



September 2021
Pier 63 Removal Project



Request for Incidental Harassment Authorization

Prepared for City of Seattle

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Prepared for

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APPENDICES

Appendix A	NMFS User Spreadsheets for Project Activities
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ABBREVIATIONS

City	City of Seattle
dB	decibel
DPS	distinct population segment
EBSP	Elliott Bay Seawall Project
ESA	Endangered Species Act
FR	Federal Register
IHA	Incidental Harassment Authorization
km ²	square kilometer
LEQ	equivalent continuous sound level in decibels
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PK	peak sound pressure
Project	Pier 63 Removal Project
PTS	permanent threshold shift
RMS	root mean square
SELcum	cumulative sound exposure level
SPL	sound pressure level
SRKW	Southern Resident killer whale
TTS	temporary threshold shift
ZOI	zone of influence

1 Description of Specified Activity

The City of Seattle (City) is submitting this request to the National Oceanic and Atmospheric Administration (NOAA) for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) for the Pier 63 Removal Project.

1.1 Overview

The City of Seattle is proposing to remove Pier 63, which is located along the Elliott Bay shoreline in Seattle, Washington (Figure 1). The Project addresses the public safety hazard of the pier, which has deteriorated and can no longer be used for public access. The project is located in downtown Seattle, in King County, Washington.

Pier 63 is currently closed to public access due to structural and safety considerations. The purpose of the Project is to entirely remove Pier 63 from the waterfront and leave the nearshore marine environment open for improved ecosystem function and salmonid migration.

In-water (below the mean higher high water mark) and overwater work (above mean higher high water) for the Project will include the following activities:

- Demolition of the timber pier structure
- Removal of existing creosote-treated timber and steel piles
- Removal of any ancillary debris and broken piles beneath the pier

This IHA application assesses potential and predicted effects on marine mammals from activities associated with the Project, in particular the proposed pile removal activities. The primary focus on in-water pile removal activities is appropriate because these activities have the potential to produce noise in the aquatic marine environment at amplitude and frequencies that could affect marine mammals. Only vibratory (continuous) pile removal is proposed as part of the Project.

Based on an analysis of the potential and predicted effects on marine mammals, the City is requesting authorization for incidental harassment of marine mammals under the MMPA. This application describes the species and numbers of marine mammals which may be affected by the Project, and the number of requested Level B harassment to be authorized for each species. The City requests authorization for incidental harassment through an IHA. Applying for an IHA is appropriate because the Project is only anticipated to require one season to complete.

Documenting compliance with the revised acoustic technical guidance issued by NOAA (2018) is fundamental to this assessment. The technical guidance provides acoustic thresholds for onset of permanent threshold shifts (PTS) and temporary threshold shifts (TTS) in marine mammal hearing for all sound sources (NOAA 2018a). To demonstrate compliance with the NOAA MMPA guidelines, this document identifies in-water noise thresholds for each marine mammal species based on the

calculated behavioral effects levels and PTS isopleths identified using in-water sound transmission equations and spreadsheets provided by NOAA in the 2018 revised guidance (NOAA 2018a). The evaluation used in-water noise values recommended by NOAA as commonly used values for removal of timber piles (NOAA 2019; Laws 2021). Comparisons between calculated marine mammal noise thresholds and predicted noise values from pile-related activities are also presented in this document and allow for projected effects to be assessed at varying distances from a noise source (i.e., the site of pile-related activities). To facilitate the development of take estimates and monitoring zones, this document identifies the PTS zone for each hearing group, which is then used as the basis for establishing the proposed Exclusion Zone for monitoring. The noise evaluation identifies Level B (non-injurious) noise thresholds for each hearing group and identifies an associated zone of influence (ZOI) for each hearing group based on the PTS zone and Level B threshold for vibratory removal of timber piles. Estimates of harassment are calculated based on each species anticipated density within the Project's ZOIs, the size of the ZOI, and the anticipated duration of project activities.

Proposed mitigation and conservation strategies are also presented that would function to substantially reduce potential negative effects on marine mammals. Mitigation and minimization measures are discussed in Sections 11, 12, and 13.

1.2 Pier 63

Pier 63 was previously used as a public open space where concerts and special events were hosted, but the pier has deteriorated and can no longer support heavy loads so is no longer in use. The Project will demolish and remove the existing pier (35,108 square feet), including removal of 900 timber piles that are approximately 14 inches in diameter and eight 30-inch steel piles. During demolition, broken piles and debris from previous pier configurations will also be removed, as feasible, to comply with Washington State Department of Natural Resources lease terms. The number of broken piles to be removed is unknown but would be removed with a clamshell bucket and pulled or cut below the mudline.

1.3 Pile Removal

During pile removal for Pier 63, decking and framing will be removed using heavy equipment or by workers on the deck. Timber piles will be removed in whole, wherever possible, by pulling the piles using a vibratory extraction method or clamshell bucket. If a pile breaks above the mudline during removal, then an attempt will be made to pull the remainder of the pile in a way that minimizes disturbance of sediments; otherwise, it will be cut below the mudline. All creosote-treated wood that is removed will be disposed of in accordance with appropriate regulations. Steel piles will be removed using vibratory extraction. Removed overwater and in-water materials will be placed onto a barge or truck with a crane and transported to a contractor's yard for later salvage or breakdown and disposal or recycling (Photograph 1).

Photograph 1
Methods for Vibratory Removal of Timber and Steel Piles



Photograph by Adam Carlson (Anchor QEA) during work for the Pier 62 Project in 2018

Pile removal is anticipated to occur from a barge using a vibratory hammer. Other standard heavy equipment will be used to demolish the upland elements of the Project but only the vibratory hammer is expected to generate underwater noise at a level that is expected to affect marine mammals.

The vibratory removal of timber and steel piles are the only activities that could potentially result in take of marine mammals. The pile removal activity is summarized in Table 1.

Table 1
Pile Removal Plan

Hammer Type¹	Activity Number and Name	Pile Type	Number of Piles	Estimated Dates of Operation	Days of Operation²	Hours per Day	Estimated Maximum Single Source Sound Levels
Vibratory Timber (APE 200 or similar)	1 - Remove timber piles at Pier 63	Timber 14" dia	900	9/1/2022 – 2/15/2023	45 working days	4	152 dB RMS at 10 meters
Vibratory Steel (APE 200 or similar)	2 – Remove steel piles at Pier 63	Steel 30-inch	8	9/1/2022 – 2/15/2023	2 working days	4	163 dB RMS at 10 meters

Notes:

1. Hammer specifications will be determined by the contractor but are expected to be similar to those listed in this table.
2. Days estimate is based on cumulative removal time. Activities will take place over approximately 3 to 4.5 months, and the hours of removal in 1 day in this table is estimated to be the maximum that could occur in any single day, although most days will entail much less vibratory activity.

RMS: root mean square. This is the square root of the energy divided by the duration. This level is the mean square pressure level of the pulse. It has been used by NMFS to describe disturbance-related effects (i.e., harassment) to marine mammals from underwater noises.

Vibratory hammers are commonly used for pile removal where sediments allow. The vibratory hammer is suspended from a crane by a cable and positioned on top of a pile. The pile is then vibrated between 1,200 and 2,400 vibrations per minute (WSDOT 2016). The vibrations liquefy the sediment surrounding the pile, reducing the resistance between the pile and sediments and allowing for the pile to be unseated and removed as the hammer is slowly lifted by the crane. The engineering design team expects the contractor to use an APE 200, 400, 600 or similar vibratory hammer for the Project.

Table 1 summarizes the proposed in-water pile removal plan and single sound source levels used in assessing effects of pile activities. Estimated source sound levels use a conservative value based on recent measured sound levels from Pier 62 and Pier 58 demolition (Laws 2021). Pile removal is expected to occur during the in-water work window in 2022 and 2023, as described in the Estimated Dates of Operation column and below in Section 2.1, Dates and Duration.

1.4 Source Sound Levels

Source sound levels are estimated based on the pile size, removal methodology, and substrate conditions. Ideally, source sound levels would be available for the same project area, pile type, and removal method; however, this is often not possible. Therefore, source sound levels are estimated conservatively using data from similar and recent projects or based on NOAA guidance (NOAA 2018a) when site-specific data are not available.

1.4.1 Background Sound

Background sound is the level that would exist without the proposed activity (pile removal), while ambient sound levels are those without human activity (NOAA 2009). The marine waterway of Elliott Bay is very active, and human factors contribute to background noise levels through ship traffic and fishing-boat depth sounders, for example. Natural elements that contribute to ambient noise include waves, wind, rainfall, current fluctuations, chemical composition, and biological sound sources (e.g., marine mammals, fish, and shrimp; Carr et al. 2006).

Choosing an appropriate background sound level for the Project is important because it partially determines the distance at which source sounds from the Project attenuate to levels that are not considered to harass marine mammals. NOAA's standard background sound level for acoustic evaluations in marine waters is 120 decibels (dB) (NOAA 2018a). Due to a lack of site-specific background noise measurements that NOAA found acceptable for use in this consultation (Laws 2021), the standard 120 dB level will be used in this analysis.

1.4.2 Vibratory Removal of Timber Piles

For vibratory timber pile removal, 152 dB root mean square (RMS) is used as the estimated source sound level based on multiple data sources considered by NOAA and common usage in MMPA documentation (Laws 2021).

1.4.3 Vibratory Removal of Steel Piles

For vibratory steel pile removal, 163 dB RMS is used as the estimated source sound level based on data collected for the Pier 62 Project (Greenbusch Group, 2019). As monitored by Greenbusch, during vibratory driving of 30-inch steel pipe piles, the average unweighted underwater 10-second RMS sound levels produced with an APE 200 Vibratory Driver/Extractor ranged between 138 and 151 decibels (dB) re: 1 micropascal (μPa) and peak values ranged between 153 and 168 dB re: 1 μPa . Average RMS sound levels generated by the APE 400 "King Kong" Vibratory Driver/Extractor ranged between 159 and 162 dB re: 1 μPa and peak values ranged between 180 and 182 dB re: 1 μPa . The APE 600 "Super Kong" Vibratory Driver/Extractor produced RMS sound levels between 147 and 163 dB re: 1 μPa and peak levels between 155 and 168 dB re: 1 μPa . Using 163 dB RMS, which was the highest RMS value recorded is adequately conservative and provides flexibility in the type of equipment to be used.

1.4.4 Potential for Additive Sound Levels

There is the potential for pile removal and installation activities for Waterfront Park (separate application) to be occurring in the fall of 2021 through spring of 2022 in the same work season as for pile removal activities at Pier 63. However, as the only activity occurring at Pier 63 is the removal of timber pilings and a very small number of steel pilings, and the duration of pile installation or

removal activities only occurs for a portion of any day (less than 30 minutes at any time), removal and installation activities at the two piers are unlikely to be occurring at the same time. Further, the sound levels and threshold distances are much less for piling removal than for piling installation so that there is unlikely to be any additive sound levels.

2 Dates, Duration, and Specified Geographic Region

2.1 Dates and Duration

All in-water work with the potential to affect marine mammals will occur during the in-water work window allowed by NOAA, U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the Washington State Department of Fish and Wildlife. For the Project, this window is anticipated to be September 1 through February 15 of any year in which work is authorized for the project. Pile removal will occur during daylight hours, typically during a work shift of 8 hours or less. The Project will take one in-water work season to complete and will be constructed from September 2022 through February 2023 or September 2023 through February 2024, depending on when funding is made available.

Anticipated dates of vibratory hammer operation are included in Table 1 for estimating impacts to marine mammals; however, the exact dates of construction for pile removal will depend on permit approval, other co-occurring construction elements, weather, and potentially unforeseen delays.

2.2 Area of Potential Effects

The Project is located in Seattle, Washington, along the downtown Seattle waterfront at Pine Street (King County, Washington) (Figure 1). The pier is adjacent to land used for businesses, residences, transportation facilities (streets, ferries, cruise ships, etc.), public services (fire station, utilities), city parks, and other recreational elements. The project occurs in Elliott Bay, within the inland Puget Sound.

The Project area is generally referred to as waters of Elliott Bay and Puget Sound within line-of-sight from the construction area, as shown in Figure 2.

3 Species and Numbers of Marine Mammals

The marine mammal species under NOAA's jurisdiction that have the potential to occur in the construction area include Pacific harbor seal *Phoco vitulina*, Northern elephant seal *Mirounga angustirostris*, California sea lion *Zalophus californianus*, Steller sea lion *Eumetopias jubatus*, harbor porpoise *Phocoena phocoena*, Dall's porpoise *Phocoenoides dalli*, Long-beaked common dolphin *Delphinus capensis*, common bottlenose dolphin *Tursiops truncatus*, killer whale (Southern Resident and West Coast transient stocks) *Orcinus orca*, humpback whale *Megaptera novaeangliae*, gray whale *Eschrichtius robustus*, and minke whale *Balaenoptera acutorostris*. Of these, the humpback whale and Southern Resident killer whale are protected under the Endangered Species Act (ESA). Species status and distribution are described in more detail in Section 4.

The Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) is a rare visitor to the inland waters of Puget Sound. Due to the low likelihood of Pacific white-sided dolphin being present in the Project area (The Whale Trail 2020), and no sightings during recent marine mammal monitoring efforts for other projects, impacts are unlikely. Therefore, incidental take of Pacific white-sided dolphin is not requested, and the species are not further discussed in this application.

Table 2 lists all species with expected potential for occurrence in Elliott Bay and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA.

The marine mammal abundance estimates presented in Table 2 represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NOAA's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. All twelve species that could potentially temporally and spatially co-occur with the activity, to a degree that take is reasonably likely to occur, are included in Table 2 and described in Section 4.

