Request for an Incidental Harassment Authorization

Power Systems & Supplies of Alaska
Ward Cove Cruise Ship Dock Project
Ward Cove, Ketchikan, Alaska

February 2020

Prepared for:
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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
dB	decibels
DPS	distinct population segment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
Hz	hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
min	minutes
MMPA	Marine Mammal Protection Act
µPa	microPascal
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PSO	Protected Species Observer
PTS	permanent threshold shift
rms	root mean square
SPL	sound pressure level
USFWS	U.S. Fish and Wildlife Service

1 DESCRIPTION OF SPECIFIC ACTIVITY

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 OVERVIEW

Power Systems & Supplies of Alaska proposes to construct a cruise ship dock in Ward Cove approximately eight kilometers (five miles) north of downtown Ketchikan, Alaska. The new dock would allow cruise ships to safely transit Tongass Narrows and provide them safe harbor in Ward Cove while relieving vessel, pedestrian, and vehicle congestion in the Port of Ketchikan and downtown Ketchikan.

Construction, which includes the installation of piles to support a new 500-foot by 70-foot floating pontoon dock, mooring structures, and shore-access transfer span and trestle, would begin in January 2020 and be completed in June 2020. All pile driving is expected to occur on 105 days (not necessarily consecutive). The proposed project would occur in marine waters that support several marine mammal species. Pile driving may result in auditory injury (Level A harassment) and behavioral harassment (Level B harassment) of harbor seals.

The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals; take 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) allows for the issuance of an Incidental Harassment Authorization (IHA), provided an activity results in negligible impacts on marine mammals and would not adversely affect subsistence use of these animals.

Harbor seal (*Phoca viutlina*) are common in the project area and Power Systems & Supplies of Alaska is requesting an IHA for Level B take of harbor seals. Construction will begin in January 2020 and will shut down for all marine mammals as required until an IHA is issued.

Minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*),humpback whale (*Megaptera novaeangliae*), gray whale (*Eschrichtius robustus*), killer whale (*Orcinus orca*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Steller Sea Lion (EDPS; *Eumatopia jubatus*), and Northern sea otters (*Enhydra lutris kenyoni*) also have ranges that are documented to extend into the project area. However, take is not request for these species and shutdown zones will be used to prevent unauthorized take.

As set out by 50 CFR 216.104, Submission of Requests, the specific items required for this application follow in Sections 1 through 14.

1.2 DETAILED DESCRIPTION OF SPECIFIC ACTIVITIES

1.2.1 Location

The proposed cruise ship dock is located in Ward Cove, located on the north side of Tongass Narrows, approximately eight kilometers (five miles) north of Ketchikan, in Southeast Alaska; Township 74S, Range 90E, Sections 33 and 34, Copper River Meridian, USGS Quadrangle Juneau A5 NE; latitude 55.4037 and longitude -131.7316 (Figure 1 and Sheet 1). Tongass Narrows are part of Alaska's Inside Passage, a route for ships through Southeast Alaska's network of islands.

Ward Cove has experienced significant industrial activity as it was previously home to a pulp mill, sawmill, and fish processing plant. See Section 2.6 for more information about how these activities polluted the cove. Ward Cove is now being redeveloped into an industrial park and the proposed cruise ship dock would be installed adjacent to decommissioned structures associated with the pulp mill (Figure 2 and 3).

Figure 1. Proposed Project Location and Vicinity Map

Figure 2. Location of Proposed Cruise Ship Dock

Figure 3. Photo of Project Site

Photo Credit: Ward Cove Group as published in Alaska Journal of Commerce June 2013.

1.2.2 Purpose and Need

Ketchikan is one of the main ports-of-call for cruise ships in Alaska, receiving up to six ships daily from May through September, with over 950,000 annual cruise passenger visits (Moffatt & Nichol/LandDesign 2016). The average length of cruise ships has increased over time. In the 1970s 550-foot long ships were common. Now ships with lengths over 900 feet are becoming the operational norm. These post-Panamax cruise ships, which are larger than those that have historically come through Alaska's Inside Passage, first started docking in downtown Ketchikan this spring (2019). The current infrastructure in downtown Ketchikan is crowded.

The purpose of this project is to construct a dock that accommodates large cruise ships and their passengers. This project is needed to provide safe harbor for large cruise ships and relieve vessel, pedestrian, and vehicle congestion in downtown Ketchikan.

1.2.3 Proposed Action

The Power Systems & Supplies of Alaska proposes to increase safe harbor for cruise ships by constructing a new cruise ship dock in Ward Cove with a trestle that includes a driving lane and walkway for easy access to shore (Table 1 and 2, Figure 4; Appendix A, Sheets 1-10).

The project would:

- Install 48 temporary 30-inch-diameter steel piles as templates to guide proper installation of permanent piles (these temporary piles would be removed prior to project completion);
- Install 14 permanent 30-inch-diameter piles, 20 permanent 36-inch-diameter piles, and 20 permanent 48-inch diameter piles to support a new 500-foot by 70-foot floating pontoon dock, mooring structures, and shore-access transfer span and trestle (Table 1, Figures 4 and 5, Sheets 1-10);
- Install dock components such as bull rail, floating fenders, mooring cleats, vehicle driveway, curb, passenger walkway, hand rail, and mast lights. (Note: these components would be installed out of the water.)

Table 1. Ward Cove Construction Components

Construction Component	Material	Dimensions (feet)	Distance Above Mean High Water (feet)
Trestle	Treated Timber Decking (slated) [1]	450 x 20	25
Transfer Span	Fiberglass Decking (slated)	16 x 14	0-25
Floating Dock	Painted Steel Pontoons with Treated Timber Decking (slated)	500 x 70	32
Catwalks (x2)	Fiberglass Decking (slated)	115 x 4	29
Piles	Galvanized Steel	See Table 2	N/A

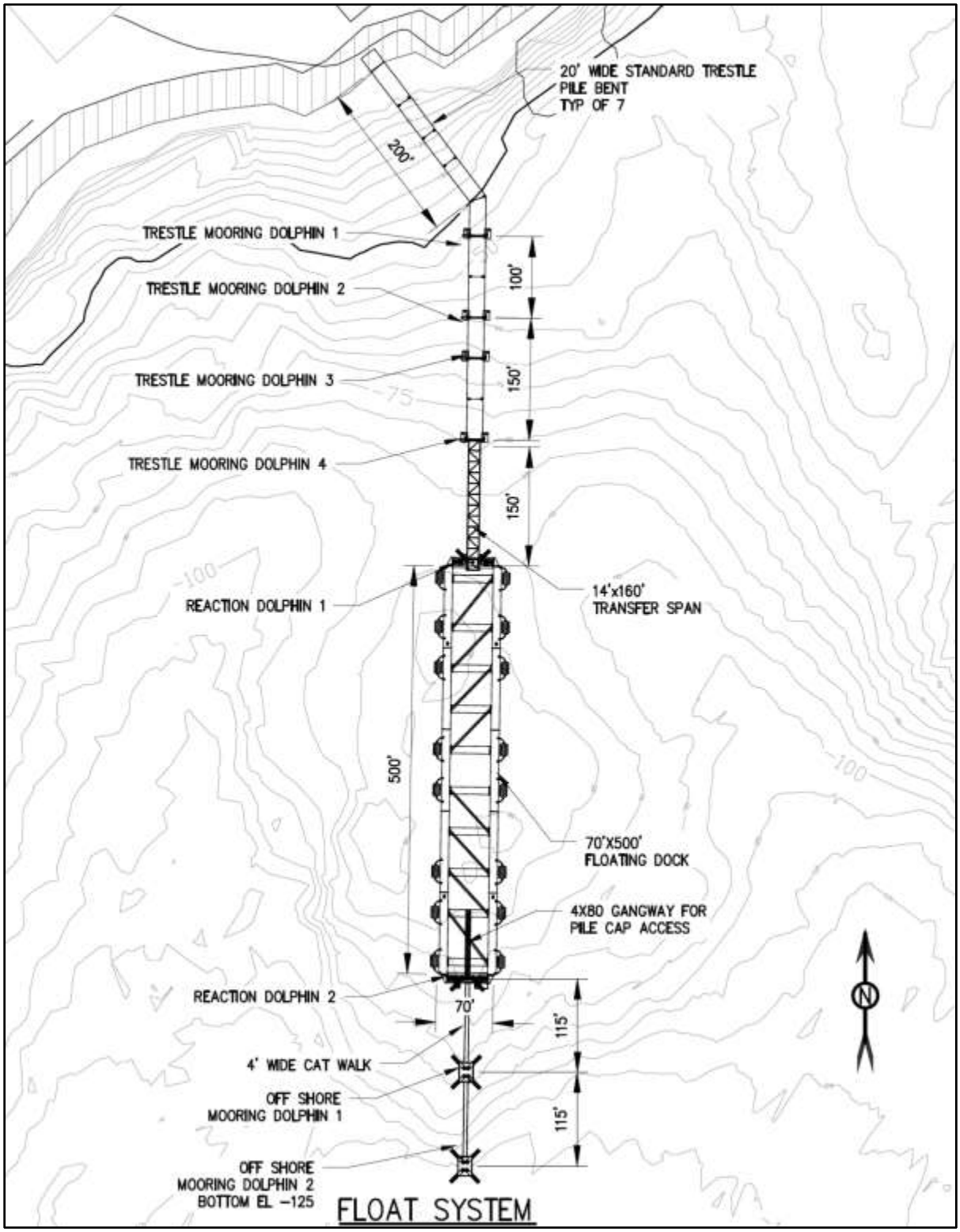
[1] The decking will be treated with 2.5# retention ACZA and the decking support will be creosote treated to 20# retention.

The project would require the installation of 102 piles shown in Table 2.

Table 2. Proposed Pile Schedule

Location	Pile Diameter (inches)	Pile Quantity
Trestle (7 bents with 2 piles per bent)	30	14
Trestle Mooring Dolphin (4 dolphins with 5 piles per dolphin)	36	20
Reaction Dolphin (2 dolphins with 6 piles per dolphin)	48	12
Off Shore Mooring Dolphin (2 dolphins with 4 piles per dolphin)	48	8
Temporary Template Pile (20 piles for standard trestle, 12 piles for mooring trestle, 8 piles for reaction dolphins and 8 piles for off shore mooring dolphins)	30	48
Total number of piles		**108**

Figure 4. Proposed Ward Cove Cruise Ship Dock



1.3 Construction Methods

1.3.1 Construction Vessels

The following vessels are expected to be used to support construction:

- One material barge (approximately 250 ft by 76 ft x 15.5 ft) to transport materials from Washington to the project site and to be used onsite as a staging area during construction.
- One construction barge (crane Barge 280 ft by 76 ft by 16 ft) to transport materials from Washington to the project site and to be used onsite to support construction.
- 1 skiff (25-foot skiff with a 125–250 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Ketchikan to support construction activities.
- 1 skiff (25-35-foot skiff powered with a 35-50 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Ketchikan to support PSO efforts.

1.3.1.1 Transport of Materials and Equipment

The material and construction barges would transport materials from Washington to the project site. These types of barges frequently travel the Inside Passage to and from Alaska. Once at the project site the construction barge would be secured in place by four mooring anchors. Anchors would not be placed in the monitored natural attenuation area or sand capped areas of the previously contaminated areas of Ward Cove. A global positioning system (GPS) unit would be used to place anchors outside the restricted areas. The anchors would be below the surface and would not be a hazard to navigation. The material staging barge would be tied to the construction barge, and materials would be moved from the staging barge to the construction barge and project site by a crane on the barge. Local barge moves to the next pile installation area (in approximately 100 feet increments) would occur at a speed of less than two miles per hour.

1.3.1.2 Transport of Workers

Construction workers would be transported from shore to the barge work platform by skiff. The travel distance would be less than 300 feet. There could be multiple shore-to-barge trips during the day; however, the area of travel would be relatively small and close to shore.

1.3.1.3 Handling of Material to Minimize Potential Contamination

(See Section 2.7 Historic Pollution for background on the site.)
As piles are installed, it is expected approximately 2 cubic yards of material would come out of each trestle pile and 10 cubic yards of material would be excavated from each dolphin pile. Less than two piling would be drilled in a day to minimize the volume of sediment disturbance. About 6 cubic yards per day would be excavated during construction of the trestle and about 20 cubic yards per day would be excavated during the construction of the dolphins, for a total of 280 cubic yards for the project.

All material that comes out of the top of the pile during pile driving (drill cutting discharge) would be collected on a barge and transported to a permitted upland location for disposal. Further, a 50-feet deep silt curtain would be installed to surround the pile driving and temporary pile removal operation.

A benthic sediment and water quality field study, reviewed by the Alaska Department of Environmental Conservation (ADEC), would be conducted prior to, during (water quality only), and following cruise ship dock construction. Following sampling protocols previously developed for the Environmental Protection Agency (EPA) during clean up and monitoring of the site, a water quality and sediment sampling program would occur. The sampling program would be reviewed and approved by the ADEC.

If the sand cap area is damaged during construction or operations, steps would be taken to restore it as directed by ADEC and EPA.

The dock's treated timber decking will be pre-fabricated and installed at the fabricator's yard in Washington State. No cutting, drilling, patching, or treatment of timber is expected to occur on site. If any incidental drilling or cutting were to become necessary on-site proper containment would be used to prevent any cuttings or sawdust from entering the water.

1.3.2 Pile Installation Equipment

The following pile installation equipment is expected to be used:

- Vibratory Hammer: ICE 44B/Static weight 12,250 pounds
- Diesel Impact Hammer: Delmag D46/Max Energy 107,280 feet-pounds
- Drilled shaft drill: Holte 100,000 feet-pounds top drive with down-the-hole hammer and bit

1.3.2.1 Pile Installation Methods

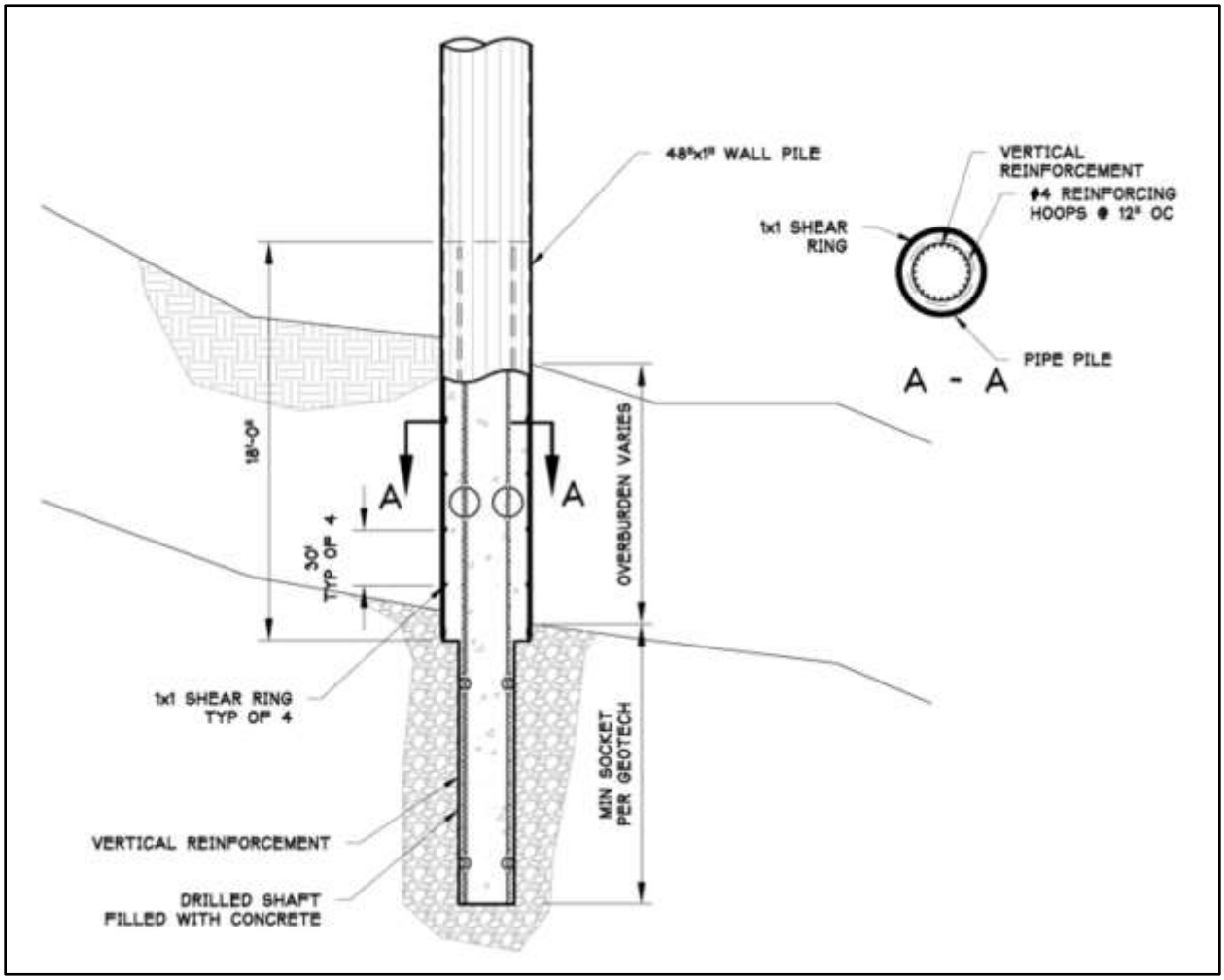
Installation and Removal of Temporary (Template) Piles

Temporary 30-inch-diameter piles would be installed and removed using a vibratory hammer.

Installation of Permanent Piles

The permanent 30-inch-diameter trestle piles would be installed through sand and gravel with a vibratory hammer and impact hammer. The permanent 36-inch and 48-inch-diameter piles would be driven through sand and gravel with a vibratory hammer and then impact driven into bedrock. After being impacted, the pile would be rock anchored. To rock anchor the pile a down-the-hole hammer with a 33-inch-diameter bit would be used to drill a shaft into the bedrock. The drill bit will be removed and the shaft will be filled with vertical reinforcement (a rebar cage) in concrete to secure the pile (Figure 5). The depth of the shaft will be determined by a geotechnical engineer prior to construction. During anchor drilling the pile is not touched by the drill and no steel-on-steel hammer noise is generated.

Figure 5. Rock Anchor Profile



1.3.2.2 Construction Sequence

In-water construction of the cruise ship dock would begin with installation of an approximately 650-foot-long trestle. Once the trestle is constructed, dolphins will be constructed. Trestle and dolphin construction will use the following sequence:

1) Vibrate 32 temporary 30-inch-diameter piles for the trestle, and 16 temporary 30-inch-diameter piles for the dolphins, a minimum of ten feet into overburden to create a template to guide installation of permanent piles.
2) Weld a frame around the temporary piles.
3) Within the frame, vibrate and impact permanent 30-inch-diameter piles into place for the trestle; or vibrate, impact, and rock anchor permanent 36-inch or 48-inch-diameter piles into place for the dolphins.
4) Remove the frame and temporary piles.
5) Perform this sequence at the seven trestle bent locations, working farther from the shoreline each sequence. Once the trestle is completed perform this sequence at the eight dolphin locations, completing one dolphin before beginning another.

After all piles are installed, construction will proceed with installation of the floating dock, transfer span, trestle, mechanical systems, and other above-water components like the vehicle driveway, passenger walkway, and mast lights.

Please see Table 3 for a conservative estimate of the amount of time required for pile installation and removal.

1.3.2.3 Other In-water Construction and Heavy Machinery Activities

In addition to the activities described above, the proposed action will involve other in-water construction and heavy machinery activities. Examples of other types of activities include using standard barges and tug boats to place and positioning piles on the substrate via a crane (i.e., "stabbing the pile").

Table 3. Ward Cove Cruise Ship Dock Pile Installation and Removal Summary

Description	Project Component				
	Temporary Pile Installation	Temporary Pile Removal	Permanent Pile Installation	Permanent Pile Installation	Permanent Pile Installation
Diameter of Steel Pile (inches)	30	30	30	36	48
# of Piles	48	48	14	20	20
Vibratory Pile Driving					
Total Quantity	48	48	20	15	20
Max # Piles Vibrated per Day	4	4	4	2	2
Vibratory Time per Pile	10 min	10 min	10 min	30 min	30 min
Vibratory Time per Day	40 min	40 min	40 min	60 min	60 min
Number of Days (48 days)	12	12	4	10	10
Vibratory Time Total (38 hours 20 min)	8 hours	8 hours	2.33 hours	10 hours	10 hours
Impact Pile Driving					
Total Quantity	0	0	14	20	20
Max # Piles Impacted per Day	0	0	2	2	2
# of Strikes per Pile	0	0	40	100	100
Impact Time per Pile	0	0	1 min	2.5 min	2.5 min
Impact Time per Day	0	0	2 min	5	5 min
Number of Days (27 days)			7	10	10
Impact Time Total (1 hour 54 minutes)	0	0	14 min	50 min	50 min
Rock Anchor Installation (Drilled Shaft)					
Total Quantity	0	0	0	20	20
Anchor Diameter	--	--	--	33”	33”
Max # Piles Anchored per Day	0	0	0	2	1
Anchor Time per Pile	0	0	0	4 hours	5 hours
Anchor Time per Day	0	0	0	8 hours	5 hours
Number of Days (30 days)				10 days	20 days
Anchor Time Total (180 hours)	0	0	0	80 hours	100 hours

1.4 ACOUSTIC THRESHOLDS AND ESONIFIED AREA

Vibratory pile driving and removal, impact pile driving, and rock anchor installation would generate in-water and in-air noise that may result in take of marine mammals.

Using the best available science, National Marine Fisheries Service (NMFS) has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur permanent threshold shifts (PTS) of some degree (equated to Level A harassment).

1.4.1 Level A Harassment

NMFS' *Technical Guidance for Assessing the Effects of Anthropogenic Sounds on Marine Mammal Hearing* (NMFS 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive) (NMFS 2018). Power Systems & Supplies of Alaska's activity includes the use of both impulsive (impact pile driving) and non-impulsive (vibratory pile driving and removal, and rock anchor installation) sources. The thresholds for auditory injury are provided in Table 4.

Table 4. Thresholds Identifying the Onset of PTS

	PTS Onset Thresholds*(received level)	
Hearing Group	**Impulsive (Impact Pile Driving)**	**Non-impulsive (Vibratory Pile Driving)**
Low-Frequency Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds, Underwater	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds, Underwater	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

Adapted from: NMFS 2018

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure level (Lp,0-pk) has a reference value of 1 µPa, and weighted cumulative sound exposure level (LE,p) has a reference value of 1µPa2s. In this Table, thresholds are abbreviated to be more reflective of International Organization for Standardization standards (ISO 2017). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals (i.e., 7 Hz to 160 kHz). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these thresholds will be exceeded.

1.4.2 Level B Harassment

NMFS predicts that all marine mammals are likely to be behaviorally harassed in a manner that they consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 decibels (dB) re 1µPa (rms) for continuous and above 160 dB re 1µPa (rms) for non-explosive impulsive sources.

1.4.3 Calculated Distances to Level A and Level B Thresholds

For this project, distances to the Level A and Level B thresholds were calculated based on various source levels, expressed in sound pressure level (SPL)[1] or sound exposure level (SEL)[2] for a given activity and pile type (e.g., vibratory removal of 30-inch-diameter steel pile, impact pile driving 48-inch-diameter steel pile) and, for Level A harassment, accounted for the maximum duration of that activity per day using the practical spreading model in the User Spreadsheet developed by NMFS. Calculated distances to thresholds are shown in Table 5 and range from approximately 1 meter to 16 kilometers. See Appendix B for the threshold calculation spreadsheets.

[1] Sound pressure is the sound force per unit micropascals (µPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 µPa, and the units for underwater sound pressure levels are decibels (dB) re 1 µPa (NMFS 2018a).

[2] A measure of sound level that takes into account the duration of the signal (NMFS 2018).

Table 5. Distances to NMFS Level A and B Acoustic Thresholds

Activity	Received Level at 10 meters	Distance (in meters) to Level A and Level B Thresholds[1]					
		Level A[2]					Level B
		Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid	Otariid	
Vibratory Pile Driving/Removal							
30-inch steel temporary installation 10 min per pile, 40 minutes per day on 12 days	161.9 SPL[3]	6.0	0.5	8.8	3.6	0.3	6,213
30-inch steel temporary removal 10 min per pile, 40 minutes per day on 12 days	161.9 SPL[3]	6.0	0.5	8.8	3.6	0.3	6,213
30-inch steel permanent installation 10 min per pile, 40 minutes per day on 4 days	161.9 SPL[3]	6.0	0.5	8.8	3.6	0.3	6,213
36-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	168.2 SPL[4]	20.6	1.8	30.5	12.5	0.9	16,343
48-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	168.2 SPL[4]	20.6	1.8	30.5	12.5	0.9	16,343
Impact Pile Driving[5]							
30-inch steel permanent installation 40 strikes per pile, 2 min per day on 7 days	186.7 SEL/ 198.6 SPL[5]	327.2	11.6	389.7	175.1	12.7	3,744
36-inch steel permanent installation 100 strikes per pile, 5 min per day on 10 days	186.7 SEL/ 198.6 SPL[5]	602.7	21.4	717.9	322.5	23.5	3,744
48-inch steel permanent installation 100 strikes per piles, 5 min per day on 10 days	186.7 SEL/ 198.6 SPL[5]	602.7	21.4	717.9	322.5	23.5	3,744
Rock Anchor Installation							
33-inch anchor permanent installation for 36-inch piles 8 hours per day on 10 days	166.2 SPL[6]	60.7	5.4	89.7	36.9	2.6	12,023
33-inch anchor permanent installation for 48-inch piles 5 hours per day on 20 days	166.2 SPL[6]	44.4	3.9	65.6	27.0	1.9	12,023

[1] Distances, in meters, refer to the maximum radius of the zone.

[2] The values provided here represent the distance at which an animal may incur PTS if that animal remained at that distance for the entire duration of the activity within a 24-hour period. For example, a harbor seal (phocid) would have to remain 4.8 meters from 30-inch piles being installed via vibratory methods for 1 hour for PTS to occur.

[3] The 30-inch-diameter vibratory pile driving source level of 161.9 SPL is proxy from median received levels at 10 meters for vibratory pile driving of 30-inch-diameter piles to construct the Ketchikan Ferry Terminal (Denes et al. 2016, Table 72). Distances calculated using NMFS Version 2.0 2018 User Spreadsheet Tab A.1 Vibratory.

[4] The 36-inch and 48-inch-diameter vibratory source level of 168.2 SPL is proxy from median received levels at 10 meters for vibratory pile driving of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Table 16). Distances calculated using NMFS Version 2.0 2018 User Spreadsheet Tab A.1 Vibratory.

[5] The impact pile driving source level of 186.7 SEL/ 198.6 SPL8 is proxy from median received levels at 10 m from impact hammering of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Tables 9 and 16). We calculated the distances to impact pile driving Level A thresholds for 30-inch piles assuming 40 strikes per pile and a maximum of 2 piles installed in 24 hours, for 36-inch and 48-inch diameter piles assuming 100 strikes per pile and a maximum of 2 piles installed in 24 hours.

[6] 33-inch diameter concrete and rebar rock anchors will be used anchor 36-inch and 48-inch-diameter piles. The rock anchoring source level of 166.2 SPL is proxy from median received levels at 10 meters from down-hole drilling of 24-inch-diameter piles to construct the Kodiak Ferry Terminal (Denes et al. 2016, Table 72). Distances calculated using NMFS Version 2.0 2018 User Spreadsheet Tab A.1 Vibratory with the default WFA of 2.5 kHz for drilling.

