# Incidental Harassment Authorization Application

Long Beach Cruise Terminal Improvement Project

Prepared for ATKINS

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# List of Acronyms

| | |
|---|---|
| APE- | American Piledriving Equipment |
| BHC- | Board of Harbor Commissioners |
| BMPs- | Best Management Practices |
| BPG- | Biogeographic Population Group |
| C- | Celsius |
| Caltrans- | California Department of Transportation |
| CDFW- | California Department of Fish and Wildlife |
| CEDA | Central Dredging Association |
| CIMRI- | Channel Islands Marine Research Institute |
| cm- | centimeters |
| CNDDB- | California Natural Diversity Database |
| CNPS- | California Native Plant Society |
| CPS FMP- | Coastal Pelagic Fishery Management Plan |
| cy- | cubic yards |
| D- | delisted |
| dB- | decibels |
| dBA- | A-weighted sound level decibels |
| $dB_{peak}$- | peak decibels |
| $dB_{rms}$- | root mean squared decibel units |
| dB re # µPa- | Decibels relative to a number of microPascals of sound pressure |
| DDD- | Dichlorodiphenyldichloroethane |
| DDE- | Dichlorodiphenyldichloroethylene |
| DDT- | Dichlorodiphenyltrichloroethane |
| DEIR- | Draft Environmental Impact Report |
| dm- | decimeters |
| DPS- | Distinct Population Segments |
| E- | Endangered |
| ERL- | effects range - low |
| ERM- | effects range median |
| ESA- | Endangered Species Act |
| F- | Fahrenheit |
| FEIR- | Final Environmental Impact Report |
| FR- | Federal Register |
| ft- | feet |
| ft-lbs | Foot pound-force |
| ft/s- | feet per second |
| FHWA- | Federal Highway Administration |
| HF- | high-frequency |
| Hz- | Hertz |
| ICE- | International Construction Equipment |
| IHA- | Incidental Harassment Authorization |

| | |
|---|---|
| in- | inches |
| kHz- | kilohertz |
| kNm- | kiloNewton meters |
| km- | kilometers |
| $km^2$- | square kilometers |
| LA- | Los Angeles |
| lbs- | pounds |
| $LC_{50}$- | lethal concentration for 50% |
| $L_{eq}$- | Equivalent sound level |
| LF- | low-frequency |
| LOA- | Letters of Authorization |
| m- | meters |
| $m^2$- | square meter |
| MF- | mid-frequency |
| MLLW- | Mean Lower Low Water |
| mm- | millimeters |
| MMPA | Marine Mammal Protection Act |
| NMFS- | National Marine Fisheries Service |
| NOAA- | National Oceanic and Atmospheric Administration |
| NOS- | National Ocean Service |
| ODMDS- | Ocean Dredged Material Disposal Site |
| ODOT- | Oregon Department of Transportation |
| OW- | otariid pinnipeds |
| PBR- | Potential Biological Removal Level |
| PCB- | Polychlorinated biphenyl |
| POLB- | Port of Long Beach |
| PSLM- | Practical Spreading Loss Model |
| PSO- | Protected Species Observer |
| psu- | practical salinity units |
| PTS- | permanent threshold shifts |
| PW- | phocid pinnipeds |
| re # µPa RMS- | sound pressure units relative to a reference (re) pressure |
| RCNM- | Road Construction Noise Model |
| RMS- | root mean squared |
| RWQCB- | Regional Water Quality Control Board |
| SC- | Southern California |
| SEL- | sound exposure level |
| $SEL_{cum}$- | cumulative sound exposure level |
| SPCC- | Spill Prevention Control and Countermeasures |
| SPL- | Sound pressure level |
| $SPL_{peak}$- | peak sound pressure level |
| sq ft- | square feet |

| | |
|---|---|
| SWPPP- | Storm Water Pollution Prevention Plan |
| SWRCB- | State Water Resources Control Board |
| T- | Threatened |
| TMDLs- | Total Maximum Daily Loads |
| TTS- | temporary threshold shifts |
| µPa- | microPascal |
| USACE- | United States Army Corps of Engineers |
| USEPA- | U.S. Environmental Protection Agency |
| USFWS- | U.S. Fish and Wildlife Service |
| ZOI- | Zones of Influence |

# 1. Description of Specified Activity

This Incidental Harassment Authorization (IHA) application is requested to allow for the unavoidable incidental take of marine mammals resulting from proposed improvements to the Long Beach Cruise Terminal dock and parking areas on Pier H at the Port of Long Beach (POLB).

Carnival Corporation & PLC ("Carnival") proposes to make improvements to its berthing facilities at the Long Beach Cruise Terminal at the Queen Mary located at Pier H in the POLB, Long Beach, California (Appendix A, Figure 1 – Vicinity Map). These improvements are to accommodate a new, larger, class of cruise ship that holds up to 4,000 passengers and to improve safety at the berth related to swells. The improvements will entail all actions and activities necessary to safely moor and service the larger vessel and the associated increase in passenger numbers (the Proposed Project).

Implementation of the Proposed Project requires the dredging of approximately 35,400 cubic yards (cy) of dredge material from the existing berth and immediate surrounding area (Appendix A, Figure 2 – Project Area), disposal of the dredged material, as well as providing berth improvements such as the installation of new high-capacity mooring dolphins, fenders, and a new passenger bridge system. Pile driving equipment will be used to perform these improvements.

The Proposed Project will involve in-water pile driving and dredging activities from November 15, 2019 to as late as April 15, 2020, that are expected to exceed National Marine Fisheries Service (NMFS) underwater noise thresholds for marine mammals and result in incidental take of select marine mammal species under the Marine Mammal Protection Act (MMPA) of 1972 Section 101 (a)(5)(D). The MMPA permits activities that result in negligible impacts on marine mammals and that do not adversely affect subsistence of these species through the issuance of its IHA permit. This IHA request evaluates the Proposed Project's potential to injure or disturb marine mammals, provides estimates of incidental take by species, and recommends mitigation measures to minimize take.

## 1.1 Legal Protections for Marine Mammals

A number of federal and state laws protect wildlife from anthropogenic activities (including those generating noise) that may be injurious or disruptive to individuals or populations. Depending on a number of factors such as animal sensitivity and proximity, construction related noise has the possibility to permanently or temporarily damage animal hearing or cause life-threating embolisms, prevent animals from communicating normally (e.g., masking of echolocation calls), or cause changes in normal animal behavior (such as abandoning pups). These laws are described in further detail below.

### 1.1.1 Marine Mammal Protection Act (MMPA)

The MMPA (16 United States (U.S.) Code (USC) 1362) of 1972 prohibits the "taking" of marine mammals and restricts the import, export, or sale of marine mammals. Take is defined as "the act of

hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." Harassment includes disruption of behavioral patterns. The MMPA specifies injury to marine mammals as "Level A Harassment" and disturbance as "Level B Harassment" (16 USC 1361 et seq). Specifically, the MMPA defines Level A Harassment as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" and Level B Harassment as "acts that have the potential to disturb (but not injure) a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (50 Code of Federal Regulations (CFR) 216.3). Implementation of the MMPA is divided between the United States Fish and Wildlife Service (USFWS) (sea otters, walruses, polar bears, manatees, and dugongs) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries (pinnipeds including seals and sea lions and cetaceans including dolphins and whales). An IHA or Letter of Authorization (LOA) may be issued for certain activities which can result in small amounts of take associated with another activity.

### 1.1.2 Endangered Species Act (ESA)

Listed species in the Port Complex (Port of Los Angeles and Port of Long Beach) receive protection under the ESA. The ESA of 1973 (16 USC 1531 et seq.) establishes a national policy that all federal departments and agencies provide for the conservation of threatened and endangered species and their ecosystems. The Secretary of the Interior and the Secretary of Commerce are designated in the ESA as responsible for: (1) maintaining a list of species likely to become endangered within the foreseeable future throughout all or a significant portion of its range (threatened) and that are currently in danger of extinction throughout all or a significant portion of its range (endangered); (2) carrying out programs for the conservation of these species; and (3) rendering opinions regarding the impact of proposed federal actions on listed species. The ESA also outlines what constitutes unlawful taking, importation, sale, and possession of listed species and specifies civil and criminal penalties for unlawful activities.

Pursuant to the requirements of the ESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed or proposed species may be present in the project region, and whether the proposed project would result in a take of such species. The ESA prohibits take of a single threatened or endangered species, except under certain circumstances and only with authorization from the USFWS or the NOAA Fisheries through a permit under Section 7 (for federal entities or federal actions) or 10(a) (for non-federal entities) of the Act. "Take" under the ESA includes activities such as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS regulations define harass to include "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering."

In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the ESA, or result in the destruction or adverse modification of critical habitat for such species (16 USC 1536[3][4]). If it is determined that a project may result in the take of a federally-listed species, a permit would be required under Section 7 or Section 10 of the ESA.

Critical Habitat is defined by the ESA as a specific geographic area containing features essential for the conservation of an endangered or threatened species. Under Section 7 of the ESA, critical habitat should be evaluated if designated for federally listed species that may be present in the project's Action Area. The Action Area serves as the "Study Area" for the purposes of a Section 7 Biological Assessment. Some marine mammal species or stocks are protected under the ESA as well as the MMPA, and these have been addressed in a separate and concurrent Biological Assessment for this Project.

## 1.2 Project Description

### 1.2.1 Background

The Proposed Project site is currently leased to Carnival by POLB and Urban Commons LLC, the master tenant from the City. These leases were originally acquired for Carnival's relocation in 2003 from Los Angeles' San Pedro Port to the POLB, when it moved the vessels from the Port of Los Angeles to POLB. The Carnival Cruise Lines Relocation Project Final Environmental Impact Report (FEIR) (November 2000) assessed the implications of the original relocation to POLB (POLB 2000). Four vessels currently call on the POLB Cruise Terminal. The *Carnival Splendor,* with an approximate capacity of 3,012 passengers, typically sails one day a week for cruises from seven to 14 days in duration. The *Carnival Imagination* (2,056 passengers) and *Carnival Inspiration* (2,054 passengers) vessels call on the terminal four days a week (combined) for three to four-day cruises. The *Carnival Miracle* occasionally docks at the POLB (scheduled for seven calls in 2019) and has a capacity of 2,124 guests. The company also arranged to lease the entirety of an onsite dome and, in early 2018, it opened the newly-renovated dome as a passenger terminal and 'home-ported' a 3,012-passenger vessel to Long Beach. Carnival transports approximately 600,000 passengers a year into the POLB for embarkation and debarkation. As stated previously, Carnival has run the Long Beach Cruise Terminal since 2003, the United States' only privately-operated cruise terminal. It is one of the busiest terminals in North America, with ships docking at the facility five days per week resulting in a more than a 70% utilization rate. The increased size of the vessel is expected, under current economic conditions, to generate an additional 50,000 passengers per year.

### 1.2.2 Project Objectives

The purpose of the Proposed Project is to make improvements at the existing berth and its environs to enable new Vista-class ships to safely moor and be serviced. Also, the Proposed Project would resolve safety issues in the existing parking structure and vessel mooring. The improvements will enable the home-porting of the 4,008-passenger *Carnival Panorama* at POLB, which is planned for arrival in Long Beach in 2019. This will be the first new Carnival ship based in Southern California in 20 years, providing additional economic growth for the City of Long Beach and the Southern California region. The *Carnival Panorama* will be replacing the 3,012 *Carnival Splendor*, which is currently home-ported at Long Beach until December 2019, as the largest craft operating out of Carnival's POLB wharf.

### 1.2.3 Project Location

The POLB is located in San Pedro Bay within the southwest portion of the City of Long Beach in southern Los Angeles (LA) County, California. Figure 1 (Appendix A, Figure 1 – Vicinity Map) serves as a map of the Long Beach region, indicating the Project vicinity. State Route 47 (via Interstate 110 Freeway) and the Interstate 710 Freeway provide access to the site from the surrounding area.

The POLB is administered by the City of Long Beach Harbor Department and encompasses 3,200 acres, with 31 miles of waterfront, 10 piers, and 80 berths. The POLB is the second-busiest container seaport in the United States, handling trade valued at more than $180 billion annually, with the aim of creating the world's most modern, efficient, and sustainable seaport. In 2004, The Board of Harbor Commissioners (BHC) directed the POLB to establish a Green Port Policy. The POLB complied and the BHC adopted the policy in January 2005. This policy serves as a guide for decision making and established a framework for environmentally friendly POLB operations.

The Project Area is located adjacent to Royal Mail Ship Queen Mary (Pier J), at Pier H within the Queen Mary Seaport at 231 Windsor Way (Appendix A, Figure 2 – Project Area). The Queen Mary Seaport is located at the south end of the Interstate 710 Freeway, directly across Queensway Bay from downtown Long Beach. Photographs of the Project Area and surrounding vicinity are provided in Appendix C.

Current bathymetric data for the area indicates that the water depth of the existing berth ranges from approximately 28 feet (ft) to 47 ft Mean Lower Low Water (MLLW) within the berth perimeter. Water depths in this area generally slope from slightly lower bathymetry in the west (near the pier) to deeper depths to the east (Appendix A, Figure 3 – Bathymetry Map). A proposed disposal site for dredge material is located at the LA-2 ocean dredged material disposal site (ODMDS), an existing disposal site just south of the POLB. The site is located in the Pacific Ocean at 33°37' 6" N, 118°17'24" W (Appendix A, Figure 1 – Vicinity Map).

#### 1.2.3.1 Physical Environment

***Water Quality***

During the mid-20th Century, the Port Complex was severely polluted (Reish et al. 1980). Water quality in the San Pedro Bay is still heavily affected by anthropologic factors, including but not limited to surface runoff, effluent discharges, accidental pollutant discharges from shipping activities and harbor and vessel activities, as well as other factors like climate, water circulation, and biological activity. Some of the main pollution inputs include trash, debris, and contaminants from the urban watershed of the Los Angeles and San Gabriel Rivers, sewage outfall, industrial activity, and general non-point source runoff. Turbidity tends to be high especially in the rainy season (MBC Applied Environmental Sciences 2016).

Although water quality in the POLB has improved over the past several decades, it remains degraded as industrial effluents and untreated runoff from storm drains and the surrounding area continue to be discharged into San Pedro Bay. These sources of contamination result in elevated levels of trace metals and organic chemicals in some areas, as well as elevated levels of bacteria (total coliforms, fecal coliforms, and *Enterococcus*) (USACE 2010). The Port Complex does not

currently meet many designated beneficial uses, and the U.S. Environmental Protection Agency (USEPA) and the California State Water Resources Control Board (SWRCB) have listed many areas within the Port Complex as impaired waterbodies under Section 303(d) of the Clean Water Act. Impairments include low levels of Dichlorodiphenyldichloroethylene (DDE)/ Dichlorodiphenyltrichloroethane (DDT) and Polychlorinated biphenyls (PCBs) (AMEC 2009).

### *Bathymetry and Sediment*

Bathymetry at the Port Complex has been significantly altered by filling and dredging. The Port Complex bottom has been dredged to a depth of about 20-40 ft MLLW, while the bathymetry of the east basin retains a more gradual downward slope moving offshore (Appendix A, Figure 3 – Bathymetry Map). Adjacent and inshore of the existing berthing structure, the bottom was dredged to depths of roughly 30 to 50 ft and the bottom slopes down from Pier H to the southeast. Beyond the berthing structure, the bottom drops sharply from roughly 20 to 40 ft out to the navigation channel, where depths exceed 50 ft (navigation channel depths between -75 and -90 ft MLLW) (NOS 2018). Sediments in the Port Complex are composed of relatively sandy silt and clay. Much of the shoreline consists of riprap and manmade structures as can be seen in aerial views (MBC Applied Environmental Sciences 2016).

### *Tides, Circulation, Temperature, and Salinity*

The open ocean outside the breakwaters retains most natural functions, although ecosystem processes have been degraded to varying degrees (CA Water Boards 2019). Although tidal action continues within the Port Complex, water circulation has been altered by past breakwater construction, fill, stormwater runoff from urban hardscape, and flood control projects on the urban rivers. Flood currents on the Long Beach side enter the harbor through the Queen's Gate (POLB breakwater), as well as the opening at the eastern edge of the Long Beach Breakwater. Tidal current speeds throughout the Port Complex are made weaker by the breakwater infrastructure and are considered to be quite week, with a maximum current of less than 0.5 feet per second (ft/sec). During winter storms, significant flows from the Los Angeles River can increase surface flows (MBC Applied Environmental Sciences 2016).

The Los Angeles River watershed and the San Gabriel River watershed discharge into the POLB. These watersheds are generally characterized by the two major rivers flowing through them, the Los Angeles River and the San Gabriel River. Both rivers have been extensively modified for flood protection, as well as commercial, residential, and industrial developments within the watersheds themselves. The development has led to impaired water quality from pollutants, resulting from the increase in dischargers within the watersheds.

Based on 2013-2014 biological surveys, surface water temperature in the Port Complex ranges from 15.5° Celsius (C) to 21.1°C, with water temperatures decreasing with greater water depth. Salinity was also documented during these surveys and average salinity was 33.5 practical salinity units (psu), which is considered normal for coastal southern California waters. Salinity was lower in the winter than the spring and summer (MBC Applied Environmental Sciences 2016).

### *Marine Mammal Habitat*

Marine mammals in the Port of Long Beach predominantly occur near the entrances and along the outer breakwater walls (MBC Applied Environmental Sciences 2016). Seasonal concentrations of marine mammals in the POLB are related to prey abundance and the availability of pinniped haul-outs. Based on review of remote sensing data and a site visit, marine mammals access to and from the Project Area is somewhat constrained by extensive breakwater systems and a relative lack of habitat diversity. Mobile species active in the water column are expected to move through the area fairly easily (MBC Applied Environmental Sciences 2016).

Within the immediate Project Area, aquatic habitat is limited to open water with a predominantly silt substrate, narrow bands of rocky substrate where shoreline protection or breakwaters have been constructed, and anthropogenic features such as docks, dolphins, and moored vessels. Narrow linear strips of kelp are associated with some of the rock protection features. Except for these narrow linear features, submerged vegetation and natural rocky substrate are rare. There are no known eelgrass beds in the immediate Project Area; water depth and turbidity preclude presence in most areas. Dredging in the Port Complex has eliminated the majority of the sandy beach, salt marsh, and kelp bed habitat that was present prior to development (MBC Applied Environmental Sciences 2016).

Adjacent terrestrial habitat is predominantly industrial or recreational including considerable hardscape. Vegetated areas are generally limited to narrow strips of maintained landscaping. At somewhat greater distances within the Project Area, sand substrate is present. On land, several small parks and beaches border the harbor, although these are maintained and may have heavy human usage, thus they have limited habitat structure or value as haul-out sites (GHD 2019a).

### *Vessel Traffic and Ambient Noise*

Ambient noise or the background sound level is defined as “all-encompassing sound normally associated with a given environment being usually a composite of sound from many sources near and far” (ANSI 1999). The Port Complex is heavily used by commercial, recreational, and military vessels. Tetra Tech (2011) reported that the underwater ambient noise levels in active shipping areas of the POLB were roughly 140 root mean squared decibel units ($dB_{rms}$) and noise levels in non-shipping areas (Terminal Island) were between 120 $dB_{rms}$ and 132 $dB_{rms}$. These underwater ambient noise levels are typical of a large marine bay with heavy commercial boat traffic (Buehler et al. 2015). Ship noise in the Port Complex thus has the potential to obscure underwater sound that would otherwise emanate from the Project Area to locations throughout the Port Complex or offshore through the breakwater entrances. Noise from dredging and other non-impulsive sources will likely become indistinguishable from other background noise as it attenuates to near ambient levels moving away from the Project Area. Ambient airborne noise was measured in the Project Area and methods are provided in the Noise Technical Report for the Project Area (GHD 2019b).

## 1.3 Affected Region of Activity

The POLB is located in southern Los Angeles County in the highly developed Port of Long Beach/Port of Los Angeles complex (Port Complex) in greater San Pedro Bay. The Project Area is located near the mouth of the Los Angeles River and several miles from the mouth of the San

Gabriel River. The Project Area is approximately two and a half miles from Queens Gate, the southern entrance to the Port Complex and approximately three miles from the entrance to Alamitos Bay. The Project Area lies adjacent to the main navigational channel used by commercial and recreational vessels transiting to the City of Long Beach's shoreline facilities and marinas. To the east, the area supports an expansive mooring field for cargo ships and barges, with a broad sand beach area extending from downtown Long Beach to Belmont Shores. The closest marine mammal "regular-use" haul-out site to the Project Area is approximately 3 km away along the breakwater directly south of the Project. However, pinnipeds may use buoys or rip rap in the harbor that are less than 1 km from Project activities (see Appendix A, Figure 4; size of dots represents number of occurrences for each location and we consider occurrence data to be an indicator of use in the absence of higher quality haul-out data for the POLB).

### 1.3.1 MMPA Action Area

The Action Area (Appendix A, Figure 5 – Action Area) includes the Project Area (Appendix A, Figure 2 – Project Area) and a variable width buffer around the Project Area. The buffered area is designed to address the area within which any impacts (auditory or visual) to marine mammals could occur as a result of Project activities. Therefore, the radius of the buffer varies in relation to underwater versus above ground Project impacts. The land side of the buffer was truncated within urban Long Beach after a site visit verified that Proposed Project-related impacts would not occur there. The remaining Action Area is intentionally conservative, and intended to encompass even the lowest probability impact areas for the purposes of this review. In order to develop the Action Area, we considered NMFS guidance on underwater and in-air auditory impacts to marine mammals as well as visual disturbance (NMFS 2018a). The Action Area does not include the waste disposal site, LA-2, as impacts associated with waste disposal at LA-2 have been previously analyzed and permitted for this site.

### 1.3.2 Pile Installation and Other Construction Activities Relevant to This IHA

The Proposed Project would introduce maritime improvements at Carnival's Long Beach Cruise Terminal and onshore at Pier H within the adjacent parking garage. The enhancements are discussed as maritime and onshore improvements (Appendix A, Figure 2 – Project Area).

#### 1.3.2.1 Maritime Improvements

The maritime improvements are focused on accommodating safe and secure moorage along the sole wharf of the facility and to accommodate current vessel design. These improvements and activities include:

- The addition of two high-capacity, pile-founded mooring dolphins are needed to allow for adequate mooring capacity during reasonably anticipated dockside conditions, often including high winds and long-period wave swell actions, which have been anecdotally observed more frequently than in the past. The new dolphins will structurally follow the design detail applied to a similar installation performed in 2008 for the existing dolphins, which are located off the north and south ends of the dock. All dolphins will connect back to the wharf deck of the marine structure via installed catwalk bridge elements. The

current dolphins have had capacity issues based upon current ship calls; thus the new dolphins will alleviate these problems.

  - A maximum of 49 piles will need to be installed. Pile driving will be performed using a derrick barge with pile driver. Piles are expected to be installed roughly the first 2/3 of the way with a vibratory pile driver and installed the last 1/3 and proofed with an impact pile driver. No temporary piles will be installed. Active pile driving may occur from November 15, 2019 to as late as April 15, 2020, and may be concurrent with the dredging work days. The total number of days where pile driving will occur is expected to be less than 26 working days (working days may be non-continuous and will be limited to the maximum-in water work window proposed for this pile driving: November 15, 2019 to as late as April 15, 2020).

- An extension to the existing passenger bridge system for an added ramp section to include an additional tower element on the existing wharf deck. A new tower and platform deck using new or current piles just south of the existing wharf deck. These new structures will connect to the existing gangway and will be approximately 63 ft above the water's surface. This will be designed to follow the specifications and design criteria of the existing gangway, to be adjustable for tidal conditions while remaining compliant with the American Disabilities Act.

- Deepening the existing berth from the current design depth of 30 ft MLLW plus 1 foot of over-dredge to a new design depth of 36 ft MLLW plus 1 foot of over-dredge for a total depth of 37 ft MLLW. Over-dredge is a standard construction design method for dredging that occurs outside the required authorized dimensions to compensate for physical conditions and inaccuracies in the dredging process and allow for efficient dredging practices. Environmental documentation must reflect the total quantities likely to be dredged including authorized dimensions and allowable over-depth (Tavolaro et al. 2007). The new dredging depth will increase navigable and mooring margins; to cope with the pitch and roll movement of the vessels due to long period wave swells and to manage mooring loads on the dock structure. The estimated dredging volume is approximately 33,250 cubic yards (cy), which consists of the following:

  - Total dredging volume to 37 ft MLLW within the existing berth: 28,250 cy

  - Total dredging volume to 37 ft MLLW within the proposed berth extension area: 5,000 cy

  - Dredging the material is expected to take approximately 30 days

  - Disposal of approximately 33,250 cy of dredged material at the LA-2 ODMDS. This location has been selected based on the findings of the physical, chemical, and biological tests conducted on the material and in consultation with the Southern California Dredged Material Management Team. The disposal option selected would be the most cost-effective management option that best addresses the needs of environmental protection and economic development.

- Replacement of the existing foam-filled fenders with oversized high-density foam-filled fenders and backing plates to improve the dampening characteristics that manage vessel movement and provide safe vessel stand-off distances from structures.

#### 1.3.2.2 Onshore Improvements

The onshore improvements are focused on an expansion of the existing parking facility to resolve current congestion and to support the new vessel size. Based on the location of the parking garage, levels of expected construction noise, and lack any pinniped haul-outs in the immediate vicinity, airborne noise associated with parking facility renovation are not expected to have any impact on marine mammals and are not evaluated in detail in this document.

## 1.4 The Fundaments of Noise

An IHA requires applicants to determine the number of marine mammals that are expected to be incidentally harassed by an action and the nature of the harassment (Level A or Level B). Section 5 defines MMPA Level A and Level B and this Section presents how quantitative acoustic analysis methodologies were applied to evaluate the potential for the Proposed Project to affect marine mammals.

The Proposed Project and its associated activities, as described in the Section 1.2, have the potential to take marine mammals through construction activities involving in-water pile driving. Other activities such as dredging are not expected to result in take as defined under the MMPA. However, we analyze the possibility of take from dredging in this document as an exercise in understanding potential Project impacts. In-water pile driving and dredging activities are anticipated to temporarily increase the adjacent underwater and airborne noise environment in the Project Area. Research suggests that increased noise may impact marine mammals in multiple ways (e.g. temporary or permanent physical or auditory injury, behavioral disturbance, masking, etc.) (NMFS 2018a). We provide below a background on underwater sound, a description of noise sources for the Proposed Project, and expected noise levels as a result of construction activities. This information, as well as applicable noise thresholds, serves as the basis for the Proposed Project calculations of Level B and Level A harassment isopleths and take calculations for cetaceans and pinnipeds in Section 6.

### 1.4.1 The Fundamentals of Noise

Noise is generated when an object moves in space and creates waves (either in air or water). Ears perceive these waves as sound (WSDOT 2012). Sound is more formally defined as “an alteration in pressure propagated by the action of elastic stresses in an elastic medium and that involves local compression and expansion of the medium” (ANSI 2013). The following sections explain general noise terms used in this technical report more clearly.

The amplitude (loudness) of a sound is its pressure, whereas its intensity is proportional to power and its pressure squared. The standard international unit of measurement for pressure is the Pascal, which is a force of 1 Newton exerted over an area of 1 square meter ($m^2$). Sound pressures are measured in microPascals (re μPa).

A logarithmic scale based on the decibel (dB) is used to account for the range of pressures and intensities collected during measurements of sound. For sound pressure level (SPL), the amplitude ratio in decibels is 20 times the $\log_{10}$ ratio of the measurement to the reference. Each increase of 20 dB in SPL reflects a 10-fold increase in signal amplitude (i.e., the amplitude of 20 dB is 10 times less than 40 dB). Decibels is a relative measure and must be accompanied by an amplitude reference. In describing underwater sound pressure, the reference (re) amplitude is usually 1 μPa, and is expressed as “dB re 1 μPa.” For in-air sound pressure, the reference amplitude is usually 20 μPa and is expressed as “dB re 20 μPa.” A full list of in-air and underwater sound-related terms used in this technical report is provided below.