Table 2
Marine Mammal Species Potentially Present in Region of Activity

Species	Stock	ESA Status	MMPA Status ¹	Timing and Likelihood of Occurrence	Stock Abundance (CV, N _{min} , most recent abundance survey) ²
Family Eschrichtiidae					
Gray whale <i>Eschrichtius robustus</i>	Eastern North Pacific	Not listed	Not designated	March to May, occasional	26,960 (0.05; 25,849; 2015/2016)
Family Balaenidae					
Humpback Whale <i>(Megaptera novaeangliae)</i>	California/ Washington/ Oregon Stock (Hawaii, Mexico, or Central America DPS) ³	Endangered, Threatened, and not listed (varies by stock)	Designated strategic	Year-round, occasional	2,900 (0.048, 2,784, 2017)
Minke whale <i>(Balaenoptera acutorostr)</i>	California/Oregon/ Washington Stock	Not listed	Not designated	September – January, occasional	636 (0.72, 369, 2014)
Family Delphinidae					
Killer whale <i>(Orcinus orca)</i>	Eastern North Pacific Southern Resident	Endangered	Designated strategic	September – May, occasional	75 (N/A, 75, 2019)
	West Coast Transient	Not listed	Not designated	Year-round, common	243 (N/A, 180, 2009)
Long-beaked common dolphin <i>(Delphinus capensis)</i>	California	Not listed	Not designated	Year-round, occasional	101,305 (0.49; 68,432, 2014)
Bottlenose dolphin <i>(Tursiops truncatus)</i>	California/Oregon/W ashington Offshore	Not listed	Not designated	Year-round, occasional	1,924 (0.54; 1,255, 2014)
Family Phocoenidae					
Harbor porpoise <i>(Phocoena phocoena)</i>	Washington Inland Waters	Not listed	Not designated	May – June peak, common	11,233 (0.37, 8,308, 2015)
Dall's porpoise <i>(Phocoenoides dalli)</i>	California/Oregon/W ashington	Not listed	Not designated	October – February, occasional	25,750 (0.45, 17,954, 2014)

Species	Stock	ESA Status	MMPA Status ¹	Timing and Likelihood of Occurrence	Stock Abundance (CV, N _{min} , most recent abundance survey) ²
Family Phocidae					
Harbor seal (<i>Phoco vitulina</i>)	Washington Northern Inland Waters stock	Not listed	Not designated	Year-round, common	11,036 (0.15, -, 1999)
Northern elephant seal (<i>Mirounga angustirostris</i>)	California breeding	Not listed	Not designated	Unknown, rare	179,000 (N/A; 81,368, 2010)
Family Otariidae					
Steller sea lion (<i>Eumetopias jubatus</i>)	Eastern U.S.	Not listed (delisted)	Not designated	Year-round, occasional	41,638 (N/A, 41,638, 2015)
California sea lion (<i>Zalophus californianus</i>)	U.S.	Not listed	Not designated	Year-round, common	257,606 (N/A, 233,515, 2014)

1. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds the potential biological removal level or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
2. NOAA marine mammal stock assessment reports online at: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For killer whale (Southern Resident), and Humpback whale, the draft 2019 Stock Assessment Reports were used. For all other species, the final 2018 Stock Assessment Reports were used. Note that more recent data for Southern Resident killer whales show the stock at 75 individuals (Center for Whale Research 2021), as described in Section 6, but the stock assessment reports are cited here.
3. When a humpback whale is sighted in Washington inland waters (Puget Sound, Strait of Juan de Fuca, San Juan Islands) it is 43% likely to be from the unlisted Hawaii DPS, 42% likely to be from the threatened Mexico DPS, and 15% likely to be from the endangered Central American DPS (NMFS 2016).

4 Affected Species Status and Distribution

This section describes the status and distribution of the species and stocks of marine mammals likely to be affected by the pile removal during Project construction. The Marine Species Density Database (U.S. Navy 2019) analyzed literature and research for marine mammal density estimates for the inland Puget Sound region. These density estimates and sources specific to the Elliott Bay area are described for each species in Section 6.

The area surrounding Pier 63 has been an active construction zone for many years. Marine mammal monitoring has frequently occurred for projects such as the Elliott Bay Seawall Project, Pier 62 Project, Waterfront Park Emergency Demolition, and Colman Dock Project (ongoing). Monitoring information from those projects was used to inform current estimates of species density and expected sightings, and is included in the following sections, in addition to general species information.

4.1 Pacific Harbor Seal

4.1.1 *General Biology*

The small, stocky Pacific harbor seal is found throughout the temperate and arctic waters of the Northern hemisphere and has the widest distribution of any pinniped (Jeffries et al. 2000). It is considered a non-migratory species, breeding and feeding in the same area throughout the year. In water, harbor seals use their hind flippers for propulsion, but on land they hitch along using only the fore flippers (Jeffries et al. 2000). The harbor seal is the most common and widely distributed pinniped found in Washington waters and is frequently sighted by recreational boaters, ferry passengers, and other users of the marine environment.

Harbor seals use hundreds of sites to rest or haul-out along coastal and inland waters, including intertidal sand bars and mudflats in estuaries; intertidal rocks and reefs; sandy, cobbley, and rocky beaches; islands; and log booms, docks, and floats in all marine areas of the state (Jeffries et al. 2000). Group sizes typically range from small numbers of animals on some intertidal rocks to several thousand animals found seasonally in coastal estuaries. Males and females are similar in size (to 250 pounds) and coloration. Females produce one pup per year, beginning at age four or five. Pups are precocious at birth, capable of swimming and following their mothers into the water immediately after birth, and typically remain with their mothers until weaning at 4 to 6 weeks of age (Jeffries et al. 2000).

4.1.2 *Abundance, Productivity, and Trends*

The Pacific harbor seal is the only pinniped species that is found year-round and breeds in Washington waters (Jeffries et al. 2000). Pupping seasons vary by geographic region, with pups born

in coastal estuaries (Columbia River, Willapa Bay, and Grays Harbor) from mid-April through June; Olympic Peninsula coast from May through July; San Juan Islands and eastern bays of Puget Sound from June through August; southern Puget Sound from mid-July through September; and Hood Canal from August through January (Jeffries et al. 2000). The Washington inland population includes Hood Canal, Puget Sound, and the Strait of Juan de Fuca out to Cape Flattery (Carretta et al. 2019a). In 1999, Jeffries et al. (2003) recorded a mean count of 9,550 harbor seals in Washington's inland marine waters. The most recent estimate for the Washington Northern Inland Waters Stock is 11,036 (Carretta et al. 2019a).

4.1.3 Species Status

The Pacific harbor seal is not currently listed under the ESA. No critical habitat has been designated for this species. Harbor seals are not considered to be a "depleted" or "strategic" stock under the MMPA.

4.1.4 Occurrence in the Area of Potential Effects

Individuals occur along the Elliott Bay shoreline. There is one documented harbor seal haul-out area near Bainbridge Island, approximately 6 miles from Pier 63. The haul-out, which is estimated at less than 100 animals, consists of intertidal rocks and reef areas around Blakely Rocks and is within the area of potential effects but at the outer extent near Bainbridge Island (Jeffries et al. 2000). Harbor seals are a commonly observed marine mammal in the area of potential effects and are known to be comfortable and seemingly curious around human activities.

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which 387 harbor seals were documented as behavioral takes in the Project area (Anchor QEA 2018, 2019a). Numbers of harbor seals observed on the Pier 62 Project ranged from 0 to 54 per day, with a per-day average of 5 in 2018.

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 of the Elliott Bay Seawall Project (EBSP), during which 267 harbor seals were documented as behavioral takes in the Project area (Anchor QEA 2014, 2015, 2016, and 2017). Numbers of harbor seals observed on the EBSP project varied from zero to seven per day, with an average of one, one, two, and three observed daily in 2014, 2015, 2016, and 2017, respectively.

Marine mammal monitoring occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition, during which 13 harbor seals were documented as Level B takes (Anchor QEA 2021).

Results of other marine mammal monitoring in the vicinity of the project in recent years are as follows:

- 2012 Seattle Slip 2 Batter Pile Project: Six harbor seals were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSF 2012).
- 2016 Seattle Test Pile Project: 56 harbor seals were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSF 2016).
- 2017-18 Seattle Multimodal Colman Dock Project (Colman Dock Project): 813 harbor seals were observed over 99 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2019).

4.2 Northern Elephant Seal

4.2.1 *General Biology*

Northern elephant seals breed and give birth in California (U.S.) and Baja California (Mexico), primarily on offshore islands (Stewart et al. 1994), from December to March (NOAA 2015). Males migrate to the Gulf of Alaska and western Aleutian Islands along the continental shelf to feed on benthic prey, while females migrate to pelagic areas in the Gulf of Alaska and the central North Pacific Ocean to feed on pelagic prey (Le Boeuf et al. 2000). Adults return to land between March and August to molt, with males returning later than females. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons (NOAA 2015).

4.2.2 *Abundance, Productivity, and Trends*

Northern elephant seals are found in the eastern and central North Pacific Ocean. Though they range as far north as Alaska and as far south as Mexico, they typically breed in the Channel Islands of California or Baja California in Mexico. Once thought to be extinct due to commercial sealing in the 1800s, the population began to steadily increase in the early 1900s (NOAA 2016a, 2016b). The population is currently estimated to be 179,000 (NOAA 2017).

4.2.3 *Species Status*

Northern elephant seals are not currently listed under the ESA. No critical habitat has been designated for this species. Northern elephant seals are not considered to be a “depleted” or “strategic” stock under the MMPA.

4.2.4 *Occurrence in the Area of Potential Effects*

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which no elephant seals were observed in the project area (Anchor QEA 2018 and 2019a). Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 of the EBSP, also during which no elephant seals were observed in the project area (Anchor QEA 2014, 2015, 2016, and

2017). Marine mammal monitoring occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition, during which no elephant seals were observed (Anchor QEA 2021).

Similarly, no elephant seals were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project or the 2016 Seattle Test Pile Project (WSF 2012, 2016). However, elephant seals have been observed by Protected Species Observers near the Project area during non-project activities. Washington State Ferries' Burt Miller reports observations of elephant seals in April 2015 and August 2017 near Maury Island, and near Alki Point in August 2017 (WSDOT 2019). Anchor QEA's Sarah Montgomery reports observations of a single female elephant seal in Saratoga passage in August 2019 (Montgomery 2020). Based on these observations, elephant seals appear to be rare visitors to the inland Puget Sound.

4.3 California Sea Lion

4.3.1 General Biology

The California sea lion is the most frequently sighted pinniped found in Washington waters and uses haul-out sites along the outer coast, Strait of Juan de Fuca, and in Puget Sound (Jeffries et al. 2000). Haul-out sites are located on jetties, offshore rocks and islands, log booms, marina docks, and navigation buoys. This species also may be frequently seen resting in the water, rafted together in groups in Puget Sound (Jeffries et al. 2000). Only male California sea lions migrate into Pacific Northwest waters, with females remaining in waters near their breeding rookeries off the coast of California and Mexico. Sea lions feed on a variety of fish including various salmonids, rockfish, forage fish, shellfish, and squid (Jeffries et al. 2000).

4.3.2 Abundance, Productivity, and Trends

The California sea lion was considered rare in Washington waters prior to the 1950s. More recently, peak numbers of 3,000 to 5,000 animals move into Pacific Northwest waters (i.e., Washington and British Columbia) during the fall and remain until late spring, when most return to breeding rookeries in California and Mexico (Jeffries et al. 2000).

The U.S. stock of California sea lion breeds in California and southern Oregon between May and July; California sea lions do not breed in Washington. Because California sea lions do not breed in Washington, accurate and up-to-date estimates of the non-breeding population in Washington alone are difficult to determine and not available. Estimates from the 1980s suggest that the population size was fewer than 3,000 by the mid-1980s (Bigg 1985). The number of California sea lions in Washington had stabilized by the 1990s (Calambokidis and Baird 1994). In 2014, NOAA estimates the minimum population size for the entire California breeding area to be taken as the lower 95% confidence interval of the 2014 population size estimate, or 233,515 animals, which is a

conservative estimate (Carretta et al. 2019a). California sea lion populations increased between 1975 and 2014, and years in which there were declines in survival often correspond to El Niño weather patterns (Carretta et al. 2019a). The population is currently estimated to be 257,606 (Carretta et al. 2019a).

4.3.3 Species Status

California sea lions are not currently listed under the ESA. No critical habitat has been designated for this species. California sea lions are not considered to be a “depleted” or “strategic” stock under the MMPA.

4.3.4 Occurrence in the Area of Potential Effects

California sea lions are often observed in the area of potential effects and are known to be comfortable and seemingly curious around human activities. There are four documented haul-out areas near Bainbridge Island, approximately 6 miles from Pier 63, and two documented haul-out areas between Bainbridge Island and Magnolia (Jefferies et al. 2000). The haul-outs consist of buoys and floats, and some are within the area of potential effects, but at the outer extent, and some are just outside the area of potential effects (Jefferies et al. 2000).

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which 541 California sea lions were documented as behavioral takes in the project area (Anchor QEA 2018 and 2019). Numbers of California sea lions observed on the Pier 62 Project ranged from 0 to 31 per day, with a per-day average of 6 in 2018. More than half (288 of 531) of California sea lion takes occurred near Alki Point where animals were frequently observed resting on two navigational buoys in the southwest area of Elliott Bay.

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 of the EBSP, during which 951 California sea lions were documented as behavioral takes in the project area (Anchor QEA 2014, 2015, 2016, and 2017). California sea lions were frequently observed (average seven per day in 2014 and 2015, and three per day in 2016 and 2017) hauled out on the same two navigational buoys within the project area and swimming along the shoreline near the project.

Marine mammal monitoring occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition, during which 13 California sea lions were documented as Level B takes (Anchor QEA 2021).

Results of other marine mammal monitoring in the vicinity of the project in recent years are as follows:

- During the 2012 Seattle Slip 2 Batter Pile project, 15 California sea lions were observed during this 1-day project in the area that corresponds to the upcoming project ZOIs (WSF 2012).

- During the 2016 Seattle Test Pile project, 12 California sea lions were observed over 10 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was four (WSF 2016).
- During the 2017-18 portion of the Colman Dock Project, 1,047 California sea lions were observed over 99 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2019).