1.4.4 Action Area

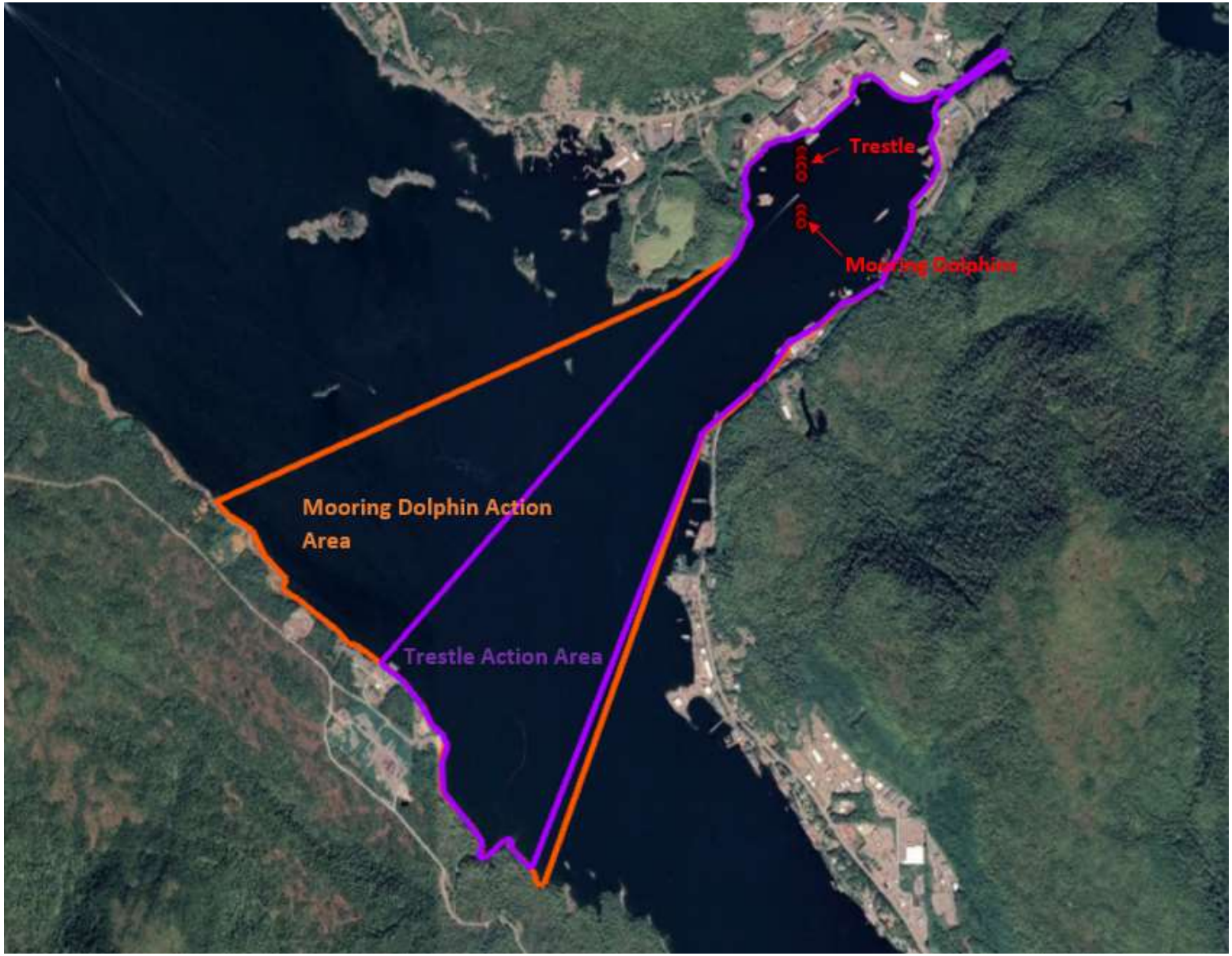
The vicinity of the project area that will be affected directly by the action, referred to as the action area in this document, has been determined by the area of water that will be ensonified above acoustic thresholds in a day. In this case, the action area is the area where received noise levels from vibratory pile driving of 48-inch piles (the farthest-reaching noise associated with the project) are expected to decline to 120 dB. As shown in Table 5, this area extends 16.3 kilometers from the source. However, the action area would be truncated in areas where land masses obstruct underwater sound transmission; the action area comprises Ward Cove and extends across Tongass Narrows to Gravina Island with a maximum radius of 3,645 meters, encompassing approximately 4 square kilometers (Figure 6).

In addition to in-water noise, pinnipeds can be adversely affected by in-air noise. Loud noises can cause hauled-out pinnipeds to flush back into the water, leading to disturbance and possible injury. NMFS has established an in-air noise disturbance threshold of 90 dB rms for harbor seals and 100 dB rms for all other pinnipeds (NMFS 2018b). Pile driving and removal associated with this project will generate in-air noise above ambient levels within Ward Cove. However, the predicted distances to the in-air noise disturbance threshold for hauled-out harbor seals (90 dB rms) and sea lions (100 dB rms) will not extend more than 69 meters and 22 meters from any type of pile being impacted or vibrated, respectively.[3] There are two documented harbor seal haul outs off the tip of Gravina Island, both located approximately eight kilometers (five miles) northwest of Ward Cove (Alaska Fisheries Science Center [AFSC] 2018). Grindall Island, 19 kilometers (12 miles) west of the northern tip of Gravina Island and approximately 24 kilometers (15 miles) northwest of Ward Cove, is a year-round sea lion haulout and appears to be the haulout area nearest the project area (HDR 2017). No in-air disturbance to hauled-out individuals are anticipated as a result of the proposed project; thus, land area is not included in the action area.

To minimize impacts to marine mammals, shutdowns and monitoring of harassment zones will be implemented to protect and document marine mammals in the action area. Please see Table 5 for calculated distances to the Level A and B thresholds, Section 11 for mitigation information and shutdown zones and figures, and the attached Marine Mammal Monitoring and Mitigation Plan for more details on mitigation, shutdown, and monitoring procedures (Appendix C).

[3] Predicted distances for in-air threshold distances. The Washington State Department of Transportation has documented un-weighted rms levels for a vibratory hammer (30-inch pile) to an average 96.5 dB and a maximum of 103.2 dB at 15 meters (Laughlin 2010). The Port of Anchorage, AK found source levels of 101 dB at 15 meters during impact installation of 48-inch-diameter steel piles (Austin et al. 2016). The maximum source level from these studies of 103.2 was used as a source level for this project.

Figure 6. Ward Cove Cruise Ship Dock Action Area



2 DATES, DURATION, AND REGION OF ACTIVITY

The date(s) and duration of such activity and the specific geographical region where it will occur.

2.1 DATES AND DURATION

Construction would begin in January 2020 [4] and be completed in June 2020.

Pile installation activities are expected to occur for a total of approximately 220 hours over 105 days (not necessarily consecutive days). The majority of pile installation time (180 hours) occurs during rock anchoring where drilling occurs inside the pile as described in Section 1.3. Please see Table 3 for the specific amount of time required to install (and remove temporary) piles.

The total construction duration accounts for the time required to mobilize materials and resources and construct the project. The duration also accounts for potential delays in material deliveries, equipment maintenance, inclement weather, and shutdowns that may occur to prevent impacts to marine mammals.

2.2 SPECIFIC GEOGRAPHIC REGION

The project is located in Southeast Alaska where numerous islands form a coastal mountain range. These mountains rise steeply to mainland mountains to the east and open to the Gulf of Alaska to the west. The project area experiences a maritime climate, characterized by mild, wet conditions.

2.3 PHYSICAL ENVIRONMENT

Ward Cove is a small estuary with an area of approximately 1 square kilometer (0.4 square mile) located off the western coast of Revillagigedo Island and on the North Shore of Tongass Narrows. The Cove is approximately 1.6 kilometers long (1 mile) and 0.8 kilometers (0.5 mile) wide with depths to 60 meters (200 feet) (EPA 2015, NOAA 2016). As stated in Section 2.7, the cove has experienced significant industrialization as it was the site of a pulp mill, sawmill, and fish processing plant. The bottom substrate is organic-rich sediments areas overlaid with either sandy material that has been thinly placed ("capped;" 15-23 inches thick) or sandy material that has been mounded (approximately 1.45 meters thick) as a remediation requirement. Deep water areas have deep organic sediments with no sandy overlay. Some areas have a high density of old sunken logs (Exponent 2000). Today the surrounding area is largely forested with pockets of industrial/commercial, residential, and recreational properties clustered along North Tongass Highway.

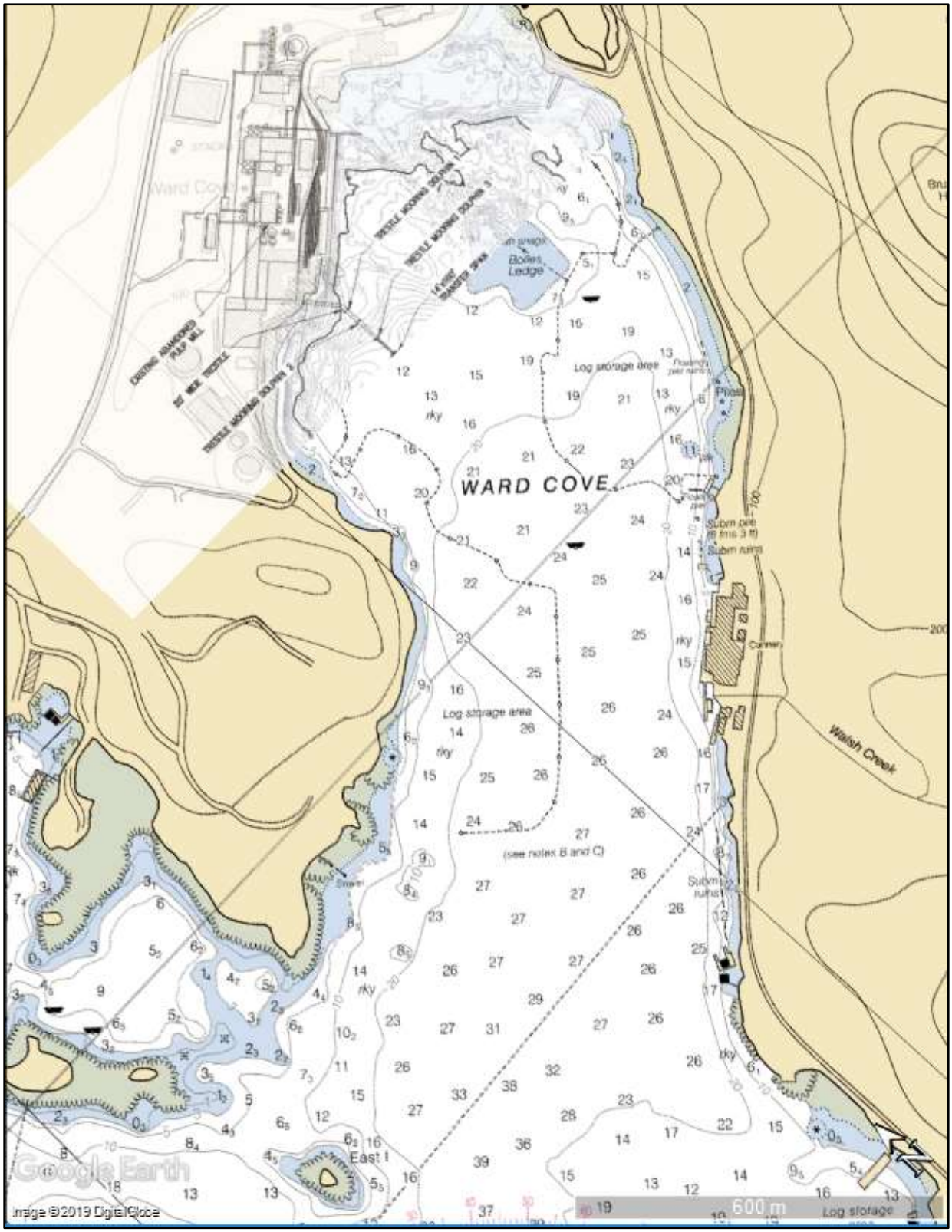
Tongass Narrows is a U-shaped glacier-carved fjord that varies between 300 meters (0.2 mile) to 2.4 kilometers wide and 15 meters to 55 meters deep (ADEC 2017, NOAA 2016). Water temperatures in the Narrows range from 12.7 to 16.6° centigrade (C) with an average of 15° C

[4] Construction permits have been issued and pile driving will begin in January 2020. The entire level B harassment area will be monitored by Protected Species Observers during pile driving activities. Pile driving will be shut down if any marine mammals enter the level B harassment area until an IHA is issued.

(ADEC 2017). Tongass Narrows is known for strong tidal currents and unusually large tidal ranges of 8 meters or more (Pentec 2001). The Narrows are characterized by steep bedrock or coarse gravel-cobble-boulder shoreline. Lower intertidal and shallow subtidal areas are often sandy or mixed gravel, sand, and shell with varying amounts of silt (HDR 2017). The Narrows are part of Alaska's Inside Passage, a route for ships through Southeast Alaska's network of islands. According to NMFS' ShoreZone Mapper (ShoreZone 2019), the shoreline at the proposed dock site in Ward Cove has the following characteristics:

- Habitat Class: protected/partially mobile/ sediment or rock sediment
- Coastal Class: cliff with gravel beach
- Biological Wave Exposure: protected

Figure 7. Ward Cove Bathymetry with Proposed Dock Overlay



National Oceanic and Atmospheric Administration (NOAA) Nautical Chart #17430 soundings in fathoms (fathoms and feet to 11 fathoms)

2.4 FISH AND ESSENTIAL FISH HABITAT

Tongass Narrows and Ward Cove are designated as EFH under the Magnuson Stevens Fisheries and Conservation Management Act for all 5 species of Pacific salmon and 15 species of groundfish (NMFS 2019). Alaska Department of Fish and Game (ADF&G) and NMFS have also identified Pacific herring and Pacific halibut as important in the project area (HDR 2017). Additionally, ENSR Consulting and Engineering listed forty-one (41) fish species within the vicinity of Ward Cove and other sources have identified that as many as 75 non-salmonid species may occur within Ward Cove (EPA 2003). EFH listings are summarized in Tables 6 and 7.

Table 6. Essential Fish Habitat Salmon Species in Project Area

Salmon Species	Juvenile	Immature	Mature	Juvenile-marine	Adult-marine waters	Spawning-freshwater only
Coho Salmon				X	X	
Chum Salmon		X		X	X	
Pink Salmon				X	X	
Chinook Salmon		X	X		X	
Sockeye Salmon		X		X	X	

Table 7. Essential Fish Habitat Groundfish Species in Project Area

Ground Fish Species	Egg	Larvae	Late Juvenile	Adult	Spawning
Pacific Ocean Perch			X	X	
Yelloweye Rockfish			X	X	
Shortraker			X	X	X
Southern Rock Sole				X	
Dover Sole		X	X	X	
Flathead Sole			X	X	
Rougheye Rockfish			X	X	
Dusky Rockfish			X	X	
Walleye Pollock	X			X	
Alaska Plaice				X	
Sablefish			X	X	X
Pacific Cod			X	X	
Arrowtooth Flounder			X	X	
Sculpin spp.			X	X	
Skates spp.			X	X	

Table 8 lists anadromous streams that provide habitat suitable for salmon and trout species near the proposed project (ADF&G 2019; Figure 8).

Table 8. Anadromous Waterways Near the Project Area

Stream Name	AWC Code	Distance from Project (km)	Species Present
Ward Creek	10150	0.7	Chum Salmon, Pink Salmon, Sockeye Salmon, Dolly Varden, and Steelhead Trout
Unnamed Stream	10145	0.7	Coho Salmon and Pink Salmon
Unnamed Creek	10490	3.5	Coho Salmon and Pink Salmon

Figure 8. Proposed Project Action Area and Locations of Anadromous Waterways

2.5 EXISTING MARINE VESSEL ACTIVITY

The action area experiences high levels of marine vessel traffic with highest volumes occurring May through September. Marine vessels that use the action area include passenger ferries, commercial freight vessels/barges, commercial tank barges, cruise ships, U.S Coast Guard vessels, commercial fishing boats, charter vessels, recreational vessels, kayaks, and floatplanes (Nuka Research and Planning Group 2012). Ward Cove is mostly used by industrial and recreational vessels; Tongass Narrows is used by a wide variety of vessels and experiences very high volumes of marine vessel traffic with highest volumes occurring May through September.

The waters of the Inside Passage support marine cargo transportation. According to automatic identification system passage-line data plots obtained from the Marine Exchange of Alaska, in 2011, 1,489 vessels moved north or south between Alaska and British Columbia. The data show that 288 vessels moved east or west between the Dixon Entrance and the Pacific Ocean during the year. Cargo ships calling at Prince Rupert dominated the east-west large vessel traffic. Cruise ships, tugs, and ferries dominated the north-south traffic (Nuka Research and Planning Group 2012).

Cruise ships are the largest vessels that routinely use Tongass Narrows with Ketchikan being one of the main ports-of-call for cruise ships in Alaska (Moffatt & Nichol/ LandDesign 2016, City of Ketchikan Ports & Harbors 2019). At any given time during the summer (May-September), as many as five large cruise ships may be moored and/or at anchor in the Port of Ketchikan located in downtown Ketchikan. In the 2019 season, a record setting forty-six ships were expected to visit Ketchikan with a total of 576 stops (City of Ketchikan 2019).

2.6 ANTICIPATED CHANGES IN VESSEL TRAFFIC

While the size of cruise ships traveling to Ketchikan is expected to increase, this project is not expected to increase vessel traffic in Alaskan waters. According to projections from the Cruise Lines International Association, cruise ship tourism is estimated to increase in Alaska. Over the next ten years cruise ship calls in Ketchikan are expected to increase by 18% and passengers are expected to increase by 49% (Bermello Ajamil & Partners 2019). According to *The City of Ketchikan Planning and Design of Port Improvements* report, "Conversations with cruise lines and Cruise Line Agencies of Alaska suggest that growth over the next decade will occur primarily as a result of homeports and primary regional ports-of-call being modified to welcome larger vessels, without significantly expanding the number of vessels operating within Alaska" (Moffatt & Nichol/LandDesign 2016). It is expected, however, that more passengers may visit Alaska on these larger ships. Currently there is no moorage for cruise ships in Ward Cove; this project would introduce cruise ship traffic to the cove, an area that is being developed into and industrial park and has experienced previous industrial development.

For information on temporary construction related vessel activity see the Section 1.3.1 which discusses vessel transport of materials and equipment and skiff transport of workers to and from the work platform.

2.7 HISTORIC POLLUTION

Ward Cove was home to a pulp mill, a sawmill, and a fish processing plant and their discharges of chemicals, pulp, and fish waste polluted the cove. The Ketchikan Pulp Company operated for 43 years, from 1954 to 1997. During that time the mill stored logs (approximately 7 billion board feet) and discharged pulp mill effluent in to the cove. This caused accumulation of bark and sunken logs on the bottom of the cove (EPA 2015). Although this discharge ceased with the mill's closure, log storage activities continued until 2001 under the operation of a sawmill and veneer mill by Gateway Forest Products, Inc., contributing additional wood residues to the cove (ADEC 2007). Wards Cove Packing Company, a seafood processing facility, discharged fish-processing waste to the cove from 1912 until its closure in 2002 (ADEC 2007).

In the early 1990s preliminary investigations were conducted to look at the environmental effects mill discharges were having on Ward Cove. Studies show that the large quantities of organic material discharged from the pulp mill led to anaerobic conditions in the sediment and production of ammonia, sulfide, and 4-methylphenol (EPA 2015). The discharge of seafood waste caused depletion of dissolved oxygen in the deeper waters of Ward Cove (ADEC 2007). By the late 1990s a risk assessment identified that people and wildlife could possibly be exposed to contaminants through inhalation, skin absorption, or accidental ingestion of contaminated ash, soil, or surface water (EPA 2015).

In March 2000, the EPA issued a Record of Decision addressing a Marine Operable Unit at the Ketchikan Pulp Company site (which addressed 80 acres of contamination in the 250-acre cove). The remedy was intended to protect the environment, and more specifically, the benthic community populating the sediments in the cove. Of the 80-acre remedy, the Record of Decision called for monitored natural recovery on approximately 53 acres and for a thin-layer sand cap for the remaining 27 acres. These remediation activities were completed in 2001 (EPA 2015). In 2004, monitoring results showed that three sand-capped areas and one shallow natural recovery area (not sand-capped) achieved biological recovery and other natural recovery areas tested are making significant progress toward biological recovery. In May 2009, the EPA concluded that the remedial action objectives had been achieved and that sediments support healthy benthic communities. Because waste was left in place, the Record of Decision stipulates institutional controls to ensure the remedy remains intact and protective of the environment.

2.8 POTENTIAL AND ONGOING POLLUTANTS

Ward Cove now meets State of Alaska Water Quality Standards for Toxic and Other Deleterious Organic and Inorganic Substances (ADEC 2007), the EPA now considers the site protective of human health and the environment (EPA 2015), and, according to the ADF&G, there are no public health advisories for consumption of seafood from Ward Cove (ADEC 2007). However, water in the cove does not yet meet Alaska water quality standards for residues and dissolved gas (ADEC 2016). A total maximum daily load (TMDL) was developed for biological residues and dissolved gas (DO) in 2007; these impairments were removed from Section 303(d)/Category 5 list and moved to Category 4a (a waterbody that is impaired but has a recovery plan) in the 2008 Integrated Report. The sediment toxicity impairment was removed from Section 303(d)/Category 5 list and moved to Category 2 in the 2006 Integrated Report (ADEC 2019). Based on remediation efforts and monitoring it appears that the water quality in the cove continues to recover (ADEC 2016).

Current permitted discharges to Ward Cove include two small sewage treatment plants, stormwater runoff at the former pulp mill site, and a discharge of leachate from the Ketchikan Pulp Company landfill (ADEC 2007).

Marine water quality of Tongass Narrows can be affected by accidental discharges and by permitted discharges from seafood processing plants, timber industry activities, shipyard and other industrial activity, treated sewer system outflows, cruise ships and other vessels

operating in marine waters, and sediment runoff from paved surfaces and disturbed areas (HDR 2017).

Seafood processing facilities in Ketchikan discharge fish waste via outfalls into deep waters in Tongass Narrows under an Alaska Pollutant Discharge Elimination System general permit for Alaskan shore-based seafood processors. As required by the permit, the discharge outfalls are situated in underwater areas that are continually flushed by strong tides (HDR 2017).

Cruise ships discharge treated sewage; effluent from properly functioning marine engines; and laundry, shower, and galley sink wastes ("greywater") into marine waters. Cruise ships accessing the proposed Ward Cove dock, similar to all cruise ships operating in Alaska, will follow the ADEC, Commercial Passenger Vessel Environmental Compliance Program, or Cruise Ship Program, general permit pursuant to Alaska Statute 46.03 and Title 18, Chapter 69 of the Alaska Administrative Code, for marine discharge of treated sewage, treated graywater, and other treated wastewater from large commercial passenger vessels operating in Alaska issued on August 29, 2014.

2.9 SEASONAL ISSUES

Marine mammal species can occur year-round in Southeast Alaska; however, concentrated numbers are most likely to occur during seasonal prey aggregation. Harbor seals are more common in Ward Cove in the spring, summer, and fall when salmon return to Ward Creek (Spokley 2019). As project construction would be initiated in the winter, with the majority of construction taking place then, this seasonal variation (increase) has been factored into take estimates.

3 SPECIES AND NUMBERS OF MARINE MAMMALS

The species and numbers of marine mammals likely to be found within the activity area.

Based on the Online Species Mapper and consultation with NMFS Alaska, there are nine species of marine mammals that could occur in the vicinity of the proposed project in Tongass Narrows and Ward Cove. Table 9 lists these species and summarizes key information regarding stock status and abundance.

Table 9. Marine Mammal Species with Ranges Extending into the Project Area

Species [a]	Stock and Abundance Estimate	Endangered Species Act (ESA) Status	MMPA Status
Minke Whale (*Balaenoptera acutorostrata*)	Alaska N/A	Not listed	Not strategic, non-depleted
Humpback Whale (*Megaptera novaeangliae*)	Central North Pacific 10,103 [b]	Threatened [b]	Strategic, depleted
Gray Whale (*Eschrichtius robustus*)	Eastern North Pacific 26,960 [c]	Not listed	Not strategic, non-depleted
Killer Whale (*Orcinus orca*)	West Coast Transient 243	Not listed	Not strategic, non-depleted
	Northern Resident 302 [d]	Not listed	Not strategic, non-depleted
	Alaska Resident 2,347	Not listed	Not strategic, non-depleted
Pacific White-Sided Dolphin (*Lagenorhynchus obliquidens*)	North Pacific 26,880	Not listed	Not strategic, non-depleted
Dall's Porpoise (*Phocoenoides dalli*)	Alaska 83,400	Not listed	Not strategic, non-depleted
Harbor Porpoise (*Phocoena phocoena*)	Southeast Alaska 6,980 [e]	Not listed	Strategic, non-depleted
Harbor Seal (*Phoca vitulina*)	Clarence Strait 27,659 [d]	Not listed	Not strategic, non-depleted
Steller Sea Lion (*Eumatopia jubatus)*	Eastern U.S. 43,201 [d]	Not listed	Not strategic, non-depleted
Northern Sea Otter (*Enhydra lutris kenyoni*)	Southeast Alaska 25,712 [f]	Not Listed	Not strategic, non-depleted

[a] Species listed with ranges extending into the project area derived from NOAA's Alaska Protect Resources Division Species Distribution Mapper (NMFS 2019a) and consultation with NMFS AK and USFWS.

[b] Under the MMPA humpback whales are considered a single stock (Central North Pacific); however, they are listed as distinct population segments (DPS) under the ESA. Two DPSs are known to occur in the action area: the Hawaii DPS is not listed under the ESA and the Mexico DPS is listed as threatened under the ESA. Using the stock assessment from Muto et al. 2019 for the Central North Pacific stock (10,103) and calculations in Wade et al. 2016, 93.9% of the humpback whales in Southeast Alaska are expected to be from the Hawaii DPS and 6.1% are expected to be from the Mexico DPS.

[c] Durban et al. 2016.

[d] Muto et al. 2019

[e] Hobbs and Waite 2010

[fr] USFWS 2014

Specific density data on marine mammals in Ward Cove and Tongass Narrows is limited. To determine the species and numbers of marine mammals likely to be found within the action area, the following was completed:

- Review of marine mammal observation logs from construction at the Ketchikan Ferry Terminal in Tongass Narrows in 2016. The logs did not document any species occurring within a 1,000-meter radius of the ferry terminal during approximately 37 hours of monitoring over 18 days in July and August of 2016 (Turnagain 2016);
- Review of the marine mammal observation report from construction of the Ketchikan Transfer Facility in Tongass Narrows in 2001. The report documented no species occurring up to 2,000 meters from the facility during approximately 26.5 hours of monitoring over 12 days in July and August of 2001 (OSSA 2001).
- Review of the Gravina Access Project Biological Assessment for species information. The assessment states that small numbers of humpback whales may be found in Tongass Narrows year-round with sightings once or twice per month and that small numbers of Steller sea lions may be found in Tongass Narrows year-round with a peak in sightings in the spring where large groups of 20-80 animals are possible (HDR 2003);
- Review of the OBIS-SEAMAP which documents Dall's porpoise in the action area. The map reports three sightings, with group sizes of 6, 3, and 2 animals in July 1991 (Haplin et. al. 2009); and,
- Review of NMFS' Stock Assessment Reports for stock status and abundance and groups size information;
- Discussion of marine mammal occurrences with employees who work with Power Systems & Supplies of Alaska in Ward Cove. Anecdotal evidence indicates that harbor seals are common Ward Cove, with most sightings of groups of 1 to 3 seals occurring in spring, summer, and fall when salmon return to Ward Creek (Spokely 2019).

Based on the above information, it is assumed that that harbor seals could occur in the action area during construction. This IHA application is limited to and assesses the potential impacts of the project on harbor seals only. Take of other species is not requested because the animals are not expected to spend much, if any, time in the action area. The project will implement shutdowns during pile driving if any other marine mammal species appears likely to approach the Level B harassment zone (Figure 6).

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

A description of the status and distribution of each species or stocks or marine mammals likely to be affected by the activity.

4.1 HARBOR SEAL

4.1.1 Hearing Ability

Harbor seals are classified by NMFS as phocid pinnipeds with a generalized in-water hearing range of 50 Hz to 86 kHz (NMFS 2018). They respond to underwater sounds from approximately 1 to 180 kHz, with the functional high-frequency limit around 60 kHz and peak sensitivity at about 32 kHz. Hearing ability in the air is greatly reduced (by 25 to 30 dB); they respond to sounds from 1 to 22.5 kHz, with a peak sensitivity of 12 kHz (Kastak and Schusterman 1995).

4.1.2 Status

Harbor seals are not listed as depleted under the MMPA or as threatened or endangered under the Endangered Species Act (ESA). The status of all 12 stocks of harbor seals identified in Alaska relative to their Optimum Sustainable Population size is unknown. The Clarence Strait stock of harbor seals, the stock that would be expected in the project vicinity, is not classified as strategic.

The current statewide abundance estimate for Alaskan harbor seals is 243,938 based on aerial survey data collected between 1996 and 2018. The abundance estimate for the Clarence Strait stock is 27,659, with a minimum estimate of 24,854 (Muto et al. 2019). The current population trend for this stock is 138 seals per year, with a probability that the stock is decreasing of 0.413 (Muto et al. 2019).

4.1.3 Distribution

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands. They haul out on rocks, reefs, beaches, and drifting glacial ice and feed in marine, estuarine, and occasionally fresh waters. Harbor seals are generally non-migratory and, with local movements associated with such factors as tide, weather, season, food availability and reproduction.

