

Request for an Incidental Harassment Authorization
Under the Marine Mammal Protection Act
for the

Statter Harbor Improvements Project Phase III B

City and Borough of Juneau, Alaska
Docks and Harbors

Revised September 2019

Submitted to:

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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
• D&H	Docks and Harbors
• 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
• WFA	Weighting Factor Adjustment



1 Description of the Activity

1.1 Introduction

The City and Borough of Juneau Docks and Harbors (CBJ D&H) is proposing improvements to Statter Harbor within Auke Bay in Juneau, Alaska to improve safety, increase efficiency and reduce congestion. 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 may result in marine mammals protected under the MMPA being exposed to sound levels above allowable noise harassment or non-serious injury thresholds.

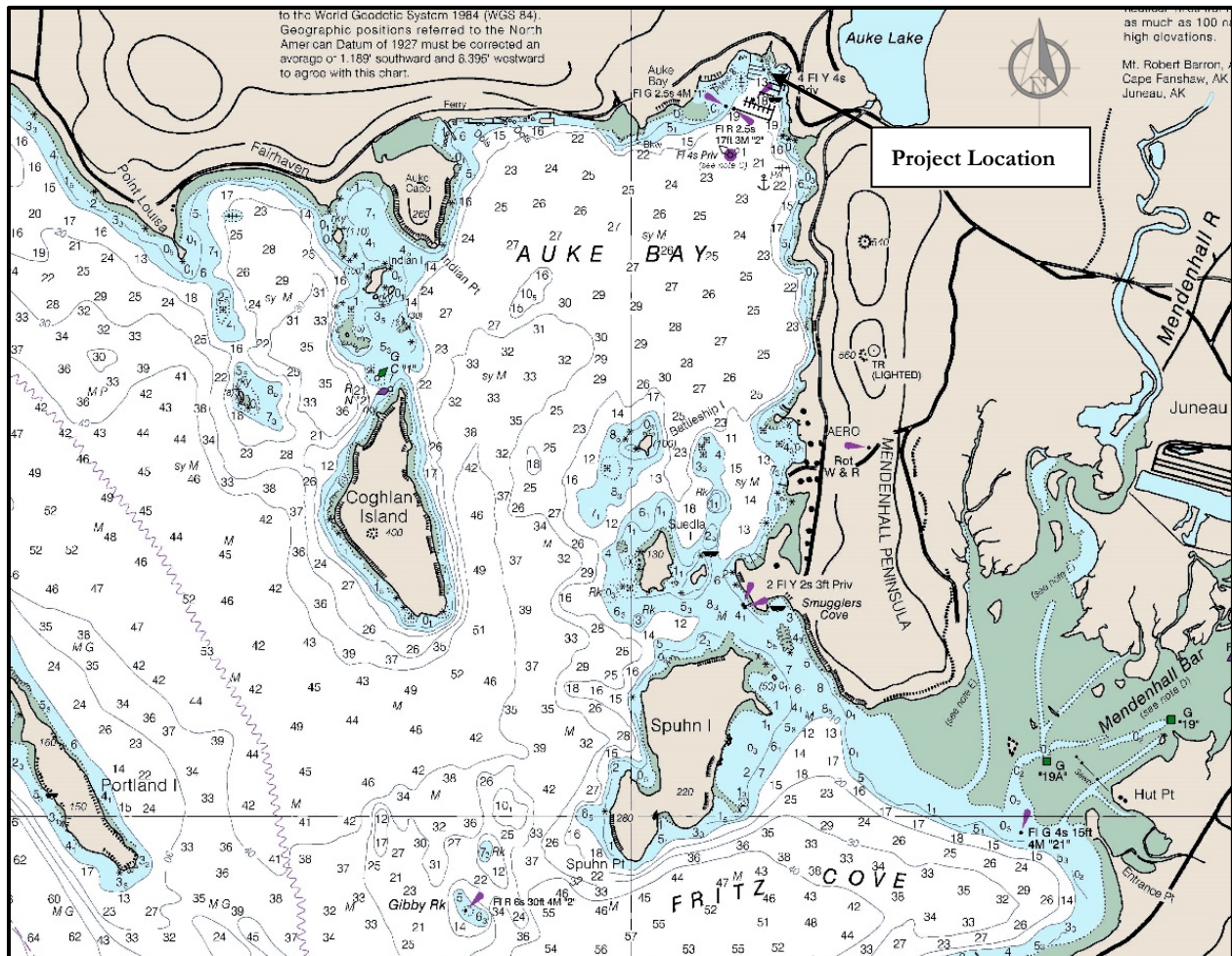


Figure 1. Project Area



Figure 2. Statter Harbor

1.2 Project Purpose and Need

The purpose of the proposed Statter Harbor Improvements Project is to improve safety, increase efficiency, and reduce congestion by incorporating improvement plans identified in the Statter Harbor Master Plan. This can be achieved through safe harbor access, improving pedestrian access, reducing congestion and separating user groups.

Due to the harbor's location near a large population base and its popularity with locals, visitors and commercial operations, harbor use has increased steadily over the last two decades. Harbor infrastructure improvements are being made over several phases to keep up with the harbor's diverse commercial and recreational users.

1.3 Project Description

The project will be constructed in phases. Phases I and II have been completed and are not discussed in the application. Phase III B will continue the process of meeting the overall project purpose by separating user groups through adding charter vessel floats and associated bus parking, to reduce congestion and increase the efficiency of operations in the harbor.



Table 1. Phases III and IV Project Quantities

Item	Size and Type, Location	Total Below HTL El. = 20.6 ft (6.3 m)
Phase III A		
Demolition and Disposal	Harbor Basin	3,392 SFT/ (315.1 SQM)
Existing Piles to be Removed	12.75-inch Steel; Boat Ramp	4 EA
	Timber; Boat Haulout	16 EA
Dredging	Dredge Basin; 1.47 acres (0.59 hectares)	24,300 CY / (18,578.7 CM)
Dredge Disposal¹	Dredge Material; Dredge Disposal Area	30,375 CY/(23,223.4 CM)
Temporary Fill for Blasting	4" Minus Shot Rock; Dredge Basin	15,000 CY/(9,556.9 CM)
Bedrock Removal	Dredge Basin	2,000 CY/(1,529.1 CM)
Temporary Surcharge Fill	4" Minus Shot Rock; MSE Wall/Armor Footprint	5,850 SFT/(543.5 SQM)
Armor Rock	Dredge Basin Armored Slopes	1,900 CY/(1,453 CM)
Phase III B		
Surface Area of Timber Floats	Commercial Charter Floats; Dredge Basin	9,500 SFT/(883 SQM)
Existing Piles to be Removed	16-inch Steel; Transient Float	3 EA
Piles to be Installed	16-inch Steel; Commercial Charter Floats	20 EA
	16-inch Steel; Transient Float	3 EA
Utilities	On floats	N/A
Final MSE Wall²	4" Minus Shot Rock; MSE Wall/Armor Footprint	8,800 CY/(6,728.1 CM)
Phases III C & IV		
Kayak Ramp (Cubic Yards)	Concrete, Shot Rock, Base Course and Armor Rock; Old Boat Launch Ramp	2,496 CY/(68.8 CM)
Concrete Sea Walk	Uplands	0
Concrete Plaza	Uplands	0
Paved Bus Parking Lot	Uplands	0
Sidewalks, Curb & Gutter	Uplands	0
Utilities	Uplands	0
Surface Area of Concrete Floats	Phase IV Permanent Moorage Floats	4,140 SFT/(384.6 SQM)
Piles to be Installed	24-inch Steel; Permanent Moorage Floats	6 EA

¹ Dredge disposal volume is larger than dredged quantity due to bulking after the material has been removed. A bulking factor of 1.25 is also supported by Bray et al. 1997, which cites this as an appropriate estimate for mechanically dredged silt and clay. Based on experience with other dredging projects, this bulking factor is likely conservative which will ensure the entirety of the volume placed during disposal operations is accounted for.

² Placement of the final MSE wall fill will require excavation of 2,750 cubic yards of the temporary surcharge fill. A total of 3,100 cubic yards of the surcharge fill will be left in place and this is accounted for within the 8,800 cubic yards of permitted fill for the MSE Wall.



1.3.1 Past and Future Phases

Phase III A improvements are scheduled to be constructed between October 1, 2019 and May 1, 2020. Phase III A includes demolition and disposal of an existing 16-foot (4.9-meter) by 200-foot (61.0-meter) concrete boat launch ramp and planks, 8-foot (2.4-meter) by 240-foot (73.2-meter) boarding float, four (4) 12.75-inch (3.2-decimeter) diameter steel pipe piles, 1,152 square feet (107.0 square meters) of the existing timber boat haulout pier, including sixteen (16) creosote treated timber piles. Improvements in Phase III A consist of approximately 24,300 cubic yards (18,578.7 cubic meters) of dredging, in-water disposal of an estimated 30,375 cubic yards (23,223.4 cubic meters) of dredge material (disposal amount increases due to a bulking factor), removal and disposal at an upland location of 2,000 cubic yards (1,529.1 cubic meters) of bedrock, placing 1,900 cubic yards of armor rock to stabilize the dredge slopes and 7,000 cubic yards (5,352 cubic meters) of clean Class A shot rock placed below high tide line for a temporary surcharge fill to prepare the site for the final MSE wall. Phase III A is covered under a separate IHA.

Phase III C is primarily an uplands improvement project, which also includes a small amount of in-water construction for a new kayak launch ramp. Phase III C generally consists of completing the uplands portion of the MSE wall, an uplands bus circulation area and parking pad, and a 12-foot (3.7-meter) by 208-foot (63.4-meter) kayak launch ramp.

Phase IV generally consists of 4,140 square feet (384.6 square meters) of concrete floats supported by six (6) 24-inch (6.1-decimeter) steel pipe piles. As an IHA can only be issued for 1 year, separate applications will be submitted for Phase IV in the future.

Total project quantities are provided in Table 1, however Phase III A and work planned for future phases are not discussed further in this application.

1.3.2 Work Included in this Application

This application covers work for Phase III B as described in detail below. Onsite construction will occur between October 1, 2020 and May 1, 2021. See Section 5 for a detailed explanation and calculations supporting the determination of noise impacts and exclusion zones.

New infrastructure to be installed during phase III B includes 9,136 square feet (848.8 square meters) of timber floats supported by twenty (20) 16-inch (4.1-decimeter) diameter steel pipe piles, an 10-foot by 100-foot gangway (3-meters by 30.5-meters), removal of the temporary surcharge fill and construction of the permanent MSE wall.

In addition to the new infrastructure, three existing piles will be repaired. A transient float was installed in Statter Harbor in 2018 as part of a different project and it is not operating as intended due to wave action and excessive movement of the float. Three temporary piles were installed without rock anchors as a temporary fix. During Phase III B these piles will be removed with a crane or vibratory hammer and reinstalled with rock anchors to provide sufficient moorage capacity for the float.

Pile driving/removal will be conducted from a floating barge, utilizing a drill to install rock sockets and a vibratory hammer to install piles. Use of impact hammers is not anticipated, and will only be used for piles that encounter soils too dense to penetrate with the vibratory equipment. The floats will be unloaded from a barge and placed in the water. Piles will be driven as each float section is installed to hold the floats in place. CBJ D&H will specify the use of vibratory pile driving equipment as the primary installation method for the project. No template piles are required for this project.

The temporary surcharge fill, placed during Phase III A, would be excavated to elevation of the wall toe, approximately +3 feet (0.9 meters) MLLW or higher dependent on the location along the wall. The CBJ will require the contractor to conduct all excavation work for temporary surcharge fill removal when the tide is below



the work elevation, such that it will be completed in the dry. The wall would be constructed and then backfilled, reusing the temporary surcharge fill consisting of clean Class A shot rock originally used for the temporary blast pad in Phase III A. Excavation and fill placement will be conducted such that work is done in the dry, thus excavation and fill placement are not discussed further in this application.

The MSE wall will be constructed with track excavators, loaders, vibratory drum rollers, dump trucks, various hand tools, and labor forces. Excavated material will be reused for the permanent MSE wall with any excess being placed into dump trucks and hauled off-site. The concrete retaining wall blocks will be set in place one course at a time. Imported fill will be delivered by dump truck, spread behind the blocks in lifts, and compacted with vibratory rollers to meet design grades and compaction requirements. A layer of geotextile fabric will be placed behind the wall on the compacted fill with each course of blocks.

Table 2. Pile Driving Summary

Activity	# piles	Pile Size/Type	Method	Average Piles/day ¹ (Range)	Driving Days	Strike/pile or minutes/pile	Estimated Total Daily Duration
Pile Removal	3	16-inch (4.1-decimeter) Steel Pipe	Vibratory	3	1	30	12 hours / 500 strikes
Pile Installation	23		Vibratory	1.5 (1-3)	8-23	120	
			Impact	1 (0-2)		250	
			Drilling	1.5 (1-3)		240	

¹ Piles per day and driving days are given as a range as actual driving days are dependent on actual conditions encountered in the field and the contractor's means and methods. For each pile a combination of a vibratory hammer and a down-the-hole hammer (and if needed an impact hammer) will be used throughout the pile driving process and throughout each day of pile driving. To estimate the noise impacts conservatively a 12 hour daily duration for continuous noise has been used in all noise calculations.



2 Dates, Duration, and Region of Activity

2.1 Dates

Phase III B of the project is planned to occur between October 1, 2020 and May 1, 2021. CBJ D&H proposes to use the following general construction sequence, subject to adjustment by the construction contractor's means and methods:

Construction Phase III B (2020-2021):

- Float fabrication
- Mobilization of equipment
- Pile driving and float installation
- Utility Installation
- Excavation of temporary surcharge fill
- Construction of permanent MSE wall
- Demobilization of equipment

2.2 Duration

Work is expected to occur between October 1, 2020 and May 1, 2021. 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 post-activity monitoring. (These protocols are discussed in detail in Section 10).

2.3 Region of Activity

The project site is located within Section 22, Township 40 South, Range 65 East of the Copper River Meridian; USGS Quad Map Juneau B-2; Latitude 58° 23' 6.99" North, 134° 38' 46.70" West; CBJ Tax Parcel ID 4B2801010032 and 4B2301050100, Legal Description A.T.S. 16 LT 3C and 739; in Juneau, Alaska.

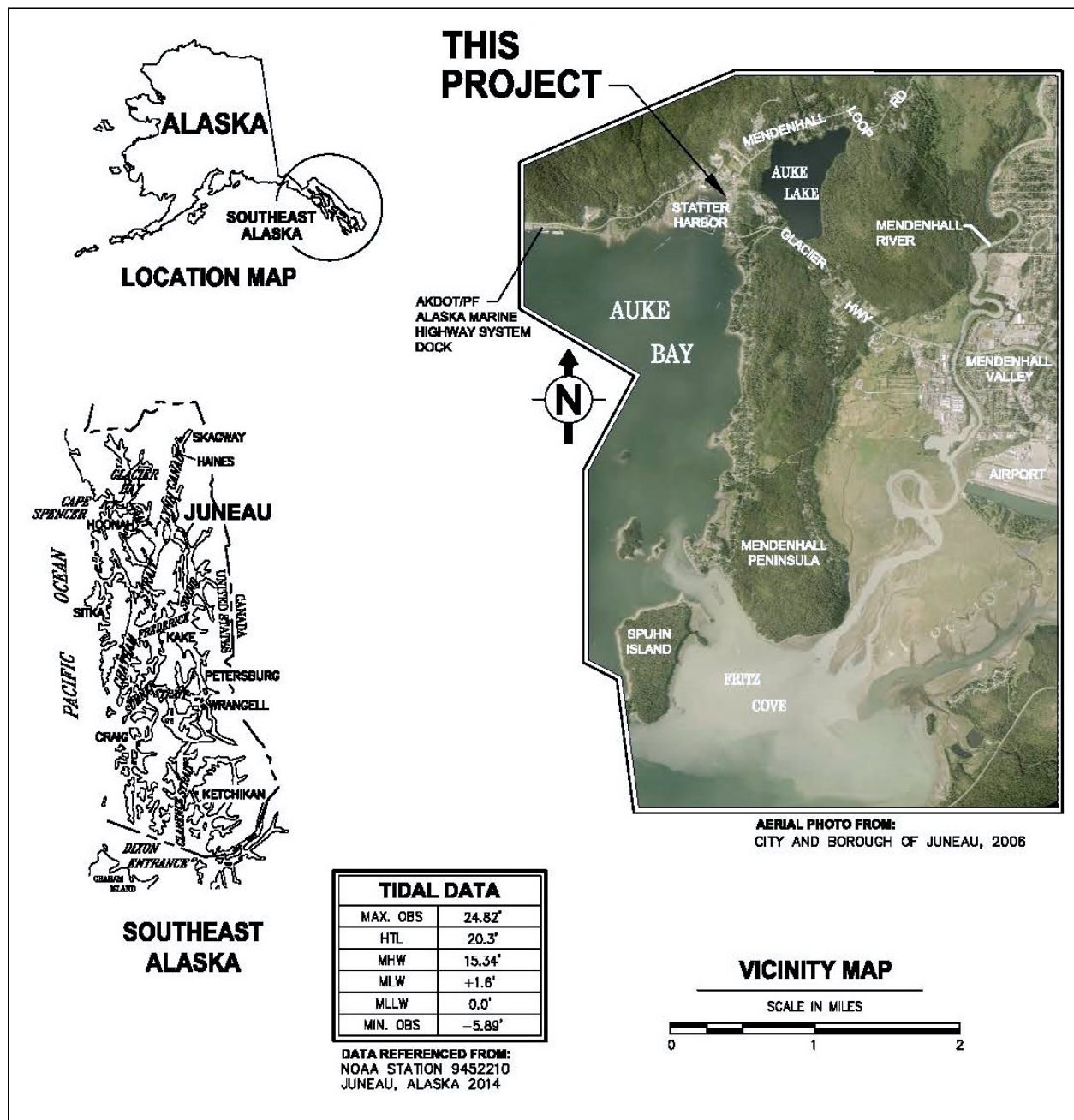


Figure 3. Region of Activity



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 Auke Bay 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.

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 known sightings of pacific white sided dolphins in the action area or within the project vicinity. 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). Due to the extremely low likelihood of sightings of pacific white sided dolphin at the project site and within applicable B harassment zones, this species is not included under this request and is not discussed further. Shutdown zones will be implemented should this species be present in the action area. Phase III A of the Statter Harbor Improvements project requested take of fewer species due to the different scope of work and generally smaller harassment isopleths. Due to the duration of drilling, and the associated harassment isopleths extending from Auke Bay into Stephens Passage (see Section 5), completing construction relying solely on shutdown measures for these species that are known to occur in the larger Auke Bay area is infeasible. While California Sea Lions are not listed as having a range extending into this area, one hauled-out in Statter Harbor in 2017 and are thus included in this application.

Descriptions of the humpback whale, Steller sea lion, harbor seal, Dall's porpoise, harbor porpoise, killer whale, minke whale and California sea lion are provided in Section 4.

Two marine mammal species that are listed under the ESA and could potentially occur in the action area; the humpback whale and the Steller sea lion. There are two recently defined DPSs of humpback whales that may be in the project area during construction, but only the Mexico DPS is listed as threatened. The Hawaiian DPS is not listed as threatened or endangered. Both the eastern and western DPSs of Steller sea lions may be located within the project area. The eastern DPS (eDPS) is not listed and the western DPS (wDPS) is listed as endangered. The wDPS is less likely to be present in the project area during the proposed action construction season. The proposed project is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of habitat for these species. Critical habitat has not been designated in the action area.



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
Humpback whale² <i>(Megaptera novaeangliae)</i>	10,103 (Entire Central North Pacific Stock) ²	Depleted, Strategic Stock	Threatened (Mexico DPS) & not listed	Intermittent
Steller sea lion² <i>(Eumetopias jubatus)</i>	41,638 (Eastern U.S. Stock)	Protected, Nonstrategic Stock	Delisted in 2013	Intermittent
	54,267 (Western U.S. Stock)	Depleted, Strategic Stock	Endangered	Rare
Harbor seal <i>(Phoca vitulina)</i>	9,478 (Lynn Canal/ Stephens Passage)	Protected, Nonstrategic Stock	NO	Common/Always present
Dall's porpoise <i>(Phocoenoides dalli)</i>	83,400 (Entire Alaska Stock)	Protected, Nonstrategic Stock	NO	Infrequent/Rare
Harbor porpoise <i>(Phocoena phocoena)</i>	975 (Southeast Alaska)	Protected, Strategic Stock	NO	Infrequent/Rare
Killer whale <i>(Orcinus orca)</i>	261 (Eastern North Pacific, Northern Residents)	Protected, Nonstrategic Stock	NO	Infrequent
	2,347 (Eastern North Pacific, Alaska Residents)			
	243 (West Coast Transients)			
Minke Whale	Unknown	Protected, Nonstrategic Stock	NO	Very Rare
California sea lion <i>(Zalophus californianus)</i>	296,750 (U.S. Stock)	Protected	NO	Very Rare

¹ Abundance estimates are from the most recent draft 2018 Alaska stock report (Muto *et al.* 2019) with the exception of the California Sea lion which is from the most recent Pacific Marine Mammals stock report (Carretta *et al.* 2019).

² Humpback whales and Steller sea lions are discussed in terms of the Distinct Population Segments in the following sections to better quantify the effects to the endangered population segments.



4 Affected Species Status and Distribution

This section describes the status, distribution, behavior, and critical habitat (ESA listed species only) for the affected species/stocks of marine mammals likely to be affected by the proposed project. Species prevalence within the project area is discussed in Section 6.

