

MARINE MAMMAL MONITORING PLAN DOWNTOWN SAN FRANCISCO FERRY TERMINAL EXPANSION PROJECT – SOUTH BASIN IMPROVEMENTS

Marine mammal monitoring will be implemented during construction of the Downtown San Francisco Ferry Terminal Expansion Project – South Basin Improvements (or project), as detailed in this Marine Mammal Monitoring Plan (plan).

1.0 PURPOSE OF THE MONITORING PLAN

The purpose of this plan is to establish procedures to ensure compliance with authorization requirements, thereby avoiding slight and serious injury (Level A harassment) of marine mammals and minimizing behavioral disturbance (Level B harassment) to the extent practicable. Lethal take of marine mammals is not expected to occur as a part of this project.

The objectives of the monitoring plan are to:

- Establish parameters to monitor site locations for the disturbance of marine mammals during the construction activities;
- Avoid injury to marine mammals through visual monitoring of identified zones of influence (e.g., zones where Level A harassment criteria may be exceeded), and provide ancillary observations of marine mammals in adjacent work areas;
- Ensure that coordination with the acoustic monitoring team occurs during pile driving to modify zones of influence related to noise thresholds for fish and marine mammals, if needed; and
- Describe field operations to obtain data as follows:
 - Make daily observations and record presence or absence of marine mammals;
 - Record marine mammal behavior observations; and
 - Establish/confirm threshold distances delineated in the Incidental Harassment Authorization (IHA) request.

2.0 OVERVIEW OF PROJECT ACTIVITIES AND PROJECT LOCATION

The San Francisco Bay Area Water Emergency Transportation Authority (WETA) is expanding berthing capacity at the Downtown San Francisco Ferry Terminal, located at the San Francisco Ferry Building, to support existing and future planned water transit services operated on San Francisco Bay by WETA and WETA's emergency operations. The project area and vicinity are shown on Figure 1.

The project includes construction of two new water transit gates and associated overwater berthing facilities, in addition to supportive improvements, such as additional passenger waiting and queuing areas and circulation improvements. The project includes the following elements:

- Removal of portions of existing deck and pile construction (portions will remain as open water, and other portions will be replaced);
- Construction of two new gates (Gates F and G);
- Relocation of an existing gate (Gate E); and
- Improved passenger boarding areas, amenities, and circulation, including extending the East Bayside Promenade along Gates E, F, and G; strengthening the South Apron of the Agriculture Building; creating the Embarcadero Plaza; and installing weather protection canopies for passenger queuing.

2.1 Species that Could Be Affected

As described in detail in Section 3 of the IHA application, seven species of marine mammals could be affected by project construction activities: Pacific harbor seal, California sea lion, harbor porpoise, gray whale, northern elephant seal, northern fur seal, and bottlenose dolphin.

2.2 Description of Activities that May Result in Take

Construction of the project improvements requires pile driving. Pile driving for the project would include impact or vibratory pile driving associated with construction of the berthing structures, and the Embarcadero Plaza and East Bayside Promenade; as well as installation of a fendering “chock block” adjacent to Gates E, F, and G. Piles would be steel, concrete, or wood, depending on the application. Pile types, numbers, and sizes are described in Section 1, Table 3 of the IHA application. Underwater sound and acoustic pressure resulting from pile driving could affect marine mammals by causing behavioral avoidance of the construction area (Level B harassment) and/or injury to sensitive species (Level A harassment). Activities are not anticipated to result in lethal take or injury of marine mammals.

For pile removal and driving, distances from pile-driving activities where marine mammals could be impacted are described in Tables 1 and 2, shown on Figures 1 through 5, and summarized below; additional detail can be found in Section 7 of the of the IHA application. It is anticipated that ambient noise levels in the vicinity of the project will often exceed 120 decibels (dB), and the actual area of Level B harassment is likely much smaller than what is presented below. For those Level A zones indicated in Table 1 to be less than 33 feet (10 meters), a conservative exclusion zone of 33 feet (10 meters) will be used for monitoring purposes.

- Impact driving of steel piles could exceed the Level A threshold for the various marine mammal hearing groups over the distances provided in Table 1. Impact driving of steel piles could exceed the Level B threshold of 160 dB RMS for over the distances provided in Table 2.
- Vibratory driving and removal of 24, 30, and 36-inch piles would exceed the Level A thresholds for the various marine mammal hearing groups indicated in Table 1, and could exceed the Level B threshold of 120 dB RMS over the distances provided in Table 2.

