

Marine Mammal Monitoring Plan for the Pier 62 Project

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City of Seattle
Marine Mammal Monitoring Plan
Pier 62 Project

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

| | |
|------|---|
| dB | decibel |
| Hz | hertz |
| kHz | kilohertz |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| RMS | root mean square |
| SEL | sound exposure level |

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SECTION 1. INTRODUCTION

The proposed monitoring plan for the Pier 62 Project includes a construction monitoring protocol as well as guidelines for construction activities associated with pile installation and removal. Monitoring would occur by observing construction activities and the surrounding marine environment for signs of marine mammals and/or potential threats to marine mammals, as well as measuring underwater noise produced by in-water, pile-related activities. This Monitoring Plan is intended to retaining enough flexibility for the monitors to use their best scientific judgment for unforeseen events that will allow for optimal protection of marine mammals.

1.1 CONSTRUCTION MONITORING

For the Pier 62 Project, monitoring of in-water, pile-related construction would be accomplished by land-based, protected-species observers. For work with a vibratory hammer or impact hammer, up to 4 monitors would be required. One monitor would be located at the construction site to survey the nearshore environment immediately surrounding active pile-related construction, and would be in close contact with construction personnel. Two monitors would be located on the north and south entrances to Elliott Bay. The fourth monitor would be on a ferry travelling the Seattle to Bainbridge Island Ferry route. All observers would monitor the designated Exclusion and Level B Harassment Zones, which are listed in Table 1 and shown on Figures 1 through 3.

TABLE 1. SUMMARY OF EXCLUSION ZONE THRESHOLDS

| Hearing Group | Exclusion Zone Thresholds ¹ | Pile Driver Type | Pile Type |
|--------------------------|--|------------------|-------------------|
| Low-frequency cetaceans | 27.3 meters | Vibratory | Timber extraction |
| | 504.8 meters | Vibratory | Steel pile |
| | 88.6 meters | Impact | Steel pile |
| Mid-frequency cetaceans | 10 meters | Vibratory | Timber extraction |
| | 44.7 meters | Vibratory | Steel pile |
| | 10 meters | Impact | Steel pile |
| High-frequency cetaceans | 40.4 meters | Vibratory | Timber extraction |
| | 746.4 meters | Vibratory | Steel pile |
| | 105.6 meters | Impact | Steel pile |
| Phocid pinnipeds | 16.6 meters | Vibratory | Timber extraction |
| | 306.8 meters | Vibratory | Steel pile |
| | 47.4 meters | Impact | Steel pile |
| Otariid pinnipeds | 10 meters | Vibratory | Timber extraction |
| | 21.5 meters | Vibratory | Steel pile |
| | 10 meters | Impact | Steel pile |

Note:

1. Radius distance from point-source, pile-related noise. Stop-work order will be issued if threshold is crossed.

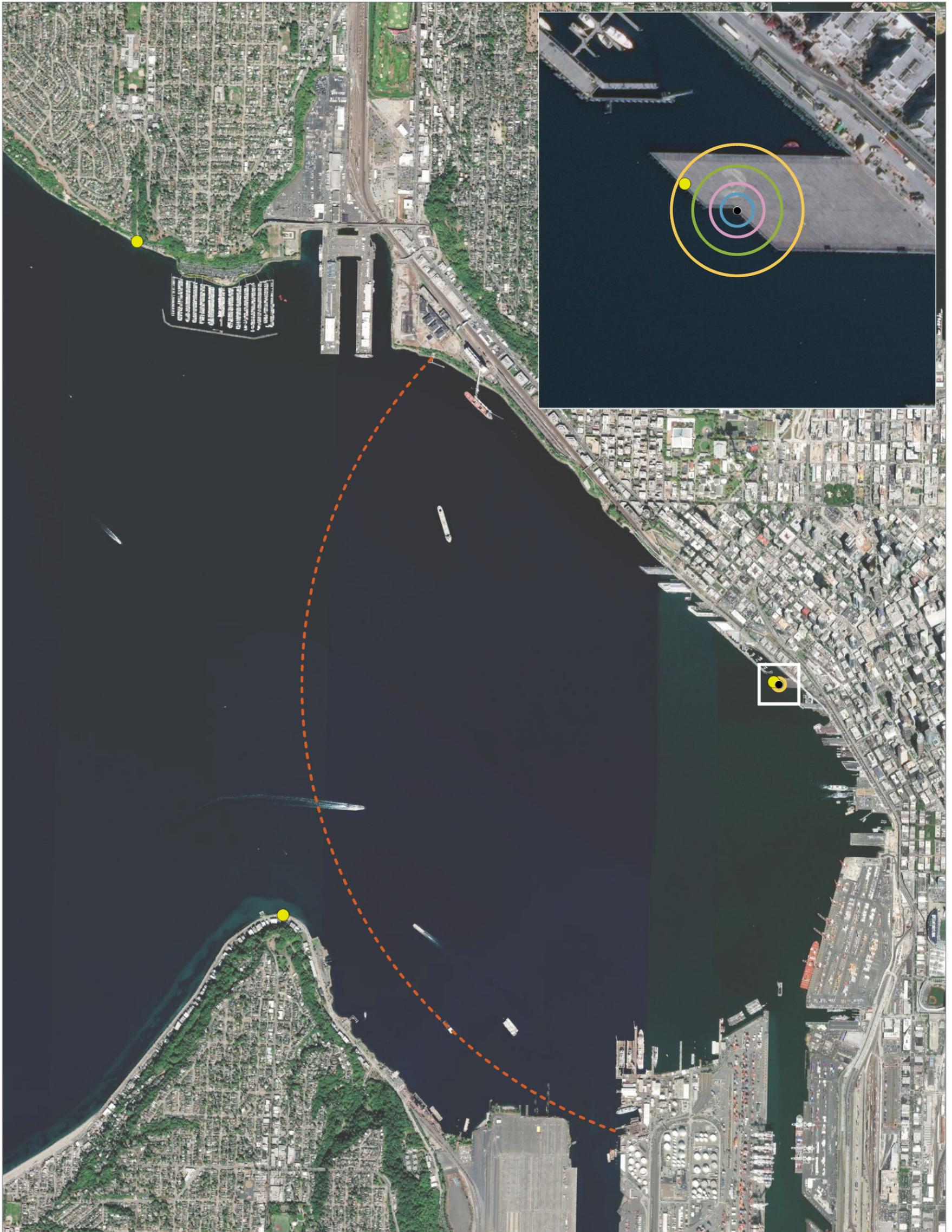
Acoustic monitoring would also occur during in-water pile driving and removal activities to document actual sound levels generated. Details regarding these aspects are discussed in the following sections.

1.1.1 Exclusion Zone Monitoring

Proposed Exclusion Zone Thresholds are provided in Table 1. Each Exclusion Zone Threshold and Level B harassment zone was determined by using the Practical Spreading Model for the pile types proposed; ambient acoustic data collected during Season 1 of the Pier 62 project (Greenbusch Group 2018); hydroacoustic monitoring for Season 1 of the Pier 62 project (Greenbusch Group 2018); hydroacoustic monitoring for the Elliott Bay Seawall Project Seasons 1, 2, 3, and 4 (Anchor QEA 2014, 2015, 2016, and 2017); and the National Oceanic and Atmospheric Administration's 2016 guidance (NOAA 2016). All thresholds represent radii distances from the point-source, pile-related work, and each is specific to marine mammal hearing groups. In addition, the Exclusion Zones and Level B Harassment Zones are specific to the type of pile activity (installation via impact or vibratory hammer, removal via vibratory hammer), and pile type (steel or timber).

Exclusion Zones, which have been established by hearing group per NOAA's 2016 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 installation or removal (NOAA 2016). 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 whales, will the lead monitor allow work to 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.

All marine mammals that are near an applicable Exclusion Zone Threshold will be closely monitored, and every precaution will be taken to ensure they are not harmed in any way. 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/National Marine Fisheries Service (NMFS).



LEGEND:

Exclusion Zone – Vibratory Removal (Timber Pile)¹

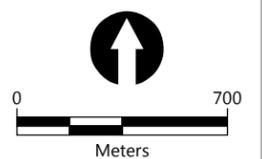
- High-Frequency Cetaceans (133 feet / 40.4 meters)
- Low-Frequency Cetaceans (90 feet / 27.3 meters)
- Phocid Pinnipeds (54 feet / 16.6 meters)
- Mid-Frequency Cetaceans and Otariid Pinnipeds (33 feet / 10 meters)