4.4 Steller Sea Lion

4.4.1 *General Biology*

Steller sea lions are colonial breeders. Adult males, known as bulls, establish and defend territories on rookeries to mate with females. Bulls sexually mature between 3 and 8 years of age, but typically are not large enough to hold territory successfully until 9 or 10 years of age. Mature males may go without eating for 1 to 2 months while aggressively defending their territory. Females, known as cows, typically reproduce for the first time at 4 to 6 years of age, usually giving birth to a single pup each year. At birth, pups are about 3.3 feet (1 meter) in length and weigh 35 to 50 pounds (16 to 22.5 kilograms). Adult females stay with their pups for a few days after birth before beginning a regular routine of alternating foraging trips at sea with nursing their pups on land. Female Steller sea lions use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups. Females usually mate again with males within 2 weeks after giving birth. Males can live to be up to 20 years old, while females can live to be 30 (summarized from NOAA 2014).

Steller sea lions prefer the colder temperate to sub-arctic waters of the North Pacific Ocean. Haul-outs and rookeries usually consist of beaches (gravel, rocky, or sand), ledges, and rocky reefs. In the Bering Sea and Okhotsk Sea, this species may also haul-out on sea ice, but this is considered atypical behavior (NOAA 2020a).

Steller sea lions are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes such as salmonids, rockfish, forage fish, bivalves, cephalopods, and gastropods. Steller sea lions forage in the nearshore and in pelagic waters. They are capable of traveling long distances in a season and can dive to approximately 1,300 feet (400 meters). Their diet may vary seasonally, depending on the abundance and distribution of prey. They may disperse and range far distances to find prey but are not known to migrate.

4.4.2 *Abundance, Productivity, and Trends*

There are two separate stocks of Steller sea lions: the eastern stock and the western stock. The two populations are delineated at Cape Suckling, Alaska (NOAA 2014). The minimum estimated eastern Steller sea lion population is estimated at 41,638 individuals (Carretta et al. 2019a). The estimated

total population size, based on 2015 data, is 19,423 pups and 52,139 non-pups, not accounting for animals at sea (Carretta et al. 2019a).

4.4.3 *Species Status*

The eastern stock of Steller sea lions is not listed as “depleted/strategic” under the MMPA and was “delisted” under the ESA on November 4, 2013 (78 Federal Register [FR] 66140).

4.4.4 *Occurrence in the Area of Potential Effects*

Steller sea lions are, at most, a rare visitor to the Pier 63 area of potential effects. Steller sea lions use haul-out locations in Puget Sound, and may occur at the same haul-outs as California sea lions.

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which no Steller sea lions were documented as takes in the Project area, and one was observed in September 2018 (Anchor QEA 2018, 2019).

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 of the EBSP, during which three Steller sea lions were observed and documented as behavioral takes in the project area (Anchor QEA 2014, 2015, 2016, and 2017).

Marine mammal monitoring occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition, during which 4 Steller sea lions were documented as Level B takes (Anchor QEA 2021).

No Steller sea lions were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project and the 2016 Seattle Test Pile Project (WSF 2012, 2016). During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 54 Steller sea lions were observed.

4.5 Harbor Porpoise and Dall’s Porpoise

Harbor porpoise and Dall’s porpoise species are analogous in natural history and distribution in regard to the proposed Project and are therefore described and assessed together.

4.5.1 *General Biology*

Harbor porpoises have a small, robust body with a short, blunt beak. Females are slightly larger than males. Harbor porpoises inhabit northern temperate and subarctic coastal and offshore waters. They are commonly found in bays, estuaries, harbors, and fjords less than 650 feet (200 meters) deep. They feed on demersal and benthic species, mainly schooling fish and cephalopods.

Dall’s porpoises are fast-swimming members of the porpoise family and are common in the North Pacific Ocean. They prefer temperate or cooler waters that are more than 600 feet (180 meters) deep and with temperatures between 36 F and 63 F (2 C and 17 C). They can be found in offshore, inshore,

and nearshore oceanic waters. They feed on small schooling fish, mid- and deep-water fish, cephalopods, and occasionally crabs and shrimp. Feeding usually occurs at night when their prey vertically migrates up toward the water surface. Dall's porpoises can dive up to 1,640 feet (500 meters) to reach their prey (NOAA 2020b).

4.5.2 Abundance, Productivity, and Trends

There are 10 stocks of harbor porpoises in U.S. waters. NOAA Stock Assessment Reports include estimated population sizes for the 10 U.S. stocks. The Washington Inland Waters Stock is the most likely to occur in waters near the Project. The population is currently estimated to be 11,233 (Carretta et al. 2019a).

For management purposes, Dall's porpoises inhabiting U.S. waters have been divided into two stocks: the Alaska stock and the California/Oregon/Washington (CA-OR-WA) stock. For both stocks, insufficient data are available to understand their current population trends. The population of the CA-OR-WA stock is currently estimated to be 25,750 (Carretta et al. 2019a).

4.5.3 Species Status

Neither harbor porpoise nor Dall's porpoise are currently listed under the ESA. No critical habitat has been designated for these species. They are not considered to be "depleted" or "strategic" stocks under the MMPA.

4.5.4 Occurrence in the Area of Potential Effects

Harbor porpoises are known to occur year-round in the inland trans-boundary waters of Washington and British Columbia, Canada (Carretta et al. 2019a). Although differences in density exist between coastal Oregon/Washington and inland Washington waters, a specific stock boundary line cannot be identified based upon biological or genetic differences. However, harbor porpoise movements and rates of intermixing within the eastern North Pacific Ocean are restricted, and there has been a significant decline in harbor porpoise sightings within southern Puget Sound since the 1940s; today, harbor porpoises are rarely observed but may be increasing in abundance (Carretta et al. 2019a). The minimum annual human-caused mortality of Washington Inland Waters stock is at minimum 7.2 individuals annually (Carretta et al. 2019a). It is likely that harbor porpoises only rarely occur in the area of potential effects.

Dall's porpoises are endemic to temperate waters of the North Pacific Ocean. Off the U.S. West Coast, they are commonly seen in shelf, slope, and offshore waters. Sighting patterns from aerial and shipboard surveys conducted in California, Oregon, and Washington at different times suggest that north-south movement between these states occurs as oceanographic conditions change, both on seasonal and inter-annual time scales. Dall's porpoises are rarely reported in the area of potential effects. The mean annual human-caused mortality in Puget Sound is approximately 0.3 individuals, or

approximately one individual every few years (Carretta et al. 2019a). It is likely that Dall's porpoise only rarely occurs in the area of potential effects.

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which 23 harbor porpoises were documented as behavioral takes in the Project area; no Dall's porpoises were observed (Anchor QEA 2018 and 2019). Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 (2014, 2015, 2016, and 2017) of the EBSF, during which one harbor porpoise was observed and documented as a take in the project area; no Dall's porpoises were observed (Anchor QEA 2014, 2015, and 2016).

One harbor porpoise and no Dall's porpoises were documented as Level B takes during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

Neither harbor porpoise nor Dall's porpoise were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project and the 2016 Seattle Test Pile Project (WSF 2012, 2016). During the 99 monitoring days of the 2017/18 Colman Dock Project, 288 harbor porpoises were observed (WSDOT 2019).

4.6 Long-Beaked Common Dolphin

4.6.1 General Biology

Long-beaked common dolphins are relatively small dolphins that can reach lengths of 6 to 8.5 feet (NOAA 2020c). Long-beaked common dolphins generally prefer shallow, tropical, subtropical and warmer temperate waters closer to the coast (usually within 50 to 100 nautical miles and on the continental shelf). Long-beaked common dolphins are usually found in large social groups averaging from 100 to 500 animals but have been occasionally seen in larger herds of thousands of individuals. These large schools are thought to consist of smaller sub-groups of 10 to 30 animals that are possibly related or separated by age and/or sex. These gregarious, energetic dolphins are commonly seen swimming rapidly, porpoising, and frequently engaging in other active surface behavior (NOAA 2020c).

4.6.2 Abundance, Productivity, and Trends

Long-beaked common dolphins are commonly found along the U.S. West Coast, from Baja, California (including the Gulf of California), northward to about central California (NOAA 2020c). Long-beaked common dolphins inhabiting west coast U.S. waters are considered to be in the California stock, which is currently estimated at 101,305 (Carretta et al. 2019a).

4.6.3 *Species Status*

The California stock of long-beaked common dolphins is not currently listed under the ESA. No critical habitat has been designated for this species. They are not considered to be a “depleted” or “strategic” stock under the MMPA.

4.6.4 *Occurrence in the Area of Potential Effects*

Long-beaked common dolphins are rarely observed in inland Washington waters.

Marine mammal monitoring occurred over 104 days during Seasons 1 and 2 of the Pier 62 Project, during which no long-beaked common dolphins were documented as takes in the Project area (Anchor QEA 2018 and 2019).

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 (2014, 2015, 2016, and 2017) of the EBSP, during which no common dolphins were observed in the project area (Anchor QEA 2014, 2015, 2016, and 2017).

No long-beaked common dolphins were observed during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

No long-beaked common dolphins were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project or the 2016 Seattle Test Pile Project (WSF 2012, 2016). However, there were reported sightings in the Puget Sound in the summer of 2016. Beginning on June 16, common dolphins were observed near Victoria, B.C. Over the following weeks, a pod of 15 to 20 (including a calf) was observed in central and southern Puget Sound. They were positively identified as long-beaked common dolphins (Orca Network 2016). This is the first confirmed observation of a pod of long-beaked common dolphins in Washington waters—NOAA states that as of 2012, long-beaked common dolphins had not been observed during surveys in Washington waters (NOAA 2020c). Two individual long-beaked common dolphins were observed in 2011: one in August and one in September (Whale Museum 2015). During the 99 monitoring days of the 2017/18 Colman Dock Project, 2 common dolphins were observed. 29 unidentified dolphins/porpoises were also observed, so the number of common dolphins in the area may be greater (WSDOT 2019).

4.7 Common Bottlenose Dolphin

4.7.1 *General Biology*

Common bottlenose dolphins are light gray to black with a robust body and short, thick beak (NOAA 2020d). They primarily feed on invertebrates, squids, and fishes, and forage individually and in groups. They range in size from 6 to 12.5 feet and 300 to 1,400 pounds, with males slightly larger

than females (NOAA 2020d). Bottlenose dolphins use echolocation to locate and capture prey, and strike fish with their flukes to knock them out of the water as one feeding strategy, termed “fish-whacking.” They are found in temperate and tropical waters around the world, and coastal and offshore stocks generally inhabit different waters. Female bottlenose dolphins reach sexual maturity between 5 and 13 years and calve on average every 3 to 6 years. Bottlenose dolphins are long-lived and females can be greater than 50 years old. They commonly are found in groups of 2 to 15 individuals, and in offshore environments can herd with hundreds of individuals (NOAA 2020d).

4.7.2 Abundance, Productivity, and Trends

Common bottlenose dolphins inhabiting west coast U.S. waters are considered to be in either the California coastal stock, which ranges from Mexico to the San Francisco area within approximately 1 kilometer of shore, or the California/Oregon/Washington offshore stock, for which NOAA surveys range into Washington, but most individuals are sighted off the shore of California. Common bottlenose dolphins in the California/Oregon/Washington offshore stock are commonly found along the California coast, northward to about the Oregon border (NOAA 2020d). This application addresses the California/Oregon/Washington offshore stock due to its higher likelihood to occur in the project area. This stock is currently estimated at 1,924 (Carretta et al. 2019a). Trend analyses for this stock have not been performed to date because other stocks have more urgent conservation concerns (Carretta et al. 2019a).

4.7.3 Species Status

The California/Oregon/Washington offshore stock of common bottlenose dolphins is not currently listed under the ESA. No critical habitat has been designated for this species. They are not considered to be a “depleted” or “strategic” stock under the MMPA.

4.7.4 Occurrence in the Area of Potential Effects

Bottlenose dolphins are approximately distributed worldwide from latitudes 45 degrees north to 45 degrees south. It is not expected that they would occur in the project area (Carretta et al. 2019a). NOAA offshore surveys from 1991 to 2014 resulted in no sightings during study transects off the Oregon or Washington coasts (Carretta et al. 2019a). In October 2017, however, multiple sightings of a bottlenose dolphin were reported to Orca Network throughout the Puget Sound and in Elliott Bay. One sighting in Carr Inlet on October 10, 2017, was confirmed by John Calambokidis of Cascadia Research (Orca Network 2017). During marine mammal monitoring for the Colman Dock Project, four bottlenose dolphins were observed in Elliott Bay in 99 days of monitoring (WSDOT 2019). It is acknowledged that bottlenose dolphins could occur within the project area.

No bottlenose dolphins were observed during monitoring for the Pier 52, EBSF, the 2012 Seattle Slip 2 Batter Pile Project or the 2016 Seattle Test Pile Project (Anchor QEA 2014, 2015, 2016, 2017 and

2018; WSF 2012, 2016). No bottlenose dolphins were observed during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

4.8 Killer Whale

Individuals from the Southern Resident killer whale (SRKW) distinct population segment (DPS) are expected to have the highest potential to occur in the area of potential effects. As a result, they will be the DPS of primary focus in this document. Transient killer whales may occasionally occur and are discussed where appropriate.

4.8.1 General Biology

Although relatively little is known about the winter movements and range of SRKW, they have been seen in coastal waters off Oregon, Washington, Vancouver Island, central California, and the Queen Charlotte Islands (NOAA 2006). They are known to move through Elliott Bay on occasion but typically remain offshore and out of the area of potential effects. Killer whale pods aggregate temporarily throughout the year and are often seen traveling and socializing together (Osborne et al. 1988; Osborne 1999; Ford et al. 2000; Kriete 2007). Breeding is assumed to also take place during these social encounters, although it has never reliably been observed in the wild. Though mating is thought to occur from May to October, young are born year-round (Osborne et al. 1988; Osborne 1999; Ford et al. 2000; Kriete 2007). Gestation averages 17 months in captive situations (Asper et al. 1988; Walker et al. 1988; Duffield et al. 1995). Killer whales are known to be polygamous, and males commonly mate with females outside their pods (Dahlheim and Heyning 1999; Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001). Female and male SRKWs reach sexual maturity at about 15 years of age.