Table 1.1 Definition of Terms

| Term | Abbreviation(s) | Reference Value | Unit | Definition |
|---|---|---|---|---|
| Decibel | dB | 1 µPa (in water at 1 meter)<br><br>20 µPa (in air at 1 meter) | dB | One-tenth of a bel. Unit of level when the base of the logarithm is the tenth root of ten, and the quantities concerned are proportional to power[c]. Used to measure the amplitude of sound[b]. |
| A-weighted decibel | dBA | 20 µPa (in air at 1 meter) | | In-air noise measured on the A-weighted scale is designed to approximate human hearing. Scale starts at 0 dBA (faintest sound detectable by humans) to ~180 dBA (rocket launch)[g]. Increase in 10 dBA indicates 2x as loud. |
| Frequency | N/A | N/A | $s^{-1}$ | The number of oscillations occurring over a unit of time (unless otherwise stated, cycles per second or hertz)[d]. |
| Hertz | Hz | N/A | $s^{-1}$ | Unit of frequency corresponding to the number of cycles per second. One hertz corresponds to one cycle per second[a]. |

Table 1.1 Definition of Terms

| Term | Abbreviation(s) | Reference Value | Unit | Definition |
|---|---|---|---|---|
| Sound Exposure Level | SEL | 1 µPa sec (in water at 1 meter)<br><br>20 µPa sec (in air at 1 meter) | dB | The constant sound level in one second, which has the same amount of acoustic energy as the original time-varying sound (i.e., the total energy of an event). SEL is calculated by summing the cumulative pressure squared over the time of the event[f]. |
| Sound Pressure Level | SPL | 1 µPa (in water at 1 meter)<br><br>20 µPa (in air at 1 meter) | dB | A measure of sound level that represents only the pressure component of sound. Ten times the logarithm to the base 10 of the ratio of time-mean-square pressure of a sound in a stated frequency band to the square of the reference pressure[c]. |
| Root Mean Squared Sound Pressure Level | RMS | 1 µPa (in water at 1 meter)<br><br>20 µPa (in air at 1 meter) | $dB_{rms}$ | Decibel measure of the square root of mean square (RMS) pressure. For impulses, the average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy of the impulse[f]. |

Table 1.1 Definition of Terms

| Term | Abbreviation(s) | Reference Value | Unit | Definition |
|---|---|---|---|---|
| Peak Sound Pressure Level | $L_{p,\,0\text{-pk}}$<br><br>$SPL_{peak}$<br><br>$dB_{peak}$<br><br>PK | 1 µPa (in water at 1 meter)<br><br>20 µPa (in air at 1 meter) | dB | Maximum instantaneous sound pressure from a short impulse sound/short sound duration[a]. |
| Cumulative Sound Exposure Level | $L_{E,\,p}$<br><br>$SEL_{cum}$ | 1 $\mu Pa^2 s$ | dB | Received level and duration of sound exposure over a given period of time or event. Metric is weighted in calculations for marine mammals based on NMFS marine mammal auditory weighting functions[a]. |

[a]NMFS 2018a
[b]NOAA 2015
[c]ANSI 2013
[d]Yost 2007
[e]ISO 2017
[f]Buehler et al. 2015
[g]WSDOT 2012

### 1.4.2 A-weighted Sound Level, dBA

Loudness is a subjective quantity that enables a listener to order the magnitude of different sounds on a scale from soft to loud. Although the perceived loudness of a sound is based somewhat on its frequency and duration, chiefly it depends upon the sound pressure level. Sound pressure level is a measure of the sound pressure at a point relative to a standard reference value; sound pressure level is always expressed in dB, a logarithmic quantity.

Another important characteristic of sound is its frequency, or “pitch.” This is the rate of repetition of sound pressure oscillations as they reach our ears. Frequency is expressed in units known as Hertz (abbreviated “Hz” and equivalent to one cycle per second ($s^{-1}$)). Sounds heard in the environment usually consist of a range of frequencies. The distribution of sound energy as a function of frequency is termed the “frequency spectrum.”

The human ear does not respond equally to identical noise levels at different frequencies. Although the normal frequency range of hearing for most people extends from a low of about 20 Hz to a high of 10,000 Hz to 20,000 Hz, people are most sensitive to sounds in the voice range, between about 500 Hz to 2,000 Hz (Yost 2007). Therefore, to correlate the amplitude of a sound with its level as perceived by people, the sound energy spectrum is adjusted, or “weighted.”

The weighting system most commonly used to correlate with people's response to noise is “A-weighting” (or the “A-filter”) and the resultant noise level is called the “A-weighted noise level” (dBA)

(Yost 2007). A-weighting significantly de-emphasizes those parts of the frequency spectrum from a noise source that occurs both at lower frequencies (those below about 500 Hz) and at very high frequencies (above 10,000 Hz) where we do not hear as well. The filter has very little effect, or is nearly “flat,” in the middle range of frequencies between 500 and 10,000 Hz.

### 1.4.3 Equivalent Sound Level, $L_{eq}$

The Equivalent Sound Level, abbreviated $L_{eq}$, is a measure of the total exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest - for example: an hour, an 8-hour school day, nighttime, or a full 24-hour day (Yost 2007). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $Leq_{1h}$, or $Leq_{(24)}$.

$L_{eq}$ may be thought of as a constant sound level over the period of interest that contains as much sound energy as (is “equivalent” to) the actual time-varying sound level with its normal peaks and valleys. It is important to recognize, however, that the two signals (the constant one and the time-varying one) would sound very different from each other. Also, the “average” sound level suggested by $L_{eq}$ is not a linear function, but logarithmic, or “energy-averaged” sound level. Thus, the loudest events may dominate the noise environment described by the metric, depending on the relative loudness of the events.

### 1.4.4 Statistical Sound Level Descriptors

Statistical descriptors of the time-varying sound level are often used instead of, or in addition to $L_{eq}$ to provide more information about how the sound level varied during the time period of interest. The descriptor includes a subscript that indicates the percentage of time the sound level is exceeded during the period. The $L_{50}$ is an example, which represents the sound level exceeded 50 percent of the time, and equals the median sound level (Yost 2007). Another commonly used descriptor is the $L_{10}$, which represents the sound level exceeded 10 percent of the measurement period and describes the sound level during the louder portions of the period. The $L_{90}$ is often used to describe the quieter background sound levels that occurred, since it represents the level exceeded 90 percent of the period.

### 1.4.5 Sound In Air Versus Water

Due to the fact that water is denser than air, sound waves travel further and faster underwater than in air when unimpeded. In air, noise levels diminish by 6 dB as the distance doubles. In comparison, noise levels only reduce by ~4.5 dB per doubling distance underwater (depends on properties of water body) (IAGC 2014, NOAA 2015).

Temperature affects the speed of sound underwater, with sound traveling faster in warm versus cold water (NOAA 2015). Transmission loss in water, or the “decrease in acoustic intensity as an acoustic pressure waves propagates out from a source” may be also affected by numerous factors other than temperature including water chemistry, topography, and sea conditions (Scientific Fisheries Systems, Inc. 2009).

## 1.5 Description of Noise Sources

Underwater and airborne sound levels are generated from a variety of natural and anthropogenic sources including both physical and biological noise. Biological noise includes sounds produced by marine mammals, fish, and invertebrates. Physical noise includes waves at the surface, tidal movement, vessel operations, dock movements, dredging, aircraft overflights, and construction noise. Noise sources on this Proposed Project are related to the use of impact and vibratory pile driving hammers and activities associated with dredging. Impact pile driving produces impulsive sounds, while vibratory pile driving and dredging produce non-impulsive (or continuous) sounds. The distinction between these two general sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (Ward 1997 *in* Southall et al. 2007). Impulsive sounds (e.g., explosions and impact pile driving) are brief broadband sound pressure pulses that occur either as isolated events or repeated in some succession. Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a decay period that may include a period of diminishing, oscillating maximal and minimal pressures. Impulsive sounds generally have an increased capacity to cause physical injury as compared with sounds that lack these features (Southall et al. 2007).

Non-impulsive (intermittent or continuous sounds) can be tonal, broadband, or both. Some of these sounds can be transient signals of short duration but without the essential properties of pulses (e.g., rapid rise time). Examples of non-impulsive sounds include vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in highly reverberant environments (Southall et al. 2007). The Project Area would likely be considered a highly reverberant environment due to shallow water depths and hard surfaces such as rocky riprap, bulkheads, and breakwaters.

### 1.5.1 Impulsive Noise – Pile Driving

Proposed Project impacts will include instances of noise and vibration related to the use of an impact pile driver during discrete periods of time associated with the installation of 49, 36-inch, steel piles. Impact pile drivers are known to produce extremely high levels of noise, both in-air and underwater (Buehler et al. 2015). The impact pile driver will be a DELMAG D100 or D80. According to DELMAG's specs for the D100-13, the energy per blow ranges from 214 to 360 kilonewton meters (kNm). This is equivalent to 157,838 to 265,552 ft-lbs (foot pound-force) (DELMAG 2018). Generally impact hammers with greater force (per blow) produce higher levels of noise in terms of dB (Buehler et al. 2015).

#### 1.5.1.1 Pile Driving Underwater Noise

In order to calculate underwater impulsive noise impacts to marine mammals, it was necessary to estimate the metric "number of strikes per pile." This value is not as commonly measured as other metrics in pile driving. However, the Washington Department of Transportation (WSDOT) and Caltrans has published these values for similar projects (in terms of substrate, pile diameter, and pile type). These projects include the Anacortes Ferry Terminal, Mukilteo Test Pile Project, and an unspecified Caltrans project (Buehler et al. 2015, WSDOT 2018). These values are re-printed below. Anticipated underwater impulsive noise Zones of Influence (ZOIs; ensonified areas defined

by noise levels expected within each zone) for impact pile driving are provided in Appendix A, Figure 6 – Impact Pile Driving ZOIs.

### Table 1.2 References for Estimating the Number of Strikes Per Pile

| Project | Vibed First | Hammer Strength (ft-lbs) | # of Strikes Per Pile | # of Piles/ Day | # of Strikes/ Day | Pile Type | Pile Diameter (inches) | Substrate |
|---|---|---|---|---|---|---|---|---|
| Anacortes Ferry Terminal[a] | Yes | 165,000 | 341-675 | 4 | 2,494 | steel pipe | 36 | sand and silt |
| Mukilteo Test Pile Project #1[a] | Yes | 164,000 | 73-227 | 4 | 682 | steel pipe | 36 | sand and silt |
| Mukilteo Test Pile Project #2[a] | Yes | 164,000 | 204-225 | 2 | 459 | steel pipe | 36 | sand and silt |
| Unknown Caltrans* Project[b] | unknown | unknown | Unknown | 2-4 | 1,600-2,400 | steel pipe | 30 | unknown |

*California Department of Transportation (Caltrans)
[a]WSDOT 2018, Table 2.
[b]Buehler et al. 2015, Table 2-3

In addition, metrics for source level root mean squared sound pressure level (RMS SPL), sound exposure level (SEL), and peak sound pressure level ($SPL_{peak}$) were needed in order to calculate underwater noise impacts to marine mammals. These values have been published for similar projects (in terms of pile diameter, pile type, sediment/substrate, and water depth) and are re-printed below.

Table 1.3 Reference Values for Estimating Underwater RMS SPL, SEL, and $SPL_{peak}$ from Impact Pile Driving

| Project | Steel Pile Diameter (in) | Vibed First | Hammer Types (force in ft-lbs) | Substrate | Water Depth (m) | Measured Underwater Sound Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Distance (m) | $SPL_{peak}$ | RMS | SEL*** |
| Humboldt Bay Bridges (Caltrans)[a]* | 36 | No | Delmag D36-32<br><br>(90,720 ft-lbs)[g] | sand, silt, and clay[c] | 10 | 10 | 210 | 193 | 183 |
| Humboldt Bay Bridges (Caltrans)[a]* | 36 | No | Delmag D36-32<br><br>(90,720 ft-lbs)[g] | sand, silt, and clay[c] | 10 | 50 | 198 | 182 | N/A |
| Stockton Wastewater Treatment Plant Utility Crossing[a]** | 36 | Yes | APE D46-42<br><br>(114,109 ft-lbs)[h] | sand, silt, and clay (generally characteristic of the river)[d] | 3-4 | 10 | 197-199 | 185-186 | 175 |
| Port MacKenzie Dock Modifications[b]* | 36 | Yes | Delmag D62-22<br><br>(165,214 ft-lbs) | unknown | 10-17 | 62 | 204-206 | 189-190 | 178-180 |
| Siuslaw River Bridge[a]** | 30 | No | Delmag D-52 (up to 75,968 ft-;lbs) | marine sand, silt, clay[e] | ~3m | 10 | 210 | 190 | 177** |
| Anacortes Ferry Terminal[f] | 36 | Yes | ICE 120S-15 (165,000 ft-lbs)[i] | sand and silt | 12.8 | 10 | 207 | 189 | 175 |

[a]Buehler et al. 2015, Table I.2-3A
[b]Blackwell 2005, page 2 in text
[c]Yang et al. 2003, page 2 in text
[d]USACE 2015
[e]ODOT 2009
[f]WSDOT 2019, Table 7-14.
[g]DELMAG 2018
[h]APE 2011
[i]ICE 2015
*No attenuation, bare pile
**used bubble curtain
***Single strike SEL (not $SEL_{cum}$)

#### 1.5.1.1 Impact Pile Driving Airborne Noise

Impact pile drivers generate significantly high levels of airborne noise. The Washington Department of Transportation (WSDOT) (2019) has published typical noise levels for these hammers to aid in analyzing airborne noise impacts. This reference value is re-printed below.

Table 1.4 Reference Values for Estimating In-air Impact Hammer Pile Driving Noise

| Project | Steel Pile Diameter (in) | Substrate | Hammer Types (force in ft-lbs) | Measured In-air Sound Levels | | |
|---|---|---|---|---|---|---|
| | | | | Distance (m) | dBA | $dB_{rms*}$ |
| Coupeville Ferry Terminal | 30[a] | unknown | APE (unknown) | 15[a] | 116[a] | 97[a] |
| Colman Ferry Terminal | 36[a] | "unusually soft"[b] | unknown | 15[a] | 97[a] | 116[a] |
| Mukilteo Ferry Terminal | 36[a] | sand and silt[d] | Delmag D-62 (164,000)[d] | 15[a]<br>91.4[c] | n/a<br>95-97[c] | 113[a]<br>unknown |

*A-weighted
[a]WSDOT 2019, Table 7-5
[b]Soderberg and Laughlin 2016, in text
[c]Laughlin 2007, Table 7
[d]WSDOT 2018, Table 2

### 1.5.2 Non-impulsive Noise –Vibratory Pile Driving

Project impacts will include instances of noise and vibration related to the use of a vibratory hammer associated with pile installation. Vibratory hammers are "oscillatory hammers that vibrate the pile, causing the sediment surrounding the pile to liquefy and allow pile penetration" (Buehler et al. 2015). Vibratory hammers are frequently employed as a mitigation measure to reduce environmental impacts on aquatic wildlife since they generally produce noise levels 10 to 20 dB lower than impact pile drivers. However, while peak sound levels may be lower for vibratory hammers than impact hammers, the total energy generated in-water can be similar since vibratory hammers operate continuously and take a longer period of time to install a pile than impact hammers. A vibratory hammer that could be used on this Project is the APE (American Pile Driving Equipment, INC) model 200-6 vibro (driving force of 271 tons) (APE 2011). Anticipated underwater non-impulsive noise ZOIs for vibratory pile driving are provided in Appendix A, Figure 7 – Vibratory Pile Driving ZOIs.

#### 1.5.2.1 Vibratory Pile Driving Underwater Noise

Table 1.5 Reference Values for Estimating Underwater RMS SPL and $SPL_{peak}$ from Vibratory Pile Driving

| Project | Pipe Diameter and Type (Length) | Hammer Type (Strength) | Water Depth (m) | Substrate | Average Time to Vibe Pile (minutes) | Proofed With Impact Hammer | Measured Underwater Sound Levels | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Distance (m) | $SPL_{peak}$ | RMS | $SEL_{cum}$ |
| Unknown*[a1] | 36-inch Steel Pipe (Length 128 ft) | Unknown Vibratory Hammer | 5 | n/a | n/a | n/a | 10 | 185 | 175 | 175 |
| Kitsap Naval Base (Bangor, WA)[a2] | 36-inch Steel Shell | APE 600 (556 tons) | 4.6-21.9 | Sand and gravel[c] | 4-38[b] | Yes | 6-29 | n/a | 169 | n/a |
| Anacortes Ferry Terminal[d3, e] | 36-inch Steel Pipe | APE King Kong (360 tons) | 22.6 | Sand and Silt | 63 (for two piles) | No | 11 | n/a | 170 | 228** |

[a]Buehler et al. 2015.
[b]HartCrowser 2013
[c]USFWS 2011
[d]WSDOT 2019
[e]Laughlin 2012
[f]APE 2011
[g]ICE 2015

*This is an average example provided by Caltrans, based on numerous project noise data
** For vibratory pile driving, the SEL was calculated based on the 10 second RMS values that were calculated over the period of the drive (63 minutes for both piles in this case) (Laughlin 2012).
1. Table I.2-2
2. Table I.3-57
3. Table 7-15.

#### 1.5.2.1 Vibratory Pile Driving Airborne Noise

Vibratory hammers drivers generate significantly high levels of airborne noise. The WSDOT (2019) has published typical noise levels for these hammers to aid in analyzing airborne noise impacts. These reference values are re-printed below.

Table 1.6 Reference Values for Estimating In-air Vibratory Hammer Pile Driving Noise

| Project | Steel Pile Diameter (in) | Substrate | Hammer Types (force in tons) | Measured In-air Sound Levels | | |
|---|---|---|---|---|---|---|
| | | | | Distance (m) | dBA | $dB_{rms*}$ |
| Vashon Ferry Terminal[a] | 30 | "moderately hard substrate"[b] | APE (unknown) | 15 | 80 | 88 |
| Keystone Ferry Terminal[a, b] | 30 | unknown | APE (unknown) | 15 | 100-105 | 96-99 |
| Friday Harbor Ferry Terminal[c] | 24 | Silty sand with hard clay layer | unknown | 91 | 85-88d | n/a |

Table 1.6 Reference Values for Estimating In-air Vibratory Hammer Pile Driving Noise

| Project | Steel Pile Diameter (in) | Substrate | Hammer Types (force in tons) | Measured In-air Sound Levels | | |
|---|---|---|---|---|---|---|
| | | | | Distance (m) | dBA | $dB_{rms*}$ |

*A-weighted
[a]WSDOT 2019, Table 7-6
[b]Reinhall et al. 2016
[c]Laughlin 2010, Table 3
[d]WSDOT 2018, Table 2

### 1.5.3 Non-impulsive Noise - Dredging

#### 1.5.3.1 Dredging Underwater Noise Impacts

Dredging at the Carnival Cruise dock will elevate underwater noise levels in the Project Area. Operations would involve the use of tugboats and clamshell dredgers. Typically, this would involve two tugboats and one clamshell dredger, running continuously. Reference values for similar non-impulsive boat engine/dredge noise were obtained for this equipment from a Central Dredging Association (CEDA) summary paper on underwater sound, a study on underwater dredging sound in New York, and a study on underwater ship noise (Reine et al. 2012, Jones et al. 2015, Veirs et al. 2016). Based on existing reference values, the dredge/tug engine would produce the highest levels of noise associated with the dredging construction phase. Anticipated underwater non-impulsive ZOIs for dredging are provided in Appendix A, Figure 8 – Dredging ZOIs.

Table 1.7 Clam Shell/Backhoe Dredge Underwater Sound Reference Values

| Activity | Sound Level | Distance at Which Sound Measured (m) |
|---|---|---|
| Tugboat engine noise[a] | 167 $dB_{rms}$ | 1 |
| Bottom contact of clam shell bucket[b] | 124 dB | 150 |
| Digging of sediment[b] | 113 dB | 150 |
| Bucket closing[b] | 99 dB | 150 |
| Winch in/out of bucket[b] | 116 dB | 150 |
| Material dropped onto barge[b] | 108 dB | 150 |
| Tugboat engine noise[c] | 170 ± 5 $dB_{rms}$ | 1 |

[a]Reine et al. 2012
[b]Dickerson et al. 2001 cited in Jones et al. 2015
[c]Veirs et al. 2016

#### 1.5.3.1 Dredging Airborne Noise Impacts

Dredging operations will occur in an area parallel to the existing dock and dolphin structures used by the Carnival Cruise ships. Operations would involve the use of tugboats and clamshell dredgers.

Typically, this would involve two tugboats and one clamshell dredger, running continuously. Reference values were obtained for this equipment from the Federal Highway Administration (FHWA) Road Construction Noise Model (RCNM) and are reprinted below (FHWA 2006). Note that these sound power levels for the tugboat are conservative; they would only occasionally run at full power under certain scenarios.

Table 1.8 Tugboat and Dredge In-air Sound Power Summary Information (FHWA 2006)

| Construction Equipment | Estimated Duration | Estimated Source dBA |
|---|---|---|
| Clam Shell Dredger | 60 minutes/hour | 87 |
| Tugboat | 60 minutes/hour | 87 |

## 1.6 Physical Impacts

### 1.6.1 Pile Driving (Impact and Vibratory Hammer)

Placement of piles will permanently occupy a small amount of physical space on and in the substrate and in the water column. It will also temporarily suspend sediment, and as discussed above, pile driving will generate temporary sound waves. Once work is complete, the piles will provide new hard substrate which may be used as attachment surfaces for algae and various invertebrates, some of which are food sources for fish and other aquatic life. There will be a slight net loss of aquatic habitat for marine mammals (i.e., substrate area lost by the installation of 49 36” piles).

### 1.6.2 Dredging

The clamshell dredge would be in direct contact with the substrate as well as moving through the water column. Although unlikely, there is a theoretical possibility of direct contact between clamshell dredge, tugboats, or barge and a marine mammal. As described below in Sections 11 and 13, mitigation measures would avoid the risk of injury resulting from direct contact. Physical impacts related to sediment suspension, described below, are more likely to occur.

#### 1.6.2.1 Suspended Sediments

Increased turbidity and suspended sediments may occur as a result of pile installation. The introduction of sediments is expected to be insignificant in relation to influencing the already high levels of turbidity in the harbor. The dock area experiences frequent sediment disturbance due to boat traffic and wave action in the area. Therefore, any Project-related sediment disturbance would be minor and not outside the norm for the area and have no measurable impact on marine mammals.

#### 1.6.2.2 Suspended Environmental Contaminants

Preliminary core samples extracted from the proposed dredge material revealed the presence of certain chemical compounds considered to be significant environmental pollutants. According to the

preliminary report, “review of the bulk chemistry data found arsenic, copper, lead, mercury, nickel, zinc, total PCBs, DDD (Dichlorodiphenyldichloroethane), DDE and total DDT to exceed “Effects Range Low” (ERL) screening levels in one of the three composites. The “Effects Range Median” (ERM) screening level was only exceeded in one Composite (Comp b) where Total DDT was slightly exceeded” (GHD 2018). The ERL and ERM refers to sediment quality objectives from Buchman (2008). According to the EPA, ERL refers to the “concentration of a contaminant above which harmful effects may be expected to occur” and ERM refers to the “concentration of a contaminant above which harmful effects always or almost always occur” (EPA 2016). Benthic bioassays were performed to determine how concentration rates affect living organisms (experiment used marine amphipods and polychaetes; *Amplelisca abdita* and *Neanthes*).

The benthic bioassays performed on the dredge material resulted in mean survival rates greater than 90% after 10-days (*Amplelisca abdita* and *Neanthes*). Additionally, elutriate samples generated using sediment from Comp-a and Comp-b with water collected from the berth dredging area were used for Sediment Elutriate Testing. The elutriates generated were used to perform bioassays with exposure to *Americamysis bahia* (96-hour survival), *Menidia beryllina* (96-hour survival), and *Mytilus galloprovincialis* (48-hour survival and normal development) using 1%, 10%, 50% and 100% of the elutriate. Due to the high survival rates, the $LC_{50}$ (lethal concentration for 50% of the population over the specified time period) could not be calculated, but can be determined by inspection to be greater than 100% of the elutriate.

If some of these environmental contaminants become suspended in the water column as a result of dredging, “in well-mixed areas, dilution is often sufficient to decrease the concentration…to inconsequential levels” (NOAA Fisheries 2009). Considering the fact that the Project Area constitutes a “well-mixed” area due to turbidity and wave action, and that sediments are already suspended on a daily basis by large ship traffic in a busy port, no measurable direct effect to marine mammals is anticipated.

# 2. Dates, Duration, and Specified Geographic Region

## 2.1 Dates of Construction

The Proposed Project will progress with pile driving, followed by or concurrent with dredging, and then tower and bridge construction. Construction activities will take place from November 15, 2019 to April 15, 2020 (maximum in-water work window). In-water pile driving and dredging may occur at any point during this time. In total, pile driving (both impact and vibratory hammer driving) is expected to take a maximum of 26 working days while dredging is expected to take a maximum of 30 working days. The only pile driving (impact and vibratory hammer driving) proposed to occur over this period is the installation of 49 36-inch steel pipe piles. Only one pile driver (impact or vibratory) will be used at any given time. These piles form the structural support for two concrete formed moorings (designed to provide for large ship berthing) and the tower portion of the passenger bridge. Dredging will be conducted during the same time period, and may or may not be concurrent with pile driving activities. Carnival is requesting this IHA for the full year from November 15, 2019 through November 15, 2020.

## 2.2 Duration of Activities

### 2.2.1 Pile Driving

The current proposed construction schedule includes a single episode of pile driving within the period of this IHA application, amounting to an estimated 26 days of pile driving. Pile driving is associated with construction of the north and south mooring structures as well as the passenger bridge cap as shown in Appendix A, Figure 2 – Project Area. The number of piles that can be driven per day is estimated as a maximum of five piles per day (driven start to finish). Piles will not be socketed (no drilling will occur). Only one pile will be actively driven at a time (there will only be one pile driver in use at any given time). No temporary piles will be removed in association with this Project. Expected ensonified areas resulting from impact pile driving are presented in Appendix A, Figure 6.

Table 2.1 Impact Pile Driving Metrics**

| Pile Driving Method | Pile Driving Locations | Estimated Number of Strikes Per Pile | Estimated Strike Duration | Estimated Number of Piles Per Day | Number of Work Days | Pile Diameter (inches) | Pile Type |
|---|---|---|---|---|---|---|---|
| Impact Pile Driving | North Mooring Structure<br><br>South Mooring Structure<br><br>Passenger Bridge Cap | 675[d] | 100 msec*[c] | 5[b] | 26 | 36[b] | Steel pipe[b] |

*milliseconds (msec)
**Based on Data Collected On Similar Projects Referenced in Section 1
[a]Buehler et al. 2015
[b]Atkins, personal communication (2018)
[c]NMFS 2018c
[d]WSDOT 2018

### 2.2.2 Vibratory Pile Driving

Vibratory pile driving would occur immediately prior to impact pile driving (limited to the same time period of 26 days, with pile driving limited to one pile at any given time). Vibratory pile driving on the Project would be limited to the installation of up to 49 36-inch steel pipe piles. It is anticipated that piles would be proofed via impact pile driving following vibratory hammer pile driving. Expected ensonified areas resulting from vibratory pile driving are presented in Appendix A, Figure 7.