Areas where Level A thresholds could be exceeded are considered the exclusion zones. To simplify monitoring, two sets of exclusion zones will be established for each type of pile driving, then separated based on the various hearing groups: one for otariids and mid-frequency cetaceans (i.e., California sea lion, northern fur seal, and bottlenose dolphin) and Pacific harbor seal; one for other phocids (i.e., northern elephant seal); and one for all other cetaceans (i.e., gray whale and harbor porpoise). Values were rounded up to the nearest hundred feet for cetaceans given the larger distances involved. See Table 3 for a summary of these exclusion zones. See Figures 1 through 3 for the exclusion zones.

Project Element Requiring Pile Installation	Source Levels at 33 feet (10 meters) (dB)		Distance to Level A Threshold ¹ , in feet ² (meters in parentheses)				
	Peak ³	RMS	Phocids	Otariids	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans
36-Inch Steel Piles – Vibratory Driver	191	157	12 (4)	1 (<1.0)	17 (5)	2 (1)	24 (7)

36-Inch Steel Piles – Impact Driver (BCA)	203	186	1,407 (429)	102 (31)	2,628 (801)	95 (29)	3,130 (954)
30-Inch Steel Piles – Vibratory Driver	181	151	5 (1)	1 (<1.0)	7 (2)	1 (<1.0)	10 (3)
30-Inch Steel Piles – Impact Driver (BCA)	203	183	735 (224)	52 (16)	1,317 (418)	49 (15)	1,634 (498)
24-Inch Steel Piles – Vibratory Driver	183	154	7 (2)	1 (<1.0)	10 (3)	1 (<1.0)	14 (4)
24-Inch Steel Piles – Impact Driver (BCA)	196	183	735 (224)	52 (16)	1,317 (418)	49 (15)	1,634 (498)

Notes:
¹ Level A thresholds are based on the NMFS 2016 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing; cSEL threshold distances are shown. See footnote 3 below.
² Where noise will not be blocked by land masses or other solid structures. Values in feet have been converted from fractional meters values, which may affect rounding during unit conversion.
³ All distances to the peak Level A thresholds are less than 33 feet (10 meters).
 Distances are rounded to the nearest foot or to "<1.0 (0)" for values less than 1 foot.
 BCA will be used during impact driving of steel piles.
 Peak and RMS are re: 1 µPa
 BCA = Bubble curtain attenuation
 RMS = root mean square
 dB = decibels
 µPa = microPascal
 NMFS = National Marine Fisheries Service

Table 2 Expected Pile-Driving Noise Levels and Distances of Level B Threshold Exceedance with Impact and Vibratory Driver				
Project Element Requiring Pile Installation	Source Levels at 33 feet (10 meters) (dB)		Distance to Level B Threshold, in feet ¹ (meters in parentheses)	Area of Potential Level B Threshold Exceedance Acres (Square Kilometers)
	Peak	RMS	160/120 dB RMS (Level B) ²	
Embarcadero Plaza and East Bayside Promenade and Gates E, F, and G Dolphin and Guide Piles				
36-Inch Steel Piles – Vibratory Driver	180	157	3,085 (940)	268 (1.084)
36-Inch Steel Piles – Impact Driver (BCA)	203	186	1,775 (541)	96 (0.389)
30-Inch Steel Piles – Vibratory Driver	181	151	1,476 (450)	70 (0.248)
30-Inch Steel Piles – Impact Driver (BCA)	203	183	1,119 (341)	43 (0.172)
24-Inch Steel Piles – Vibratory Driver	183	154	2,134 (651)	128 (0.519)
24-Inch Steel Piles – Impact Driver (BCA)	196	183	1,119 (341)	43 (0.172)

Notes:
¹ Where noise will not be blocked by land masses or other solid structures. Values in feet have been converted from fractional meters values, which may affect rounding during unit conversion.
² For underwater noise, the Level B harassment (disturbance) threshold is 160 dB for impulsive noise and 120 dB for continuous noise.
 BCA will be used during impact driving of steel piles.
 Peak and RMS are re: 1 µPa.
 BCA = Bubble curtain attenuation will be used during impact driving of steel piles.
 dB = decibels
 RMS = root mean square

Table 3			
Level A Harassment - Exclusion Monitoring Zones in feet(meters)²			
Hearing Groups	Impact Pile Driving		Vibratory Pile Driving
	24- and 30-inch Steel Piles ft. (m)	36-inch Steel Piles ft. (m)	24-, 30-, and 36-inch Steel Piles ft. (m)¹
Harbor Seal	100 (30)	100 (30)	33(10)
Other Phocids	735 (224)	1,410 (430)	33 (10)
Otariids and Dolphins	100 (30)	100 (30)	33 (10)
Cetaceans	1,640 (500)	3,130 (955)²	33 (10)

¹ Exclusion Zone is applicable for all other pile driving and extraction activities for all marine mammal species groups. Exact distances for each hearing group for each activity type are all within 33 feet (10 meters).