Distribution of the Clarence Strait stock ranges from the east coast of Prince of Wales Island from Cape Chacon north through Clarence Strait to Point Baker and along the east coast of Mitkof and Kupreanof Islands north to Bay Point, including Ernest Sound, Behm Canal, and Pearse Canal (Muto et al. 2019).

4.1.4 Presence in Project Area

Harbor seals can occur on any given day in the action area, although they tend to be more abundant during spring, summer and fall months when salmon are present in Ward Creek.

Anecdotal evidence indicates that harbor seals typically occur in groups of 1-3 animals (Spokely 2019). As described in Section 3, harbor seals were not observed in Tongass Narrows during a combined 63.5 hours of marine mammal monitoring that took place in 2001 and 2016 (OSSA 2001, Turnagain 2016).

There are no known harbor seal haulouts within the project area. According to the AFSC list of harbor seal haul-out locations, the closest listed haulout are located off the tip of Gravina Island, approximately eight kilometers (five miles) northwest of Ward Cove (AFSC 2018).

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury, and/or death) and the method of incidental taking.

Power Systems & Supplies of Alaska requests the issuance of an IHA pursuant to Section 101(a)(5) of the MMPA for incidental take by Level A and B take of harbor seal that may occur in the Ward Cove Cruise Ship Dock project harassment zones during construction.

The activities outlined in Section 1 have the potential to take marine mammals by exposure to in-water sound. Level A and B take will potentially result from noise associated with pile installation (and temporary pile removal) using the methods mentioned above (vibrating, impacting, and rock anchoring).

Vibratory pile driving and rock anchoring will be shut down if harbor seals approach or enter the respective Level A harassment zones. However, the zone where Level A take could occur during impact pile driving (325 meters) is larger than the proposed shutdown zone (200 meters) and a minor amount of Level A take is requested. Please see Section 11 for a description of mitigation measures including shutdown zones and procedures.

The applicant requests an IHA for incidental take of harbor seals described within this application for 1 year, beginning March 1, 2020 (or the issuance date, whichever is earlier). Power Systems & Supplies of Alaska is not requesting a Letter of Authorization at this time because the activities described herein are expected to be completed within 1 year from the date of authorization and are not expected to rise to the level of serious injury or mortality, which would require a Letter of Authorization.

6 TAKE ESTIMATES FOR MARINE MAMMAL

The number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.

6.1 ESTIMATED TAKE

Incidental take is estimated for harbor seals only considering: 1) Acoustic thresholds above which NMFS believes phocids will be behaviorally harassed or incur some degree of permanent hearing impairment; 2) the size of the action area (the area of water that will be ensonified above acoustic thresholds in a day); 3) the density or occurrence of marine mammals in the action area; and, 4) the number of days of pile driving and removal activity.

The following information was used to inform estimated take (previously summarized in Section 3):

- During marine mammal monitoring conducted in 2016 within Tongass Narrows for the Ketchikan Ferry Terminal, no harbor seals were observed within a 1,000-meter radius of the ferry terminal during approximately 37 hours of monitoring over 18 days in July and August of 2016 (Turnagain 2016).
- During monitoring conducted in 2001 for construction of the Ketchikan Transfer Facility no harbor seals were observed up to 2,000 meters from the facility during approximately 26.5 hours of monitoring over 12 days in July and August of 2001 (OSSA 2001).
- Anecdotal evidence indicates that harbor seals occur in Ward Cove in groups of three.

To be conservative, the group size of harbor seals in Ward Cove and Tongass Narrows was increased to five (5) individuals. The take calculation was then estimated based on the typical group size multiplied by the number of expected groups per day multiplied by the number of days of pile driving.

6.1.1 Level B Take Requested

Harbor seals are common in the action area in the spring, summer, and fall and are expected to be encountered frequently during project construction. It is conservatively estimated that 2 groups of 5 harbor seals may occur within the Level B harassment zone every day that pile driving may occur (5 animals in a group x 2 groups per day x 105 days = 1,050 animals). To avoid duplicating Level B and Level A take, the Level A take request (see next section) is subtracted from Level B. Therefore, Power Systems & Supplies of Alaska requests authorization for 950 Level B takes of harbor seals.

Although the Level B harassment zones area for trestle construction and mooring dolphin construction vary in size (see Figure 6), it is expected that most of the take will occur within Ward Cove (not Tongass Narrows) where the action areas overlap. Therefore, the take estimate applies to construction of the entire facility.

6.1.2 Level A Take Requested

The Level A harassment zone for harbor seals for impact pile driving of 30-inch piles is 175.1 meters, and for impact driving of 36 and 48-inch piles, the zone is 322.5 meters. For other pile driving activities the zones are much smaller. Impact pile driving would be shut down before a harbor seal enters within 200 meters during impact pile driving of all piles; however, Level A take of harbor seals is requested. Impact driving would occur for approximately 10 minutes per day on 20 days of construction. For this reason, 100 Level A takes of harbor seal are requested (5 animals in a group x 1 group per day x 20 days = 100 animals).

There are two documented harbor seals haul outs located off the tip of Gravina Island, both located approximately eight kilometers northwest of Ward Cove (AFSC 2018) As the in-air harassment zone for harbor seals is limited to 53 meters, no in-air harassment of harbor seals is anticipated, and no take is requested associated with in-air noise.

6.2 All Marine Mammal Takes Requested

This analysis for the Power Systems & Supplies of Alaska Ward Cove Cruise Ship Dock Project predicts 100 potential Level A takes and 950 potential Level B takes of harbor seals (Tables 10 and 11).

Throughout all pile driving activity, the Level B monitoring zone will be scanned to monitor for the presence of MMPA- and/or ESA-listed species.

The estimated species occurrence in the action area and the take calculation is shown in Table 10 and the percentage of stock is shown in Table 11.

Table 10. Estimated Species Occurrence in Action Area and Take Calculation

Species	Estimated Number of Sightings per Month[1]	Estimated Typical Group Size[2]	Estimated Max Group Size	Level B Take Calculation	Level A Take Calculation
Harbor Seal	Daily	1, 2-3	25	5 animals per group x 2 groups per day x 105 days= 1,050-100 level A takes=950	5 animals in a group x 1 group every day x 20 days impact driving= 100

[1] Estimated number of sightings per month from Spokely 2019.

Table 11. Take Requests for Marine Mammals and Percent of Stock

Species	Stock (N_{EST}) [1]	Level A	Level B	Percent of Stock
Harbor Seal	Clarence Strait (27,659)	100	950	3.8

[1] Stock estimate from Muto, M. M. et al. 2019. Appendix 2. Stock Summary Table (last revised December 30, 2018). NOAA-TM-AFSC-378 unless otherwise noted.

7 ANTICIPATED IMPACT OF THE ACTIVITY

The anticipated impact of the activity to the species or stock of marine mammal.

Power Systems & Supplies of Alaska is requesting authorization for Level B take of harbor seals. Incidental takes of harbor seals will likely be multiple takes of individuals, rather than single takes of unique individuals. The stock take calculation in Table 11 assumes takes of individual animals, instead of repeated takes of a smaller number of individuals; therefore, the stock take percentage calculations are conservative.

Incidental Level B take is expected to result primarily in short-term changes in behavior, such as avoidance of the project area, changes in swimming speed or direction, and changes in foraging behavior. Level B exposure could occur on all days when pile driving and removal occurs (see Section 2.1 for project dates and duration). Because of the limited time that marine mammals could be exposed to Level B harassment, the Ward Cove Cruise Ship Dock project would be unlikely to have any impact on stock recruitment or survival, and therefore, would have a negligible impact on the stocks of these species.

Most Level A take of harbor seals would be prevented by shutdowns within 200 meters of pile driving; however, some Level A take of harbor seals is requested for those times when harassment may occur during impact pile driving of 36- and 48-inch piles. Incidental Level A take can cause injury including permanent, partial, or full hearing loss if marine mammals are exposed to underwater sounds exceeding the injury threshold, which vary by species. Marine mammals exposed to high received sound levels may experience non-auditory physiological effect such as increased stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage.

Because of the limited area and time over which harbor seals could experience Level A harassment (impact pile driving would only occur for approximately 10 minutes per day during 8 days, and/or construction would be shut down within 200 meters-see Table 3), it is not expected that there would be any impact on stock recruitment or survival, and therefore, there would be no impact on the stocks of these species.

8 ANTICIPATED IMPACTS ON SUBSISTENCE USES

The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.

Alaska Natives have traditionally harvested subsistence resources, including sea lions and harbor seals, in Southeast Alaska for hundreds of years. Since surveys of harbor seal subsistence harvest in Alaska began in 1992, there have been declines in the number of households hunting and harvesting seals in Southeast Alaska (Wolf et al. 2013). Subsistence harvest data for the Clarence Strait stock indicates an average annual harvest in the years 2004-2008 of 164 harbor seals and an average annual harvest in the years 2011-2012 of 40 harbor seals (summarized in Muto et al. 2016a from Wolf et al. 2013). In 2012, the community of Ketchikan had an estimated subsistence take of 22 harbor seals (Wolf et al. 2013). The ADF&G has not recorded harvest of cetaceans in the area (ADF&G 2018).

In June 2019, attempts were made to contact the Alaska Harbor Seal Commission, the Alaska Sea Otter and Steller Sea Lion Commission, and the Ketchikan Indian Community (KIC, federal-recognized Tribe) to discuss this project. The Alaska Harbor Seal Commission is currently not operational. Comments were not received from the Alaska Sea Otter and Steller Sea Lion Commission.
Tony Gallegos, the cultural and natural resources director for the Ketchikan Indian Community was available for comment and wrote:

“Thank you for contacting Ketchikan Indian Community to gather information regarding tribal concerns regarding berth 4 expansion impacts on marine mammal harvesting. As we discussed over the phone although my department does deal with natural resource and cultural issues for KIC, I cannot speak on behalf of the tribe. However, in my best professional judgement there would be no significant impacts on marine mammal harvest opportunities during the construction or operation phase of the project described, which will take place in perhaps the most headily commercial and industrial area of the Tongass Narrows. I will bring this up during the Feb 26thOWL Committee and get back to you if there are further questions or concerns.”

On July 15, 2019, the Power Systems and Supplies of Alaska and Ward Cove Dock Group representatives met with the Ketchikan Indian Community at the tribe’s office in Ketchikan. Information regarding construction of the dock was shared with members of the “Our Way of Life Committee.” The committee members did have concerns about the cruise ship dock’s potential impacts on water quality and fish. However, because harbor seals eat fish, most members said that they were not concerned about their take.

The USACE received comments from the Ketchikan Indian Community during the Department of Army (Section 404/10) Permit public comment period. A letter from the tribe focused on impacts of dock construction and cruise ship operation on the cove’s contaminated sediments and fish. Marine mammal impacts were not mentioned.

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 or to impact subsistence harvest of marine mammals in the region because:

- Construction activities are localized and temporary in the previously developed Ward Cove;
- Mitigation measures will be implemented to minimize disturbance of marine mammals in the action area; and,
- The project will not result in significant changes to availability of subsistence resources.

9 ANTICIPATED IMPACTS ON HABITAT

The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.

9.1 Impacts to Physical Habitat

9.1.1 Project Footprint

The construction of the cruise ship dock would cause some permanent removal of habitat available to marine mammals, including harbor seals. The area lost would be small, approximately equal to the area of the cruise ship berth and associated pile placements. The area lost has been previously industrialized and is already in an active marine industrial area. Loss of habitat is anticipated to be minor, and have been minimized by use of a floating, pile-supported design rather than a design requiring dredging or fill. The proposed design would not impede migration through the action area.

As described in the above section on historic pollution, Ward Cove has experienced significant industrial activity and pollution from pulp mill, sawmill, and fish processing plant activities. The pollution qualified Ward Cove for an EPA Superfund cleanup to reduce toxicity of sediments to the bottom-dwelling animals, and to enhance recolonization of the bottom sediments to support a healthy community of marine animals. Remediation activities which included removing logs, dredging, and capping the cove's bottom with sand were completed in 2001, and the EPA now considers the remedy functioning as intended and protective of human health and the environment (EPA 2015).

Construction of the cruise ship dock would occur near the decommissioned pulp mill in a previously polluted area where sand capping has occurred; the dock would cause permanent removal habitat of this remediated habitat.

Project impacts to habitat are unlikely to measurably affect harbor seals' habitat.

9.1.2 Turbidity/Sedimentation

All material that comes out of the top of the pile during pile driving (drill cutting discharge) would be collected on a barge and transported to a permitted upland location for disposal. The contractor would surround the pile driving, temporary pile removal, and collection of excavated material operation with a 50-feet deep silt curtain. The contractor would also have a boom, absorbent materials, and containment available.

9.2 Effects of Project Activities on Marine Mammal Habitat

9.2.1 Animal Avoidance or Abandonment

As previously mentioned, harbor seals could experience a temporary loss of suitable habitat, within the action area if elevated noise levels associated with in-water construction result in their displacement from the area. However, avoidance of the area because of noise is expected to be temporary and will not result in long-term effects to the local populations of harbor seals.

Another potential impact on marine mammals associated with the project could be a temporary loss of habitat because of elevated noise levels due to construction support vessels. Tugs, barges, and small skiffs would be used during construction. For tugs and barges broadband source levels have been measured at 145 to 170 dB re: 1 µPa, and for small ships and supply vessels broadband source levels have been measured at 170 to 180 dB re: 1µPa (Richardson et al. 1995). Once the dock is operational, cruise ships would dock there. Average broadband source levels for cruise ships have been estimated at 181 ± 3 dB re: 1 µPa (Hatch et al. 2008), 182 dB re: 1 µPa, and 219 ± 3.8 dB re: 1 µPa (Kipple and Gabriele 2007). Allen et al. (2012) recorded source levels for four categories of vessels, recording cruise ships as the loudest of 24 ships in these categories with the highest broadband source level calculated at 219 ± 3.8 dB re: 1 µPa. Allen et al. (2012) also found that source levels typically increased with vessel size and speed.

Numerous studies of interaction between surface vessels and marine mammals have demonstrated that free-ranging marine mammals engage in avoidance behavior when surface vessels move toward them. Many authors suggest that vessel generated noise is a factor in that avoidance behavior (NMFS 2018). As described above, construction related vessels and cruise ships would produce marine vessel noise. This noise would be introduced to an action area that already experiences vessel noise due to existing high volumes of vessel traffic. Marine vessels that use the area include passenger ferries, commercial freight vessels/barges, commercial tank barges, cruise ships, U.S Coast Guard vessels, commercial fishing boats, charter vessels, recreational vessels, kayaks, and floatplanes (Marine Safety Task Force 2018). Cruise ships are the largest vessels that routinely use Tongass Narrows. At any given time during the summer (May-September), as many as five large cruise ships may be moored and/or at anchor in the Port of Ketchikan located in downtown Ketchikan. In 2019, forty-six cruise ships visited Ketchikan with a total of 576 stops (City of Ketchikan 2019). Harbor seals that occur in the action are likely habituated to vessel noise.

Acoustic disturbance from vessel noise is not anticipated to negatively impact harbor seals because:

- Construction vessel noise associated with this project would be temporary and the number of cruise ships in the Ketchikan vicinity is not expected to increase;
- Vessel noise is a common presence that is already occurring in the action area,
- Harbor seals that occur in the Ketchikan vicinity are likely habituated to regular vessel traffic; and
- In Tongass Narrows the maximum speed limit of 7 knots for vessels of over 23 feet would be observed as outlined in the 2018 Southeast Alaska Voluntary Waterway Guide.

Therefore, impacts on harbor seals associated with vessel noise from this project would be too small to detect or measure and therefore are insignificant.

9.3 Effects of Project Activities on Marine Mammal Prey Habitat

In general, construction activities within the estuarine habitat and in coastal marine areas have the potential to impact harbor seal prey species, in particular salmon, habitat. The proposed

activities associated with construction of the dock may adversely impact marine resources directly and indirectly through sound pollution, increased turbidity, and habitat loss and/or modification. Other impacts that may occur as a result of the proposed project include the following: increase in vessel traffic, increased human access (e.g., tourism), and cumulative development of shoreline properties. Impacts as a result of each construction activity and indirect impacts are described below. Table 12 details each activity that could impact salmon habitat and potential adverse impacts the activity may have (NOAA 2017).

An Essential Fish Habitat (EFH) assessment that was drafted for this project (Appendix D) and expected concurrence by NMFS Habitat Division in Anchorage, Alaska is expected in early January 2020. The EFH assessment details the potential impacts to fish, including salmon and other species that are harbor seal prey as summarized below.

Table 12. Potential Adverse Impacts for Each Activity Associated with the Proposed Project

Activity	Potential Impacts to Marine Mammal Prey Species and Their Habitat						
	Distribution of Fish	Behavior of Fish	Injuries and or mortality to Fish	Increase in Turbidity	Release of Contaminants	Changes in Ambient Light	Changes in Wave and Current Regimes
Pile Installation	X	X	X	X			
Pile Removal	X	X	X	X	X		
Overwater Structure	X	X				X	X

The potential impacts to construction methods and proposed conservation and mitigation measures, including collecting the drill cuttings material, using a sediment curtain will help to ensure that no short-term adverse impacts to salmon and other fish species that harbor seals may feed upon. In addition, because the floating portion of the dock is at least 5 feet above water in 70 to 150 feet of water, there will be little long-term adverse impacts to fish species' habitat from the overwater structure. Finally, because of the placement of the dock in deep water and the operations of the cruise ships as they move into and out of Ward Cove, it is unlikely that the sediment cap or other bottom material will be disrupted by cruise ship operations. Therefore, there would be no long-term adverse impacts to fish species important to harbor seals from cruise ship operations.

Fish populations in the project area that serve as harbor seal prey could be affected by noise from in-water pile-driving. High underwater sound pressure levels have been documented to alter behavior, cause hearing loss, and injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005).

In general, impacts to marine mammal prey species and habitat are expected to be minor and temporary. The area impacted by the project is very small compared to the available habitat in Tongass Narrows. The most likely impact to prey will be temporary behavioral avoidance of the immediate area. During pile driving it is expected that fish and harbor seals would temporarily move to nearby locations and return to the area following cessation of in-water construction activities. Therefore, indirect effects on harbor seals' prey during construction are not expected to be substantial.

10 ANTICIPATED EFFECTS OF HABITAT IMPACTS ON MARINE MAMMALS

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The most likely effects on marine mammal habitat from the proposed project would be temporary, short duration in-water noise, localized, temporary water quality effects, and temporary prey (fish) disturbance. The direct loss of habitat available to marine mammals during construction due to noise, water quality impacts, disturbance of prey species, and other construction activity is expected to be short-term and minimal.

10.1 Loss of Marine Mammal Habitat Due to Noise

Displacement of harbor seals by construction noise is not expected to be permanent nor is it anticipated to have long-term effects on the species. Project activities are not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations, because pile driving and other construction-related noise sources will be temporary and intermittent. However, increased vessel traffic (cruise ships, small excursion craft) currently occurring in the area may result in an overall increased level of ambient noise in near Ward Cove. This may deter harbor seals from inhabiting or traveling through the area and result in a minor loss of habitat.

10.2 Loss of Marine Mammal Habitat Due to Turbidity

Another potential impact on marine mammals associated with the project could be temporary sediment suspension and increased turbidity associated with pile driving and removal in Ward Cove. As previously mentioned, during pile driving, all the drill cuttings material will be collected on a barge and transported to an approved upland location for disposal. In addition, a 50-feet deep silt curtain would be installed to surround the pile driving and temporary pile removal operation.

Cruise ships will be the primary vessels at the Ward Cove Cruise Ship Dock and will utilize the dock daily from late April to early October. The cruise ship dock has been located to avoid disturbance to the sand cap and ocean floor because it is located on the fringe of sand capped area and minimizes cruise ship travel distance and maneuvering within the area of concern. The placement of the dock in deep water decreases the potential for scour or turbidity. The cruise ship azipods would be in approximately 127 feet of water (about 100 feet below the azipods) when the vessel is docked. Note that these depths are at extreme low tide, and most of the time the azipods will be in deeper water.

Further, cruise ship operations will ensure that there would be minimal disturbances to the sand cap. The vessels will approach the dock bow first. Approaching the berth bow first will keep the thrust from the azipod propellers away from the sand cap and the area of concern. The cruise ships will approach the dock such that near-berth maneuvering is minimized. To the extent possible, major course corrections will occur prior to entering the area of concern. In addition, docking will be performed with the minimal use and thrust from bow thrusters as operationally possible.

Power Systems and Supplies of Alaska has agreed to perform a pre-construction survey and sediment sampling program that mimics the 2007 sediment survey performed by Integral Corp (Exponent 2001). The survey will establish the sediment chemistry, toxicity, and benthic community composition immediately prior to construction. The applicant will also perform a follow up survey at an interval of one year or other period acceptable to the EPA and ADEC to allow comparison of the site before construction and after operations begin. Water quality monitoring (measurements of dissolved oxygen and turbidity) will be performed during construction and early during the first season of cruise ship landings.

Therefore, there would be no short or long-term adverse impacts to marine mammal habitat from construction of the dock or cruise ship operations.

10.3 Disturbance or Loss of Prey Species

As stated in Section 9, fish populations in the project area that serve as marine mammal prey could be affected by noise or turbidity generated from in-water pile-driving. It is expected that most fish will be able to move away from the proposed activity to avoid harm and will still be available to marine mammals as a food source. The quantity, quality, and availability of adequate food resources are therefore not likely to be reduced (due to the small area affected, mobility of fish, anticipated recolonization, and the temporary nature of the project).

These temporary impacts on habitat were discussed in more detail in Section 9.

11 MITIGATION MEASURES

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Mitigation measures and construction techniques will be employed to minimize effects to marine mammal species and habitat. These measures are described below and presented in detail in the Ward Cove Cruise Ship Dock Marine Mammal Monitoring and Mitigation Plan (Appendix C).

11.1 Mitigation Measures Designed to Reduce Project Impacts

The project uses the most compact design possible, while meeting the demands of the vessels that would use the facility.

- The project uses a design that does not require dredging, blasting, or fill.
- The project uses a design that incorporates the smallest-diameter piles practicable while still minimizing the overall number of piles.
- The project uses a design that places the cruise ship berth and piles at or beyond the 50-foot contour to avoid impacts to the nearshore zone and disturbance to important ecological resources such as submerged aquatic vegetation and diverse substrate composition.
- All material that comes out of the top of the pile during pile driving (drill cutting discharge) would be collected on a barge and transported to a permitted upland location for disposal.
- Pile driving, temporary pile removal, and collection of excavated material operations will be surrounded by a 50-feet deep silt curtain.
- Floats or barges will not be grounded at any tidal stage.

11.2 Oil and Spill Prevention

- The contractor will provide and maintain a spill cleanup kit on-site at all times, to be implemented as part of the DB Brightwater Shipboard Oil Pollution Emergency Plan for oil spill prevention and response (Turnagain 2018).
- Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment will be checked regularly for drips or leaks, and would be maintained and stored properly to prevent spills.
- Oil booms will be readily available for oil or other fuel spill containment should any release occur.
- All chemicals and petroleum products will be properly stored to prevent spills.
- No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.

11.3 Mitigation Measures Designed to Reduce Impacts to Marine Mammals

- There will be a nominal 10-meter shutdown zone for construction-related activity where acoustic injury is not an issue. This type of work could include (but is not limited to) the following activities: (1) movement of the barge to the pile location; (2) positioning of the pile on the substrate via a crane (i.e., stabbing the pile); (3) removal of the pile from the water column/substrate via a crane (i.e., deadpull); or (4) the placement of sound attenuation devices around the piles. For these activities, monitoring would take place from 15 minutes prior to initiation until the action is complete.
- Protected Species Observers (PSOs) will be present in the action area during all pile driving and removal. The Marine Mammal Monitoring and Mitigation Plan for the proposed project is included as Appendix C.
- To ensure that the action area has been surveyed for marine mammal presence, pile driving/removal would not begin until a PSO has given a notice to proceed.
- To minimize noise during impact pile driving, pile caps (pile softening material) will be used. Much of the noise generated during pile installation comes from contact between the pile being driven and the steel template used to hold the pile in place. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel on steel noise generation.
- To minimize impact to marine mammals, a “soft start” technique would be used when impact pile driving with an initial set of three strikes from the impact hammer at 40 percent energy, followed by a one-minute waiting period, then two subsequent 3-strike sets.
- The soft-start would be applied prior to the beginning of pile driving/removal activities each day or when pile driving/removal hammers have been idle for more than 30 minutes.
- Prior to pile driving, the action area would be surveyed for marine mammal presence for 30 minutes. If any marine mammal is sighted within a shutdown zone during this 30-minute survey period prior to pile driving, or during the soft-start, Power Systems & Supplies of Alaska would delay pile driving/removal until the animal(s) is confirmed to have moved outside of and on a path away from the area or if 15 minutes (for pinnipeds or small cetaceans) or 30 minutes (for large cetaceans) have elapsed since the last sighting of the marine mammal within the shutdown zone.
- Shutdowns would be implemented if a marine mammal appears likely to enter a shutdown zone (Section 11.3).
- All work will be performed during daylight hours to allow for visual monitoring. Pile driving activities will not be conducted when weather conditions or darkness do not allow for observation of all waters within the shutdown zones.

11.4 Shutdown and Monitoring Zones

Power Systems & Supplies of Alaska is requesting Level A and B take of harbor seal incidental to construction of the Ward Cove Cruise Ship Dock. Power Systems & Supplies of Alaska is not

requesting take for any other marine mammal. Shutdown and monitoring zones are described in the following sub-sections and Table 13.

11.4.1 Level A Shutdown and Monitoring Zones

There will be a nominal 10-meter shutdown zone for construction-related activity where acoustic injury is not an issue. This type of work could include (but is not limited to) the following activities:

- Movement of the barge to the pile location;
- Positioning of the pile on the substrate via a crane (i.e., stabbing the pile); or
- The placement of sound attenuation devices around the piles.

For these activities, monitoring would take place from 15 minutes prior to initiation until the action is complete.

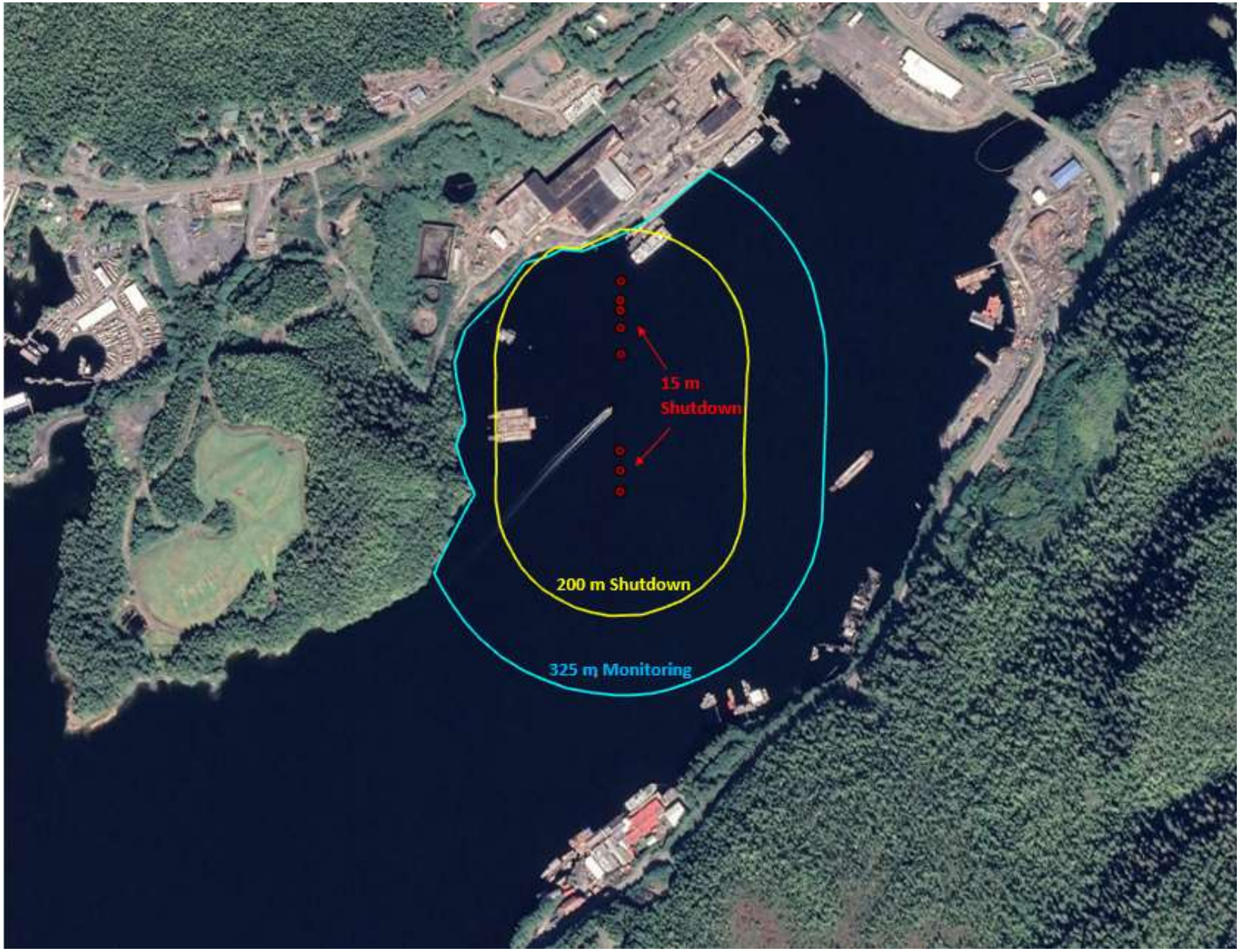
Power Systems & Supplies of Alaska will implement additional shutdowns to protect marine mammals from Level A harassment and prevent auditory injury to all hearing groups during pile installation, removal, and rock anchoring project activities as shown in Table 13 and Figure 9. For impact pile-driving of 36- and 48-inch piles, the Level A harassment zone radius for harbor seal is larger than the proposed shutdown zones. Because they are more difficult to see and due to the high likelihood of their presence within the project area, Level A take has been requested for harbor seals in those instances in which they occur within the Level A harassment zone but outside of the shutdown zone *or* if they were to occur within the shutdown zone and were not visualized in time for the project to be shut down.