Table 2.2 Vibratory Pile Driving Metrics*

| Pile Driving Method | Pile Driving Locations | Estimated Driving Duration | Estimated Number of Piles Per Day | Number of Work Days | Pile Diameter (inches) | Pile Type |
|---|---|---|---|---|---|---|
| Vibratory Pile Driving | North Mooring Structure<br><br>South Mooring Structure<br><br>Passenger Bridge Cap | 31.5 minutes[a] | 5[b] | 26 | 36[b] | Steel pipe[b] |

*Based on Data Collected On Similar Projects Referenced in Section 6
[a]WSDOT 2019, Table 7-15
[b]Atkins, personal communication (2018)

### 2.2.3 Dredging

The current proposed construction schedule includes dredging within the period of this IHA application, amounting to an estimated 30 days. Dredging is associated with the Carnival Cruise berth expansion (see dredge area in Appendix A, Figure 2 – Project Area). Expected ensonified areas resulting from dredging are presented in Appendix A, Figure 8.

Table 2.3 Dredging Metrics

| Construction Technique | Dredging Location | Number of Work Days | Amount of Dredged Material | Construction Technique |
|---|---|---|---|---|
| Dredging | Dredge Template in the Carnival Cruise Berth | 30 | 35,400 cy | Dredging |

# 3. Species and Numbers of Marine Mammals

A literature review was conducted to identify marine mammals known to be present or potentially present within or near the Action Area. These included biological surveys specific to the POLB and multi-year surveys covering extensive areas of offshore waters (MEC Analytical Systems 2002, SAIC 2010, Jefferson et al. 2013, MBC Applied Environmental Sciences 2016). In addition, the California Department of Fish and Wildlife (CDFW), USFWS, and NOAA Fisheries lists of Endangered (E) and Threatened (T) species for the Project vicinity (9 Quad search: Torrance, Long Beach, Long Beach OE S, Los Alamitos, San Pedro, Seal Beach, Inglewood, South Gate, Whittier) were reviewed on October 29, 2018 and again on September 22, 2019 (CDFW 2018, NOAA Fisheries 2018a, USFWS 2018) (provided in Appendix B). According to these sources, at least 19 species of marine mammals may potentially occur offshore of the Port Complex (NOAA 2015)

Federal Register (FR) 80(204):63958). Only a handful of these species have been documented within the POLB in the past several decades. Only three species are common within the Port Complex: California Sea Lion *(Zalophus californianus*), Pacific Harbor Seal (*Phoca vitulina richardii*), and Common Bottlenose Dolphin (*Tursiops truncatus*). Four species were reported during intensive monthly surveys conducted in 2013-2014, with two of these (California Sea Lion and Common Bottlenose Dolphin) observed in the immediate Project Area (MBC Applied Environmental Sciences 2016 and Table 3.2). The other species addressed below and excluded from further consideration are not known to occur in the POLB, with the exception of a few whale species (e.g., Blue Whales and Fin Whales) that have occasionally washed up in the Port Complex over the past few decades following ship strikes (MMC 2007; SAIC 2010; MEC Analytical Systems 2002; USACE 1992).

The likelihood of occurrence is based on past biological surveys, federal and state database searches, a literature review, and personal communications with individuals familiar with harbor operations (MEC Analytical Systems 2002, SAIC 2010, Jefferson et al. 2013, MBC Applied Environmental Sciences 2016, AECOM 2017). Published literature and online information from NOAA Fisheries provides the basis for characterizations of habitat, stock sizes, and status (NOAA Fisheries 2018c). Table 3.1 characterizes marine mammals potentially present in or near the Port Complex.

### Table 3.1 Stock Assessment for Marine Mammals Potentially Present in the Port of Long Beach Area

| C. Name (Sci. Name) | ESA | MMPA Status | Stock Name and Status | Stock Abundance[d] | PBR* | Annual M/SI** | Occurrence in the POLB | Seasonality |
|---|---|---|---|---|---|---|---|---|
| **California Sea Lion** (*Zalophus californianus*) | N/A | P | U.S. | 257,606 | 9,200 | 389 | Common | year-round[a, b] |
| **Pacific Harbor Seal** (*Phoca vitulina richardii*) | N/A | P | California | 30,968 | 1,621 | 43 | Common | year-round[a, b] |
| **Gray Whale** (*Eschrichtius robustus*) | D | P | Eastern North Pacific | 26,960 | 624 | 132 | Occasional (species); outer harbor strandings in 2000 and 2017 | January through May[a] |
| **Gray Whale** (*Eschrichtius robustus*) | E | D | Western North Pacific | 290 | 0.06 | unknowns | Not documented, included because of long distance movements and difficulty of distinguishing stocks | presumably January through May |
| **Blue Whale** (*Balaenoptera musculus*) | E | D | Eastern North Pacific | 1,146 | 2.3 | > 0.2 | Rare; Two reported POLB strandings, Aug 1987 and Sep 2007 | summer/fall[a] |
| **Fin Whale** (*Balaenopter physalus*) | E | D | California/ Oregon/ Washington | 9,029 | 81 | >2.0 | Very rare; One reported POLB stranding in December 2017 | summer/fall[a] |

## Table 3.1 Stock Assessment for Marine Mammals Potentially Present in the Port of Long Beach Area

| C. Name (Sci. Name) | ESA | MMPA Status | Stock Name and Status | Stock Abundance[d] | PBR* | Annual M/SI** | Occurrence in the POLB | Seasonality |
|---|---|---|---|---|---|---|---|---|
| **Humpback Whale**<br><br>(*Megoptera novaeangliae*) | E<br><br>T<br><br>N/A | D | California/ Oregon/ Washington | 2,374 | 11.0 | >9.2 | Two live Humpback Whales have been documented in the Port of Los Angeles (one in June of 2016 and one in April of 2017) in by Harbor Breeze Cruises (HappyWhale 2019, OBIS SEAMAP 2019) | year-round, mostly summer/fall[a] |
| **Short-beaked Common Dolphin**<br><br>(*Delphinus delphis*) | N/A | P | California/ Oregon/ Washington | 969,861 | 8,393 | >40 | Occasional presence of *Delphinus sp*.; in SoCal offshore waters 72% are estimated to be this species[c] | year-round[a] |
| **Long-beaked Common Dolphin[4]**<br><br>(*Delphinus capensis*) | N/A | P | California | 101,305 | 657 | >35.4 | Occasional presence of *Delphinus sp*.; in SoCal offshore waters 28% are estimated to be this species.[3] | year-round[a] |
| **Risso's Dolphin**<br><br>(*Grampus griseus*) | N/A | P | California/ Oregon/ Washington | 6,336 | 46 | >3.7 | Nil; Reported offshore but not in POLB | year-round, mostly fall/winter[a] |
| **Pacific White-sided Dolphin**<br><br>(*Lagenorhynchus obliquidens*) | N/A | P | California/ Oregon/ Washington | 26,814 | 191 | 7.5 | Rare, no recent POLB reports | winter and early spring [a] |
| **Northern Right Whale Dolphin**<br><br>(*Lissodelphis borealis*) | N/A | P | California/ Oregon/ Washington | 26,556 | 179 | 3.8 | Nil; no reports in POLB | fall and winter[a] |
| **Common Bottlenose Dolphin**<br><br>(*Tursiops truncates*) | N/A | P | California Coastal | 453-515 | 2.7 | > 2.0 | Common | year-round [a, b] |

**Key:**

**ESA** = (E) Endangered - Listed in the Federal Register as being in danger of extinction, (T) – Listed in the Federal Register as threatened, (N/A) Not Listed, (D) Delisted- Delisted as a recovered species or population

**MMPA** = (P) Protected, (D) Depleted

*PBR = Potential Biological Removal Level

**M/SI = annual mortality/serious injury

[a]AECOM 2017

[b]80 FR 53658

[c]Jefferson et al. 2013

[d]NOAA Fisheries 2018c (most up to date stock assessments)

[4]taxonomic status currently in question; Society for Marine Mammalogy 2018

Data on marine mammals was collected within the Port Complex over a 12-month period in 2013-2014 for a general biological survey (MBC Applied Environmental Sciences 2016). This dataset

included a substantial portion (but not all) of the Action Area. Data gathering was conducted concurrently for birds and marine mammals and is based on monthly point counts within a number of distinct study units, including one encompassing about half of the existing Carnival dock. This dataset is relatively recent and is site-specific. Thus it covers the actual habitats and locations potentially impacted by the Proposed Project. However only raw numbers are reported and densities were not calculated, and the description of methods is ambiguous in some areas. For example, there is no discussion of how sample points were selected so in the absence of complete information we must assume the points are not unbiased. The following table (Table 3.2) includes all marine mammal species observed in the Port Complex during monthly biological survey from the fall of 2013 through the fall of 2014.

Table 3.2 Summary of All Marine Mammal Observations, 2013-2014, Port of Long Beach and Port of Los Angeles. Adapted from MBC Applied Environmental Sciences (2016).

| Survey Month | California Sea Lion | Harbor Seal | Bottlenose Dolphin | Common Dolphin | Unidentified Dolphin | Total Count |
|---|---|---|---|---|---|---|
| Sep 2013 | 23 | 9 | 2 (1) | 0 | 0 | 34 (1) |
| Oct 2013 | 55 | 3 | 0 | 0 | 0 | 58 |
| Nov 2013 | 40 (2) | 8 | 3 | 0 | 0 | 51 (2) |
| Dec 2013 | 33 | 14 | 3 | 0 | 0 | 50 |
| Jan 2014 | 53 | 18 | 0 | 0 | 0 | 71 |
| Feb 2014 | 40 | 4 | 0 | 40 | 0 | 84 |
| Mar 2014 | 51 | 13 | 5 | 0 | 0 | 69 |
| Apr 2014 | 95 | 35 | 0 | 0 | 0 | 130 |
| May 2014 | 60 | 42 | 0 | 0 | 0 | 103 |
| Jun 2014 | 48 | 41 | 0 | 0 | 0 | 89 |
| Jul 2014 | 39 | 15 | 0 | 0 | 0 | 54 |
| Aug 2014 | 50 | 21 | 5 | 0 | 0 | 76 |
| **Total** | 587 (2) | 223 | 18 (1) | 40 | 1 | 869 (3) |
| **Monthly Mean** | 48.9 (0.17) | 18.6 | 1.5 (0.08) | 3.33 | 0.08 | 72.4 (0.25) |

(x) = observations within Study Zone 19/Pier G, which includes the Carnival Cruise Lines dock

## 3.1 Extralimital Species Excluded From Further Consideration

Several species of marine mammals have been reported as rare or occasional visitors to the Port Complex. These include valid and well-documented reports of occasional observations or rare stranding events by qualified professionals as well as anecdotal and undocumented reports. Other species have been noted as present in nearby ocean waters but never reported inside the Port Complex. Brief accounts follow to document why we believe presence of these species is improbable and that construction impacts are very unlikely, and thus no take is requested.

### 3.1.1 Blue Whale (*Balaenoptera musculus*), Eastern North Pacific Stock

Blue Whales are the largest living animal on the planet (NatureServe 2018). They are also considered the loudest animal on the planet, with communication calls traveling between whales up to 1,000 miles away from each other (NOAA Fisheries 2018d). They were first listed under the Endangered Species Conservation Act (precursor to the ESA) in 1970 (35 FR 8491). No critical habitat has been designated for this species at this time.

The stock population found off the coast of southern California is the eastern North Pacific Blue Whale (NOAA Fisheries 2018d). Blue Whales are found in coastal as well as pelagic environments and frequently occur on the continental shelf (NatureServe 2018). They engage in seasonal migrations between their summer feeding grounds in the Gulf of Alaska and wintering/breeding grounds off the coast of southern California, Baja, and occasionally Costa Rica (Mate et al. 1999, NatureServe 2018, NOAA Fisheries 2018d). Blue Whales reach sexual maturity at roughly 10 years old and females bear one calf every two to three years. Calves are weaned at eight months (NatureServe 2018). Blue Whales may live up to ninety years. Blue whales feed exclusively on krill by straining seawater through their baleen plates (NOAA Fisheries 2018d). During the height of commercial whaling, the species was heavily overharvested, resulting in significant population declines (NatureServe 2018). Current threats to the species include vessel strikes, entanglement in fishing gear, pollution, underwater anthropogenic noise, oil and gas exploration and development, and climate change (NMFS 2018c, NOAA Fisheries 2018d).

At the POLB, Blue Whales are occasionally observed in the Southern California Bight during fall migration. The closest known live Blue Whale record in relation to the breakwater is 3.6 kilometers (km) directly west of the Port of LA Breakwater. The closest record in relation to the POLB breakwater is 4.1 km directly south. This record is approximately 8.5 km from the Carnival Dock (OBIS SEAMAP 2019). There were eight documented strandings on the coastline between Long Beach and Santa Barbara from August 1987 through September 2007. Observations can cluster within short time frames (four in late summer/early fall 2007 between Long Beach and Santa Barbara). These strandings have been linked to vessel strikes along shipping channels and may be associated with red tides or other disorienting events (MMC 2007, Berman-Kowalewski et al. 2010). These strandings have been designated as an UME (Unusual Morality Event) by NMFS (Wilkinson 1996). At the Port Complex, five strandings associated with vessel strikes were recorded from 1988 to 2007. The stranded animals ranged from 46 to 74 ft in length (MMC 2007, Berman-Kowalewski et al. 2010).

Blue Whales are more commonly observed in higher concentrations around the Channel Islands in southern California (Irvine et al. 2014). Given the rarity of sightings within the Port Complex (five reports in 20 years and all deceased individuals), the fact that Project underwater noise impacts will not propagate significantly outside of the POLB, and the large size of the animals (i.e. could not enter the POLB without being detected by the Project's Protected Species Observers (PSOs; certified marine mammal and sea turtle monitors that are approved by NMFS) stationed at POLB entrances), no take is anticipated. No impacts are expected to occur to this species. Therefore, they are excluded from further consideration.

### 3.1.2 Fin Whale (*Balaenoptera physalus*), California/Oregon/Washington Stock

Fin or "Finback" Whales were first listed under the Endangered Species Conservation Act in 1970 as a result of overexploitation from commercial whaling in the mid-1900s (35 FR 8491, NOAA Fisheries 2018d). No critical habitat has been designated for this species at this time. Although still depleted, the population off the coast of California is believed to be recovering/increasing based on recent stock assessments (NOAA Fisheries 2018c).

Fin whales are highly pelagic and most are commonly found twenty-five miles or more offshore (NatureServe 2018). Fin Whales may travel singly or in pairs and small pods (NatureServe 2018). Most individuals engage in seasonal migrations between summer feeding areas in the Arctic and Antarctic to winter breeding grounds in the tropics (breeding ground locations are currently unknown) (NOAA Fisheries 2018d). However, non-migratory populations are known from the Gulf of California (Bérubé et al. 2002). Migration routes are in the open ocean and well away from the coast, making Fin Whale populations difficult to track/monitor (NOAA Fisheries 2018d). Fin Whales reach sexual maturity at six to 12 years old and females will give birth to one calf every two to three years (NatureServe 2018, NOAA Fisheries 2018d). Fin Whales feed on krill, fish, copepods, and squid (NatureServe 2018). Current threats to the species include vessel strikes, pollution, anthropogenic underwater noise, and anthropogenic exploitation of whale prey (euphausiids) (NatureServe 2018, NOAA Fisheries 2018d).

Fin Whales occur in the Southern California Bight year-round, although they may seasonally range from central California to Baja (Falcone and Schorr 2013). The Fin Whale is also a seasonal migrant past the POLB and occasionally observed just outside the outer harbor in the open ocean (MBC Applied Environmental Sciences 2016, iNaturalist 2018). The closest known live Fin Whale record in relation to the Port Complex is 1.5 km directly south of the Port of Los Angeles breakwater. This record is approximately 8.8 km from the Carnival dock (OBIS SEAMAP 2019). A dead juvenile (approximately 40-foot) Fin Whale washed up against Pier T in the POLB in late December 2017. The animal was believed to have been struck by a ship outside the harbor and dragged inside the breakwater (OCR 2017). However, Fin Whales are not known to voluntarily enter the POLB. Given that this species does not occur within the Port Complex, the fact that Project underwater noise impacts will not propagate significantly outside of the POLB, and the large size of the animals (i.e. could not enter the POLB without being detected by Project's PSOs stationed at POLB entrances), no take is anticipated. No impacts are expected to occur to this species. Therefore, they are excluded from further consideration.

### 3.1.3 Risso's Dolphin (*Grampus griseus*), California/Oregon/Washington Stock

Risso's Dolphin are not federally listed under the ESA, but the species receives protection under the MMPA. The species is typically found in deep offshore waters and on the edge of the continental shelf. However, they can also occur in nearshore waters. They are found worldwide in temperate, tropical, and subtropical waters. In U.S. waters, they range from the Gulf of Alaska to the Gulf of Mexico.

Risso's Dolphins tend to travel in pods of 10 to 30 individuals (NOAA Fisheries 2018d). However, large pods can occur of several thousand dolphins (NatureServe 2018). The species is believed to engage in seasonal migrations between summer pelagic areas and winter coastal areas

(NatureServe 2018). Peak breeding season off the coast of California occurs from the fall to winter (NOAA Fisheries 2018d). Adults reach sexual maturity around five to nine years old and females typically produce a calf once every three years (NatureServe 2018). Risso's Dolphins can dive to 1,000 ft. They feed at night and are known to take a variety of prey including squid, octopus, fish, krill, and cuttlefish (NOAA Fisheries 2018d). Threats to the species include entanglement in fishing gear, anthropogenic underwater noise, and environmental contaminants (NOAA Fisheries 2018d).

There are numerous records of this species from the continental shelf in the Southern California Bight (NOAA Fisheries 2018c). In addition, they are commonly observed offshore near Catalina Island and the Channel Islands (iNaturalist 2018). However, they are infrequently seen close to shore and there are no known records of this species from the POLB. The closest record to the Port Complex is 7.2 km directly south of the Port of Los Angeles breakwater. This record is approximately 12.6 km from the Carnival dock (OBIS SEAMAP 2019). Given that this species does not occur within the Port Complex and the fact that Project underwater noise impacts will not propagate significantly outside of the POLB, no take is anticipated. No impacts are expected to occur to this species. Therefore, they are excluded from further consideration.

### 3.1.4 Pacific White-sided Dolphin (*Lagenorynchus obliquidens*), California/Oregon/Washington

Pacific White-sided Dolphins are not federally listed under the ESA, but the species receives protection under the MMPA. The species is found throughout the North Pacific Ocean from the Kamchatka Peninsula and southern Alaska south to Japan and Baja California (NatureServe 2018). In the U.S., Pacific White-sided Dolphins commonly occur in waters over the continental shelf or along the continental slope (NOAA Fisheries 2018d). Pacific White-sided Dolphins are distinguished from other co-occurring dolphins by their unique white markings: white stripes on either side of the body that extend from eye to tail (NOAA Fisheries 2018d).

In North America, the species may make seasonal north-south migrations, with dolphins spending the spring and summer off the coast of Oregon and Washington, and the winter off the coast of California (Barlow 2016). This species has a slow reproductive rate and adults do not reach sexual maturity until the age of eight to 10 years old. Calving season occurs in later summer or early fall. Adult females give birth to one calf and only reproduce once every three years (NatureServe 2018, NOAA Fisheries 2018d). Pacific White-sided Dolphins are social and travel in schools of 10 to 100 individuals. They also will work cooperatively to hunt schooling fish (NOAA Fisheries 2018d). Population trends for this species are currently unknown. Threats to the species include mortality associated with entrapment in fishing gear and underwater noise pollution (NatureServe 2018, NOAA Fisheries 2018d).

The Pacific White-sided Dolphin is seasonally present outside the POLB breakwater in the open ocean. The species was apparently reported by USACE (1992) as present in the harbor, although there is no known occurrence data or records to support this claim (MBC Applied Environmental Sciences 2016; SAIC 2010; MEC Analytical Systems 2002). The closest known record to the Port Complex is 2.1 km directly west of the Port of Los Angeles Breakwater. This record is approximately 13.8 km from the Carnival dock (OBIS SEAMAP 2019). Given that this species does not occur within the Port Complex and the fact that Project underwater noise impacts will not propagate

significantly outside of the POLB, no take is anticipated. No impacts are expected to occur to this species. Therefore, they are excluded from further consideration.

### 3.1.5 Northern Right Whale Dolphin (*Lissodelphis borealis*), California/Oregon/Washington

Northern Right Whale Dolphins are not federally listed under the ESA, but the species receives protection under the MMPA. The species is the only dolphin in the North Pacific without a dorsal fin (NOAA Fisheries 2018d). They generally are associated with deeper and cooler offshore waters over the continental shelf and slope, but may also occur in temperate waters (Becker et al. 2014, NatureServe 2018). In the eastern north Pacific, they range from the Gulf of Alaska to Baja California (NOAA Fisheries 2018d). Northern Right Whale Dolphins may travel in pods of up to three thousand individuals. These pods may include other dolphin species (NOAA Fisheries 2018d). They engage in seasonal migrations (potentially related to prey availability), spending the spring and summer in more northern climes and wintering in southern latitudes (NatureServe 2018, NOAA Fisheries 2018d). Males and females reach sexual maturity around 10 years old and females give birth to one calf during the winter/spring every two years (NOAA Fisheries 2018d). Northern Right Whale Dolphins feed on a variety of prey including squid and lanternfish (NatureServe 2018). Threats to the species include underwater anthropogenic noise, entanglement in fishing gear, and hunting (Japan) (NOAA Fisheries 2018d).

Northern Right Whale Dolphins rarely occur nearshore at the POLB, and they have not been reported within the Action Area. The closest record to the Port Complex is 26.5 km directly southwest of the Port of Los Angeles breakwater. This record is approximately 32.5 km from the Carnival dock (OBIS SEAMAP 2019). Given that this species does not occur within the Port Complex and the fact that Project underwater noise impacts will not propagate significantly outside of the POLB, no take is anticipated. No impacts are expected to occur to this species. Therefore, they are excluded from further consideration.

# 4. Affected Species Status and Distribution

### 4.1.1 Humpback Whale (*Megoptera novaeangliae*), California/Oregon/Washington Stock

The Humpback Whale was first listed under the Endangered Species Conservation Act in 1970 as a result of overexploitation from commercial whaling (35 FR 8491). In 2016, NMFS determined that the Humpback Whale species (previously listed at the species level) only required protection under the ESA for certain distinct population segments (DPS) (81 FR 62259). No critical habitat has been designated for this species at this time although NMFS has agreed to designate critical habitat for Pacific Humpback Whales in 2019 (CBD 2018).

Humpback Whales that occur off the California Coast (feeding groups) belong to the Central American and Mexican DPSs as well as a few whales from the Hawaii DPS (breeding groups) (NOAA Fisheries 2018d). The Central American DPS is listed as endangered under the ESA, the Mexican DPS is listed as threatened, and the Hawaiian DPS is not-listed (81 FR 62259). For

management purposes, NOAA Fisheries considers the California/Oregon/Washington stock to be endangered and MMPA depleted.

Humpback Whale habitat includes the open ocean and coastal waters, as well as inshore areas such as bays. Summer distribution is in temperate and subpolar waters. In winter, most humpbacks are found in tropical/subtropical waters near islands or coasts (NOAA Fisheries 2018d). Humpback Whales have one of the longest migrations of any animal, with some populations traveling up to 5,000 miles annually. They may travel singly or in small pods (NatureServe 2018). In general, Humpback Whales exhibit strong matrilineal site fidelity to breeding/wintering areas and feeding/summering areas (NOAA Fisheries 2018d). Humpback Whales reach sexual maturity at four to ten years old and females will give birth to one calf every two to three years (NatureServe 2018, NOAA Fisheries 2018d). The whales feed on krill by filtering the prey from sea water through their baleen plates. They have unique strategies in corralling the krill involving “bubble nets,” sounds, and their pectoral fins (NOAA Fisheries 2018d). Current threats to the species include pollution, anthropogenic underwater noise, vessel strikes, anthropogenic disturbance at breeding sites (or other areas where whales congregate), and entanglement in fishing gear (NatureServe 2018, NOAA Fisheries 2018d).

Humpback Whales are seasonal migrants (spring and fall) past the POLB and are frequently observed in the open ocean outside the outer harbor (MBC Applied Environmental Sciences 2016, iNaturalist 2019). Two live Humpback Whales have been documented in the Port of Los Angeles (one in June of 2016 and one in April of 2017) in by Harbor Breeze Cruises (HappyWhale 2019, OBIS SEAMAP 2019). Based on species migration patterns, Humpback Whales could be present in the Action Area during the proposed construction season (fall and into winter) (NOAA Fisheries 2018d). The species is considered to be a “low-frequency cetacean” by NMFS (2018a). NMFS specifies generalized hearing ranges for low-frequency cetaceans (baleen whales) as 7 Hz to 35 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

### 4.1.2 Gray Whale (*Eschrichtius robustus*), Eastern and Western North Pacific Stocks

Gray Whales are only found in the North Pacific Ocean. There are two recognized populations: the Western North Pacific and Eastern North Pacific. Gray Whales were first listed under the Endangered Species Conservation Act in 1970 as a result of overexploitation from commercial whaling (35 FR 8491). The Eastern North Pacific population recovered after the International Whaling Commission issued a ban on commercial whaling, and it was delisted in 1994 (59 FR 31094-31095). The Western North Pacific population is currently estimated at roughly 140 individuals and listed under the ESA as federally endangered (NOAA Fisheries 2018d). No critical habitat has been designated for this species at this time.

The Eastern North Pacific Gray Whale population winters off the coast of Baja California and Sinaloa and spends the summer foraging in the Bering and Chukchi Seas. However, some Gray Whales are known to summer off the coast of California (NOAA Fisheries 2018d). Western Gray Whales summer and feed along the Asian Coast and were believed to winter off of Southern China (Weller et al. 2002). However, recent tracking data indicates that the Western Gray Whale population may in fact be Eastern Gray Whales foraging outside areas normally attributed to the

population and that the two stocks may be more closely linked than previously thought (Mate et al. 2015). Gray Whales engage in extraordinarily long annual migrations, traveling up to 10,000 miles round-trip. The species currently holds the record for the longest recorded migration for a mammal (Mate et al. 2015).

Female Gray Whales bear one calf roughly every two years (NatureServe 2018, NOAA Fisheries 2018d). Known breeding grounds occur off the coast of Mexico and suspected breeding grounds include waters off China and Japan (Weller et al. 2008, Mate et al. 2015, NatureServe 2018, NOAA Fisheries 2018c, and NOAA Fisheries 2018d). Calving grounds in Mexico are characterized by sandy or muddy substrate, eelgrass beds, and mangrove swamps (Rice et al. 1981). The characteristics of possible Asian calving grounds are currently unknown (Mate et al. 2015). Gray Whales are unique in their feeding strategies compared to other whales. They feed on benthic and epibenthic invertebrates by sucking sediment from the sea floor and filtering prey from the mud with their baleen plates.

Current threats to the species include vessel strikes, shipping congestion in migration corridors, coastal development, offshore oil and gas exploration, entanglements in fishing gear, and human disturbance from tourism (NOAA Fisheries 2018c and NOAA Fisheries 2018d). Anthropogenic noise may also serve as a threat to the species. In fact, Gray Whales are known to modify the structure (modified frequency) and timing of underwater calls in relation to increased anthropogenic background noise (Dahlheim and Castellote 2016).

Eastern North Pacific Gray Whales seasonally migrate past the POLB. Southward migrations occur in January and February, with movements back to the north in March and April (Hildebrand et al. 2012). Jefferson et al. (2013) reported only six Gray Whales during extensive warm season (May through October) aerial transect monitoring of the Southern California Bight in 2008-2013. Two strandings have been reported in the POLB vicinity: one in 2000 and one in 2017 (MEC Analytical Systems 2002, Serna 2017).