Level B Harassment Zone – All Hearing Groups²

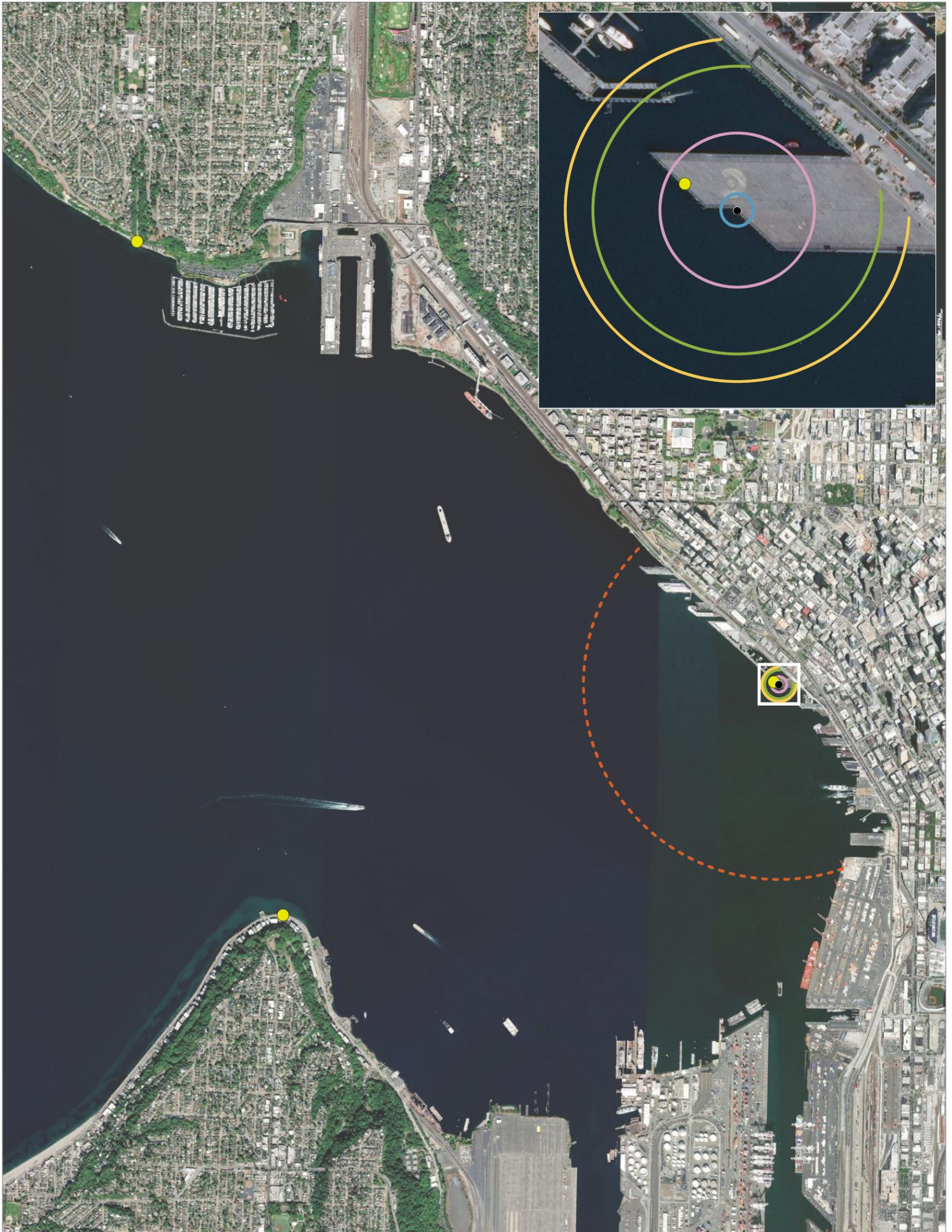
- 14-inch Timber Pile Vibratory Removal (9,610 feet / 1.8 miles / 2,929 meters to Exclusion Zone)
- Marine Mammal Monitor Location
- Hammer Location

NOTES:

1. Exclusion zones will be adjusted as needed, based on location of hammer operations.
2. Harassment zone extends from the dashed line (2,929 meters) to the exclusion zone for each hearing group.