² Some exact values have been rounded up (such as 98 feet [30 meters] rounded up to 100 feet) for purposes of ease in monitoring.

ft. = feet
m = meters

3.0 MARINE MAMMAL MONITORING

National Marine Fisheries Service (NMFS)-approved biologists or marine mammal observers (MMOs) will be designated for visual monitoring, record keeping, and reporting for the project. The MMO(s) will be present for all pile driving activities, including vibratory and impact driving activities. Underwater noise monitoring conducted during pile driving for the prior construction season has resulted in the establishment of Level B zones for vibratory driving that are small enough to be adequately covered by one observer. Since the Level A zones for impact driving are larger, two MMOs will be present when impact driving occurs.

3.1 Baseline Monitoring

The MMO(s) will survey the potential Level A and nearby Level B harassment zones (areas within approximately 3,130 feet of the pile-driving area observable from the shore) on 2 separate days—no earlier than 7 days before the first day of construction—to establish baseline observations. Monitoring will be timed to occur during various tides (preferably low and high tides) during daylight hours from locations that are publicly accessible (e.g., Pier 14 or the Ferry Plaza). The information collected from baseline monitoring will be used for comparison with results of monitoring during pile-driving activities.

3.2 Construction Monitoring

In several cases, the Level A thresholds would only be expected to be exceeded within a few feet of pile driving; in other cases, the Level A thresholds could be exceeded out to approximately 3,130 feet (610 meters) (see Table 1). WETA will implement a mitigation measure that requires work to cease if a marine mammal is observed in an exclusion zone (Table 3). For those Level A zones less than 33 feet (10 meters) as indicated in Table 1, a conservative exclusion zone of 33 feet (10 meters) will be used (Table 3).

As described above, for purposes of monitoring, there will be two sets of exclusion zones depending on the activity: impact pile driving and then vibratory pile driving and extraction. The exclusion zones are divided between otariids and dolphins (sea lions, northern fur seals and bottlenose dolphins) and harbor seals, other phocids (i.e., northern elephant seal) and then one exclusion zone is used for all other cetacean species (i.e., gray whales and harbor porpoises). See Figures 1 through 3 for the exclusion zones that will be monitored during construction activities.

The exclusion zones will be monitored for 30 minutes prior to any pile extraction and driving activities to ensure that the area is clear of any marine mammals. If marine mammals are sighted in the exclusion zone, the start of pile extraction and driving activities will be delayed to allow the animals to move out of the area. If, during pile driving or pile extraction activities, a marine mammal is seen above water and then dives below, the contractor will wait 15 minutes for pinnipeds and small cetaceans, and 30 minutes for gray whales; if no marine mammals are observed in that time, it will be assumed that the animal has moved beyond the exclusion zone and work can resume. The MMO(s) will observe the exclusion zones from the most practicable vantage point possible (e.g., Pier 14 or the Ferry Plaza).

For the areas where the Level B threshold could be exceeded (Table 2, i.e., the area potentially exposed to underwater noise levels at or above 160 dB root mean square [RMS]) for impact driving and 120 dB RMS for vibratory driving), behavioral observations of marine mammals will be made and take would be documented. MMO observations will be made to the extent possible using binoculars from the Ferry Plaza, Pier 14, or other publicly accessible locations along the waterfront. Because no take is being authorized for Guadalupe fur seal or humpback whale, work must be halted if this species is detected in the Level A or Level B zones. One MMO will be present during vibratory driving, and two MMOs will be present during impact driving. WETA will coordinate closely with the local marine mammal rehabilitation center to share information on any sightings of this listed species. Work delays will be implemented as necessary.

The MMO(s) shall record all observations of marine mammals, regardless of distance from the pile being driven, as well as behavior and potential behavioral reactions of the animals. Observations within the ferry terminal shall be distinguished from those in the nearshore waters of San Francisco Bay.