The Western North Pacific stock of the species has a very low potential to actually occur in the Action Area. Recent tracking data on Gray Whales tagged off of Sakahalin Island, Russia (Western North Pacific population) revealed cross-basin movements. Tagged individuals crossed the Pacific Ocean from Russia to British Columbia, and then migrated south along the Pacific coast to Baja California (Mate et al. 2015). Since it is impossible to tell individuals from the Eastern and Western North Pacific populations apart without genetic testing, we must assume that some of the federally endangered Western population could occasionally be present in California waters (NOAA Fisheries 2018c). Given the small population size of the Western North Pacific stock and the distances involved, if present near the Action Area they may comprise a very small percentage of observations. Presence during construction season is expected to be extremely unlikely but not impossible. There are at least 19 documented occurrences of this species in the Port Complex. Almost all records are from the late winter (February) and early spring (March through April). However, there is one documented occurrence of this species near the Southeast Basin in the Port Complex from December of 2017. Most records of this species are from just outside the Port Complex in San Pedro Bay, with three records from August through November and over 40 records in December (HappyWhale 2019, OBIS SEAMAP 2019). The species is considered to be a “low-frequency cetacean” by NMFS (2018a). NMFS specifies generalized hearing ranges for low-frequency cetaceans (baleen whales) as 7 Hz to 35 kHz (NMFS 2018a). Based on this information,

it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

### 4.1.3 California Sea Lion (*Zalophus californianus*), U.S. Stock

California Sea Lions are not federally listed under the ESA, but the species receives protection under the MMPA. The species is found in the eastern North Pacific Ocean. California Sea Lions generally range from the U.S./Mexico border to Canada, although males may be found foraging during the winter as far north as southern Alaska (NatureServe 2018, NOAA Fisheries 2018d).

California Sea Lions are polygynous, with males defending breeding territories of up to 14 females. Although sea lions reach sexual maturity at four to five years old, males do not defend territories until 9 years of age, when they reach “social” maturity (NOAA Fisheries 2018d). The breeding season occurs in summer and early fall and pups are born in spring and summer the following year (NatureServe 2018, NOAA Fisheries 2018d). The largest breeding colonies are found on offshore islands from the Channel Islands in California south to Baja. California Sea Lions breed on sandy beaches or in rocky coves. They also commonly haul-out on jetties, ocean buoys, and on marina docks (NOAA Fisheries 2018d). California Sea Lions feed at night on a variety of prey including squid and fish (Hawes 1983, NatureServe 2018). Threats to the species include mortality associated with the commercial fishing industry, mortality associated with algal blooms, human harassment (via feeding and wildlife tours), food shortages during El Nino, and underwater noise (Ono et al. 1987, Scholin et al. 2000, NatureServe 2018, NOAA Fisheries 2018c, NOAA Fisheries 2018d).

California Sea Lions are known to occur in the Action Area year-round. There are recent sightings of this species from the inner as well as the outer harbor (MBC Applied Environmental Sciences 2016, iNaturalist 2018, Laura McCue NOAA, pers. comm). The closest marine mammal “regular-use” haul-out site to the Project Area is approximately 3 km away along the breakwater directly south of the Project. However, pinnipeds may use buoys or rip rap in the harbor that are less than 1 km from Project activities (see Appendix A, Figure 4; size of dots represents number of occurrences for each location and we consider occurrence data to be an indicator of use in the absence of higher quality haul-out data for the POLB). This species has a high potential of occurring in the Action Area during construction activities. The species is considered to be an “otariid pinniped” by NMFS (2018a). NMFS specifies generalized hearing ranges for otariid pinnipeds (sea lions) as 60 Hz to 39 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

### 4.1.4 Pacific Harbor Seal (*Phoca vitulina richardii*), California Stock

Pacific Harbor Seals are not federally listed under the ESA, but the species receives protection under the MMPA. The species is found in temperate waters off the coast of North America, from the California/Mexico border to Alaska (NOAA Fisheries 2018c). Pacific Harbor Seals are non-migratory and show strong fidelity to haul-out sites. However, the species will travel to find breeding and foraging sites (Herder 1986, NOAA Fisheries 2018c, NOAA Fisheries 2018d).

Harbor Seals do not reach sexual maturity until three to seven years old. Breeding occurs in the water and pups are born at haul-out sites (NOAA Fisheries 2018d). Haul-out sites are located on

the mainland as well as on offshore islands and may include beaches, rocky shores, and intertidal sandbars (NatureServe 2018). The peak haul-out period occurs from May to July in California (NOAA Fisheries 2018c). Pupping season primarily occurs during the spring and summer. Female Harbor Seals raise their pups in large nurseries (NOAA Fisheries 2018d). Harbor Seals feed on a variety of prey items including shellfish, crustaceans, and fish (NOAA Fisheries 2018d). Foraging sites may be located in the open ocean as well as in bays (Ougzin 2013). Along the west coast of the U.S., the Pacific Harbor Seal population is stable or increasing (NOAA Fisheries 2018d). Threats to the species include mortality associated with the commercial fishing industry, human harassment, habitat degradation, and pollution (NatureServe 2018, NOAA Fisheries 2018d).

This species is known to occur in the Action Area year-round and is said to occasionally follow cruise ships to forage on organisms churned up from the harbor bottom and on food thrown off the deck by passengers (MBC Applied Environmental Sciences 2016, iNaturalist 2018, M. Peters, Carnival Cruise Lines, pers. comm.). However, no Harbor Seals were observed in the immediate Project Area during the 2013-2014 biological study or during GHD's two-day site visit (MBC Applied Environmental Sciences 2016). The closest marine mammal "regular-use" (i.e. known basking site) haul-out site to the Project Area is approximately 3 km away along the breakwater directly south of the Project. However, pinnipeds may use buoys or rip rap in the harbor that are less than 1 km from Project activities (see Appendix A, Figure 4; size of dots represents number of occurrences for each location and we consider occurrence data to be an indicator of use in the absence of higher quality haul-out data for the POLB). Presence within the larger Action Area is probable although not continuous and generally not in large numbers, based on available information. The species is considered to be a "phocid pinniped" by NMFS (2018a). NMFS specifies generalized hearing ranges for phocid pinnipeds (true seals) as 50 Hz to 86 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

#### 4.1.5 Short-beaked Common Dolphin (*Delphinus Delphis*), California/Oregon/Washington Stock

Short-beaked Common Dolphins are not federally listed under the ESA, but the species receives protection under the MMPA. Short-beaked Common Dolphins occur worldwide in temperate and subtropical waters, usually no more than 300 nautical miles from shore (NOAA Fisheries 2018c, NatureServe 2018). On the west coast of the U.S., the species distribution follows the California Current, and Short-beaked Common Dolphins are found off the coast of California year-round (NMFS 2018d). The species is considered to be the most abundant cetacean in California waters (NOAA Fisheries 2018c). Short-beaked Common Dolphins are associated with prey-rich ocean upwellings and underwater landscape features such as seamounts, continental shelves, and oceanic ridges (NMFS 2018d).

Short-beaked Common Dolphins are distinguished from other cetaceans by a unique "hour glass" color pattern on their bodies. Short-beaked Common Dolphins grow up to six ft in length and typically weight around 170 lbs (NMFS 2018f). Short-beaked Common Dolphins are highly social and may be found in "megapods" of hundreds of individuals (NMFS 2018f). The species may exhibit seasonal migratory movements, as the population size off the California coast increases in association with warmer water temperatures (Forney and Barlow 1998, Barlow 2016, NOAA

Fisheries 2018d). Short-beaked Common Dolphins feed on schooling fish and squid (NMFS 2018f). Like many cetaceans, Common Dolphins have slow reproductive rates and adults do not reach sexual maturity until the age of five to 12 years old. Calving season occurs from the winter through spring in California. Adult females give birth to one calf and only reproduce every two to three years (NatureServe 2018, NMFS 2018f). Threats to the Short-beaked Common Dolphin includes exploitation/mortality associated with the yellow-fin tuna industry, mortality from drift gill nets, and underwater noise (NatureServe 2018, NMFS 2018f, NOAA Fisheries 2018c).

Both species of Common Dolphins have been reported in the Project vicinity. In general, the Short-beaked Common Dolphin is reported as more abundant than the Long-beaked Common Dolphin, with the former making up an estimated 72 percent of individuals observed in the Southern California Bight during a 2008-2013 monitoring effort (Jefferson et al. 2013). Positive identification is not always possible in the field however. MBC Applied Environmental Sciences (2016) reported Common Dolphins on only one of 12 monthly survey events during 2013-2014 studies; a pod of 40 animals was observed in February 2014 in Study Zone 20, on the Port of Los Angeles side. MBC Applied Environmental Sciences did not attempt further identification. Forney and Barlow (1998) noted an inshore/southerly shift of this species in the winter months. Bearzi (2005) noted that in Santa Monica Bay, the two forms were both present, tended to occur > 500 meters (m) offshore, and were often associated with submarine canyons and upwelling. However, Bearzi found that they were never seen in mixed schools. OBIS SEAMAP Data has records of the species within 6.7 km southwest of the POLB breakwater and 17.6 km from the Project Area (OBIS SEAMAP 2019). Based on the available information, one or both forms of Common Dolphins may be present within the Action Area but presence is likely occasional and of short duration. The only known documented occurrences in the Port Complex are from the winter months. The species is considered to be a “mid-frequency cetacean” by NMFS (2018a). NMFS specifies generalized hearing ranges for mid-frequency cetaceans (dolphins) as 150 Hz to 160 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

#### 4.1.6 Long-beaked Common Dolphin (*Delphinus capensis*), California Stock

Long-beaked Common Dolphins are not federally listed under the ESA, but the species receives protection under the MMPA. Recent literature follows Heyning and Perrin (1994) in recognizing two species of Common Dolphin. Cunha et al. (2015) have raised doubts on that taxonomy, and the most recent updated list by Society for Marine Mammalogy (2018) no longer recognizes *Delphinus capensis* as valid, while stating that Eastern Pacific populations will require further study. Such taxonomy questions are beyond the scope of the present document except to note that the literature may refer to one species or two depending on date of publication. Stock information is from NOAA Fisheries (2018b) and is presented as two species, presumably pending better information. Short-beaked and Long-beaked Common Dolphins share many similar characteristics, but the species differ in appearance, size, and habitat preferences (NMFS 2018d).

Long-beaked Common Dolphins are found throughout the Atlantic, Indian, and Pacific Ocean. They prefer shallow, coastal tropical and subtropical waters with warm water temperature, typically within 50 nautical miles of the coast (NOAA Fisheries 2018c). In the U.S. their distribution ranges from Baja California, Mexico to Central California. Long-beaked Common Dolphins are distinguished

from other cetaceans by a unique “hour glass” color pattern on their bodies. Long-beaked Common Dolphins reach lengths of up to 8.5 ft and weights of 160- 500 lbs (NMFS 2018d).

Long-beaked Common Dolphins are highly social and may be found in “megapods” of hundreds of individuals (NMFS 2018d). The species may exhibit seasonal migratory movements, as the population size off the California coast increases in association with warmer water temperatures (Forney and Barlow 1998, Barlow 2016, NOAA Fisheries 2018d). Long-beaked Common Dolphins feed on schooling fish and squid (NMFS 2018d). Like many cetaceans, Common Dolphins have slow reproductive rates and adults do not reach sexual maturity until the age of 5 to 12 years old.

Calving season occurs from the winter through spring in California. Adult females give birth to one calf and only reproduce every two to three years (NatureServe 2018, NMFS 2018d). Threats to the Short-beaked and Long-beaked Common Dolphins include exploitation/mortality associated with the yellow-fin tuna industry, mortality from drift gill nets, and underwater noise (NatureServe 2018, NMFS 2018d, NOAA Fisheries 2018c).

Both species of Common Dolphins have been reported in the Project vicinity. In general, the Short-beaked Common Dolphin is reported as more abundant than the Long-beaked Common Dolphin, with the former making up an estimated 72 percent of individuals observed in the Southern California Bight during a 2008-2013 monitoring effort (Jefferson et al. 2013). Positive identification is not always possible in the field. MBC Applied Environmental Sciences (2016) reported Common Dolphins on only one of 12 monthly survey events during 2013-2014 studies; a pod of 40 animals was observed in February 2014 in Study Zone 20, on the Port of Los Angeles side. MBC Applied Environmental Sciences did not attempt further identification. Bearzi (2005) noted that in Santa Monica Bay, the two forms were both present, tended to occur > 500 m offshore, and were often associated with submarine canyons and upwelling. However, Bearzi found that they were never seen in mixed schools. OBIS SEAMAP has records of this species within 22 km northwest of the Port of Los Angeles breakwater and 30 km from the Carnival dock (OBIS SEAMAP 2019). Based on the available information, one or both forms of Common Dolphins may be present within the Action Area but presence is likely occasional and of short duration. The only known documented occurrences in the Port Complex are from the winter months. The species is considered to be a “mid-frequency cetacean” by NMFS (2018a). NMFS specifies generalized hearing ranges for mid-frequency cetaceans (dolphins) as 150 Hz to 160 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

### 4.1.7 Common Bottlenose Dolphin (*Tursiops truncatus*), California Coastal Stock

Common Bottlenose Dolphins are not federally listed under the ESA, but the species receives protection under the MMPA. The species is found worldwide in tropical, subtropical, and temperate waters (NatureServe 2018). On the west coast of North America, Common Bottlenose Dolphins occur from Baja California to San Francisco Bay (NOAA Fisheries 2018d). In California, both coastal and pelagic populations of bottlenose dolphins exist (Walker 1981). These populations are known to be both genetically and morphologically distinct. Coastal Bottlenose Dolphins are commonly found in lagoons, bays, sounds, and river mouths and exhibit north south movements along the coast, likely influenced by prey resources (Defran et al. 1999, NatureServe 2018).

Bottlenose Dolphins may travel in groups or alone. They exhibit complex social interactions including “playing” and cooperatively pursuing and trapping prey. They will take a variety of prey items including schooling fish, crustaceans, and squid. Like most cetaceans, adults do not reach sexual maturity until the age of five to 15 years old. Calving season varies among individual populations (Urian et al. 1996). In California, calving season generally peaks in spring and fall (MMC 2018). Females give birth to one calf and the calf stays with its mother for three to six years (NOAA Fisheries 2018d). Population trends for Coastal Common Bottlenose Dolphins in California waters are currently unknown. However, worldwide threats to the species include pollution, human harassment (via feeding and wildlife tours), underwater noise pollution, mortality associated with commercial and recreation fishing, mortality associated with algal blooms, and hunting in Japanese waters (NatureServe 2018, NOAA Fisheries 2018d).

At the POLB, *Tursiops sp*. have been observed in the outer as well as the inner harbor. Although not abundant, they were observed during five of 12 monthly sampling events during the most recent (2013-2014) biological survey (MBC Applied Environmental Sciences 2016, Table 6.2). There have been recent sightings of this species near the Queen Mary Dock and elsewhere in the Action Area (MBC Applied Environmental Sciences 2016, iNaturalist 2018, Laura McCue NOAA, pers. comm.). OBIS SEAMAP has records of the species from within 6.4 km south of the POLB breakwater and 8.1 km from the Carnival dock (OBIS SEAMAP 2019).This species has a moderate potential of occurring in the Action Area during construction activities. The species is considered to be a “mid-frequency cetacean” by NMFS (2018a). NMFS specifies generalized hearing ranges for mid-frequency cetaceans (dolphins) as 150 Hz to 160 kHz (NMFS 2018a). Based on this information, it is expected that Project construction noise may affect this species. Noise impacts are discussed further in Section 6.

# 5. Type of Incidental Taking Authorization Requested

In accordance with the MMPA Section 101(a)(5)(D), authorization is requested from the NMFS for incidental take (IHA by Level B harassment and Level A PTS) (50 CFR., Part 216.A §216.3) of NMFS-defined marine mammal stocks, including California Sea Lion (U.S. Stock), Pacific Harbor Seal (California Stock), Short-beaked and Long-Beaked Common Dolphin (California/Oregon/Washington), and Common Bottlenose Dolphin (California Coastal Stock) as a result of pile driving activities associated with expanding the Carnival Cruise Lines dock and facilities. It is anticipated that California Sea Lions will be the most commonly observed species in the Action Area. Pacific Harbor Seals and Common Bottlenose Dolphins may also enter the Action Area during foraging activities. Gray Whales and Humpback Whales are less likely to enter the Action Area, but incidental sightings of this species in the POLB have been documented. Take of whales will be avoided (as discussed further in Sections 11 and 13). Any marine mammals in the Action Area may be exposed multiple times to Project noise impacts during construction activities. Per NMFS recommendations, we assume that take from construction noise can occur only once per 24 hour period for any individual animal (i.e. an animal can only be “taken” once per day in terms of Level A or Level B harassment).

The client requests the IHA for one year with an effective date of November 15, 2019. Once the IHA is received, the client would proceed with pile driving and dredging per terms agreed upon in the IHA mitigation and monitoring measures.

Take is requested for the following activities:

- Impact Pile Driving Noise (as described in Section 1.5.1)
- Vibratory Hammer Pile Driving Noise (as Described in Section 1.5.2)

Methods for estimating marine mammal noise impact isopleths (sound pressure contours) for each activity are described in further detail in the following section (Section 6.1) and modeling results are described in Section 6.2. Protected species take estimates (provided in Section 6.2.3) are based on sound source types and levels, transmission loss modeling, regional species populations, and proposed mitigation monitoring methods. Take is requested for all marine mammal species with potential to occur in the Action Area.

# 6. Take Estimates for Marine Mammals

## 6.1 Methods

Construction techniques were evaluated for their potential to generate noise levels above Level A and Level B harassment thresholds. The methodology used to calculate these thresholds is discussed below.

### 6.1.1 Estimating Underwater Noise Impacts to Marine Mammals

Marine mammals are known to occur year-round in the Project vicinity and an increase in underwater noise (associated with pile driving and dredging) could potentially impact marine mammals through permanent injury to hearing, temporary injury to hearing, and masking (through auditory interference) of important communication calls (NOAA 2016). Since marine mammals (depending on species) may heavily rely on their hearing for intraspecific communication, the identification of food resources, navigation, etc., permanent and temporary impacts to their hearing could significantly impact individual animals (NMFS 2018a).

Underwater noise impacts to marine mammals were modeled based on the NMFS 2018 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS 2018a). NMFS, National Ocean Service (NOS), and the Office of National Marine Sanctuaries first developed this guidance in 2016 to facilitate the assessment of underwater anthropogenic noise on the hearing of marine mammals. The guidance describes the thresholds at which marine mammals may experience permanent or temporary injurious impacts to their hearing. Threshold shifts are defined by NMFS as “the received levels… at which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to underwater anthropogenic sound sources” (NMFS 2018a). Permanent (PTS) and Temporary (TTS) Thresholds were determined for all NMFS-defined marine mammal hearing groups: low- (LF), mid- (MF), and high- (HF) frequency cetaceans as well as otariid (OW) and phocid (PW) pinnipeds (Table 6.1) (NMFS 2018a). The MMPA (1972), as amended, specifies injury

to marine mammals as “Level A Harassment” (16 USC 1361 et seq). Specifically, the MMPA defines Level A Harassment as “any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild” and Level B Harassment as “acts that have the potential to disturb (but not injure) a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering” (50 CFR 216.3). NMFS defines PTS as Level A Harassment and behavioral disturbance as Level B Harassment.

We used the NMFS Optional User Spreadsheet Tool (Version 2.0) to estimate underwater marine mammal thresholds for the onset of injurious permanent threshold shifts (PTS) as a result of impulsive and non-impulsive noise (NMFS 2018d). To estimate the effects of impulsive noise (e.g., impact pile driving), we used the NMFS Optional User Spreadsheet Tool tab E.1 (Impact Pile Driving). To estimate the effects on non-impulsive noise (e.g. vibratory pile driving and dredging), we used tab A.1 for vibratory pile driving and tab A for stationary source, non-impulsive, continuous noise (dredging) (NMFS 2018d).

We also investigated marine mammal behavioral disturbance as a result of impulsive and non-impulsive noise. The NMFS 2018 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing does not include published guidance on Level B Harassment thresholds (NMFS 2018a). However, NOAA Fisheries has published general underwater behavioral disturbance guidelines for all marine mammals as 160 $dB_{rms}$ for impulsive noise and 120 $dB_{rms}$ for continuous noise (NOAA Fisheries 2018b).

We used the Practical Spreading Loss Model (PSLM), recommended by NMFS (2012) for spherical-spreading noise, to calculate the behavioral impacts (Level B isopleths) of nearshore underwater noise on wildlife. The PSLM is presented in NMFS (2012) as:

$$\text{Transmission Loss (TL)} = 15 \log (R_2/R_1)$$

Where $R_1$ is the distance of a known or measured sound level and $R_2$ is the estimated distance required for the sound to attenuate to a predetermined acoustic threshold. The number 15 serves as the transmission loss constant in water while this is substituted for a value of 20 on land (NMFS 2012, WSDOT 2012).

The equation may be rearranged to solve for $R_2$ (the isopleth or area of potential noise effects for the purposes of our analysis) as:

$$R_2 = R_1 * 10\text{^} ((\text{dB at}_{R1} - dB_{\text{acoustic threshold}})/15)$$

We estimated the impacts of impulsive as well as non-impulsive underwater sound sources on marine mammals in the Action Area. Finneran (2016) defines impulsive noise as “noise with high peak sound pressure, short duration, fast rise-time, and broad frequency content” and non-impulsive noise as “steady-state noise.” For the purposes of this analysis and in accordance with NMFS guidance (2018a), we consider impact pile driving to be impulsive noise and vibratory pile driving and dredging to be non-impulsive noise.

### *Applicable Noise Thresholds*

Data discussing PTS (which permanently impacts hearing), TTS (which temporarily impacts hearing), and behavioral disturbance thresholds for underwater noise impacts on marine mammals were obtained from NMFS (2018a) and NOAA Fisheries (2018a) guidance. Reference values are reprinted below.

Table 6.1 Marine Mammal PTS, TTS, and Behavioral Disruption Thresholds for Underwater Noise *

| Hearing Group[a] | Generalized Hearing Range[a] | PTS Onset Threshold[a] | | TTS Onset Threshold[a] | Behavioral Disturbance Threshold[b] | |
|---|---|---|---|---|---|---|
| | | Impulsive | Non-impulsive | | Impulsive | Non-impulsive |
| **Low-frequency (LF) cetaceans** (baleen whales) | 7 Hz to 35 kHz | $SEL_{cum}$: 183<br>PK: 219 | $SEL_{cum}$ :199 dB | $SEL_{cum}$: 179 dB | 160 $dB_{rms}$ | 120* $dB_{rms}$ |
| **Mid-frequency (MF) cetaceans** (dolphins, toothed whales, beaked whales, | 150 Hz to 160 kHz | $SEL_{cum}$: 185<br>PK: 230 | $SEL_{cum}$ :198 dB | $SEL_{cum}$: 178 dB | | |
| **High-frequency (HF) cetaceans** (true porpoises, *Kogia*, river dolphins, *cephalorhynchid*, *Lagenorhynchus cruciger* & *L. australis*) | 275 Hz to 160 kHz | $SEL_{cum}$: 155<br>PK: 202 | $SEL_{cum}$ :173 dB | $SEL_{cum}$: 153 dB | | |
| **Phocid pinnipeds (PW) (underwater)** (true seals) | 50 Hz to 86 kHz | $SEL_{cum}$: 185<br>PK: 218 | $SEL_{cum}$ :201 dB | $SEL_{cum}$: 181 dB | | |
| **Otariid pinnipeds (OW) (underwater)** (sea lions and fur seals) | 60 Hz to 39 kHz | $SEL_{cum}$: 203<br>PK: 232 | $SEL_{cum}$ :219 dB | $SEL_{cum}$: 199 dB | | |

[a]NMFS 2018a; generalized hearing range representative of the group based on an incomplete sampling of species
[b]NOAA Fisheries 2018b
Notes:
*The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level

### *Impulsive Noise - Impact Pile Driving Marine Mammal Isopleth Modeling*

Table 6.2 Impact Pile Driving Metrics Used for the Port of Long Beach Underwater Noise Impact Calculations*

| Pile Driving Method | Estimated Number of Strikes Per Pile | Number of Piles Per Day | Source RMS SPL (with bubble curtains) | $SPL_{peak}$** | $SEL_{cum}$ (with bubble curtains)** | Pile Diameter (in) | Pile Type | Substrate | Vibed First | Hammer Strength (ft-lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| Impact Pile Driving | 675[c] | 4[c] | 189[a] (~182)[c] | 207[a] | 175[a] (~168)[b] | 36[c] | Steel[c] | Silt and sand[c] | Yes[c] | 165,000[c] |

*Based on Data Collected On Similar Projects Referenced in Section 4
**Measured at 10 m
[a]WSDOT 2019, Table 7-14
[b]Austin et al. 2016
[c]WSDOT 2018

*Model Input and Assumptions - Impact Pile Driving - Level A Harassment (PTS Threshold Shift)*

To calculate the impacts of underwater impact pile driving noise on marine mammals (Level A Harassment), we input the following values into the NMFS Optional User Spreadsheet Tool tab E.1 (Version 2.0) (2018d) (full spreadsheet provided in Appendix D):

- $SEL_{cum}$ 175 dB at 10 m for underwater impact pile driving based on Anacortes Ferry Terminal Project, which involved driving 36” in piles into similar substrate with a diesel hammer of similar power (ft-lbs) (WSDOT 2018)
- Calculations used $SEL_{cum}$ of 168 dB, based on a 7 dB reduction in underwater noise with the application of bubble curtains (e.g. pneumatic barrier typically comprised of hosing or PVC piping that disrupts underwater noise propagation) (Austin et al. 2016)
- 5 Steel pipe piles installed per day (maximum number of piles per day confirmed by Atkins; personal communication 2019)
- 675 Strikes Per Pile (high-end estimate) based on Anacortes Ferry Terminal Project, which involved driving 36” in piles into similar substrate with a diesel hammer of similar power (ft-lbs) (WSDOT 2018)
- Transmission loss constant of 15 for underwater noise (NMFS 2012)
- Weighting Factor Adjustment of 2 kHz (specific weighting factor for impact pile driving)

*Model Input and Assumptions - Impact Pile Driving – Level B Harassment (Behavioral Disruption)*

To calculate the impacts of underwater impact pile driving noise on marine mammals (Level B Harassment), we input the following values into the PSLM:

- Source level RMS SPL for underwater impact pile driving estimated as 189 $dB_{rms}$ at 10 m (WSDOT 2019).

