pile driving to allow marine mammals to leave the area prior to exposure to maximum noise levels.

For vibratory hammers, the contractor shall run the vibratory hammer for no more than 30 seconds followed by a quiet period of at least 60 seconds without vibratory removal of piles. The process shall be repeated twice more within 10 minutes before beginning in-water pile driving operations.

For impact hammers, the soft start technique must initiate approximately three strikes at a reduced energy level, followed by a 30-second waiting period. This procedure would also be repeated two additional times before beginning in-water pile driving operations.

If work ceases for more than 30 minutes, soft start procedures must recommence prior to performing additional pile driving work.

11.3 In-Water or Over-Water Construction Activities

During in-water or over-water construction activities having the potential to affect marine mammals, a shutdown zone of 33 feet (10 m) will be implemented to ensure that marine mammals are not endangered by physical interaction with construction equipment. However, this is zone is encompassed within all other shutdown zones and thus is not discussed further.

11.4 Vessel Interactions

In order to minimize impacts from vessel interactions with marine mammals, the crews aboard project vessels will follow NMFS's marine mammal viewing guidelines and regulations as practicable. (https://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm).

11.5 Compensatory Habitat Mitigation

CBJ has requested a permit for the proposed project under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act from the USACE. To receive that permit, CBJ will be required to avoid, minimize, and mitigate impacts to intertidal habitat. For impacts that cannot be avoided or minimized, CBJ will coordinate compensatory mitigation with USACE.

12 Arctic Subsistence Uses, Plan of Cooperation

This section is not applicable to the proposed project. The project will take place in Juneau, which is located in waters south of the 60° North latitude demarcation. No activities will take place in or near a traditional Arctic subsistence hunting area.

13 Monitoring and Reporting Plans

13.1 Monitoring Plan

Monitoring measures for the potential impacts the project could have on marine mammals are discussed briefly in Section 11 and at length in the MMMP (Appendix B).

13.2 Reporting

The procedures for reporting are listed below and also in the MMMP (Appendix B).

13.2.1 Annual Report

A comprehensive annual marine mammal monitoring report documenting marine mammal observations will be submitted to NMFS at the end of the in-water work season. The draft comprehensive marine mammal monitoring report will be submitted to NMFS within 90 calendar days of the end of the in-water work period. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during dredging days. A final comprehensive report will be prepared and submitted to NMFS within 30 calendar days following resolution of comments on the draft report from NMFS.

The reports shall include at a minimum:

- General data:
  - Date and time of activity
  - Water conditions (e.g., sea-state)
  - Weather conditions (e.g., percent cover, percent glare, visibility)
- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring
  - Times when in-water construction is delayed due to presence of marine mammals within shutdown zones.
- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
    - Distance from animal to sound source.
    - Reason why/why not shutdown implemented.
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
    - If a shutdown was implemented, the distance from animal to sound source at the time of the shutdown.
    - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
    - Distance to the animal from the sound source during soft start.
- Post-activity observational survey-specific data:
  - Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
  - Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

14 Coordinating Research to Reduce and Evaluate Incidental Take

The data recorded during marine mammal monitoring for the proposed project will be provided to NMFS in monitoring reports. These reports will provide information on the usage of the site by harbor seals. The monitoring data will inform NMFS and future permit applicants about the behavior and adaptability of pinnipeds and cetaceans for future projects of a similar nature.

15 Conclusion

For the reasons described in this document, CBJ has determined that the proposed project is likely to result in the Level B harassment of harbor seals. This project has implemented impact minimization measures, including a Marine Mammal Monitoring Plan, to reduce the potential for unauthorized harassment.

While the harassment has the potential to result in minor behavioral effects or minor injury to any marine mammals present during project activities, based on the analysis presented in this document, these individual impacts will have a negligible effect on the stocks of marine mammals described in this document or on their habitats.

16 Literature Cited

5 AAC 99.015(a)(2). Joint Board Nonsubsistence areas. Alaska Administrative Code. Effective 5/15/93, Amended as of 7/1/2016.

Allen, B. M., and R. P. Angliss. 2014. Alaska marine mammal stock assessments, 2013. U.S.

[Caltrans, 2015]. Buehler, D., R. Oestman, J. Reyff, K. Pommerenck, B. Mitchell. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Written for the California Dept. of Transportation, Div. of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. Sacramento, CA.

City and Borough of Juneau Docks & Harbors (CBJ D&H). 2018. Marine Park to Taku Dock: Urban Design Plan. Prepared for CBJ D&H by Corvus Design, PND Engineers, Inc., Northwind Architects, LLC and Rain Coast Data. February 2018.

Dahlheim, M.E., J.M. Waite, and P.A. White, 2009. Cetaceans of Southeast Alaska: Distribution and Seasonal Occurrence. Journal of Biogeography 36:410-426.

Denes, S. L., G.J. Warner, M.E. Austin, and A.O. MacGillivray. 2016. Hydroacoustic Pile Driving Noise Study – Comprehensive Report. Document 001285, Version 2.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation & Public Facilities.

Eguchi, T., & J. T. Harvey. 2005. Diving behavior of the Pacific harbor seal (*Phoca vitulina richardii*) in Monterey Bay, California. Marine Mammal Science, 21(2), 283-295.

Gjertz, I., C. Lydersen, O. Wiig. 2001. Distribution and diving of harbour seals (*Phoca vitulina*) in Svalbard. Polar Biol (2001) 24: 209-214. Springer-Verlag.