Table 13. Harbor Seals Pile Driving Shutdown and Level A Monitoring Zones

Activity	Calculated Distance (m) to Phocid Level A Thresholds	Shutdown and Monitoring Zones (m) for Phocid (*monitoring zone shown in italics*)
In-Water Construction Activities*		
Barge movements, pile positioning, sound attenuation placement*	NA	10
Vibratory Pile Driving/Removal		
30-inch steel temporary installation 10 min per pile, 40 minutes per day on 12 days	3.6	10
30-inch steel temporary removal 10 min per pile, 40 minutes per day on 12 days	3.6	10
30-inch steel permanent installation 10 min per pile, 40 minutes per day on 4 days	3.6	10
36-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	12.5	15
48-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	12.5	15
Impact Pile Driving		
30-inch steel permanent installation 40 strikes per pile, 2 min per day on 7 days	175.1	200
36-inch steel permanent installation 100 strikes per pile, 5 min per day on 10 days	322.5	*325 (level A monitoring)* 200 (shutdown)
48-inch steel permanent installation 100 strikes per piles, 5 min per day on 10 days	322.5	*325 (level A monitoring)* 200 (shutdown)
Rock Anchor Installation		
33-inch anchor permanent installation for 36-inch piles 8 hours per day on 10 days	36.9	40
33-inch anchor permanent installation for 48-inch piles 5 hours per day on 20 days	27.0	40

Shutdown zone distances refer to the maximum radius of the zone and are rounded (see Table 4 for calculated distances).
*Although acoustic injury is not the primary concern with these activities, shutdowns will be implemented to avoid impacts to species.

Figure 9. Ward Cove Cruise Ship Dock Level A Monitoring and Shutdown Zones



11.4.2 Level B Shutdown and Monitoring Zones

Power Systems & Supplies of Alaska is requesting Level B take of harbor seal incidental to constructing the Ward Cove Cruise Ship Dock and shutdowns associated with Level B harassment of harbor seals are not proposed. The monitoring zones associated with Level B disturbance are outlined in Table 14 and Figure 10.

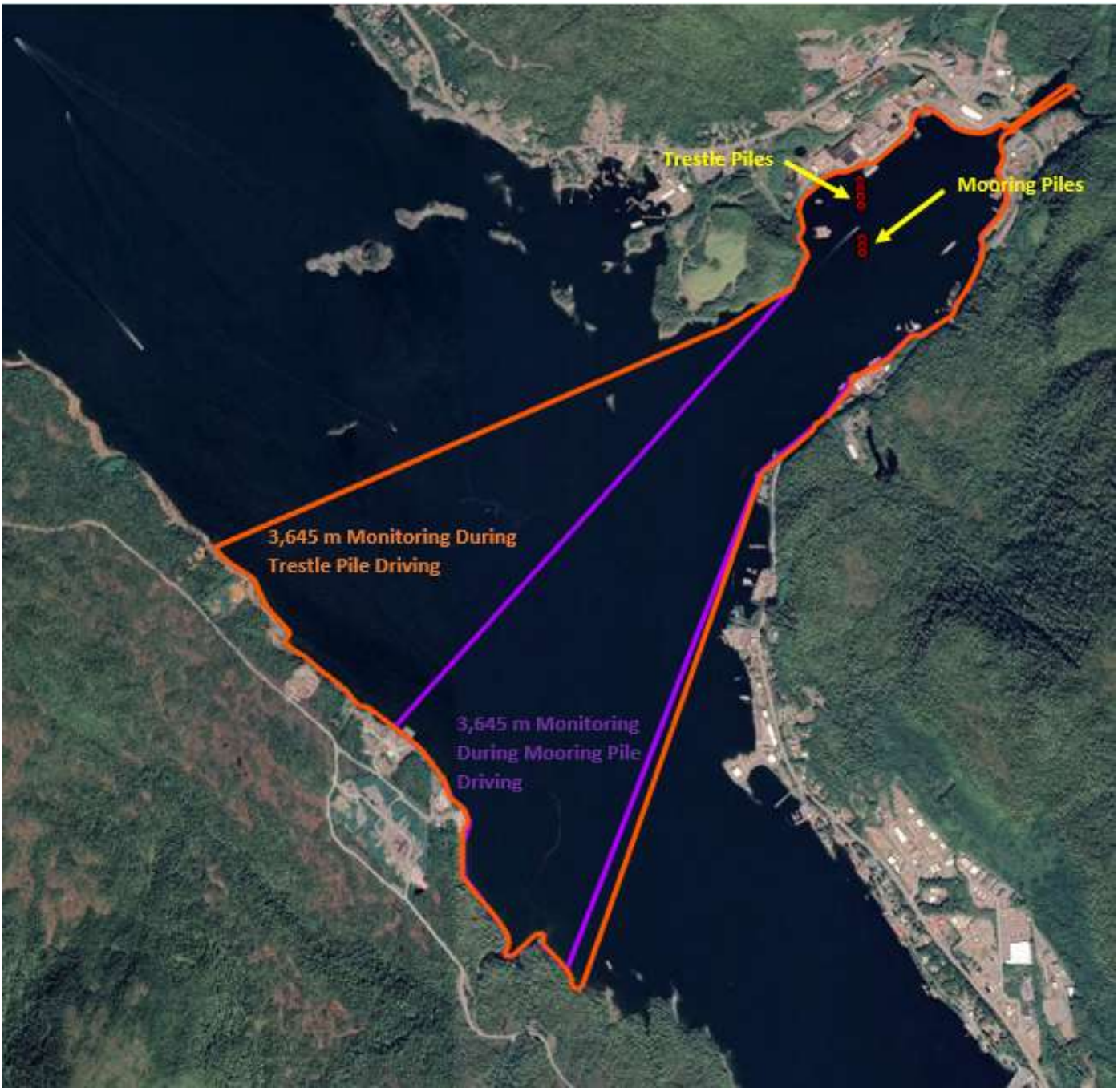
No other Level B take is authorized, and pile driving would be shut down as summarized in Table 14 and Figures 10 to avoid Level B take in the unlikely event that a marine mammal species, other than harbor seals, were to enter the action area.

Although the calculated distance to Level B thresholds extends up to 16.3 kilometers from the source, all level B zones are truncated at 3,645 meters from the source where Gravina Island blocks noise transmission (Figure 10).

Table 14. Level B Shutdown and Monitoring Zones

Activity	Calculated Distance (m) to Level B Thresholds	Monitoring Zone (m) for Harbor Seals Shutdown Zone for all Other Marine Mammal Species
Vibratory Pile Driving/Removal		
30-inch steel temporary installation 10 min per pile, 40 minutes per day on 12 days	6,213	3,645
30-inch steel temporary removal 10 min per pile, 40 minutes per day on 12 days	6,213	3,645
30-inch steel permanent installation 10 min per pile, 40 minutes per day on 4 days	6,213	3,645
36-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	16,343	3,645
48-inch steel permanent installation 30 min per pile, 60 minutes per day on 10 days	16,343	3,645
Impact Pile Driving		
30-inch steel permanent installation 40 strikes per pile, 2 min per day on 7 days	3,744	3,645
36-inch steel permanent installation 100 strikes per pile, 5 min per day on 10 days	3,744	3,645
48-inch steel permanent installation 100 strikes per piles, 5 min per day on 10 days	3,744	3,645
Rock Anchor Installation		
33-inch anchor permanent installation for 36-inch piles 8 hours per day on 10 days	12,023	3,645
33-inch anchor permanent installation for 48-inch piles 5 hours per day on 20 days	12,023	3,645

Figure 10. Ward Cove Cruise Ship Dock Harbor Seal Level B Monitoring Zones



12 ARCTIC PLAN OF COORDINATION

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. (This requirement is applicable only for activities that occur in Alaskan waters north of 60° North latitude.)

Although the action area is located south of 60° north, the latitude NMFS regulations consider Arctic waters and no activities will take place in or near traditional Arctic subsistence hunting areas, there are subsistence uses of marine mammals in Southeast Alaska including the community of Ketchikan. Alaska Natives have traditionally harvested subsistence resources, including harbor seals, in Southeast Alaska for hundreds of years.

Section 11 describes mitigation measures designed to reduce project impacts and Section 8 details subsistence information and consultations with subsistence users in the project vicinity.

13 MONITORING AND REPORTING

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Monitoring Protocols

To minimize impacts of project activities on marine mammals, a detailed Marine Mammal Monitoring and Mitigation Plan has been developed for the project and is included as Appendix C. Project shutdown and monitoring zones as outlined in Appendix C and Section 11.3 would be implemented during any in-water pile driving activities associated with the project. If the number of animals of a species exposed to Level A or B harassment approaches the number of takes allowed by the IHA, Power Systems & Supplies of Alaska will notify NMFS and seek further consultation.

13.2 Monitoring Report

Power Systems & Supplies of Alaska will submit a draft report to NMFS not later than 90 days following the end of construction activities or 60 days prior to the issuance of any subsequent IHA for the project. Power Systems & Supplies of Alaska will provide a final report within 30 days following resolution of NMFS' comments on the draft report. Reports will contain, at minimum, the following:

- Date and time that monitored activity begins and ends for each day conducted (monitoring period);
- Construction activities occurring during each daily observation period, including how many and what type of piles driven;
- Deviation from initial proposal in pile numbers, pile types, average driving times, etc.
- Weather parameters in each monitoring period (e.g., wind speed, percent cloud cover, visibility);
- Water conditions in each monitoring period (e.g., sea state, tide state);
- For each marine mammal sighting:
    - Species, numbers, and, if possible, sex and age class of marine mammals;
    - Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
    - Type of construction activity that was taking place at the time of sighting;
    - Location and distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
    - Reason why shutdown was implemented (if needed)
    - If shutdown was implemented, behavioral reactions noted and if they occurred before or after shutdown.

        - Estimated amount of time that the animals remained in the Level A or B zone.
- Description of implementation of mitigation measures within each monitoring period (e.g., shutdown or delay);
- Other human activity in the area within each monitoring period;
- A summary of the following:
    - Total number of individuals of each species detected within the Level B Zone.
    - Total number of individuals of each species detected within the Level A Zone and the average amount of time that they remained in that zone.
    - Daily average number of individuals of each species detected within the Level B Zone, and estimated as taken, if appropriate.

Power Systems & Supplies of Alaska will also immediately report injured or dead marine mammals to NMFS, and, if the specified activity clearly causes the take of marine mammals in a manner prohibited by the IHA (e.g. serious injury or mortality), Power Systems & Supplies of Alaska will immediately cease pile activities and report the incident to NMFS.

14 SUGGESTED MEANS OF COORDINATION

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

In-water and in-air noise generated by pile driving at the Power Systems & Supplies of Alaska Ward Cove Cruise Ship Dock is the primary issue of concern to local marine mammals during this project. Potential impacts on marine mammals have been studied, with the results used to establish the noise criteria for evaluating take.

The data recorded during marine mammal monitoring for the proposed project will be provided to NMFS in the monitoring report (Section 13.2). The report will provide information on marine mammals' use of Ward Cove and Tongass Narrows, including numbers before, during, and after pile driving activities. The monitoring data may also inform NMFS and future permit applicants generally about the behavior of marine mammals during pile installation and removal for future projects of a similar nature.

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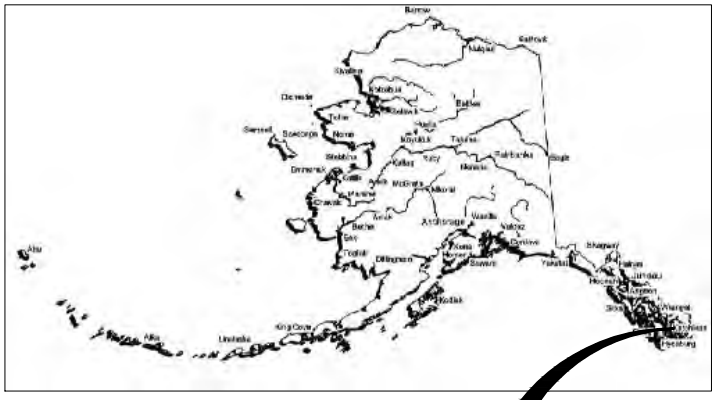
Appendix A. Project Permit Drawings



PROJECT VICINITY

PROJECT LOCATION

WARD COVE

NORTH TONGASS HIGHWAY

GRAVINA ISLAND

KETCHIKAN AIRPORT

CITY OF KETCHIKAN

SOUTH TONGASS HIGHWAY

WEST TONGASS NARROWS

EAST TONGASS NARROWS

PENNOCK ISLAND

N

PURPOSE:

DATUM: 0.0'

HTL = 19.7'
MHW = 15.45'
MLLW = 0.0'

VICINITY MAP & LOCATION MAP

JOB NO. 19_112_A

PROPOSED: CRUISE SHIP DOCK

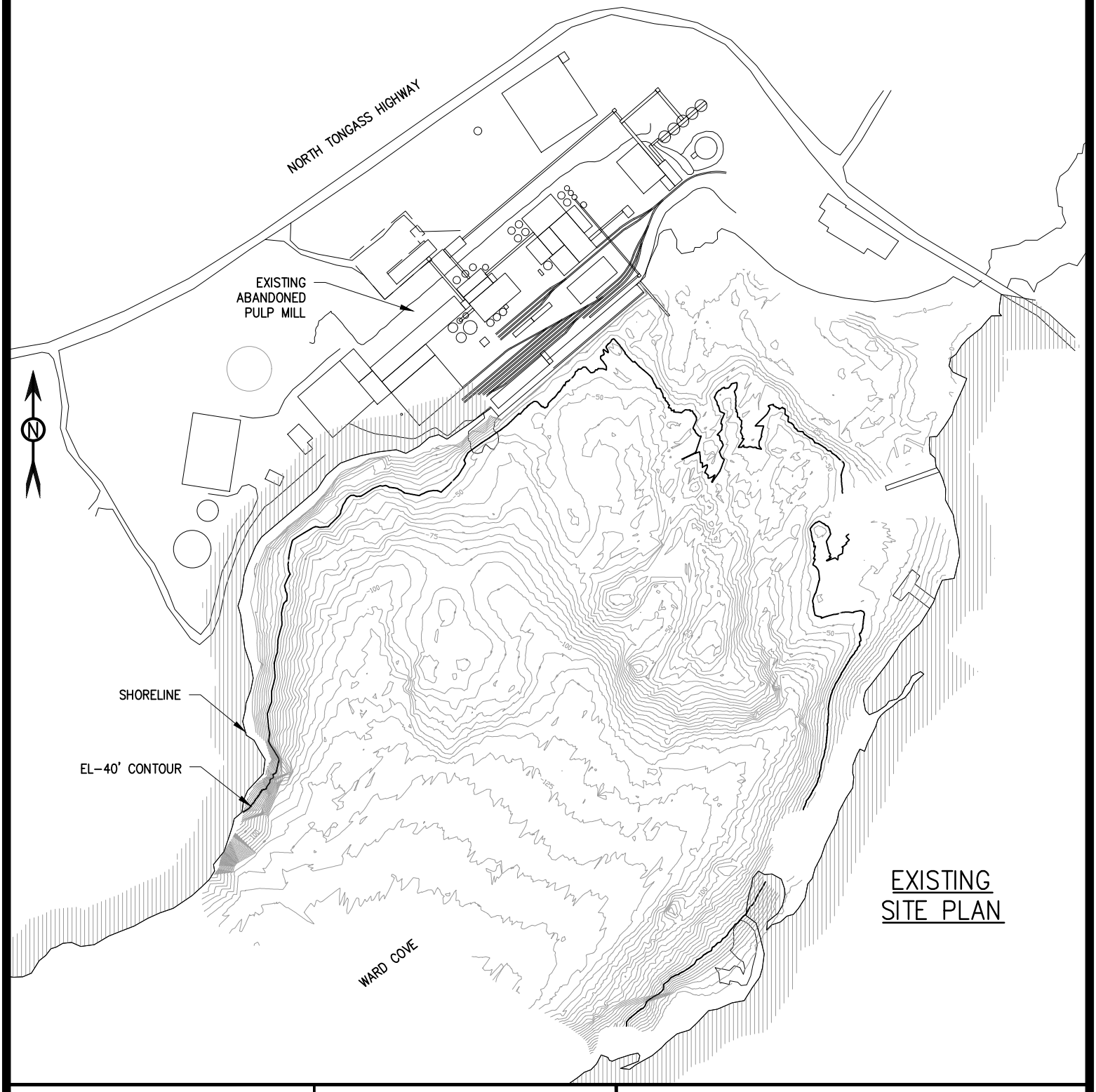
IN: WARD COVE

AT: KETCHIKAN, AK

APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA

DATE: 16 MAY 2019

SHEET: 1 OF 10



PURPOSE:

DATUM: 0.0'

HTL = 19.7'
MHW = 15.45'
MLLW = 0.0'

EXISTING
SITE PLAN

JOB NO. 19_112_A

PROPOSED: CRUISE SHIP DOCK

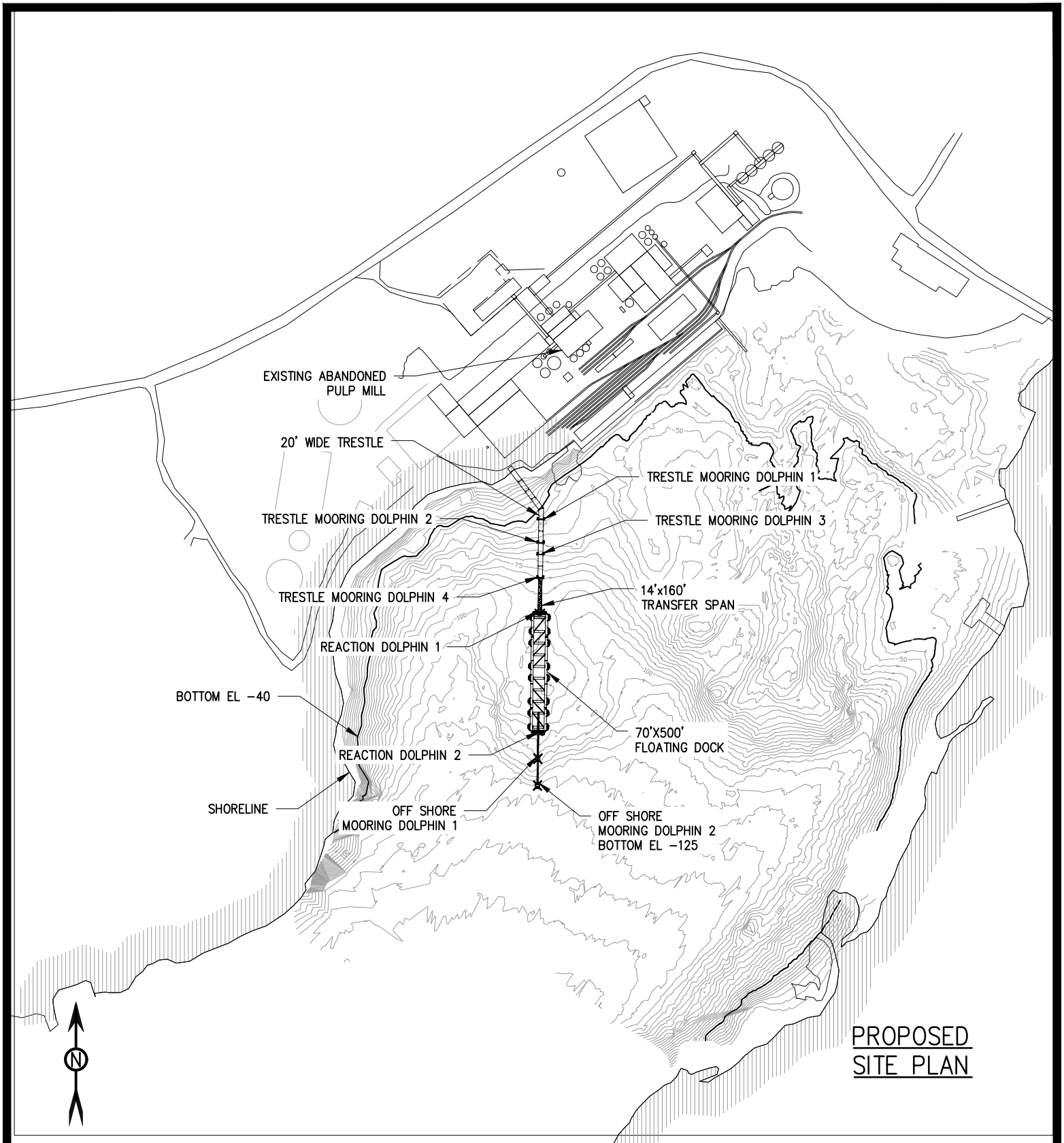
IN: WARD COVE

AT: KETCHIKAN, AK

APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA

DATE: 16 MAY 2019

SHEET: 2 OF 10



PROPOSED SITE PLAN

PURPOSE:

DATUM: 0.0'

HTL = 19.7'
MHW = 15.45'
MLLW = 0.0'

PROPOSED
SITE PLAN

JOB NO. 19_112_A

PROPOSED: CRUISE SHIP DOCK

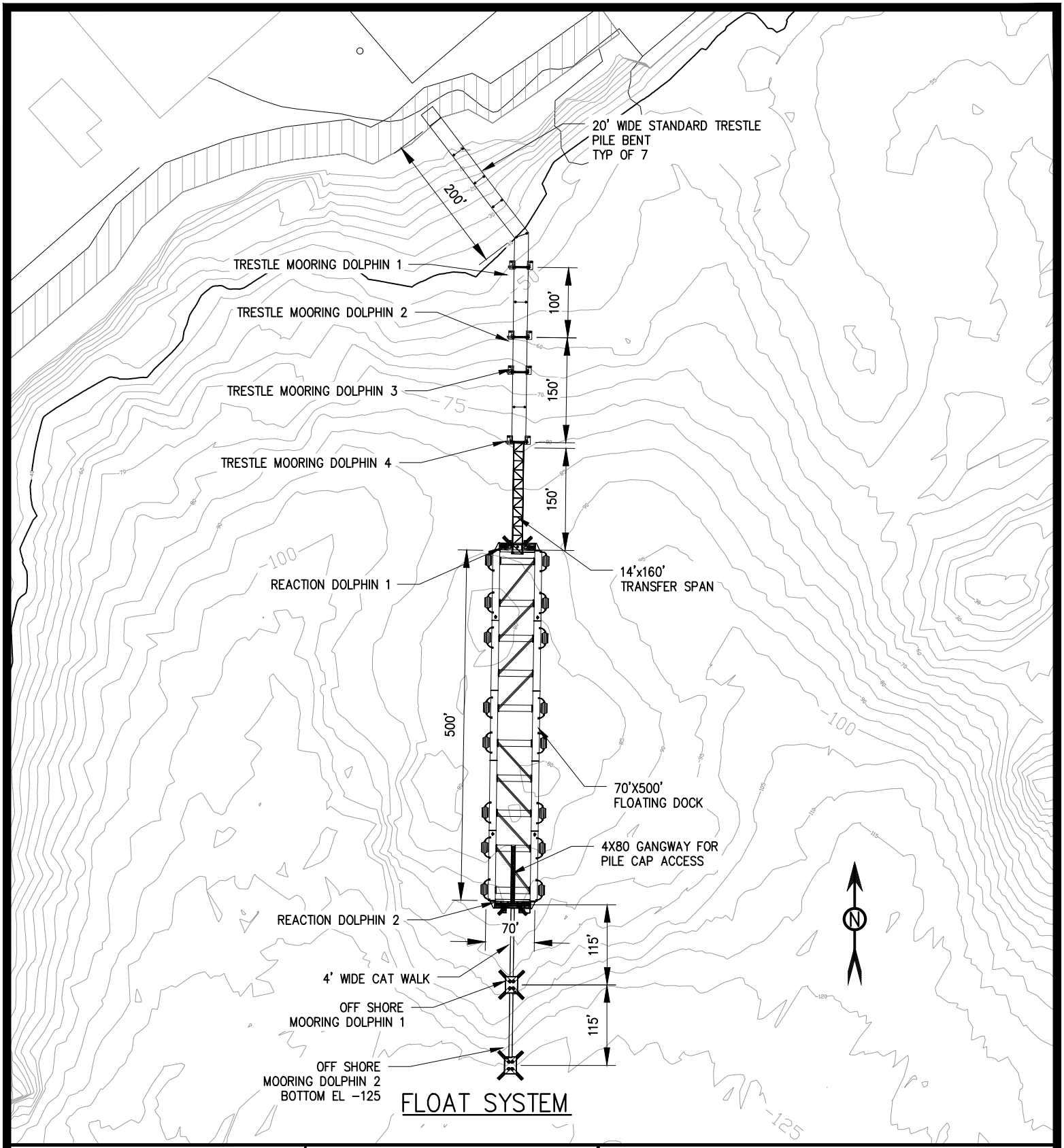
IN: WARD COVE

AT: KETCHIKAN, AK

APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA

DATE: 16 MAY 2019

SHEET: 3 OF 10



FLOAT SYSTEM

PURPOSE:

DATUM: 0.0'

HTL = 19.7'
MHW = 15.45'
MLLW = 0.0'

PROPOSED
FLOAT SYSTEM

JOB NO. 19_112_A

PROPOSED: CRUISE SHIP DOCK

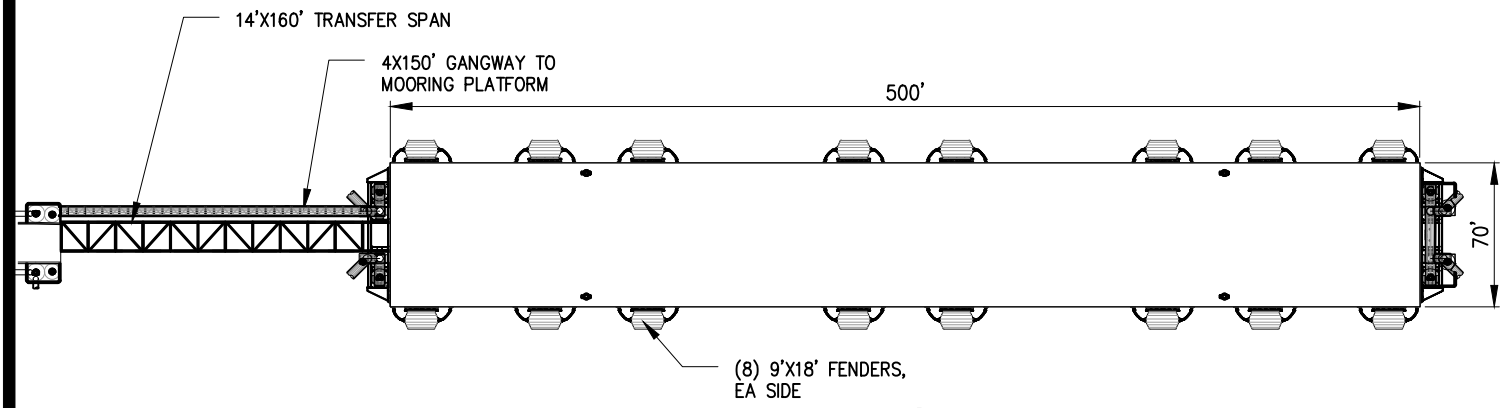
IN: WARD COVE

AT: KETCHIKAN, AK

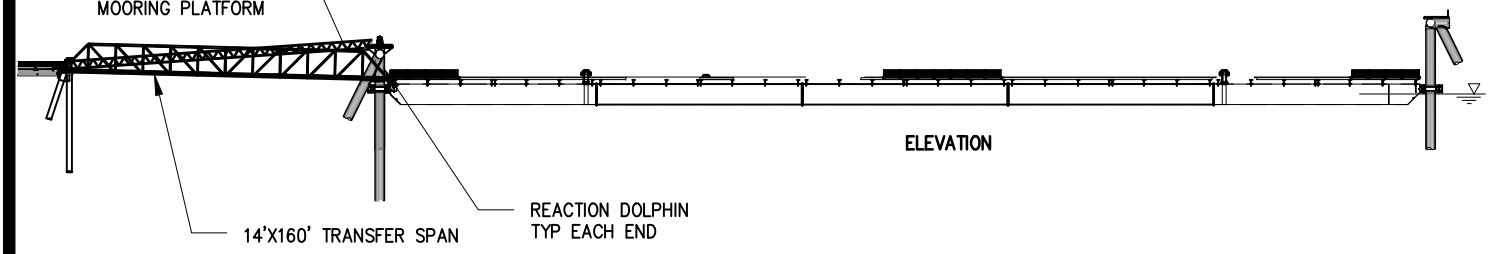
APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA

DATE: 16 MAY 2019

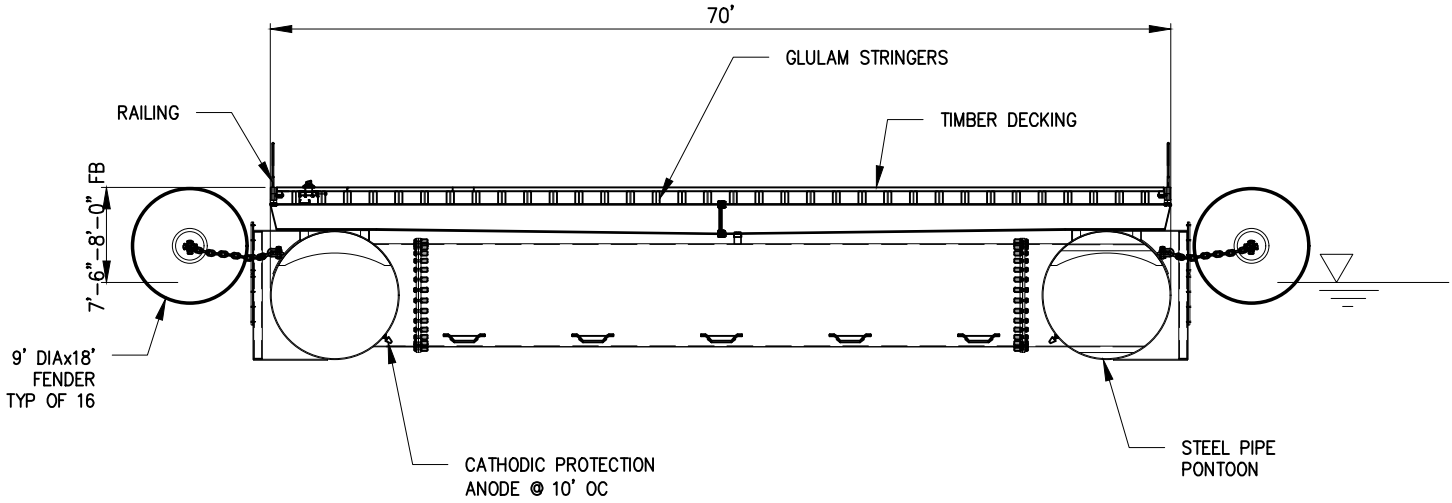
SHEET: 4 OF 10



PLAN

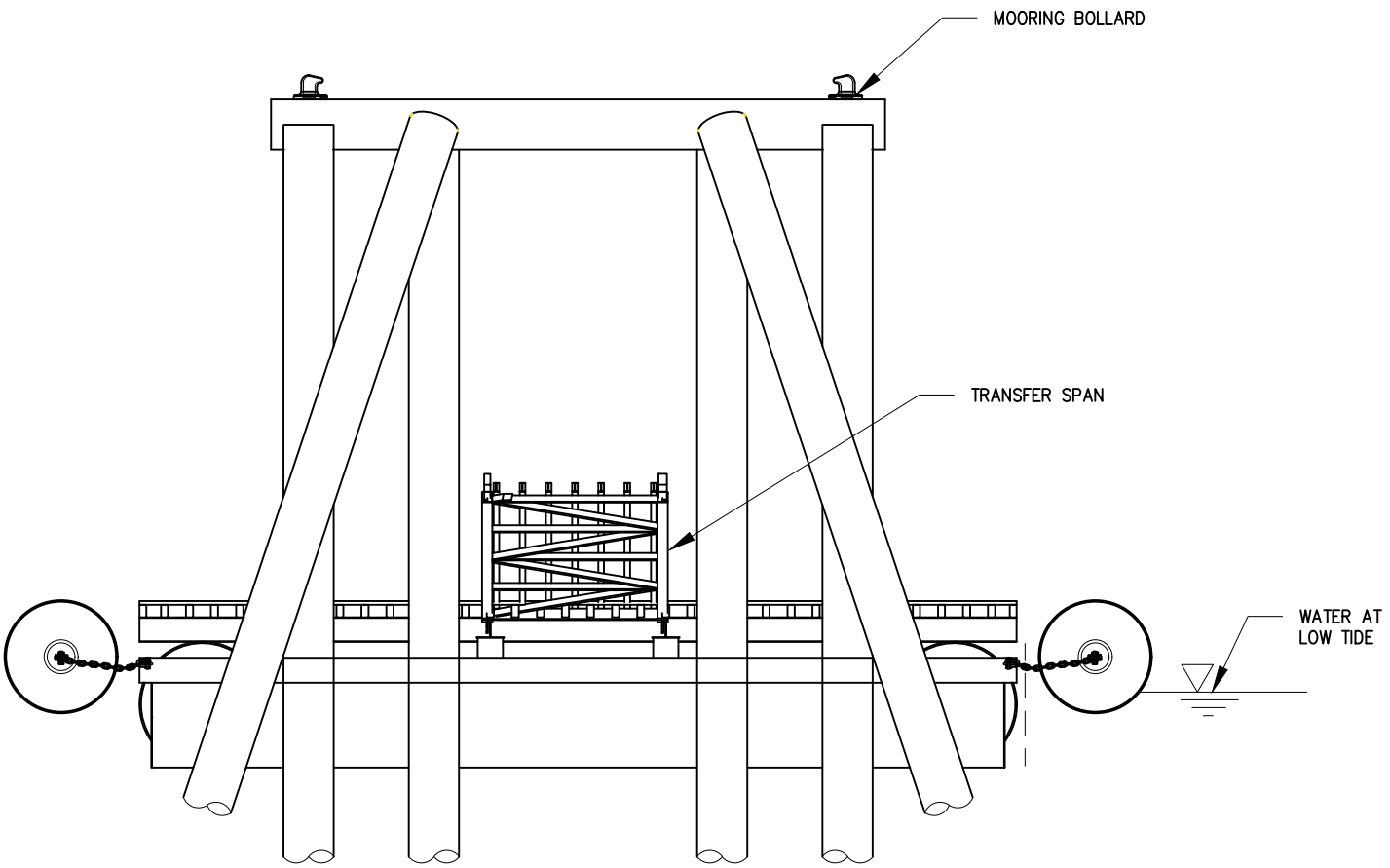


ELEVATION



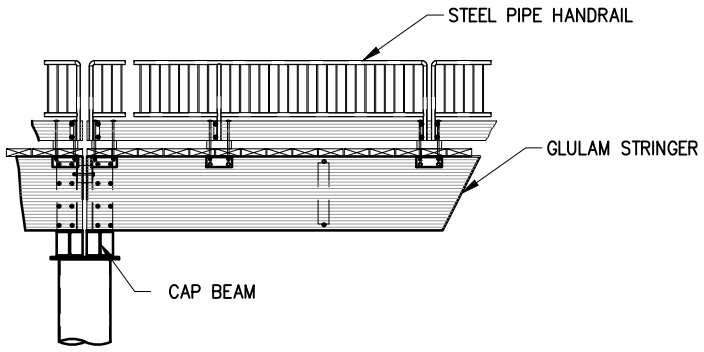
TYPICAL FLOAT SECTION

PURPOSE: NEW CRUISE SHIP DOCK	TYPICAL FLOAT	PROPOSED: CRUISE SHIP DOCK
		IN: WARD COVE
		AT: KETCHIKAN, AK
DATUM: 0.0' HTL = 19.7' MHW = 15.45' MLLW = 0.0'	JOB NO. 19_112_A	APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA
		DATE: 16 MAY 2019 SHEET: 5 OF 10

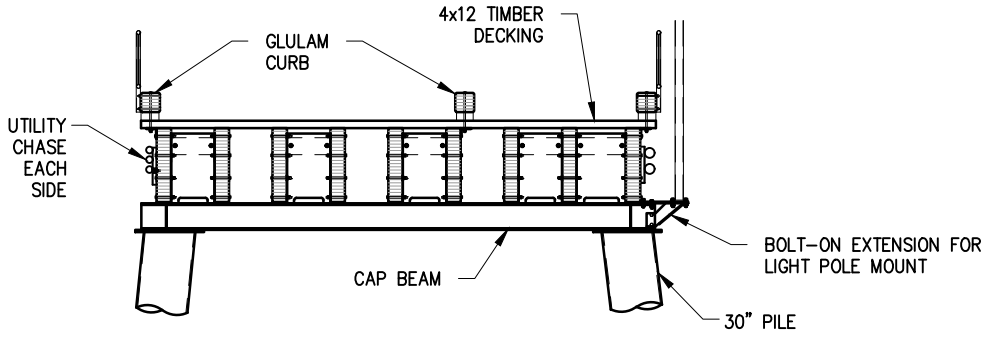


REACTION DOLPHIN

PURPOSE: NEW CRUISE SHIP DOCK DATUM: 0.0' HTL = 19.7' MHW = 15.45' MLLW = 0.0'	PROPOSED REACTION DOLPHIN JOB NO. 19_112_A	PROPOSED: CRUISE SHIP DOCK IN: WARD COVE AT: KETCHIKAN, AK APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA DATE: 16 MAY 2019 SHEET: 6 OF 10



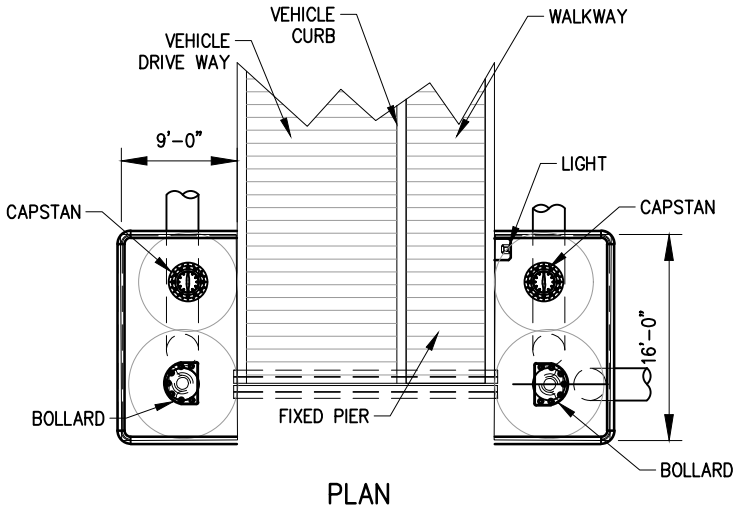
ELEVATION AT PILE BENT



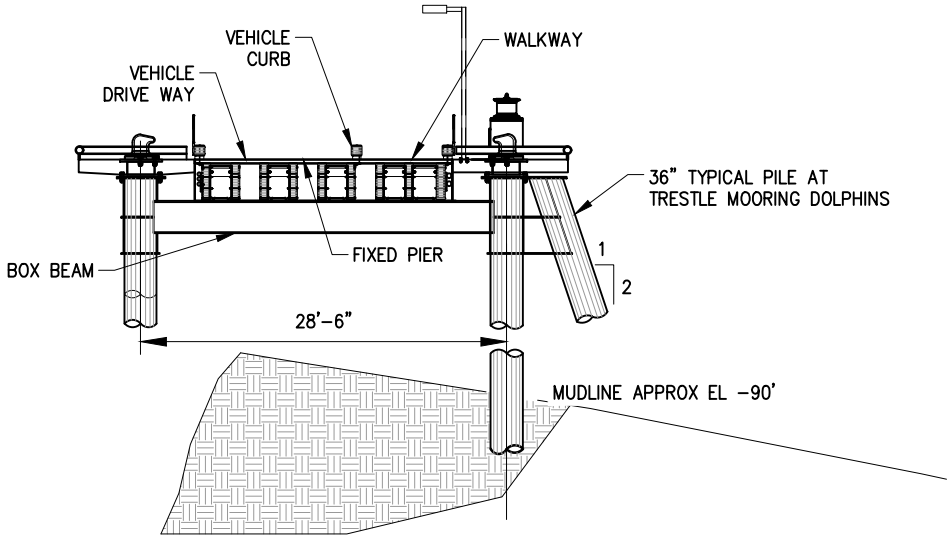
SECTION AT PILE BENT

TYPICAL TRESTLE SECTION AT STANDARD BENT

PURPOSE:		PROPOSED TRESTLE DETAIL	PROPOSED: CRUISE SHIP DOCK
			IN: WARD COVE
			AT: KETCHIKAN, AK
DATUM: 0.0'	HTL = 19.7'		APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA
	MHW = 15.45'		
	MLLW = 0.0'	JOB NO. 19_112_A	DATE: 16 MAY 2019 SHEET: 7 OF 10



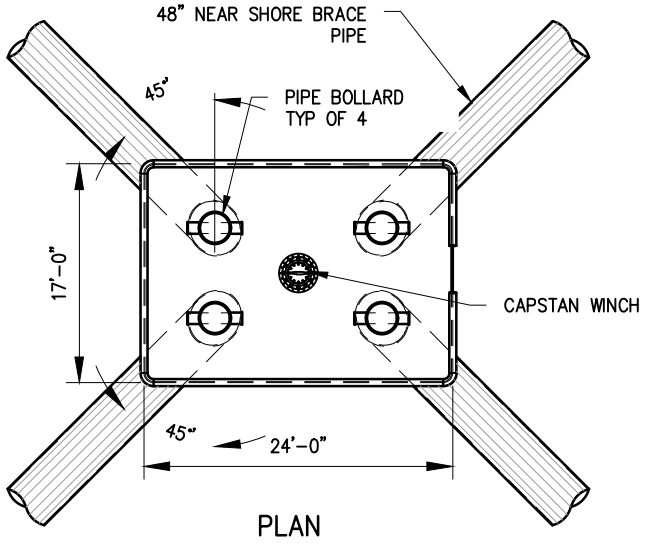
PLAN



ELEVATION

TYPICAL TRESTLE SECTION AT MOORING DOLPHIN

PURPOSE:	PROPOSED MOORING DOLPHIN	PROPOSED: CRUISE SHIP DOCK IN: WARD COVE AT: KETCHIKAN, AK APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA
DATUM: 0.0' HTL = 19.7' MHW = 15.45' MLLW = 0.0'	JOB NO. 19_112_A	DATE: 16 MAY 2019 SHEET: 8 OF 10



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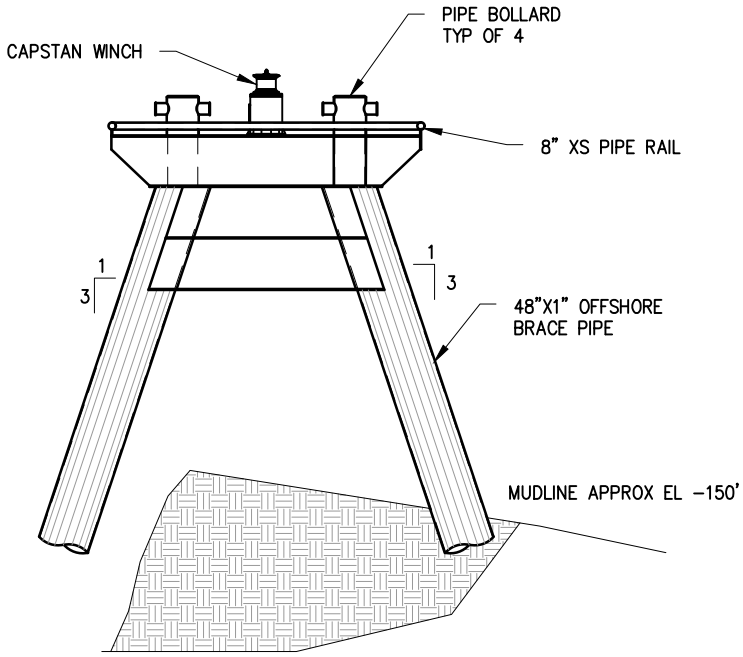
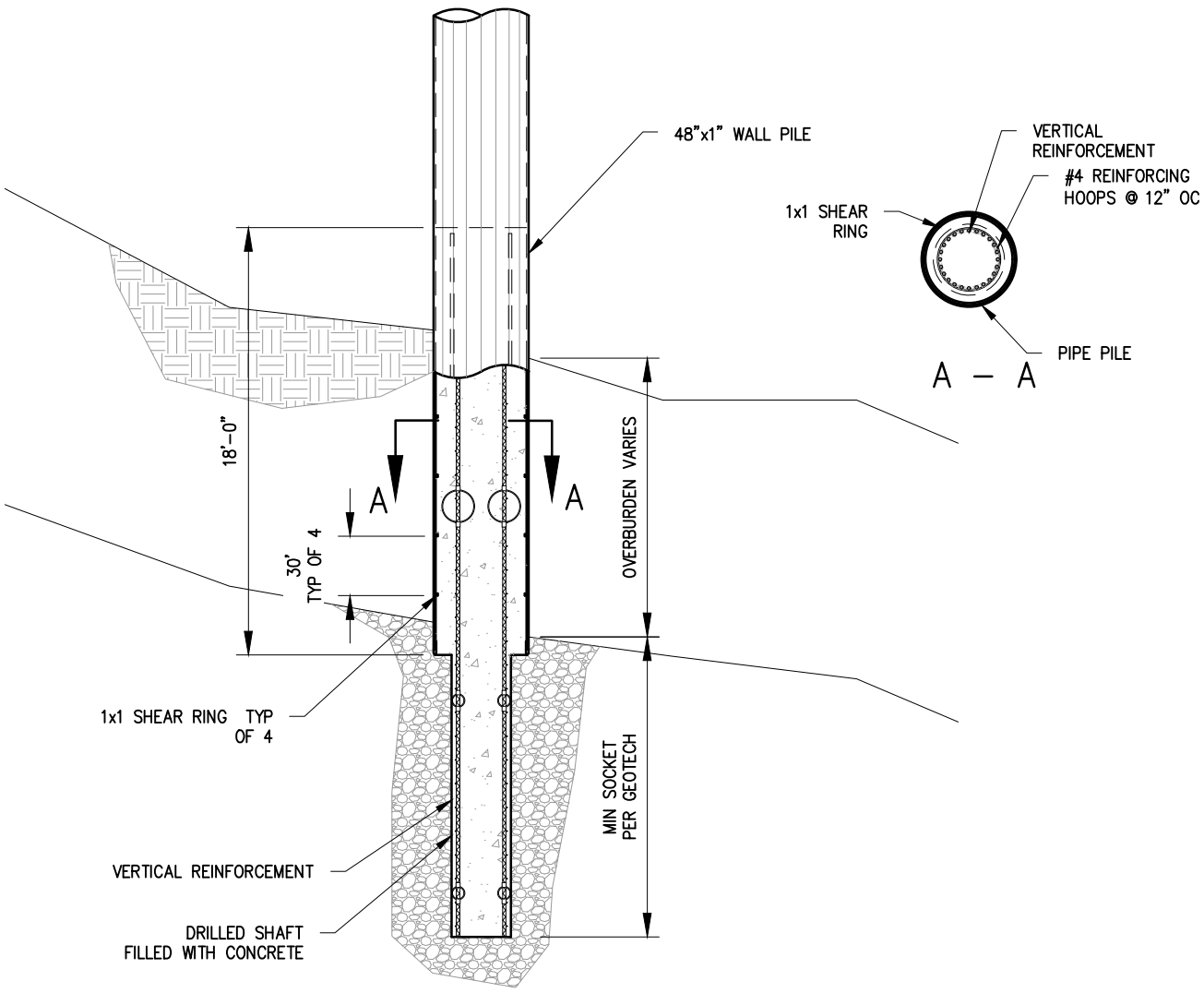


ELEVATION

OFFSHORE MOORING DOLPHIN DETAIL

PURPOSE:	PROPOSED MOORING DOLPHIN	PROPOSED:	CRUISE SHIP DOCK
		IN:	WARD COVE
		AT:	KETCHIKAN, AK
DATUM: 0.0' HTL = 19.7' MHW = 15.45' MLLW = 0.0'	JOB NO. 19_112_A	APPLICATION BY:	POWER SYSTEMS & SUPPLIES OF ALASKA
		DATE:	16 MAY 2019



ELEVATION

TYPICAL ELEVATION AT ROCK ANCHOR

PROPOSED PILE SCHEDULE				
LOCATION	SIZE	QTY	MAX LENGTH	SOCKET LENGTH
TRESTLE BENT (7 BENTS WITH 2 PILES PER BENT)	30"	14	120'	30'
TRESTLE MOORING DOLPHIN (4 DOLPHINS WITH 5 PILES PER DOLPHIN)	36"	20	130'	30'
REACTION DOLPHIN (2 DOLPHINS WITH 6 PILES PER DOLPHIN)	48"	12	150'	30'
OFF SHORE MOORING DOLPHIN (2 DOLPHINS WITH 4 PILES PER DOLPHIN)	48"	8	180'	30'
TEMPLATE PILE (20 PILES FOR STANDARD TRESTLE, 12 PILES FOR MOORING TRESTLE, 8 PILES FOR REACTION DOLPHINS AND 8 PILES FOR OFF SHORE MOORING DOLPHINS)	30"	48	VARIES	VARIES

PURPOSE:

DATUM: 0.0'

HTL = 19.7'
MHW = 15.45'
MLLW = 0.0'

PROPOSED
PILE ANCHOR

JOB NO. 19_112_A

PROPOSED: CRUISE SHIP DOCK
IN: WARD COVE
AT: KETCHIKAN, AK
APPLICATION BY: POWER SYSTEMS & SUPPLIES OF ALASKA
DATE: 16 MAY 2019

Appendix B. Threshold Calculation Spreadsheets

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

VERSION 2.0: 2018

KEY

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

30-inch piles, vibratory driving

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	The 30-inch-diameter vibratory pile driving source level of 161.9 SPL is proxy from median received levels at 10 meters for vibratory pile driving of 30-inch-diameter piles to construct the Ketchikan Ferry Terminal (Denes et al. 2016, Table 72).

Please include any assumptions

PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2.5	default

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	161.9
Number of piles within 24-h period	4
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	2400
10 Log (duration of sound production)	33.80
Propagation (xLogR)	15
Distance from source level measurement (meters)ǂ	10

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

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

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

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS isopleth to threshold (meters)	**6.0**	**0.5**	**8.8**	**3.6**	**0.3**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

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

VERSION 2.0: 2018

KEY

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

36 and 48-inch piles, vibratory driving

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	The 48-inch-diameter vibratory source level of 168.2 SPL is proxy from median received levels at 10 meters for vibratory pile driving of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Table 16).

Please include any assumptions

PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2.5	default

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	168.2
Number of piles within 24-h period	2
Duration to drive a single pile (minutes)	30
Duration of Sound Production within 24-h period (seconds)	3600
10 Log (duration of sound production)	35.56
Propagation (xLogR)	15
Distance from source level measurement (meters)ǂ	10

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

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

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

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS isopleth to threshold (meters)	**20.6**	**1.8**	**30.5**	**12.5**	**0.9**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

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

VERSION 2.0: 2018

KEY

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

30-inch piles, impact driving

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	The 30-inch-diameter impact pile driving source level of 186.7 SEL/ 198.6 SPL8 is proxy from median received levels at 10 m from impact hammering of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Tables 9 and 16).
Please include any assumptions	
PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	default

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

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

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

SEL_{cum}

Source Level (RMS SPL)	
Number of piles per day	
Strike Duration$^{\Delta}$ (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)*	

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

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

PK

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

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

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

RESULTANT ISOPLETHS*

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

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**	**#NUM!**

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

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**205.7**

SEL_{cum}

Source Level (Single Strike SEL)	186.7
Number of strikes per pile	40
Number of piles per day	2
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)*	10

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

PK

Source Level (PK SPL)	212
Distance of source level measurement (meters)*	10
Source level at 1 meter	227.0

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

RESULTANT ISOPLETHS*

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

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**327.2**	**11.6**	**389.7**	**175.1**	**12.7**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**3.4**	**NA**	**46.4**	**4.0**	**NA**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

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

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

VERSION 2.0: 2018

KEY

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

36 and 48-inch piles, impact driving

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	The 36-inch-diameter impact pile driving source level of 186.7 SEL/ 198.6 SPL8 is proxy from median received levels at 10 m from impact hammering of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Tables 9 and 16).
Please include any assumptions	
PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	default

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 75), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

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

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

SEL_{cum}

Source Level (RMS SPL)	
Number of piles per day	
Strike Duration$^{\Delta}$ (seconds)	
Number of strikes per pile	
Duration of Sound Production (seconds)	0
10 Log (duration of sound production)	#NUM!
Propagation (xLogR)	
Distance of source level measurement (meters)*	

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

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

PK

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

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

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

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

30-inch piles, vibratory driving

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!

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

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**209.7**

SEL_{cum}

Source Level (Single Strike SEL)	186.7
Number of strikes per pile	100
Number of piles per day	2
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)*	10

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

PK

Source Level (PK SPL)	212
Distance of source level measurement (meters)*	10
Source level at 1 meter	227.0

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

RESULTANT ISOPLETHS*

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

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**602.7**	**21.4**	**717.9**	**322.5**	**23.5**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**3.4**	**NA**	**46.4**	**4.0**	**NA**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

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

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

VERSION 2.0: 2018

KEY

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

36-inch piles, rock anchoring

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	Rock anchoring of 24" rock anchors for 36"-diameter piles. The rock anchoring source level of 166.2 SPL is proxy from median received levels at 10 meters from down-hole drilling of 24-inch-diameter piles to construct the Kodiak Ferry Terminal (Denes et al. 2016, Table 72).

Please include any assumptions

PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)¥	2.5	default drilling value

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	166.2
Number of piles within 24-h period	2
Duration to drive a single pile (minutes)	240
Duration of Sound Production within 24-h period (seconds)	28800
10 Log (duration of sound production)	44.59
Propagation (xLogR)	15
Distance from source level measurement (meters)ǂ	10

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

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

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

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**60.7**	**5.4**	**89.7**	**36.9**	**2.6**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

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

VERSION 2.0: 2018

KEY

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

48-inch piles, rock anchoring

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Ward Cove Cruise Ship Dock, Ketchikan, Alaska
PROJECT/SOURCE INFORMATION	Rock anchoring of 33" rock anchors for 48"-diameter piles. The rock anchoring source level of 166.2 SPL is proxy from median received levels at 10 meters from down-hole drilling of 24-inch-diameter piles to construct the Kodiak Ferry Terminal (Denes et al. 2016, Table 72).

Please include any assumptions

PROJECT CONTACT	Kate Arduser, Solstice Alaska Consulting, Inc. kate@solsticeak.com

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)¥	2.5	default drilling value

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

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

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

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	166.2
Number of piles within 24-h period	1
Duration to drive a single pile (minutes)	300
Duration of Sound Production within 24-h period (seconds)	18000
10 Log (duration of sound production)	42.55
Propagation (xLogR)	15
Distance from source level measurement (meters)ǂ	10

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

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

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

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**44.4**	**3.9**	**65.6**	**27.0**	**1.9**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

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

Appendix C. Marine Mammal Monitoring and Mitigation Plan

Marine Mammal Monitoring and Mitigation Plan

Power Systems & Supplies of Alaska
Ward Cove Cruise Ship Dock Project
Ward Cove, Ketchikan, Alaska

Submitted July 2019
Revised October 2019
Revised December 12, 2019
Revised December 18, 2019
Revised December 31, 2019
Revised January 22, 2020
Revised February 4, 2020

Prepared for:
Power Systems & Supplies of Alaska
6841 North Tongass Hwy
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Prepared by:

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Submitted to:
National Marine Fisheries Service

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ACRONYMS AND ABBREVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
ESA	Endangered Species Act
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
OPR	Office of Protected Resources (NMFS)
PSO	protected species observer
USACE	U.S. Army Corp of Engineers
USFWS	U.S. Fish and Wildlife Service

UPDATE: Protected Species Observer #1 will not be located at the head of Ward Cove as shown in some figures in the plan. Instead, the PSO would be on the construction barge with a clear view of Ward Cove.