- Calculations used 182 $dB_{rms}$, based on a 7 dB reduction in underwater noise with the application of bubble curtains (Austin et al. 2016)
- Marine mammal behavioral disruption threshold of 160 $dB_{rms}$ for impulsive noise (NOAA Fisheries 2018b)
- Transmission loss constant of 15 for underwater noise (NMFS 2012)

The resultant model is:

Level B Harassment Threshold = 10 * 10^ ((182 $dB_{rms}$ – 160 $dB_{rms}$)/15)

***Non - impulsive Noise – Vibratory Pile Driving***

Table 6.3 Vibratory Pile Driving Metrics Used for the Port of Long Beach Underwater Noise Impact Calculations*

| Pile Driving Method | Estimated Driving Duration | Estimated Number of Piles Per Day | Estimated Source RMS SPL (with bubble curtains) | Distance Sound Measured (meters) | Pile Diameter (inches) | Pile Type | Substrate | Hammer Strength |
|---|---|---|---|---|---|---|---|---|
| Vibratory Pile Driving | 31.5 minutes[a] | 5[b] | 170 (163)[a] | 11 | 36[b] | Steel pipe[b] | Sand and silt | APE King Kong (360 tons) |

*Based on Data Collected On Similar Projects Referenced in Section 4
[a]WSDOT 2019, Table 7-15
[b]Atkins, personal communication (2018)

*Model Input and Assumptions - Vibratory Pile Driving - Level A Harassment (PTS Threshold Shift)*

To calculate the impacts of underwater vibratory pile driving noise on marine mammals (Level A Harassment), we input the following values into the NMFS Optional User Spreadsheet Tool tab A.1 (Version 2.0) (2018d) (full spreadsheet provided in Appendix D):

- RMS SPL for underwater vibratory pile driving estimated as 170 $dB_{rms}$ at 11 m based on Anacortes Ferry Terminal Project, which involved driving 36” in piles into similar substrate with a slightly stronger hammer than the one proposed for Carnival (Laughlin 2012, WSDOT 2019)
- Calculations used RMS SPL of 163 dB, based on a 7 dB reduction in underwater noise with the application of bubble curtains (Austin et al. 2016)
- 5 Steel pipe piles installed per day (estimate agreed to be reasonable by Atkins; personal communication 2018)
- Duration of 31.5 minutes to drive a 36 in steel pile in sand/silt substrate with a slightly stronger hammer than the one proposed for Carnival (WSDOT 2019)
- Transmission loss constant of 15 for underwater noise (NMFS 2012)

- Weighting Factor Adjustment of 2.5 kHz (specific weighting factor for vibratory pile driving) (NMFS 2018d)

*Model Input and Assumptions - Vibratory Pile Driving – Level B Harassment (Behavioral Disruption)*

To calculate the impacts of underwater vibratory pile driving noise on marine mammals (Level B Harassment), we input the following values into the PSLM:

- RMS SPL for underwater vibratory pile driving estimated as 170 $dB_{rms}$ at 11 m based on Anacortes Ferry Terminal Project, which involved driving 36" in piles into similar substrate with a slightly stronger hammer than the one proposed for Carnival (Laughlin 2012, WSDOT 2019)
- Calculations used RMS SPL of 163 dB, based on a 7 dB reduction in underwater noise with the application of bubble curtains (Austin et al. 2016)
- Behavioral disruption for non-impulsive noise for marine mammals at 120 $dB_{rms}$ (NOAA Fisheries 2018b)
- Transmission loss constant of 15 for underwater noise (NMFS 2012)

The resultant model is:

$$\text{Level B Harassment Threshold} = 11 * 10^{\wedge} ((163\ dB_{rms} - 120\ dB_{rms})/15)$$

### *Non - impulsive Noise - Dredging Marine Mammal Isopleth Modeling*

Sounds produced by tugboats associated with dredging would primarily occur on the same days as pile driving. Since take is already requested in association with pile driving on these days (pile driving will produce higher sound levels), and marine mammals may only be taken once per 24-hour period, no additional take is requested for dredging. However, an analysis of dredging noise is provided below to provide supporting evidence that dredging noise (primarily from tugboats) will be minimal and on par with current existing heavy boat/tugboat traffic in the POLB.

Table 6.4 Clam Shell Dredging and Tugboat Metrics Used for the Port of Long Beach Underwater Noise Impact Calculations*

| Activity | Received Sound | Distance at Which Sound Measured (m) |
|---|---|---|
| Tugboat Engine Noise[a] | Source Level: 170 ± 5 $dB_{rms}$ | 1 |

*Based on Data Collected On Similar Projects Referenced in Section 4
[a]Veirs et al. 2016

*Model Input and Assumptions – Dredging - Level A Harassment (PTS Threshold Shift)*

Computed distances to acoustic disturbance thresholds from non-impulsive sources are based on the distances at which the Project sound source declines to ambient. To calculate the impacts of underwater dredging noise on marine mammals (Level A Harassment), we input the following values into the NMFS Optional User Spreadsheet Tool (Version 2.0) tab A for stationary source, non-impulsive, continuous noise (2018d) (full spreadsheet provided in Appendix D):

- Loudest aspect of underwater dredging is anticipated to be associated with the tugboat engine, estimated as 170 $dB_{rms}$ (at 1 meter) (Veirs et al. 2016).
- Weighting Factor Adjustment of 2.5 kHz (specific weighting factor for vibratory hammer; most similar metric provided in NMFS 2018d to continuous engine noise)
- Duration of sound production (hours) within 24 – hour period estimated as 10 hours (based on anticipated 10 hour work day)
- Transmission loss constant of 15 for underwater noise (NMFS 2012).

*Model Input and Assumptions - Dredging – Level B Harassment (Behavioral Disruption)*

To calculate the impacts of underwater dredging noise on marine mammals (Level B harassment), we input the following values into the PSLM:

- Loudest aspect of underwater dredging is anticipated to be associated with the tugboat engine, estimated as 170 $dB_{rms}$ (at 1 meter) (Veirs et al. 2016).
- Behavioral disruption for non-impulsive noise for marine mammals at 120 $dB_{rms}$ (NOAA Fisheries 2018b).
- Transmission loss constant of 15 for underwater noise (NMFS 2012).

The resultant model is:

$$\text{Level B Harassment Threshold} = 1 * 10^{\wedge} ((170\ dB_{rms} - 120\ dB_{rms})/15)$$

### 6.1.2 In-air Noise Impacts to Marine Mammals

Marine mammals are known to occur year-round in the Project vicinity and an increase in airborne noise (associated with pile driving and dredging) could impact marine mammals at haul-out sites. To investigate in-air noise impacts to marine mammals in the Action Area, we used the PSLM recommended by NMFS (2012) for spherical-spreading noise. The PSLM is presented in NMFS (2012) as:

$$\text{Transmission Loss (TL)} = 15 \log (R_2/R_1)$$

Where $R_1$ is the distance of a known or measured sound level and $R_2$ is the estimated distance required for the sound to attenuate to a predetermined acoustic threshold. The number 15 serves as the transmission loss constant in water while this is substituted for a value of 20 on land (NMFS 2012, WSDOT 2012).

The equation may be rearranged to solve for $R_2$ (the isopleth or area of potential noise effects for the purposes of our analysis) as:

$$R_2 = R_1 * 10^{\wedge} ((dB\ at_{R1} - dB_{acoustic\ threshold})/20)$$

Table 6.6 summarizes the values we used to calculated airborne noise impacts to wildlife (values reprinted from examples given in Section 1.4). These values represent the “worst case scenario” in terms of airborne noise impacts on wildlife and provide conservative estimates to inform Project minimization and mitigation methods.

### *Applicable Noise Thresholds*

NOAA Fisheries (2018a) has provided the following guidance on in-air noise behavioral disruption thresholds for Harbor Seals and non-Harbor Seal pinnipeds. These thresholds are reprinted below for reference. Behavioral disruption guidance has not been published by NOAA at this time for other marine mammal groups, such as cetaceans. Cetaceans are not expected to experience any airborne noise impacts from construction activities in the Action Area.

Table 6.5 Marine Mammal Behavioral Disruption Thresholds for In-Air Noise (Level B Harassment) (NOAA Fisheries 2018b)

| Marine Mammal Group[a] | Behavioral Disruption Threshold[a] |
|---|---|
| Harbor Seals | 90 $dB_{rms}$ |
| Non-harbor seal pinnipeds | 100 $dB_{rms}$ |

[a]NOAA Fisheries 2018b

### *Impulsive and Non-impulsive Airborne Noise - Impact Pile Driving, Vibratory Pile Driving, and Dredging Marine Mammal Isopleth Modeling*

Table 6.6 Metrics Used for the Port of Long Beach Airborne Noise Calculations

| Construction Equipment | Noise Level | Distance at Which Sound Received (m) | Steel Pile Size (in) | Substrate | Hammer Strength |
|---|---|---|---|---|---|
| Impact Pile Driving[a] | 113 $dB_{rms}$ | 15 | 36 | Sand and silt | Delmag D-62 (164,000) |
| Vibratory Pile Driving[b,c] | 99 $dB_{rms}$ | 15 | 30 | Unknown | APE (unknown) |
| Clam shell dredge[d] | 87 dBA | 15 | n/a | Unknown | n/a |

[a]WSDOT 2019, Table 7-5
[b]WSDOT 2019, Table 7-6
[c]Reinhall et al. 2016
[d]WSDOT 2018, Table 2

#### *Model Input and Assumptions - Impact Pile Driving*

To calculate the impacts of airborne pile driving noise on marine mammals, we input the following values into the PSLM:

- Estimated airborne noise from impact pile driving is 113 $dB_{rms}$ (measured at a distance of 15 m) based on Mukilteo Ferry Terminal Project, which involved driving 36” in piles into sand and silt with a similar impact hammer to the one proposed for Carnival (WSDOT 2019)
- Behavioral disturbance threshold for harbor seals of 90 $dB_{rms}$ and 100 $dB_{rms}$ for non-harbor seal pinnipeds (NOAA Fisheries 2018b)

- Transmission loss constant of 20 for airborne noise over hard ground (assumes a 6 dB reduction per doubling distance) (WSDOT 2012)

The resultant models are:

Harbor Seal Airborne Level B Threshold: $R_2 = 15 * 10^{((113\ dB_{rms} - 90\ dB_{rms})/20)}$

Non-Harbor Seals Pinniped Airborne Level B Threshold: $R_2 = 15 * 10^{((113\ dB_{rms} - 100\ dB_{rms})/20)}$

*Model Input and Assumptions – Vibratory Pile Driving*

To calculate the impacts of airborne vibratory pile driving noise on marine mammals, we input the following values into the PSLM:

- Estimated airborne noise from impact pile driving is 99 $dB_{rms}$ (measured at a distance of 15 m) based on the Keystone Ferry Terminal Project, which involved driving 30" in piles into hard substrate with an APE vibratory hammer (WSDOT 2018, WSDOT 2019)
- Behavioral disturbance threshold for harbor seals of 90 $dB_{rms}$ and 100 $dB_{rms}$ for non-harbor seal pinnipeds (NOAA Fisheries 2018b)
- Transmission loss constant of 20 for airborne noise over hard ground (assumes a 6.0 dB reduction per doubling distance) (WSDOT 2012)

The resultant models are:

Harbor Seal Airborne Level B Threshold: $R_2 = 15 * 10^{((99\ dBA - 90\ dB_{rms})/20)}$

Non-Harbor Seals Pinniped Airborne Level B Threshold: $R_2 = 15 * 10^{((99\ dB_{rms} - 100\ dB_{rms})/20)}$

*Model Input and Assumptions – Dredging*

To calculate the impacts of airborne dredging noise on marine mammals, we input the following values into the PSLM:

- Estimated airborne noise from a clam shell dredge is 87 dBA (measured at a distance of 15 m). Airborne noise impact numbers were not available for dredging in $dB_{rms}$. Peak dBA values serve as a conservative approach/worst case scenario to evaluate impacts (FHWA 2006)
- Behavioral disturbance threshold for harbor seals of 90 $dB_{rms}$ and 100 $dB_{rms}$ for non-harbor seal pinnipeds (NOAA Fisheries 2018b)
- Transmission loss constant of 20 for airborne noise over hard ground (assumes a 6.0 dB reduction per doubling distance) (WSDOT 2012)

The resultant models are:

Harbor Seal Airborne Level B Threshold: $R_2 = 15 * 10^{((87\ dB_{rms} - 90\ dB_{rms})/20)}$

Non-Harbor Seals Pinniped Airborne Level B Threshold: $R_2 = 15 * 10^{((87\ dB_{rms} - 100\ dB_{rms})/20)}$

### 6.1.3 Marine Mammal Density Estimates

Input data to calculate marine mammal densities was taken from two sources. Jefferson et al. (2013) provided detailed density estimates for marine mammals from a large, mostly offshore area of the Southern California Bight, including areas around the Channel Islands. Although this study did not include the POLB, it did include nearshore waters not far to the south. Density estimates were based largely on airborne transects and utilized distance sampling methods. This source provided data for a number of marine mammal species including some not likely to occur nearshore or in the Action Area; however it is the most detailed, most extensive, and most recent readily available dataset for the region.

We also utilized data collected within the Port Complex over a 12-month period in 2013-2014 (MBC Applied Environmental Sciences 2016). This dataset included a substantial portion (but not all) of the Action Area. Data gathering was conducted concurrently for birds and marine mammals and is based on monthly point counts (one day per month) within a number of distinct study units including one encompassing about half of the existing Carnival dock. This dataset is relatively recent and is site-specific, thus it covers the actual habitats and locations potentially impacted by the Proposed Project. However only raw numbers are reported and densities were not calculated, and the description of methods is ambiguous in some areas. Because the observations were reported by month, we were able to break out those observations which were made during the fall/winter construction season, possibly offering a more accurate estimate of the species and abundance actually present during the Proposed Project construction season. This is somewhat limited by the smaller sample size and shorter (one year) term of this study relative to the multi-year offshore dataset.

To estimate density from the MBC Applied Environmental Sciences (2016) data, we calculated the two-dimensional area of their combined study area (based on their sampling quadrants), using graphics in their report showing the limits of each study zone. The number of observations for each species and the study area acreage was then used to calculate density.

## 6.2 Results - Anticipated Noise Impacts of the Activity

### 6.2.1 Underwater Noise Impacts

#### 6.2.1.1 Impulsive Noise - Pile Driving

### Table 6.7 Marine Mammals Resultant Isopleths – Underwater Impulsive Noise From Impact Pile Driving Noise (Level A Harassment) (NMFS 2018d)

| Hearing Group[a] | $SEL_{cum}$ Threshold[a] (dB) | PTS Isopleth to threshold (m) | PTS Isopleth to threshold (ft) | PK Threshold[a] (dB) | PTS PK Isopleth to threshold (m) | PTS PK Isopleth to threshold (ft) |
|---|---|---|---|---|---|---|
| Low-Frequency Cetaceans | 183 | 224.7 | 737.2 | 219 | N/A | 7.2 |
| Mid-Frequency Cetaceans | 185 | 8.0 | 26.3 | 230 | N/A | N/A |
| High-Frequency Cetaceans | 155 | 267.6 | 878.0 | 202 | N/A | 96.1 |
| Phocid Pinnipeds | 185 | 120.2 | 394.4 | 218 | N/A | 8.2 |
| Otariid Pinnipeds | 203 | 8.8 | 28.9 | 232 | N/A | N/A |

[a]NMFS 2018a

### Table 6.8 Anticipated Marine Mammal Behavioral Disruption As A Result of Impulsive Noise From Impact Pile Driving Underwater Noise (Level B Harassment)

| Activity | Behavioral Disturbance Isopleth (disturbance to x m) | Behavioral Disturbance Isopleth (disturbance to x ft) |
|---|---|---|
| Impact Pile Driving | 292.7 | 960.3 |

Based on the NMFS (2018d) Optional Worksheet, impact pile driving (with the addition of bubble curtains) on this Project may result in underwater noise levels that could cause auditory injury (PTS threshold shift) to marine mammals. Calculations using the $SEL_{cum}$ metric versus the $SPL_{peak}$ metric produced the largest isopleths (most conservative model results) (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). The PTS isopleth to threshold values are considered below to discuss possible Project impacts. In addition, modeling results indicate that all marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) if they are near impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8).

#### *Humpback Whale (Megoptera novaeangliae), California/Oregon/Washington Stocks*

Low frequency cetaceans (e.g., Humpback Whales) could experience PTS within 224.7 m (737.2 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving

activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend significantly beyond the outer harbor. Humpback Whales seasonally migrate past the POLB and are infrequently observed just outside the outer harbor (MBC Applied Environmental Sciences 2016). The species has a low potential to actually occur in the Action Area, but there have been infrequent recent reports in the harbor (HappyWhale 2019, OBIS SEAMAP 2019). With mitigation measures, including PSOs with stop work authority (marine pile driving Project activities will stop if whales approach the Level B ZOIs) and bubble curtains, it is anticipated that there would not be any take of Humpback Whales.

#### *Gray Whale (Eschrichtius robustus), Eastern and Western North Pacific Stocks*

Low frequency cetaceans (e.g., Gray Whales) could experience PTS within 224.7 m (737.2 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend significantly beyond the outer harbor. Gray Whales seasonally migrate past the POLB and are infrequently observed just outside the outer harbor (MBC Applied Environmental Sciences 2016). The species has a low potential to actually occur in the Action Area, but there have been infrequent recent reports in the harbor (Laura McCue NOAA, pers. comm). With mitigation measures including PSOs with stop work authority and bubble curtains, it is anticipated that there would not be any take of Gray Whales.

#### *California Sea Lion (Zalophus californianus), U.S. Stock*

Otariid pinnipeds (e.g., sea lions or fur seals) could experience PTS within 8.8 m (28.9 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. There are recent sightings of this species from the inner as well as the outer harbor (MBC Applied Environmental Sciences 2016, iNaturalist 2018, Laura McCue NOAA, pers. comm). This species has a high potential of occurring in the Action Area during construction activities. With mitigation measures, it is anticipated that take of California Sea Lions may be limited to Level B (behavioral disturbance).

### *Pacific Harbor Seal (Phoca vitulina richardii), California Stock*

Phocid pinnipeds (e.g., harbor seals) could experience PTS within 120.2 m (394.4 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend significantly beyond the outer harbor. At the POLB, this species is known to occur in the Action Area year-round and is said to occasionally follow cruise ships to forage on organisms churned up from the harbor bottom and on food thrown off the deck by passengers. However, the species is less likely to occur in the Action Area than California Sea Lions (MBC Applied Environmental Sciences 2016, GHD 2019a, iNaturalist 2018). With mitigation measures, it is anticipated that take of Pacific Harbor Seals may be primarily limited to Level B (behavioral disturbance).

### *Short-beaked and Long-beaked Common Dolphin (Delphinus Delphis and Delphinus capensis), California/Oregon/Washington Stock and California Stock*

Mid-frequency cetaceans, such as Short-beaked and Long-beaked Common Dolphins, could experience PTS within 8.0 m (26.3 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated of shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend significantly beyond the outer harbor. One or both forms of Common Dolphins may be present within the Action Area but presence is likely occasional and of short duration (MBC Applied Environmental Sciences 2016, GHD 2019a). However, presence cannot be ruled out during Project implementation. With mitigation measures, it is anticipated that take of Common Dolphins may be limited to Level B (behavioral disturbance).

### *Common Bottlenose Dolphin (Tursiops truncatus), California Coastal Stock*

Mid-frequency cetaceans, such as Common Bottlenose Dolphins, could experience PTS within 8.0 m (26.3 ft) of impact pile driving activities (Appendix A, Figure 9 – Level A Harassment from Underwater Impact Pile Driving Noise) (Table 6.7). In addition marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 292.7 m (960.3 ft) of impact pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.8). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Common Bottlenose Dolphins are commonly observed in low to moderate numbers in the Port Complex and have the potential to occur in the Action Area during Project implementation (MBC Applied Environmental Sciences 2016, GHD 2019a). With

mitigation measures, it is anticipated that take of Common Bottlenose Dolphins may be limited to Level B (behavioral disturbance).

#### 6.2.1.2 Non-impulsive Noise – Vibratory Pile Driving

Based on the NMFS (2018d) Optional Worksheet, vibratory pile driving (with the addition of bubble curtains) on this Project may result in underwater noise levels that could only cause auditory injury (PTS threshold shift) to marine mammals directly adjacent to vibratory pile driving activities (Table 6.9, Appendix A, Figure 10 – Level A Harassment from Vibratory Pile Driving Noise). The PTS isopleth to threshold values are considered below to discuss possible Project impacts. In addition, the modeling results indicate that all marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) in the vicinity of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10).

Table 6.9 Marine Mammals Resultant Isopleths – Underwater Non-impulsive Noise Vibratory Pile Driving (Level A Harassment) (NMFS 2018d)

| Hearing Group[a] | $SEL_{cum}$ Threshold[a] (dB) | PTS Isopleth to threshold (m) | PTS Isopleth to threshold (ft) |
|---|---|---|---|
| Low-Frequency Cetaceans | 199 | 19.4 | 63.7 |
| Mid-Frequency Cetaceans | 198 | 1.7 | 5.6 |
| High-Frequency Cetaceans | 173 | 28.7 | 94.2 |
| Phocid Pinnipeds | 201 | 11.8 | 38.7 |
| Otariid Pinnipeds | 219 | 0.8 | 2.6 |

[a]NMFS 2018a

Table 6.10 Anticipated Marine Mammal Behavioral Disruption As A Result of Construction-related Underwater Non-impulsive Vibratory Pile Driving Noise (Level B Harassment)

| Activity | Behavioral Disturbance Isopleth (disturbance within x m) | Behavioral Disturbance Isopleth (disturbance within x ft), |
|---|---|---|
| Vibratory Pile Driving | 8,092.1 | 26,548.9 |

***Humpback Whales (Megoptera novaeangliae), California/Oregon/Washington Stock***

Low frequency cetaceans, such as Humpback Whales, could experience PTS within 19.4 m (63.7 ft) of vibratory pile driving activities (Appendix A, Figure 10 – Level A Harassment from Underwater

Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority and bubble curtains, it is anticipated that there would be no take of Humpback Whales from underwater vibratory pile driving noise.

#### *Gray Whale (Eschrichtius robustus), Eastern and Western North Pacific Stocks*

Low frequency cetaceans, such as Gray Whales, could experience PTS within 19.4 m (63.7 ft) of vibratory pile driving activities (Appendix A, Figure 10 – Level A Harassment from Underwater Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority and bubble curtains, it is anticipated that there would be no take of Gray Whales from underwater vibratory pile driving noise.

#### *California Sea Lion (Zalophus californianus), U.S. Stock*

Otariid pinnipeds (e.g., sea lions or fur seals) are only likely to experience PTS within 0.8 m (2.6 ft) of vibratory pile driving activities (Appendix A, Figure 10 – Level A Harassment from Underwater Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority, it is anticipated that take of California Sea Lions from underwater vibratory pile driving noise would be limited to underwater Level B harassment (behavioral disturbance).

#### *Pacific Harbor Seal (Phoca vitulina richardii), California Stock*

Phocid pinnipeds (e.g., harbor seals) could experience PTS within 11.8 m (38.7 ft) of vibratory pile driving activities (Appendix A, Figure 10 – Level A Harassment from Underwater Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority, it is anticipated that take of Pacific Harbor Seals from underwater vibratory pile driving noise would primarily be limited to underwater Level B harassment (behavioral disturbance).

### *Short-beaked and Long-beaked Common Dolphin (Delphinus Delphis and Delphinus capensis), California/Oregon/Washington Stock and California Stock*

Mid-frequency cetaceans, such as Short-beaked and Long-beaked Common Dolphins, could experience PTS within 1.7 m (5.6 ft) of vibratory pile activities (Appendix A, Figure 10 – Level A Harassment from Underwater Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority, it is anticipated that take of Short-beaked and Long-beaked Common Dolphins from underwater vibratory pile driving noise may be limited to underwater Level B harassment (behavioral disturbance).

### *Common Bottlenose Dolphin (Tursiops truncatus), California Coastal Stock*

Mid-frequency cetaceans, such as Common Bottlenose Dolphins, could experience PTS within 1.7 m (5.6 ft) of vibratory pile activities (Appendix A, Figure 10 – Level A Harassment from Underwater Vibratory Pile Driving Noise) (Table 6.9). In addition, marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 8,092.1 m (26,548.9 ft) of vibratory pile driving activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.10). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With mitigation measures including PSOs with stop work authority, it is anticipated that take of Common Bottlenose Dolphins from underwater vibratory pile driving noise may be limited to underwater Level B harassment (behavioral disturbance).

#### 6.2.1.3 Non-impulsive Noise - Dredging

Table 6.11 Marine Mammals Resultant Isopleths – Underwater Non-impulsive Noise from Dredging (Level A Harassment) (NMFS 2018d)

| Hearing Group[a] | $SEL_{cum}$ Threshold[a] (dB) | PTS Isopleth to threshold (m) | PTS Isopleth to threshold (ft) |
|---|---|---|---|
| Low-Frequency Cetaceans | 199 | 12.6 | 43.3 |
| Mid-Frequency Cetaceans | 198 | 1.1 | 3.6 |
| High-Frequency Cetaceans | 173 | 18.7 | 61.4 |
| Phocid Pinnipeds | 201 | 7.7 | 25.3 |
| Otariid Pinnipeds | 219 | 0.5 | 1.6 |

[a]NMFS 2018a

Table 6.12 Anticipated Marine Mammal Behavioral Disruption As A Result of Construction-related Underwater Non-impulsive Dredging Noise (Level B Harassment)

| Activity | Behavioral Disturbance Isopleth (disturbance within x m) | Behavioral Disturbance Isopleth (disturbance within x ft) |
|---|---|---|
| Dredging | 2,154.4 | 7,068.2 |

Based on the NMFS (2018d) Optional Worksheet, dredging may result in underwater noise levels that could cause auditory injury (PTS threshold shift) to marine mammals only directly adjacent to dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise). In addition, based on modeling results, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) as a result of dredging activities (Appendix A, Figure 12 – Level B Harassment). However, this isopleth would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor.

***Humpback Whale (Megoptera novaeangliae), California/Oregon/Washington Stock***

Low frequency cetaceans, such as Humpback Whales, could experience PTS within 12.6 m (43.3 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater

may exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.12). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of Humpback Whales from underwater dredging noise.

#### *Gray Whale (Eschrichtius robustus), Eastern and Western North Pacific Stocks*

Low frequency cetaceans, such as Gray Whales, could experience PTS within 12.6 m (43.3 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.12). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of Gray Whales from underwater dredging noise.

#### *California Sea Lion (Zalophus californianus), U.S. Stock*

Otariid pinnipeds (e.g., sea lions or fur seals) are only likely to experience PTS within 0.5 m (1.6 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.12). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of California Sea Lions from underwater dredging noise.

#### *Pacific Harbor Seal (Phoca vitulina richardii), California Stock*

Phocid pinnipeds (e.g., harbor seals) could experience PTS within 7.7 m (25.3 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.12). However, these isopleths would likely

be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of Pacific Harbor Seals from underwater dredging noise.

#### *Short-beaked and Long-beaked Common Dolphin (Delphinus Delphis and Delphinus capensis), California/Oregon Washington Stock and California Stock*

Mid frequency cetaceans, such as Short-beaked and Long-beaked Common Dolphins, could experience PTS within 1.1 m (3.6 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater may exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figure 12 – Level B Harassment) (Table 6.12). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of Short or Long-beaked Common Dolphins from underwater dredging noise.

#### *Common Bottlenose Dolphin (Tursiops truncatus), California Coastal Stock*

Mid frequency cetaceans, such as Common Bottlenose Dolphins, could experience PTS within 1.1 m (3.6 ft) of dredging activities (Appendix A, Figure 11 - Level A Harassment from Underwater Dredging Noise) (Table 6.11). In addition, based on modeling results, marine mammals foraging underwater may also exhibit behavioral changes (Level B Harassment) within 2,154.4 m (7,068.2 ft) of dredging activities (Appendix A, Figures 11 and 12) (Table 6.12). However, these isopleths would likely be slightly smaller in areas where the underwater noise waves are attenuated or shielded from the open ocean by boundaries such as the harbor jetties/breakwaters or other in-water structures. With this being the case, it is anticipated that underwater noise impacts will not extend beyond the outer harbor. Considering the fact that dredging noise levels from tugboats will be on par with typical underwater noise levels in the POLB, and with mitigation measures including PSOs with stop work authority, it is anticipated that there would be no take of Common Bottlenose Dolphins from underwater dredging noise.