3.3 Post-Construction Monitoring

The MMO(s) will continue to observe the exclusion zone and surrounding areas for a minimum of 30 minutes after pile driving stops.

4.0 QUALIFICATIONS AND RESPONSIBILITIES FOR MMOS

4.1 Minimum Qualifications for MMOS

To be considered qualified to record observations of marine mammals for the project, observers must meet the following criteria:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface, with the ability to estimate target size and distance; use of binoculars may be necessary to identify marine mammals;
- Experience in conducting field observations and collecting data according to assigned protocols (this may include academic experience), and ability to perform these tasks;
- Experience or training in the identification of marine mammal species and behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of marine mammal observations, including marine mammal species observed within the exclusion and behavioral disturbance zones; and
- Ability to communicate with project personnel orally, by radio and in person, to provide real-time information on marine mammals observed in the area, as necessary.

All monitoring personnel will be provided a copy of this monitoring plan and the IHA. Monitoring personnel must read and understand the contents of this plan—as well as the IHA—as they relate to coordination, communication, and identification and reporting of incidental harassment of marine mammals.

4.2 MMO Responsibilities

MMO tasks associated with monitoring and reporting requirements for each of the project activities are summarized below:

- Possess a copy of and understand the requirements of the 2018 IHA issued for the project;
- Establishing exclusion zone distances from the pile to be extracted/installed, in coordination with the acoustic monitors;
- Monitoring the exclusion zone 30 minutes before pile driving is initiated to ensure that marine mammals are not present;
- Monitoring the exclusion zone for a minimum of 30 minutes after pile driving stops;
- Monitoring any marine mammal activity in the vicinity of the pile-driving activity;
- Observing marine mammal behavior and recording observations, as described in Section 3.0;
- In the event that a marine mammal is observed within the behavioral disturbance zone, recording a Level B take and documenting behaviors;
- If applicable, recording a Level A take and documenting behaviors;
- Coordinating with WETA, construction contractor(s), and other monitors on site;
- Preparing Monitoring Data Sheets; and
- Preparing a post-construction report.

5.0 DATA COLLECTION AND REPORTING

5.1 Monitoring Data

Observations will be recorded, and will include the following, to the extent available:

- Location in relation to the Level A and Level B harassment zones;
- Environmental conditions (weather, sea state, tides, etc.);
- Species;
- Sex and age class;
- Number of animals;
- Description of behavior, including the location and direction of movement;
- Time of observation;
- Construction activity, including the time that pile driving begins and ends; and
- Other acoustic or visual disturbances.

The reactions of marine mammals will be recorded based on the following classifications: 1) no response; 2) head alert (e.g., looks towards the source of disturbance); 3) approaches in water (but does not leave); and 4) retreat or flush (e.g., leaves the area or flushes from the haul-out site). Attached is a Monitoring Data Sheet to be used for recording observations.

If a marine mammal carcass is found in the area, the event would be reported to NMFS according to the following schedule:

1. If a carcass is found and it is determined that it was caused by the contractor's activities, the contractor will immediately cease all activities and NMFS will be notified immediately. The MMO(s) will gather required data and report to NMFS.

2. If a carcass is found and the cause is unknown, NMFS will be notified immediately, and the MMO(s) will report the required data. Activities could continue while NMFS reviews the incident.
3. If a carcass is found and the cause is determined to not be associated with the contractor's activities, the MMO(s) will report it to NMFS within 24 hours, with the required data. Construction activities would not be interrupted.

If accessible to the MMO(s), the carcass would be tagged; if possible, the MMO(s) would determine and record the species, age, and sex for reporting to NMFS.

5.2 Monitoring Equipment

The following equipment will be used by the MMO(s):

- A rangefinder capable of achieving an accuracy of ± 5 feet at a range of 100 feet;
- Binoculars;
- Radio or cell phone; and
- Monitoring Data Sheets.

The MMO(s) will use high-quality binoculars to monitor marine mammals at distant locations. A radio or cell phone will be used to coordinate with the construction contractor and the acoustics team, if applicable. To the extent practicable, digital video or 35 millimeter still cameras will be used to document the behavior and response of marine mammals to construction activities or other disturbances.

5.3 Reporting

The following sections detail the NMFS reporting requirements pursuant to the IHA.

5.3.1 Monitoring Data Sheets

Monitoring Data Sheets that summarize the monitoring results, construction activities, and environmental conditions would be compiled and submitted with the post-construction monitoring report. The Monitoring Data Sheets are attached.