1 INTRODUCTION

Power Systems & Supplies of Alaska proposes the following Marine Mammal Monitoring and Mitigation Plan (4MP) for use during pile installation to construct a dock in Ward Cove approximately eight kilometers (five miles) north of downtown Ketchikan, Alaska. The project is in waters of the U.S., within the range of the Endangered Species Act (ESA) listed Mexico distinct population segment of humpback whales and nine Marine Mammal Protection Act (MMPA)-listed marine mammals, and has the potential to generate noise that could exceed Level A and B harassment thresholds established by the National Marine Fisheries Service (NMFS). Monitoring and shutdown zones will be implemented to prevent Level A and Level B impacts to all marine mammals except harbor seals.

The purpose of this plan is to prevent impacts to marine mammals by prescribing how mitigation measures and construction techniques will be employed, outlining the duties of the Protected Species Observers (PSOs), and summarizing reporting requirements. The plan uses a combination of marine mammal monitoring, soft-starts, shutdowns, and species data collection and reporting to comply with the permits and authorizations required to construct this project.

Figure 1. Location of Proposed Cruise Ship Dock in Ward Cove

Figure 2. Photo of Project Site

Photo Credit: Ward Cove Group as published in Alaska Journal of Commerce June 2013.

2 PERMITS AND AUTHORIZATIONS

The project will comply with the required terms and conditions outlined in the following requested permits and authorizations:

- U.S Army of Engineers (USACE) Permit (DA Permit) POA-2019-00313, Ward Cove Cruise Ship Dock Project for activities in Waters of the U.S.;
- NMFS Alaska Region Protect Resources Division ESA Section 7 Informal Consultation;
- NMFS Office of Protected Resources (OPR) Incidental Harassment Authorization (IHA) for Level B take of harbor seals (requested).

3 EXPECTED SPECIES AND TAKE REQUESTED

The species that may occur in the project area are shown in Table 1. Shutdowns will be implemented to avoid take of all species except harbor seals.

Table 1. Species that May Occur in Project Area

Minke Whale (*Balaenoptera acutorostrata*)
Humpback Whale (*Megaptera novaeangliae*)
Gray Whale (*Eschrichtius robustus*)
Killer Whale (*Orcinus orca*)
Pacific White-Sided Dolphin (*Lagenorhynchus obliquidens*)
Dall's Porpoise (*Phocoenoides dalli*)
Harbor Porpoise (*Phocoena phocoena*)
Harbor Seal (*Phoca vitulina*)
Steller Sea Lion (*Eumatopia jubatus*)
Northern Sea Otter (*Enhydra lutris*)

4 SHUTDOWN ZONES

Because species are impacted by noise in different ways, species-specific shutdown zones have been calculated for this project employing NMFS's *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* and *User Spreadsheet*. Where landforms, like the shores of Revillagigedo Island and Gravina Island, stop underwater noise transmission, shutdown zones are based on the truncated distance and are smaller than their calculated distances. Calculated distanced are described in Section 4.1 and shutdown zones are described in Section 4.2.

4.1 Calculated Distance to Shutdown Zones

The calculated distances to the Level B thresholds are shown in Table 2. For NMFS-managed species, Level B shutdown zones represent areas where received noise levels from pile driving activities meet or exceed 120 dB during vibratory pile driving and rock anchoring, and 160 dB during impact pile driving. For U.S. Fish and Wildlife Service (USFWS) managed northern sea otters, Level B shutdown zones represent areas where received noise levels from pile driving activities meet or exceed 160 dB during all pile driving activities.

Table 2. Calculated Distances to Level B Shutdown Zones

Source	Level B other NMFS-managed species (m)	Level B northern sea otter (m)
Vibratory Pile Driving/Removal		
30-inch steel installation and removal	6,213	13
36-inch and 48-inch steel installation	16,343	35
Impact Pile Driving		
30-inch, 36-inch and 48-inch steel installation	3,744	3,744
Rock Anchor Installation		
33-inch anchor for 36-inch and 48-inch steel piles	12,023	26

4.2 Shutdown Zones

Power Systems & Supplies of Alaska's contractor will monitor different shutdown zones depending on species and the type of construction activity that is occurring. Shutdown zones for this project include a 10- meter shutdown zone for all in-water activity and truncated distances to the Level B thresholds for pile installation activities. The shutdown zones for the project are presented in Table 3.

Table 3. Shutdown Zones to be Implemented under this plan

Source	Level A harbor seals (m)	Level B harbor seals [1] (m)	Level B other NMFS-managed species (m)	Level B northern sea otter (m)
In-Water Construction Activities [2]				
Barge movements, pile positioning, sound attenuation placement	10	10	10	10
Vibratory Pile Driving/Removal				
30-inch steel installation and removal	10	0	3,645	35
36-inch and 48-inch steel installation	15	0	3,645	35
Impact Pile Driving				
30-inch, 36-inch and 48-inch steel installation	200	0	3,645	3,645
Rock Anchor Installation				
33-inch anchor for 36-inch and 48-inch steel piles	40	0	3,645	35

Shutdown zones are rounded up to the nearest 5 meters.

[1] Level B take of harbor seals authorized; therefore, shutdowns within level B zone not required

[2] Although acoustic injury is not the primary concern with these activities, shutdowns will be implemented to avoid impacts to species.

5 METHODS

Power Systems & Supplies of Alaska, their contractor, and qualified PSOs will work together to implement construction mitigation methods, marine mammal monitoring and reporting, and shutdowns to prevent impacts to marine mammals.

The contractor will submit a Pre-Construction Notification to NMFS 10 days prior to initiating pile driving activities. The contractor will employ construction mitigation measures including driving all piles with a vibratory hammer to the maximum extent possible prior to using an impact hammer, and using soft-starts and pile caps for pile driving.

Four land based PSOs will be employed for marine mammal monitoring and will be present during all in-water work. PSOs will continuously scan the shutdown zones outlined in this plan and ensure shutdown zones are clear of marine mammals prior to in-water construction. PSOs will collect data including environmental conditions, marine mammal sightings and behavior, and construction activity at the time of sightings and will relay data to the contractor and Power Systems & Supplies of Alaska for reporting. If a marine mammal is observed approaching a shutdown zone, the PSOs will contact the contractor to shutdown construction activity.

Land based PSOs will be located at stations that allow them to clearly view the shutdown (and harbor seal monitoring) zones for marine mammals. These PSO stations and shutdown and monitoring zones are shown on Figures 3-7.

Figure 3. Ward Cove Cruise Ship Marine Mammal Monitoring and Shutdown Zones Locations

Activity	Shutdown Zone (m) [a]	Species
Barge movements, pile positioning, sound attenuation placement	10	All
Vibratory 30 inch	10	Harbor Seals
Vibratory 48 inch	15	Harbor Seals
Vibratory and Rock Anchor	35 [a]	Sea Otters
Rock Anchor	40	Harbor Seals
Vibratory, Impact, Rock Anchor	200 [b]	Harbor Seals
Offshore Mooring Dolphins Impact	3,645	Sea Otters
Trestle Impact	3,645	Sea Otters
Offshore Mooring Dolphins Vibratory, Impact, Rock Anchor	3,645	All Marine Mammals, Except Harbor Seals and Sea Otters
Trestle Vibratory, Impact, Rock Anchor	3,645	All Marine Mammals, Except Harbor Seals and Sea Otters
Impact	325 monitoring	Monitoring for Level A take of harbor seals

[a] 10, 15, and 40 m shutdown zones not distinguished to scale
[b] Level A harassment zone for impact driving extends to 325 meters; however, shutdown will occur at 200 meters

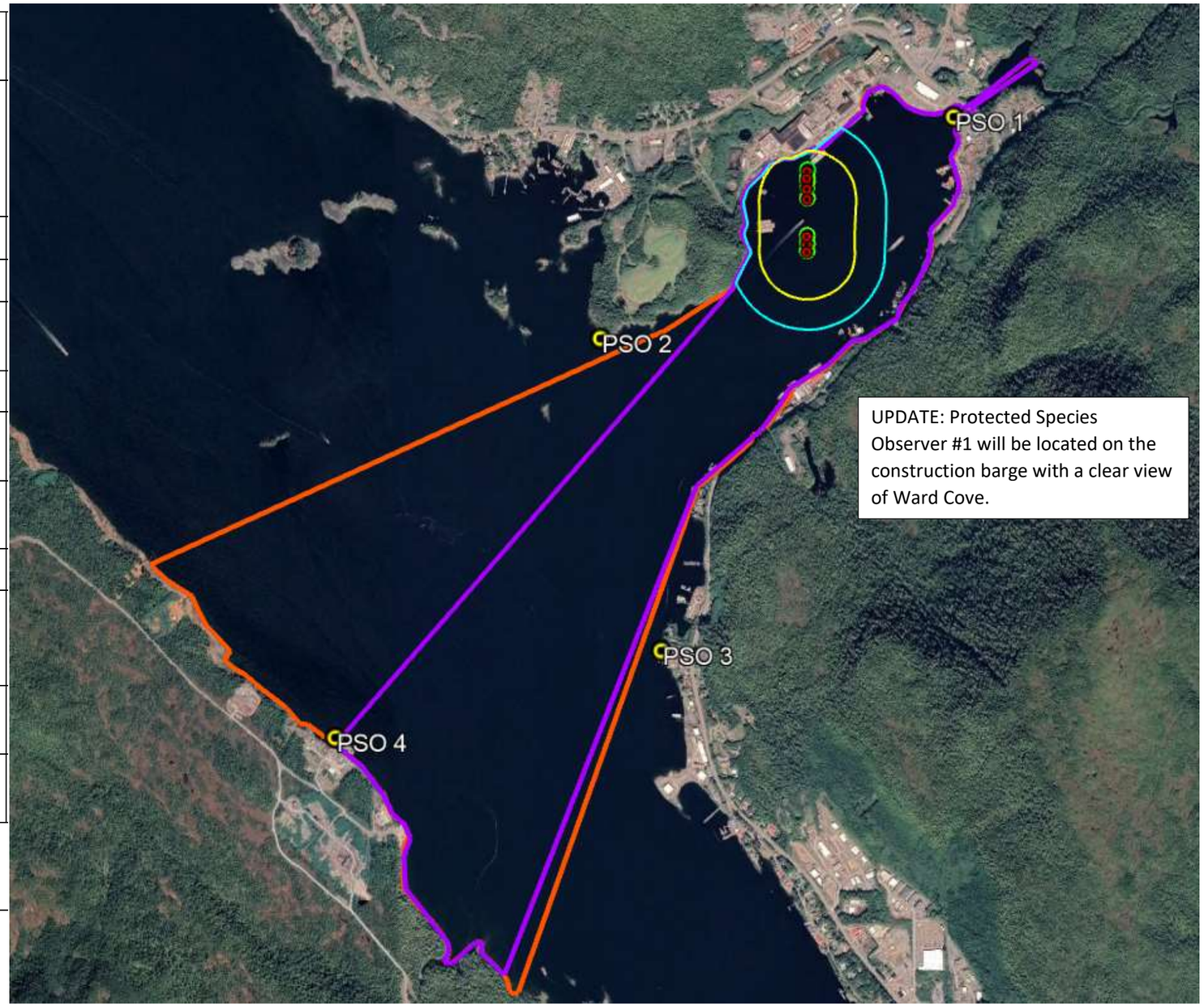


Figure 4. View of Ward Cove and Tongass Narrows from PSO Station 1

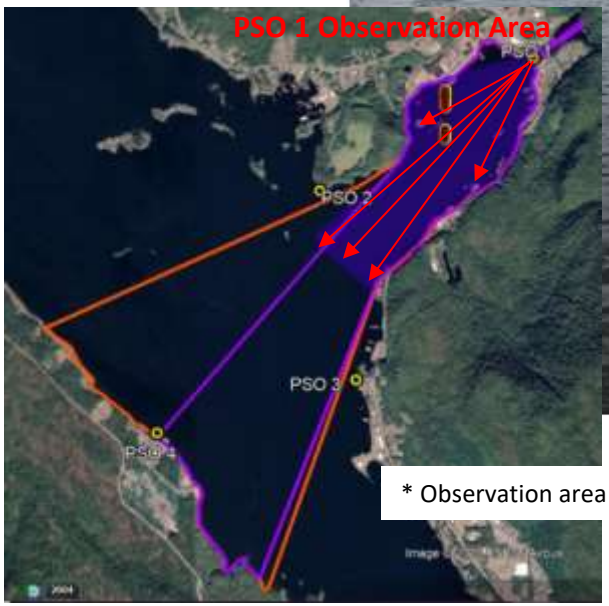


Figure 5. PSO Station 1 Observation Area (blue shaded area) *** in Relation to the Action Area** (orange and purple lines)

* Observation area defined as the area where the PSO has a clear line of sight up to 2,000 meters.

Figure 6. View of Ward Cove and Tongass Narrows from PSO Station 2 near "The Cross"

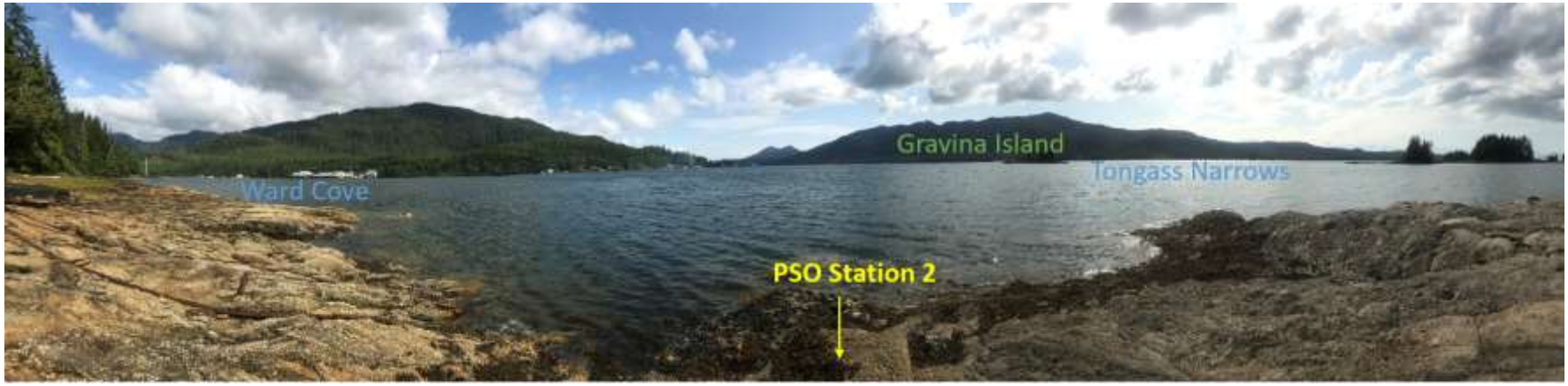
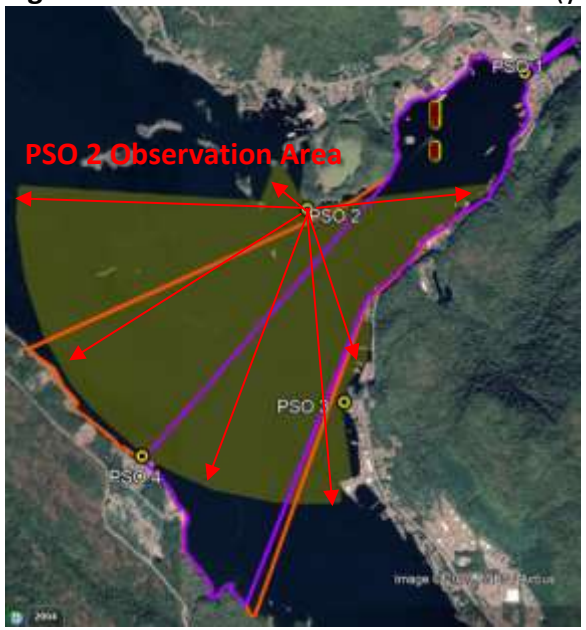


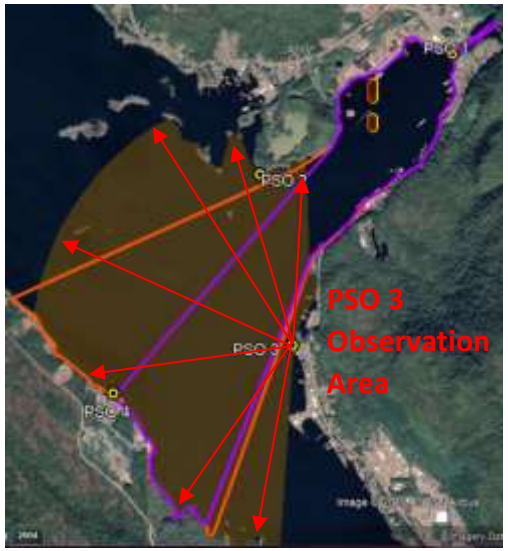
Figure 7. PSO Station 2 Observation Area (yellow shaded area)*** in Relation to the Action Area** (orange and purple lines)



* Observation area defined as the area where the PSO has a clear line of sight up to 2,000 meters.

Figure 8. View of Ward Cove and Tongass Narrows from PSO Station 3 above Murphy's Seaplane Base

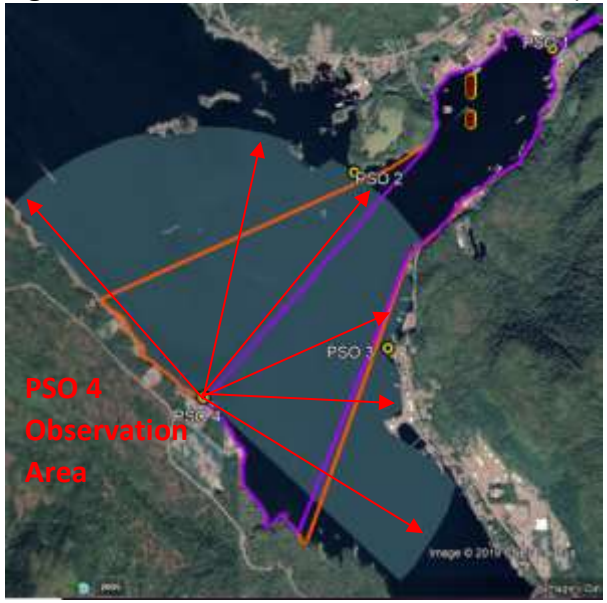
Figure 9. PSO Station 3 Observation Area (yellow shaded area)*** in Relation to the Action Area** (orange and purple lines)



* Observation area defined as the area where the PSO has a clear line of sight up to 2,000 meters.

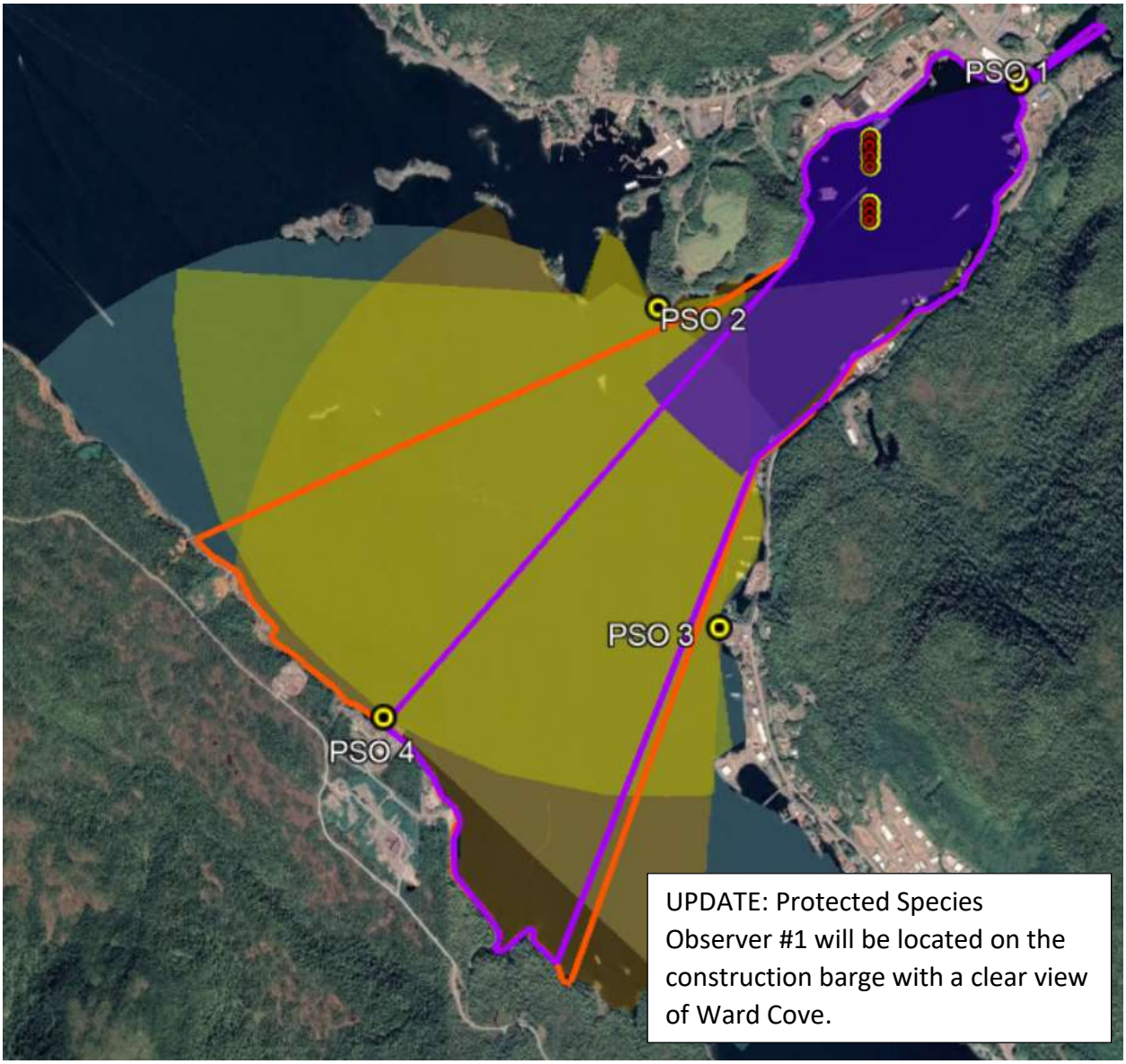
Figure 10. View of Ward Cove and Tongass Narrows showing PSO Station 4 at the Ketchikan Gateway Borough Dock on Gravina Island

Figure 11. PSO Station 4 Observation Area (blue shaded area)* **in Relation to the Action Area** (orange and purple lines)



* Observation area defined as the area where the PSO has a clear line of sight up to 2,000 meters.

Figure 12. Ward Cove Cruise Ship Protected Species Observer Stations' Observation Areas (shaded areas)* **in Relation to the Action Area** (orange and purple lines)



* Observation area defined as the area where the PSO has a clear line of sight up to 2,000 meters.

6 MITIGATION MEASURES

In order to prevent impacts to marine mammals, the contractor will implement the following mitigation measures during pile driving activities.

6.1 General Conditions

- To minimize noise during impact pile driving, pile caps (pile softening material) will be used. Much of the noise generated during pile installation comes from contact between the pile being driven and the steel template used to hold the pile in place. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel on steel noise generation.

- To minimize impact to marine mammals, a "soft start" technique will be used when impact pile driving with an initial set of three strikes from the impact hammer at 40 percent energy, followed by a one-minute waiting period, then two subsequent 3-strike sets.

6.2 Visual Monitoring by PSOs

6.2.1 General requirements – visual monitoring

- Power Systems & Supplies of Alaska's contractor, through the use of NMFS-approved PSOs, will monitor for the presence and behavior of marine mammals prior to, during, and after all pile driving and removal.

- All work will be performed during daylight hours to allow for visual monitoring. Pile driving activities will not be conducted when weather conditions or darkness do not allow for observation of all waters within the shutdown zones.

- If an environmental factor, water conditions, or sea state restricts the observers' ability to make observations within the marine mammal shutdown zone, pile driving activities will cease. Pile driving activities will not be initiated or continue until the entire largest shutdown zone for the activity is visible.

- To aid in observing, determining the location of, and communicating the presence of protected species within the action area, PSOs will have the following supplies:
    - binoculars
    - range finder
    - GPS
    - compass
    - two-way radio communication with construction foreman/superintendent
    - log book to record all activities that may be submitted to agencies (NMFS, USACE) upon request

- Power Systems & Supplies of Alaska's contractor will conduct briefings between construction supervisors and crews, the marine mammal monitoring team, and Power Systems & Supplies of Alaska staff prior to the start of all pile driving activities and when

new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

- Each day prior to commencing pile driving activities, the lead PSO will conduct a radio check with the construction foreman or superintendent to confirm the activities and zones to be monitored that day. The construction foreman and lead PSO will maintain radio communications throughout the day so that the PSOs may be alerted to any changes in the planned construction activities and zones to be monitored.

- On-shift PSOs will have no other primary duties than to watch for and report on events related to marine mammals during monitoring periods.

- PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break between shifts, and will not perform duties as a PSO for more than 12 hours in a 24-hour period (to reduce PSO fatigue).

- Pre-activity monitoring: PSOs will scan for the presence of marine mammals for 30 minutes before any pile driving activities take place for the day or if more than 30 minutes has elapsed in absence of pile activity.
    - If the shutdown zones have been observed to be clear of marine mammals for 30 minutes, pile driving activities may commence.
    - If any marine mammals are present within a shutdown zone, pile driving activities will not begin until the animal(s) has left the shutdown zone or has not been observed in the shutdown zone for 15 minutes.

- For all pile driving activities and in-water heavy machinery work, Power Systems & Supplies of Alaska's contractor will implement the appropriate shutdown and monitoring (Table 2) around the pile or work zone. If a marine mammal approaches the shutdown zone, such operations will cease.

- For in-water heavy machinery and construction work other than pile driving (e.g., barge movements, pile positioning, dead-pulling, and sound attenuation), a minimum 10 meter shutdown zone will be implemented. If a marine mammal comes within 10 meters of such operations, operations will cease and vessels will reduce speed to the minimum level required to maintain steerage and safe working conditions.

- After a shutdown occurs, pile driving activities will only begin after the animal is observed leaving the shutdown zone or has not been observed for 15 minutes after the commencement of the shutdown.

- If waters exceed a sea state that restricts the observers' ability to make observations within the marine mammal shutdown zones, pile driving activities will cease. Pile driving

activities will not be initiated or continue until the entire largest shutdown zone for the activity is visible.

- Throughout all pile driving activity, the PSOs will continuously scan the shutdown and harbor seal monitoring zones to monitor for marine mammal presence or approach.
    - If any marine mammals enter, or appear likely to enter, their respective shutdown zones during pile driving activities, all pile driving activities will cease immediately. Pile driving activities may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, pile-driving activity may begin 15 minutes (pinnipeds) and 30 minutes (cetaceans) after the animal is last observed in the area.

- Post-construction monitoring will be conducted for 30 minutes beyond the cessation of pile driving activities at the end of the day.

6.2.2 Number and location of PSOs

Four PSOs will work from monitoring stations that have been selected to provide an unobstructed view of all water within the shutdown zones (Figure 3).

- Four (4) PSOs will be employed during all pile driving activities. One PSO will be posted at each station listed below (Figure 3):
    - PSO #1: stationed near the site of pile driving (Figure 4);
    - PSO #2: stationed at the point on the north side of Ward Cove (near "The Cross") (Figure 5);
    - PSO #3: stationed at the pull-off of North Tongass Highway above Murphy's Seaplane Base (Figure 6);
    - PSO #4: stationed at the Ketchikan Gateway Borough Dock on Gravina Island across Tongass Narrows from Ward Cove (Figure 7).

6.2.3 PSO Qualifications

Power Systems & Supplies of Alaska and their contractor will adhere to the following conditions when selecting PSOs:

- Independent PSOs will be used (i.e., not construction personnel).
- Power Systems & Supplies of Alaska will submit the curriculum vitae (CV) of all observers to NMFS (name to be determined) prior to the PSOs starting work.
- At least one PSO must have prior experience working as a marine mammal observer during construction activities.
- Other PSOs may substitute education (degree in biological science or related field) or training for experience.
- One observer will be designated as lead observer or monitoring coordinator. The lead observer will have prior experience working as an observer.
- Power Systems & Supplies of Alaska and their contractor will ensure that observers have the following additional qualifications:

- 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; use of binoculars may be necessary to correctly identify the target;
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times and reasons for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior;
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary; and
- Sufficient training, orientation, or experience with the construction operations to provide for personal safety during observations.