Killer whale females are estimated to live between 80 and 90 years and 50 to 60 years for males (Olesiuk et al. 1990). The life expectancy at birth ranges from 17 years for males to 29 years for females (Olesiuk et al. 1990). That number increases greatly for whales that survive the first 6 months of life, from 29 years for males to between 50 and 60 years for females.

Southern resident killer whales feed primarily on salmonids and other marine fishes. They are often found in and around Puget Sound during the summer and early fall pursuing migrating salmon (Osborne et al. 1988; Osborne 1999; Kriete 2007). At times, they have also been observed preying on marine mammals including pinnipeds and other cetaceans (NOAA 2006). Their unique foraging strategies include cooperative hunting, food sharing, and innovative learning (Smith et al. 1981; Pitman et al. 2003). However, very little is known about winter feeding habits of SRKWs.

4.8.2 Abundance, Productivity, and Trends

The SRKW DPS is composed of three pods: J, K, and L pods, totaling 75 whales as of the most recent formal abundance survey (Carretta et al. 2019b). However, the Southern Residents are tracked by nonprofit groups, research entities, and federal agencies so their current population status is often updated based on more recent encounters. As of July 1, 2019, the population was determined to be 73 (CWR 2020). With one member of the population held in captivity at the Miami Seaquarium, the population in the wild totals 72 whales. They are found in and around Puget Sound and the San Juan Islands during the summer and early fall feeding on migrating salmon, and J pod is the most commonly observed pod in that area (Osborne et al. 1988; Osborne 1999, 2008; Kriete 2007). More commonly, the pods are found in Haro Strait, Boundary Passage, the southern Gulf Islands, eastern portions of the Strait of Juan de Fuca, and in the southern Strait of Georgia (Heimlich-Boran 1988; Felleman et al. 1991; Olson 1998; Ford et al. 2000). This DPS has experienced a marked decline in recent years, and all three pods along the Strait of Juan de Fuca and in Hood Canal may be moving towards extinction (NOAA 2006).

The West Coast transient stock is composed of two populations: the outer coast and the inner coast subpopulations. Current estimates of the inner coast population is 243 individuals (Carretta et al. 2019a).

4.8.3 Species Status

The SRKW DPS was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). Critical habitat was designated on November 29, 2006 (71 FR 69054) and includes all marine waters greater than 20 feet in depth. Critical habitat for this DPS includes three specific areas: the summer core area in Haro Strait and waters around the San Juan Islands, Puget Sound, and the Strait of Juan de Fuca (NOAA 2006). By formally receiving a listing status as endangered under the ESA, SRKW were automatically considered as a “strategic” stock under the MMPA. This stock was considered “depleted” prior to its 2005 listing under the ESA. Transient killer whales are currently listed as “depleted” but have no listing status under the ESA.

4.8.4 Occurrence in the Area of Potential Effects

A long-term database maintained by the Whale Museum contains sightings and geospatial locations of SRKWs, among other marine mammals, in inland waters of Washington State (Osborne 2008). Data are largely based on opportunistic sightings from a variety of sources (i.e., public reports, commercial whale watching, Soundwatch, Lime Kiln State Park land-based observations, and independent research reports) but is regarded as a robust but difficult to quantify inventory of occurrences. The data provide the most comprehensive assemblage of broad-scale habitat use by the DPS in inland waters.

Based on reports from 1990 to 2008, the greatest number of unique killer whale sighting-days near or in the area of potential effects occurred from November through January, although observations were made during all months except May (Osborne 2008). Most observations were of SRKWs passing west of Alki Point (82% of all observations), which lies on the edge or outside the area of potential effects; this pattern is potentially due to the high level of human disturbance or highly degraded habitat currently found within Elliott Bay. Of the pods that comprise this DPS, J Pod, with an estimated 24 members, is the pod most likely to appear year-round near the San Juan Islands, in the lower Puget Sound near Seattle, and in Georgia Strait at the mouth of the Fraser River. J Pod tends to frequent the west side of San Juan Island in mid to late spring (CWR 2020).

Killer whales were observed on 4 of 104 monitoring days for the Pier 62 Project, with behavioral takes documented on 2 days. A ferry-based monitor observed 5 killer whales in the main channel of the Puget Sound, assumed to be Southern Resident J Pod based on Orca Network data in November 2018. 11 killer whales were observed, again near the main channel of Puget Sound in January 2019, but were determined to be transients (Anchor QEA 2018 and 2019).

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 (2014, 2015, 2016, and 2017) of the EBSF, during which one killer whale was documented as a behavioral take in the project area (unknown if SRKW or transient), and one pod of six killer whales was also observed in Elliott Bay within the 30-minute window before or after pile driving activity (Anchor QEA 2014, 2015, 2016, and 2017). The killer whales were not identified as SRKW or transients.

No killer whales were documented as Level B takes during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

No SRKW were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project or the 2016 Seattle Test Pile Project (WSF 2016). During the 99 monitoring days of the 2017/18 Colman Dock Project, 148 Southern Residents were observed in the area (multiple sightings of some members of the J pod) (WSDOT 2019).

4.9 Humpback Whale

4.9.1 General Biology

Humpback whales are baleen whales known for their long pectoral fins. They feed primarily on krill, plankton, and small fish, consuming up to 3,000 pounds per day. As with other baleen whales, the adult females are larger than adult males, with lengths reaching 60 feet. Humpbacks are grey in color, with significant variation such that the patterns on the undersides of the flukes can be used to identify individual whales.

Humpback whales have the longest migration of any mammal. Individuals of the Mexico DPS have been observed to make the 3,000-mile trip between Alaska and Hawaii in as little as 36 days. Humpbacks spend the warmer months in norther latitudes feeding and building fat stores; they migrate south during the winter for the breeding season (NOAA 2020e). However, it is not uncommon to observe individuals in Washington waters during the winter.

4.9.2 Abundance, Productivity, and Trends

The global humpback whale population was significantly reduced by commercial whaling in the 1800s and early 1900s. However, protections were implemented in the 1960s and 1970s, and humpback whale populations are recovering (Best et al. 2015).

There are two potential DPSs occurring within the project area: the Mexico DPS and the Central America DPS. Whales from three different DPSs (Central America, Mexico, and Hawaii) are included in the MMPA stock identified as the "California/Oregon/Washington Stock." The current estimate for the CA-OR-WA stock is 2,900 (Carretta et al. 2019b).

4.9.3 Species Status

For the MMPA stock assessment reports (Carretta et al. 2019b), the CA-OR-WA Stock is defined to include humpback whales that feed off the west coast of the United States, including animals from both the California-Oregon and Washington-southern British Columbia feeding groups. The Mexico DPS of humpback whales feeds along the Washington coast, and is listed as "threatened" under the ESA (81 FR 62259). The Central America DPS also is known to feed in the Washington-southern British Columbia area, and is listed as "endangered" (81 FR 62259). Consequently, the CA-OR-WA stock is automatically considered as a "depleted" and "strategic" stock under the MMPA. A recovery plan was adopted in 1991 (NOAA 1991).

4.9.4 Occurrence in the Area of Potential Effects

Humpback whales are found in coastal waters of Washington as they migrate from feeding grounds in Alaska to California to winter breeding grounds in Mexico. Humpbacks are only rare visitors to Puget Sound. In 1976 and 1978, two sightings were reported in Puget Sound and one sighting was reported in 1986 (Osborne et al. 1988; Calambokidis and Steiger 1990; Calambokidis and Baird 1994).

Humpback whales were observed on 2 of the 104 monitoring days for the Pier 62 Project, with behavioral takes documented on both days in February 2019 (Anchor QEA 2019).

Marine mammal monitoring occurred on 175 days during Seasons 1, 2, 3, and 4 (2014, 2015, 2016, and 2017) of the EBSF, during which two humpback whales were observed in the project area (Anchor QEA 2014, 2015, 2016, and 2017), with one documented behavioral take during Season 2.

No humpback whales were observed during monitoring for the 2012 Seattle Slip 2 Batter Pile Project, 2016 Seattle Test Pile Project, or 2017/18 Colman Dock Project (WSF 2012, 2016; WSDOT 2018). Additionally, one humpback whale was struck by a Washington State Ferries vessel on May 28, 2019, in an area overlapping with the project.

No humpback whales were documented as Level B takes during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

4.10 Gray Whale

4.10.1 General Biology

Gray whales spend April through November in Arctic feeding grounds and December through April in Mexican breeding areas. Between October and February, the species migrates south along the West Coast, returning north between February and July.

The gray whale is unique among cetaceans as a bottom-feeder that rolls onto its side, sucking up sediment from the seabed. Benthic organisms that live in the sediment are trapped by baleen plates as water and silt are filtered out. Gray whales feed in shallow waters, usually 150 to 400 feet deep. Adults can consume 1 to 1.5 tons of food per day during peak feeding periods (Rugh et al. 2001).

4.10.2 Abundance, Productivity, and Trends

Systematic counts of Eastern North Pacific gray whales migrating south along the central California coast have been conducted by shore-based researchers most years since 1967. The current population estimate is 20,960 gray whales (Carretta et al. 2019a). In contrast, the Western North Pacific population remains highly depleted, and its continued survival is questionable. This population is estimated to include fewer than 100 individuals.

4.10.3 Species Status

The Eastern North Pacific stock of the gray whale, which is found in Washington waters, has been delisted under the ESA. The Western North Pacific stock of gray whales that does not occur in the Pacific Northwest has not recovered and remains listed as endangered.

4.10.4 Occurrence in the Area of Potential Effects

Eastern North Pacific gray whales occur frequently off the coast of Washington during their southerly migration in November and December, and northern migration from March through May (Rugh et al. 2001). Gray whales are observed in Washington inland waters regularly between the months of January and September, with peaks between March and May (CWR 2020). Gray whale sightings are typically reported in February through May and include an observation of a gray whale off the ferry

terminal at Pier 52 heading toward the East Waterway in March 2010 (CWR 2020). Additionally, one gray whale carcass washed up underneath Colman Dock in January 2015, which is just south of Waterfront Park. It is assumed that gray whales might rarely occur in the area of potential effects.

No gray whales were observed during monitoring for the EBSP, the 2012 Seattle Slip 2 Batter Pile Project, 2016 Seattle Test Pile Project. (Anchor QEA 2014, 2015, 2016, 2017, 2018; WSF 2012, 2016). Though no gray whales were reported during monitoring for 2017-2018 Colman Dock Project (WSDOT 2019), unpublished data from WSDOT in 2018 and 2019 show a few sightings of gray whales: in December 2018, January 2019, and November 2019 (WSDOT, unpublished data).

No gray whales were documented as Level B takes during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

4.11 Minke Whale

4.11.1 General Biology

Minke whales have small dark sleek bodies and a small dorsal fin; they are often recognized by surfacing snout first and a shallow but visible “bushy” blow. These baleen whales are usually sighted individually or in small groups of two to three, but there are reports of loose aggregations of up to 400 animals associated with feeding areas in higher latitudes (NOAA 2020f). Minke whales prefer temperate to boreal waters, but are also found in tropical and subtropical region; they can be found in both coastal/inshore and oceanic/offshore areas. They feed most often in cooler waters at higher latitudes (NOAA 2020f).

4.11.2 Abundance, Productivity, and Trends

Minke whales migrate seasonally and are capable of traveling long distances. Some animals and stocks of this species have resident home ranges and are not highly migratory. The distribution of minke whales varies by age, reproductive status, and sex. Older mature males are commonly found in the polar regions in and near the ice edge, and often in small social groups, during the summer feeding season. Mature females will also migrate farther into the higher latitudes, but generally remain in coastal waters. Immature animals are more solitary and usually stay in lower latitudes during the summer. In U.S. waters, minke whales in Alaskan waters are migratory, but animals in the inland waters of CA-OR-WA are considered “residents” because they establish home ranges (NOAA 2020e). The population is currently estimated to be 636 (Carretta et al. 2019a).

4.11.3 Species Status

Minke whales are not listed under the ESA and are classified as “non-depleted” under the MMPA.

4.11.4 Occurrence in the Area of Potential Effects

The CA-OR-WA stock of minke whale may be found near the project site. The CA-WA-OR stock is considered a resident stock (Carretta et al. 2019a) and includes minke whales within the inland Washington waters of Puget Sound and the San Juan Islands (Dorsey et al. 1990; Carretta et al. 2019a).

Minke whales are reported in Washington inland waters year-round, although few are reported in the winter (Calambokidis and Baird 1994). They are relatively common in the San Juan Islands and Strait of Juan de Fuca (especially around several of the banks in both the central and eastern Strait), but are relatively rare in Puget Sound. For example, on October 1, 2017, one Minke whale was reported on the west side of Whidbey Island (Orca Network 2017); however, none have been reported inside the project area by Orca Network.

No minke whales were observed during monitoring for the EBSP, the 2012 Seattle Slip 2 Batter Pile Project or the 2016 Seattle Test Pile Project (Anchor QEA 2014, 2015, 2016, and 2017; WSF 2012, 2016). One minke whale was observed during monitoring for the Colman Dock Project, in October 2019 (WSDOT, unpublished data). No Minke whales were documented as Level B takes during marine mammal monitoring that occurred over 51 days, between October 20, 2020, and February 10, 2021, for the Waterfront Park Emergency Demolition (Anchor QEA 2021).

5 Type of Incidental Take Authorization Requested

The MMPA defines “harassment” as:

any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (50 C.F.R., Part 216, Subpart A, Section 216.3 Definitions).

Level A is the more severe form of harassment because it may result in injury or death, whereas Level B harassment causes only disturbance, with no potential for injury.

The 2018 NOAA acoustical guidance identifies the received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute, incidental exposure to all underwater anthropogenic sound sources.