5.3.2 Post-Construction Monitoring Report

A draft report would be submitted to NMFS within 90 days after completion of the project, or sixty days prior to the issuance of any subsequent IHA for this project, whichever comes first. The draft report would include a description of the materials and methods used in monitoring, an overall summary of the project results, a discussion of the compliance record over the course of the entire program, and a discussion of the effectiveness of monitoring methods. A detailed list of the items to be included in the post-construction monitoring report is located in the 2018 IHA issued for the project.

A final report would be prepared and submitted to the services within 30 days following receipt of any comments on the draft report. Copies of the final report would be issued to pertinent regulatory agencies by WETA.

An acoustic data report, including data collected and summarized from all monitoring positions, would be submitted to NMFS in a similar manner, as described in the project Acoustic Monitoring Plan. The marine mammal and acoustic monitoring reports would provide useful information that would allow design of future projects to reduce incidental take of marine mammals. WETA would share field data and behavioral

observations on marine mammals that occur in the project area. This information could be made available to federal, state, and local resource agencies, scientists, and other interested parties upon written request.

Date: _____
 Page ___ of ___

Daily Marine Mammal Monitoring Data Sheet
Downtown San Francisco Ferry Terminal Expansion Project – South Basin Improvements

MMO: _____

Other personnel onsite: _____

Time		Air Temp (°F)	Wave Height (ft.)	Wind (mph)	Cloud Cover (%)
Starting					
Ending					

Tidal Information* (Gauge: _____)		
Sunrise: _____		Sunset: _____
High/Low	Tide Time	Height (ft.)

Other Notes:

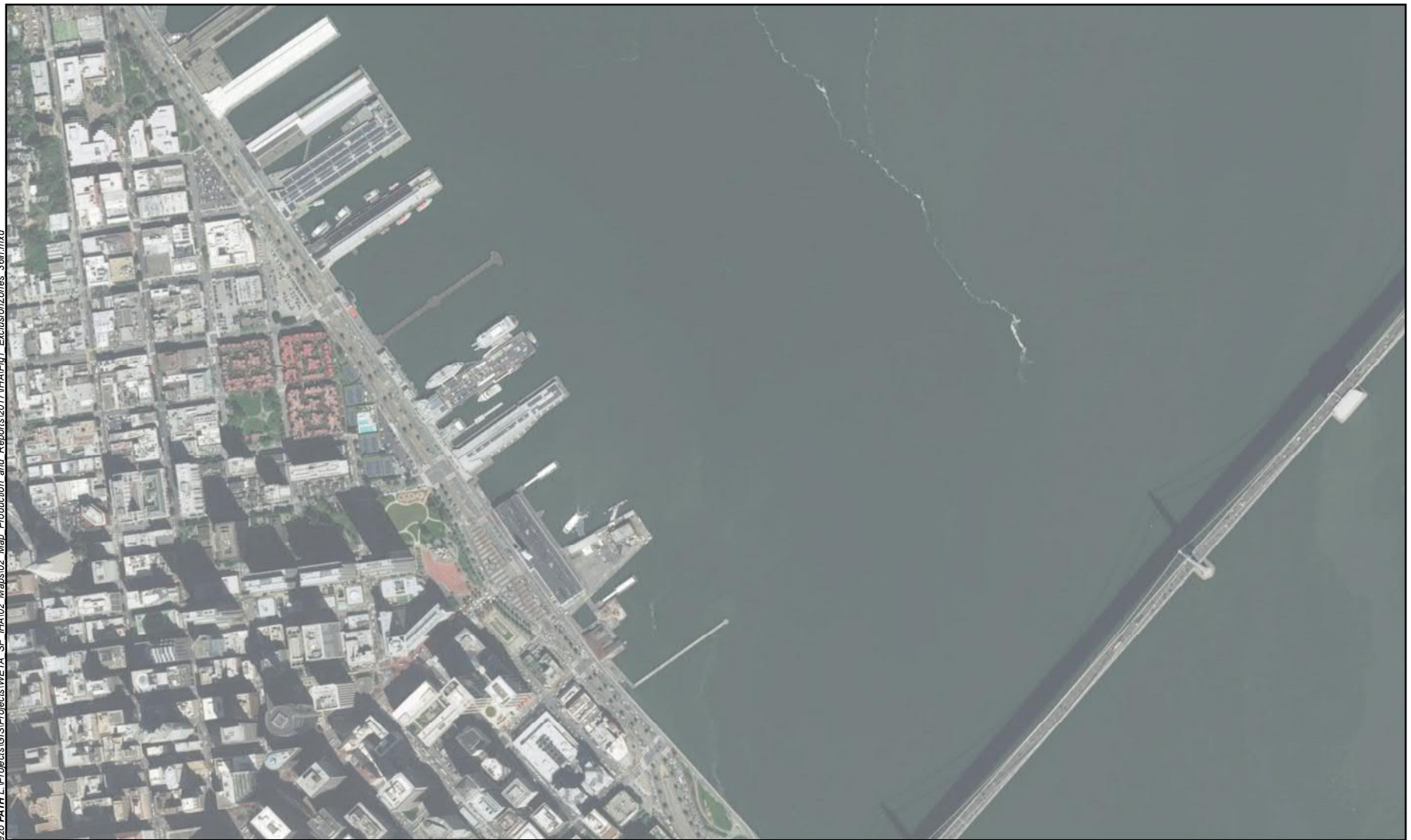
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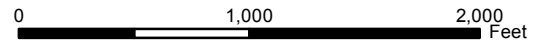
Comment Reference Number	Pile Number	Method of Pile Driving (Impact/Vibratory)	Pile Driving Start/End Time	Observation Start/End Time	Mammal Species		
					Species ¹	Sex/Age Class	Number