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LEGEND:

Exclusion Zone – 30-inch Impact Installation¹

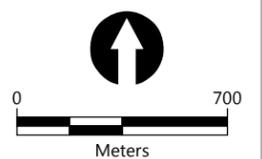
- Mid-frequency Cetaceans and Otariid Pinnipeds (33 feet / 10 meters)
- Phocid Pinnipeds (156 feet / 47.4 meters)
- Low-frequency Cetaceans (291 feet / 88.6 meters)
- High-frequency Cetaceans (347 feet / 105.6 meters)

Level B Harassment Zone

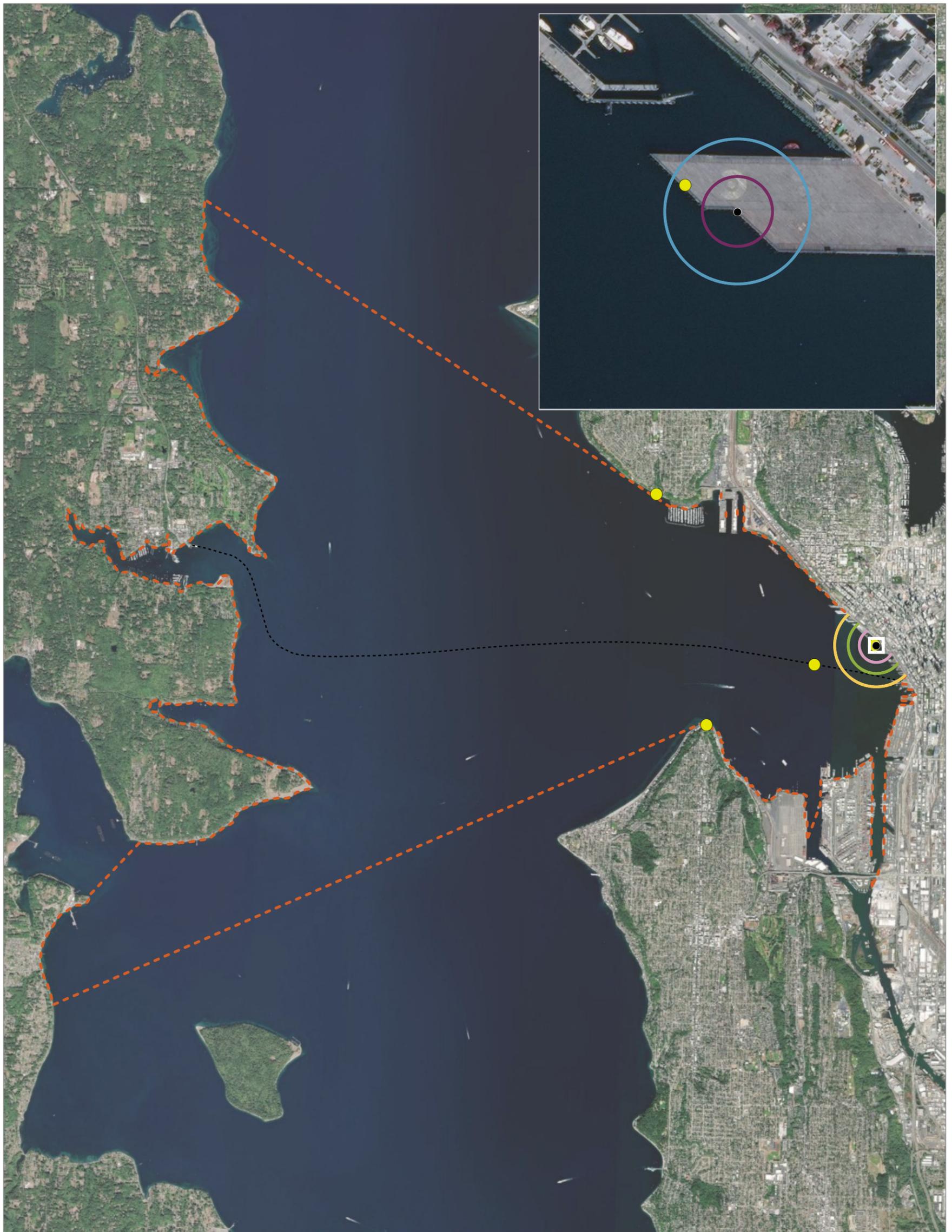
- **Mid-Frequency Cetaceans and Otariid Pinnipeds²**
All Cetaceans, Otariids, and Phocids (3,940 feet / 0.8 miles / 1,201 meters)
- Marine Mammal Monitor Location
- Hammer Location

NOTES:

1. Exclusion zones will be adjusted as needed, based on location of hammer operations.
2. Harassment zone extends from the dashed line (1,201 meters) to the exclusion zone for each hearing group.