PTS onset acoustic thresholds (Level A harassment) for all sound sources are divided into two broad categories: impulsive and non-impulsive (Table 3). Acoustic thresholds are also presented as dual metric acoustic thresholds using cumulative sound exposure level (SEL_{cum}) and peak sound pressure (PK) metrics for impulsive sounds. As dual metrics, NOAA considers onset of PTS to have occurred when either one of the two metrics is exceeded. NOAA’s alternative methods for development of PTS isopleths apply only to acoustic thresholds in the SEL_{cum} metric. Based on the proposed Project details, no component of the action will include work that is expected to exceed the peak sound pressure level (SPL) PK thresholds for PTS or TTS, and no evaluations were required to identify take related to PK thresholds. Therefore, the type of incidental take requested is based on exceedance of the acoustic thresholds in the SEL_{cum} metric and the disturbance thresholds identified in Section 13.

Table 3
Acoustic Thresholds for Non-Impulsive and Impulsive Sounds

Hearing Group	Non-Impulsive Permanent Threshold Shift Onset	Impulsive Permanent Threshold Shift Onset
Low-frequency Cetaceans	199 dB SEL _{cum}	183 dB SEL _{cum}
Mid-frequency Cetaceans	198 dB SEL _{cum}	185 dB SEL _{cum}
High-frequency Cetaceans	173 dB SEL _{cum}	155 dB SEL _{cum}
Phocid Pinnipeds (Underwater)	201 dB SEL _{cum}	185 dB SEL _{cum}
Otariid Pinnipeds (Underwater)	219 dB SEL _{cum}	203 dB SEL _{cum}

5.1 Type of Take Requested

Under Section 101(a)(5)(D) of the MMPA, the City of Seattle requests an IHA for activities anticipated to begin within the in-water work window starting September 1, 2022. Level B incidental take by acoustical harassment is requested for marine mammals that may occur in the Project area during the construction activities. Vibratory pile removal is the only construction activity with potential for causing take.

The PTS isopleths were identified for each hearing group for vibratory removal methods that will be used in the Project, as described in Section 1. The PTS isopleth distances were calculated using the NOAA acoustic threshold calculator (Appendix A), with inputs based on surrogate noise measurements from other sources and estimating conservative working durations, as described in Section 1.5. Injury within the PTS isopleth would be consistent with Level A take, and therefore an Exclusion Zone will be established such that work will stop if animals are present within the Exclusion Zone established for each hearing group based on the PTS isopleth calculated for the proposed pile installation and removal actions. Take requested in this application is entirely Level B acoustical harassment, with take requested as described in Section 6. Table 4 summarizes the Level A and Level B zones.

Table 4
Summary of Level A Exclusion Zone Thresholds and Level B Harassment Thresholds

Hearing Group	Level A Exclusion Zone Thresholds (meters)	Level B Harassment Zone (meters)	Pile Activity
Low-frequency cetaceans	6	1,359	Vibratory Timber
	19	7,357	Vibratory Steel
Mid-frequency cetaceans	1	1,359	Vibratory Timber
	2	7,357	Vibratory Steel
High-frequency cetaceans	9	1,359	Vibratory Timber
	29	7,357	Vibratory Steel
Phocid pinnipeds	4	1,359	Vibratory Timber
	12	7,357	Vibratory Steel
Otariid pinnipeds	1	1,359	Vibratory Timber
	1	7,357	Vibratory Steel

5.2 Method of Incidental Taking

The method of incidental take requested is Level B acoustical harassment as the Level A exclusion zone thresholds are so small that marine mammals are unlikely to enter these zones. It would occur within the 120 decibel (dB) root mean square (RMS) disturbance threshold for vibratory removal of 14-

inch timber piles. This threshold would be met or exceeded within the ZOI for pile removal described in Section 1.

5.3 Project Activities Not Considered to Generate Take

5.3.1 Airborne Noise Evaluation

Pile removal activities are not anticipated to generate in-air noise at levels that would injure pinnipeds that spend time on land or make use of haulouts within the vicinity of the Project.

The sound threshold guidance provided by NMFS and summarized in Table 5 is used for estimating exposure behavioral disturbance isopleths.

Table 5
Airborne Behavioral Disturbance Thresholds (dB re: 1 microPascal)

Source	Harbor seals	Other pinnipeds	Cetaceans
All sources	90	100	Not established

The spherical spreading loss model¹ (WSDOT 2020) for airborne noise is used to determine the zones in which pinnipeds have the potential to face behavioral disturbance. No adverse impacts are anticipated for airborne noise for other hearing groups, such as cetaceans. The spherical spreading loss model and source sounds for similar impact and vibratory installation activities were used to calculate isopleths for airborne sources, as shown in Table 6.

Table 6
Calculated Isopleths – Airborne Sources

Source	Source Level	Behavioral Disturbance Threshold (meters) ²	
		Harbor Seals	Other Pinnipeds
Vibratory removal (timber)	96.5 dB LEQ at 15 meters ¹	32	11

Notes:

1. Laughlin (2010) measured airborne noise from vibratory installation of 30-inch test piles at the Keystone Ferry Terminal in Puget Sound as an unweighted level of 96.5 dB LEQ/RMS standardized to 15 meters. This value is used for assessing vibratory removal of steel and timber piles for this Project.
2. All thresholds were rounded up to the nearest meter to be conservative.

For vibratory removal of either timber or steel piles, the sound levels are expected to be at or above the threshold for harbor seals within approximately 32 meters of the construction activity. For other pinnipeds, the sound levels are expected to be at or above the threshold within approximately 11 meters of the construction activity. It is unlikely that any harbor seals or other pinnipeds will remain out of the water within those thresholds during pile removal activity and sustain harassment or injury

¹ Transmission loss = geometric loss coefficient X log (R1/R0), where the geometric loss coefficient is 20, R1 is the range to the target SPL (m), and R0 is the distance from the source of the initial measurement in meters.

associated with airborne noise. If any do, they will have already been considered a take based on the Level B Harassment zones and will not need to be double-counted as take under an airborne harassment scenario. Therefore, the Project does not request any take for airborne sources of harassment.

5.3.2 Vessel Traffic

Vessel traffic would temporarily increase as a result of the Project from the staging of barges and use of small boats by construction personnel. During construction, vessel traffic will likely increase and potentially increase the risk for species-vessel interactions. After Project completion, there is no expected long-term increase in vessel traffic from the Project as the pier would be removed. The potential short-term increases in vessel traffic and barge presence are not expected to result in any vessel strikes or significant increases in noise above baseline and therefore are not considered as part of this application.

5.3.3 Substrate Disturbance

Short-term and localized turbidity and resuspension of contaminants will occur during in-water bottom-disturbing activities, but these conditions are expected to be localized near the activity, where marine mammals are not expected to occur. A silt curtain will be in place to contain turbidity and suspended material during construction. The silt curtain is not intended as a marine mammal exclusion device, but it is anticipated that no marine mammals will approach within the area where turbidity may exceed background levels. If present, the duration of exposure to potentially resuspended chemicals will be short and it is unlikely that resuspension would result in water column contaminant concentrations that would pose a risk to marine mammals or their prey or would have long-term effects to habitat. The Project will result in long-term marine aquatic habitat enhancement benefits compared to existing conditions by the removal of a significant quantity of creosote treated piles.

6 Take Estimates for Marine Mammals

This section provides a conservative estimate of the number of marine mammals that may be taken by each type of construction activity identified in Section 5. This application uses species density data from the Pacific Navy Marine Species Density Database (U.S. Navy 2019) and sources specific to the Elliott Bay area (described for each species below) to estimate take for marine mammals. The Marine Species Density Database incorporates analyzed literature and research for marine mammal density estimates per season for the inland Puget Sound. Density estimates specific to Elliott Bay are not available for any of the species addressed in this application, and therefore takes must be estimated based on the nearest available and most appropriate density estimates, plus site-specific knowledge and professional judgment. The ZOIs for the Project are described in Table 7 and are based on the overall area of disturbance generated by pile removal given modeled or calculated distances to attenuation below disturbance (Level B) thresholds. Unless otherwise described, incidental take for each activity is estimated by the following equation:

$$\text{Incidental take estimate} = \text{species density} \times \text{zone of influence} \times \text{days of pile activity}$$

This equation accounts for the acoustic thresholds above which the National Marine Fisheries Service (NMFS) indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment, the area that will be ensonified above these levels in a day, the density of occurrence of marine mammals within the ensonified areas, and the number of days of activity. This equation is assumed to be a reasonable extrapolation for estimating takes, which relies on analytical calculation of the likelihood that a species is present (density), in the area (ZOI), on a day activity is occurring in that ZOI. For some species, however, site specific knowledge from past marine mammal monitoring efforts is used instead. Level A take is estimated based on the likelihood (using the same equation or best professional judgment based on recent monitoring) that marine mammals would enter the Level A zone without detection.

For each species, the Marine Species Density Database density estimate is listed along with any pertinent local monitoring or occurrence information. The take determination for each species is described in the following sections.

Table 7
Zones of Influence Descriptions and Duration of Activity

Zone of Influence	Activity	Construction Method	ZOI Area (km²)	Days of Activity in ZOI
1	Removal of timber piles	Vibratory	2.35	45 days
2	Removal of 30-inch steel piles	Vibratory	34.34	2 days

Note: The zone of influence listed here is the ensonified area for the Level B harassment zone.

6.1 Harbor Seal

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of harbor seal is estimated as shown in Table 8.

Table 8
Take Estimate for Harbor Seal

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	3.91	2.35	45	414	--	--	--	--
2	3.91	34.34	2	269	--	--	--	--
Total	--	--	--	683	282	0	11,036	2.56%

Although this results in a take estimate of 683 instances, the City believes that this estimate is unrealistically high, when compared to marine mammal monitoring data for recent nearby projects. During monitoring for the Pier 62 Project, the maximum number of harbor seals documented as Level B take in one day was 54, but the average number documented per day was 5. It is assumed that during this Project, the average number of takes would be 6 or less per day, which was used to calculate the total Level B take request of 282 harbor seals. The Level A zone is 12 meters and no Level A take is requested.

The City is requesting Level B take of 282 harbor seals.

6.2 Northern Elephant Seal

Based on U.S. Navy species density estimates (U.S. Navy 2019), potential take of northern elephant seal is expected to be zero, as shown in Table 9.

Table 9
Take Estimate for Northern Elephant Seal

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0	2.35	45	0	--	--	--	--
2	0	34.34	2	0	--	--	--	--
Total	--	--	--	0	1	0	179,000	0.0006%

It should be noted that the Whale Museum reported one sighting of northern elephant seal in the area of potential effects area between 2008 and 2014. Orca Network also reported one sighting in 2017 near Edmonds, Washington (Orca Network 2017); and Washington State Ferries describes sightings near Maury Island and Alki Point in 2015 and 2017 in their 2018 Incidental Harassment Authorization Application for the Colman Dock Project (Burt Miller pers. comm. as cited in WSDOT 2019). Additionally, a contractor for the Pier 62 Project (Anchor QEA Protected Species Observer Sarah Montgomery) reports observing one female northern elephant seal in Saratoga Passage, north of the Project area, in August 2019 (Montgomery, 2019, pers. comm.). Based on these sightings, it is anticipated that up to 1 northern elephant seal may be observed in one season of pile removal work. Therefore, the City is requesting authorization for Level B acoustical harassment of one northern elephant seal per season, for a total of 1 take. The Level A zone is 12 meters and no Level A take is requested.

6.3 California Sea Lion

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of California sea lions is estimated as shown in Table 10.

Table 10
Take Estimate for California Sea Lion

ZOI	Density (per km²)	Level B ZOI Area (km²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.2212	2.35	45	24	--	--	--	--
2	0.2212	34.34	2	16	--	--	--	--
Total	--	--	--	40	470	0	257,606	0.18%

This results in a take estimate of 40 individuals. The City believes that this estimate is unrealistically low when compared to marine mammal monitoring data for recent nearby Projects. During monitoring for the Pier 62 Project, a maximum of 31 sea lions were observed in one day, with an average of 6 takes per day. 470 takes would allow an average of approximately 10 sea lions per day. This is a reasonable request because sea lions haul out on buoys at Alki Beach, near the monitoring area for the Project. The Level A zone is less than 10 meters and no Level A take is requested.

The City is requesting Level B take of 470 California sea lions.

6.4 Steller Sea Lion

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of Steller sea lion is estimated as shown in Table 11.

Table 11
Take Estimate for Steller Sea Lion

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.0478	2.35	45	6	--	--	--	--
2	0.0478	34.34	2	4	--	--	--	--
Total	--	--	--	10	94	0	41,638	0.23%

This results in a take estimate of 10 individuals. The City believes that this estimate is unrealistically low when compared to marine mammal monitoring data for recent nearby Projects. Recent monitoring data from the Colman Dock Project in 2017 and 2018 (WSDOT 2019) shows that 54 Steller sea lions have been observed over 99 days of monitoring activity, which occurs in the same area as this Project. This equates to approximately one Steller sea lion every other day. Other monitoring data (see Section 4.4.4) suggest that Steller sea lions have not been observed as frequently in monitoring from 2014 to 2017. Due to the increasing trend in recent observations, the City believes that 94 Level B takes (which would equate to approximately 2 per day) is a reasonable request. The Level A zone is less than 10 meters and no Level A take is requested.

The City is requesting Level B take of 94 Steller sea lions.

6.5 Harbor Porpoise

Based on species density estimates from Smultea et al. (2017), which is the best available density data, the potential take of harbor porpoise is estimated as shown in Table 12.

Table 12
Take Estimate for Harbor Porpoise

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.54	2.35	45	58	--	--	--	--
2	0.54	34.34	2	38	--	--	--	--
Total	--	--	--	94	235	0	11,233	2.1%

Note: Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.

Although this results in a take estimate of 94 individuals, the City believes that this estimate is unrealistically low, when compared to marine mammal monitoring data for recent nearby projects. Recent monitoring data from the Colman Dock Project in 2017 and 2018 (WSDOT 2019) shows that 288 harbor porpoises have been observed over 99 days of monitoring activity, which occurs in the same area as this Project. This equates to approximately three per day. The City believes that 235 takes (which would equate to up to 5 per day) is a reasonable request. The Level A zone is 29 meters and no Level A take is requested.