1 CL = California sea lion PH = Pacific harbor seal NF = northern fur seal
HP = Harbor porpoise GW = Gray whale BN = bottlenose dolphin
O = Other (include name) ES = northern elephant seal

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- Approximate Pile Driving Location
- Project Area
- 36-inch Steel Pile - Exclusion Zones**
 - Harbor Seal, Otariid Pinnipeds, and Dolphins (100 ft)
 - Other Phocid Pinnipeds (1,410 ft)
 - Other Cetaceans (3,130 ft)



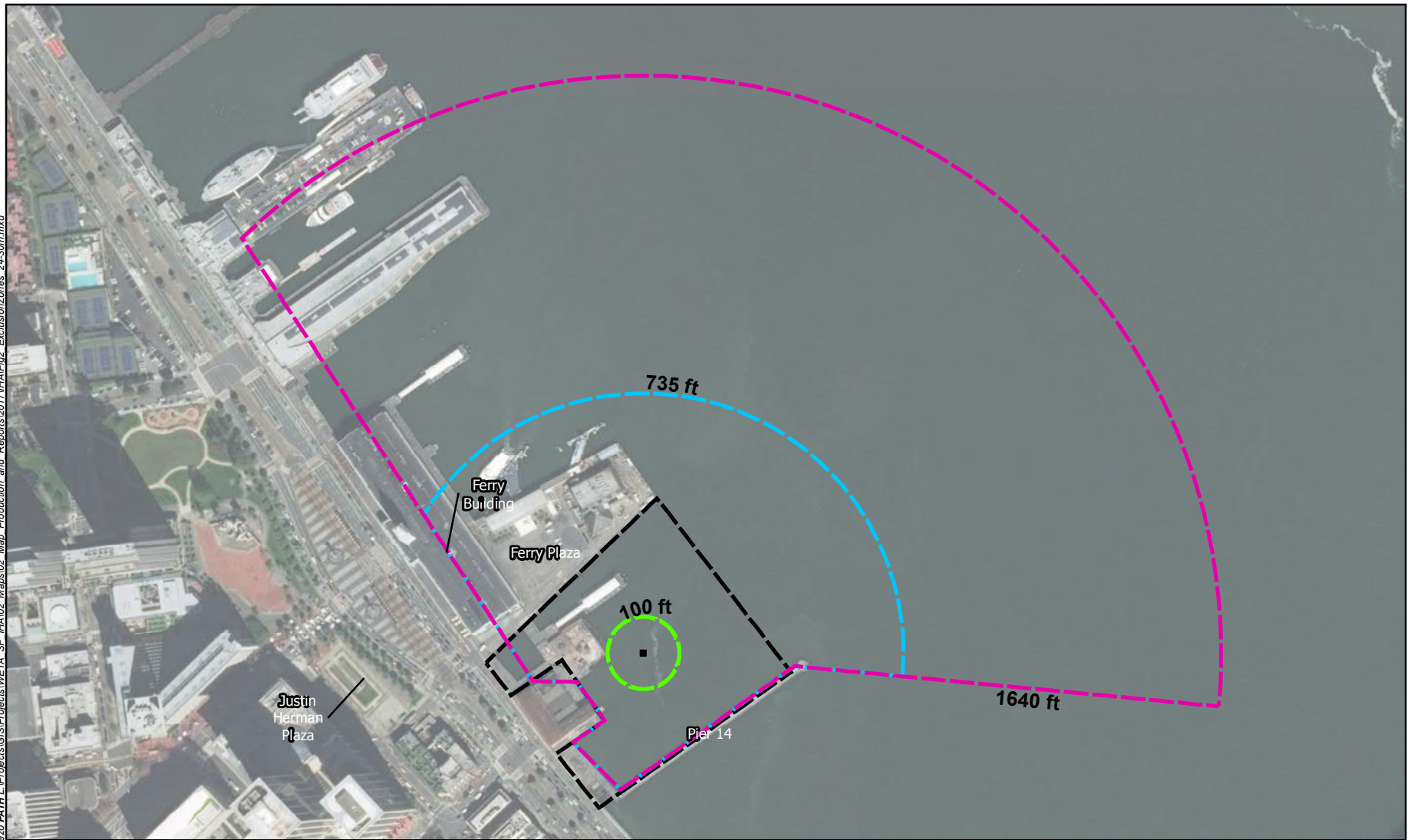
EXCLUSION ZONES FOR IMPACT PILE DRIVING 36-INCH STEEL PILES

Downtown San Francisco Ferry Terminal
 South Basin Expansion
 28067812 San Francisco Bay Area Water Emergency Transportation Authority

FIGURE 1

Source: NAIP Imagery, USDA FSA, 2014

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 Source: NAIP Imagery, USDA FSA, 2014



- Approximate Pile Driving Location
- Project Area
- 24 and 30-inch Steel Pile - Exclusion Zones**
- Harbor Seal, Otariid Pinnipeds, and Dolphins (100 ft)
- Other Phocid Pinnipeds (735 ft)
- Other Cetaceans (1,640 ft)