4.1 Humpback Whale (*Megaptera novaeangliae*)

4.1.1 Status

In 1970, the humpback whale was listed as endangered under the Endangered Species Conservation Act (ESCA) (35 FR 18319). In 1973 Congress replaced the ESCA with the Endangered Species Act (ESA), and humpback whales continued to be listed as endangered. Because humpback numbers subsequently increased across much of their range, NMFS conducted a global status review and reassessed the status of humpback whales under the ESA (Bettridge *et al.* 2015). Based on that review, 14 DPSs of humpback whales were identified, and listings revised as appropriate (81 FR 62260).

In the North Pacific, five DPSs that breed in subtropical and tropical waters from Asia to Central America then migrate north to feed in highly productive North Pacific feeding grounds were identified (Bettridge *et al.* 2015). Whales from three of these DPSs migrate to Alaskan waters: the Mexico DPS (ESA-listed as threatened), the Western North Pacific DPS (ESA-listed as endangered), and the Hawaii DPS (delisted) (81 FR 62260). These DPSs equate to the California/Oregon/Washington, Western North Pacific, and Central North Pacific stocks, respectively.

4.1.2 Distribution

The humpback whale is distributed worldwide in all ocean basins. Relatively high densities of humpback whales are found in feeding grounds in Southeast Alaska and northern British Columbia, particularly during summer months. Based on extensive photo identification data, NMFS has determined that individual humpback whales encountered in Southeast Alaska and northern British Columbia have a 93.9 percent probability of being from the recovered (delisted) Hawaii DPS (CV= 0.17) and a 6.1 percent probability of being from the currently threatened (ESA-listed) Mexico DPS (CV= 0.03) (Wade *et al.* 2016). There is a 0 percent probability that humpback whales in Southeast Alaska are from the endangered Western North Pacific DPS (Wade *et al.* 2016). Intermixed DPSs are not visually distinguishable; their identity can only be determined by DNA or photo identification. Therefore, we will use Wade *et al.* (2016) estimates that assume 93.9 percent of humpbacks in Southeast Alaska are from the Hawaii DPS and 6.1 percent are from the Mexico DPS.

Humpbacks migrate to Alaska to feed after months of fasting in low latitude breeding grounds. The timing of migration varies among individuals: most humpbacks begin returning to Alaska in spring and most depart Alaska for southern breeding grounds in fall or winter. Peak numbers of humpbacks in Southeast Alaska occur during late summer to early fall, but because there is significant overlap between departing and returning whales, humpbacks can be found in Alaska feeding grounds in every month of the year (Baker *et al.* 1985, Straley 1990, Witteveen and Wynne 2009). There is also an apparent increase in the number of humpbacks overwintering in feeding grounds in Alaska (Straley *et al.* 2017).

Humpback whale individuals of different DPS (natal) origin are indistinguishable from one another (unless fluke patterns are linked to the individual in both feeding and breeding ground). The frequency of occurrence of



animals by DPS provided in this IHA application is only an *estimate*, and is based on the DPS ratio and the assumption that the ratio is consistent throughout the Southeast Alaska region (Wade *et al.* 2016).

4.1.2.1 Hawaii Distinct Population Segment Humpback Whale (Hawaii DPS)

Humpbacks that breed around the main Hawaiian Islands have been observed in summer feeding grounds throughout the North Pacific. Most of the Hawaii DPS migrates to feeding grounds in Southeast Alaska and northern British Columbia (Bettridge *et al.* 2015). Mark-recapture analysis of identification photographs suggests the Hawaii DPS numbers approximately 10,103 individuals and is increasing (Calambokidis *et al.* 2008). A multi-strata analysis estimated the abundance of the Hawaii DPS as 11,398 individuals (CV=0.04) (81 FR 62260). As mentioned above, Wade *et al.* (2016) estimated that 93.9 percent of the humpbacks encountered in Southeast Alaska and Northern British Columbia are from the Hawaii DPS.

4.1.2.2 Mexico Distinct Population Segment Humpback Whale (mDPS)

Whales in the Mexico DPS typically breed off the Revillagigedo Islands in Mexico and migrate to northern feeding grounds ranging from British Columbia to the western Gulf of Alaska. Given their widespread range and their opportunistic foraging strategies, Mexico DPS humpback whales may be in the vicinity during the proposed project activities. In the final rule changing the status of humpback whales under the ESA (81 FR 62260), the abundance of the Mexico DPS was estimated to be 3,264 individuals (CV= 0.06) with an unknown trend. Note that only a portion of the Mexico DPS migrates to Alaska for feeding; the probability that a whale encountered in Southeast Alaska and northern British Columbia is from the Mexico DPS is, again, 6.1 percent (Wade *et al.* 2016).

4.1.2.3 Critical Habitat

No critical habitat has been designated for the Humpback whale in Alaskan waters.

4.1.3 Reproduction and Breeding

During the winter months most humpback whales make a long annual migration to the low-latitude subtropical and tropical waters to breed and calve. Humpback whales do not breed or calve in Alaska waters and individuals of the Hawaii DPS (North Central Pacific stock) primarily migrate to Hawaii for breeding and calving (Muto *et al.* 2018), while Mexico DPS (California/Oregon/Washington stock) whales breed in Mexican waters.

4.1.4 Foraging

While in their Alaskan feeding grounds, humpback whales prey on a variety of euphausiids and small schooling fishes including Pacific herring (*Clupea pallasii*), longfin smelt (*Spirinchus thaleichthys*), capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), juvenile walleye pollock (*Theragra chalcogramma*), and salmon (*Oncorhynchus* spp.) smolts (Nemoto 1957, Kawamura 1980, Krieger and Wing 1986, Witteveen *et al.* 2008, Straley *et al.* 2017, Chenoweth *et al.* 2017). Herring targeted by Southeast Alaska whales in Lynn Canal were lipid-rich, with energy content ranging from 7.3 to 10.0 kJ/gram (Vollenweider *et al.* 2011). The local distribution of humpbacks in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring and euphausiids (Moran *et al.* 2017). Important feeding areas include Glacier Bay and adjacent portions of Icy Strait, Stephens Passage/Frederick Sound, Seymour Canal, Lynn Canal, and Sitka Sound. During autumn and winter, the non-breeding season, humpbacks remaining in Southeast Alaska target areas where herring and eulachon (*Thaleichthys pacificus*) are abundant, such as Seymour Canal, Berners Bay, Auke Bay, Lynn Canal, and Stephens Passage (Krieger and Wing 1986, Moran *et al.* 2017). Over 2,940 and 2,019 humpback whale



foraging-days were documented in Lynn Canal alone in the 2007-2008 and 2008-2009 winter seasons, respectively (Moran *et al.* 2017).

4.1.5 Hearing Ability

Humpback whales live in an acoustic world. Humpbacks produce a variety of vocalizations ranging from 20 Hz to 10 kHz to locate prey, coordinate communal feeding efforts, attract mates, and for mother-calf communication (Au *et al.* 2006, Vu *et al.* 2012). NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, with an applied frequency range between 7 Hz and 35 kHz (NMFS 2016). Depending on its strength and duration, anthropogenic noise can result in social disturbance, physical discomfort, and masking of intraspecific humpback communication. Although difficult to detect visually, evidence that individual humpbacks are responding to elevated noise levels has been inferred by whales leaving/avoiding ensonified areas and reducing the duration and frequency of intraspecific vocalizations (NRC 2005, Nowacek *et al.* 2007). Humpback whales use singing as a form of underwater communication at their wintering grounds for mating and seasonally at feeding grounds, like the Aleutian Islands (Fleming and Jackson 2011). Loud underwater noises, such as those from seismic surveys and pile driving, can result in humpback whales adjusting their acoustic behavior in ways like altering song length (Fleming and Jackson 2011).

4.2 Steller Sea Lion (*Eumetopias jubatus*)

4.2.1 Status

The Steller sea lion was listed as a threatened species under the ESA in 1990 following declines of 63% on certain rookeries since 1985 and declines of 82% since 1960 (55 FR 12645). In 1997, two DPSs of Steller sea lion were identified based on differences in genetics, distribution, phenotypic traits, and population trends (Fritz *et al.* 2013, 62 FR 24345).

In 2014 Steller sea lions had a worldwide population estimated at 142,360-157,498 animals (Allen and Angliss 2014). The Eastern DPS (eDPS) population counts continued to increase during the same period and was removed from ESA listing in 2013 (78 FR 66140). The eDPS of Steller Sea Lions is protected under the MMPA but is not a strategic or depleted species. The Western DPS (wDPS) is listed as endangered under the ESA and is a depleted, strategic stock under the MMPA (Muto *et al.* 2017).

4.2.1.1 Eastern DPS

The eDPS stock is commonly found in the project area waters and were most recently surveyed in Southeast Alaska in June-July of 2015. The current population estimate for the US eDPS stock is 41,638 individuals. In Southeast Alaska the estimated total abundance is 28,594 individuals of which 20,756 are non-pups and 7,838 are pups. The eDPS has been increasing between 1990 to 2015 with an estimated annual increase of 4.76% for pups and 2.84% for non-pups (Muto *et al.* 2017).

4.2.1.2 Western DPS

The wDPS stock is found infrequently in the project area waters, however do occur rarely. The estimated overlap of the wDPS is discussed further in Section 6.2. The current abundance estimate for the US portion of the wDPS is 50,983. The overall trend for the wDPS in Alaska is an annual increase of 1.94% for non-pups and 1.87% for pups (Muto *et al.* 2017).



4.2.2 Distribution

Steller sea lions range throughout the North Pacific Ocean from Japan, east to Alaska, and south to central California (Muto et al. 2019). They range north to the Bering Strait, with significant numbers at haulouts on St. Lawrence Island, Alaska in the spring and fall. Their range extends around the North Pacific Ocean rim, with most sea lions occupying either rookeries or haulouts, depending on the season. Male sea lions are more likely to disperse beyond their typical habitat, but this primarily occurs after the breeding season (NMFS 2019a).

The wDPS generally occurs west of Cape Suckling (144° W longitude), and the eDPS generally occurs east of the Cape. The centers of abundance and distribution for the wDPS are in the Gulf of Alaska and Aleutian Islands.

The geographic and genetic interplay between the wDPS and the eDPS needs to be understood to gauge potential project impacts in the action area on the endangered wDPS. Large movements by individual Steller sea lions on either side of the 144° W demarcation have occurred, and wDPS individuals have been documented in Southeast Alaska, especially north of Sumner Strait (Jemison *et al.* 2013, Fritz pers. comm. 2017). Most Steller sea lions in the action area are expected to be from the eDPS but small numbers of wDPS animals also inhabit these waters (Jemison *et al.* 2013). However, it is not possible to visually distinguish between the two DPSs without brandings.

Members of this species are not known to migrate, but individuals disperse widely outside of the breeding season (late May to early July). At sea, Steller sea lions commonly occur near the 656-foot (200-meter) depth contour but have been found from nearshore to well beyond the continental shelf (Kajimura and Loughlin 1988). Sea lions move on and offshore to pelagic waters for feeding excursions. They are also capable of traveling long distances in a season. Sea lions may make semi-permanent or permanent one-way movements from one site to another (Chumbley *et al.* 1997, Burkanov and Loughlin 2005). Round trip transit of greater than 4,040 miles (6,500 km) by individual Steller sea lions has been documented (Jemison *et al.* 2013).

Land sites used by Steller sea lions are referred to as rookeries and haulouts. Rookeries are used by adult sea lions for pupping, nursing, and mating during the reproductive season (generally from late May to early July). Haulouts are used by all age classes of both genders but are generally not where sea lions reproduce. At sea, they are seen alone or in small groups, but may gather in large "rafts" at the surface near rookeries and haulouts or foraging sites.

4.2.2.1 Critical Habitat

There is no critical habitat designated for Steller sea lions within the action area. The action area is located approximately 12 nautical miles (22.22 kilometers) from around Benjamin Island, well outside of the 3,000-foot (914.4-meter) designated critical habitat (Figure 4).

4.2.3 Reproduction and Breeding

The breeding range extends along the northern edge of the Pacific Ocean from the Kuril Islands, Japan, through the Aleutian Islands and Southeast Alaska, south to California (Loughlin *et al.* 1984).

4.2.4 Foraging

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods (e.g., capelin, cod, herring, mackerel, pollock, rockfish, salmon, sand lance, etc.), bivalves, cephalopods (e.g., squid and octopus) and gastropods (Pitcher 1981; Merrick *et al.* 1997). On rare occasions, Steller sea lions prey on seals and possibly sea otter pups.



Their diet may vary seasonally depending on the abundance and distribution of prey. Womble *et al.* (2009) found that “a reasonable annual foraging strategy for Steller sea lions is to forage on herring (*Clupea pallasii*) aggregations in winter, spawning aggregations of forage fish in spring, salmon (*Oncorhynchus spp.*) in summer and autumn, and pollock (*Theragra chalcogramma*) and Pacific hake (*Merluccius productus*) throughout the year.” They may disperse and range great distances to find aggregated prey but are not known to migrate. Steller sea lions can dive to approximately 1,300 feet (400 meters) in depth to exploit deep prey resources.

4.2.5 Hearing Ability

Steller sea lion’s hearing sensitivity is similar to that of other otariids. Steller sea lion aerial hearing ability ranges from approximately 0.25-30 kHz; however, hearing of one individual was found to be most sensitive to noise from 5-14.1 kHz (Muslow and Reichmuth 2010). Underwater, Steller sea lion best hearing range has been measured at from 1-16 kHz in a male individual and maximum hearing sensitivity of a female individual at 25 kHz, showing a marked sexual dimorphism (though hearing characteristics may also vary based on age or size of the individual). Steller sea lions use both aerial and underwater vocalizations during breeding, territorial disputes, and rearing of pups (Kastelein *et al.* 2005).

NMFS categorizes Steller sea lions in the Otariid Pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz (NMFS 2016).

4.2.6 Steller Sea Lion Critical Habitat

There is no critical habitat designated for Steller sea lions within the action area. The action area is located approximately 12 nautical miles (22.22 kilometers) from around Benjamin Island, well outside of the 3,000-foot (914.4-meter) designated critical habitat (Figure 4).



Figure 4. Steller Sea Lion Critical Habitat Sites in Southeast Alaska



4.3 Harbor Seal (*Phoca vitulina*)

4.3.1 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.

4.3.2 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 (Klinkhart *et al.* 2008). Harbor seal movement is highly variable, with no seasonal patterns identified.

Up to 44% of their time is spent hauled out, with hauling out occurring more often during the summer (Pitcher and Calkins 1979; Klinkhart *et al.* 2008). Harbor seals 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; Klinkhart *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.

4.3.3 Reproduction and Breeding

In Alaska harbor seals typically give birth to single pups between May and mid-July (Klinkhart *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 (Klinkhart *et al.* 2008).

4.3.4 Diving and Foraging

Harbor seals commonly dive to depths that are less than 20 meters 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 (Klinkhart *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).

4.3.5 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 Turnbull 1995, Kastak and Schusterman 1998, Wolski *et al.* 2003). Harbor seals are considered part of the Phocid Pinniped hearing group (NMFS 2016).

4.4 Dall's Porpoise (*Phocoenoides dalli*)

4.4.1 Status

The Dall's porpoise is not designated as depleted or classified as strategic under the MMPA, nor are they listed under the ESA. Only one stock of Dall's porpoise is currently recognized in Alaskan waters – the Alaska stock – with an estimated abundance of 83,400, although this estimate is outdated (Muto *et al.* 2019). While the Dall's porpoise is generally considered abundant, there is insufficient data on population trends to determine whether the population is stable, increasing or decreasing (NMFS 2019b).

4.4.2 Distribution

Dall's porpoises are widely distributed in the North Pacific Ocean, usually in deep oceanic waters (>600 ft/183 m), over the continental shelf or along slopes (NMFS 2019b, Muto *et al.* 2019). They can be found along the west coast of the United States ranging from California to the Bering Sea in Alaska (NMFS 2019b).

4.4.3 Reproduction and Breeding

Dall's porpoises can be found in Alaskan waters year-round (Muto *et al.* 2019) and typically give birth between June and September to single calves (NMFS 2019b).

4.4.4 Foraging

Dall's porpoises feed on small schooling fish, mid- and deep-water fish, cephalopods, and crustaceans. Their prey includes anchovies, herring, hake, myctophids, smelts, squid, octopus, crabs, and shrimp (NMFS 2019b).

4.4.5 Hearing Ability

Dall's porpoises communicate through generation of clicks at the 165 to 175 kHz range and have a general hearing range between 275 Hz and 160 kHz (NMFS 2016). They are considered part of the high-frequency cetacean hearing group.



4.5 Harbor Porpoise (*Phocoena phocoena*)

4.5.1 Status

The Southeast Alaska stock of harbor porpoise is not designated as depleted under the MMPA nor listed under the ESA but is considered Strategic due to human-induced mortality (Muto *et al.* 2018).

4.5.2 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. NMFS currently acknowledges three stocks of harbor porpoise within this range (Muto *et al.* 2018), with the one encompassing the action area – the Southeast Alaska stock – ranging from Dixon Entrance to Cape Suckling. This stock is estimated to include 975 individuals based on 2010-2012 surveys (Muto *et al.* 2018).

The harbor porpoise frequents nearshore waters and coastal embayments throughout their range, including bays, harbors, estuaries, and fjords less than 650 feet (198 m) deep (NMFS 2019c).

4.5.3 Reproduction and Breeding

Harbor porpoises are believed to typically mate during summer months and give birth between May and July, however very little is known about their reproduction and breeding (NMFS 2019c)

4.5.4 Foraging

Harbor porpoises forage primarily on Pacific herring, other small schooling fish, and cephalopods and will occasionally feed on squid and octopus (NMFS 2019c). In Southeast Alaska, large numbers of harbor porpoise may form temporary feeding aggregations in areas of localized prey concentration, such as Icy Strait and Sumner Strait (Muto *et al.* 2018).

4.5.5 Hearing Ability

Based on their hearing capacity, Harbor porpoise are considered to be in the high frequency functional hearing group, with assumed sensitivity matching sound they generate (NMFS 2016). Harbor porpoise' best estimated hearing ranges from 16 to 140 kHz with maximum sensitivity occurring between 100 and 140 kHz (Kastelein *et al.* 2005b). The peak frequency produced by harbor porpoises for echolocation is 120 to 130 kHz, which corresponds with the maximum sensitivity range.

4.6 Killer Whale (*Orcinus orca*)

4.6.1 Status

NMFS considers three stocks of killer whales to occur in southeast Alaskan waters, which may occur separately or concurrently within the project area. These stocks are the Eastern North Pacific/Alaska Resident stock (2,347 individuals), Eastern North Pacific/Northern Resident stock (261 individuals), the West Coast Transient stock (243 individuals) (Muto *et al.* 2018). These stocks represent two of the three ecotypes of killer whales occurring within the North Pacific Ocean – resident (forages on fish) and transient (forages primarily on marine mammals). However, NMFS is evaluating new genetic information that will likely result in a revision of the above stock



structure (Muto *et al.* 2018). The killer whale is protected under the MMPA, but none of these stocks are listed as a strategic or depleted species under the MMPA nor is it listed as threatened or endangered under the ESA.

4.6.2 Distribution

Killer whales are found in every ocean of the world (NMFS 2019d) and are the most widely distributed marine mammal (Allen and Angliss 2014).

4.6.3 Reproduction and Breeding

Killer whales do not have a distinct breeding season and their birthing rate is not well understood, however it is estimated that killer whales will give birth once every five years (NMFS 2019d).

4.6.4 Foraging

Killer whales have no natural predators and are known as the top carnivores currently living on the Earth (Pitman 2011). The species has the most varied diet of all cetaceans; however, the transient populations typically hunt marine mammals while the resident populations feed on fish, particularly salmon and Atka mackerel (Barrett-Lennard *et al.* 2011, Parsons *et al.* 2013). Residents often travel in much larger and closer groups than transients and have been observed sharing fish they catch. Transient killer whales feed on other marine mammals including Steller sea lions, harbor seals, and various species of cetaceans. They are also more likely to rely on stealth, making less frequent and less conspicuous calls and skirting “along shorelines and around headlands” in order to hunt their prey in highly coordinated attacks (Barrett-Lennard *et al.* 2011).

4.6.5 Hearing Ability

Killer whales rely on underwater sound for a variety of reasons including navigation, feeding, and communication. Killer whales use echolocation to assist with food gathering — transient killer whales use it rarely and most likely for hunting, while resident whales use it to locate salmon (Au *et al.* 2004). Killer whale social signals resemble the sound of mid-range tactical sonar (Southall *et al.* 2007), with signals commonly occurring as pulsed calls, whistles, and clicks (Szymanski *et al.* 1999). Increases in noise levels near killer whale habitat, like that associated with increasing vessel traffic, have been found to result in an increase in the duration of killer whale calls (Foote *et al.* 2004 as cited in Southall *et al.* 2007). Killer whales are part of the mid-frequency cetacean functional hearing group, with their estimated auditory bandwidth between 150 Hz and 160 kHz (Southall *et al.* 2007).

4.7 Minke Whale (*Balaenoptera acutorostr*)

4.7.1 Status

The minke whale is protected under the MMPA but is not listed as a strategic or depleted species. Minke whales are also not listed as threatened or endangered under the ESA, although no abundance estimates are available for minke whales (Muto *et al.* 2018). The minke whales population status is considered stable and they are the most abundant rorqual, or “great whale”, in the world (NMFS 2019e).

4.7.2 Distribution

Minke whales are widely distributed throughout the northern hemisphere and are found in both the Pacific and Atlantic oceans. Minke whales in Alaska are considered migratory and during summer months are typically found in the Arctic and during winter months are found near the equator (NMFS 2019e).



4.7.3 Reproduction and Breeding

Minke whales are believed to calve in the winter months (NMFS 2019e), however little is known about their breeding areas.

4.7.4 Foraging

Minke whales feed by side-lunging through schools of prey and are opportunistic predators feeding on a variety of crustaceans, plankton, and small school fish (NMFS 2019e).

4.7.5 Acoustic Ecology

Minke whales have a generalized hearing range of 7 Hz to 35 kHz and fall under the Low-frequency Cetacean hearing group (NMFS 2019e).