The City requests Level B take of 235 harbor porpoises.

6.6 Dall's Porpoise

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of Dall's porpoise is estimated as shown in Table 13.

Table 13
Take Estimate for Dall's Porpoise

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.079	2.35	45	9	--	--	--	--
2	0.079	34.34	2	6	--	--	--	--
Total	--	--	--	15	36	0	25,750	0.14%

Note: Take estimates are rounded up to the nearest individual for each activity. Because density implies only a likelihood of occurrence, takes are not rounded for each day of activity.

Although this results in a take estimate of 15 individuals, the City believes that this estimate is unrealistically low, when compared to marine mammal monitoring data for recent nearby Projects (see Section 4.5.4). Though rarely sighted in the Project area, it is conservatively estimated that up to 12 Dall's porpoises could enter the Level B thresholds monthly (approximately 3 months of Project activity). This results in a take estimate of 36 individuals. The Level A zone is 29 meters and no Level A take is requested.

Therefore, the City requests Level B take of 36 Dall's porpoises.

6.7 Long-Beaked Common Dolphin

Based on U.S. Navy species density estimates (U.S. Navy 2019), potential instances of take of long-beaked common dolphin is expected to be zero as shown in Table 14; therefore, the City calculates take for this species based on local monitoring data.

Table 14
Take Estimate for Long-Beaked Common Dolphin

ZOI	Density (per km²)	Level B ZOI Area (km²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0	2.62	45	0	--	--	--	--
2	0	34.34	2	0	--	--	--	--
Total	--	--	--	0	21	0	101,305	0.021%

The earliest documented sighting of long-beaked common dolphins in Puget Sound was July 2003. In June 2011, two long-beaked common dolphins were sighted in South Puget Sound. Sightings continued in 2012, and in 2016-17 (NOAA 2018b). Four to twelve sightings were reported regularly, with confirmed sightings of up to 30 individuals. In 2016, the Orca Network (2016) reported a pod of up to 20 long-beaked common dolphins. During monitoring for the Colman Dock Project in 2017-2018, 2 long-beaked common dolphins were observed. Therefore, the City is requesting authorization for instances of take by Level B harassment of 7 long-beaked common dolphins per month for a total of 21 individuals. The Level A zone is within 10 meters and no Level A take is requested.

The City requests Level B take of 21 long-beaked common dolphins.

6.8 Common Bottlenose Dolphin

Based on U.S. Navy species density estimates (U.S. Navy 2019), instances of potential take by Level B harassment of bottlenose dolphin is expected to be zero as shown in Table 15; therefore, the City calculates take for this species based on local monitoring data.

Table 15
Take Estimate for Common Bottlenose Dolphin

ZOI	Density (per km²)	Level B ZOI Area (km²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0	2.62	45	0	--	--	--	--
2	0	34.34	2	0	--	--	--	--
Total	--	--	--	0	21	0	1,924	1.1%

The take estimate of bottlenose dolphin for the Project is based on local monitoring data. In 2017 the Orca Network (2017) reported sightings of a bottlenose dolphin in Puget Sound and in Elliott

Bay, and WSDOT observed two bottlenose dolphins in one week during monitoring for the Colman Dock Multimodal Project (WSDOT 2018). In addition, a group of seven dolphins were observed in 2017 and were positively identified as part of the CA coastal stock (Cascadia Research Collective, 2017). Bottlenose dolphins typically travel in groups of 2 to 15 in coastal waters (NOAA 2020d). Therefore, the City requests instances of takes by Level B harassment of 7 individuals per month for a total of 21 individuals. The Level A zone is less than 10 meters and no Level A take is requested.

6.9 Southern Resident Killer Whale

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of Southern Resident killer whale is estimated as shown in Table 16.

Table 16
Take Estimate for Southern Resident Killer Whale

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.007828	2.35	45	1	--	--	--	--
2	0.007828	34.34	2	1	--	--	--	--
Total	--	--	--	2	0	0	75	0%

Note: stock abundance for Southern Resident killer whale is obtained from the Center for Whale Research (2021) for purposes of calculating the percentage of stock potentially affected by this activity (data from NOAA stock assessment reports are provided in Table 1). As of December 31, 2021, there are 74 Southern Resident killer whales, but an additional calf was born in February 2021, so 75 is used as the stock abundance.

The density for the SRKW is variable across seasons and across the range. The inland water density estimates vary from 0.000009 to 0.000018 per square kilometer (km²) in summer, 0.004001 to 0.007828/km² in fall, and 0.002091-0.005089/km² in winter. Therefore, the take estimated as shown in Table 16 is conservatively based on the highest density estimated during the fall (0.007828/km²) for the SRKW population, which was 75 individuals as of February 2021.

However, the take estimate is only 2 individuals (when rounding up take estimates much less than 1 for each type of activity). The City believes this estimate to be realistic. However, because the removal of steel pilings that generates the larger ZOI is only anticipated to require 2 days and up to four protected species observers will be on site during this activity and actively monitoring the Orca Network and other whale information sites, the City is not requesting any take and will shut down work to avoid take if any SRKW approach the Level B ZOIs. It is highly unlikely that SRKW would approach the ZOI for timber piling removal, but similarly, the City will shut down work to avoid take.

Therefore, the City requests no Level B take of SRKW.

6.10 Transient Killer Whale

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of transient killer whale is estimated as shown in Table 17.

Table 17
Take Estimate for Transient Killer Whale

ZOI	Density (per km²)	Level B ZOI Area (km²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.003828	2.35	45	1	--	--	--	--
2	0.003828	34.34	2	1	--	--	--	--
Total	--	--	--	2	18	0	300	6%

As with the SRKW, the density estimate of transient killer whales is variable between seasons and regions. Density estimates range from 0.001582/km² in summer, to 0.002373/km² in fall, and 0.003828/km² in winter. Work could occur throughout summer, fall and winter, so the highest estimate, winter density, is used to conservatively estimate take.

This results in a take estimate of only 2 individuals. The City believes that this estimate is unrealistic as there have been reports of transient killer whales in Elliott Bay by the Orca Network (2016b) and sightings from recent projects (see Section 5.8.1). Transient killer whales also frequently travel together in small groups. Thus, the City estimates that transient killer whales may be seen in a group of up to 6 individuals once per month during the proposed project. The Level A zone is less than 10 meters and no Level A take is requested.

Therefore, the City requests Level B take of 18 transient killer whales.

6.11 Humpback Whale

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of humpback whales is estimated as shown in Table 18.

Table 18
Take Estimate for Humpback whale

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.00270	2.35	45	1	--	--	--	--
2	0.00270	34.34	2	1	--	--	--	--
Total	--	--	--	2	6	0	2,900	0.21%

Although this results in a take estimate of 2 individuals, the City believes that this estimate is unrealistically low, when compared to marine mammal monitoring data for recent nearby projects (see Section 4.9.4). During previous work for the Pier 62 Project and EBSP, two humpback whales were observed for both projects (Anchor QEA 2014, 2015, 2016, 2017, 2018 and 2019a). Therefore, it is likely that humpback whale may be occasionally present, up to 2 per month, for a total of 6.

The Level A zone is 19 meters and no Level A take is requested. Therefore, the City requests authorization for Level B take of 6 humpback whales.

6.12 Gray Whale

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of gray whales is estimated as shown in Table 19.

Table 19
Take Estimate for Gray Whale

ZOI	Density (per km ²)	Level B ZOI Area (km ²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.000086	2.35	45	1	--	--	--	--
2	0.000086	34.34	2	1	--	--	--	--
Total	--	--	--	2	3	0	26,960	0.011%

This results in an estimated take of only 2 individuals. The City thinks this is too low based on occasional sightings of gray whales in central and south Puget Sound. The City requests authorization for Level B take of 3 gray whales (up to one per month). This is consistent with the rare sightings of gray whales in the Project area as described in Section 4.10.4. The Level A zone is 19 meters and no Level A take is requested.

The City requests authorization for Level B take of 3 gray whales.

6.13 Minke Whale

Based on U.S. Navy species density estimates (U.S. Navy 2019) for the inland waters of Puget Sound, potential take of Minke whale is estimated as shown in Table 20.

Table 20
Take Estimate for Minke whale

ZOI	Density (per km²)	Level B ZOI Area (km²)	Days of Activity	Level B Take Estimate	Level B Take Request	Level A Take Request	Stock Abundance	% of Stock (take/ abundance*100)
1	0.00045	2.35	45	1	--	--	--	--
2	0.00045	34.34	2	1	--	--	--	--
Total	--	--	--	2	3	0	636	0.47%

This results in an estimated take of only 2 individuals. The City thinks this is too low based on occasional sightings of minke whales in central and south Puget Sound. The City requests authorization for Level B take of 3 minke whales (up to one per month). This is consistent with the rare sightings of minke whales in the Project area as described in Section 4.11.4. Since marine mammal monitoring and coordination with Orca Network would likely detect minke whales and stop work before they could enter the small Level A zones, and minke whales are infrequent visitors to the Project area, it is unlikely that any minke whales would be taken by Level A harassment.

The City requests authorization for Level B take of 3 minke whales and no Level A take.

6.14 Summary of Request for Take

The City of Seattle has evaluated the potential for Level A and Level B acoustical harassment for all the species anticipated to occur within the ZOI for pile removal activities. Table 21 presents a summary of the total estimated take for each species and the take as a percentage of the total estimated stock size.

Table 21
Summary of Requested Takes

Species	Stock	Level A Take	Level B Take	Total Take	Stock Abundance	Take Percent of Total Stock
Pacific harbor seal (<i>Phoca vitulina</i>)	Washington Northern Inland Waters stock	0	282	282	11,036	2.56%
Northern elephant seal (<i>Mirounga angustirostris</i>)	California breeding	0	1	1	179,000	0.00056%
California sea lion (<i>Zalophus californianus</i>)	U.S.	0	470	470	257,606	0.18%
Steller sea lion (<i>Eumetopias jubatus</i>)	Eastern U.S.	0	90	90	41,638	0.22%
Harbor porpoise (<i>Phocoena phocoena</i>)	Washington Inland Waters	0	225	225	11,233	2%
Dall's porpoise (<i>Phocoenoides dalli</i>)	California/Oregon/Washington	0	36	36	25,750	0.14%
Long-beaked common dolphin (<i>Dephinus capensis</i>)	California	0	21	21	101,305	0.021%
Common bottlenose dolphin (<i>Tursiops truncatus</i>)	California/Oregon/Washington Offshore	0	21	21	1,924	1.1%
Southern resident killer whale DPS (<i>Orcinus orca</i>)	Eastern North Pacific Southern Resident	0	0	0	75	0%
Transient killer whale (<i>Orcinus orca</i>)	West Coast Transient	0	18	18	300	6%
Humpback whale (<i>Megaptera novaeangliae</i>)	California/Washington/Oregon Stock (Hawaii, Mexico, or Central America DPS)	0	6	6	2,900	0.21%
Gray whale (<i>Eschrichtius robustus</i>)	Eastern North Pacific	0	3	3	26,960	0.011%
Minke whale (<i>Balaenoptera acutorostrata</i>)	California/Oregon/Washington Stock	0	3	3	636	0.47%

7 Anticipated Impact of the Activity

Incidental take estimates are provided in Section 6. The stock take calculations identified in Tables 8 to 20 in Section 6 assume takes of individuals, which could occur in the Project Area multiple times and be counted more than once as take; therefore, the stock take percentage calculations summarized in Table 21 are conservative. Notably, the project includes only stationary activities. When resident animals may be present, the estimated take numbers represent instances of take that may occur to a smaller number of individuals and thus, a smaller percent of a stock.

The Project is not anticipated to cause permanent harm or lethal take of any marine mammal species. If incidental takes occur, they are expected to result in only short-term changes and potential temporary hearing threshold shift. Further, the removal of the pier will not create barriers to entrance or egress from biologically important areas, nor will work occur during a critical time or in a critically important habitat location. Mitigation and monitoring measures described in Sections 11 and 13 will further decrease any adverse impacts. The potential effectiveness of the mitigation measures in reducing the numbers of takes or exposure time is also not quantified in the take estimation process—another reason the estimates should be considered conservative.

Overall, the potential Level B harassment takes identified in Section 6 are not expected to have any impact on stock recruitment or survival, and therefore would have a negligible impact on the stocks of any of the species evaluated. Because no potential biological removal (i.e., mortality) is anticipated as part of the Project, there is no anticipated effect to any stock's ability to reach or maintain its optimum sustainable population as defined by NMFS in Stock Assessment Reports.

8 Anticipated Impacts on Subsistence Uses

Not applicable. The proposed activity will take place in Seattle, Washington within an area that does not overlap with subsistence uses of marine mammals. Therefore, there are no relevant subsistence uses of marine mammals implicated by this action.

Currently, there are no authorized ceremonial and/or subsistence hunts for marine mammals in Puget Sound or the San Juan Islands (Norberg 2007, as cited in WSDOT 2016), with the possible exception of some coastal tribes (located outside of the area of potential effects), which may be allowed a small number of directed take for subsistence purposes under the MMPA.

9 Anticipated Impacts on Habitat

The Project could potentially affect habitat and the Elliott Bay nearshore ecosystem via effects to water quality (increases in turbidity levels), prey species distribution, and disturbance. However, negative effects would be temporary in nature and would not result in long-term effects to habitat for species protected under the MMPA. In addition, the removal of creosote piles and resulting restoration of open water habitat will improve habitat in the nearshore environment, which will support prey species for many marine mammals.

9.1 Water Quality

The types of water quality effects from the Project include the generation of short-term turbidity or resuspension of contaminated sediments during pile removal. These effects would be minimized by the use of silt curtains. The Washington State Department of Ecology will require that water quality standards be met throughout the construction duration; thus, no adverse effects are expected to marine mammals, and only minor short-term disturbance would occur to their prey species, such as salmonids and marine invertebrates. The short-term changes in turbidity affect only a small proportion of the available habitat in the Puget Sound (i.e., within 150 feet of the construction activity).