6.3 Reporting

6.3.1 Notification of intent to commence construction

Power Systems & Supplies of Alaska will inform NMFS OPR and the NMFS Alaska Region Protected Resources Division (names to be determined) 10 days prior to commencing construction activities.

6.3.2 Daily activity logs

For each day of construction activity that requires a PSO, the following information will be recorded in a log provided by Power Systems & Supplies of Alaska:

1. Date and time that each monitoring period[1] begins and ends;

2. Prevailing environmental conditions in each monitoring period (e.g., wind speed, percent cloud cover, visibility, sea state, tide state);

3. Construction activities occurring during each monitoring period, including how many and what size of piles were driven; and

4. Indication of whether marine mammals were sighted. For each marine mammal sighting, the PSO will complete a "Marine Mammal Sighting Form" as described below, and shown in Appendix A.

[1] There may be several monitoring periods within a day. If environmental conditions change throughout the day, the PSO should record a new monitoring period to reflect those changes. A new monitoring period will also begin after each break in construction activity.

6.3.3 Marine Mammal Sighting Form

Each marine mammal sighting will be recorded on a "Marine Mammal Sighting Form." The PSO will record the following information:

- Species, numbers, and, if possible, sex and age class of marine mammals;
- Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
- Location and distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- Time and description of most recent project activity prior to marine mammal observation;
- Environmental conditions as they existed during each sighting event, including, but not limited to: Beaufort sea state, weather conditions, visibility (km), lighting conditions;
- Description of implementation of mitigation measures, if required, within each monitoring period (e.g., shutdown or delay);
- Other human activity in the area within each monitoring period.

6.3.4 Interim monthly reports

During construction, Power Systems & Supplies of Alaska will submit brief, monthly reports to NMFS OPR (name to be determined) and NMFS Alaska Region Protected Resources Division that summarize PSO observations and recorded unauthorized takes, if they occur. The monthly reports will be submitted by email to a NMFS representative (to be named).

The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by close of business on the fifth working day of the month following the end of the reporting period.

6.3.5 Final report

Power Systems & Supplies of Alaska will submit a draft final report by email to NMFS OPR (name to be determined) and NMFS AKR Protected Resources Division (name to be determined) not later than 90 days following the end of construction activities. Power Systems & Supplies of Alaska will provide a final report within 30 days following resolution of NMFS's comments on the draft report. If no comments are received from NMFS within 30 days, the draft final report will be considered the final report.

The final reports will contain, at minimum, the following information:

- Summary of construction activities, including beginning and completion dates;
- Description of any deviation from initial proposal in pile numbers, pile types, average driving times, etc.;
- Table summarizing all marine mammal sightings during the construction period including:
  a. dates, times, species, number, location, and behavior of any observed marine mammals;
  b. daily average number of individuals of each species (differentiated by month as appropriate) observed and estimated as taken, if appropriate;
- Number of shut-downs throughout all monitoring activities;
- Table summarizing any incidents resulting in unauthorized take of marine mammals;

- Brief description of any impediments to obtaining reliable observations during construction period;
- Description of any impediments to complying with these mitigation measures; and
- Appendices containing all PSO daily logs and marine mammal sighting forms.

6.3.6 Reporting Injured or Dead Marine Mammals

If it is clear that project activity has caused the take of any marine mammal, Power Systems & Supplies of Alaska's contractor will immediately cease the specified activities and report the incident to NMFS AKR Protected Resources Division and the NOAA Fisheries statewide 24-hour Stranding Hotline (877) 925-7773.

The report must include the following:

- Time and date of the incident;
- Description of the incident;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and;
- Photographs or video footage of the animal(s) (if available).

Activities will not resume until NMFS is able to review the circumstances of the unauthorized take. NMFS would work with Power Systems & Supplies of Alaska and their contractor to determine what measures are necessary to minimize the likelihood of further unauthorized take and ensure ESA and MMPA compliance. Power Systems & Supplies of Alaska's contractor will not resume their activities until notified by NMFS.

In the event that Power Systems & Supplies of Alaska or their contractor discovers an injured or dead marine mammal and the lead PSO 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, or scavenger damage), Power Systems & Supplies of Alaska will report the incident to the NMFS AKR Protected Resources Division and the NMFS Alaska Regional Stranding Coordinator or Hotline within 24 hours of the discovery. The report will include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with Power Systems & Supplies of Alaska to determine whether additional mitigation measures or modifications to the activities are appropriate.

6.4 Strike Avoidance

Vessels will adhere to the Alaska Humpback Whale Approach Regulations when transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). These regulations require that all vessels:

- Not approach within 100 yards of a humpback whale, or cause a vessel or other object to approach within 100 yards of a humpback whale,

- Not place vessel in the path of oncoming humpback whales causing them to surface within 100 yards of vessel,
- Not disrupt the normal behavior or prior activity of a whale, and
- Operate at a slow, safe speed when near a humpback whale (safe speed is defined in regulation (see 33 CFR § 83.06)).

Vessels will also follow the NMFS Marine Mammal Code of Conduct for other marine mammal species, which recommend maintaining a minimum distance of 100 yards; not encircling, or trapping marine mammals between boats, or boats and shore; and putting engines in neutral if approached by a whale or other marine mammal to allow the animals(s) to pass.

Appendix A.

Marine Mammal Sighting Forms

MARINE MAMMAL OBSERVATION RECORD

Project Name:

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.	Sighting Cue	Species	Group Size	Behavior Code (see code sheet)	Construction Type	Mitigation Type	Exposure (Y/N)	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		

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 considers 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.

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
HAPO	Harbor Porpoise
DAPO	Dall's Porpoise
MINK	Minke Whale
ORCA	Killer Whale

Construction Type

Code	Activity Type
V	Vibratory Pile Driving
I	Impact Pile Driving
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

Appendix D. Ward Cove Cruise Ship Dock Project Essential Fish Habitat Assessment

Essential Fish Habitat Assessment

Power Systems & Supplies of Alaska
Ward Cove Cruise Ship Dock Project
Ward Cove, Ketchikan, Alaska

January 2020

Prepared for:
Power Systems & Supplies of Alaska and
Ward Cove Dock Group, LLC.
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Submitted to:
National Marine Fisheries Service

TABLE OF CONTENTS

TABLES

FIGURES

1 INTRODUCTION

Power Systems & Supplies of Alaska is proposing to construct a cruise ship dock in Ward Cove approximately eight kilometers (five miles) north of downtown Ketchikan, Alaska. The new dock would allow cruise ships to safely transit Tongass Narrows and provide them safe harbor in Ward Cove while relieving vessel, pedestrian, and vehicle congestion in downtown Ketchikan. Construction, which includes the installation of piles to support a new 500-foot by 70-foot floating pontoon dock, mooring structures, and a shore-access transfer span and trestle, would begin in January 2020 and be completed in June 2020. No fill, dredging, or blasting is proposed as part of this project.

Historically, Ward Cove has supported the Ketchikan Pulp Mill, Co. from 1954 until its closure in 1997, a sawmill, and fish processing plant (Kiffer 2017). Since the closure of the pulp mill the Environmental Protection Agency (EPA) has completed sediment cleanup of the area after years of mill effluent being dumped into the cove (EPA 2000). Ward Cove is now being redeveloped into an industrial park and the proposed cruise ship dock would be installed adjacent to decommissioned structures associated with the pulp mill.

This assessment of Essential Fish Habitat (EFH) for the Ward Cove Cruise Ship Dock Project is being provided in compliance with The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104- 267). The 1996 amendment established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan (FMP). Section 305(b)(2) of the Magnuson-Stevens Act requires Federal action agencies to consult with NOAA's National Marine Fisheries Service (NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

The proposed cruise ship dock in Ward Cove is located within an area designated as EFH and the below assessment satisfies all EFH consultation requirements.

2 PROJECT PURPOSE

The purpose of this project is to construct a dock that accommodates larger cruise ships and their passengers outside of downtown Ketchikan. This project is needed to improve safe transit through Tongass Narrows, provide safe harbor for large cruise ships, and relieve existing and future vessel, pedestrian, and vehicle congestion in the Port of Ketchikan and downtown Ketchikan.

Ketchikan is one of the main ports-of-call for cruise ships in Alaska (Moffatt & Nichol/ LandDesign 2016, City of Ketchikan Ports & Harbors 2019). Currently up to six ships visit Ketchikan daily between May and September, and this number is expected to increase. According to projections from the Cruise Lines International Association (CLIA), cruise ship tourism is estimated to increase by about 16 percent in 2019 over 2018 numbers.

Not only will more ships land in Ketchikan, the ships will be larger. The "Very Large Cruise Ships" (VLCS, also referred to as Neo Panamax, mega cruise ships, and megaships), which carry 4,000-5,000 passengers, began visiting Alaska in 2019 and carry up to twice as many passengers as other ships. According to a January 2019 presentation to the Ketchikan City Council, a fifth berth may be needed to accommodate the future demand and the community needs to evaluate its capacity to handle the future load.

All of the cruise ships visiting Ketchikan currently land downtown at the Port of Ketchikan in Tongass Narrows. With up to six ships landing a day, this causes congestion in the Port and in Tongass Narrows. To dock at the busy there, cruise ships must transit and maneuver very slowly in a very busy section of Tongass Narrows. These ships can be difficult to maneuver at slow speeds making transiting in the Narrows difficult. The Southeast Alaska Pilots Association conducted research relevant to the VLCS operational guidelines for Southeast Alaska. Their recommendations to Captain White of the Coast Guard Sector Juneau highlight vessel congestion in Tongass Narrows and recommend fewer large vessels in Port area.

On a heavy ship day, Ketchikan can host more than 15,000 visitors in a town of approximately 8,300 residents. As the ships get larger and accommodate more passengers, that may increase to 20,000 visitors in a day. All of the cruise ships visiting Ketchikan currently land downtown. When the passengers disembark, they often head out for excursions or walk around downtown. There is considerable vessel, pedestrian, and vehicle congestion in downtown Ketchikan during periods when cruise ships are docked.

3 PROPOSED ACTION

3.1 PROJECT LOCATION

The proposed cruise ship dock is located in Ward Cove, located on the north side of Tongass Narrows, approximately eight kilometers (five miles) north of Ketchikan, in Southeast Alaska; Township 74S, Range 90E, Sections 33 and 34, Copper River Meridian, USGS Quadrangle Juneau A5 NE; latitude 55.4037 and longitude -131.7316 (Figure 1-3). Tongass Narrows are part of Alaska's Inside Passage, a route for ships through Southeast Alaska's network of islands.

Figure 1. Ward Cove Cruise Ship Dock Project Location

Figure 2.Location of Proposed Cruise Ship Dock

Figure 3. Photo of Project Site (Photo Credit: Ward Cove Group 2013)

3.2 CONSTRUCTION DETAILS

The proposed project would include the installation of piles to support a new 500-foot by 70-foot floating pontoon dock, mooring structures, and shore-access transfer span and trestle (Table 1-2 and Figure 4). The project would:

- Install 48 temporary 30-inch-diameter steel piles as templates to guide proper installation of permanent piles (these temporary piles would be removed prior to project completion);
- Install 14 permanent 30-inch-diameter piles, 20 permanent 36-inch-diameter piles, and 20 permanent 48-inch diameter piles to support a new 500-foot by 70-foot floating pontoon dock mooring structures, catwalks, and shore-access transfer and 450-foot by 20-foot trestle (Table 1-2 and Figure 4)
- Install dock components such as bull rail, floating fenders, mooring cleats, vehicle driveway, curb, passenger walkway, hand rail, and mast lights. (Note: these components would be installed out of the water.)

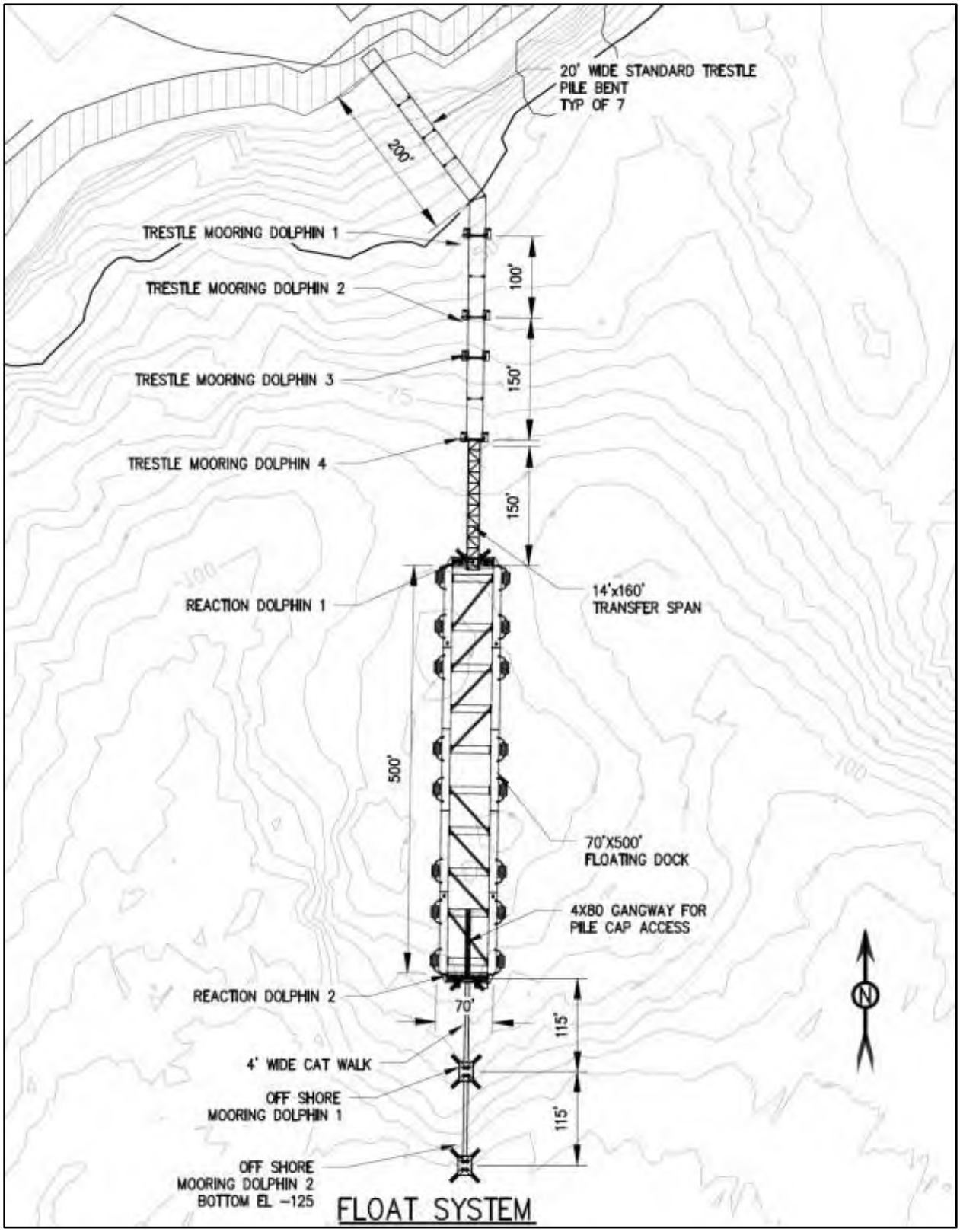
Table 1. Ward Cove Construction Components

Construction Component	Material	Dimensions (feet)	Distance Above Mean High Water (feet)
Trestle	Treated Timber Decking (slated)	450 x 20	25
Transfer Span	Fiberglass Decking (slated)	16 x 14	0-25
Floating Dock	Painted Steel Pontoons with Treated Timber Decking (slated)	500 x 70	32
Catwalks (x2)	Fiberglass Decking (slated)	115 x 4	29
Piles	Galvanized Steel	See Table 2	N/A

Table 2. Ward Cove Cruise Ship Dock Pile Installation and Removal Summary

Description	Project Component				
	Temporary Pile Installation	Temporary Pile Removal	Permanent Pile Installation	Permanent Pile Installation	Permanent Pile Installation
Diameter of Steel Pile (inches)	30	30	30	36	48
# of Piles	48	48	14	20	20
Vibratory Pile Driving					
Total Quantity	48	48	20	15	20
Max # Piles Vibrated per Day	4	4	4	2	2
Vibratory Time per Pile	10 min	10 min	10 min	30 min	30 min
Vibratory Time per Day	40 min	40 min	40 min	60 min	60 min
Number of Days (48 days)	12	12	4	10	10
Vibratory Time Total (38 hours 20 min)	8 hours	8 hours	2.33 hours	10 hours	10 hours
Impact Pile Driving					
Total Quantity	0	0	14	20	20
Max # Piles Impacted per Day	0	0	2	2	2
# of Strikes per Pile	0	0	40	100	100
Impact Time per Pile	0	0	1 min	2.5 min	2.5 min
Impact Time per Day	0	0	2 min	5	5 min
Number of Days (27 days)			7	10	10
Impact Time Total (1 hour 54 minutes)	0	0	14 min	50 min	50 min
Rock Anchor Installation (Drilled Shaft)					
Total Quantity	0	0	0	20	20
Anchor Diameter	--	--	--	33”	33”
Max # Piles Anchored per Day	0	0	0	2	1
Anchor Time per Pile	0	0	0	4 hours	5 hours
Anchor Time per Day	0	0	0	8 hours	5 hours
Number of Days (30 days)				10 days	20 days
Anchor Time Total (180 hours)	0	0	0	80 hours	100 hours

Figure 4. Proposed Ward Cove Dock



3.2.1 Pile Installation Equipment

The following pile installation equipment is expected to be used:

- Vibratory Hammer: ICE 44B/Static weight 12,250 pounds
- Diesel Impact Hammer: Delmag D46/Max Energy 107,280 feet-pounds
- Drilled shaft drill: Holte 100,000 feet-pounds top drive with down-the-hole hammer and bit

3.2.2 Pile Installation Methods

Installation and Removal of Temporary (Template) Piles

Temporary 30-inch-diameter piles would be installed and removed using a vibratory hammer.

Installation of Permanent Piles

The permanent 30-inch-diameter trestle piles would be installed through sand and gravel with a vibratory hammer and impact hammer. The permanent 36-inch and 48-inch-diameter piles would be driven through sand and gravel with a vibratory hammer and then impact driven into bedrock. After being impacted, the pile would be rock anchored. To rock anchor the pile a down-the-hole hammer with a 33-inch-diameter bit would be used to drill a shaft into the bedrock. The drill bit will be removed and the shaft will be filled with vertical reinforcement (a rebar cage) in concrete to secure the pile. The depth of the shaft will be determined by a geotechnical engineer prior to construction. During anchor drilling the pile is not touched by the drill and no steel-on-steel hammer sound is generated.

3.2.3 Construction Vessels

The following vessels are expected to be used to support construction:

- One material barge (approximately 250 ft by 76 ft x 15.5 ft) to transport materials from Washington to the project site and to be used onsite as a staging area during construction.
- One construction barge (crane Barge 280 ft by 76 ft by 16 ft) to transport materials from Washington to the project site and to be used onsite to support construction.
- 1 skiff (25-foot skiff with a 125–250 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Ketchikan to support construction activities.
- 1 skiff (25-35-foot skiff powered with a 35-50 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Ketchikan to support PSO efforts.

3.2.4 Construction Sequence

In-water construction of the cruise ship dock would begin with installation of an approximately 650-foot-long trestle. Once the trestle is constructed, dolphins will be constructed. Trestle and dolphin construction will use the following sequence:

1) Vibrate 32 temporary 30-inch-diameter piles for the trestle, and 16 temporary 30-inch-diameter piles for the dolphins, a minimum of ten feet into overburden to create a template to guide installation of permanent piles.
2) Weld a frame around the temporary piles.
3) Within the frame, vibrate and impact permanent 30-inch-diameter piles into place for the trestle; or vibrate, impact, and rock anchor permanent 36-inch or 48-inch-diameter piles into place for the dolphins.
4) Remove the frame and temporary piles.
5) Perform this sequence at the seven trestle bent locations, working farther from the shoreline each sequence. Once the trestle is completed perform this sequence at the eight dolphin locations, completing one dolphin before beginning another.

After all piles are installed, construction will proceed with installation of the floating dock, transfer span, trestle, mechanical systems, and other above-water components like the vehicle driveway, passenger walkway, and mast lights.

Please see Table 2 for a conservative estimate of the amount of time required for pile installation and removal.

3.2.5 Other In-water Construction and Heavy Machinery Activities

In addition to the activities described above, the proposed action will involve other in-water construction and heavy machinery activities. Examples of other types of activities include using standard barges, tug boats, or clamshell equipment to place or remove material (including submerged logs); and positioning piles on the substrate via a crane (i.e., “stabbing the pile”).

4 AFFECTED ESSENTIAL FISH HABITAT

EFH is defined by the Magnuson-Stevens Fishery Conservation and Management Act as those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity. Section 305(b)(2) of the Magnuson-Stevens Act requires Federal action agencies to consult with National Oceanic and Atmospheric Administration (NOAA) NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

4.1 AFFECTED HABITAT

Tongass Narrows and Ward Cove are designated as EFH under the Magnuson Stevens Fisheries and Conservation Management Act for all 5 species of Pacific salmon and 15 species of groundfish (NMFS 2019, NOAA 2019). Alaska Department of Fish and Game (ADFG) and NMFS have also identified Pacific herring and Pacific halibut as important in the project area (HDR 2017). Additionally, ENSR Consulting and Engineering listed forty-one (41) fish species within the vicinity of Ward Cove and other sources have identified that as many as 75 non-salmonid species may occur within Ward Cove (EPA 2003). EFH listings are summarized in Tables 4 and 5.

In addition to the marine habitat in Tongass Narrows and Ward Cove, several fish streams listed as anadromous by ADFG are located in the project action area. ADFG's Alaska Fish Resource Monitor mapper identifies waterbodies in Alaska that are important to the spawning, rearing, or migration of anadromous fish (ADFG 2019). Table 3 identifies the anadromous waters near the project action area.

4.1.1 Tongass Narrows and Ward Cove

Tongass Narrows is a U-shaped glacier-carved fjord that varies between 300 meters (0.2 mile) to 2.4 kilometers (1.5 miles) wide and 15 meters (50 foot) to 55 meters (180 foot) deep (ADEC 2017, NOAA 2019). Water temperatures in the Narrows range from 12.7 to 16.6° centigrade (C) with an average of 15° C (ADEC 2017). Tongass Narrows is known for strong tidal currents and unusually large tidal ranges of 8 meters (25 foot) or more (Pentec 2001). The Narrows are characterized by steep bedrock or coarse gravel-cobble-boulder shoreline. Lower intertidal and shallow subtidal areas are often sandy or mixed gravel, sand, and shell with varying amounts of silt (HDR 2017). The Narrows are part of Alaska's Inside Passage, a route for ships through Southeast Alaska's network of islands.

Ward Cove is a small estuary with an area of approximately 1 square kilometer (0.4 square mile) located off the western coast of Revillagigedo Island and on the North Shore of Tongass Narrows. The Cove is approximately 1.6 kilometers long (1 mile) and 0.8 kilometers (0.5 mile) wide with depths to 60 meters (200 feet) (EPA 2015, NOAA 2019). As stated in Section 1.2.1, the cove has experienced significant industrialization as it was the site of a pulp mill, sawmill, and fish processing plant that has resulted in low dissolved oxygen levels (EPA 2003). Today the surrounding area is largely forested with pockets of industrial/commercial, residential, and recreational properties clustered along North Tongass Highway.

According to the ShoreZone Mapper (ShoreZone 2019), the shoreline at the proposed dock site in Ward Cove has the following characteristics:

- Habitat Class: protected/partially mobile/ sediment or rock sediment
- Coastal Class: cliff with gravel beach
- Biological Wave Exposure: protected

Contamination History

Ward Cove was home to a pulp mill, a sawmill, and a fish processing plant and their discharges of chemicals, pulp, and fish waste polluted the cove. The Ketchikan Pulp Company operated for 43 years, from 1954 to 1997. During that time the mill stored logs (approximately 7 billion board feet) and discharged pulp mill effluent in to the cove. This caused accumulation of bark and sunken logs on the bottom of the cove (EPA 2015). Although this discharge ceased with the mill's closure, log storage activities continued until 2001 under the operation of a sawmill and veneer mill by Gateway Forest Products, Inc., contributing additional wood residues to the cove (ADEC 2007). Wards Cove Packing Company, a seafood processing facility, discharged fish-processing waste to the cove from 1912 until its closure in 2002 (ADEC 2007).

In the early 1990s, preliminary investigations were conducted to determine the environmental effects mill discharges were having on Ward Cove. Studies show that the large quantities of organic material discharged from the pulp mill led to anaerobic conditions in the sediment and production of ammonia, sulfide, and 4-methylphenol (EPA 2015). The discharge of seafood waste caused depletion of dissolved oxygen in the deeper waters of Ward Cove (ADEC 2007).

Since then, significant remediation activities, including removing logs, dredging, and sand capping, have occurred to reduce the harmfulness of sediments to the bottom-dwelling animals and to enhance recolonization of the bottom sediments to support a healthy community of marine animals. Remediation activities were completed in 2001 (EPA 2015). As stated in the letter from EPA (May 7, 2009) approving the 2007 monitoring report:

> "As you know, sediment remedial action was performed within the 80-acre Area of Concern (AOC) in Ward Cove between October 2000 and February 2001. The sediment remedy addressed risks to benthic macroinvertebrates from three chemicals of concern (i.e., ammonia, 4-methylphenol, and sulfide). As documented in the Record of Decision (ROD; EPA 2000), EPA had determined that the contaminated sediments were not toxic to human health or to birds and mammals living in the Cove. The sediment remedial action relied largely on monitored natural recovery and enhanced natural recovery. Enhanced natural recovery using thin layer placement (TLP) with 6-12 inches of clean sand was successfully implemented at approximately 27 acres within Ward Cove. Monitored natural recovery was the remedial alternative for the remainder of the AOC. The first long-term monitoring effort occurred in Ward Cove in 2004, and the second monitoring effort occurred in 2007."

As stated in the letter from the EPA (September 19, 2019) in response to the public notice for this project:

> "Ward Cove is a small 250-acre bay on the north shore of the Tongass Narrows that was formerly home to the Ketchikan Pulp Company. In 2000, the EPA issued a Record of Decision (ROD) addressing the Marine Operable Unit (OU) at the Ketchikan Pulp Company (KPC) CERCLA Site (the Site) pursuant to CERCLA, 42 U.S.C. 9601 et seq. The 2000 ROD set forth a remedy that addressed 80 acres of contamination in Ward Cove. The remedy was intended to "reduce toxicity of surface sediments" and to "enhance recolonization of surface sediments to support a healthy marine benthic infauna community with multiple taxonomic groups" (p. 49, ROD). Of the 80-acre remedy, the ROD called for monitored natural attenuation (MNA) on approximately 53 acres, and for dredging and a thin-layer sand cap for the remaining 27 acres. Under the EPA oversight, KPC performed the remedial action construction in Ward Cove between 2000 and 2001. In May 2009, the EPA concluded that the multiple lines of evidence used to evaluate sediment quality in the Marine OU indicated that the Remedial Action Objectives had been achieved, and that the sediments supported healthy benthic communities."

The sand cap was not designed to encapsulate or contain underlying sediment. The goal of the sand cap (as detailed in 1.1 Overview of Remedy of the ROD) was to reduce toxicity of surface sediments to the benthic organisms and to provide material to enhance recolonization of the bottom sediments to support a healthy community of marine animals. According to the ROD, the selected remedy would achieve remedial action objectives (RAOs; i.e. reduce toxicity in surface sediments and enhance recolonization of sediments to support a healthy benthic community) through a combination of thin-layer capping, mounding, navigational dredging, and natural recovery.

According to the EPA's letter cited above, the RAOs have been successful. Over 10 years ago, the EPA found that the RAOs had been met and that the sediments support health benthic communities.

4.1.2 Anadromous Waterways

Sediment (bottom and suspended), water temperature, dissolved oxygen, streamflow, and debris are important factors in freshwater streams, rivers, and creeks that can successfully support salmon and trout species. The relatively young geological topography of Southeast Alaska has mass wasting and valley and stream development that are in particularly active stages. This lends to changing watersheds, but consistently suitable salmon and trout habitat (USFS 1974). In 1991, the U.S. Forest Service (USFS) completed an *Evaluation of a Stream Channel-Type System for Southeast Alaska* indicated that a majority of freshwater ways that supported fish species had gravel substrates that ranged from fine gravel and rubble to course gravel and cobble with occasional sections of large boulders. Some streams also had sand and organic muck present (USFS 1991). Table 3 lists anadromous streams that provide habitat suitable for salmon and trout species near the proposed project (Figure 5).