### 6.2.2 In-Air Noise Impacts

#### 6.2.2.1 California Sea Lion (*Zalophus californianus*), U.S. Stock

Table 6.13 Anticipated Marine Mammal (Non Harbor Seal Pinnipeds) Behavioral Disruption As A Result of Construction-related Airborne Noise (Level B Harassment)

| Activity | Behavioral Disturbance Isopleth (disturbance within x m) | Behavioral Disturbance Isopleth (disturbance within x ft) |
|---|---|---|
| Impact Pile Driving | 67.0 | 219.8 |
| Vibratory Hammer | 13.4 | 44.0 |
| Dredging | 3.4 | 11.2 |

California Sea Lions on land (e.g., haul-outs) within 67.0 m (219.8 ft) of impact pile driving may be disturbed. In addition, sea lions on land (e.g., haul-outs) within 13.4 m (44.0 ft) of vibratory hammer pile driving or 3.4 m (11.2 ft) of dredging may be disturbed (Appendix A, Figure 13 – Airborne Noise Level B Harassment) (Table 6.13). This species has a high potential of occurring in the Action Area during construction activities. California Sea Lions are protected under the federal MMPA and disruption of normal feeding activities could constitute harassment (particularly during the breeding season, since this could result in decreased pup provisioning rates). However disturbances associated with pile driving would be temporary and of short duration. In addition, the Carnival Cruise berth only occupies a small portion of the POLB and nearshore Pacific coastline, and California Sea Lions are found throughout the POLB (as well as the nearshore Pacific Ocean). No breeding activity (only foraging) is expected to occur within ~67 m of pile driving activities. In addition, no known haul-outs are known to occur this close to construction activities. The closest marine mammal “regular-use” haul-out site to the Project Area is approximately 3 km away along the breakwater directly south of the Project. However, pinnipeds may use buoys in the harbor that are roughly 1 km from Project activities (Appendix A, Figure 4 – Marine Mammal Haul-outs). This being the case, it is anticipated that airborne noise disturbance from pile driving and dredging would not result in novel Level A or B take of California Sea Lions (any individuals within 67 meters of construction activities would already have been exposed to underwater noise, and take of an individual animal is limited to once every 24-hour period). It is anticipated that take of California Sea Lions may be limited to Level B harassment from underwater noise.

#### 6.2.2.2 Pacific Harbor Seal (*Phoca vitulina richardii*), California Stock

Table 6.14 Anticipated Marine Mammal (Harbor Seal) Behavioral Disruption As A Result of Construction-related Airborne Noise (Level B Harassment)

| Activity | Behavioral Disturbance Isopleth (disturbance within x m) | Behavioral Disturbance Isopleth (disturbance within x ft) |
|---|---|---|
| Pile Driving | 211.9 | 695.2 |
| Vibratory Hammer | 42.3 | 138.8 |
| Dredging | 10.6 | 34.8 |

Pacific Harbor Seals on land (e.g., haul-outs) within 211.9 m (695.2 ft) of impact pile driving may be disturbed. In addition, Harbor Seals on land (e.g., haul-outs) within 42.3 m (138.8 ft) of vibratory hammer pile driving or 10.6 m (34.8 ft) of dredging may be disturbed (Appendix A, Figure 13 – Airborne Noise Level B Harassment) (Table 6.14). At the POLB, this species is known to occur in the Action Area year-round and has a high potential of occurring in the Action Area during construction activities. Harbor Seals are protected under the federal MMPA and disruption of normal feeding activities could constitute harassment (particularly during the breeding season, since this could result in decreased pup provisioning rates). However disturbances associated with pile driving would be temporary and of short duration. In addition, the Carnival Cruise berth only occupies a small portion of the POLB and nearshore Pacific coastline, and Harbor Seals are found throughout the POLB (as well as the nearshore Pacific Ocean). No breeding activity (only foraging) is expected to occur within approximately 211.9 m of pile driving activities. In addition, no haul-outs are known to occur this close to construction activities. The closest marine mammal “regular-use” haul-out site to the Project Area is approximately 3 km away along the breakwater directly south of the Project. However, pinnipeds may use buoys in the harbor that are roughly 1 km from Project activities (Appendix A, Figure 4 – Marine Mammal Haul-outs). This being the case, it is anticipated that airborne noise disturbance from pile driving and dredging would not result in novel Level A or B Take of Pacific Harbor Seals (any individuals within 211.9 meters of construction activities would already have been exposed to underwater noise, and take of an individual animal is limited to once every 24-hour period). It is anticipated that take of Pacific Harbor Seals may primarily be limited to Level B harassment from underwater noise.

### 6.2.3 Take Estimates

Take is calculated below by estimating the number of marine mammals that may be impacted by construction noise on any given day during pile driving. Sounds produced by dredging would primarily occur on the same days as pile driving. Since take is already requested in association with pile driving on these days, pile driving will produce higher sound levels, and marine mammals may only be taken once per 24-hour period, no additional take is requested for dredging. Take numbers are based on the Project’s noise impacts. Actual take numbers are expected to be considerably lower in the field with the implementation of mitigation measures (e.g. presence of PSOs). Estimated marine mammal presence and associated densities were obtained using the best

scientific information available and included species counts from either the general Project vicinity or surveys within the POLB (Jefferson et al. 2013, MBC Applied Environmental Sciences 2016) (see Tables 6.15 and 6.16 below). Based on our calculations, we anticipate that the Proposed Project will result in Level B take of several species of marine mammals and Level A take of Pacific Harbor Seals. Our estimates reflect a conservative approach towards estimating take and fewer individuals are likely be taken in the field.

Level A harassment is expected to be minimal based proposed monitoring and mitigation measures and the fact that sound is likely to deter marine mammals from approaching within the Level A threshold distances. However, we request Level A in on this IHA based on the assumption that a certain percentage (discussed further below) of cryptic marine mammals (e.g., specifically Pacific Harbor Seals) may enter the Level A Zones without detection.

Buffers have been created from the modeled distances of the Level A and Level B ZOIs for each marine mammal group. The Proposed Project Marine Mammal Mitigation and Monitoring Plan (4MP) provides specific measures to mitigate Level A take including the use of exclusion zones, soft start methods, shut down procedures, use of experienced PSOs, and implementation of proven training and communication processes to halt in-water construction activities, if required (described further in the 4MP included as Appendix E).

The marine mammal density estimates below (Table 6.15) were used to calculate take for species not detected during POLB environmental surveys in 2013-2014 (surveys conducted from September 2013 to August 2014) (MBC Applied Environmental Sciences 2016). This data, from U.S. Navy surveys, represents the best scientific information available on densities for Humpback Whales and Gray Whales in Southern California waters (Jefferson et al. 2013). Density data for the remaining species (California Sea Lion, Pacific Harbor Seal, Short and Long-beaked Common Dolphins, and Common Bottlenose Dolphin) were obtained from seasonal appropriate species counts in the Port Complex (see Table 6.16 below) (MBC Applied Environmental Sciences 2016).

Table 6.15 U.S. Navy Marine Mammal Densities Within the Southern California Range Complex (Aerial Line Transect Surveys for 2008-2013) (Jefferson et al. 2013)

| Common Name | Scientific Name | SoCal Abundance 2008-2013** | SoCal Density |
|---|---|---|---|
| Humpback Whale | *Megoptera novaeangliae* | 22 | 0.00142 |
| Gray Whale | *Eschrichtius robustus* | 221 | 0.01162 |
| California Sea Lion | *Zalophus californianus* | 1,454 | 0.10345 |
| Pacific Harbor Seal | *Phoca vitulina richardii* | N/A | N/A |
| Short-beaked Common Dolphin | *Delphinus delphis* | 15,955 | 1.26097 |
| Long-beaked Common Dolphin | *Delphinus capensis* | 6,440 | 0.50897 |
| Common Bottlenose Dolphin | *Tursiops truncatus* | 496 | 0.02584 |

*Densities of #marine mammals/km$^2$

**As the construction season may span both the warm (May through October) and cold Season (November through April) (or fall close to the beginning/end), the highest calculated abundance was used to estimate density

Table 6.16 MBC Applied Environmental Sciences Marine Mammal Densities within the Port Complex (Point Counts for 2013-2014) (MBC Applied Environmental Sciences 2016)

| Common Name | Scientific Name | Port Complex Max Monthly Number 2013-2014 | Port Complex Density 2013-14 * |
|---|---|---|---|
| Humpback Whale | *Megoptera novaeangliae* | 0 | 0 |
| Gray Whale | *Eschrichtius robustus* | 0 | 0 |
| California Sea Lion | *Zalophus californianus* | 95 | 3.13 |
| Pacific Harbor Seal | *Phoca vitulina richardii* | 42 | 1.38 |
| Short-beaked Common Dolphin | *Delphinus delphis* | 40*** | 1.32 |
| Long-beaked Common Dolphin | *Delphinus capensis* | 40*** | 1.32 |
| Common Bottlenose Dolphin | *Tursiops truncatus* | 5 | 0.17 |

*Surface area of MBC Applied Environmental Sciences survey region estimated as 30.35 km$^2$ via GIS. Density as #marine mammals/km$^2$.

**As the construction season may span both the Warm (May through October) and Cold Season (November through April) (or fall close to the beginning/end), the highest calculated abundance was used to estimate density.

***Only identified as “Common Dolphin” and not identified to the species level.

Table 6.17 Estimated Species Densities Used for Take Calculations*

| Common Name | Scientific Name | Estimated Density in the POLB |
|---|---|---|
| Humpback Whale | *Megoptera novaeangliae* | 0.00142[a] |
| Gray Whale | *Eschrichtius robustus* | 0.01162[a] |
| California Sea Lion | *Zalophus californianus* | 3.13[b] |
| Pacific Harbor Seal | *Phoca vitulina richardii* | 1.38[b] |
| Short-beaked Common Dolphin | *Delphinus delphis* | 1.32[b] |
| Long-beaked Common Dolphin | *Delphinus capensis* | 1.32[b] |
| Common Bottlenose Dolphin | *Tursiops truncatus* | 0.17[b] |

*Densities were obtained from Jefferson et al. 2013 or calculated from MBC Applied Environmental Sciences 2016. The highest density values available were used.

[a]Jefferson et al. 2013

[b]MBC Applied Environmental Sciences 2016

#### 6.2.3.1 Equation

We used the following formula to estimate marine mammal take as a result of Project activities:

$$\text{Take} = (n * ZOI) * D$$

Where:

- n = the density estimate for each marine mammal species (animals/km$^2$)
- ZOI = the area where sound pressure level is equal to or exceeds to species threshold
- D = the number of days of the activity

#### 6.2.3.2 Assumptions

- Take estimates were based on underwater noise ZOIs expected with implementation of bubble curtains (Tables 6.18 and 6.20).
- All piles installed would have equal noise disturbance levels (and maximum expected noise values were used in modeling).
- Individual animals could only be taken once per 24-hour period.
- The models used highest density values available for the general Project vicinity in order to allow for the most conservative take estimate.
- Impact pile driving and vibratory pile driving would occur during the same day.
- Take estimates were rounded to the nearest whole number as it is impossible to take a fraction of an animal.

#### 6.2.3.3 Estimates

***Level B Take Estimates***

Based on Level B underwater ZOIs calculated for impact and vibratory pile driving (rounded values up to the nearest tens place from Table 6.18 below) we calculated expected Level B take of marine mammals (Table 6.19).

Table 6.18 Level B Underwater ZOIs For All Marine Mammal Species*

| Construction Activity | Behavioral Disturbance Isopleth Radii (m) | Behavioral Disturbance Ensonified Area ($km^2$) |
|---|---|---|
| Impact Pile Driving | 292.90 | 0.39 |
| Vibratory Hammer | 8,092.10 | 27.42 |

*The underwater ensonified area ($km^2$) was calculated in ArcMap 10.6.1 by clipping isopleth radii to land.

Table 6.19 Marine Mammal IHA Level B Take Estimates

| Construction Activity | Species | Estimated Density in POLB | ZOI ($km^2$) | Days of Activity | Estimated Take (Daily) | Estimated Take (Total) | Estimate Take (Rounded up to Whole Number) |
|---|---|---|---|---|---|---|---|
| Impact Pile Driving | *Humpback Whale* | 0.00142[a] | 0.39 | 26 | 0 | 0.0143988 | **2.0** |
| Vibratory Hammer | | | 27.42 | 26 | 0 | 1.0123464 | |
| **Humpback Whale Total** | | | | | | **1.0267** | |
| Impact Pile Driving | *Gray Whale* | 0.01162[a] | 0.39 | 26 | 0 | 0.1178268 | **9.0** |
| Vibratory Hammer | | | 27.42 | 26 | 0 | 8.2841304 | |
| **Gray Whale Total** | | | | | | **8.4020** | |
| Impact Pile Driving | *California Sea Lion* | 3.13[b] | 0.39 | 26 | 0.7722 | 31.7382 | **2264** |
| Vibratory Hammer | | | 27.42 | 26 | 54.2916 | 2231.4396 | |
| **California Sea Lion Total (rounded up to next whole number)** | | | | | | **2263.1778** | |
| Impact Pile Driving | *Pacific Harbor Seal* | 1.38[b] | 0.39 | 26 | 0.5382 | 13.9932 | **998** |
| Vibratory Hammer | | | 27.42 | 26 | 37.8396 | 983.8296 | |
| **Pacific Harbor Seal Total (rounded up to next whole number)** | | | | | | **997.8228** | |
| Impact Pile Driving | *Short-beaked Common Dolphin* | 1.32[b] | 0.39 | 26 | 0.2627274 | 13.3848 | **955** |
| Vibratory Hammer | | | 27.42 | 26 | 18.4717572 | 941.0544 | |
| **Short-beaked Common Dolphin Total (rounded up to next whole number)** | | | | | | **954.4392** | |
| Impact Pile Driving | *Long-beaked Common Dolphin* | 1.32[b] | 0.39 | 26 | 0.1021566 | 13.3848 | **955** |
| Vibratory Hammer | | | 27.42 | 26 | 7.1823948 | 941.0544 | |
| **Long-beaked Common Dolphin Total (rounded up to next whole number)** | | | | | | **954.4392** | |
| Impact Pile Driving | *Common Bottlenose Dolphin* | 0.17[b] | 0.39 | 26 | 0.0663 | 1.7238 | **123** |
| Vibratory Hammer | | | 27.42 | 26 | 4.6614 | 121.1964 | |
| **Common Bottlenose Dolphin Total (rounded up to next whole number)** | | | | | | **122.9202** | |

[a]Jefferson et al. 2013
[b]MBC Applied Environmental Sciences 2016

The exercise of calculating take for Humpback Whales and Gray Whales was completed for the table above (Table 6.19). However, qualified Protected Species Observers (PSOs) will exercise stop work authority to shut down construction activities if a whale approaches the POLB entrances.

Since underwater noise (with the addition of bubble curtains) will be restricted to the POLB, Level B take of Humpback Whales and Gray Whales will be completely avoided (e.g. Level B take of whale species will be zero), and is therefore not requested in this IHA.

### *Take Estimates*

The client intends to minimize Level A take by having qualified PSOs onsite during pile driving. These PSOs will have stop work authority to shut down marine pile driving activities immediately if a marine mammal approaches the exclusion zone. We do not anticipate Level A take for Humpback Whales and Gray Whales as they would be unable to enter the monitoring zone without the PSOs observing them from a greater distance. Based on all other Level A isopleths calculated for impact pile driving (Table 6.20), Level A take is only requested for Pacific Harbor Seals. All other species have Level A isopleths smaller than 10 meters (mandatory shut down zone for marine mammals) (Table 6.20) and are expected be readily detected by a PSO when approaching the 10 meter isopleth. Similarly, no Level A take is requested for vibratory pile driving as the Level A isopleths are smaller than or around 10 meters, and any marine mammals would be visible when approaching within 10 meters of vibratory pile driving activities (Table 6.21). Requested Level A take for Pacific Harbor Seals is presented in Table 6.22.

Table 6.20 Level A Underwater Ensonified ZOIs For Impact Pile Driving By Species

| Species | Level A Isopleth Radius (m) | Level A ZOI ($km^2$) |
|---|---|---|
| California Sea Lion (Otariid Pinniped) | 8.8 | 0.114852 $km^2$ |
| Pacific Harbor Seal (Phocid Pinniped) | 120.2 | 0.002189 $km^2$ |
| Short-beaked Common Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |
| Long-beaked Common Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |
| Common Bottlenose Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |

Table 6.21 Level A Underwater Ensonified ZOIs For Vibratory Pile Driving By Species

| Species | Level A Isopleth Radius (m) | Level A ZOI ($km^2$) |
|---|---|---|
| California Sea Lion (Otariid Pinniped) | 0.8 | 0.000445 $km^2$ |
| Pacific Harbor Seal (Phocid Pinniped) | 11.8 | 0.003154 $km^2$ |
| Short-beaked Common Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |
| Long-beaked Common Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |
| Common Bottlenose Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |

### Table 6.22 Marine Mammal IHA Level A Take Estimates

| Construction Activity | Species | Estimated Density in POLB | ZOI ($km^2$) | Days of Activity | Estimated Take (Daily)* | Estimated Take (Total) |
|---|---|---|---|---|---|---|
| Impact Pile Driving | *Pacific Harbor Seal* | 1.38[a] | 0.002189 | 26 | 0.00302082 | 0.07854132 |
| Vibratory Hammer | | | 0.003154 | 26 | 0.00435252 | 0.11316552 |
| **Pacific Harbor Seal Total (rounded up to next whole number)** | | | | | | **5*** |

[a]MBC Applied Environmental Sciences 2016

*As Pacific Harbor Seals may be difficult to detect at 120 meters (Level A isopleth), NMFS recommended a 50 meter isopleth shut down zone for this species and requested increasing the Level A take to 5 animals (NMFS, personal communications 2019).

Table 6.23 (below) presents total requested Project-related take from impact and vibratory pile driving. Requested take below is based on worst case scenarios that involve taking "unique animals." It is more likely that a few resident individuals (particular California Sea Lions) may actually be taken multiple times over the duration of pile driving activities. However, our calculations are based on the assumption that an animal can only be taken one time per 24-hour period.

### Table 6.23 Summary of Total Requested Take (Level B and Level A from Impact and Vibratory Pile Driving)

| Species | Stock | Level B (Harassment) Take | Level A (Injury) Take | Total Take* | Abundance of Stock | Requested Total Take as Percentage of Stock (round up to whole number) |
|---|---|---|---|---|---|---|
| Humpback Whale | California/ Oregon/ Washington | 0 | 0 | 0 | 2,374 | 0% |
| Gray Whale | Eastern North Pacific/Western North Pacific | 0 | 0 | 0 | 290-26,90 (depending on population) | 0%** |
| California Sea Lion | U.S. | 2264 | 0 | 2264 | 257,606 | 0.9% |
| Pacific Harbor Seal | California | 998 | 5 | 998 | 30,968 | 3.2% |
| Short-beaked Common Dolphin | California/ Oregon/ Washington | 955 | 0 | 995 | 969,861 | 0.1% |
| Long-beaked Common Dolphin | California | 955 | 0 | 995 | 101,305 | 1% |
| Common Bottlenose Dolphin | California Coastal | 123 | 0 | 123 | 453-515 | 27.2%** |

*Total take is the larger of two numbers (Level A or Level B) as an animal can only be take once per 24-hr period

**Smaller abundance numbers used to estimate Total Take As a Percentage of Stock

# 7. Anticipated Impact of the Activity

## 7.1 Humpback Whale (*Megoptera novaeangliae*), California/Oregon/ Washington Stock

With implementation of mitigation measures (specifically, using bubble curtains to limit underwater construction noise propagation to within the Port Complex, use of PSO's, and shutting down vibratory pile driving if a Humpback Whale approaches the Level B ZOI), both Level A and Level B take of Humpback Whales will be effectively avoided. With implementation of these measures, no whales will experience Level B disturbance, Level A PTS or TTS, or physical injury as a result of Project activities. No impacts are expected to occur to the species, and therefore no take is requested.

## 7.2 Gray Whale (*Eschrichtius robustus*), Eastern and Western North Pacific Stocks

With implementation of mitigation measures (specifically, using bubble curtains to limit underwater construction noise propagation to within the Port Complex, use of PSO's, and shutting down vibratory pile driving if a Gray Whale approaches the Level B ZOI), both Level A and Level B take of Gray Whales will be effectively avoided. With implementation of these measures, no whales will experience Level B disturbance, Level A PTS or TTS, or physical injury as a result of Project activities. No impacts are expected to occur to the species, and therefore no take is requested.

## 7.3 California Sea Lion (*Zalophus californianus*), U.S. Stock

With implementation of mitigation measures, the Project will have a negligible impact on the California Sea Lion, U.S. Stock. Project-related noise is expected to impact only 0.9% of the total U.S. Stock. Overall, the U.S. Stock is generally considered to be increasing (based on pup counts from 1975-2011). However, in 2013, NOAA declared an UME for the stock, due to a high number of pup strandings (reasons for strandings are unknown) (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 2,264 individuals, with the anticipation that certain individuals may be "taken" multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or US Stock and have no impact on long-term recruitment or survival or this species. No breeding rookeries occur within the Port Complex, and any take will be limited to foraging or loafing individuals.

## 7.4 Pacific Harbor Seal (*Phoca vitulina richardii*), California Stock

With implementation of mitigation measures, the Project will have a negligible impact on the Pacific Harbor Seal, California Stock. Project-related noise is expected to impact only 3.2% of the total California Stock. The estimated minimum population size for this species is considered to be 20,109, and current population estimates put the stock at 30,968 individuals. The population

increased from 1981 to 2004, but subsequent surveys have indicated possible stock declines (NOAA Fisheries 2018c).

Impacts to the stock will primarily be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 998 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, Level A take is only requested for five Pacific Harbor Seals. No physical injuries (i.e. barotraumas), other than PTS, are expected to occur to Pacific Harbor Seals within the Level A ZOI. No mortalities are expected. Level A and Level B take requested for this species will not affect the viability of the population, species, or California Stock and have no impact on long-term recruitment or survival or this species. No breeding rookeries occur within the Port Complex, and any take will be limited to foraging or loafing individuals.

## 7.5 Short-beaked Common Dolphin (*Delphinus Delphis*), California/Oregon/Washington

With implementation of mitigation measures, the Project will have a negligible impact on the Short-beaked Common Dolphin, California/Oregon/Washington Stock. Project-related noise is expected to impact only 0.1% of the total California/Oregon/Washington Stock. Short-beaked Common Dolphins are considered to be the most abundant cetacean off the coast of California. The abundance off this species is known to increase during warm-water periods in Southern California. However, the overall status of the stock (e.g. decreasing or increasing) is not currently known (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 955 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California/Oregon/Washington Stock and have no impact on long-term recruitment or survival or this species.

## 7.6 Long-beaked Common Dolphin (*Delphinus capensis*), California Stock

With implementation of mitigation measures, the Project will have a negligible impact on the Long-beaked Common Dolphin, California Stock. Project-related noise is expected to impact only 1% of the total California Stock. The species is considered to be increasing in southern California waters. However, a formal analysis of stock trends has not been performed at this time (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 955 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California Stock and have no impact on long-term recruitment or survival or this species.

## 7.7 Common Bottlenose Dolphin (*Tursiops truncatus*), California Coastal Stock

With implementation of mitigation measures, the Project will have a negligible impact on the Common Bottlenose Dolphin, California Coastal Stock. Project-related noise may impact up to 27.2% of the total California Stock. Based on mark-recapture data, the stock appears to be stable and may potentially be growing (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 123 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California Coastal Stock and have no impact on long-term recruitment or survival or this species.

# 8. Anticipated Impacts on Subsistence Uses

There are no known or relevant subsistence uses of marine mammals within the Action Area. The Proposed Project is within an existing developed industrial footprint. There are no known ceremonial or indigenous hunts for marine mammals within the San Pedro Bay. The requested take of affected stocks would thus not have an unmitigable adverse impact on the availability of any marine mammal species or stock for subsistence purposes.

# 9. Anticipated Impacts on Habitat

## 9.1 Direct Impacts

No critical habitat is designated within or directly adjacent to the Action Area, and no impacts to critical habitat are expected to occur as a result of this Project. The primary impacts to habitat would be associated with temporary noise from pile driving and temporary sediment suspension and lesser levels of noise from dredging. These activities may cause animals to leave the area during the work interval and make the habitat unavailable for periods of time during the work window.

Airborne and waterborne noise from pile driving would occur over an estimated three to four week span. Distances at which impacts would occur vary by species and are described in detail above. Work would not begin when marine mammals are present within or near Level A impact zones and soft starts would allow a short time during which marine mammals could depart from the outer edges of the Level B impact zone. Given the low probability of marine mammal presence in the immediate Project Area at any given time and the generally low density of most marine mammal species within the POLB, actual displacement from habitat is expected to be minimal. However, marine mammals moving through the area would presumably be much less likely to enter the Level B impact zone during work activities, so this habitat would be temporarily unavailable for use.

Dredging will occur within a small footprint immediately adjacent to the existing dock and will result in temporary suspension of fine sediments. Turbidity is already high in the Project Area, and dredge

impacts are expected to occur on 30 non-consecutive days spread out through the proposed in-water work window (November 15, 2019 to April 15, 2020). Sediment would be expected to settle relatively quickly after each disturbance event. Because the dredge footprint is already occupied by large cruise ships on five out of seven days each week, the habitat is not available for use most of the time under baseline conditions.

Extension of the existing dock would result in increased shading. The increase would be minor, about 5,430 square ft (0.12 acre) of the total 4,600-acres of water within the POLB (POLB 2019). There is no known eelgrass or other submerged vegetation within the dock extension footprint, and kelp beds are limited to linear areas along nearby rock protection and would not be impacted by the new shaded area. Because of the location within a busy port, frequent disturbance under baseline conditions, already degraded and modified habitat conditions, and the presence of better quality habitat outside of but near the POLB, direct impacts to habitat are expected to be minimal and of relatively short duration.

## 9.2 Indirect Impacts

Indirect impacts to habitat such as long-term dispersal of marine mammals or prey would be insignificant and discountable because of the small total area and the short duration of the proposed activity.

# 10. Anticipated Effects of Habitat Impacts on Marine Mammals

The construction of an extended dock, pile driving, dredging, and the presence of a cruise ship one additional day per week will result in a very minor loss of benthic and water column habitat and a very small increase in hardscape (dolphins) which would provide attachment surface for algae and invertebrates. Overall, the net habitat loss for marine mammals would be insignificant and discountable. Most of the habitat loss (associated with pile driving and dredging activities) would be temporary and last for only a few weeks.

# 11. Mitigation Measures to Protect Marine Mammals and Their Habitat

## 11.1 Proposed Conservation and Mitigation Measures

### 11.1.1 Construction Mitigation Measures

Conservation measures are intended to avoid, minimize, or compensate for environmental impacts to protected species and their habitats. Federal and State agencies may agree upon additional conservation measures.

The following proposed conservation measures are included as part of the Project:

1. Silt fences will be deployed at onshore construction areas to prevent any sediment from flowing into tidal waters. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevent sediment from entering the waters below the construction area.
2. Construction materials, debris, or dredge material, will not be placed or stored where it may be allowed to enter into or be placed where it may be washed by rainfall into waters of the U.S./State.
3. Best Management Practices (BMPs) such as a Storm Water Pollution and Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures (SPCC) Plan will be implemented to prevent entry of storm water runoff into tidal waters, the entrainment of excavated contaminated materials leaving the site, and to prevent the entry of polluted storm water runoff into coastal waters during the transportation and storage of excavated materials.
4. Non-essential work vehicles and equipment will be parked at least 100 ft away from the shoreline.

### 11.1.2 Noise Mitigation Measures

Noise mitigation measures, such as bubble curtains, will be implemented in order to minimize Project underwater noise impacts to special-status and/or protected marine mammal species.

Table 11.1 Pile Driving Physical Mitigation Methods

| Attenuation Measure | Associated Reduction in Underwater Noise | Source |
|---|---|---|
| Bubble Curtain | 7 dB reduction in underwater noise | Austin et al. 2016 |

1. A “soft start” (e.g. ramp-up period, see additional details below in Section 13) that lasts between 20 to 40 minutes will be conducted prior to the initiation of full-power pile driving at the beginning of each day, or following a 30 minute or longer break in pile driving, to warn any marine mammals to move away from the construction area. This process is designed to allow marine mammals to move out of the area.
2. Bubble curtains will be implemented in association with pile driving. Use of an air bubble curtain can generally reduce sound pressure levels by 5-10 dB, with higher effectiveness at higher sound levels (Buehler et al. 2015). Current proposed bubble curtains specifications for the Project will involve employing a two-tier single-pile system supplied by a 1200 CFS oil-less compressor. Bubble curtains will meet the following conditions per NMFS:
    a. The bubble curtain must distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
    b. The lowest bubble ring shall be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact.

c. The bubble curtain shall be operated such that there is proper (equal) balancing of air flow to all bubblers.

d. The applicant shall require that construction contractors train personnel in the proper balancing of air flow to the bubblers and corrections to the attenuation device to meet the performance standards. This shall occur prior to impact driving.