4.8 California Sea Lion (*Zalophus californianus*)

4.8.1 Status

The California Sea Lion is protected under the MMPA but is not listed as a strategic or depleted species under the MMPA (NMFS 2019d). The California sea lion is not listed as threatened or endangered under the ESA. The California sea lion U.S. stock population is estimated at 296,750 animals (Carretta et al. 2017) and has grown by 6.2 percent on average since 1983 (NMFS 2019f).

4.8.2 Distribution

The U.S. stock of California sea lions have a wide range, typically from the border of the United States and Mexico (NMFS 2019d). During the winter males commonly migrate to feeding grounds off California, Oregon, Washington, British Columbia and recently Southeast Alaska. Females and pups on the other hand stay close to breeding colonies until the pups have weened. The furthest north females have been observed is off the coast of Washington and Oregon during warm water years (NMFS 2019f). While California sea lions aren't common in Alaska, one was present on the docks in Statter Harbor in 2017 (NOAA 2017).

4.8.3 Reproduction and Breeding

California sea lions typically breed on islands in southern California, western Baja California and the Gulf of California (Carretta et al 2017).

4.8.4 Foraging

California sea lions feed primarily offshore in coastal waters. They are opportunistic predators and eat a variety of prey including squid, anchovies, mackerel, rockfish and sardines (NMFS 2019f).

4.8.5 Hearing Ability

Based on their hearing capacity, California sea lions are considered to be in the Otariid Pinniped functional hearing group, with assumed sensitivity matching sound they generate (NMFS 2016). The general hearing range is from 60 Hz to 39 kHz.



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Incidental Harassment Authorization Request
CBJ D&H Statter Harbor Improvements Project Phase III B



5 Type of Incidental Take Authorization Requested

Under Section 101(a)(5)(D) of the MMPA, CBJ D&H requests an IHA for takes by Level A harassment (i.e., non-serious injury or permanent [hearing] threshold shift) and 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 D&H requests an IHA for one year with an effective date of October 1, 2020. If work included in Phase III B is not completed at the end of that period, CBJ D&H would request an IHA renewal.

Take is requested for the following activities;

- Drilling, impact pile driving and vibratory pile driving activities (as described in Section 1.3 and combined with the mitigation measures described in Section 10) have the potential to take permitted marine mammals by Level B harassment resulting in behavioral disturbance or temporary threshold shift (TTS) due to the effects of increased underwater noise levels.
- Impact pile driving (as described in Section 1.3) and applying the mitigation measures described in Section 10) has the potential to take permitted marine mammals by Level A harassment resulting in permanent threshold shift (PTS) or non-serious injury.
- During impact and vibratory pile driving activities the project has the potential to increase airborne noise levels for pinnipeds hauled out along the shoreline of Auke Bay. Airborne impact isopleths are substantially smaller than underwater impact isopleths for the same activities, so it is likely that any takes from airborne noise would already be accounted for in estimates for underwater noise impacts.

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 Section 10 and in Appendix B. Takes of non-permitted species will be prevented by the mitigation measures described in Section 10.

5.1 Method of Incidental Taking

Statter Harbor Improvements Phases III B includes drilling, impact and vibratory pile driving in an area where Steller sea lions, humpback whales, and 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 μ Pa (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 μ Pa (for underwater) and in dB re: 20 μ Pa 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 $\mu\text{Pa}^2\text{-sec}$. (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 $\mu\text{Pa}^2 \text{ s}$)					
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 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* 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

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

⁵ OW Pinnipeds include the Steller sea lion and California sea lion



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 value 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

5.3.1.1 Non-Impulsive Sources - Vibratory Pile Driving and Removal

The closest known measurements of sound levels for vibratory pile installation of 16-inch (41-cm) steel piles are from the U.S. Navy Proxy Sound Source Study for projects in Puget Sound. Based on the projects analyzed it was determined that 16- to 24-inch (41- to 61-cm) piles exhibited similar sound source levels for projects in Puget Sound resulting in a recommended source level of 161 dB_{RMS} at 33 feet (10 m) for piles diameters ranging from 16- to 24-inches (41- to 61-cm) (U.S. Navy 2015).

The closest known measurements of vibratory pile removal similar to this project are from the Kake Ferry Terminal project for vibratory extraction of an 18-inch steel pile. The extraction of 18-inch steel pipe piles using a vibratory hammer resulted in underwater noise levels reaching 152.4 dB_{RMS} at 55.8 feet (17 meters) (Denes *et al.* 2016). The pile diameters for the proposed project are smaller, thus the use of noise levels associated with the pile extraction at Kake are conservative.

Table 7. Parameters for Vibratory Pile Driving 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	16-inch (41-cm) Steel Pile Removal	152.4 dB _{RMS} ^a at 56 ft (17 m)	2.5 kHz	12 ¹	23 ²
		16-inch (41-cm) Steel Pile Installation	161 dB ^b at 33 ft (10 m)			

(^aUS Navy 2015; ^bDenes *et al.* 2016)

Pile driving noise is conservatively anticipated to be continuous over 12 hour work days, over a total of 23 work days. It is anticipated all of the piles will require drilling for rock anchors and will be installed at the rate of a single pile per day. To be conservative and to account for unseen circumstances in the field pile driving activities may occur over an estimated total of 23 days.

¹ Actual duration of pile driving noise will likely be less than 12 hours due to the amount of time it takes to pick up and prepare piles to be driven. However, to be conservative a total duration of 12 hours is used for assessment purposes. Both pile installation and removal may occur in a single day. Due to the short nature of pile removal (approximately 1 hour or less) it is include within the total duration for vibratory installation.

² The total duration of pile driving, including drilling, vibratory and impact installation, is 23 days. Use of impact hammers is not anticipated, and will only be used for piles that encounter soils too dense to penetrate with the vibratory equipment. Should impact hammers be required both vibratory and impact hammers may be used during a work day.



Underwater harassment zones are summarized in Section 5.4. Permitted pinnipeds and cetaceans 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/removal will shut down.

5.3.1.2 Down the Hole Drilling

Denes *et al.* (2016) measured sound emanating from the drilling of 24-in (61-cm) piles at Kodiak and calculated a median sound source level SPL of 166.2 dB at 33 feet (10 meters) which was used to calculate the PTS onset isopleths. Other recent sound source verification data from Skagway is available, however it is solely for the installation of 42-inch (107-cm) diameter piles and thus the Denes *et al.* (2016) is the best available estimate for the installation of drilled rock sockets for 16-inch diameter piles.

Table 8. Parameters for Underwater Noise Calculations

Source	Source Type	Median SPL _{RMS} (dB re 1 µPa @ 1 m)	Estimated Duration	
			Hours per Day	Days
Drilling Installation	Non-impulsive, continuous	166.2 dB ^a at 33 feet (10 m)	6-12 hours (1-2 piles) ¹	23

(^aDenes *et al.* 2016)

5.3.1.3 Impact Pile Driving

For impact pile driving of 16-inch (41-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) piles data for the 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 9. 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-inch (41-cm)	190 dB _{RMS} ^a at 33 ft (10 m)	205 dB	175 dB ^a at 33 ft (10 m)	2 kHz	0-1	500	0-23

(^aYurk *et al.* 2013)

¹ Actual duration will be dependent on actual field conditions encountered. To conservatively analyze noise impacts the longest duration of 12 hours is used.



5.3.2 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-cm) piles was not available. Vibratory installation of 16-inch (41-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 vibratory pile driving.

Table 10. Parameters for Airborne Noise Calculations

Source	Source Type	Pile Size	Sound Pressure Level
Vibratory Hammer	Non-impulsive, continuous	16-inch (61-cm)	96.4 dB _{L5EQ} at 50 feet (15 m) ^a
Impact Hammer	Impulsive	16-inch (61-cm)	111 dB _{RMS} at 15 feet (15 m) ^b

(^aLaughlin 2010; ^bWSDOT 2017)



5.4 Calculated Impact Isopleths

Table 11. Calculated Isopleths – Underwater Sources

Source	Source Level	PTS Onset Isopleth					Behavioral Disturbance Isopleth
		(LF) Low-Frequency Cetaceans	(MF) Mid-Frequency Cetaceans	(HF) High-Frequency Cetaceans	Phocid Pinnipeds (PW)	Otariid Pinnipeds (OW)	Cetaceans & Pinnipeds
Vibratory Pile Removal (Steel)	152.4 dB _{RMS} ^a at 56 ft (17 m)	53.5 ft (16.3 m)	4.6 ft (1.4 m)	78.7 ft (24.0 m)	32.5 ft (9.9 m)	2.3 ft (0.7 m)	8061.8 ft (2457.2 m)
Vibratory Installation/Drilling¹	166.2 dB _{RMS} ^b at 33 ft (10 m) ^a	260.8 ft (79.5 m)	23.0 ft (7.0 m)	385.8 ft (117.6 m)	158.5 ft (48.3 m)	11.15 ft (3.4 m)	7.5 miles (12.1 km)
Impact Pile Driving (Steel)	175 dB ^c at 33 ft (10 m)	604.3 ft (184.2 m)	21.7 ft (6.6 m)	720.1 ft (219.5 m)	323.5 ft (98.6 m)	23.6 ft (7.2 m)	3,280 ft (1,000 m)

(^aAustin et al 2015; ^bDenes et al. 2016; ^cYurk 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	96.4 dB _{L5EQ} at 50 feet (15 m) ^a	N/A	115 feet (35 m)	33 feet (10 m)
Impact Pile Driving	110 dB _{RMS} at 50 feet (15 m) ^b	N/A	492 feet (150 m)	164 feet (50 m)

(^aLaughlin 2010, ^bLaughlin, 2013)

¹ Based on experience both vibratory installation and drilling will occur in a single day. Level A harassment zones have been calculated based on the assumption that both vibratory installation and drilling will both occur during a single workday with a total duration of up to 12 hours. Actual work days may be shorter based on the contractors means and methods.



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

Source	Underwater Noise (dB re: 1 μ Pa)					
	Source Level	Low-Frequency (LF) Cetaceans	Mid-Frequency (MF) Cetaceans	High-Frequency (HF) Cetaceans	Phocid Pinnipeds (PW)	Otariid Pinnipeds (OW)
16-inch piles	175 dBA 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

(*Yurk et al. 2015*)

6 Number of Marine Mammals that May Be Affected

The CBJ is requesting the issuance of an IHA for one year with an effective date of October 1, 2020 for take of MMPA-defined stocks that include animals in the endangered Steller sea lions wDPS and humpback whales from the threatened Mexico DPS. This IHA request covers these ESA-listed species in their respective MMPA-defined stocks and covers anticipated takes of non-ESA listed marine mammal populations.

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 D&H 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.

A take summary is provided in Table 14 and the basis for these take estimates for each species are provided in Sections 6.1 through 6.8.



Table 14. Take Summary

Species		Number of Takes	
		Level B	Level A
Humpback whale	Humpback Whale Hawaii DPS	86	N/A
	Humpback Whale Mexico DPS	6	N/A
Steller sea lion	Steller Sea Lion eDPS	2,282	N/A
	Steller Sea Lion wDPS	501	N/A
Harbor seal		2,806 (255,285 sightings)	253 (11,509 sightings)
Dall's porpoise		60	12
Harbor porpoise		46	23
Killer whale		55	N/A
Minke whale		8	N/A
California Sea Lion		23	N/A

6.1 Humpback Whale

Humpback whales occur frequently in Auke Bay in winter on an intermittent basis, but their genetic and stock-designation identities are rarely known: individuals are indistinguishable unless humpback whale fluke or dorsal fin shape and pattern are known. Data on their distribution suggests that both the mDPS and Hawaii DPS of humpback whales may be present in Auke Bay. No quantitative agency data or published reports on marine mammals in Auke Bay are available at the time of this writing.

For information on marine mammals in the Auke Bay Statter Harbor project area, several long-standing researchers, naturalists and academic scientists were consulted regarding the presence and abundance of these species in Auke Bay, and their typical winter habitat use patterns in the broader Auke Bay region and Statter Harbor, specifically. Individuals consulted provided records consisting of written survey counts, recorded opportunistic observations, or date-linked imagery such as photographs and video clips from which positive species identifications and individual counts could be made. These data were compiled by Oceanus Alaska (Ridgeway unpubl. data 2017).

Some whale researchers, resource managers, and whale watching guides track the presence of individual Humpback whales in the Juneau area by unique fluke patterns (Krieger and Wing 1986, Teerlink 2017). Based on fluke pattern identification, 189 unique whales were identified in the Juneau to Glacier Bay and Seymour Canal area (Krieger and Wing 1986). In recent years, 179 individual humpback whales were identified from the Juneau area, based upon fluke photographs taken between 2006 and 2014 (Teerlink 2017).



For the waters closer to the Auke Bay project vicinity, including Stephens Passage, Saginaw Channel, Favorite Channel, and Lynn Canal, researchers have documented 4 to 18 humpback whales in winter (Krieger and Wing 1986, Moran *et al.* 2017). Residents immediately north of Tee Harbor (Quinn unpubl. data 2017) have maintained records of opportunistic whale observations since 1994. Winter records for months October through May were extracted from these data for analysis. During the 24-year observation period, a total of 483 observations were recorded of 709 individual humpback whales (Quinn unpubl. Data 2017). Of these, 483 sightings were of single whales, 96 observations were of two whales (pairs or two individuals), and 40 observations were of groups ranging from 3 to 12 individuals each. Many presumed mother-calf pairs were noted. Whales in this area engaged in a wide range of activities, including feeding, browsing, trumpeting, vocalizing (a wide range of tones and rhythms), sleeping and transiting. This observation area is within 10 nm (~16 km) of the project area, and whales seen here are presumed to move in and out of Auke Bay throughout the winter months.

For the years 2013 through 2017, 117 observational records of humpback whales were taken during oceanographic surveys in Auke Bay from Statter Harbor breakwater, Auke Bay Marine Station dock, and by boat on a monthly or quarterly basis (Ridgway unpubl. data 2017). Additional records were taken from opportunistic surveys from the Auke Bay Marine Station observation pier on a more frequent basis during winter months. Typical numbers observed at any given time are 0-1 whales. Four whales in a single day have been seen every year in at least three winter months, and in one year up to seven individuals have been observed inside Auke Bay concurrently during at least one month. Carlson and Haight reported observing one to nine whales in Auke Bay from 1973-1984.

These data were compiled with University of Alaska Southeast student survey data from 2015-2016 (Pearson *et al.* unpubl. data 2017) and additional observation records from multiple sources to build a non-continuous time series of marine mammal occurrence in Auke Bay. Photographs, video, and media reports on mammal occurrences were used to augment written records. Thirteen individuals and agencies contributed data records or time-linked countable imagery. Images of individual animals were used to document presence/absence of a species in Auke Bay, and specific habitat was noted if recognized. Photographs and images of multiple animals were reviewed and individually counted twice by independent viewers, and the lower confirmed count was entered.

In the winter of 2015 and 2016, two whales slept in the harbor at night over a five-week period between the headwalk float and the shore, often against a large wooden tugboat that winters in the harbor. Other whales have been observed sleeping in 2016 and 2017 alongshore near the Auke Bay ferry terminal.

In addition to count data, the local whale fluke database was used for matching individual whale identifications; Teerlink (2017) and others have observed two individual whales in Auke Bay on multiple occasions in 2017:



Figure 5. Humpback whale “Dot Spot”

Humpback whale no. 1443, named “Dot Spot” was in Auke Bay Harbor on February 18, 2017; March 05, 2017; and March 13, 2017. Other observers have confirmed that Dot Spot was likely the most frequently observed whale in Auke Bay Statter Harbor from 2015 to 2017 (Armstrong pers. comm. 2017, Bakker pers. comm. 2017; S. Teerlink 2017).

Humpback whale no. 2460 (no name). Teerlink observed no. 2460, multiple times across three winter seasons in Auke Bay: October 1 to May 31 2015, 2016 and 2017.



Figure 6. Humpback whale No. 2460

Neither whale no. 1443 nor 2460 have been linked to breeding ground identifications, hence, the DPS from which they originate is not currently known.



Humpback whales utilize habitats in the project area intermittently. The breakwater and other dock structures appear to serve as fish-attracting devices, where forage fish (herring, capelin, sandlance, pollock, and juvenile salmon) aggregate and are targeted by diving humpback whales. Two humpback whales in recent years have also targeted a shallow trough off the east end of the Statter harbor breakwater for deeper diving foraging excursions targeting herring and possibly juvenile pollock (Ridgway pers. observ.). Some individual whales enter Auke Bay through the north Coghlan Island entrance and conduct a pattern of exploitation or “browsing” in the bay and inner harbor. In this area some whales lunge feed and gulp massive volumes of feed in seawater immediately adjacent to or rubbing against boats, docks and other structures in deep to shallow waters throughout the action area. These whales have been observed continuing a pattern search alongshore to Auke Creek and up Fritz Cove, where they have been seen lunge feeding in small coves and gullies in shallow water to aggregate schooling fish.

Because humpback whale individuals of different DPS (natal) origin are indistinguishable from one another (unless fluke patterns are linked to the individual in both feeding and breeding ground), the frequency of occurrence of animals by DPS is only *estimated* using the DPS ratio, based upon the assumption that the ratio is consistent throughout the Southeast Alaska region (Wade *et al.* 2016).

We believe that the proposed action will likely result in direct and indirect impacts on humpback whales through short-term harassment, possible alteration of transit or sleeping locations, and temporary prey species displacement. For purposes of estimating effects and takes of the mDPS of humpback whales, we acknowledge that they cannot be readily distinguished from non-listed humpback whales in the project area and assume that some whales are from the mDPS.

Work is expected to occur over 23 days and will involve a mixture of vibratory pile driving and drilling each day. Based on the available information and the extent of the Level B harassment zone it is estimated up to 4 humpback whales could be exposed to elevated noise during each day of pile driving and drilling. Using a daily potential maximum rate of four humpback whales per day, the project could take up to 92 humpback whales.

Table 15. Estimated number of takes of humpback whales¹

Species	Vibratory Pile Driving and Drilling
	(23 days)
Humpback Whale Hawaii DPS	86
Humpback Whale Mexico DPS (6.1%)	6
	Total Takes 92

No Level A takes are requested for humpback whales as the Level A harassment zones are small and shutdown measures can be implemented prior to any humpback whales enter Level A harassment zones.

The Level B harassment potential from the proposed activities is **not likely** to result in significant adverse impacts to any humpback whales.

¹ Estimated number of total takes of mDPS humpback whales incidental to each activity with the potential to result in take. Basis for total take of humpback whales in Statter Harbor: likely daily counts of up to two humpback whales in Statter Harbor (of which 6.1% may be of the mDPS) X #days of activity.



6.2 Steller Sea Lion

Steller sea lions occur in Auke Bay in winter on an intermittent basis, but their genetic and stock-designation identities are rarely known: individuals are indistinguishable unless sea lions are branded (and the brand is observed). Satellite-tagged individual animals from the Benjamin Island haulout and Auke Bay were observed multiple times between November 2010 and January 2011 (Fadely 2011), and the Auke Bay boating community frequently observes Steller sea lions moving to and from the haulout complex into Auke Bay. No quantitative agency data or published reports on marine mammals in Auke Bay are available at the time of this writing.

From 2013-2017, Steller sea lion have been documented in Auke Bay travelling as individuals or in herds of 50 to an estimated 120+ animals, during every month of the winter season. During winter 2015-2016, Steller sea lions foraged aggressively on young herring and 1-2-year-old Walleye pollock for over 20 days, continuously. Some sea lions were also observed consuming small flatfish, likely yellowfin sole, harvested from the seafloor (depth 25-45 meters), during this period. While no sea lions were observed hauled out on beaches or structures in the harbor, large rafts of 20-50 animals formed and rested in the outer harbor area between foraging bouts.



Figure 7. Steller sea lions aggressively foraging on Auke Bay herring. December 2015. Photo: Jos Bakker

Simultaneous surface counts of 121 individual sea lions suggests that likely upwards of 200 animals or more were targeting prey in Statter Harbor during herring aggregation events. These 121 to 200 animals comprise roughly 20 to 30% of the animals typically found at the Benjamin Island and Little Island haulout complexes during winter months. (Ridgway pers. observ.)

Since 1988, ADF&G has branded a sample of Steller sea lion pups born on Southeast Alaska rookeries as a means of studying the life history and movements of this population. Temporal and regional re-sights of branded

SSLs have helped document a degree of mixing of eDPS and wDPS Steller sea lions in Southeast Alaska waters (Jemison *et al.* 2013).

Only three individual, branded wDPS Steller sea lions have been observed at Benjamin Island, the closest haulout, from 2003-2006 with a maximum of 3 sightings per individual. No branded wDPS individuals have been observed in the ADF&G surveys from 2007-2016. The 2007 ADF&G surveys offer the most abundant data for Steller sea lion counts at Benjamin Island. A total of 11 surveys were conducted between January and July 2017, ranging from 0-768 Steller sea lions, with an average count of 404 individuals. In 2007 no wDPS animals were observed. While it is possible an individual from the wDPS may be at the Benjamin Island haulout, it is rare, and none have been documented at this haulout for the last decade (Jemison pers. comm. 2017).

Although recent data in the northern part of the eastern DPS indicate movement of western sea lions east of the 144° line, the mixed part of the range remains small (Jemison *et al.* 2013) and the overall discreteness of the eDPS from the wDPS remains distinct. Based on observations by ADF&G over the last decade this project is unlikely to impact wDPS individuals. Recent studies indicate up to 18% of the Steller sea lions in Southeast Alaska, and at Benjamin Island may be from the wDPS (Hastings *et al.* 2019).