Jacobs, S.R. and J.M. Terhune. 2002. The effectiveness of acoustic harassment devices in the Bay of Fundy, Canada: seal reactions and a noise exposure model. Aquatic Mammals, 28.2: 147-158.

Kastak, D. and R.J. Schusterman. 1998. Low frequency amphibious hearing in pinnipeds: Methods, measurements, noise, and ecology. Journal of the Acoustical Society of America. 103(4): 2216-2228.

Kastak, D., B. L. Southall, R. J. Schusterman, and C. R. Kastak. 2005. Underwater Temporary Threshold Shift in Pinnipeds: Effects of Noise Level and Duration. Journal of the Acoustical Society of America. 118.5 (2005): 3154-163. Web.

Kastak, D. 2008. Effects of noise on seals and sea lions: laboratory approaches. Bioacoustics 17: 169-171

Kastelein, RA, M Horvers, L Helder-Hoek, S Van de Voorde, R ter Hofstede, & H van der Meij. 2017. Behavioral Responses of Harbor Seals (*Phoca vitulina*) to FaunaGuard Seal Module Sounds at Two Background Noise Levels. Aquatic Mammals, 43(4), 347-363, DOI 10.1578/AM.43.4.2017.347

Kinkhart, E., K. Pitcher, G. Blundell. 2008. Harbor Seal. Alaska State Dept. of Fish and Game. Revised and reprinted 2008. Accessed from https://www.adfg.alaska.gov/static/education/wns/harbor_seal.pdf.

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

Laughlin, J. 2011. Memorandum: Port Townsend Dolphin Timber Pile Removal – Vibratory Pile Monitoring Technical Memorandum. Washington State Dept. of Transportation.

Marine Mammal Commission. 2007. Marine Mammals and Noise. A Sound Approach to Research and Management. Report to Congress March 2007. Bethesda, MD. https://www.mmc.gov/wp-content/uploads/fullsoundreport.pdf

Møhl, B. (1968). Auditory sensitivity of the common seal in air and water. Journal of Auditory Research, 8(1), 27-38.

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. 2017. Alaska marine mammal stock assessments, 2016. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-355, 366 p. doi:10.7289/V5/TM-AFSC-355. June 2017. Document available: http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-355.pdf

NMFS. 2015 (accessed). Interim Sound Threshold Guidance. West Coast Region, NMFS, NOAA, U.S. Dept. of Commerce. Retrieved from: www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

NMFS. 2016. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. NMFS, NOAA, U.S. Dept. of Commerce. NOAA Technical Memorandum NMFS-OPR-55. July 2016. Retrieved from: www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf

NMFS. 2018. 2018 Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. NMFS, NOAA, U.S. Dept. of Commerce. NOAA Technical Memorandum NMFS-OPR-59. Retrieved from: https://www.fisheries.noaa.gov/webdam/download/75962998

NMFS. 2018b. Apply for an Incidental Take Authorization. Office of Protected Resources, NMFS, NOAA, U.S. Dept. of Commerce. Updated 6/29/18, accessed 6/29/18 at https://www.fisheries.noaa.gov/national/marine-mammal-protection/apply-incidental-take-authorization#section-5-type-of-incidental-taking-authorization-requested

Pitcher, K.W. and D.G. Calkins. 1979. Biology of the Harbor Seal, *Phoca vitulina richardii*, in the Gulf of Alaska. Report for the Outer Continental Shelf Environmental Assessment Program. NOAA, U.S. Dept. of Commerce.

Scheffer, V., & Slipp, J. (1944). The Harbor Seal in Washington State. The American Midland Naturalist, 32(2), 373-416. doi:10.2307/2421307

Sease, J.L. 1992. Status Review: Harbor Seals (*Phoca vitulina*) in Alaska. Alaska Fisheries Science Center. NMFS, NOAA, U.S. Dept. of Commerce. December, 1992. Seattle, Washington.

Southall, B. L., A. E. Bowles, W. T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene, 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): 409-521. Retrieved from: http://thecre.com/pdf/Aquatic_Mammals_33_4_FINAL.pdf.

Terhune, J. M. 1988. Detection thresholds of a harbor seal to repeated underwater high-frequency, short duration sinusoidal pulses Can. J. Zool. 66, 1578–1582.

Terhune JM, Turnbull S. Variation in the psychometric functions and hearing thresholds of a harbor seal. In: Kastelein RA, Thomas JA, Nachtigall PE, editors. Sensory systems of aquatic mammals. Woerden: DeSpil Publishers; 1995. pp. 81–93.

U.S. Fish and Wildlife. 2012. Observer Protocols for Pile Driving, Dredging and Placement of Fill. Draft. Anchorage Field Office. USFWS. Dept. of Interior. August 7, 2012.

Wolski, L.F., R.C. Anderson, A.E. Bowles, P.K. Yochem. 2003. Measuring hearing in the harbor seal (Phoca vitulina): Comparison of behavioral and auditory brainstem response techniques. J. Acoust. Soc. Am. 113 (1), January 2003. [DOI: 10.1121/1.1527961]

WSDOT. 2017. Request for an Incidental Harassment Authorization under the Marine Mammal Protection Act for the Seattle Multimodal Project at Colman Dock. Prepared for WSDOT By Washington State Ferries and National Marine Fisheries Service. March 2017.

Yurk, H., A Schlesinger, and A. MacGillivray. 2015. *A Literature Review of Pile Driving Noise: Alaska Department of Transportation and Public Facilities Pile Driving Noise Study*. JASCO Document 1010, Version 2.0. Technical Report by JASCO Applied Sciences for Alaska Department of Transportation and Public Facilities.