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LEGEND:

Exclusion Zone – Vibratory Installation (Steel Pile)

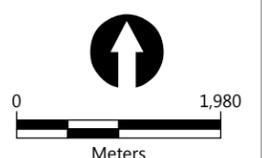
- Otariid Pinnipeds (72 feet / 22 meters)
- Mid-Frequency Cetaceans (148 feet / 45 meters)
- Phocid Pinnipeds (1,007 feet / 307 meters)
- Low-Frequency Cetaceans (1,656 feet / 505 meters)
- High-Frequency Cetaceans (2,449 feet / 746 meters)

Level B Harassment Zone - All Hearing Groups¹

- All Cetaceans, Otariids, and Phocids (54,117 meters / 177,549 feet / 33.6 miles)
- Marine Mammal Monitor Location
- Hammer Location
- Seattle-Bainbridge Island Ferry

NOTES:

1. Level B zone measured from end of permanent threshold shift for each hearing group out to common land-based attenuation points shown on map.
2. Harassment zone extends from the dashed line (54,117 meters) to the exclusion zone for each hearing group.



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Figure 3
Exclusion and Level B Harassment Zones for Vibratory Pile Driving
 Pier 62 Project – Marine Mammal Monitoring Plan
 Seattle, Washington

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1.1.2 Stop-Work Order Protocol

When a marine mammal is observed approaching the applicable Exclusion Zones (see Table 1 and Figures 1 through 3), 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 or impact 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 work day 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 or impact hammer.

If the authorized SRKW Level B harassment number has been exceeded, the following stop-work conditions will be in affect:

- a) If SRKWs are sighted within the vicinity of the project area and are approaching the Level B Harassment/Monitoring Zone during in-water construction activities, a stop-work order will be issued.
- b) If a killer whale approaches the Level B Harassment/Monitoring Zone during pile driving or 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.
- c) If a SRKW enters the Level B Harassment/Monitoring Zone undetected, in-water pile driving or pile removal shall be suspended until the SRKW exits the Level B Harassment/Monitoring Zone to avoid further Level B harassment.

1.1.3 Level B Behavioral Harassment Zones

In addition to monitoring the Exclusion Zones described above, protected-species observers will also monitor the Level B Harassment Zones. These zones vary by activity but are the same for all hearing groups. Table 2 provides a summary of the Level B Harassment Zones for each activity. 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 distance indicated in the table. The distance to the Level B Harassment Zone for vibratory installation of steel piles stops short of the modeled distance due to intervening land masses.

TABLE 2. SUMMARY OF LEVEL B HARASSMENT ZONES

| Pile Type and Activity | Pile Driver Type | Distance to Level B Harassment Zone |
|-------------------------------|-------------------------|--|
| Timber extraction | Vibratory | 2,929 meters |
| Steel pile installation | Impact | 1,201 meters |
| | Vibratory | 54,117 meters |

Within this monitoring area, the cumulative daily number of take will be documented throughout each pile-related work day. All sightings of marine mammals will be documented by the monitors on a marine mammal sighting form (Attachment A). 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 their 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.

1.2 AUTHORIZED TAKE

Table 3 provides the number of takes for each marine mammal species authorized by NOAA for the Pier 62 Project. If the authorized total take for any particular species is reached at any point prior to the completion of in-water pile driving and/or removal, NOAA/NMFS will be immediately notified that the take has been reached and will be consulted for further guidance.

TABLE 3. AUTHORIZED INCIDENTAL TAKE BY LEVEL A AND LEVEL B HARASSMENT

| Marine Mammal Species | Authorized Level A Take | Authorized Level B Take | Authorized Total Take |
|---|--------------------------------|-----------------------------------|-----------------------------------|
| Pacific harbor seal (<i>Phoca vitulina</i>) | 53 | 1,598 | 1,651 |
| Northern elephant seal (<i>Mirounga angustirostris</i>) | 0 | 2 | 2 |
| California sea lion (<i>Zalophus californianus</i>) | 0 | 1,905 | 1,905 |
| Steller sea lion (<i>Eumetopias jubatus</i>) | 0 | 187 | 187 |
| Harbor porpoise (<i>Phocoena phocoena</i>) | 25 | 2,716 | 2,741 |
| Dall's porpoise (<i>Phocoenoides dalli</i>) | 2 | 196 | 198 |
| Long-beaked common dolphin (<i>Dephinus capensis</i>) | 0 | 49 | 49 |
| Common bottlenose dolphin (<i>Tursiops truncatus</i>) | 0 | 49 | 49 |
| Southern resident killer whale DPS (<i>Orcinus orca</i>) | 0 | 23 (single occurrence of one pod) | 23 (single occurrence of one pod) |

| Marine Mammal Species | Authorized Level A Take | Authorized Level B Take | Authorized Total Take |
|--|--------------------------------|--------------------------------|------------------------------|
| Transient killer whale (<i>Orcinus orca</i>) | 0 | 42 | 42 |
| Humpback whale (<i>Megaptera novaengliae</i>) | 0 | 5 | 5 |
| Gray whale (<i>Eschrichtius robustus</i>) | 0 | 4 | 4 |
| Minke whale (<i>Balaenoptera acutorostrata</i>) | 0 | 10 | 10 |

1.1.1 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 driving and removal. Monitors would be positioned as shown in Figures 1 to 3.