Using a potential daily maximum rate, the project could take up to 121 Steller sea lions each day of pile driving activities due to the large Level B harassment zones. It will be (conservatively) assumed that no more than 121 individual sea lions will enter the outer harbor each day. The maximum daily count of 121 was used to make this determination as Steller sea lions have been observed in large herds within vicinity of the harbor in excess of seven days when prey is abundant and the Level B harassment zones are large and in relatively close proximity



to Benjamin Island (~22 km from project site). Thus, during these times it is likely that the rate of taking would be higher as the animals will be counted more than once if they dive and/or leave and re-enter the monitoring zone. On other days when dense groups are not present, fewer takes will be encountered, and it is assumed the overall take levels will even out. While there are a small number of resident harbor seals, it is anticipated there will be larger numbers of Steller sea lion takes, due to the large herds they have been observed in, the large size of the Level B harassment zones (up to 12.1 km) and the relative proximity to an established haul-out at Benjamin Island. While the Level B harassment zones for Phase III A were generally smaller, much of the larger zones in Phase III B are truncated due to land masses. Further, take numbers are estimated based on the largest group observed rafting in the Auke Bay vicinity and thus is considered to be an appropriate estimate for this phase as well.

While Steller sea lions are present in large numbers within the action area, they are seen in small numbers less frequently within the inner harbor. Based on conversations with the Statter Harbor harbormaster 6-8 Steller sea lions are seen within the inner harbor several times per week during.

No Level A takes are requested for Steller sea lions as the Level A harassment zones are small and shutdown measures can be implemented prior to Steller sea lions entering any Level A harassment zone. The Level B harassment potential from the proposed activities is **not likely** to result in significant adverse impacts to Steller sea lions.

Table 16. Estimated number of takes of Steller sea lions

Species	Vibratory Pile Driving and Drilling
	(23 days)
Steller Sea Lion eDPS	2,282
Steller Sea Lion wDPS (18%)	501
	Total Takes 2,783

6.3 Harbor Seal

Harbor seals are residents of the project area and observed within the harbor on a regular basis and can be found within the immediate project vicinity on a daily basis. Over the last three winters, a group of up to 12 harbor seals has been observed in inner Statter Harbor near the harbormaster building along with 1-2 dispersed seals near the Auke Creek shoreline (Kate Wynne pers. observ.). Additionally, other counts from 2014-2016 recorded 2-16 animals within Statter Harbor. Because harbor seals are nearly always present in the harbor, the determination of estimated takes is on the conservative side; animals are likely to be recorded more than once each day as it is likely not possible to determine if they are the same individuals. Up to 52 individual seals have been photographed simultaneously hauled out on the nearby dock at Fishermen's Bend (Ridgway unpubl. data). Direct effects of construction noise in this area will be partially blocked by the recently constructed Phase II boat launch and parking area. We assume that the majority of animals that haul out on the nearby floats at Fishermen's Bend are likely to go under water and resurface throughout the duration of the project.

The action area also extends into Stephens Passage near the location of a known harbor seal haulout near Horse Island. Abundance estimates within this area are 276.5 harbor seals (NOAA 2018). However, only a small portion



of this survey unit is located within the project area and thus it is estimated that 25% (70 harbor seals) may also be located within the action area each day. With both areas combined it is estimated up to 121 harbor seals (52 + 70) may be exposed to elevated sound levels during each day of drilling.

Sightings can be estimated on the assumptions that up to 122 harbor seals will be present in the Level B harassment zone and each seal will dive and resurface every 4 minutes (Klinkhart *et al.* 2008).

$$\text{Pile Removal Duration} = 3 \text{ piles} * 0.5 \text{ hours} = 1.5 \text{ hours}$$

$$\text{Vibratory Installation Duration} = 23 \text{ piles} * 2 \text{ hours} = 46 \text{ hours}$$

$$\text{Drilling Duration} = 23 \text{ piles} * 4 \text{ hours} = 92 \text{ hours}$$

$$\text{Total Duration} = 1.5 \text{ hours} + 46 \text{ hours} + 92 = 139.5 \text{ hours}$$

$$\text{Level B Harbor Seal Sightings} = \left(122 \text{ harbor seals} * 139.5 \text{ hours} * 15 \frac{\text{sightings}}{\text{hour}} \right) = 255,285 \text{ total sightings}$$

Using a potential daily maximum rate, observers could sight up to 255,285 harbor seals during the duration of the project. A rate of take of no more than 122 individual seals per day will be used for the project. This rate caps take at an assumed rate, though sighting rates will include multiple counts of the same individuals. It is assumed that no more than 122 individual seals will enter the action area each day. 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.

$$\text{Harbor Seal Level B Takes} = 23 \text{ days} * 122 \text{ harbor seals} = 2,806 \text{ Level B Takes}$$

Due to the number of harbor seals commonly within the Level A zones for impact pile driving and drilling, there is a chance the injury zone will not be free of harbor seals for sufficient time to allow for impact driving as harbor seals frequently use the nearby habitat. It is assumed that no more than 122 individual seals will enter the outer harbor each day and that no more than 11 are likely to be found within the inner harbor, which will be used as the maximum of harbor seals that may be taken by Level harassment for each day of the project. This rate caps take at an assumed rate, though sighting rates will include multiple counts of the same individuals. Harbor seals are known to utilize the area within the Level A harassment zone and it is estimated they may be present in the Level A harassment zones for up to 50% of pile driving/drilling activities.

$$\text{Level A Harbor Seal Sightings} = 11 \text{ harbor seals} * \frac{139.5}{2} \text{ hours} * 15 \frac{\text{sightings}}{\text{hour}} = 11,509 \text{ total sightings}$$

$$\text{Harbor Seal Level A Takes} = 23 \text{ days} * 11 \text{ harbor seals} = 253 \text{ Level A Takes}$$

Using this as a worst case estimate, the project could result in up to 1,196 total Level B takes and 253 total Level A takes of harbor seals. The Level B harassment and limited Level A harassment potential from the proposed activities are **not likely** to result in significant adverse impacts to harbor seals.

6.4 Dall's Porpoise

There is little data regarding Dall's porpoise presence in the project area. Systematic surveys of Dall's porpoise abundance and distribution have not been conducted in Auke Bay specifically, however from 2001-2007 surveys of cetaceans in Southeast Alaska were conducted during the spring, summer and fall. In-water work will occur from fall into late spring. Dall's porpoise were observed in nearby waterways including Stephen's Passage and Lynn Canal (Dalheim *et al.* 2009) and while the species is generally in water depths of 600 feet (113 meters) or greater they may also occur in shallower waters, (Moran *et al.* 2018). Dall's porpoises have been observed to



have strong seasonal patterns with the highest number being observed in the spring and the fewest in the fall (Dahlheim et al. 2009). Group size in Alaska typically ranging from 10 to 20 individuals (Wells 2008). Should Dall's porpoise be present within the project area it is most likely to be during the spring months based on the strong seasonal patterns observed. The project is located in habitat that is not typical for Dall's porpoise, however they may still be present during the spring months of March, April and May and it is assumed that a large pod of 20 Dall's porpoises (Wells 2008) may enter the harassment zones once each of these months.

$$\text{Dall's Porpoise Level B Takes} = 3 \text{ months} * 20 \frac{\text{individuals}}{\text{pod}} = 60 \text{ Level B Takes}$$

Dall's porpoises can generally be observed by monitors due to the "rooster tail" splash often made when surfacing (Wells 2008). However, due to the size of the Level A harassment zone associated with drilling (120 meters), and due to the possibility for night work, it is possible Dall's porpoises may enter the Level A harassment zone undetected. It is conservatively assumed that one pair or harbor porpoises may enter the Level A harassment zone every fourth day of pile driving.

$$\text{Dall's Porpoise Level A Takes} = \frac{23 \text{ days}}{4} * 2 \text{ Dall's porpoises} = 12 \text{ Level A Takes}$$

Using this as a worst case estimate, the project could take **up to 60 total Level B takes and 16 total Level A takes of harbor porpoises**. The Level A and Level B harassment potential is not likely to result in death to any harbor porpoises.

6.5 Harbor Porpoise

Harbor porpoises have been observed to be skittish and generally avoid boat traffic and thus are likely to avoid the immediate project area, however may be present in the larger harassment zones associated with vibratory pile driving and drilling, especially given their preference for shallow, nearshore waters (Dahlheim et al. 2015). There is little data regarding harbor porpoise presence in the project area, however they have been observed in the project vicinity during several surveys of nearby waterways including Lynn Canal and Stephens Passage (Dahlheim et al. 2009, Dahlheim et al. 2015). The average group size ranged from 1.24 to 1.57 throughout the study years, consistent with recent NMFS estimates that one pair per day may be present in the Auke Bay Area (FR 52394). Based on the available information is estimated that up to one pair of harbor porpoises may be taken during each of the 23 days of pile driving.

Harbor porpoises are stealthy, having no visible blow and a low profile in the water making the species difficult for monitors to detect (Dahlheim et al. 2015). The Level A harassment zones extend up to 220 meters, because of this distance it is possible harbor porpoises may enter the Level A harassment zone undetected. It is conservatively assumed that one pair or harbor porpoises may enter the Level A harassment zone every other day of pile driving.

$$\text{Harbor Porpoise Level B Takes} = 23 \text{ days} * 2 \text{ harbor porpoises} = 46 \text{ Level B Takes}$$

$$\text{Harbor Porpoise Level A Takes} = \frac{23 \text{ days}}{2} * 2 \text{ harbor porpoises} = 23 \text{ Level A Takes}$$

Using this as a worst case estimate, the project could take **up to 46 total Level B takes and 23 total Level A takes of harbor porpoises**. The Level A and Level B harassment potential is not likely to result in death to any harbor porpoises.



6.6 Killer Whale

Killer whales occur commonly within the waters of the project area and are observed within the project area several times annually. Occurrences could include members of one or more of the three designated stocks occurring in the project area: Eastern North Pacific, Northern Residents, (2) Eastern North Pacific, Alaska Residents, and (3) West Coast Transients. The best available data for Auke Bay comes from a compilation of public sightings recorded by Oceanus Alaska. This compilation is believed to be fairly compressive as Juneau residents often report killer whale sightings. Killer whales are have been observed during all months, however less frequently in winter months. From 2010-2017 an average of 25 killer whale sightings were recorded in the project area per year (Ridgeway unpubl. data 2017). Data did not make distinctions between the stocks and thus the ratio between stocks is unknown. However, the AG resident pod is one pod known to frequent the Juneau area (Dahlheim et al. 2009; personal observation) and has 41 members recorded in the North Gulf Oceanic Society's Identification Guide (NGOS 2019). This pod is seen in the area intermittently in groups of up to approximately 25 individuals (personal observation), consistent with the data for the area. Transient orcas have been observed in nearby waterways as well and one group of 14 individuals were observed during surveys (Dahlheim et al. 2009). Orcas move fast and have large ranges, and while they may occasionally enter the Level B harassment zones they are unlikely to linger in the area. Based on the information available it is conservatively estimated that one pod of residents (41) and one pod of transients (14) may be taken during the duration of the project. As killer whales may not be able to be readily distinguished between resident and transients, or the applicable stock populations, a total of 55 takes of orcas are requested.

Using this as a worst case estimate, the project could take **up to 55 total Level B takes of killer whales**. The level B harassment potential is not likely to result in death to any killer whales. No Level A takes are requested for killer whales due to the small size of the Level A harassment zones and because killer orcas are generally somewhat conspicuous shutdown measures will be implemented prior to an orca entering a Level A harassment zone.

6.7 Minke Whale

There are no known occurrences of minke whales within the action area, however since their ranges extend into the project area and they have been observed in southeast Alaska (Dahlheim et al. 2009) it is possible the species could occur near the project area given the large harassment zones associated with drilling. Therefore, one take is being requested per month of the project (October 2020 through May 2021).

$$\text{Minke Whale Level B Takes} = 1 \text{ minke } \frac{\text{whale}}{\text{month}} * 8 \text{ months} = 8 \text{ minke whale Level B Takes}$$

Using this as a worst case estimate, the could take up to 1 minke whale per month, **resulting in up to 8 total Level B take of minke whales**. The level B harassment potential is not likely to result in death to any minke whales. Due to the unlikely occurrence of minke whales and the ability to shut down pile driving activities prior to one entering the Level A harassment zone, no Level A takes of minke whales are requested.

6.8 California Sea Lion

California sea lions are not typically found in the project area, however one hauled out on Statter Harbor boat launch ramp float in September of 2017. NOAA humanely hazed the aggressive sea lion off of the dock and there have been no reports of California sea lions in the area since. For take purposes it is estimated that one California sea lion may be present each day of in-water work



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Using this as a worst case estimate, the project could take up to 1 California sea lion during each day of the project, **resulting in up to 23 total Level B takes of California sea lions.** The level B harassment potential is not likely to result in death to any California sea lions. No Level A takes are requested for California sea lions.



7 Anticipated Impact on Species or Stocks

The proposed project has the potential to impact marine mammals by increasing noise in Auke Bay. Marine mammals which may be impacted include the humpback whale, Steller sea lion, harbor seal, Dall's porpoise, harbor porpoise, killer whale and California sea lion. The project also has the potential to temporarily increase the low likelihood of vessel interactions with marine mammals.

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 action area. ESA-listed species 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 and cetaceans 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 pinnipeds and cetaceans. 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 10, such as soft start procedures, will be incorporated into the project to minimize the potential for noise related injuries.

7.2 Vessel Interactions

Auke Bay is a sheltered bay located to the east of the intersection of Stephens Passage, Favorite Channel, and Saginaw Channel. The Auke Bay Ferry Terminal, part of the Alaska Marine Highway System, is located to the west of the project site within Auke Bay. The Auke Bay Loading Facility is located adjacent to the ferry terminal. This, in conjunction with Statter Harbor and Fishermen's Bend, results in Auke Bay being a major traffic area for commercial and recreational vessels.

Close proximity to vessel presence has been observed to disrupt feeding aggregations of humpbacks, including separation of mothers and calves, as well as dispersal of the fish schools they were targeting (Krieger and Wing 1986). In addition to its acoustic impacts, vessel traffic also poses a direct threat to humpbacks through ship-strike injury and mortality (Muto *et al.* 2017). Vulnerability to ship-strike may be higher in areas where humpbacks rest, as they spend three times as much time at the surface when resting than when traveling fast. However,



Statter Harbor is the busiest harbor in Juneau with frequent commercial and recreational boat traffic in and out of the harbor and no known vessel strikes have occurred in the harbor.

The proposed project has the potential to increase temporarily the number of vessels using Auke Bay. Because the adjacent moorage facilities are utilized less in the winter there will be decreased vessel traffic during the construction window. The harbor is currently overcrowded and thus the new commercial floats will ease congestion rather than create a significant permanent increase in vessel traffic, since the commercial charter vessels currently utilize the crowded harbor. The new permanent moorage floats may result in a minor increase in vessels being moored, however are unlikely to increase the overall vessel traffic because of the adjacent parking area and boat launch ramp available to those without moorage. The increase in the likelihood of vessel interactions will be temporary and occur only during construction due to temporary construction vessels. The new CBJ D&H floats are not likely to result in a permanent increase in vessel traffic.



8 Anticipated Impact on Subsistence

Alaska Native hunters in the north Juneau-Auke Bay vicinity do not traditionally harvest humpback whales. Steller sea lion have been traditionally hunted by Alaska Natives in Southeast Alaska for food and material products such as meat, skins, and whiskers (for art and regalia). Active hunting continues in the western Gulf of Alaska region of the wDPS range, but very few sea lions are harvested in Southeast Alaska in recent years (Wolfe *et al.* 2012, L. Sill pers. comm. 2017). Most sea lion harvests occur in winter months. In 2012, all nine of nine sea lions harvested in Southeast Alaska were male (Wolfe *et al.* 2012). Harbor seal, however, remain highly prized for rendering oil, fat, meat, and skins for cultural uses and are actively hunted in the Auke Bay project vicinity (K. Lindoff pers. comm. 2017, M. Miller pers. comm. 2017).

Records on Steller sea lion total subsistence takes includes kills plus struck and lost animals. Subsistence reports do not attribute the animals to eastern or western stocks of Steller sea lion. Impacts of subsistence hunting on the endangered western stock can only be coarsely inferred by applying the estimated percent of wDPS animals in northern Southeast Alaska (18%) to harvest numbers described below, but this estimate should not be construed as a take of endangered Steller sea lions without applying appropriate demographic, DNA and other parameters to the calculus.

The ADF&G subsistence data for Southeast Alaska shows that from 1992 through 2008, plus 2012, from zero to 19 animals were taken by Alaska Native hunters per year (Wolfe *et al.* 2012). The total subsistence sea lion take in these reporting years was an estimated 104 animals, averaging 8 sea lion takes per year (Wolfe *et al.* 2012). Of the total sea lions taken, two were reported taken from the Juneau area: one in 1994 and one in 2006 (Wolfe *et al.* 2012).

Subsequent to the 2012 reporting year through 2017, an estimated 12 or fewer Steller sea lion have been taken annually in all of Southeast Alaska (L. Sill pers. comm. 2017, M. Miller pers. comm. 2017). Up to ten Steller sea lions are taken annually in the Sitka Sound vicinity for meat and hides, and an estimated one to three sea lions are taken in Southeast Alaska communities outside Sitka Sound (L. Sill pers. comm. 2017, M. Miller pers. comm. 2017). There are no reported subsistence takes of sea lion in the Juneau vicinity or in the project area since 2006 (L. Sill 2006).

Harbor seals are hunted by Alaska Native subsistence hunters within about three miles (~5 km) of the project area (K. Lindoff pers. comm. 2017). The ADF&G, in partnership with the Alaska Native Harbor Seal Commission and hunters, compile information on subsistence seal harvest through household surveys. Based upon data for harvests in most hunting communities, hunters in Southeast Alaska took from 523 to 719 harbor seal in the years 1992-2008. In 2012 an estimated 595 harbor seals were taken for subsistence uses (Wolfe *et al.* 2012). Seals were harvested across the year, with peak harvests in March, May, and October. Lowest harvests were in December, January, and February.

Most recent reported data indicates that in 2012, an estimated 5 seals were struck and lost, and about 26 harbor seal were harvested for food (Wolfe *et al.* 2012). From 2013 through 2017, Juneau area harbor seal hunting has continued, with several cultural heritage programs teaching students how to harvest, cut and store seal meat.

8.1 Impact on Subsistence Hunting

Juneau area subsistence hunters do not target humpback whales, and very rarely target Steller sea lions; however, local Native communities hunt harbor seal for meat, oil, blubber, and skins. Oceanus Alaska consulted with ADF&G, the Douglas Indian Association, Sealaska Heritage Institute, and the Central Council of the Tlingit



and Haida Indian Tribes of Alaska during November and December of 2017 to inquire whether any impacts would be likely from this project.

Chuck Smythe of Sealaska Heritage Institute stated that the primary concern in the project area would be impacts to herring fisheries, not to marine mammals (C. Smythe pers. comm. 2018). As discussed in Section 9.1.2, impacts to fish are anticipated to be localized and temporary in nature, so are not likely to impact herring fisheries further from town. Herring are not a subsistence fishery within the Juneau Nonsubsistence Area, which covers all waters within twenty to forty miles of the project area (5 AAC 99.015(a)(2)).

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.

8.1.1 Whale Subsistence Hunting in Juneau

Humpback whales may be temporarily displaced from Auke Bay due to Statter Harbor construction activities and barging operations associated with the project. Distances animals are likely to move in response to project activities are anticipated to be less than five kilometers, still a great distance away from any known active subsistence whale hunting regions. Thus, there is no impact to subsistence hunting in Juneau.

8.1.2 Steller Sea Lion Subsistence Hunting in Juneau

The proposed project is anticipated to have no long-term impact on Steller sea lion populations or their habitat. Since there is very little sea lion hunting in the Juneau area, short term displacement of animals from the project area is anticipated to have no effect on abundance or availability of Steller sea lions to subsistence hunters.

8.1.3 Harbor Seal Subsistence Hunting in Juneau

Neither the local population nor any individual seal are likely to be adversely impacted by the proposed action beyond noise-induced harassment or slight injury. Temporary displacement and seals being more dispersed from haulout docks and or foraging areas in Auke Bay may increase their vulnerability to predators such as killer whales, potentially reducing the local seal population. Temporary displacement from inner Statter Harbor and Fishermen's Bend or broader dispersal in the Auke Bay vicinity may also increase harbor seal movement to Auke Rec, Indian Point and other sites where they are more accessible to subsistence hunters. This is considered a negligible impact on harbor seal subsistence hunting in the Juneau area (K. Lindoff pers. comm. 2017, C. Smythe pers. comm. 2017).



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. Physical impacts to habitat are anticipated to be temporary.

9.1.1 Direct Impacts

The primary reason that animals would leave habitats in the project area would be due to elevated noise levels.

Construction activities will likely have temporary impacts on Steller sea lion and harbor seal habitat through increases in underwater and airborne sound from pile driving. Project-related disturbances will not be detectable at the nearest known Steller sea lion haulouts.

Harbor seals are known to haulout on the nearby floats at Fishermen's Bend and construction noise may impact marine mammals in this area. Direct effects of construction noise in this area will be partially blocked by the recently constructed Phase II boat launch and parking area.

Effects will be short-term and are not anticipated to extend significantly beyond the construction phase of the project. 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 Steller sea lions and harbor seals to these activities. Best management practices and mitigation used to minimize potential environmental effects from project activities are described in Section 1.3.

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 dock facilities often attract pinnipeds and other marine mammals to Auke Bay due to the availability of prey. It is also not uncommon for commercial, subsistence, and sport fishermen to clean fish within the marine waters around Juneau, providing additional enticements.

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. Driving piles generates intense underwater sound pressure waves that would have the potential to displace, injure, or kill fish. The extent of injury or harm to fish is difficult to quantify. Pile driving in other areas has not shown significant disruption to adult salmon movement or behavior and indicate that it is unlikely that fish will suffer injury from in-water noise produced by activities like the pile driving and pile removal activities planned for this project (Grette 1985, Ruggerone et al. 2008). However, juvenile salmon may be more susceptible to adverse impacts from pile driving due to their smaller body size.