3. Number of piles installed per day will be limited to five.

4. Heavy equipment, such as dredges, operating from barges or nearshore will be idled for 20 to 40 minutes prior to full-force power.

# 12. Mitigation Measures to Protect Subsistence Uses

No impacts to subsistence uses are expected, therefore no mitigation measures are required.

# 13. Monitoring and Reporting

A Marine Mammal Mitigation and Monitoring plan is provided as Appendix E, but key plan elements are summarized below. This plan draws heavily on noise mitigation measures and Protected Species Observer protocols from the Bureau of Ocean Energy Management (BOEM) NTLs (Notice to Lessees) 2016-G01 and 2016-G02 (BOEM 2016a, BOEM 2016b).

## 13.1 Marine Mammal Mitigation and Monitoring

### 13.1.1 Marine Mammal PSOs and Shut Down Procedures

1. A qualified PSO(s) will conduct environmental awareness training for all individuals involved in construction activities. The training will include, at a minimum, an overview of sensitive resources, a review of permit conditions, communication protocols, and consequences of non-compliance.

2. Qualified PSOs will be present during noise-generating portions of marine construction (e.g., pile driving and dredging).

3. Pile driving may only occur 45 minutes after sunrise to 45 minutes before sunset to allow biological monitors time to complete 30 minute pre- and post-construction surveys.

4. Qualified PSO(s) would be present during active construction activities, including pile driving and dredging to ensure that exclusion zones are maintained and the Proposed Project Marine Mammal Mitigation and Monitoring Plan is implemented (included as Appendix E).

5. The PSO(s) will ensure that no impacts to sensitive marine mammal habitat (such as eelgrass or kelp forests will occur).

6. Pile driving will be limited to daylight hours to ensure that biological monitors are able to accurately survey the area.

### *Monitoring*

1. A qualified, independent (non-construction personnel, with no other duties), PSO(s) will conduct marine mammal monitoring for a minimum of one day within one week prior to construction activities to establish baseline conditions. Monitoring would be conducted during different tide levels/hours of the day to ensure that temporal marine mammal movements in the Action Area are thoroughly known.
2. Up to seven qualified PSOs will be present during noise-generating portions of construction to cover the exclusion area (greatest number of monitors will be required to cover the exclusion zone for whales during pile driving). PSO locations are subject to review and approval by POLB, with PSO safety as an important concern. For each construction activity, the following number of PSOs are proposed (Figures 14-16):
    a. Vibratory Pile Driving: 7
    b. Impact Pile Driving: 7
    c. Dredging: 2
3. Pile driving and dredging may not occur during conditions of limited visibility (heavy fog, heavy rain, and Beaufort sea states above 4) since these conditions would impede PSOs from accurately surveying the exclusion and monitoring zones.
4. PSOs will be in place and begin monitoring at least 30 minutes prior to the onset of construction activities (e.g. prior to the ramp up period). PSOs will have an unobstructed 360 degree view of the Project Area and exclusion/monitoring zones.
5. PSOs will be equipped with a suitable means of communicating with the construction manager to ensure efficient communication during all activities (e.g. radios, etc.). PSOs will utilize suitable equipment to identify marine mammals and determine distances, including but not limited to marine binoculars equipped with a reticle (e.g. grid) rangefinder, spotting scopes (20-60 zoom or equivalent), and digital cameras.
6. Ramp-up will not be initiated unless the monitoring/exclusion zones are free of marine mammals. The intent of the ramp-up process is to warn marine mammals of impending construction activities so that they may leave the area unimpeded prior to full-force pile driving.
7. Ramp-up (lower power drives or “idling” of equipment) will occur over a period of time between 20 and 40 minutes prior to full-force pile driving.
8. PSOs will continually scan the area with binoculars and the naked eye during observation periods. Prior to and during construction, PSOs will use a marine mammal observation sheet to record a count of all marine mammals species detected, behavioral patterns, location and direction of movement (e.g. bearing), time and concurrent construction activities (as well as start/stop time of construction activity),

acoustic or visual disturbance, and weather conditions/tide level. If there is a brief break in work, the monitor will continue to scan the monitoring area.

9. PSO shifts will be limited to a maximum 12 hours of monitoring per 24-hour period.

10. PSOs will be qualified biologists who have completed a protected species observer training program. PSOs will have the ability to identify marine mammals and able to recognize characteristic behavior types. Curriculum vitaes (CVs) will be provided to NMFS for review and approval in advance of the start of construction. PSOs will have stop work authority.

11. Any shut down of marine construction activities on the project following the appearance of a marine mammal in (or in the case of whales, approaching) the exclusion zone (Table 13.1) must be followed by a 20-minute all-clear period (continuous monitoring will occur during this time). If no species are detected in (or in the case of whales, near) the exclusion zone during this time, ramp-up procedures may be initiated (will be confirmed by PSO radioing contractor with the all-clear).

12. 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 entering or within the monitoring zone (Table 13.1), pile driving 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 20 minute observation time period has elapsed.

13. Any shut down for unanticipated reasons (e.g. mechanical difficulties) that lasts longer than 20 minutes must be followed by a ramp-up (20-40 minutes lower force strikes or idling).

14. PSOs will continue to monitor for 30 minutes following the cessation of marine construction activities to ensure all potential impacts/exposures are accounted for.

***Minimum Monitor/PSO Qualifications from NOAA Fisheries – West Coast Region (reprinted) (NOAA Fisheries 2019a)***

- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
- Advanced education in biological science, wildlife management, mammalogy or related fields (Bachelor's degree or higher is preferred).
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation or experience with vessel operation and pile driving operations to provide for personal safety during observations.

- Writing skills sufficient to prepare a report of observations. Reports should include such information as the number, type, and location of marine mammals observed, the behavior of marine mammals in the area of potential sound effects during construction, dates and times when observations and in-water construction activities were conducted, dates and times when in-water construction activities were suspended because of marine mammals, etc.
- Ability to communicate orally, by radio or in person, with Project personnel to provide real time information on marine mammals observed in the area, as needed.

### *Additional Recommended Monitor/PSO Qualifications*

- Considerable experience using binoculars and a spotting scope
- Physical ability to stand and monitor for long periods of time
- Construction monitoring experience (to follow work progress during the day and accurately communicate with the construction manager)

### *Exclusion and Monitoring Zones*

Maximum monitoring and exclusion zones for each construction activity are presented in Appendix A, Figures 14-16. Although no take is requested for dredging in the IHA (per NMFS recommendations), we propose the option of monitoring marine mammals during dredging noise impacts (below) as monitors will already be required and onsite during dredging as a USACE mandated mitigation measures to protect federally listed Green Sea Turtles (*Chelonia mydas*).

Table 13.1 Proposed Biological Monitoring Zones (Appendix A, Figures 14-16)*

| Source | Monitoring Zone (radius in m)* | | Exclusion/Shutdown Zone (radius in m)* | |
|---|---|---|---|---|
| **Impact Pile Driving** | Phocid Pinnipeds | 300 | Phocid Pinnipeds | 50 |
| | Otariid Pinnipeds | 300 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | N/A | Low Frequency Cetaceans | 8100** |
| | Mid-Frequency Cetaceans | 300 | Mid-Frequency Cetaceans | 10 |
| **Vibratory Pile Driving** | Phocid Pinnipeds | 8100 | Phocid Pinnipeds | 50 |
| | Otariid Pinnipeds | 8100 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | 8100 | Low Frequency Cetaceans | 8100** |
| | Mid-Frequency Cetaceans | 8100 | Mid-Frequency Cetaceans | 10 |
| **Dredging*** ** | Phocid Pinnipeds | 100 | Phocid Pinnipeds | 10 |
| | Otariid Pinnipeds | 100 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | 100 | Low Frequency Cetaceans | 10 |
| | Mid-Frequency Cetaceans | 100 | Mid-Frequency Cetaceans | 10 |

*rounded up to tens' place for ease of monitoring (values from Tables 6.18, 6.20, and 6.21)

*The exclusion zone for Gray and Humpback Whales is from the Vibratory Hammer ZOI. This number is also used as the exclusion zone during impact pile driving as these two activities will occur in close temporal succession.

****Although NMFS does not require monitoring during dredging, USACE guidance for the POLB does require monitors onsite during this activity to monitor for Green Sea Turtles within 100 feet of the dredge. Marine Mammals will also be monitored simultaneously during this time.

As shown in Table 13.1, exclusion (shut down) and monitoring zones have been established to delineate areas where underwater impulsive and non-impulsive construction noise may be injurious or disruptive to marine mammals.

- Exclusion or shutdown zones will be limited to a maximum monitoring radius of 50 meters with the exception of whales. Shut down zones for whales will include the monitoring zone for vibratory pile driving (monitoring radius of 8,100 meters to avoid any take of whales).
- Qualified PSOs will ensure that exclusion and monitoring zones are maintained during construction. If a marine mammal or other sensitive wildlife species approaches the exclusion zone prior to or during construction activities, the PSO will monitor the individual closely. If the species enters the exclusion zone, all pile driving would cease until the animal has left the area and has been gone for at least 15 minutes. If a pinniped or dolphin species enters the monitoring zone, work may continue unless the permitted take quota is close to being reached. If a Gray or Humpback Whale approaches the exclusion zone, all work would cease until the animal has left the area and has been gone for at least 15 minutes.

- Exclusion and monitoring zones were developed from ZOIs (and modified based on noise attenuation/blocking as a result on in-water structures such as breakwaters). Exclusion and monitoring zones will be identified using landmarks and a reticle rangefinder in the field.
- If the animal enters the exclusion zone or appears to be distressed, the PSO will have stop work authority to cease construction activities until the animal has left the area. This will ensure that take is kept to a minimum. Level A take is only requested for five Pacific Harbor Seals.
- If permitted species enter the monitoring zone during construction, exposures will be recorded and documented as a Level B take. If marine mammals enter the Level B zone when construction is not occurring, no take will be recorded.
- If PSOs observe an injured or impaired marine mammal during construction activities (that is a direct result of Proposed Project activities), the PSO will immediately notify NMFS. In addition, they will record the species, date, time, and location of the observation, and take photographs of the animal for documentation purposes. Marine work will cease until NMFS reviews the circumstances of the prohibited take. If the injury (or death) is not related to Proposed Project activities, the PSO will still notify NMFS immediately.

## 13.2 Monitoring Reporting

### 13.2.1 Initial Notification

A Project representative will notify NMFS one week prior to Project initiation, to inform them that construction is imminent.

### 13.2.2 Final Report

A Project representative will provide NMFS with a draft final report no later than 90 days after the completion of marine construction activities. A final report must be submitted no later than 30 days after receiving comments on the draft from NMFS. The report will include the species and numbers of marine mammals seen within each exclusion and monitoring zone, behavioral observations, and an evaluation of the effectiveness of mitigation measures.

In addition, general monitoring reporting will “discuss the implementation of the Project (i.e., the activities that were actually conducted), the results of the monitoring program, and the implementation of the mitigation measures” and include the following per NOAA Fisheries (2019a) IHA guidance:

- Summary of the activity (dates, times, and specific locations, Project actions, durations and sources actually completed) and any changes from the activities proposed in the application
- Summary of mitigation implementation
- Both detailed monitoring results and a comprehensive summary addressing goals of monitoring plan, including:

    - Number, species, and any other relevant information regarding marine mammals observed and estimated exposed/taken during
    - Description of the observed behaviors (in both presence and absence of activities)
    - Environmental conditions when observations were made
- Assessment of the implementation and effectiveness of prescribed mitigation and monitoring measures

The report will also summarize the following daily data including observer effort data, survey data, and sighting data.

### *Observer Effort Data*

Observer effort data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Date
- Start time/Stop time
- Coordinates of project activities and coordinates of each observer
- Average environmental conditions

### *Survey Data*

Survey data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Time pre-ramp-up survey begins
- Species detected during pre-ramp-up
- Time construction equipment reaches "full-force"
- Species detected during survey
- Any shut down actions
- Time noise-generating construction activities cease

### *Sighting Data*

Sighting data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Date and time of observation
- Latitude and longitude of observer and bearing to species
- Water depth (meters)
- Species ID and certainty of ID; description
- Number of individuals (note if any are juveniles)
- Direction of animals' travel (bearing)
- Construction activity at the time of sighting
- Distance of animal to construction activity
- Level A or B exposure
- If sighting is associated with a shut down, the behavior of the animal before and after the shut down will be included. This type of daily sighting report (e.g. associated with a shut down) will be sent to NMFS within 24 hours of the incident.

### *Injured/Dead Protected Species Reporting*

- Observers will report any sightings of injured or dead protected species immediately. This will occur whether or not the injury or death is caused by project activities. These sightings will be reported to the NMFS West Coast Marine Mammal Stranding Hotline (1-866-767-6114) (NOAA Fisheries 2019b).

# 14. Suggested Means of Coordination

NOAA Fisheries will be provided with contact information for the Project biologist, PSOs, and the construction manager to facilitate communication during construction. PSOs will be provided with contact information for appropriate NOAA Fisheries staff. For more general communication before, during, and after construction, key senior staff associated with the project will be identified and a recommended communication protocol will be provided.

# 15. Literature Cited


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# Appendices

A. Figures

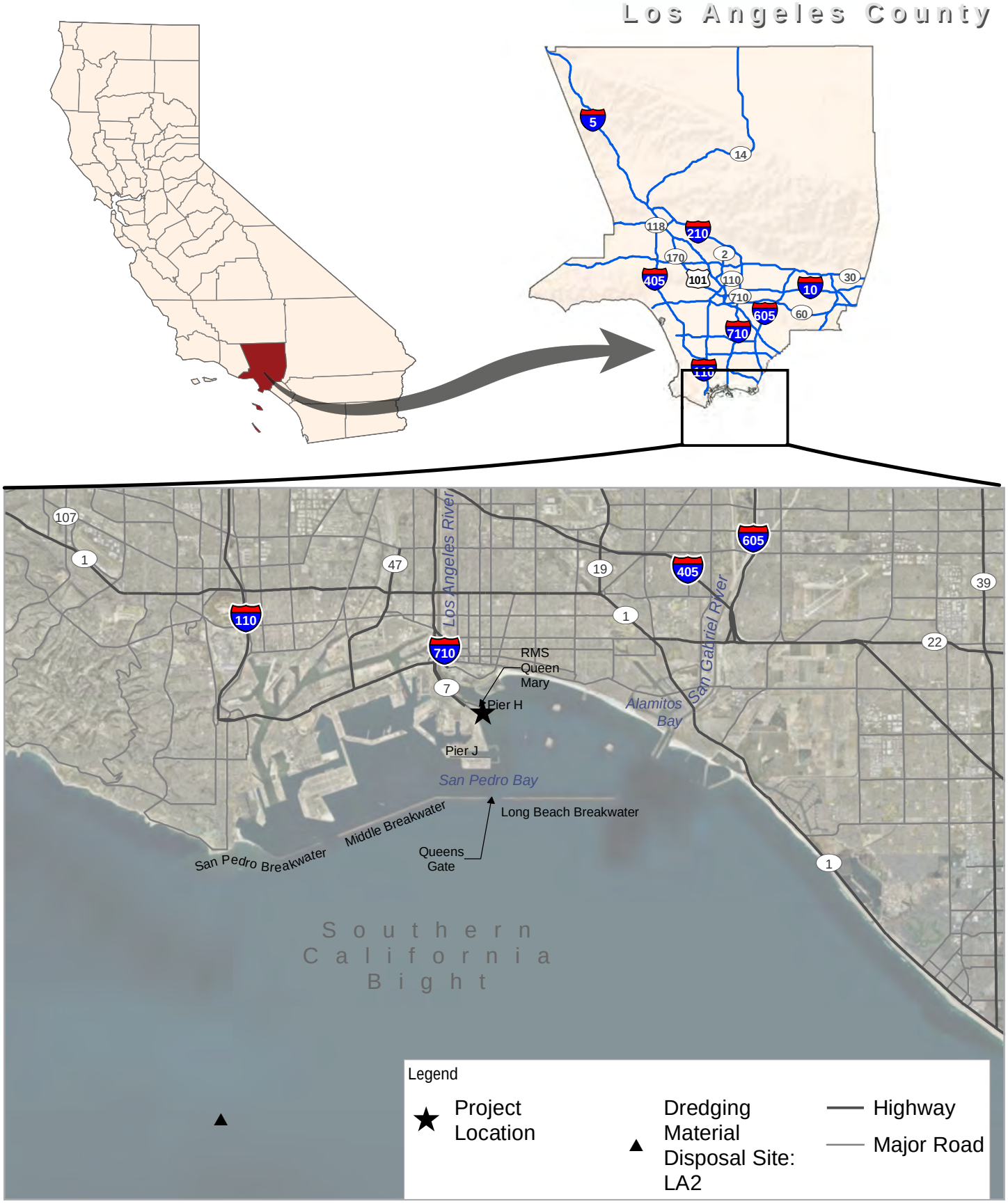
B. CNDDB, IPaC, CNPS, NMFS, and MMPA Database Search Results

C. Reconnaissance Site Visit Photographs

D. Marine Mammal Noise Impact Calculators

E. Marine Mammal Mitigation and Monitoring Plan (4MP)

# Appendix A Figures

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Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

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City of Long Beach
Port of Long Beach Carnival Cruise
Lines Terminal Improvement Project

Vicinity Map

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 01

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Data source: Sources: Esri, USGS, NOAA
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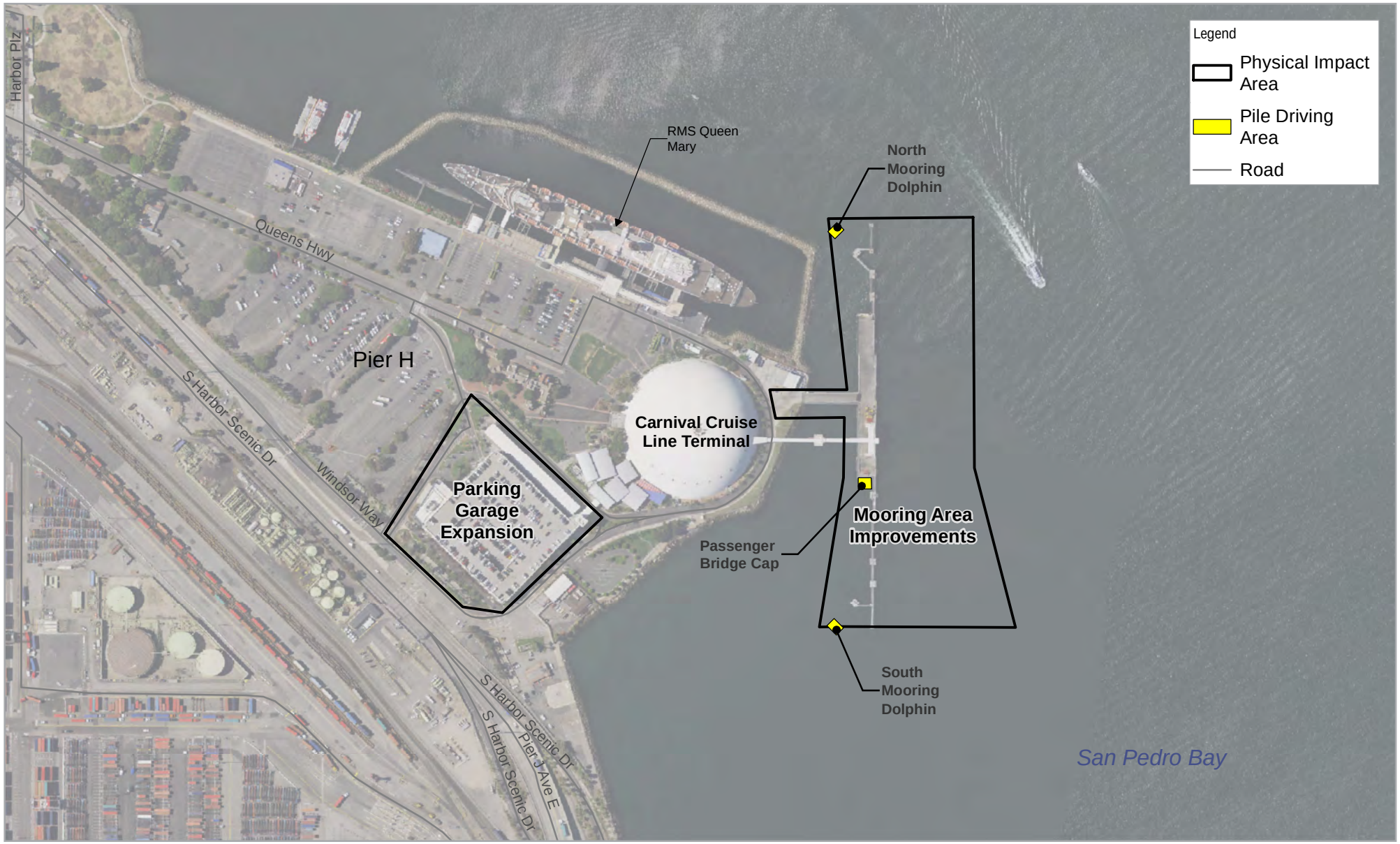


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City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Project Area

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 02

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Data source: Project Area Boundary, GHD; The National Map imagery, 2016; . Created by: jclark2

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City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Bathymetry

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 03

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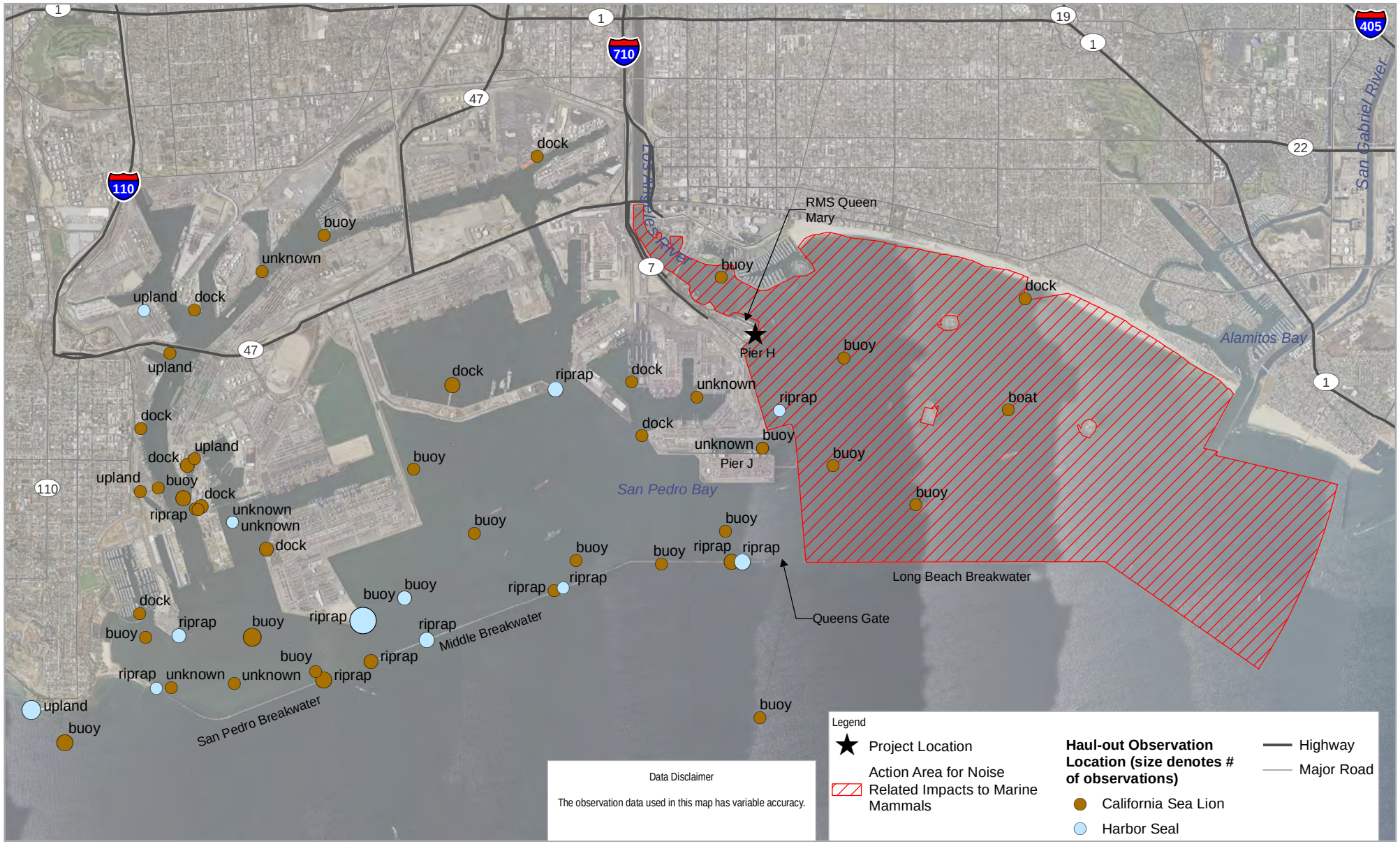
Print date: 23 Jun 2019 - 12:53

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2




Paper Size ANSI A

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Map Projection: Lambert Conformal Conic

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GHD

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Project No. 11183495
Revision No. -
Date 06/23/2019

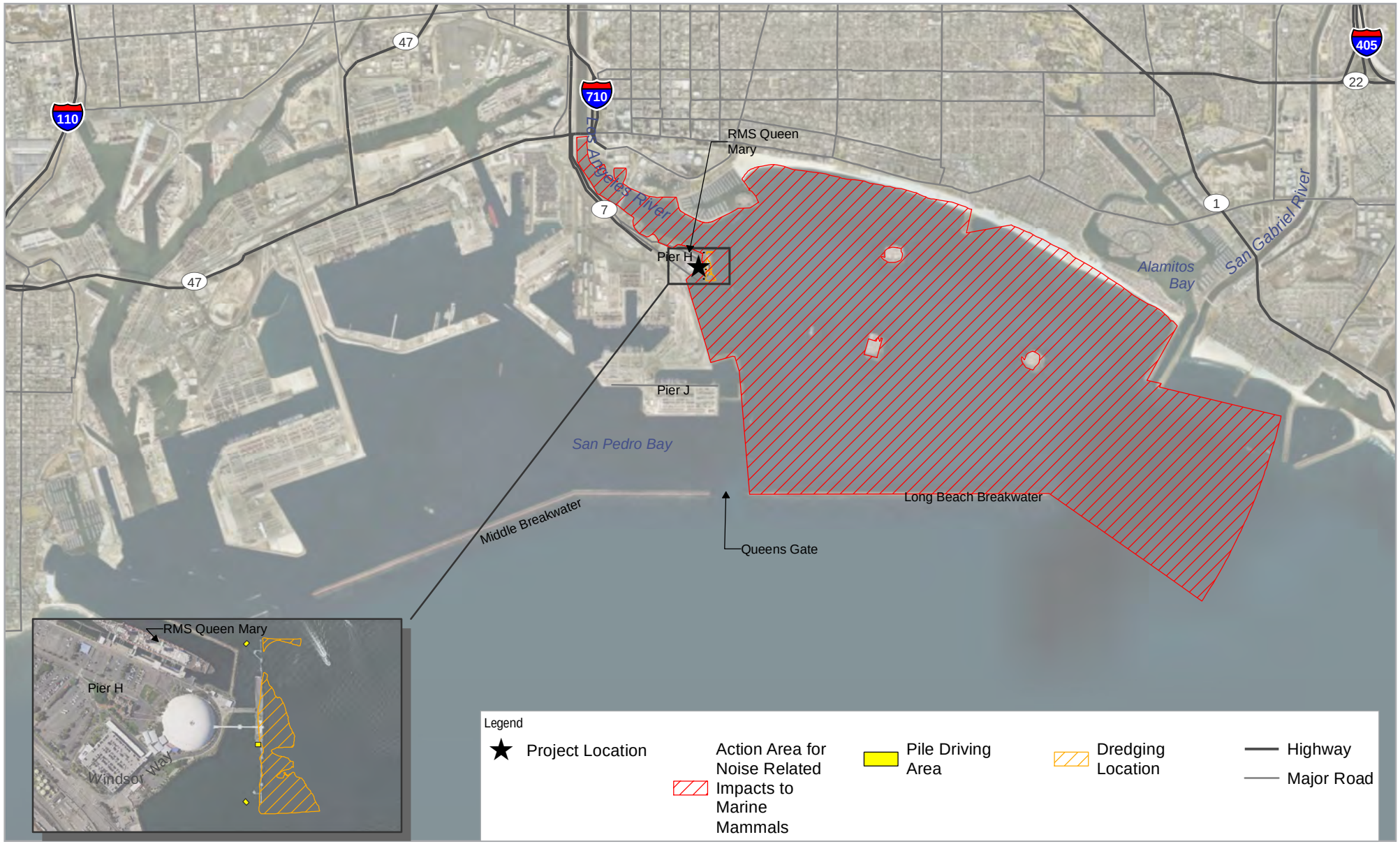
Marine Mammal Haul-out Map

FIGURE 04

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_004_HaulOut_RevB.mxd

Print date: 23 Jun 2019 - 13:03

Data source: iNaturalist harbor seal and california sea lion locations; POLB/POLA San Pedro Bay Marine Mammal Surveys, 2008 and 2013; Study Area Boundary, Pile driving and dredging locations, Atkins; Action Area, GHD, 5/8/2019; GHD 11/20/2018; The National Map imagery, 2016; . Created by: jclark2