Water quality monitoring was conducted for the EBSP between 2013 and 2016 and for the Pier 62 Project in 2017 to 2019. Turbidity generated from project activities was generally observed to disperse within approximately 50 feet and then quickly dissipated (SDOT 2014, 2015, 2016, 2019).

9.1.1 *Resuspended Contaminants*

Sediment contaminants (e.g. metals and organics) could become resuspended during construction actions that similarly result in increased turbidity. Whether exposure to contaminants causes detrimental biological effects depends on the contaminant, its concentration in the water, and the duration of exposure. With very high levels of contaminants or persistent exposure, fish or marine mammals could ingest enough toxins to suffer the adverse effects of bioaccumulation. Under certain conditions resuspension and exposure to contaminants could even result in acute toxicity and potential for bioaccumulation (Neff 2002), effects to olfaction (Klaprat et al. 1992), immunosuppression (Baker et al. 1983; Schreck 1996), avoidance (Hansen et al. 1999), and reduced foraging due to removal of prey species.

Existing data (Anchor QEA 2019b) indicate that elevated concentrations of mercury, copper, PAHs, PCBs, and dioxins/furans are present in surface and/or subsurface sediments near Pier 63. Although only limited tissue data are available, they indicate that sediment contaminants are bioavailable and could potentially pose ecological risks. These results show that resuspension of contaminants may be a concern during project construction. However, construction during the in-water work window will

reduce the density of fish species along the waterfront during the time when sediment resuspension is possible. Though project construction may resuspend contaminants in the short-term, removal of creosote-treated piles reduces a major source of contamination in the nearshore environment over the long-term.

9.2 Effects to Prey Species

It is expected that both marine mammals and their prey will disperse from the Project area due to noise generated by Project activities. Prey species for the various marine mammals discussed in this document include marine invertebrates and fish species. Short-term effects would occur to marine invertebrates during removal of existing piles. This effect is expected to be minor and short-term on the overall population of marine invertebrates in the Project area. The Project will also have temporary effects on salmonids and other fish species in the Project area due to disturbance, turbidity, noise, and the potential resuspension of contaminants. All in-water work will occur during the designated in-water work window to avoid and minimize effects on juvenile and adult salmonids. Additionally, marine resident fish species are only present in limited numbers along the seawall during the in-water work season and primarily occur during the summer months, when work would not be occurring (Anchor QEA 2012).

The Project is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species, because any adverse effects on prey species will be localized and short term, there are many fish and prey species in Puget Sound, and mitigation measures to protect fish during construction will be used.

9.3 Modification of Habitat

The presence of equipment during removal of the pier will result in a minor temporary loss of benthic habitat and potentially change underwater features for fish. These changes are insignificant and limited to the area of construction.

Habitat will be temporarily modified in the Project area due to elevated underwater noise levels. However, noise from the Project will not be detectable at the nearest haulouts for sea lions and seals. Pile activity can cause pinnipeds to move out of an ensonified area (Russell et al. 2016), but distribution returns to normal approximately 2 hours after the activity ceases. Therefore, any avoidance of the ensonified Project area is expected to be temporary and not restrict mammals from accessing prey.

A decrease in nearshore and intertidal overwater cover of 35,108 square feet will improve nearshore ecosystem function by allowing natural light penetration in the nearshore zone used by migratory salmon as well as other juvenile marine fishes. This would likely increase prey species for MMPA-protected species and will assist in the migration of juvenile salmonids.

The Project will result in long-term marine aquatic habitat benefits compared to existing conditions by removing 900 creosote-treated timber and eight 30-inch steel piles and providing open water habitat for the nearshore ecosystem.

10 Anticipated Effects of Habitat Impacts on Marine Mammals

The proposed Project will not result in a significant permanent loss or modification of habitat for marine mammals or their food sources. The most likely effects on marine mammal habitat for the proposed Project are temporary, short-duration in-water noise; temporary prey (fish) disturbance; and localized, temporary water quality effects. The direct loss of habitat available to marine mammals during the Project is expected to be minimal because the habitat near the Project area is in a heavily used commercial and industrial area. The long-term effects will be beneficial from the removal of creosote and restoration of open water habitat.

11 Mitigation Measures to Protect Marine Mammals and Their Habitat

11.1 Timing

Vibratory pile removal will occur only during daylight hours. This increases the probability of detecting marine mammals and supports implementation of a Marine Mammal Monitoring Plan. In-water construction will occur during the designated in-water work window for the Project.

11.2 Pre-Construction Briefing

The City will conduct briefings for construction supervisors, crews, and the marine mammal monitoring team prior to the start of all pile removal activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.

11.3 Shutdown Measures

The contractor will implement shutdown measures if the cumulative total of individuals observed within the Level B zones for any particular species exceeds the number authorized under the Incidental Harassment Authorization (IHA) and if such marine mammals are sighted within the vicinity of the Project area and are approaching the Level B Harassment zones during in-water construction activities.

If a marine mammal approaches or enters the shutdown zone during activities or pre-activity monitoring, all pile removal activities at that location will be halted or delayed, respectively. If pile removal is halted or delayed due to the presence of a marine mammal, the activity will not resume or commence until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or the observation time period indicated in the IHA has elapsed (expected to be 15 or 30 minutes).

If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the Level B zone for the pile size and method used or within the shutdown zones (Table 22), pile removal activities must shut down immediately using delay and shutdown procedures. Activities must not resume until the animal has been confirmed to have left the area or the observation time period indicated in the IHA has elapsed (expected to be 15 or 30 minutes).

A determination that the shutdown zone is clear must be made during a period of good visibility (i.e., the entire shutdown zone and surrounding waters must be visible to the naked eye).

Table 22**Summary of Level A Exclusion Zone Thresholds and Level B Harassment Thresholds**

Hearing Group	Level A Exclusion Zone Thresholds (meters)	Level B Harassment Zone (meters)	Pile Activity
Low-frequency cetaceans	6	1,359	Vibratory Timber
	19	7,357	Vibratory Steel
Mid-frequency cetaceans	1	1,359	Vibratory Timber
	2	7,357	Vibratory Steel
High-frequency cetaceans	9	1,359	Vibratory Timber
	29	7,357	Vibratory Steel
Phocid pinnipeds	4	1,359	Vibratory Timber
	12	7,357	Vibratory Steel
Otariid pinnipeds	1	1,359	Vibratory Timber
	1	7,357	Vibratory Steel

Note:

Any marine mammal within 10 meters will trigger a shutdown even if their Level A threshold is less than 10 meters.

11.4 Level B Harassment Zones

The City will implement the Level B Harassment/Monitoring Zones described in Table 22.

11.5 Vessel Interactions

If any vessels are used to monitor marine mammals as part of the Project, the vessels will follow NOAA and other state and local viewing guidelines and regulations.

11.6 Construction Best Management Practices

All Project construction activities will be performed in accordance with the established standards to reduce environmental impacts on all species and habitats. These activities are subject to state and federal permit conditions and use the best guidance available to accomplish the necessary work while avoiding and minimizing environmental effects to the greatest extent possible. The following best management practices will be implemented during construction to avoid or minimize potential impacts to the environment:

- All in-water work will occur within the approved in-water work window for the project.
- The contractor will be responsible for the preparation of a Spill Plan (SP) to be used for the duration of the project. The plan will be submitted to the project engineer prior to the commencement of any construction activities. A copy of the plan with any updates would be maintained at the work site by the contractor.
 - The SP will outline spill prevention BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The SP will also outline contractor

management elements such as personnel responsibilities, project site security, site inspections, and training.

- The SP will outline what measures will be taken by the contractor to prevent the release or spread of hazardous materials, either found on site and encountered during construction but not identified in contract documents, or any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. These items include, but are not limited to, gasoline, oils, and chemicals.
 - The contractor will maintain, at the job site, the applicable spill response equipment and material designated in the SP.
 - The contractor will regularly check fuel hoses, oil drums, oil or fuel transfer valves, and fittings for leaks, and shall maintain and store materials properly to prevent spills.
 - No petroleum products, fresh cement, lime, concrete, chemicals, or other toxic or deleterious materials will be allowed to enter surface waters.
 - There will be no discharge of oil, fuels, cleaning solvents or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
- Construction of the proposed project will comply with water quality restrictions imposed by the Washington State Department of Ecology, which state that turbidity in marine waters exceeding state water quality standards will not extend beyond a 150-foot mixing zone radius during construction (WAC 173-201A-210(1)(e)(i)(D)).
 - A temporary containment boom will be utilized to capture debris during demolition activities. The containment boom may be fitted with a short silt curtain to comply with water quality standards during in-water construction. Barges will not be allowed to ground out during construction.
 - The contractor will be required to retrieve any floating debris generated during construction. Any debris in the containment boom will be removed by the end of the workday or when the boom is removed, whichever occurs first. Retrieved debris will be disposed of at an upland disposal site.
 - Demolition and construction materials will not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters.
 - Piles that break or are already broken below the waterline may be removed with a clamshell bucket. To minimize disturbance to bottom sediments and splintering of piling, the contractor will use the minimum size bucket required to pull out piling based on pile depth and substrate. The clamshell bucket will be emptied of piling and debris on a contained barge before it is lowered into the water.
 - Hazardous waste and treated wood waste will be disposed of by the contractor in a landfill that meets the liner and leachate standards of the state minimum functional standards (WAC 173-304).

12 Mitigation Measures to Protect Subsistence Uses

Mitigation measures for this Project are not applicable (see Section 8). The proposed activity will take place in Seattle, Washington, and no activities overlap with subsistence hunting areas; therefore, there are no relevant subsistence uses of marine mammals adversely impacted by this action. With no adverse impacts, no mitigation is required.

13 Monitoring and Reporting

13.1 Marine Mammal Monitoring

Marine mammal monitoring will be conducted during in-water pile removal and will occur in strategic locations around the area of potential effects. Monitors will be positioned such that each monitor has a distinct view-shed and the monitors collectively have overlapping view-sheds. In the case where visibility becomes limited, additional land-based monitors and/or boat-based monitors may be deployed.

13.1.1 *Exclusion Zone Monitoring*

Proposed Exclusion Zone Thresholds are provided in Table 22. Each Exclusion Zone Threshold and Level B harassment zone was determined by using the Practical Spreading Model for the pile types proposed and NOAA's 2018 guidance (NOAA 2018a, Attachment A). All thresholds represent radii distances from the point-source, pile-related work, and each Level A zone is specific to marine mammal hearing groups.

Exclusion Zones, which have been established by hearing group per NOAA's 2018 guidance, are intended to provide a physical threshold that, when crossed by a given marine mammal species, will trigger a stop-work order for in-water pile removal (NOAA 2018a). In the event that a stop-work order is triggered, the observed marine mammal(s) will be closely monitored while it remains in or near the Exclusion Zone, and only when it moves well outside of the Exclusion Zone or has not been observed for at least 15 minutes for pinnipeds and 30 minutes for cetaceans, will work recommence. It will be up to the best scientific judgment of the monitor(s) observing the marine mammal to determine when it has moved far enough away from the Exclusion Zone for work to recommence.

All marine mammals that are near an applicable Exclusion Zone Threshold will be closely monitored. If an individual marine mammal shows signs of distress or unexpected behavior, even while they are well outside of an applicable Exclusion Zone Threshold, a stop-work order will be issued and further consultation will be made with NOAA.

13.1.2 *Stop-Work Order Protocol*

When a marine mammal is observed approaching the applicable Exclusion Zones (see Table 22 and Figure 2), the monitor(s) will immediately notify the construction manager of the direction of travel and distance of the marine mammal relative to the Exclusion Zone. A stop-work order would be immediately issued if a monitor observes a marine mammal clearly crossing an applicable Exclusion Zone, regardless of observed marine mammal behavior. In response, the construction manager will immediately require the operator of the vibratory hammer to stop work.

Following issuance of a stop-work order, the marine mammal will be closely monitored and updates of location and behavior will be provided to the construction manager at appropriate intervals, likely less than 15 minutes apart. The marine mammal will continue to be monitored while it is within the Exclusion Zone until it has clearly moved out of and away from the threshold, has not been observed for at least 15 minutes for pinnipeds or 30 minutes for whales, or when the end of the workday is reached.

Work will resume after the marine mammal monitor(s) has notified the construction manager that the marine mammal has moved outside of, and is headed away from, the Exclusion Zone or has not been observed for at least 15 minutes for pinnipeds or 30 minutes for whales. At times, unanticipated scenarios may be encountered by the marine mammal monitors, who will use their best scientific judgment to make conservative decisions to ensure no marine mammal will be harmed by in-water operation of a vibratory hammer.

Specific to killer whales (transient and SRKW), the following stop-work conditions will be in effect: If a killer whale approaches the Level B Harassment/Monitoring Zone during pile removal, and it is unknown whether it is a SRKW or a transient killer whale, it should be assumed to be a SRKW and a stop-work order will be issued.

13.1.3 Level B Behavioral Harassment Zone

In addition to monitoring the Exclusion Zones described above, protected-species observers will also monitor the Level B Harassment Zones. Table 23 provides a summary of the Level B Harassment Zones. The Level B Harassment Zone starts at the activity-specific Exclusion Zone for the relevant hearing group and extends in a radial arc out to the total distance indicated in the table. The distance to the Level B Harassment Zone stops short of the threshold when it encounters an intervening land mass.

The exact number of protected species observers to be on site for each activity will be finalized in the monitoring plan, but it is estimated that two observers will be on site for the vibratory removal of timber piles and four observers will be on site for the vibratory removal of steel piles.

Table 23
Summary of Level B Harassment Zones

Pile Type and Activity	Pile Removal Type	Distance to Level B Harassment Zone (meters)
Timber removal	Vibratory	1,359
Steel Removal	Vibratory	7,357

Within this monitoring area, the cumulative daily number of takes will be documented throughout each pile-related workday. All sightings of marine mammals will be documented by the monitors on a marine mammal sighting form such as the example provided in the NOAA guidance, or similarly detailed (see Section 13.1.5). A take will be documented for each individual marine mammal no more than once in a 24-hour period. The monitors will keep an accurate take count of marine mammals sighted within the applicable Level B Harassment Zone, document each take on the sighting form, and notify the construction crew and other appropriate staff if any marine mammal has the potential to cross an applicable Exclusion Zone Threshold. Once a marine mammal is within the area of potential effects, the observers will track its movements and document its behaviors until it moves well out of the area.