While prey may disperse to nearby habitat, after activities cease each day, it is expected that forage fish will re-aggregate and become more available. This is because vibratory equipment will be the primary means of pile installation for the project and fish have demonstrated an avoidance response to vibratory equipment where as fish may become habituated to impact noises after the first few strikes causing them to potentially remain where noise levels are harmful (Limpinsel et al. 2017). Due to the use of vibratory equipment as the primary means of



pile installation, long term impacts on the availability of prey availability is not anticipated. Further, numerous past pile driving projects do not appear to have deterred marine mammals from using the area and the continued use of the area indicates prey species reaggregate and become available for marine mammals once pile driving has ceased.

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. The project will occur within a developed area and the minor dock addition is not anticipated to increase the amount of boat traffic in the harbor. Commercial vessels raft to one another on the transient float when no spaces are available. This project is intended to separate user groups by providing a separate location where charter vessels can pick up their passengers. This project will not have an impact on the amount of permanent or transient moorage available or the number of vessels able to enter the harbor, rather it provides a staging area for picking up passengers that is separate from the recreational users. Based on the current use of the harbor by marine mammals it is not anticipated the float infrastructure will deter marine mammals from using the harbor, given their apparent tolerance for structures and vessel noise within the harbor.

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.

Anticipated Impact of Loss or Modification of Habitat

The proposed project is not likely to result in the permanent loss of marine mammal habitat and the small alterations due to over-water structures are not likely to adversely affect marine mammal habitat or alter current uses of the habitat.



10 Mitigation Measures

10.1 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 Statter Harbor is an active recreational and commercial harbor with high levels of noise and boat traffic, there is already a higher level of ambient noise within the area than in natural conditions. The mitigation measures and best management practices (BMP) 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 harbor 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.
- The harbor improvement structures are designed to limit contaminant releases and will be maintained in a manner that manages pollutants and debris streams to avoid incidental introduction of deleterious materials into Auke Bay.
- Harbor improvement structures were designed to provide barrier-free migration and vertical movement for marine and estuarine fish in Auke Bay.
- 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.
- During construction, activities which may attract marine mammals such as fish cleaning and carcass disposal will be managed in concert with the CBJ D&H staff to eliminate mammal attractants to the project area where possible.
- 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.
- To minimize impacts to pink and chum salmon fry and coho and Chinook salmon smolt, and DIPAC hatchery net pen species in Auke Bay, contractors will refrain from pile driving activities from May 1 through June 30.
- A minimum of 2 observers will monitor permitted pile driving and drilling activities in accordance with protocols reviewed and approved by NMFS. A detailed MMMP is found in Appendix B.

10.2 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 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.

10.3 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 10 meters will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment.

10.4 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>).

10.5 Compensatory Habitat Mitigation

CBJ D&H 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 D&H will be required to avoid, minimize, and mitigate impacts to intertidal habitat. For impacts that cannot be avoided or minimized, CBJ D&H will coordinate compensatory mitigation with USACE.



11 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.



12 Monitoring and Reporting Plans

12.1 Monitoring Plan

Monitoring measures for the potential impacts the project could have on marine mammals are discussed briefly in Section 10 and at length in the MMMP (Appendix B).

12.2 Reporting

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

12.2.1 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 pile driving and drilling 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.



13 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 humpback whales, Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales and California sea lions as observed during the project. 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.



14 Conclusion

For the reasons described in this document, CBJ D&H has determined that the proposed project is likely to result in the Level B harassment of humpback whales, Steller sea lions, harbor seals, harbor porpoises, Dall's porpoises, killer whales and California sea lions. 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.



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15.1 Auke Bay Marine Mammal Observation Record Sources

No quantitative agency data or reports on marine mammals in Auke Bay are available at the time of this writing. Written observation data were provided by Oceanus Alaska. Additional observation records augmented the time series for every species. Photographs, video and time link data were used to augment written records. The following individuals and entities contributed to the Auke Bay marine mammal data summary provided by Oceanus herein:

Jos Bakker, Jos Bakker Photography
Robert Armstrong, Nature Bob
Patty Rose, Audubon Society Juneau
Dr. Terrance Quinn III, University of Alaska Fairbanks
Suzie Teerlink, NOAA National Marine Fisheries Service
Doug Jones, Naturalist
Michelle Ridgway, Oceanus Alaska
Kate Wynne, University of Alaska Fairbanks Professor Emeritus, and Chair,
NOAA Alaska Region Marine Mammal Stock Review Group
Dr. Heidi Pearson & Students, University of Alaska Southeast
Ms. Kerry Howard, Photographer
Dr. Richard Carlson, NOAA National Marine Fisheries Service
Dr. Richard Haight, NOAA National Marine Fisheries Service
Lauri Jemison, Alaska Department of Fish and Game
Dr. Jamie Womble, National Park Service, Alaska
Ms. Lorainne Lorainne
John Moran, NOAA National Marine Fisheries Service
Ron Heintz, NOAA National Marine Fisheries Service.



P

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D

Incidental Harassment Authorization Request
CBJ D&H Statter Harbor Improvements Project Phase III B

Appendix A. Project Permit Drawings

P

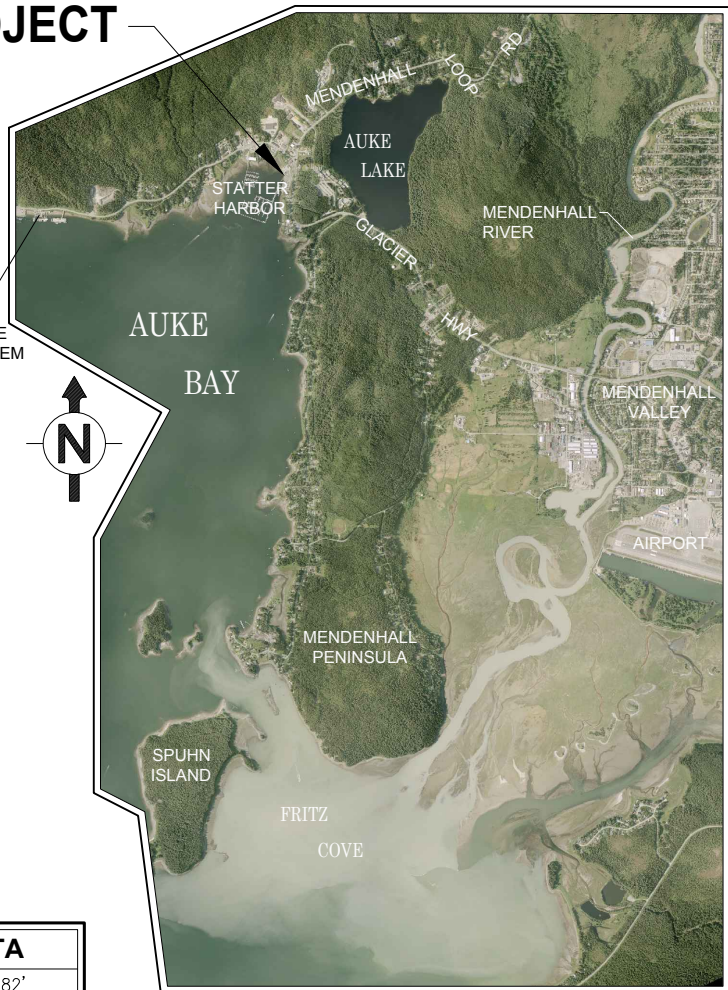
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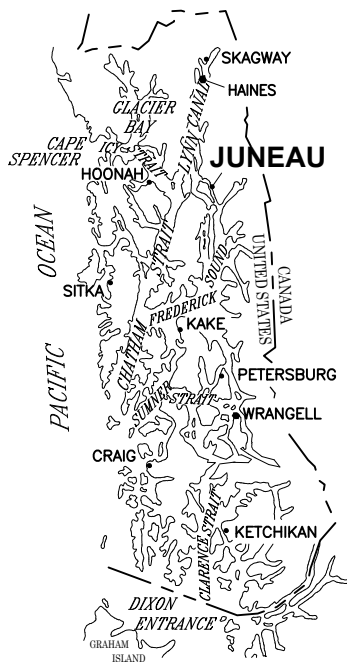


THIS PROJECT

AKDOT/PF
ALASKA MARINE
HIGHWAY SYSTEM
DOCK



AERIAL PHOTO FROM:
CITY AND BOROUGH OF JUNEAU, 2006



TIDAL DATA	
MAX. OBS	24.82'
HTL	20.6'
MHW	15.3'
MLW	+1.6'
MLLW	0.0'
MIN. OBS	-5.89'

DATA REFERENCED FROM:
NOAA STATION 9452210
JUNEAU, ALASKA 2014

VICINITY MAP

SCALE IN MILES



PURPOSE:

THE PROJECT PURPOSE IS TO IMPROVE SAFETY AND REDUCE CONGESTION BY INCREASING HARBOR EFFICIENCY THROUGH INCORPORATION OF IMPROVEMENT PLANS IDENTIFIED IN THE STATTER HARBOR MASTER PLAN.

DATUM:

MLLW = 0.0' HTL = +20.6'

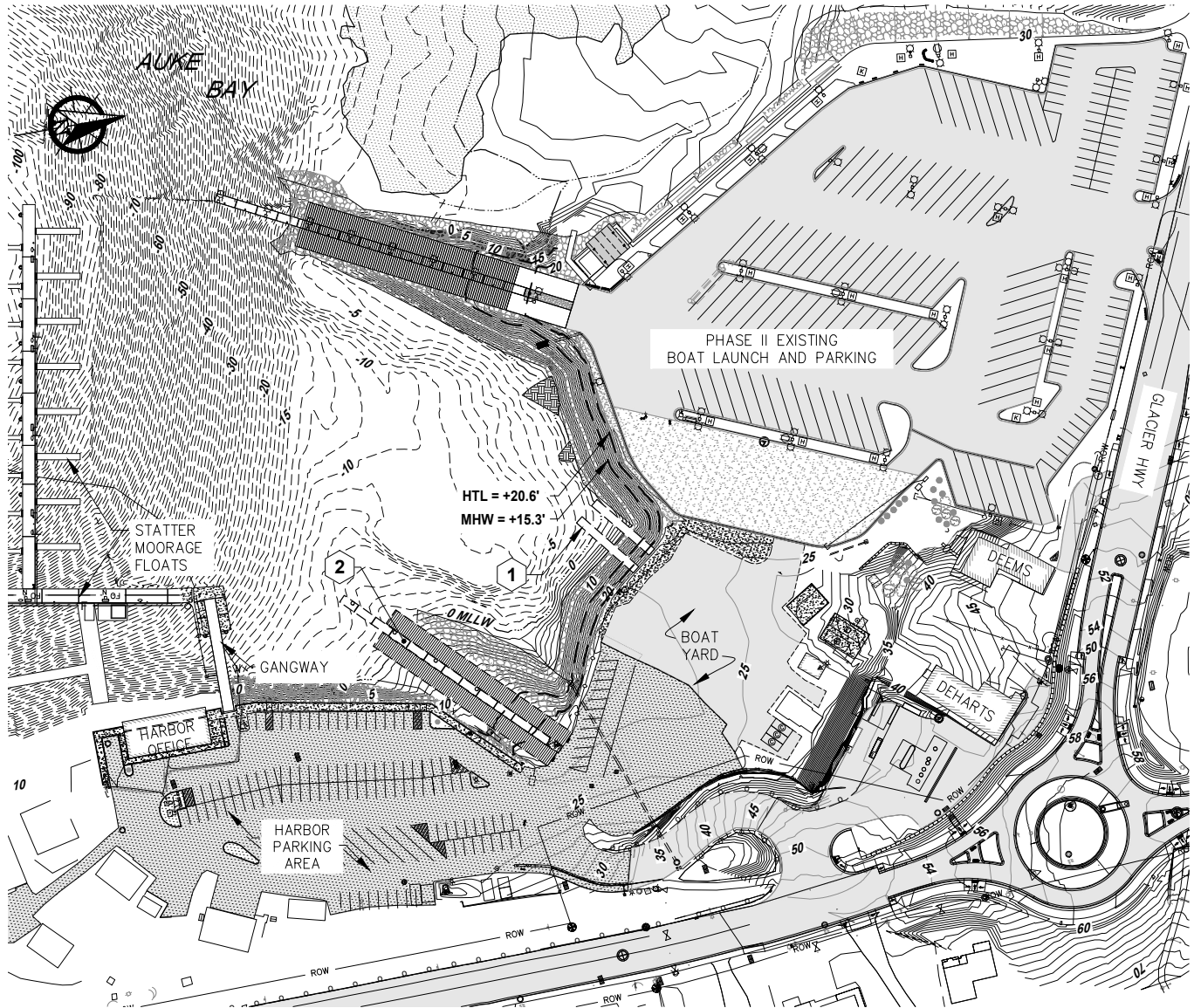
VICINITY MAP

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
FILE NO.:
WATERWAY: AUKE BAY
PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
LAT.: 58.3852° N LONG.: 134.6461° W
DATE: MARCH, 2019

PND PROJECT NO. 152069

SHEET 1 of 15



EXISTING CONDITIONS DEMOLITION PLAN

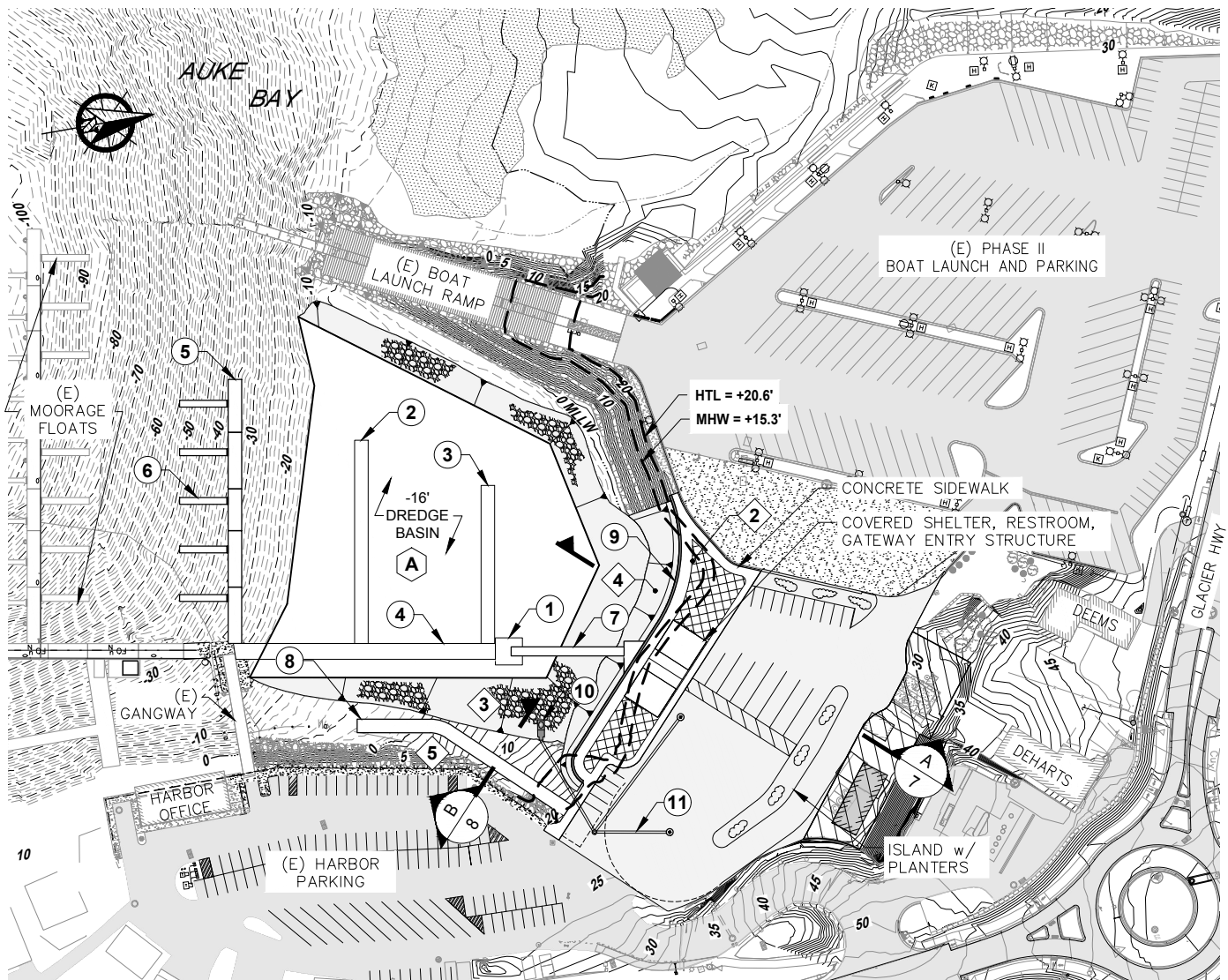
SCALE IN FEET
0 80 160 FT.

DEMOLITION SUMMARY

ITEM	DESCRIPTION
1	REMOVE AND DISPOSE EXISTING TIMBER BOAT HAUL-OUT PIER (1,152 SF) INCLUDING (16) EACH TIMBER PILES.
2	REMOVE AND DISPOSE (2) EXISTING 16' WIDE x 186' LONG, CONCRETE PLANK LAUNCH RAMPS; 8' WIDE x 240' TIMBER BOARDING FLOAT; (4) 12.75"Ø STEEL PIPE PILES AND CONCRETE ABUTMENT.

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019



GENERAL SITE PLAN



LEGEND

- ① A C PROPOSED IMPROVEMENTS, SEE SHEET 4 FOR DESCRIPTIONS
 (E) = EXISTING

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019

PROPOSED STRUCTURAL IMPROVEMENTS SUMMARY - BELOW HTL

SYMBOL	ITEM	PILE SIZE DIA. (INCH)	PILE QUANTITY
①	GANGWAY LANDING FLOAT – 20' x 20'	16	20
②	TIMBER MAINWALK FLOAT – 16' x 180'		
③	TIMBER MAINWALK FLOAT – 16' x 140'		
④	TIMBER HEADWALL FLOAT – 16' x 226'		
⑤	CONCRETE MAIN FLOAT – 12' x 240'	24	6
⑥	(6) FINGER FLOATS – 6' X 42'	N/A	
⑦	ALUMINUM GANGWAY – 8' X 100'	N/A	
⑧	KAYAK LAUNCH RAMP – 12' x 208'	N/A	
⑨	CONCRETE MSE RETAINING WALL – 280 LF	N/A	
⑩	CONCRETE STORM DRAIN OUTFALL	N/A	
⑪	STORM DRAIN PIPE	N/A	

NOTE:

TOTAL AREA OF OVER WATER COVERAGE: APPROX. 17,400 SF
TOTAL PILES: APPROX. 26

MATERIAL SCHEDULE - BELOW HTL

SYMBOL	ITEM	VOLUME (CY)
⬡	DREDGE MATERIAL – OFFSHORE DISPOSAL	30,375
⬢	MSE RETAINING WALL FILL – (INCLUDING PORTION OF SURCHARGE FILL TO REMAIN)	8,000
⬣	DREDGE BASIN SLOPE ARMOR ROCK – CLASS II	1,900
⬤	MSE RETAINING WALL SLOPE ARMOR ROCK – CLASS III	800
⬥	KAYAK RAMP – CONCRETE PLANKS AND ARMOR ROCK	2,496

PROPOSED DREDGING; BEDROCK REMOVAL SUMMARY

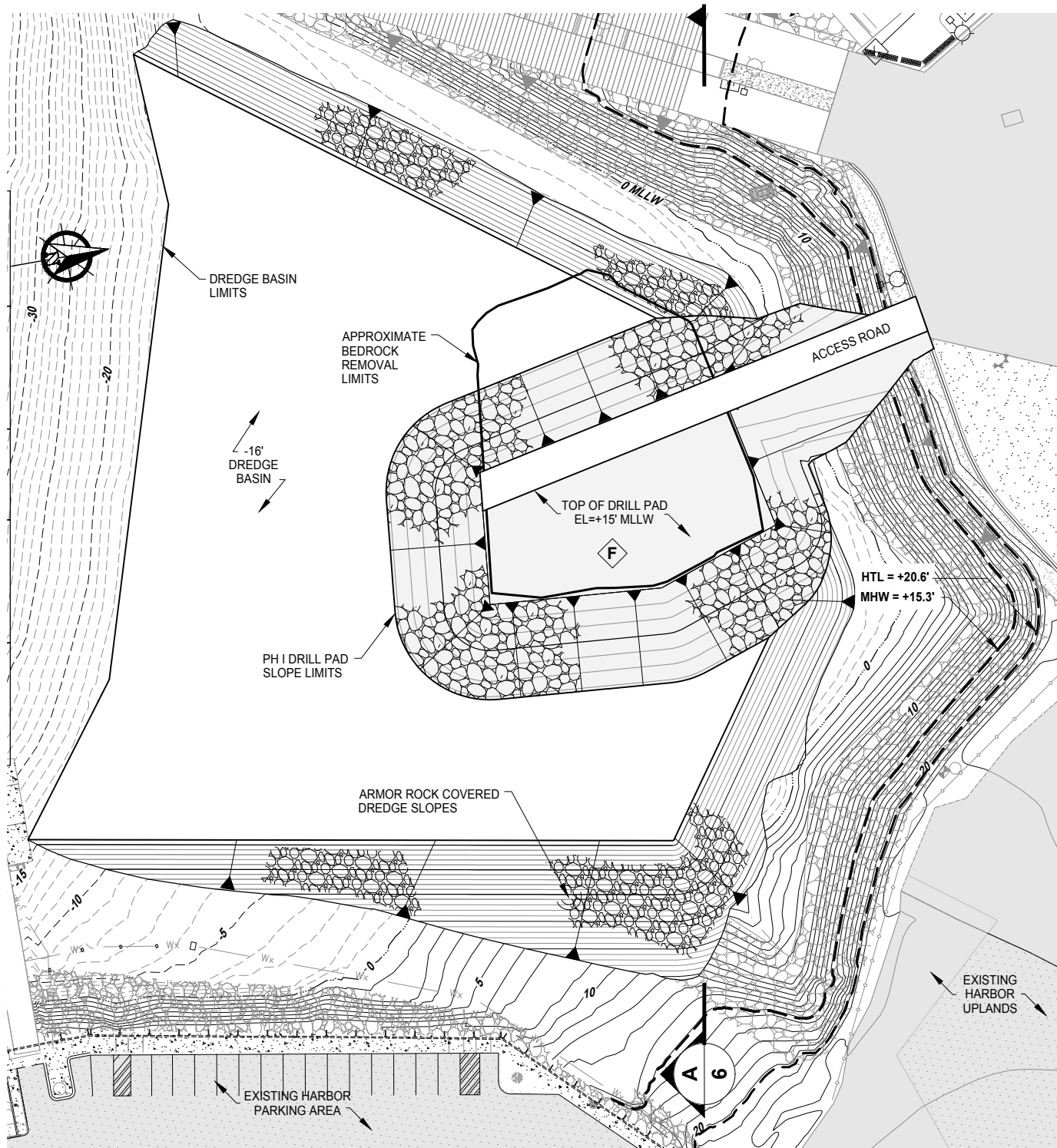
SYMBOL	ITEM	VOLUME (CY)
⬢	DREDGING	24,300
⬢	BEDROCK REMOVAL	2,000

TEMPORARY FILL MATERIAL SCHEDULE

SYMBOL	ITEM	VOLUME (CY)
⬢	TEMPORARY BLAST PAD – CLASS A SHOT ROCK	15,000
⬢	TEMPORARY SURCHARGE FILL – CLASS A SHOT ROCK	7,000