EXCLUSION ZONES FOR IMPACT PILE DRIVING 24 AND 30-INCH STEEL PILES

Downtown San Francisco Ferry Terminal
 South Basin Expansion
 28067812 San Francisco Bay Area Water Emergency Transportation Authority

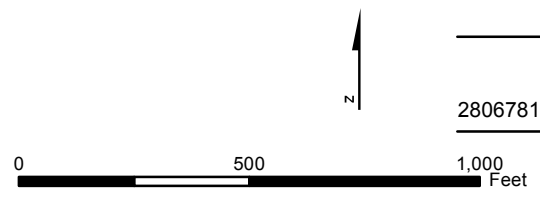
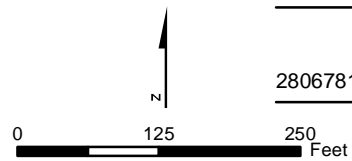


FIGURE 2



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- Approximate Pile Driving Location
- ▬ Project Area
- ▨ Exclusion Zone - All Pile Sizes
- ▨ Otariid Pinnipeds & Dolphins (33 ft)
- ▨ Phocid Pinnipeds (33 ft)
- ▨ Cetaceans (33 ft)



EXCLUSION ZONES FOR VIBRATORY DRIVING OF STEEL PILES

Downtown San Francisco Ferry Terminal
 South Basin Expansion
 28067812 San Francisco Bay Area Water Emergency Transportation Authority

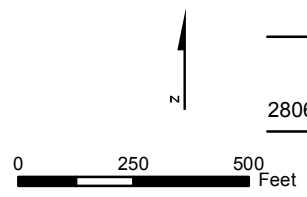
FIGURE 3

Source: NAIP Imagery, USDA FSA, 2014

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- Approximate Pile Driving Location
- ▬ Project Area
- 24-inch Steel Pile with Bubble Curtain
160 dB RMS (1,119 feet)
- 30-inch Steel Pile with Bubble Curtain
160 dB RMS (1,119 feet)
- 36-inch Steel Pile with Bubble Curtain
160 dB RMS (1,775 feet)