Table 3. Anadromous Waterways Near the Project Area

Stream Name	AWC Code	Distance from Project (km)	Species Present
Ward Creek	10150	0.7	Chum Salmon, Pink Salmon, Sockeye Salmon, Dolly Varden, and Steelhead Trout
Unnamed Stream	10145	0.7	Coho Salmon and Pink Salmon
Unnamed Creek	10490	3.5	Coho Salmon and Pink Salmon

Figure 5. Proposed Project Action Area and Locations of Anadromous Waterways

Ward Creek (AWC: 10150) and Unnamed Stream (AWC: 10145)

Ward Creek and Unnamed Stream (AWC: 10145) flow into the Northeast side of Ward Cove approximately 0.7 km from the proposed project location. Ward Creek flows from Connell Lake south to Ward Lake before emptying into Ward Cove. The creek supports Chum (present), Coho (present and rearing), Pink (present and spawning), and Sockeye Salmon (present), Steelhead Trout (present, spawning, and rearing) and Dolly Varden (present). The Unnamed Stream flows to the west of Ward Lake and supports Coho (spawning and rearing) and Pink Salmon (spawning) (ADFG 2019).

Unnamed Creek (AWC: 10490)

Unnamed Creek (AWC: 10500) is located on Gravina Island approximately 3.5 km from the proposed project location and flows directly into Tongass Narrows. The creek supports Chum (spawning), Coho (present), and Pink Salmon (present and spawning) (ADFG 2019).

Unnamed Creek (AWC: 10550)

Unnamed Creek (AWC: 10550) is located 4.0 km Northwest of the proposed project location. The creek is located on Gravina Island and flows directly into Tongass Narrows. Unnamed Creek supports Coho (present) and Pink Salmon (present) (ADFG 2019).

4.2 AFFECTED SPECIES

Based upon correspondence with NMFS and examining other marine projects in the area it was determined that all five (5) species of Pacific salmon and fifteen (15) species of groundfish have EFH in the waterways in and around the proposed project area (USACE 2017; HDR 2017). Tables 4 and 5 list each species and what life stages they are present. A description of each species is below.

Table 4. Essential Fish Habitat Salmon Species in Project Area

Salmon Species	Juvenile	Immature	Mature	Juvenile-marine	Adult-marine waters	Spawning-freshwater only
Coho Salmon				X	X	
Chum Salmon		X		X	X	
Pink Salmon				X	X	
Chinook Salmon		X	X		X	
Sockeye Salmon		X		X	X	

Table 5. Essential Fish Habitat Groundfish Species in Project Area

Ground Fish Species	Egg	Larvae	Late Juvenile	Adult	Spawning
Pacific Ocean Perch			X	X	
Yelloweye Rockfish			X	X	
Shortraker			X	X	X
Southern Rock Sole				X	
Dover Sole		X	X	X	
Flathead Sole			X	X	
Rougheye Rockfish			X	X	
Dusky Rockfish			X	X	
Walleye Pollock	X			X	
Alaska Plaice				X	
Sablefish			X	X	X
Pacific Cod			X	X	
Arrowtooth Flounder			X	X	
Sculpin spp.			X	X	
Skates spp.			X	X	

4.2.1 Species Descriptions

Salmonid Species Descriptions

Coho Salmon (*Oncorhynchus kisutch*)

The NMFS EFH mapper shows that Coho Salmon have EFH in Ward Cove and in Tongass Narrows (NMFS 2019). Coho salmon enter spawning streams from July to November, usually during periods of high runoff. The eggs hatch early in the spring, where the embryos remain in the gravel using the egg yolk until they emerge in May or June. Juvenile Coho spend one to three winters in streams and may spend up to five winters in lakes before migrating to the sea as smolt (ADF&G 2002). Coastal streams, lakes, estuaries, and tributaries to large rivers provide Coho rearing habitat. Coho juveniles may also use brackish-water estuarine areas in summer and migrate upstream to fresh water to overwinter. They spend about 16 months at sea before returning to coastal areas and entering fresh water to spawn (NPFMC 2019).

Chum Salmon (*O. keta*)

The NMFS EFH mapper shows that Chum Salmon have EFH in Ward Cove and Tongass Narrows (NMFS 2019). Returning to spawn as 2 to 7-year old, Chum Salmon spawn between June and November in gravel in streams, side-channel sloughs, and intertidal portions of streams when the tide is below the spawning grounds (NPFMC 2019). Chum Salmon fry, like Pink Salmon, do not overwinter in the streams but migrate out of the streams directly to the sea shortly after emergence (ADF&G 2002). This outmigration occurs between February and June, but most fry leave the streams during April and May. Chum salmon tend to linger and forage in the intertidal areas at the head of bays. Estuaries are important for Chum Salmon rearing during spring and summer..

Pink Salmon (*O. gorbuscha*)

The NMFS EFH mapper shows that Pink Salmon have EFH in Ward Cove and Tongass Narrows (NMFS 2019). Pink Salmon are distinguished from other Pacific salmon by having a fixed two-year life span. Because of the life span, pink salmon spawning in a particular river system in odd and even years are reproductively isolated from each other and have developed into genetically different lines (NPFMC 2019). Adult pink salmon enter spawning streams between late June and mid-October. They spawn within a few miles of the coast, and spawning within the intertidal zone or the mouth of streams is very common. Shallow riffles where flowing water breaks over coarse gravel or cobble-size rock and the downstream ends of pools are favored spawning areas. The eggs hatch in early to mid-winter and the fry swim up out of the gravel and migrate downstream into salt water by late winter or spring (ADF&G 2002).

Chinook Salmon (*O. tshawytscha*)

The NMFS EFH mapper shows that Chinook Salmon have EFH in Ward Cove and Tongass Narrows (NMFS 2019). Adult chinook salmon are found over a broad geographic range,

encompassing different ecotypes and very diverse habitats in Southeast Alaska. Chinook salmon generally spawn from mid-June to mid-August in waters ranging from a few centimeters deep to several meters deep. Eggs hatch in the late winter or early spring and juveniles typically remain in fresh water for at least one year before migrating to the ocean in the springtime (ADF&G 2002). Chinook salmon spend one to six years at sea before they return to freshwater streams to spawn (NPFMC 2019). Adults return to spawning streams from July through September (Morrow 1980).

Sockeye Salmon (*O. nerka*)
The NMFS EFH mapper shows that Sockeye Salmon have EFH in Tongass Narrows and Ward Cove (NMFS 2019). Sockeye Salmon exhibit a greater variety of life history patterns than other Pacific salmon, and are known to use lake-rearing habitats in the juvenile stages (NPFMC 2019). Sockeye Salmon generally spawn in late summer and autumn. They use a wide variety of spawning habitats such as rivers, streams, and upwelling areas along lake beaches. Eggs hatch during the winter and the young salmon move into the rearing areas. In systems with lakes, juveniles usually spend one to three years in fresh water before migrating to the ocean in the spring as smolts. However, in systems without lakes, many juveniles migrate to the ocean soon after emerging from the gravel (ADF&G 2002).

Ground Fish Species Descriptions
Pacific Ocean Perch (*Sebastes alutus*)
Pacific Ocean Perch have a wide range throughout the North Pacific. They can be found in Alaskan waters during all life stages. Adults are primarily found offshore during fall and winter months in 150 to 420 meters waters along the outer continental shelf and the upper continental slope. During the summer, adults migrate to shallower depths (150 to 300 meters). Not much is known about the early life stages of Pacific Ocean Perch; however, larvae released offshore in April and May are thought to be pelagic and drift with the current. Larvae release is thought to occur offshore, but it is suggested that small juveniles prefer rocky, high relief areas inshore and progressively move into deeper waters (NPFMC 2019).

Yelloweye Rockfish (*S. ruberrimus*)
This species is found in 18 to 550 meters of water, but most commonly occur in rocky, rugged habitat between 90 to 185 meters of water. Little is known about early life stages, but juveniles have been found in high relief areas that are abundant with underwater structures at depth of 13 meters or more. Yelloweye adults spawn in southeast Alaska between April and July with a peak occurring in May (NPFMC 2019).

Shortraker (*S. borealis*) and Rougheye Rockfish (*S. aleutianus*)
Shortraker and Rougheye Rockfish often occur together due to similar depth and habitat preferences. Both species are found in the highest abundance along the continental slope in areas of steep slopes and numerous boulders between 300 to 500 meters. Little is known about the early life stages of each species. It is estimated that Shortraker Rockfish spawn from

February to April and Rougheye Rockfish spawn December through April. The larvae from both species are pelagic and have been found in offshore waters and some Shortraker larvae have been sampled in coastal Southeast Alaskan waters. Juveniles share the same habitat as adults; however, they have been found in shallower areas (NPFMC 2019).

Southern Rock Sole (*Lepidopsetta bilineata*)
Southern Rock Soles range from Baja, California to the Gulf of Alaska and eastern Aleutian Islands. Adults spawn during the summer months within the Gulf of Alaska between 35 to 120 meters. Larvae are pelagic, but juveniles as young as one year have been sampled in benthic habitats along the continental shelf with adults (Forrester and Thompson 1969). Prior to spawning, adults migrate to shallower waters between 50 to 100 meters with sandy substrate to feed. After spawning during the summer Southern Rock Sole migrate to deeper wintering grounds (NPMFC 2019).

Dover Sole (*Microstomus pacificus*)
There is a wide spread distribution of Dover Sole in the Gulf of Alaska with presence in waters deeper than 300 meters, but more common between 100 to 200 meters during the summer (Turnock et al. 2002). Spawning occurs in deeper waters from February through May with peak spawning occurring in May (Abookire and Macewicz 2003). As Dover Sole go through life stages and reach sexual maturity, they move down the continental slope and into deeper waters (NPMFC 2019).

Flathead Sole (*Hippoglossoides elassodon*)
Adult Flathead Sole migrate between winter spawning grounds near the shelf margins and summer feeding grounds in the mid to outer continental shelf. Spawning can start as early as March and goes through June. Juveniles inhabit water shallower than 100 meters and much like adult Flathead Sole prefer sand and mud substrate (NPMFC 2019).

Dusky Rockfish (*S. variabilis*)
Much of the information that has been obtained about dusky rockfish comes from data collected during the summer months from the commercial fishery or in research surveys. Based upon this data, the Gulf of Alaska appears to be the center of abundance for Dusky Rockfish. It is presumed that spawning occurs in spring and may extend into summer. Juveniles share the same 100 to 200 meters depth preferences possibly along rocky areas of the outer continental as adults, but they have been found in shallower water during this early life stage (NPFMC 2019).

Walleye Pollock (Theragra calcogramma)
Walleye pollock is the second most abundant groundfish stock in the Gulf of Alaska and accounts for 25 to 50 percent of the catch and 20 percent of the biomass. The proposed project is within the Gulf of Alaska stock area which extends from Southeast Alaska to the Aleutian

Islands. Based upon mid-water trawler surveys, Pacific Walleyes occurs in waters less than 300 meters. Peak spawning in the Gulf of Alaska happens in late March in Shelikof Strait generally over 100 to 200 meters of water. Juveniles have a widespread distribution and have no known habitat preferences. Adult Walleye Pollock occur throughout the water column on the outer and mid-continental shelf of the Gulf of Alaska (NPFMC 2019).

Alaska Plaice (*Pleuronectes quadrituberculatus*)
Alaska Plaice are present in continental shelf waters year-round and travel seasonally through their range. A majority of Alaska Plaice have been sampled along the Alaska Peninsula and Kodiak Island, but have been found within the Gulf of Alaska. Sampling events have obtained fish from near shore waters at depths less than 100 meters. Spawning typically occurs from March to April on hard sandy ground (Zhang 1987 and NPMFC 2019).

Sablefish (*Anoplopoma fimbria*)
Most adult and late juvenile Sablefish are found in depths of 366 to 914 meters along the continental shelf, the lope, and the deep-water coastal fjords over any substrate (NPFMC 2019). Spawning occurs in late spring and larvae have been found in pelagic waters at 300 to 500 meters (McFarlane 1997).

Pacific Cod (*Gadus macrocephalus*)
Pacific Cod prefer soft substrate such as mud, sandy mud, muddy sand, or sand in deeper waters (Marrow 1980). This habitat can be found in Tongass Narrows and the species is likely to be present. Pacific Cod are concentrated along the continental shelf edge and upper slope from 100 to 200 meters of water during winter and spring before overwintering in shallower waters (<100 meters) (DiCosimo 2001). Larvae are epipelagic and most commonly found in the upper 45 meters of the water column. Juveniles can be found in nearshore waters from 60 to 150 meters deep and often use eelgrass and kelp beds (NMFS 2003).

Arrowtooth Flounder (*Atheresthes stomias*)
Arrowtooth flounder have a benthic lifestyle with distinct summer and winter grounds along the eastern Bering Sea shelf. Spawning occurs from as early as September to as late as March at depths of 100 to360 meters (NPMFC 2019; DiCosimo 2001). Pelagic (open seas) eggs and larvae inhabit all areas of the continental shelf, though predominantly inhabiting only the inner and middle shelf regions. Juveniles and adults are demersal (bottom dwelling) in gravel and muddy sand. Juveniles typically inhabit shallow areas until they are about 10 centimeters long. During winter, the flounder migrate to shelf margins and upper continental slopes to avoid cold temperatures (NPMFC 2019). This species is a likely inhabitant of Ward Cove and Tongass Narrows.

Sculpin spp. (*Cottidae*)

Sculpins are bottom-dwelling fish that live in tide pools and in shallow marine waters, but can be found in deeper waters. They can occasionally can be found in freshwater. Sculpins generally spawn in the winter; however, larvae have been found year-round. Adults and late juveniles can be found in the middle shelf regions. Sculpins are known to use a wide range of habitats, including intertidal pools and all shelf habitats, e.g., mud, sand, gravel, etc. (NPFMC 2019). Several species of sculpin have been identified in intertidal and subtidal surveys in Tongass Narrows and are likely to occur in Ward Cove.

Skates spp. (*Rajidae*)
Juvenile and adult skates can be found in the middle shelf regions and feed on bottom invertebrates and fish. Not much is known about seasonal movements and or early life stage habitat requirements. Skates are known to use a broad range of substrate types (mud, sand, gravel, and rock) and can typically be found in the lower portion of the water column (NPFMC 2019). It is probable that skates occasionally inhabit the deeper waters of Tongass Narrows and shallower waters of Ward Cove.

5 ASSESSMENT OF POTENTIAL PROJECT IMPACTS ON ESSENTIAL FISH HABITAT

In general, construction activities within the estuarine habitat and in coastal marine areas have the potential to impact EFH. The proposed activities associated with construction of the dock may adversely impact marine resources directly and indirectly through sound pollution, increased turbidity, habitat loss and/or modification. Other impacts that may occur as a result of the proposed project include the following: increase in vessel traffic, increased human access (e.g., tourism), and cumulative development of shoreline properties. Impacts as a result of each construction activity and indirect impacts are described below. Table 6 details each activity that could impact EFH and what potential adverse impacts the activity may have (NOAA 2017).

Table 6. Potential Adverse Impacts for Each Activity Associated with the Proposed Project

Activity	Potential Impacts						
	Distribution of Fish	**Behavior of Fish**	**Injuries and or mortality to Fish**	**Increase in Turbidity**	**Release of Contaminants**	**Changes in Ambient Light**	**Changes in Wave and Current Regimes**
Pile Installation	X	X	X	X			
Pile Removal	X	X	X	X	X		
Overwater Structure	X	X				X	X

5.1 PILE INSTALLATION AND REMOVAL

5.1.1 Short-Term Impacts

Sound

Pilings are a central part of the construction of marine structures. For the proposed action, galvanized steel pilings will support the trestle, the floating dock structure, and provide structures (dolphins) for mooring the large ships that will use the dock. To install and remove these piles a vibratory hammer, impact hammer, and drilled shaft drill will be used. Each piece of equipment produces sound that exceeds known thresholds for fish species (Table 7). Impact hammers produce sharp, short bursts of sound that create sound with little energy in the infrasound range that fish fail to respond to the particle motion. In comparison to impact hammers, vibratory hammers produce sound with longer duration and have more energy in the lower frequency range (Carlson et al 2001; Wursig et al 2000).

There are several methods used to remove temporary pilings from the substrate. Pilings can be removed from the substrate using a vibratory hammer or via the direct pull method. The use of the vibratory hammer will cause similar sound impacts as present during pile installation; however, the direct pull method creates little noise within the water column.

For the proposed project, an action area for fish has been determined by the area of water that will be ensonified above the acoustic threshold of 155 decibels (dB) re 1µPa (rms) for impacting; this is the area where received noise levels from pile driving could expose fish to impacts described below. The action area includes approximately 4 square kilometers in Ward Cove extending into Tongass Narrows near the community of Ketchikan in Southeast Alaska (latitude 55.4037 and longitude -131.7316; See Figure 2).

Distances were calculated using the practical spreading model in the Zone of Influence spreadsheet tool developed by NMFS. The calculated area radiates from between 8,066 meters from pile driving at the proposed cruise ship dock site for impacting.[1] However, sound will be truncated by landforms; it will radiate through Ward Cove to the shores of Revillagigedo Island and across Tongass Narrows approximately 3,600 meters to the shore of Gravina Island.

Note that impact driving would only occur for approximately 2.5 minutes each day and would only occur on 27 days (not concurrent); therefore, ensonification of the area by impact pile driving would be for a total of 2 hours over 27 days.

[1] Impact pile driving source level of 186.7 SEL/ 198.6 SPL8 is proxy from median received levels at 10 m from impact hammering of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Tables 9 and 16).

Little is known about the effects of sound on juvenile and adult fish; however, current research accepted by NMFS supports that physical injury can occur when SPLs reach 206 dB re 1 µPa during a single strike and/or when the accumulated sound exposure level (SEL) from multiple strikes reaches 187 dB re 1 µPa for large fishes (≥2 grams) or 183 dB re 1 µPa for small fishes (<2 grams). There is currently not enough research to determine how sound impacts the earlier life stages of fish though it is known that smaller fish are more affected than larger fish by sound pollution (NOAA 2017).

During pile installation and removal, pile driving sound can affect the distribution and behavior of juvenile pink salmon and chum salmon. Other species of fish may change migration routes to avoid the area or leave the area entirely to find more suitable spawning grounds and habitat (NOAA 2017). SPLs of 155 dB re 1 µPa can stun small fish and make them more susceptible to predation. Physical injury to fish such as fatal damage to swim bladders in small fish and compromised swim bladders in larger fish can also result from exposure to underwater sound.

Sedimentation

Installing and removing pilings could potentially compromise the sand layer that was created as a part of the EPA clean-up effort. As piles are installed, it is expected approximately 2 cubic yards of material would come out of each trestle pile and 10 cubic yards of material will be excavated from each dolphin pile. Less than two piling will be drilled in a day to minimize the volume of sediment disturbance. About 6 cubic yards per day would be released during construction of the trestle and about 20 cubic yards per day would be released during the construction of the dolphins, for a total of 280 cubic yards for the project.

Some agencies would contend that the material coming out of the driven piles would have contamination. The release of contaminates is well studied in Ward Cove due its use as a pulp mill. In the past, these contaminates have created hypoxia, insufficient oxygen, for marine life in ward cove (EPA 2003). Contaminates and hypoxia can lead to decreased growth rates and reduced reproductive success. Some species such as juvenile Chinook Salmon have been observed avoiding areas of low dissolved oxygen. Non-salmonid species that use Ward Cove are less effected by low dissolved oxygen; however, research still suggests that there is the potential for adverse effects to occur (EPA 2003).

5.1.2 Long-term Impacts

No long-term impacts are expected from the placement of piles within the project area.

5.1.3 Indirect Impacts

Injured fish as a result of sound, increased turbidity, and the release of contaminates can have indirect impacts on other species and the local marine system as a whole. Lethal and sublethal impacts to fish, decreased visibility, and an increase in suspended particles in the water column can have indirect impacts on prey species by making them more susceptible to predation. This combined with fish potentially being deterred from the area and seeking out alternative

spawning grounds could affect future populations in the area and in-turn commercial, sport, and subsistence harvests (NOAA 2017).

5.1.4 Conservation and Mitigation Measures

Incorporating the following **pile driving** conservation measures will help to ensure that no adverse impacts would occur to EFH and EFH-managed species/species complexes and other fish and marine resources in the project area.

Sound Conservation and Mitigation Measures

- Pile installation and removal will occur at a time of year (January-May) when larval and juvenile stages of fish species with designated EFH are not present.
- Impact hammer use will be minimized. When impact hammers are used, the pile will first be driven as deep as possible with a vibratory hammer and then use the impact hammer to drive the pile to its final position. (See Table 7.)
- As possible, the impact hammer will be operated at a reduced energy setting when possible and impacted into bedrock.

Sedimentation Conservation and Measures

- All material that comes out of the top of the pile during pile driving (drill cutting discharge) will be collected on a barge and transported to a permitted upland location for disposal.
- A 50-feet deep silt curtain will surround the pile driving and temporary pile removal operation.
- Temporary piles will be removed slowly to allow sediment to slough off at or near the mudline.
- A benthic sediment and water quality field study, reviewed by the Alaska Department of Environmental Conservation (ADEC), will be conducted prior to and following cruise ship dock construction.
- Following sampling protocols previously developed for the EPA during clean up and monitoring of the site, a water quality and sediment sampling program would occur. The sampling program would be reviewed and approved by the ADEC. The sampling program would include:
    - Prior to initiating construction and immediately following construction:
        - Determining the depth of the sediment at the site.
        - Collecting and analyzing sediment samples from within and near dock project footprint for contaminates.
        - Collecting water samples and determining dissolved oxygen and O_2.

- During construction, collecting water samples and determining dissolved oxygen and O_2.

5.2 OVERWATER STRUCTURES

The trestle, transfer spans, floating dock, and catwalks are designed to allow some ambient light to flow through to the water surface, but adverse impacts are still likely to occur as a result of installing the overwater structures. Table 1 and Section 2.2 provides additional information about each construction component.

5.2.1 Short Term Impacts

No short-term impacts are expected as a result of installing an overwater structure. Measurable effects of over water structures on the marine environment occur over a period of time.

5.2.2 Long-term Impacts

Long-term impacts as a result of installing an overwater structure include changes in ambient light conditions, alterations of wave and current energy regimes, release of contaminants, and activities associated with the use and operation of the overwater facilities (NOAA 2017).

Ambient light is often reduced as a result of overwater structures. Shading caused by structures can affect the plant and animal communities that rely on the habitat below the installed structures. Distributions of plants, invertebrates, and fish can become limited and less complex. This is due to a decrease in available light for photosynthesis to occur in diatoms, benthic algae, eelgrass, and other photosynthesizers that marine and estuarine fishes rely on as a food source, protection, and rearing young. Studies have shown there is a decrease in juvenile fish populations under overwater structures. Reduced-light conditions can also directly adversely impact fish species that rely on visual cues for spatial orientation, prey capture, schooling, predator avoidance, and migration.

Changes in wave and current energy regimes can be adversely impacted by overwater structures. The structures can interrupt the transportation of detrital materials and alter substrate composition in nearshore habitats (Hanson et al 2005; NOAA 2017). Adequate substrate is required for plant propagation, fish and shellfish settlement and rearing, and forage fish spawning (NOAA 2017).

Although no treated wood will come directly in contact with marine waters, some treated wood is incorporated into the dock structure. Contaminates from overwater structure materials such as the treated wood used in the trestle and floating dock structures are commonly known to leak into the marine environment for a short period after installation. The most common contaminates associated with treated wood are polycyclic aromatic hydrocarbon (from creosote-treated wood), ammoniacal copper zinc arsenate, and chromated copper arsenate (NOAA 2017; Poston 2001). These chemicals are known to cause harmful effects to fish such as, but not limited to: cancer, reproductive anomalies, immune dysfunction, and growth and development impairment.

5.2.3 Indirect Impacts

A decrease in aquatic vegetation and phytoplankton as a result of a decrease in light from overwater structures can indirectly impact fish by reducing prey abundance and habitat complexity (NOAA 2017).

5.2.4 Overwater Structures Conservation and Mitigation Measures

- The project employs the fewest number of pilings necessary to support the dock structure and to allow light into under-pier areas and minimize impacts to the substrate.
- Although not planned for this reason, the docks will be installed in a north-south orientation to allow the arc of the sun to cross perpendicular to the structure to reduce the duration of light limitation.
- In addition, although not planned specifically for this reason, the float is located in deep water to avoid light limitation and grounding impacts to the intertidal or shallow subtidal zones.
- As recommended by NMFS, the dock' bottom would maintain at least 5 feet water between the top of the water and the deck of the float (supported by pontoons). The floating deck would be in about 70-500 feet of water.

5.3 CRUISE SHIP OPERATIONS

Deep draft vessels are equipped with azipod propulsion systems to aid in maneuvering the vessel. These propulsion systems have been shown to disturb sediment and increase turbidity in shallower depths (Jones 2011).

5.3.1 Long-Term Impacts

Cruise ships will be the primary vessels at the Ward Cove Cruise Ship Dock and will utilize the dock daily from late April to early October. Due to the frequent and extended period of use and projected lifetime of the dock sedimentation impacts to EFH and EFH species associated with cruise ship operations could potentially be long-term.

Agencies have voiced concern over the potential for cruise ship operations to displace the sediment cap associated

5.3.2 Conservation and Mitigation Measures

The cruise ship dock has been located to avoid disturbance to the sand cap and ocean floor and therefore, EFH and EFH species because it is:

- Located on the fringe of sand capped area to minimize cruise ship travel distance and maneuvering within the area of concern.
- In deep water to decreases the potential for scour or turbidity. The cruise ship azipods would be in approximately 127 feet of water (about 100 feet below the azipods) when the vessel is docked. Note that these depths are at extreme low tide. Most of the time the azipods will be in deeper water.

- Oriented so that the cruise ships can perform primary course adjustments prior to entering the area of concern. (The optimized orientation allows cruise ships to dock with only minor, slow speed course adjustments occurring within the area of concern.)

In addition, cruise ship operations will ensure that there would be minimal disturbances to the remedy since:

- Cruise ship azipods point out, laterally from the ship, not down towards the ocean floor, which minimizes impacts to the benthic environment.
- Cruise ship vessels will approach the dock bow first. Approaching the berth bow first will keep the thrust from the azipod propellers away from the sand cap and the area of concern.
- Vessels will approach the dock such that near-berth maneuvering is minimized. To the extent possible, major course corrections will occur prior to entering the area of concern.
- Docking will be performed with the minimal use and thrust from bow thrusters as operationally possible.

During the first season of cruise ship operation, a water quality and sediment sampling program, following protocols reviewed and approved by the ADEC, would occur to gage whether there are impacts to the sediment cap. The protocols would mirror the sampling methods used prior to construction and would include:

- Determining the depth of the sediment at the site.
- Collecting and analyzing sediment samples from within and near dock project footprint for contaminates.
- Collecting water samples and determining dissolved oxygen and O_2.

Finally, as directed by the EPA, a "plan of best management practices" for operations of cruise ships using the proposed dock would be developed by the applicant with the EPA, ADEC, and other agencies as appropriate. The plan would include details of the information taking into account anticipated wind, current, and traffic conditions. As requested, the plan would be submitted to EPA and ADEC at least 90 days prior to commencing operations.

6 CONCLUSIONS AND DETERMINATION OF EFFECTS

That construction methods and proposed conservation and mitigation measures, including collecting the drill cuttings material, using a sediment curtain will help to ensure **that no short-term adverse impacts to EFH and EFH-managed species/species complexes and other fish and marine resources would occur** in the project area. In addition, because the floating portion of the dock is at least 5 feet above water in 70 to 500 feet of water, there will be **no long-term adverse impacts to EFH from the overwater structure**. Finally, because of the placement of the dock in deep water and the operations of the cruise ships as they move into and out of

Ward Cove, it is unlikely that the sediment cap or other bottom material will be disrupted by cruise ship operations. Therefore, there would **be no long-term adverse impacts to EFH from cruise ship operations**.

Field-based sediment and water quality sampling conducted before and during construction and during the first season of cruise ship operations will show that no damage to the site or adverse impacts to EFH occurs.

However, if damage is observed, the EPA's institutional controls require that any damage caused to the areas that have been remedied, in particular the sand capped areas, be restored at the direction of the EPA. Power Systems & Supplies of Alaska and Ward Cove Dock Group, LLC. are aware that the 2000 Consent Decree between the EPA and the responsible parties, prohibits persons from "using the site in a manner that would interfere with or adversely affect the integrity or protectiveness of the remedial measures…" The applicants further understands that the Consent Decree applies to them as the owner of Ward Cove tidelands and that they would be responsible for any costs associated with reviewing and overseeing actions that violate the institutional controls.

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