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
FILE NO.:
WATERWAY: AUKE BAY
PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
LAT.: 58.3852° N LONG.: 134.6461° W
DATE: MARCH, 2019

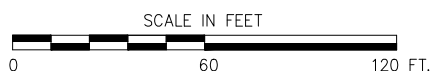


BEDROCK REMOVAL SITE PLAN PHASE I

LEGEND

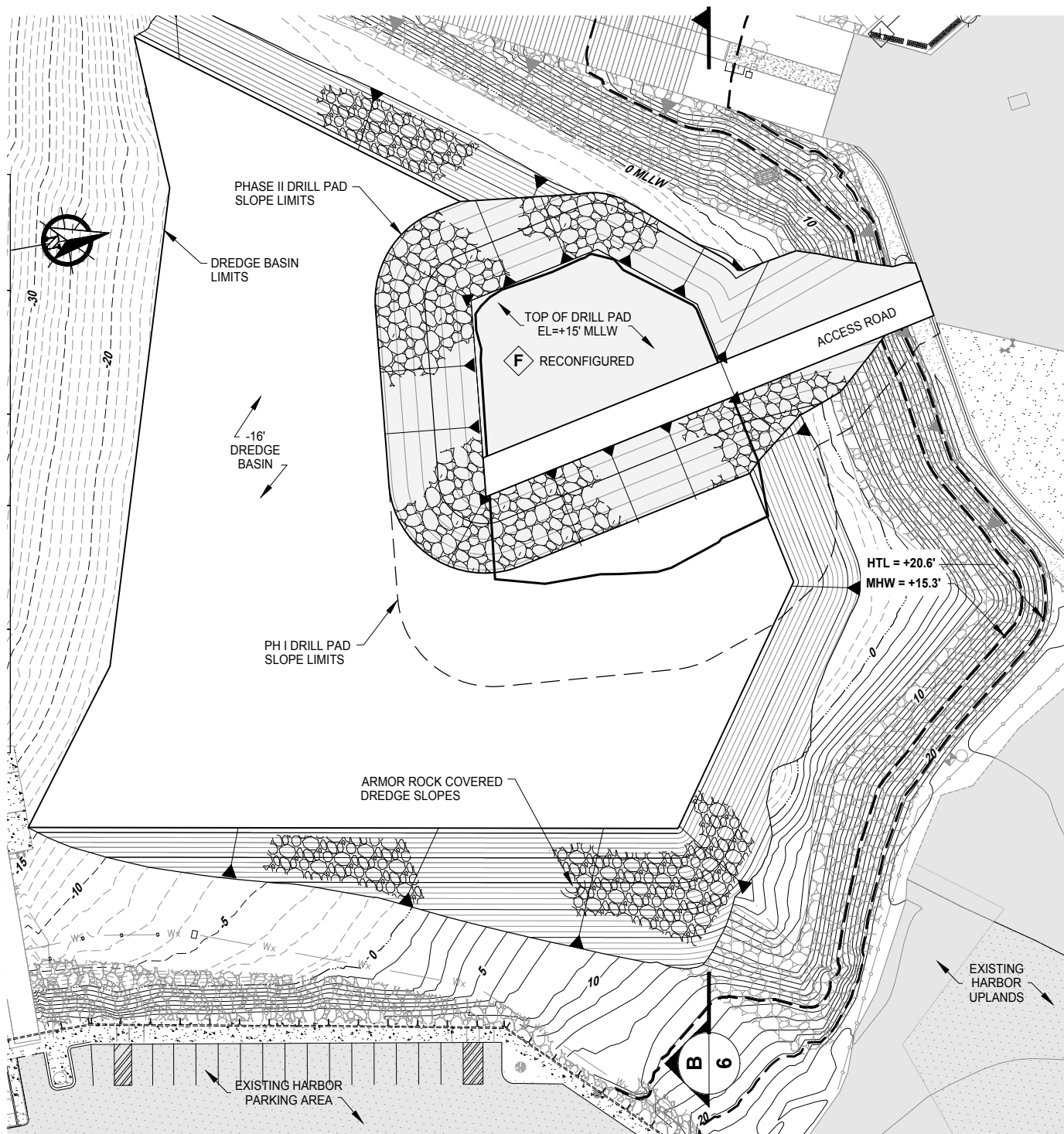


PROPOSED IMPROVEMENTS,
SEE SHEET 4 FOR DESCRIPTIONS



STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
FILE NO.:
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LAT.: 58.3852° N LONG.: 134.6461° W
DATE: MARCH, 2019



BEDROCK REMOVAL SITE PLAN PHASE II

LEGEND

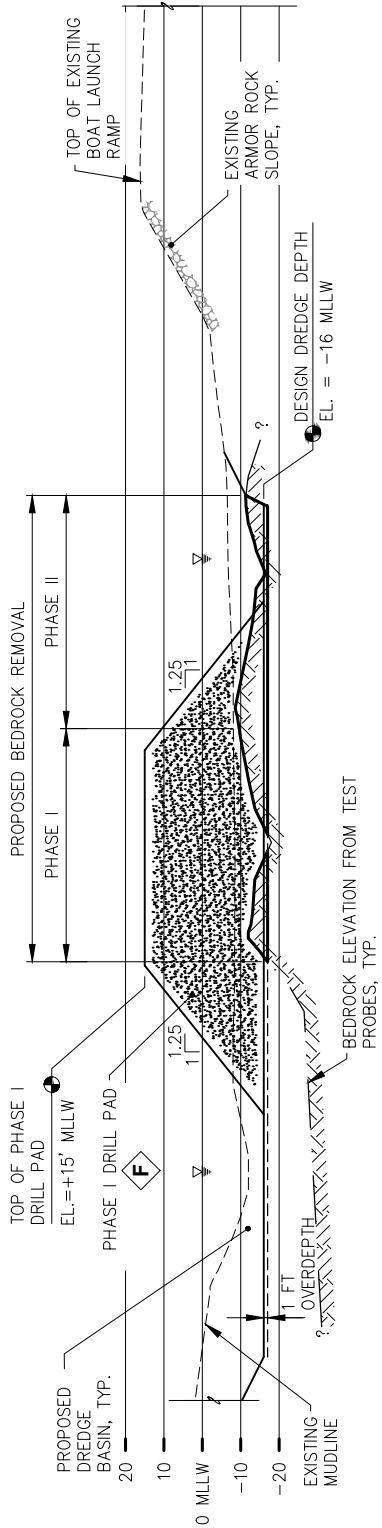
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SEE SHEET 4 FOR DESCRIPTIONS

SCALE IN FEET

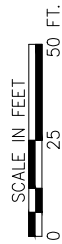
0 60 120 FT.

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019



PROFILE - PHASE I DRILL PAD - VIEW SOUTH

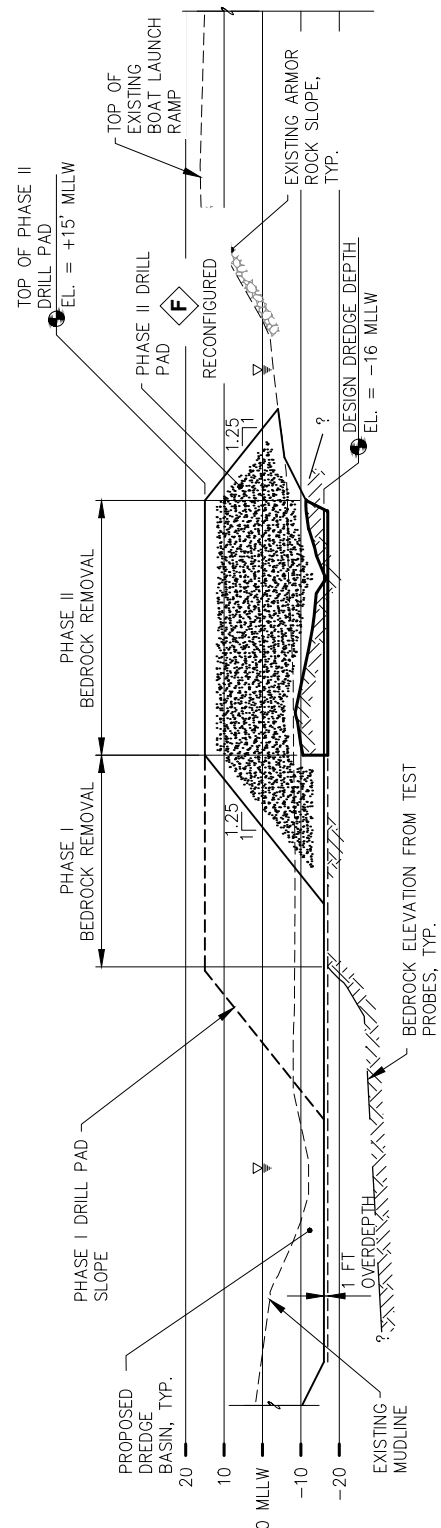


LEGEND



PROPOSED IMPROVEMENTS,
SEE SHEET 4 FOR DESCRIPTIONS

A
4



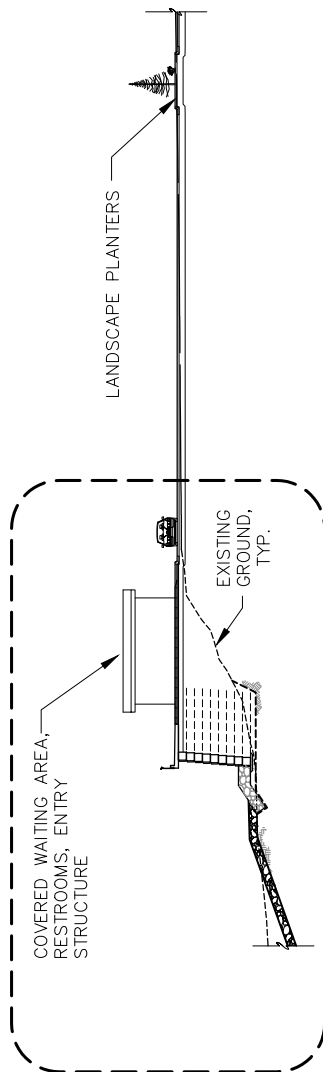
PROFILE PHASE II DRILL PAD - VIEW SOUTH



B
5

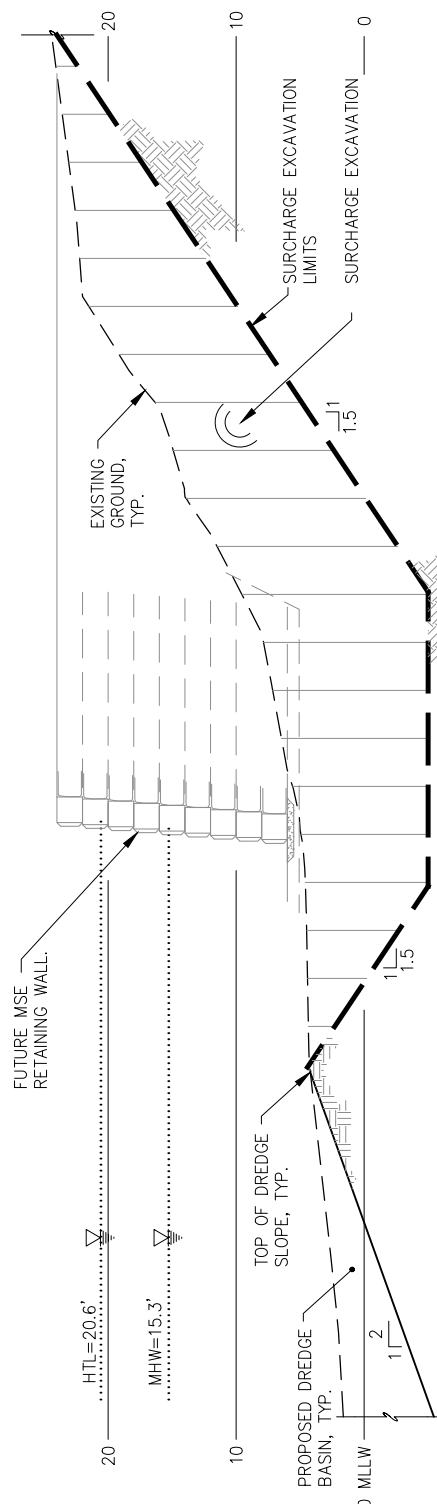
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FILE NO.:
WATERWAY: AUKE BAY
PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
LAT.: 58.3852° N LONG.: 134.6461° W
DATE: MARCH, 2019



A TYPICAL SITE SECTION

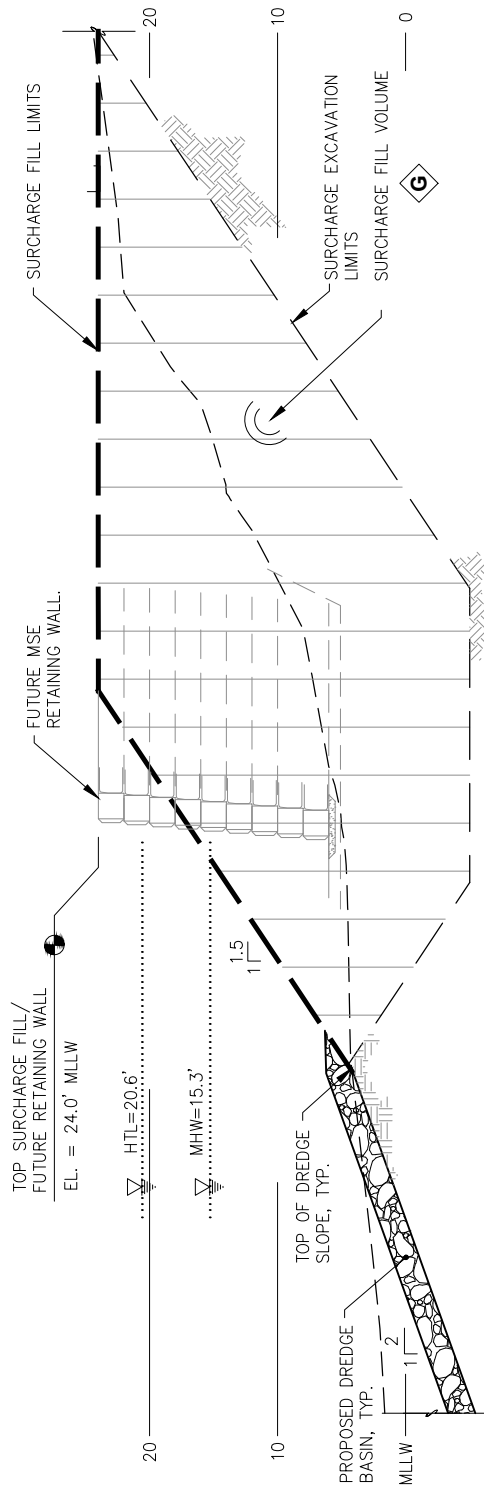
SEE 3-STEP CONSTRUCTION SEQUENCE



STEP 1: SURCHARGE EXCAVATION TYPICAL SECTION

STATTER HARBOR IMPROVEMENTS PHASE III

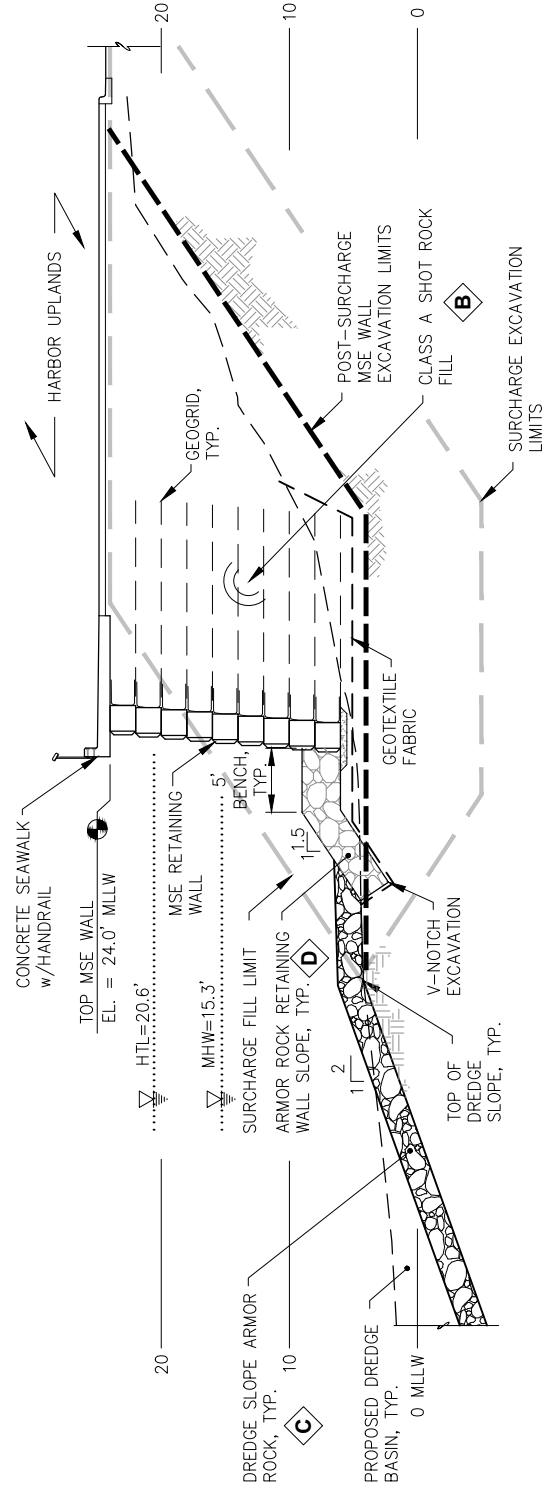
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 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019