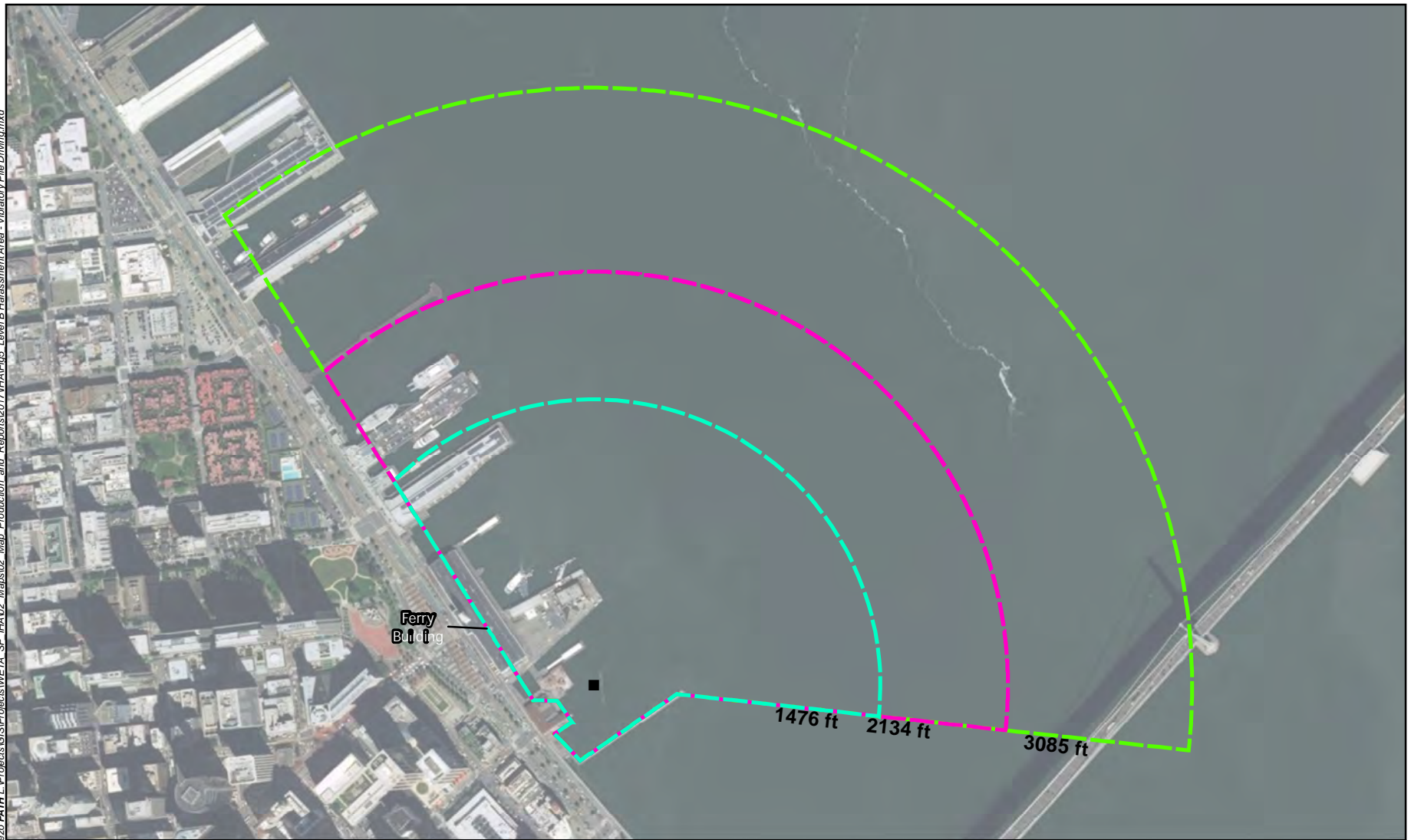
LEVEL B HARASSMENT AREA - IMPACT PILE DRIVING

Downtown San Francisco Ferry Terminal
South Basin Expansion
28067812 San Francisco Bay Area Water Emergency Transportation Authority

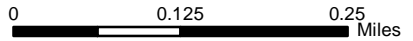
FIGURE 4

Source: NAIP Imagery, USDA FSA, 2014

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- Approximate Pile Driving Location
- 36-inch Steel Pile
120 dB RMS (3,085 feet)
- 30-inch Steel Pile
120 dB RMS (2,134 feet)
- 24-inch Steel Pile
120 dB RMS (1,476 feet)



LEVEL B HARASSMENT AREA - VIBRATORY PILE DRIVING AND EXTRACTION

Downtown San Francisco Ferry Terminal
South Basin Expansion
28067812 San Francisco Bay Area Water Emergency Transportation Authority

FIGURE 5

Source: NAIP Imagery, USDA FSA, 2014