13.1.4 Marine Mammal Monitoring Protocol

Marine mammal monitors would be deployed in strategic locations around the area of potential effects at all times during in-water pile removal. Monitors will be positioned at locations that provide full views of the Level B and Level A zones for the activity occurring. The stations are anticipated to be at the construction site or on an adjacent pier, and at Alki Point. Feedback received from NOAA during the consultation process (such as the number and location of monitors for different Project activities) will be incorporated in the final Marine Mammal Monitoring Plan developed before project construction.

Marine mammal monitoring will begin at least 30 minutes prior to the start of all pile removal each day and will continue during active pile removal. If necessary due to the presence of a marine mammal within or near the Exclusion Zone at the end of the pile-removal shift, marine mammal monitoring will continue for up to 30 minutes following construction. If visibility precludes monitors from viewing their designated view-shed (due to fog or poor lighting), then pile removal activities would not be allowed or alternate methods of monitoring must be employed (i.e., boat-based monitoring). Monitors will be continually updated on pile-related construction activities in a manner that would allow them to provide accurate and appropriate marine mammal observations.

All monitors will be trained protected-species observers with good eyesight and identification skills. Monitors will have received NOAA-approved training that covers detection, identification, and distance estimation (i.e., estimating the distance a marine mammal is from an observer) of all marine mammal species potentially found in and around Elliott Bay. Each monitor must pass an identification test conducted at the training. Each will have the experience and ability to conduct field observations and collect data according to this protocol. They will be experienced with directional orienteering, using binoculars and spotting scopes, efficiently accessing and referencing marine mammal identification materials, understanding safety protocol, and writing field notes and entering data into the field datasheets. Each monitor will be properly equipped with necessary gear during their shift, including binoculars, field guides, compass, cellular phone, and back-up power.

A comprehensive marine mammal monitoring plan and manual will be assembled for the monitoring team prior to the start of in-water work. The manual will contain all relevant permit requirements and will describe the procedures that the Project team will implement to comply with the conditions of applicable permits. The plan and proof of monitor training will be provided to NOAA if requested for review or approval. Additionally, any input received from NMFS during the consultation process or during review of the plan will be incorporated in the final Marine Mammal Monitoring Plan.

13.1.5 Marine Mammal Sighting Form

A sighting form or application will capture all necessary details important to marine mammal identification and protection during pile-related activities. The monitoring form or application will be used to record the following information:

- Background information
 - Date, observer name, and location.
 - Environmental conditions (weather, wind, waves), plus notes on conditions that could confound marine mammal detections and the time and location that they occurred.
- Marine mammal sightings
 - Species observed, number, pod composition, distance to pile-related activities, and behavior of marine mammals throughout duration of sighting.
 - Time of first and last sighting.
 - Discrete behavioral reactions to construction, if apparent.
 - Pile-related activities taking place concurrently with each sighting.
 - Monitor response including whether a stop-work order was issued, why, and for how long, or if a take was recorded.
 - The number of take(s), by species, their locations, and behavior.

13.2 Acoustic Monitoring

No acoustic monitoring is proposed for this Project.

13.3 Reporting

The City will submit written reports detailing the results of marine mammal monitoring. The Marine Mammal Monitoring Report will include a description of the pile removal activities and the monitoring effort. It will also provide total takes, takes by day, stop-work orders for each species, and information on observed behavior.

The Marine Mammal Monitoring Report will be drafted and submitted to NOAA Office of Protected Resources at the end of construction. The report will summarize information presented in the daily

monitoring logs in a manner to effectively convey important marine mammal observations made during the Project. The monitoring report will include the following:

- Data and time collected for each distinct marine mammal species observed in the Project area.
- Weather conditions.
- Approximate distance between the marine mammal and the noise source.
- Activity at the construction site when a marine mammal was sighted.
- A summary of take issued per species that year and to date.
- A summary of any stop-work orders given that year including number, species involved, and circumstances.
- Descriptions of marine mammal species observed, overall numbers of individuals observed, frequency of observation, behavior and any behavioral changes, and context of the changes relative to construction activities.
- Other important details that would provide context to the marine mammal observations made that year.

14 Suggested Means of Coordination

The City proposes to coordinate with NOAA for direction on how to proceed if the Level B or Level A harassment take is met for a species, and work is not complete, or if species for which take is not authorized are sighted within the Project area. Data from marine mammal monitoring will be shared with NOAA (as described in Section 13) and made available for incorporation into databases or research upon request.

If the City becomes aware of other co-occurring or preceding in-water construction projects with marine mammal monitoring efforts in Elliott Bay (e.g., the Colman Dock Project), they will attempt to coordinate with the project proponent to share marine mammal sighting information or other information that may further reduce the environmental effects of this Project.

The Project team will monitor and coordinate with local marine mammal sighting networks (i.e., Orca Network and/or the Center for Whale Research) to gather information on the location of whales prior to initiating any pile removal activity. In addition, reports will be made available to interested parties upon request.

The City proposes to carry out additional voluntary mitigation measures during pile removal to minimize impacts from noise on the Seattle Aquarium's captive marine mammals, as well as for air and water quality concerns. During the Pier 62 Project in 2017 to 2019, these measures were successfully coordinated and implemented, and the City will implement similar measures during Project construction, as follows:

- If aquarium animals are determined by the Aquarium veterinarian to be distressed, the City will coordinate with Aquarium staff to determine appropriate next steps, which may include suspending pile removal work for 30 minutes, provided that suspension does not pose a safety issue for construction crews.
- The City will make reasonable efforts to take at least one regularly scheduled 20-minute break in pile removal each day.
- The City will regularly communicate with the Aquarium staff when pile removal is occurring.
- The City will further coordinate with the Aquarium to determine appropriate methods to avoid and minimize impacts to water quality.

The City does not anticipate the project resulting in impacts associated with airborne dust. If, during construction, odors associated with the project are an issue, the City will coordinate with its contractor to determine appropriate mitigation measures.

15 Conclusion

The City has described how the proposed Project has the potential to result in Level B harassment of marine mammals. The Project will implement mitigation measures, including marine mammal monitoring and stop work zones to minimize harassment and avoid unauthorized take. As described in this IHA application, the Project will have negligible effects to stocks of marine mammals protected by the MMPA or their habitats and will result in small numbers of incidental take. Results of marine mammal monitoring will further inform understanding of marine mammal behavior in Elliott Bay, and habitat enhancements from the Project will ultimately support the prey base for marine mammals through improving food web processes at lower trophic levels.

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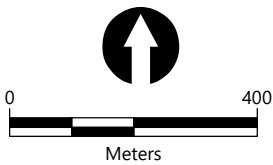
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Figures



LEGEND:

 Pier 63

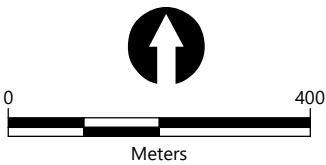




LEGEND:

- Hammer Location
- ▭ Pier 63
- Level B Harassment Zone – All Hearing Groups**
- ▭ Vibratory Removal (Timber Pile): 1,359 meters
- Exclusion Zones**
- ▭ Otariid Pinnipeds (1 meter)
- ▭ Mid-Frequency Cetaceans (1 meter)
- ▭ Phocid Pinnipeds (3 meters)
- ▭ Low-Frequency Cetaceans (6 meters)
- ▭ High-Frequency Cetaceans (9 meters)

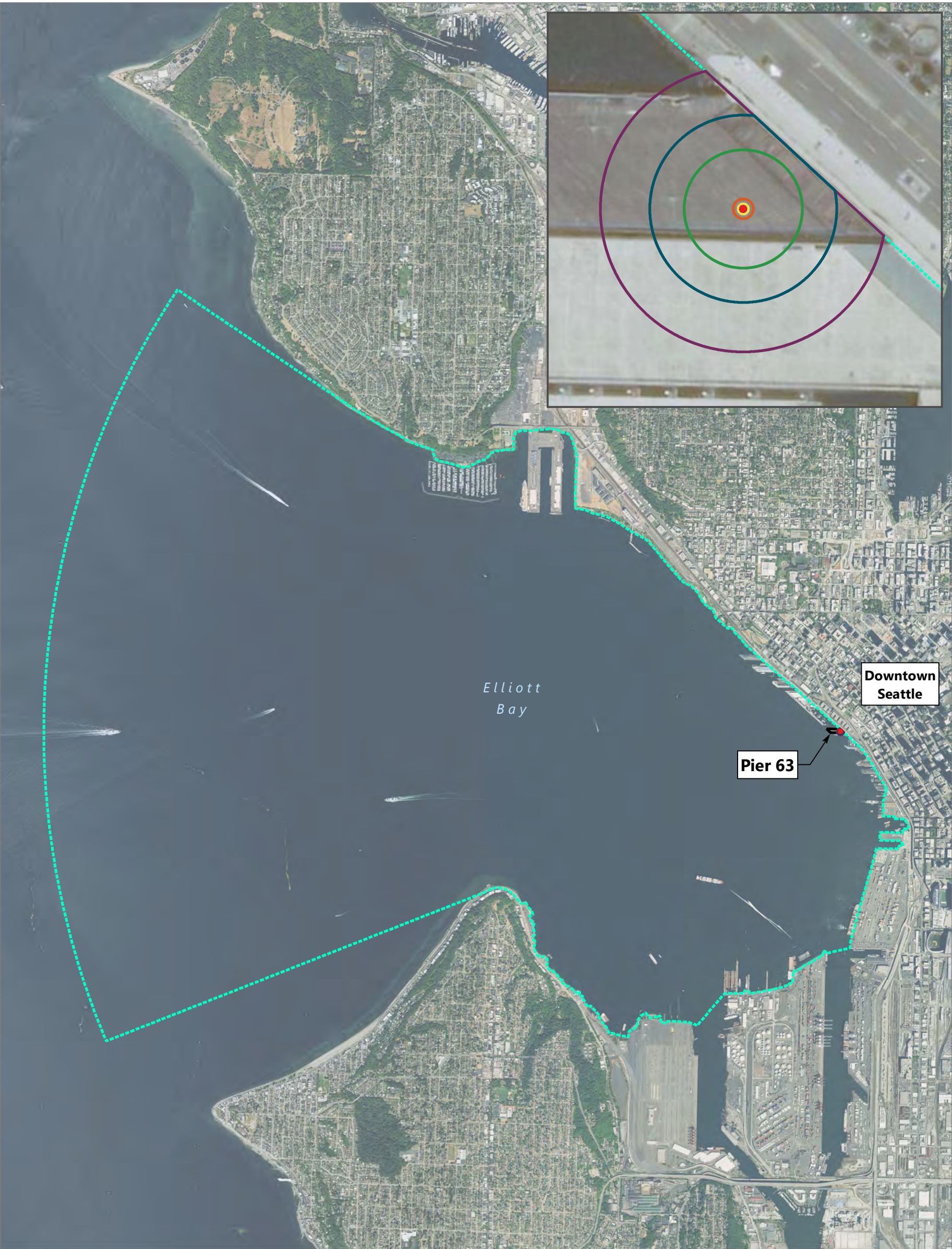
NOTES:
1. Exclusion zones will be adjusted as needed, based on location of hammer operations.



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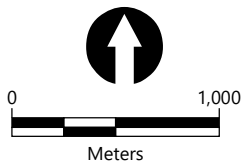
Figure 2
Exclusion and Level B Harassment Zones for Vibratory Removal of Timber Piles
Pier 63 Removal Project
Request for Incidental Harassment Authorization



LEGEND:

- Hammer Location
- ▭ Pier 63
- Level B Harassment Zone – All Hearing Groups**
- ▭ Vibratory Removal (Steel Pile): 7,357 meters
- Exclusion Zones**
- ▭ Otariid Pinnipeds (1 meter)
- ▭ Mid-Frequency Cetaceans (2 meters)
- ▭ Phocid Pinnipeds (12 meters)
- ▭ Low-Frequency Cetaceans (19 meters)
- ▭ High-Frequency Cetaceans (29 meters)

NOTES:
1. Exclusion zones will be adjusted as needed, based on location of hammer operations.



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Figure 3
Exclusion and Level B Harassment Zones for Vibratory Removal of Steel Piles
Pier 63 Removal Project
Request for Incidental Harassment Authorization

Appendix A

NMFS User Spreadsheets for Project Activities

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

VERSION 2.0: 2018

KEY

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

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Pier 63 Removal Project
PROJECT/SOURCE INFORMATION	See references in IHA Application

Please include any assumptions

PROJECT CONTACT	See cover letter of application
-----------------	---------------------------------

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

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	Relying on default due to lack of project-specific information
--	-----	--

[‡] 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)	152
Number of piles within 24-h period	20
Duration to drive a single pile (minutes)	20
Duration of Sound Production within 24-h period (seconds)	24000
10 Log (duration of sound production)	43.80
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

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

NOTE: The User Spreadsheet tool provides a means to estimate 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)	6.1	0.5	9.0	3.7	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

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Pier 63 Removal Project
PROJECT/SOURCE INFORMATION	See references in IHA application

Please include any assumptions

PROJECT CONTACT	See Cover Letter of IHA Application
-----------------	-------------------------------------

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

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2.5	Relying on default due to lack of project-specific information
--	-----	--

[‡] 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)	163
Number of piles within 24-h period	4
Duration to drive a single pile (minutes)	45
Duration of Sound Production within 24-h period (seconds)	10800
10 Log (duration of sound production)	40.33
Propagation (xLogR)	15
Distance from source level measurement (meters)	10

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

NOTE: The User Spreadsheet tool provides a means to estimate 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)	19.3	1.7	28.6	11.7	0.8

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

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