One monitor will be stationed at the construction site near the activity. Two additional monitors would be stationed at designated viewpoints on the north and south entrance of Elliott Bay, likely at Hamilton Viewpoint Park (Alki Point) and at West 32nd Avenue (city pump station), providing them broad, unobstructed view-sheds. The fourth monitor would be stationed on a ferry traveling the Seattle-to-Bainbridge Island route during vibratory pile installation. Additionally, during vibratory pile installation, the monitor stationed at Alki Point will walk between the east and west sides of the point so that the full Level B Harassment Zone can be viewed.

Each marine mammal monitor will be tasked with continuously scanning their view-shed within the zone of influence, documenting all marine mammals and, if seen, closely tracking their behaviors and locations, and communicating their observations to the rest of the monitoring crew. Proper coordination between the team of monitors and the construction manager will be facilitated by a designated monitoring coordinator who will establish coordination details each morning prior to the start of construction, and strictly maintain them throughout the construction day. Monitors will have a clear understanding of the location of various zones that pertain to each type of pile activity and the associated marine mammal hearing groups, and will continually coordinate and update each other as well as other crew members, as appropriate. Communication will be primarily via cellular phone. Each monitor will have a list of contact phone numbers, including for the monitoring coordinator, construction manager, and other management and staff.

Coordination between monitors and construction contractors would occur at least once each day prior to the start of work. This coordination would include a review of the pile-related work schedule and any marine mammal issues that could potentially occur. Other details provided to the monitors would include construction location, number and type of piles, timing, whether work would be pile installation or removal, and the type of hammer to be used. Any changes in pile-related work schedule will be conveyed to the monitors at least 30 minutes prior to their implementation, when possible.

Marine mammal monitoring will begin at least 30 minutes prior to the start of all pile driving and removal each day, and will continue at all times during active pile driving and removal. If necessary due to the presence of a marine mammal within or near the Exclusion Zone at the end of the pile-driving or 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-driving 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 make adjustments 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 (Attachment A). Each monitor will be properly equipped with necessary gear during their shift, including binoculars, field guides, compass, cellular phone, and back-up power.

Each monitor would work, on average, eight to 10 daylight hours per day and would be relieved by a new monitor if pile-related activities occur over a longer day or fatigue and/or lack of preparedness begins to decrease ability to detect marine mammals. If necessary, the number of monitors would be increased and/or their positions would be changed to ensure full visibility of the area of potential effects and to ensure early sighting of any marine mammal that enters the area. Monitors shall have no other responsibilities while making observations.

A comprehensive marine mammal monitoring 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 the City of Seattle and its contractors will implement to comply with the conditions of applicable permits.

1.2.1 Marine Mammal Sighting Form

The sighting form will capture all necessary details important to marine mammal identification and protection during pile-related activities. See Attachment A for the sample sighting form.

The monitoring form 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.
- For 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.

1.2.2 Acoustic Monitoring

Acoustic monitoring will be conducted during in-water pile installation and removal during Season 2. Acoustic monitoring for vibratory removal of timber piles was conducted during Season 1 activities. If feasible, it will also be conducted during Season 2. However, because Season 2 vibratory timber pile removal will be based on safety hazards and immediate project needs, it might not be possible to arrange for acoustic monitoring. It is likely that vibratory and impact installation will be occurring concurrently. Acoustic monitoring will be conducted on six days during Season 2, with a goal of recording sound data during each scenario of equipment operating (vibratory, impact, or both concurrently).

Collection of the acoustic data will be accomplished using a minimum of two hydrophones. At least one stationary land-based microphone would also be deployed to record airborne sound levels. For underwater acoustic monitoring, the hydrophones will be placed such that there is a direct line of acoustic transmission through the water column between the impact or vibratory hammer and the hydrophones, without any interposing structures (including other piles) that could impede sound transfer, when possible. All acoustic recordings will be conducted approximately one meter below the water surface and one meter above the sea floor, or as applicable to optimize sound recordings in the nearshore environment.