LEGEND

STEP 2: SURCHARGE FILL TYPICAL SECTION

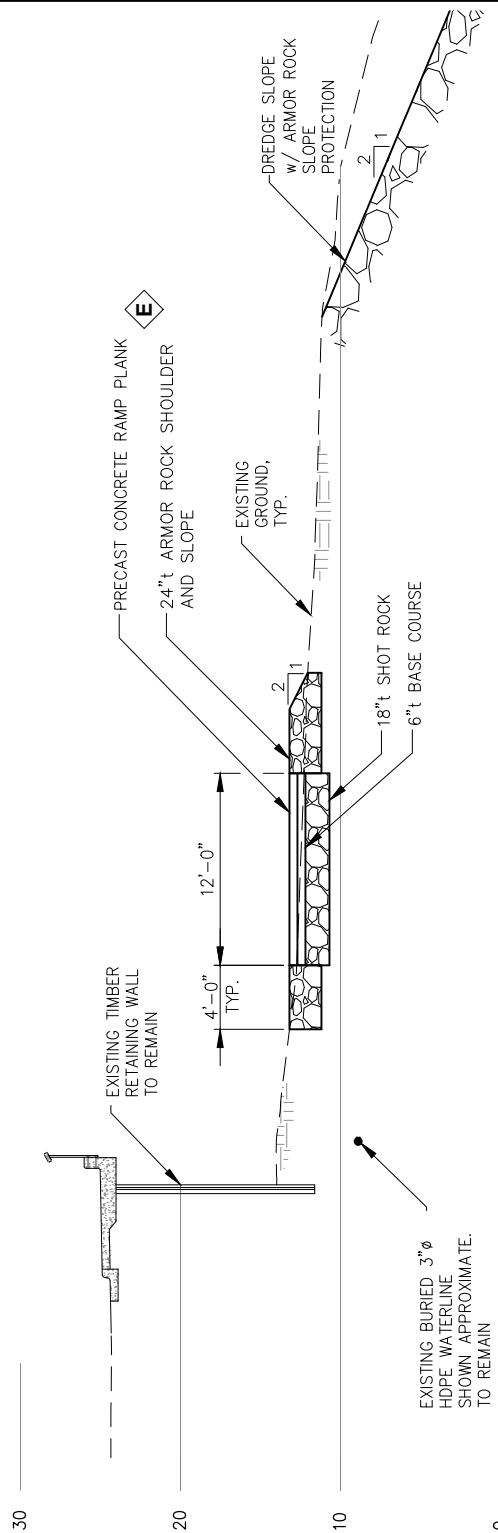
G PROPOSED IMPROVEMENTS, SEE SHEET 4 FOR DESCRIPTIONS



STEP 3: POST-SURCHARGE RETAINING WALL TYPICAL SECTION

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
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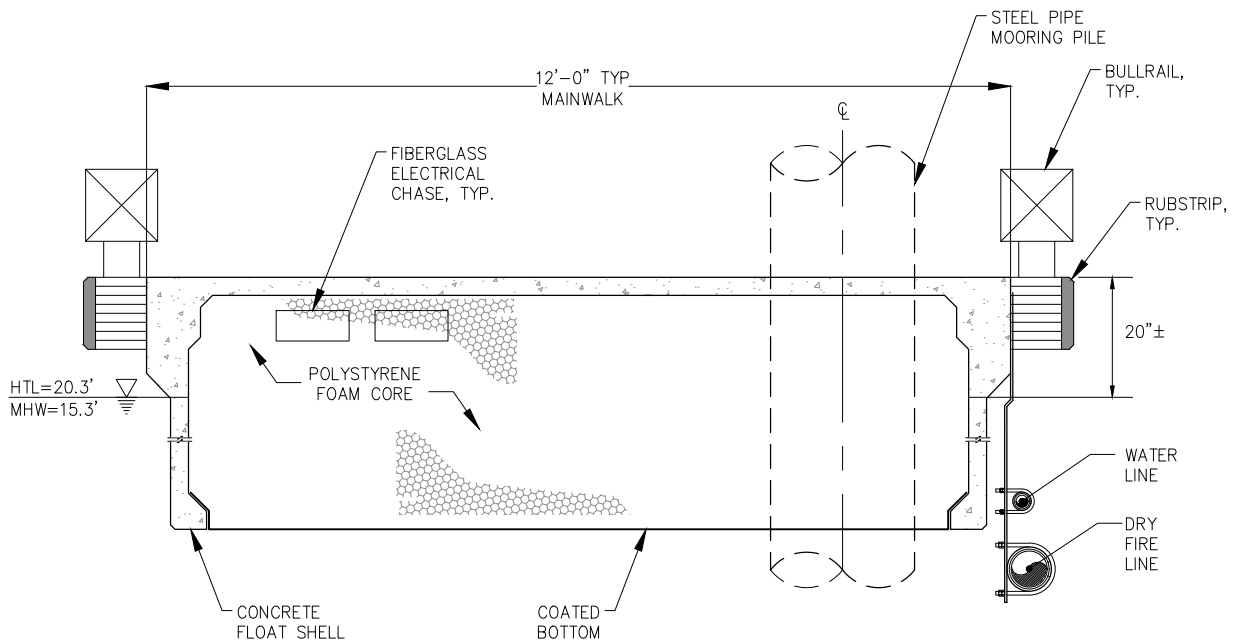
**B 3 KAYAK LAUNCH RAMP
TYPICAL SECTION**

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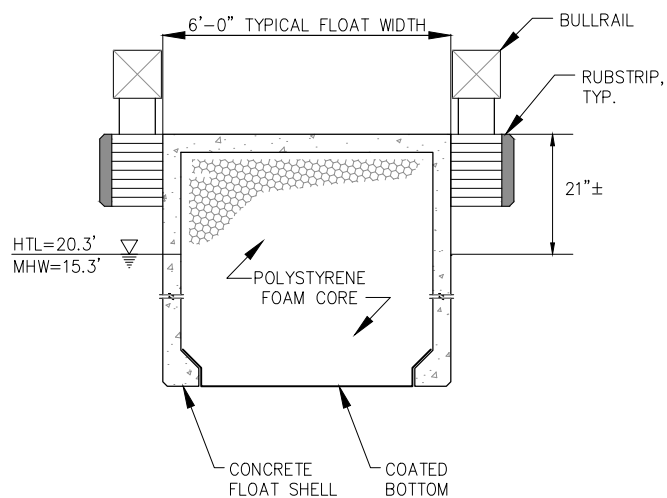
E PROPOSED IMPROVEMENTS, SEE SHEET 4 FOR DESCRIPTIONS

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
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NEW MAINWALK FLOAT SECTION

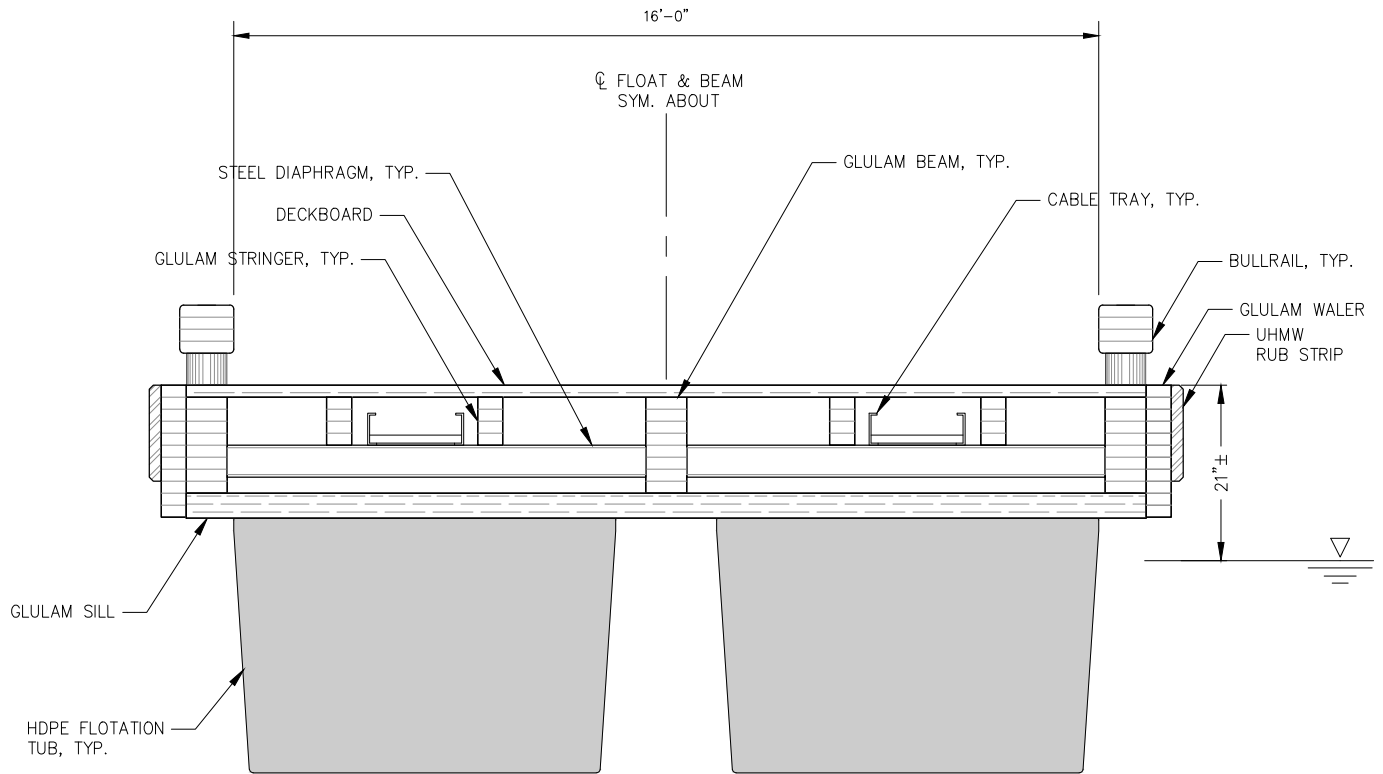


NEW FINGER FLOAT SECTION

CONCRETE MOORAGE FLOAT TYPICAL SECTIONS

STATTER HARBOR IMPROVEMENTS PHASE III

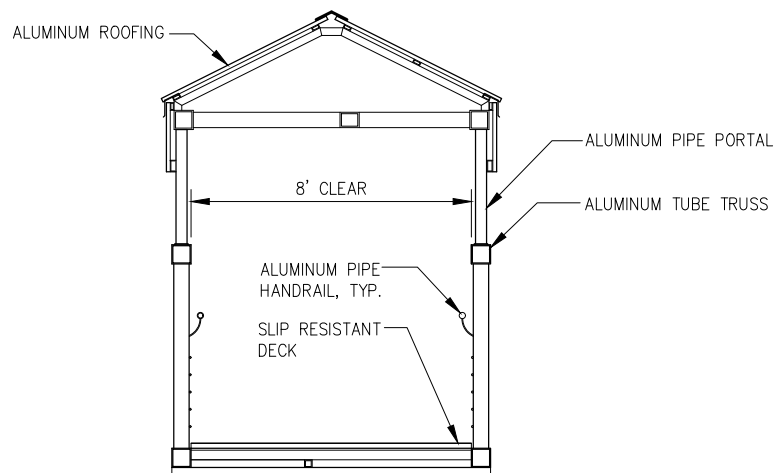
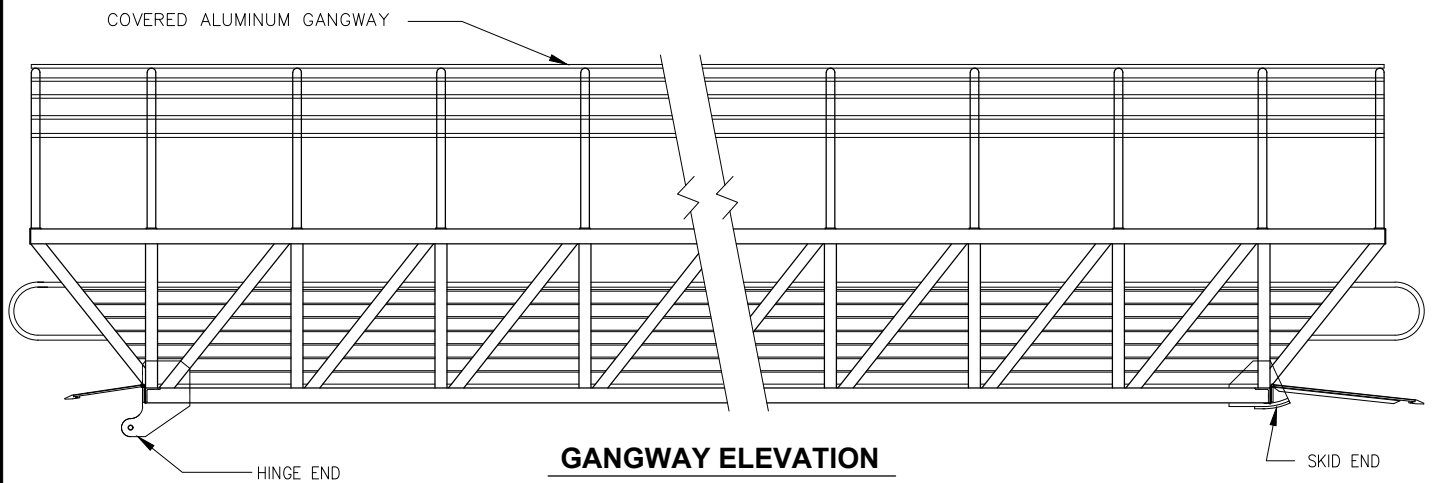
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 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019



TIMBER MOORAGE FLOATS **TYPICAL SECTION**

STATTER HARBOR IMPROVEMENTS PHASE III

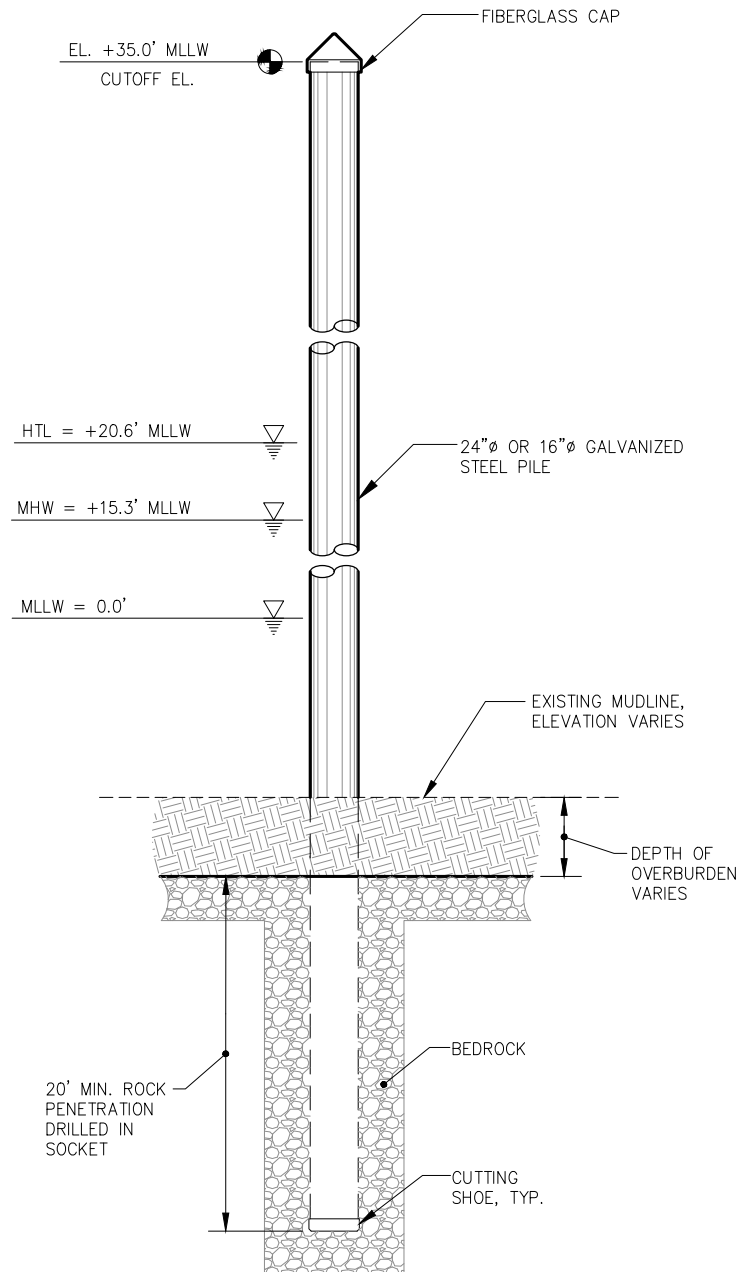
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 FILE NO.:
 WATERWAY: AUKE BAY
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 LAT.: 58.3852° N LONG.: 134.6461° W
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GANGWAY TYPICAL SECTION

STATTER HARBOR IMPROVEMENTS PHASE III

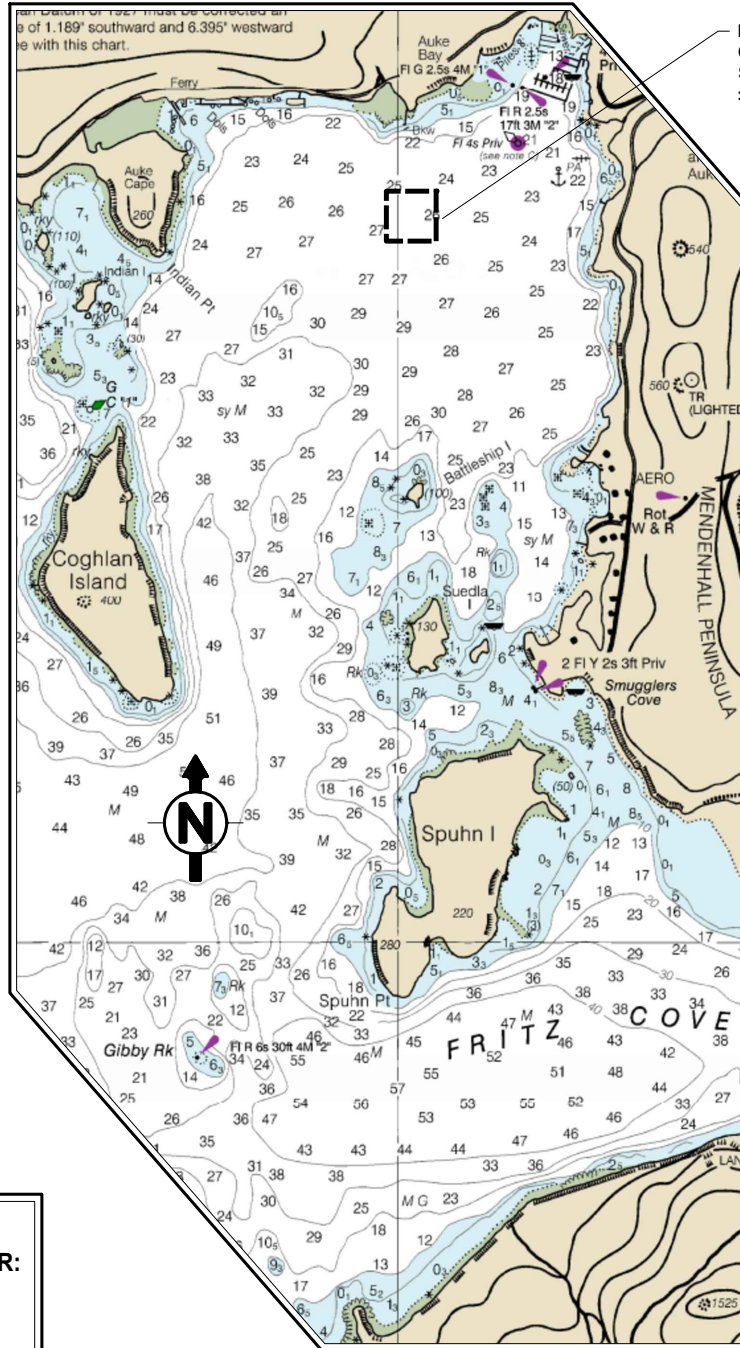
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 FILE NO.:
 WATERWAY: AUKE BAY
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 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
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 DATE: MARCH, 2019



STEEL PIPE PILE DETAILS

STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
 FILE NO.:
 WATERWAY: AUKE BAY
 PROPOSED ACTIVITY: HARBOR IMPROVEMENTS
 SEC. 23 T. 40 S R. 65 E M COPPER RIVER MERIDIAN
 LAT.: 58.3852° N LONG.: 134.6461° W
 DATE: MARCH, 2019



PROPOSED
OFFSHORE DISPOSAL
SITE CENTER
± 65 ACRES

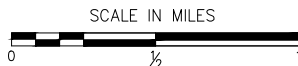
**OFFSHORE
DISPOSAL SITE CENTER:**

LAT: N 58°22'22.08"
LONG: W 134°39'49.32"

NOTE:
CENTER LOCATION APPROXIMATE

BATHYMETRY FROM: NOAA 17315
GASTINEAU CHANNEL AND TAKU
INLET

**OFFSHORE DISPOSAL
SITE PLAN**



STATTER HARBOR IMPROVEMENTS PHASE III

APPLICANT: CITY AND BOROUGH JUNEAU/ DOCKS AND HARBORS
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DATE: MARCH, 2019



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Incidental Harassment Authorization Request
CBJ D&H Statter Harbor Improvements Project Phase III B

Appendix B. Marine Mammal Monitoring Plan

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Marine Mammal Monitoring Plan
for the
Statter Harbor Improvements Project Phase III B
City and Borough of Juneau, Alaska
Docks and Harbors Department

Revised September 2019
(DRAFT Pending receipt of final permits)

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





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ACRONYMS AND ABBREVIATIONS

- CBJ City and Borough of Juneau
- D&H Docks and Harbors Department
- ESA Endangered Species Act
- GPS global positioning system
- IHA Incidental Harassment Authorization
- 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
- SPL sound pressure level
- TTS temporary threshold shift



1 Introduction

The purpose of this Marine Mammal Monitoring Plan (MMMP) is to provide a protocol for monitoring affected species during the proposed construction of Phase III B of the City and Borough of Juneau Docks and Harbors Department (CBJ D&H) Statter Harbor Improvements Project in Juneau, Alaska. This plan was developed to support the Incidental Harassment Authorization (IHA) application under the Marine Mammal Protection Act, Section 101(a)(5)(D) permitting. The IHA application provides a detailed discussion on the calculations for the proposed action.

A marine mammal monitoring program will be implemented at the start of specified construction activities and will follow the protocols outlined in this MMMP. The primary goals of the monitoring program are:

- To monitor the proposed shutdown and monitoring zones, to estimate the number of marine mammals exposed to noise at, or exceeding established thresholds, and to document animal responses;
- To minimize impacts to the marine mammal species present in the project area by implementing mitigation measures including monitoring, ensuring the shutdown zones are clear of marine mammals, soft start, and shutdown procedures; and
- To collect data on takes, occurrence and behavior of marine mammal species in the project area and any potential impacts from the project.



Figure 1. Project location within Auke Bay, Juneau, AK



2 Phase III B Project Description

CBJ D&H is proposing improvements to Statter Harbor within Auke Bay in Juneau, Alaska to improve safety, increase efficiency and reduce congestion. A complete description of the region, project tasks, project materials, dates and duration, affected species, and anticipated impacts are included in the Phase III B IHA application to which this document is a companion. In general terms, this phase of the project will consist of installation of new commercial vessel moorage floats, including piles and utilities.

3 Species Covered Under IHA

Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), humpback whales (*Megaptera novaeangliae*), harbor porpoises (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whales (*Orcinus orca*), minke whales (*Balaenoptera acutorostrata*) and California sea lions (*Zalophus californianus*) are covered under the Phase III B IHA request.

Work will shut down if any other marine mammal enters an unauthorized harassment zone.