Background noise recordings (in the absence of pile installation or removal) will also be made during the study to provide a baseline background noise profile. The results and conclusions of the study will be summarized and presented to NOAA/NMFS with recommendations on any modifications to this proposed plan or Exclusion Zones.

All sensors, signal conditioning equipment, and sampling equipment will be calibrated at the start of the monitoring period to National Institute of Standards and Technology standards and will be re-checked at the start of each day.

A stationary two-channel hydrophone recording system will be deployed to record continuous sound associated with pile driving and removal activities during the monitoring period. Key methodological details are as follows:

- Prior to monitoring, water depth measurements will be made to ensure that hydrophones will not drag on the bottom during tidal changes. The hydrophones will be placed approximately one meter below the surface and one meter above the seafloor. The depth with respect to the bottom may vary somewhat due to tidal changes and current effects.
- The hydrophone systems will be deployed to maintain a constant distance of approximately 10 meters from the pile-related noise source.
- The hydrophones, signal conditioning, and recording equipment will be configured to acquire maximum source levels without clipping recorded data.

To empirically verify the modeled behavioral disturbance zones, underwater and airborne acoustic monitoring would occur for two days during each type of pile installation or removal activity. In the event

that underwater sound monitoring shows that noise generation from pile installation or removal consistently exceeds the anticipated noise levels, as documented in the Incidental Harassment Authorization application, NOAA/NMFS will be consulted. The medians and means will be reported for all of the metrics in the acoustic monitoring plan.

Post-analysis of underwater sound level signals would include the following:

- Impact Pile Driving
 - Determination of the maximum absolute value of the instantaneous pressure within each strike.
 - Root mean square (RMS) value for the period of which 90 percent of the energy is represented (RMS 90, 5 percent to 95 percent) for each absolute peak pile strike.
 - Peak sound pressure level (SPL) and pulse duration for each pile strike.
 - Mean and standard deviation/error of the RMS 90 percent for all pile strikes of each pile.
 - Rise time.
 - Number of strikes per pile and per day.
 - Number of strikes exceeding 206-decibel (dB) peak.
 - Sound exposure level (SEL) of the single pile strike with the absolute peak sound pressure, mean SEL.
 - Cumulative SEL (cumulative SEL = single strike SEL + 10*LOG (number of pile strikes)).
 - Frequency spectrum, between 20 hertz (Hz) and 20 kilohertz (kHz), for up to eight successive strikes with similar sound level.
- Vibratory Pile Driving and Removal
 - RMS values (average, standard deviation/error, minimum, and maximum) for each recorded pile. The 10-second, RMS-averaged values will be used for determining the source value and extent of the 120 dB underwater isopleth.
 - Frequency spectra will be provided for each functional hearing group as outlined in NOAA's 2016 guidance (NOAA 2016).
 - All underwater source levels will be standardized to a reference distance of 10 meters (33 feet).

Post-analysis of airborne noise will be presented in an unweighted format, and will include the following:

- The unweighted RMS values (average, minimum, and maximum) for each recorded pile. The average values will be used for determining the extent of the airborne isopleths relative to species specific criteria.
- Frequency spectra will be provided from 10 Hz to 20 kHz for representative pile-related activity.
- All airborne source levels will be standardized to a reference distance of approximately 15 meters (50 feet).

Acoustic monitoring will be performed using a standardized method that will facilitate comparisons with other studies. In the event that pile-related noise trends toward consistently surpassing calculated levels,

NOAA/NMFS will be contacted immediately to discuss the situation. Table 4 provides the anticipated noise levels by pile type and method.

TABLE 4. METHOD AND SOUND LEVEL SUMMARY

| Construction Phase | Type | Installation/Removal Method | Source Sound Levels |
|---------------------------|---------------------------------|------------------------------------|---|
| Installation | | | |
| Pier 62 | Steel pile 30-inch ¹ | Vibratory | 177 dB RMS ^{1,2,3} / 180 dB RMS ⁴ |
| | Steel pile 30-inch | Impact | 189 dB RMS ⁵ |
| Removal | | | |
| Pier 62 | Timber pile 14-inch | Vibratory | 161 dB RMS ⁶ |

Notes:

1. A template consisting of two 24-inch pipe piles connected by a structural steel frame will also be installed and removed as part of the general 30-inch steel pile installation activities, to correctly position the steel 30-inch piles. Sound source levels associated with installation and removal of 24-inch steel template piles are assumed to be no greater than installation of 30-inch steel piles (177 dB_{RMS}), and all monitoring for template pile installation and removal will conservatively occur using the thresholds identified for 30-inch steel pile installation.
2. Source sound level obtained from Port Townsend Test Pile Project: Underwater Noise Monitoring Final Report (Laughlin 2011).
3. Single source pile driving sound level
4. Additive source sound level for two piles driven simultaneously. For simultaneous operation of two vibratory hammers installing steel pipe piles, the 180 dB_{RMS} value is based on identical single-source levels, adding three dB based on WSDOT rules for decibel addition (2018).
5. Source sound level obtained from Colman Dock Test Pile Project 2016 (WSDOT 2016).
6. Hydroacoustic monitoring during Pier 62 Season 1 showed unweighted RMS ranging from 140 to 169 dB (Greenbusch Group 2018); the 75th percentile of these values is 161 dB_{RMS}. 161 dB_{RMS} was chosen to conservatively calculate thresholds.

dB – decibels

RMS – root mean square

1.3 REPORTING

In addition to capturing marine mammal monitoring data on field datasheets, a daily monitoring log and annual marine mammal monitoring and acoustic monitoring reports will be prepared.

1.3.1 Daily Monitoring Log

A running daily monitoring log will be maintained and updated at the end of each survey day, summarizing important observations and applicable aspects of construction. The daily monitoring log will summarize important details noted by the monitors in a format that readily conveys these details to interested and appropriate parties.

1.3.2 Annual Monitoring Reports

Each year, an annual monitoring report would be drafted and submitted to NOAA Office of Protected Resources, and NMFS Northwest Regional Office, at the end of each construction season. Each annual report would summarize information presented in the daily monitoring logs in a manner to effectively

convey important marine mammal observations made during that year. The annual monitoring report would 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.

1.3.3 Acoustic Monitoring Report

Each year, a report providing the results of all acoustic monitoring would also be drafted and submitted to NOAA/NMFS. This reports would include the following:

- Size and type of piles monitored.
- A detailed description of any sound attenuation device used, including design specifications.
- The impact hammer energy rating used to drive the piles, description of the vibratory hammer, and make and model of the hammer(s).
- A description of the sound monitoring equipment.
- The distance between hydrophones and depth of water and the hydrophone locations.
- The depth of the hydrophones.
- The distance from the pile to the water's edge.
- The depth of water in which the pile was driven.
- The depth into the substrate that the pile was driven.
- The physical characteristics of the bottom substrate into which the pile was driven.
- The total number of strikes to drive each pile.
- The results of the hydroacoustic monitoring, including the frequency spectrum, ranges and means for the peak and RMS sound pressure levels, and an estimation of the distance at which RMS values reach the relevant marine mammal thresholds and background sound levels. Vibratory driving results would include the maximum and overall average RMS calculated from 10-second RMS values during the drive of the pile.
- A description of any observable marine mammal behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time.

REFERENCES

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City of Seattle

Pier 62 Project

ATTACHMENT A
PIER 62 MARINE MAMMAL MONITORING FORMS

Pier 62 Marine Mammal Monitoring Form

Monitoring Location: Const Site Alki Magnolia Ferry Observer: _____ Date: _____

Weather Conditions: Sunny Overcast Rain Whitecaps Average temp: _____ Other conditions: _____

Environmental Conditions Limiting MMM: None Yes - describe: _____

MMM Start Time: _____ MMM End Time: _____

Pile Activity (Begin, End, Breaks): _____

Monitoring Type: Vibe Impact Communication during Monitoring: _____

| Species | Species # | Time Begin | Time End | Duration | PD Distance (feet) | Take # | Behavior | Reactions to Pile Activity |
|---------|-----------|------------|----------|----------------------------|--------------------|--------|--|---|
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |
| | | | | ____ Hours ____ Minutes | | | <input type="radio"/> Swimming <input type="radio"/> Foraging <input type="radio"/> Resting ¹ <input type="radio"/> Intermittent <input type="radio"/> Other ² | <input type="radio"/> No pile activity <input type="radio"/> None observed <input type="radio"/> Yes ² |

Notes:

1. Resting on mooring buoy (hailed out), debris, or shoreline.

2. Describe behavior or reaction to pile activity here.

Total Daily Takes: CSL Takes = _____ HS Takes = _____ Other Takes = _____