4 Methods

Under directives in the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA), this marine mammal monitoring and impacts minimization plan was tailored to the project to ensure appropriate documentation and compliance with applicable regulations. Monitoring will be conducted by NMFS approved marine mammal observers (hereafter, "observers"). Land-based observers will be located on-site before, during, and after in-water construction activity at sites appropriate for monitoring marine mammals within and approaching the Level A and Level B harassment zones. Where Level B zones are too large to be fully observed takes will be estimated by extrapolation based on the percentage of the Level B harassment zone visible.

During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye. Observers will work shifts of a maximum of four consecutive hours followed by an observer rotation or a 1-hour break and will work no more than 12 hours in any 24-hour period. Observers will collect data including environmental conditions (e.g., sea state, precipitation, glare, etc.), marine mammal sightings (e.g., species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures (takes). Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this MMMP.

Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, ensuring shutdown zones are clear of marine mammals, and shutdown procedures. They will be in continuous contact with the construction personnel via two-way radio. A cellular phone with local service will be used as back-up communications and for safety purposes.

An employee of the construction contractor will be identified as the pile driving supervisor for observers at the start of each construction day. Observers will communicate directly to the pile driving supervisor when a shutdown is deemed necessary due to marine mammals approaching an applicable shutdown zone.

4.1 Observer Qualifications

Monitoring will be conducted by qualified, trained observers. In order for observers to be considered qualified, the following requirements must be met:



- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance;
- Physical capability of performing essential duties, including sitting or standing for periods of up to four hours, using binoculars or other field aid, and documenting observations;
- Experience and ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals and marine mammal behavior, including the ability to accurately identify marine mammals in Alaskan waters to species;
- Sufficient training, orientation or experience with the construction operation to provide for identification of concurrent activities and for personal safety during observations;
- Writing skills sufficient to prepare reports of observations; and
- Ability to communicate orally, by radio and in person, with project personnel to provide real-time information on marine mammals observed in the area and the appropriate mitigation response for the circumstances.

4.2 Data Collection

Observers will use a National Marine Fisheries Service (NMFS)-approved Observation Record (Appendix A) which will be completed by each observer for each survey day and location. Observation Records will be used by observers to record the following:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (e.g. percent cloud cover, percent glare, visibility) and sea state (the Beaufort Wind Force Scale will be used to determine sea-state);
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile removal activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown.

4.3 Equipment

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

- Appropriate Personal Protective Equipment;
- Portable radios and headsets for the observers to communicate with the pile driving supervisor and other observers;
- Cellular phone as backup for radio communication;
- Contact information for the other observers, pile driving supervisor, and NMFS point of contact;
- Daily tide tables for the project area;
- Watch or chronometer;
- Binoculars (quality 7 x 50 or better) or spotting scope with built-in rangefinder or reticles (rangefinder may be provided separately);
- Hand-held GPS unit, map and compass, or grid map to record locations of marine mammals;



- Copies of MMMP, IHA, and/or other relevant permit requirement specifications in sealed clear plastic cover;
- Notebook with pre-standardized monitoring Observation Record forms on waterproof paper; and

4.4 Shutdown and Monitoring Zones

CBJ D&H has established shutdown and monitoring zones to delineate areas in which marine mammals may be exposed to injurious underwater sound levels due to in-water construction. Work which could cause noise levels to rise above non-permitted thresholds will shut down if marine mammals are approaching shutdown zones. Observers will also monitor and document activities in areas where animals could be subjected to noise levels at or above the permitted thresholds. The effective zones are summarized below and are discussed in detail in Section 5 of the IHA request.

Species with permitted Level B harassment under the IHA include Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), humpback whales (*Megaptera novaeangliae*), harbor porpoises (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whales (*Orcinus orca*), minke whales (*Balaenoptera acutorostrata*) and California sea lions (*Zalophus californianus*). Take of any other marine mammal is not permitted under the IHA, nor is take by activities not authorized by the IHA.

Determination of harassment radii was discussed fully in the IHA request. The effective radii are summarized in Tables 1 and 2 below. The following shall apply to monitoring and shutdown zones.

- During all in-water or over-water construction activities having the potential to affect marine mammals, a shutdown zone of 35 feet (10 meters) will be implemented to ensure that animals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the slinging of construction materials via crane.
- The harassment zones will be monitored throughout the permitted in-water or over-water construction activity.
 - If a permitted marine mammal enters the monitoring zone, an exposure will be recorded and animal behaviors documented. However, permitted construction activities would continue without cessation unless the animal approaches or enters the shutdown zone.
 - If a marine mammal approaches or enters a shutdown zone, all permitted construction activities will be immediately halted until the marine mammal has left the shutdown zone.
- Take, in the form Level B harassment, of marine mammals other than permitted species is not authorized and will be avoided by shutting down construction activities before individuals of these species enter the Level B harassment zone.



Table 1. Effective Shutdown and Monitoring Zones – Underwater Sources

Source	Shutdown Zone – Permitted Species					Shutdown Zone
	Low-Frequency Cetaceans (Humpback Whale and Minke Whale)	Mid-Frequency Cetaceans (Killer Whale)	High-Frequency Cetaceans (Dall's and Harbor Porpoise)	Phocid Pinnipeds (Harbor Seal)	Otariid Pinnipeds (Steller and California Sea Lions)	Non-Permitted Species
Vibratory Pile Removal	70 ft (20 m)	35 ft (10 m)	85 ft (25 m)	35 ft (10 m)	35 ft (10 m)	8,075 ft (2460 m)
Vibratory Installation/Drilling	265 ft (80 m)	35 ft (10 m)	390 ft (120 m)	160 ft (50 m)	35 ft (10 m)	7.5 miles (12.1 km)
Impact Pile Driving (Steel)	605 ft (185 m)	35 ft (10 m)	720 ft (220 m)	325 ft (100 m)	35 ft (10 m)	3,280 ft (1000 m)

*Since many Level A harassment zones are smaller than the conservative 35-foot (10-meter) shutdown zone to prevent physical injury, the conservative shutdown zone will be implemented for all in-water activities.

4.5 Observer Monitoring Locations

In order to observe the shutdown and monitoring zones effectively, observers will be positioned at the best practicable vantage points, taking into consideration security, safety, access, and space limitations. A minimum of 2 observers will be stationed at locations that provide adequate visual coverage for shutdown and monitoring zones during pile driving and drilling activities. Potential observation locations are depicted in Figures 2 and 3. Observation locations will be selected based on visibility and the type of work occurring.

Monitoring zone identification may be based on fixed points and structure-defined areas incorporating the zone radii or greater area, rather than exact measurements. Marine mammal researchers and monitoring personnel typically use spotting scopes and binoculars to enhance visibility and reticle binoculars and laser range finders to gauge distance of animals from viewing stations. However, Statter Harbor provides challenges for these technologies. Reticle binoculars require an open-water backdrop (open horizon) to determine the angle for calculating distance to an object, and the observer must always know height above the subject viewed to make an accurate distance estimate. The recommended observation stations for this project are high points that provide a greater field-of-view of the project area, but complicate the geometry required for estimating distance to moving animals. Limiting factors such as structures, moving boats, or fog can interfere with spotting scope or laser rangefinder distance measurements. For these reasons, we propose using monitoring zones defined by structures (such as ramps, docks, land features, and pilings) of precisely known geographic locations that approximately correspond to the calculated perimeters from circular project site monitoring zones. This practical adaptation will provide for much more precise counting of animals in a particular section of Auke Bay without introducing ambiguous estimates of distance from construction equipment.

During pile driving and drilling activities a minimum of two observers will be onsite. Monitoring locations are limited as much of the coastline is private property. Monitoring locations are further limited by safety concerns associated with staging monitors in Stephens Passage, or on uninhabited islands, due to wave and weather considerations during winter months. Thus the primary monitoring locations (Figure 2) proposed include at the project site and at either the Auke Bay Ferry Terminal or the Auke Bay Loading Facility, both of which are located in Auke Nu Cove. Alternatively, a roving vessel based monitor (Figure 3) may be utilized in place of the observer at the Auke Bay Ferry Terminal/Auke Bay Loading Facility should vessels or construction



equipment block the monitoring zone. Takes will be interpolated based on the percentage of the monitoring zone visible.

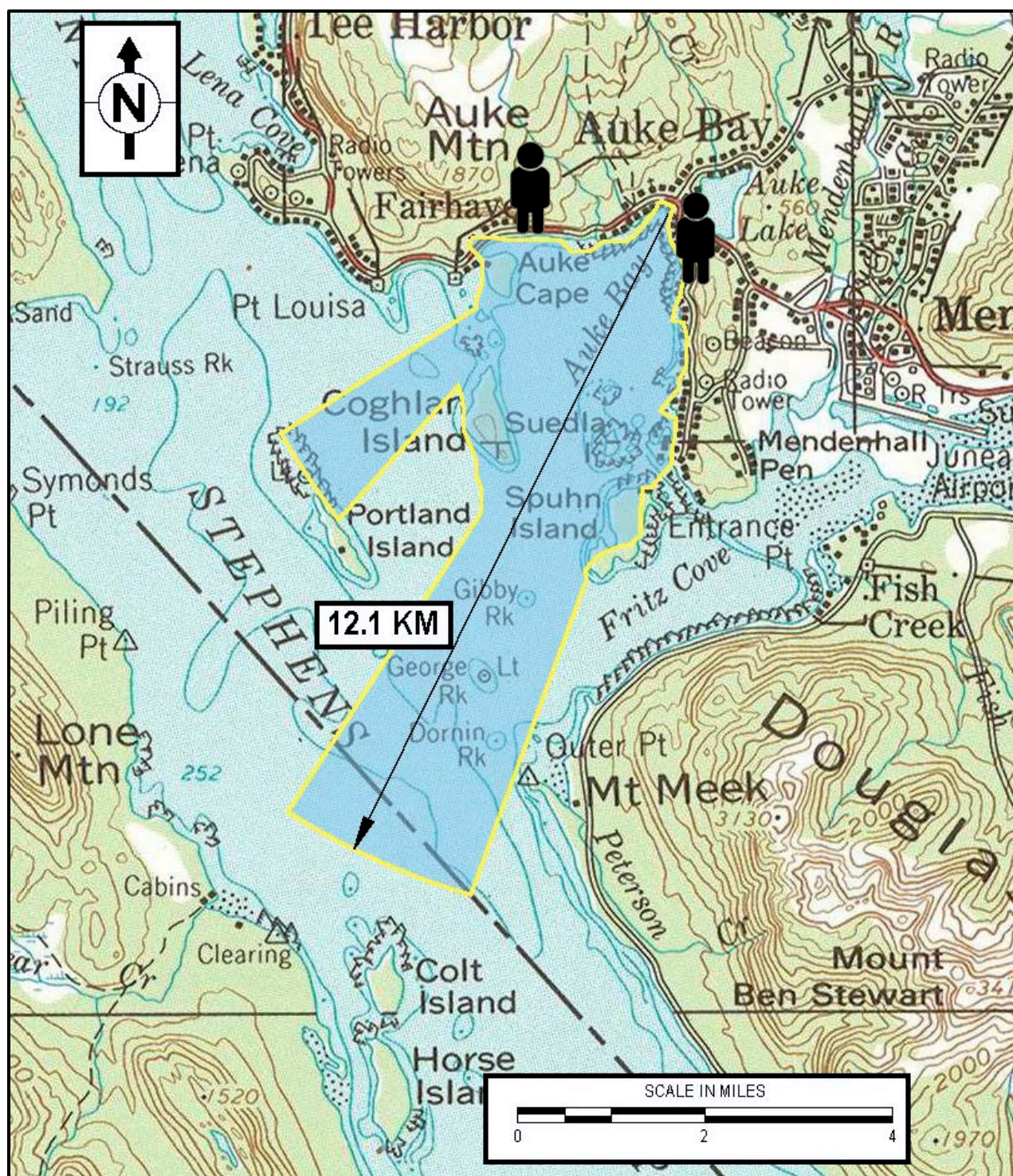


Figure 2. Primary Potential Observer Locations



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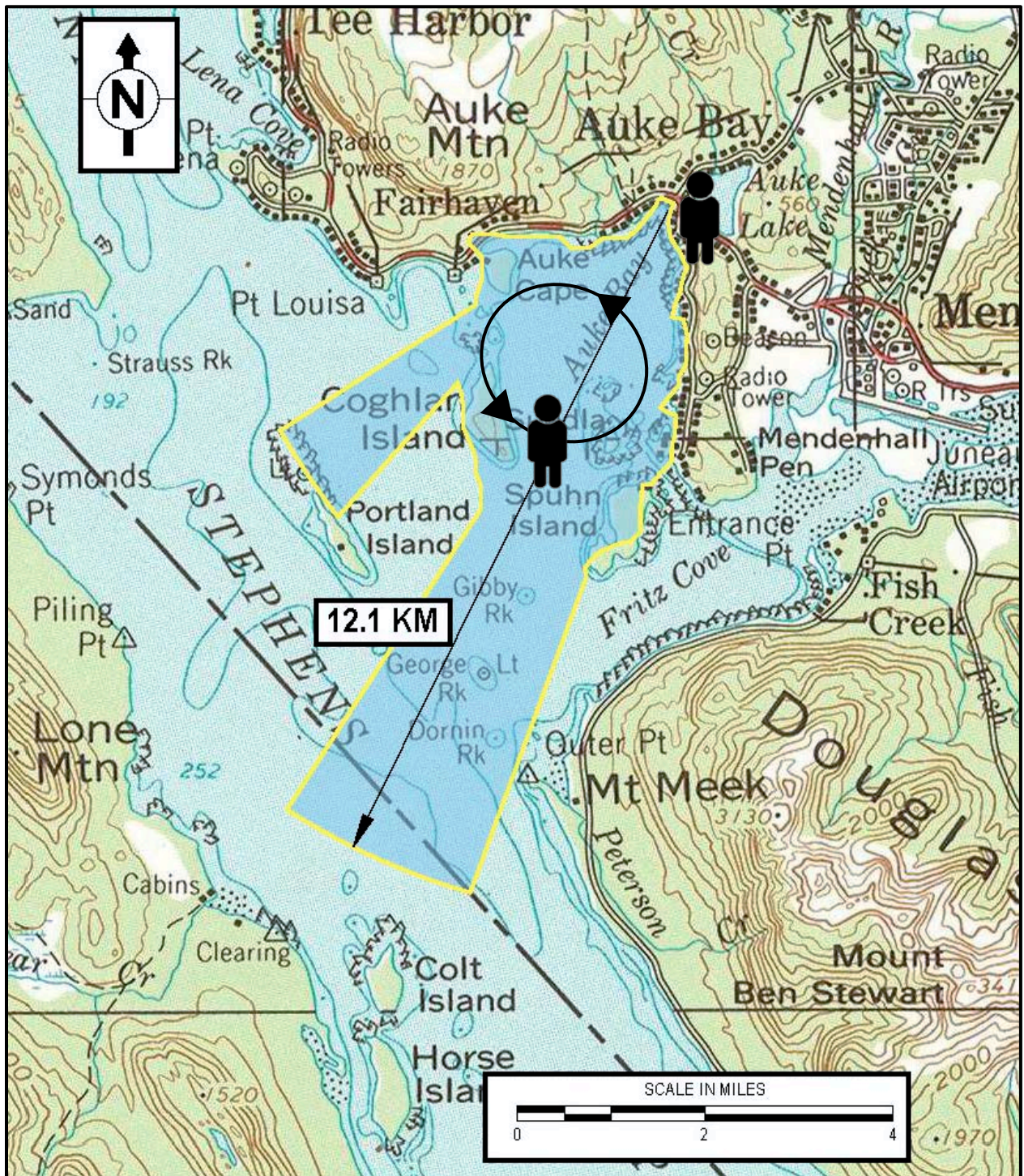


Figure 3. Alternative Observer Locations



4.6 Monitoring Techniques

CBJ D&H will collect sighting data and behaviors of marine mammal species that are observed in the shutdown and monitoring zones during construction. All observers will be qualified and trained in marine mammal identification and behaviors, as described in Section 4.1. NMFS requires that the observers have no other construction-related tasks while conducting monitoring.

Observation of shutdown and monitoring zones will take place from 30 minutes prior to initiation through 30 minutes post-completion of all permitted in-water activities.

Observation generally necessitates that daylight is sufficient for observers to visualize the entirety of the monitoring zones, so observations will commence and complete during daylight hours to the extent possible. However, daylight hours are limited during winters in Alaska and there is a strong possibility the contractor will need to work outside of daylight hours, particularly in November through February.

4.6.1 Pre-Activity Monitoring

The following monitoring methodology will be implemented prior to commencing permitted activities:

- Prior to the start of permitted activities, observers will monitor the shutdown and monitoring zones¹ for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans). They will ensure that no marine mammals are present within the shutdown zone before permitted activities begin.
- The shutdown zone will be cleared when marine mammals have not been observed within the zone for that 15-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans).
- When all applicable shutdown zones are clear, the observers will radio the pile driving supervisor. Permitted activities will not commence until the pile driving supervisor receives verbal confirmation the zones are clear.
- If permitted species are present within the monitoring zone, work will not be delayed, but observers will monitor and document the behavior of individuals that remain in the monitoring zone.
- In case of fog or reduced visibility, observers must be able to see the entirety of shutdown and monitoring zones before permitted activities can be initiated.

4.6.2 Soft Start Procedures

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

- 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.
- For other heavy equipment operating from barges or nearshore, the equipment will be idled for 15 minutes prior to operation.
- If work ceases for more than 30 minutes, soft start procedures must recommence prior to performing additional work.

¹ The monitoring zone includes the area visible by the 2 observers, which may vary slightly based on weather conditions and whether the second monitor is land or vessel based. Based on the monitoring locations and assuming each observer can effectively see approximately 2 km from the monitoring station the total monitoring zone is approximately 3 km from the project site.



4.6.3 During-Activity Monitoring

The following monitoring methodology will be implemented during permitted activities:

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

4.6.4 Shutdown

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

- The observers shall immediately radio or call to alert the pile driving supervisor.
- All permitted activities will be immediately halted.
- In the event of a shutdown of pile installation or removal operations, permitted activities may resume only when:
 - The animal(s) within or approaching the shutdown zone has been visually confirmed beyond or heading away from the shutdown zone, or 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) have passed without re-detection of the animal;
 - Observers will then radio or call the pile driving supervisor that activities can re-commence.

4.6.5 Breaks in Work

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

If permitted activities cease for more than 30 minutes and monitoring has not continued, pre-activity monitoring and soft start procedures must recommence. This includes breaks due to scheduled or unforeseen construction practices or breaks due to permit-required shutdown. Following 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) of monitoring, work can begin according to the pre-activity monitoring protocols. Work cannot begin if an animal is within the shutdown zone or if visibility is not clear throughout the shutdown and monitoring zones.

4.6.6 Post-Activity Monitoring

Monitoring of the shutdown and monitoring zones will continue for 30 minutes following completion of vibratory pile driving. A post-monitoring period is not required for other in-water construction. These surveys will record observations, focusing on observing and reporting unusual or abnormal behavior of marine mammals. Observation Record forms will be used to document observed behavior.

5 Reporting

5.1 Injured or Dead Marine Mammal

If CBJ D&H finds an injured, sick, or dead marine mammal, a representative will notify NMFS and provide the species or description of the animal(s), condition of the animal or carcass, location, date and time of first discovery, observed behaviors (if alive), and photograph or video (if available).

- If the marine mammal's condition is a direct result of the project, notification will be made and work will stop until NMFS is able to review the circumstances of the prohibited take.
- If the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced



decomposition, scavenger damage), CBJ D&H shall report the incident within 24 hours of the discovery. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death.

- If cause of death is unclear, CBJ D&H shall immediately report the incident. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death. NMFS will work with CBJ D&H to determine whether additional mitigation measures or modifications to the activities are appropriate.

Care should be taken in handling dead specimens, if encountered, to preserve biological materials in the best possible state for later analysis of cause of death. In preservation of biological materials from a dead animal, the finder (i.e. observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

Reports will be made to the Office of Protected Resources and the Alaska Regional Stranding Coordinator.

5.2 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 for each phase. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during permitted activities. 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.

At a minimum the reports shall include:

- General data:
 - Date and time of activity
 - Water conditions (e.g., sea-state)
 - Weather conditions (e.g., percent cover, percent glare, visibility)
- Specific pile driving data:
 - Description of the pile removal being conducted (pile locations, pile size and type), and times (onset and completion) when pile removal occurs.
 - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that vibratory pile removal times and strike counts are accurately recorded. The duration of soft start procedures should be noted as separate from the full power duration.
 - Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)
- 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 vibratory pile removal 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.



Appendix A. Marine Mammal Observation Record



MARINE MAMMAL
OBSERVATION RECORD

Project Name: Statter Harbor Improvements

Monitoring Location: _____

Date: _____

Time Effort Initiated: _____

Time Effort Completed: _____

Page of

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

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

Marine Mammal Observation Record – Sighting Codes

Behavior Codes

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

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

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

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

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



Marine Mammal Monitoring Plan
CBJ Statter Harbor Improvements Project

Event

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

Sighting Cues

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

Marine Mammal Species

Code	Marine Mammal Species
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPBK	Humpback Whale
OTT	Sea Otter
STEID	Steller's Eider
OTHR	Other

Construction Type

Code	Activity Type
V	Vibratory Pile Driving (installation and extraction)
I	Impact Pile Driving
DP	Dead pull
ST	Stabbing
DR	Drilling
OWC	Over-Water Construction
NOWC	No Over-Water Construction
NONE	No Construction

Mitigation Codes

Code	Activity Type
SS	Soft Start
BC	Bubble Curtain
DE	Delay onset of In-Water Work
SD	Shut down In-Water Work

Visibility

Code	Distance Visible
B	Bad (<0.5km)
P	Poor (0.5 – 0.9km)
M	Moderate (0.9 – 3km)
G	Good (3 – 10km)
E	Excellent (>10km)

Weather Conditions

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

Wave Height

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