Paper Size ANSI A

0 510 1,020 1,530 2,040

Meters

1 " = 1,828.8 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Project No. 11183495
Revision No. -
Date 06/23/2019

Action Area Boundary

FIGURE 05

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_005_ActionArea_RevD.mxd

Print date: 23 Jun 2019 - 13:33

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Action Area, GHD, 5/16/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 50 100 150 200

Meters
1 " = 182.88 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Unattenuated Underwater Impulsive RMS Levels During Impact Pile Driving Zones of Influence

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 06

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_006_DBRMS_PileDriving_RevE.mxd
Print date: 23 Jun 2019 - 13:17

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; dBrms isopleths, 5/06/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 250 500 750 1,000

Meters
1 " = 914.4 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Unattenuated Underwater Non-Impulsive RMS Levels During Vibratory Pile Driving Zones of Influence

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 07

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_007_DBRMS_VibratoryPileDriving_RevF.mxd
Print date: 23 Jun 2019 - 13:27

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths 5/16/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 190 380 570 760

Meters

1 " = 685.8 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Unattenuated Underwater Non-Impulsive RMS Levels During Dredging Zones of Influence

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 08

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_008_DBRMS_Dredging_RevE.mxd
Print date: 23 Jun 2019 - 13:42

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths 5/06/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 50 100 150 200

Meters
1 " = 190.5 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Marine Mammal Level A Harassment from Underwater Impulsive Impact Pile Driving Noise

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 09

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevC.mxd
Print date: 23 Jun 2019 - 13:56

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 5/17/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 25 50 75 100

Meters
1 " = 88.9 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Marine Mammal Level A Harassment from Underwater Non-Impulsive Vibratory Pile Driving Noise

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 10

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevC.mxd
Print date: 23 Jun 2019 - 13:58

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 5/17/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 25 50 75 100

Meters
1 " = 91.44 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

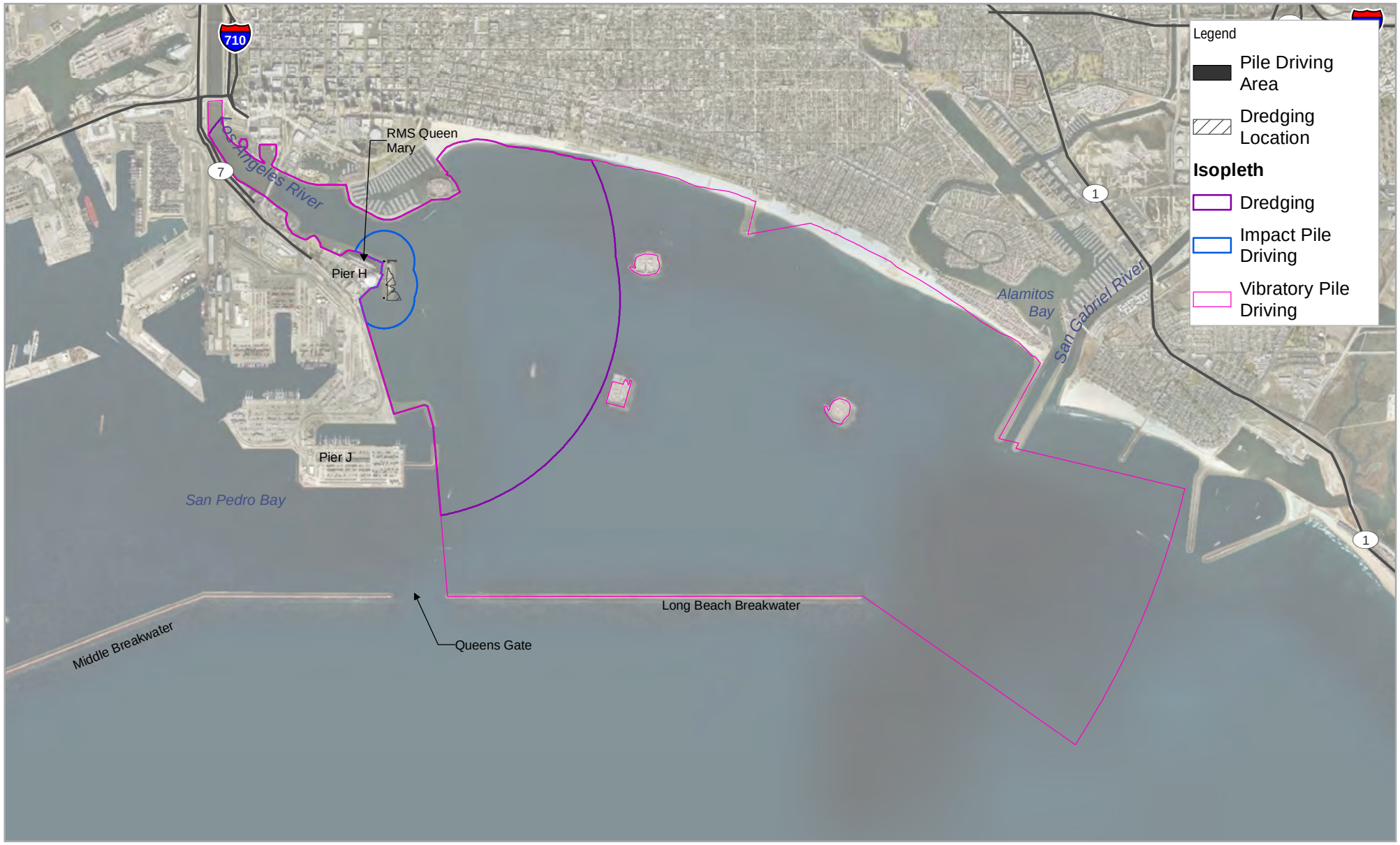
Marine Mammal Level A Harassment from Underwater Non-Impulsive Dredging Noise

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 11

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevC.mxd
Print date: 23 Jun 2019 - 13:55

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 5/17/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2




Paper Size ANSI A

0 360 720 1,080 1,440

Meters

1 " = 1,318.26 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Marine Mammal Level B Harassment from Underwater Impulsive & Non-Impulsive Noise

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 12

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevC.mxd
Print date: 23 Jun 2019 - 14:04

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 5/17/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 40 80 120 160

Meters
1 " = 165.1 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Marine Mammal Level B Harassment from Airborne Noise

Project No. 11183495
Revision No. -
Date 06/23/2019

FIGURE 13

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevC.mxd
Print date: 23 Jun 2019 - 13:59

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 5/17/2019; GHD 11/20/2018; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 360 720 1,080 1,440

Meters

1 " = 1,318.26 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Vibratory Pile Driving Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 14

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevD.mxd
Print date: 22 Aug 2019 - 12:24

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 360 720 1,080 1,440

Meters

1 " = 1,318.26 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

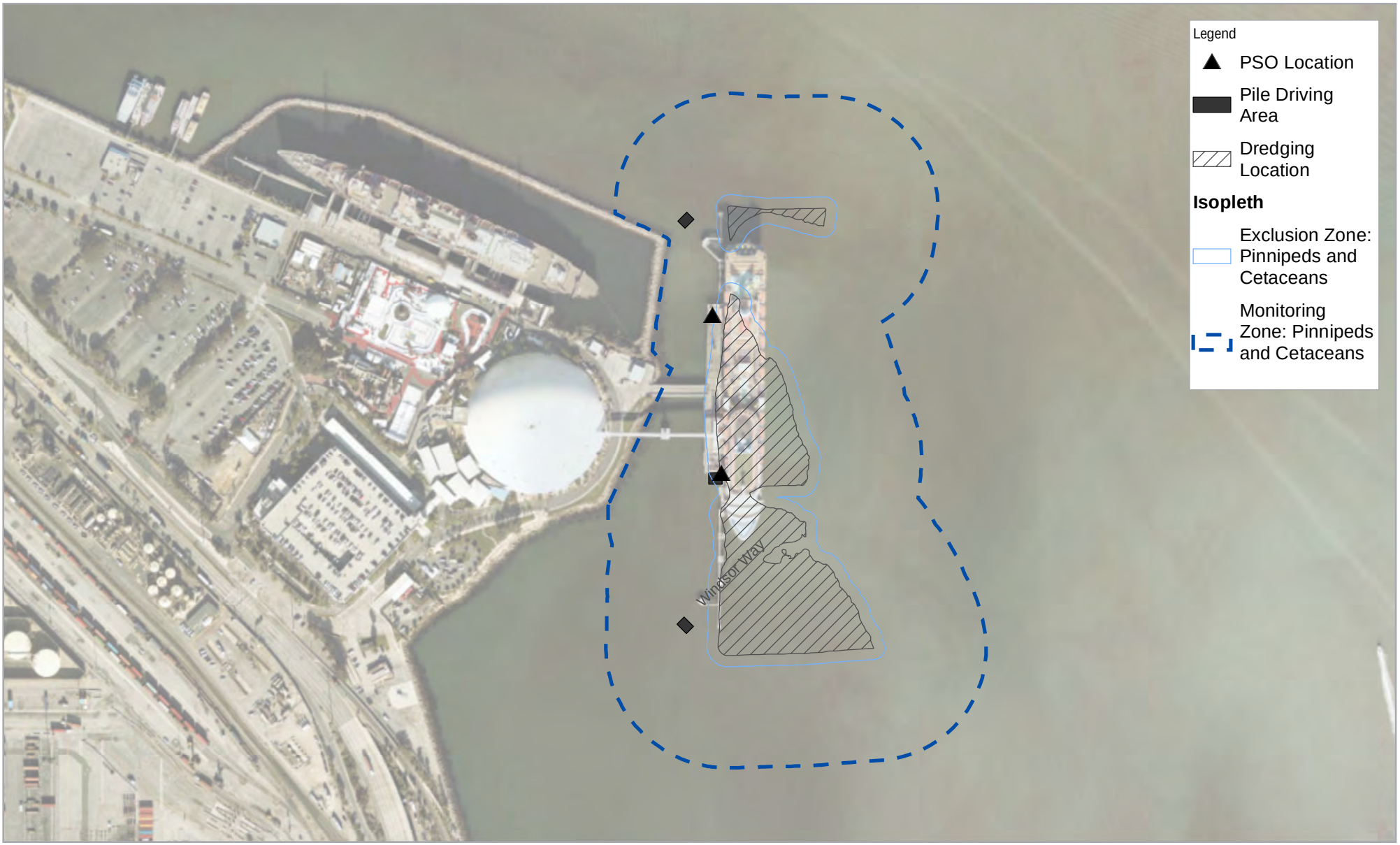
Impact Pile Driving Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 15

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevD.mxd
Print date: 22 Aug 2019 - 13:11

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2




Paper Size ANSI A

0 30 60 90 120

Meters
1 " = 119.38 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Dredging Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 16

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\IHA\11183495_IHA_Isopleth_MB_RevD.mxd
Print date: 22 Aug 2019 - 12:35

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

# Appendix B CNDDB, IPaC, CNPS, NMFS, and MMPA Database Search Results

## Appendix B: CNDDB, IPaC, CNPS, NMFS, and MMPA Database Search Results

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| ***Insects*** | | | | | | | | | |
| *Glaucopsyche lygdamus palosverdesensis* | Palos Verdes blue butterfly | Endangered | None | | XERCES_CI-Critically Imperiled | Coastal scrub | Restricted to the cool, fog-shrouded, seaward side of Palos Verdes Hills, Los Angeles County. | Host plant is Astragalus trichopodus var. lonchus (locoweed). | **Low Potential.** No coastal scrub habitat is present at or adjacent to the project site or proposed waste disposal area. All recent records of this species in the vicinity are from the Palo Verdes Hills and the species' host plant (locoweed) is unlikely to be present in the project or waste disposal area. |
| *Bombus crotchii* | Crotch bumble bee | None | None | | IUCN_EN-Endangered | Open grassland and scrub habitats | Coastal California east to the Sierra-Cascade crest and south into Mexico. | Food plant genera include Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum. | **Low Potential.** Although the project area is within the species historical range, no open grassland, coastal dune, or scrub habitat are present within or directly adjacent to the project vicinity or at the proposed waste disposal site. The closest known recent records of this species species to the project area are from the Baldwin Hills and Redondo Beach. |
| *Cicindela gabbii* | Western Tidal-flat Tiger Beetle | None | None | | | Estuary \| Mud shore/flats | Inhabits estuaries and mudflats along the coast of Southern California. | Generally found on dark-colored mud in the lower zone; occasionally found on dry saline flats of estuaries. | **Low Potential.** Species is believed to be extirpated in Los Angeles County. All known extant occurrences of this species are from San Diego, Orango, and Ventura County at parks or military facilities. |
| *Cicindela hirticollis gravida* | Sandy Beach Tiger Beetle | None | None | | | Coastal dunes | Inhabits areas adjacent to non-brackish water along the coast of California from San Francisco Bay to northern Mexico. | Clean, dry, light-colored sand in the upper zone. Subterranean larvae prefer moist sand not affected by wave action. | **Low Potential.** Species is believed to be extirpated in Los Angeles County. All known extant occurrences of this species are from San Diego, San Luis Obispo, Santa Barbara, and Ventura County at parks, preserves, or military facilities. |
| *Cicindela latesignata latesignata* | Western Beach Tiger Beetle | None | None | | | Mud shore/flats | Mudflats and beaches in coastal Southern California. | | **Low Potential.** Species is believed to be extirpated in Los Angeles County. All known extant occurrences of this species are from San Diego County. |
| *Cicindela senilis frosti* | Senile Tiger Beetle | None | None | | | Mud shore/flats \| Wetland | Inhabits marine shoreline, from Central California coast south to salt marshes of San Diego. Also found at Lake Elsinore | Inhabits dark-colored mud in the lower zone and dried salt pans in the upper zone. | **Low Potential.** Species is believed to be extirpated in Los Angeles County. All known extant occurrences of this species are from San Diego County. |
| *Danaus plexippus pop. 1* | Monarch - California overwintering population | None | None | | USFS_S-Sensitive | Closed-cone coniferous forest | Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. | Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby. | **Low Potential.** Recent records from Long Beach (Heartwell Park and El Dorado Nature Center). However, no wind-protected tree groves are present at or in the vicinity or the project site or at the proposed waste disposal site (very limited vegetation in the highly developed Port of Long Beach). |
| *Panoquina errans* | wandering (=saltmarsh) skipper | None | None | | IUCN_NT-Near Threatened | Marsh & swamp \| Wetland | Southern California coastal salt marshes. | Requires moist saltgrass for larval development. | **Low Potential.** Closest records are from Playa Del Ray and Bolsa Chica Ecological Reserve. No high quality tidal marsh for the species is present within or directly adjacent to the project vicinity or at the proposed waste disposal site. |
| *Trigonoscuta dorothea dorothea* | Dorothy's El Segundo Dune weevil | None | None | | | Coastal dunes | Coastal sand dunes in Los Angeles County. | | **Low Potential.** Found in coastal sand dunes in Los Angeles County (Playa del Rey area) and at Bolsa Chica Ecological Reserve in Orange County. No coastal dune habitat for this species in present within or directly adjacent to the project vicinity or at the proposed waste disposal site. |
| ***Mollusks*** | | | | | | | | | |
| *Tryonia imitator* | Mimic Tryonia (=California brackishwater snail) | None | None | | IUCN_DD-Data Deficient | Aquatic \| Brackish marsh \| Estuary \| Lagoon \| Marsh & swamp \| Salt marsh \| Wetland | Inhabits coastal lagoons, estuaries and salt marshes, from Sonoma County south to San Diego County. | Found only in permanently submerged areas in a variety of sediment types; able to withstand a wide range of salinities. | **Low Potential.** No brackish salt marshes are present on or directly adjacent to the project site or proposed waste disposal area. |
| ***Crustaceans*** | | | | | | | | | |
| *Streptocephalus woottoni* | Riverside fairy shrimp | Endangered | None | | IUCN_EN-Endangered | Coastal scrub \| Valley & foothill grassland \| Vernal pool \| Wetland | Endemic to Western Riverside, Orange, and San Diego counties in areas of tectonic swales/earth slump basins in grassland and coastal sage scrub. | Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season. | **No Potential.** No vernal pools or fresh water pools suitable for their life cycle exist at or near the study area. |
| ***Fish*** | | | | | | | | | |
| *Siphateles bicolor mohavensis* | Mohave tui chub | Endangered | Endangered | | AFS_EN-Endangered \| CDFW_FP-Fully Protected | Aquatic \| Artificial flowing waters \| Artificial standing waters | Endemic to the Mojave River basin, adapted to alkaline, mineralized waters. | Needs deep pools, ponds, or slough-like areas. Needs vegetation for spawning. | **No Potential.** The CNDDB occurrence near the study area was an experimental transplant of fish at a botanical garden in the 1970's. In six years, the experiment failed and the population became extirpated. |
| ***Amphibians*** | | | | | | | | | |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Spea hammondii* | Western Spadefoot | None | None | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| IUCN_NT-Near Threatened | Cismontane woodland \| Coastal scrub \| Valley & foothill grassland \| Vernal pool \| Wetland | Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. | Vernal pools are essential for breeding and egg-laying. | **Low Potential.** No suitable habitat present,. |
| ***Reptiles*** | | | | | | | | | |
| *Anniella stebbinsi* | southern California legless lizard | None | None | | CDFW_SSC-Species of Special Concern \| USFS_S-Sensitive | Broadleaved upland forest \| Chaparral \| Coastal dunes \| Coastal scrub | Generally south of the Transverse Range, extending to northwestern Baja California. Occurs in sandy or loose loamy soils under sparse vegetation. Disjunct populations in the Tehachapi and Piute Mountains in Kern County. | Variety of habitats; generally in moist, loose soil. They prefer soils with a high moisture content. | **Low Potential.** No suitable habitat present,. |
| *Aspidoscelis tigris stejnegeri* | coastal whiptail | None | None | | CDFW_SSC-Species of Special Concern | | Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. | Ground may be firm soil, sandy, or rocky. | **Low Potential.** No suitable habitat present,. |
| *Emys marmorata* | western pond turtle | None | None | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| IUCN_VU-Vulnerable \| USFS_S-Sensitive | Aquatic \| Artificial flowing waters \| Klamath/North coast flowing waters \| Klamath/North coast standing waters \| Marsh & swamp \| Sacramento/San Joaquin flowing waters \| Sacramento/San Joaquin standing waters \| South coast flowing waters \| South coast standing waters \| Wetland | A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. | Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying. | **Low Potential.** No suitable habitat present,. |
| *Phrynosoma blainvillii* | coast horned lizard | None | None | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern | Chaparral \| Cismontane woodland \| Coastal bluff scrub \| Coastal scrub \| Desert wash \| Pinon & juniper woodlands \| Riparian scrub \| Riparian woodland \| Valley & foothill grassland | Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. | Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects. | **Low Potential.** No suitable habitat present,. |
| ***Birds*** | | | | | | | | | |
| *Agelaius tricolor* | Tricolored Blackbird | None | Candidate Endangered | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| IUCN_EN-Endangered \| NABCI_RWL-Red Watch List \| USFWS_BCC-Birds of Conservation Concern | Freshwater marsh \| Marsh & swamp \| Swamp \| Wetland | Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California. | Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony. | **Low Potential.** No nesting or foraging habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the project vicinity in the last 10 years. |
| *Pelecanus occidentalis californicus* | California Brown Pelican | Delisted | Delisted | | BLM_S-Sensitive \| CDFW_FP-Fully Protected \| USFS_S-Sensitive | | Colonial nester on coastal islands just outside the surf line. | Nests on coastal islands of small to moderate size which afford immunity from attack by ground-dwelling predators. Roosts communally. | **High Potential.** The species is known to forage in the immediate project vicinity. |
| *Empidonax traillii extimus* | Southwestern Willow Flycatcher | Endangered | Endangered | | NABCI_RWL-Red Watch List | Riparian woodland | Riparian woodlands in Southern California. | | **Low Potential.** No nesting or foraging habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the project vicinity. |
| *Rallus obsoletus levipes* | Light-footed Ridgway's Rail | Endangered | Endangered | | CDFW_FP-Fully Protected \| NABCI_RWL-Red Watch List | Marsh & swamp \| Salt marsh \| Wetland | Found in salt marshes traversed by tidal sloughs, where cordgrass and pickleweed are the dominant vegetation. | Requires dense growth of either pickleweed or cordgrass for nesting or escape cover; feeds on molluscs and crustaceans. | **Low Potential.** Resident population at Seal Beach National Wildlife Refuge to the east of the project vicinity but no pickleweed/cordgrass foraging or nesting habitat for this species is present in the immediate project vicinity or at the porposed waste disposal site. |
| *Sternula antillarum browni* | California Least Tern | Endangered | Endangered | | CDFW_FP-Fully Protected \| NABCI_RWL-Red Watch List | Alkali playa \| Wetland | Nests along the coast from San Francisco Bay south to northern Baja California. | Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, land fills, or paved areas. | **High Potential.** The species is known to forage in the immediate project vicinity. In addition, there is a known nesting population on Pier 400 just to the west of the project site in the Port of Los Angeles. |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Vireo bellii pusillus* | Least Bell's Vireo | Endangered | Endangered | | IUCN_NT-Near Threatened \| NABCI_YWL-Yellow Watch List | Riparian forest \| Riparian scrub \| Riparian woodland | Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. | Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite. | **Low Potential.** Although there are a few records of this species in the Long Beach (i.e. along the LA River at Willow Street), there is no breeding or foraging habitat for this species in the project vicinity or at the proposed waste disposal site. |
| *Passerculus sandwichensis beldingi* | Belding's Savannah Sparrow | None | Endangered | | | Marsh & swamp \| Wetland | Inhabits coastal salt marshes, from Santa Barbara south through San Diego County. | Nests in Salicornia on and about margins of tidal flats. | **Low Potential.** Records from Seal Beach National Wildlife Refuge to the east of the project vicinity but no coastal marsh foraging or nesting habitat for this species is present in the immediate project vicinity or at the proposed waste disposal site. |
| *Coccyzus americanus occidentalis* | Western Yellow-billed Cuckoo | Threatened | Endangered | | BLM_S-Sensitive \| NABCI_RWL-Red Watch List \| USFS_S-Sensitive \| USFWS_BCC-Birds of Conservation Concern | Riparian forest | Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. | Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape. | **Low Potential.** No nesting or foraging habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the project vicinity in the last 10 years. |
| *Athene cunicularia* | Burrowing Owl | None | None | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern \| USFWS_BCC-Birds of Conservation Concern | Coastal prairie \| Coastal scrub \| Great Basin grassland \| Great Basin scrub \| Mojavean desert scrub \| Sonoran desert scrub \| Valley & foothill grassland | Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. | Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel. | **Low Potential.** Records from Seal Beach National Wildlife Refuge to the east of the project vicinity but no foraging or nesting habitat for this species is present in the immediate project vicinity or at the proposed waste disposal site. |
| *Buteo regalis* | Ferruginous Hawk | None | None | | CDFW_WL-Watch List \| IUCN_LC-Least Concern \| USFWS_BCC-Birds of Conservation Concern | Great Basin grassland \| Great Basin scrub \| Pinon & juniper woodlands \| Valley & foothill grassland | Open grasslands, sagebrush flats, desert scrub, low foothills and fringes of pinyon and juniper habitats. | Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles. | **Low Potential.** Records from Seal Beach National Wildlife Refuge to the east of the project vicinity but no foraging or nesting habitat for this species is present in the immediate project vicinity or at the proposed waste disposal site. |
| *Rynchops niger* | Black Skimmer | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern \| NABCI_YWL-Yellow Watch List \| USFWS_BCC-Birds of Conservation Concern | Alkali playa \| Sand shore | Nests on gravel bars, low islets, and sandy beaches, in unvegetated sites. Nesting colonies usually less than 200 pairs. | | **High Potential.** The species is known to forage and has historically nested in the immediate project vicinity. |
| *Charadrius alexandrinus nivosus* | Western Snowy Plover | Threatened | None | | CDFW_SSC-Species of Special Concern \| NABCI_RWL-Red Watch List \| USFWS_BCC-Birds of Conservation Concern | Great Basin standing waters \| Sand shore \| Wetland | Sandy beaches, salt pond levees & shores of large alkali lakes. | Needs sandy, gravelly or friable soils for nesting. | **Low Potential.** Incidental sightings in the Port Complex. Howver, the species is not know to breed/commoly forage in the project vicinity. Closest records are from Bolsa Chica Ecological Reserve. |
| *Polioptila californica californica* | Coastal California Gnatcatcher | Threatened | None | | CDFW_SSC-Species of Special Concern \| NABCI_YWL-Yellow Watch List | Coastal bluff scrub \| Coastal scrub | Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California. | Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied. | **Low Potential.** Records from Seal Beach National Wildlife Refuge to the east of the project vicinity but no foraging or nesting habitat for this species is present in the immediate project vicinity or at the proposed waste disposal site. However, one incidental record of this species at the Los Angeles Harbor Pier 400 seabird colony. |
| *Phalacrocorax auritus* | Double-crested Cormorant | None | None | | CDFW_WL-Watch List \| IUCN_LC-Least Concern | Riparian forest \| Riparian scrub \| Riparian woodland | Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. | Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins. | **High Potential.** The species is known to forage and nest in the immediate project vicinity. |
| *Ardea alba* | Great Egret | None | None | | CDF_S-Sensitive \| IUCN_LC-Least Concern | Brackish marsh \| Estuary \| Freshwater marsh \| Marsh & swamp \| Riparian forest \| Wetland | Colonial nester in large trees. | Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. |
| *Ardea herodias* | Great Blue Heron | None | None | | CDF_S-Sensitive \| IUCN_LC-Least Concern | Brackish marsh \| Estuary \| Freshwater marsh \| Marsh & swamp \| Riparian forest \| Wetland | Colonial nester in tall trees, cliffsides, and sequestered spots on marshes. | Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows. | **High Potential.** The species is known to forage and nest in the immediate project vicinity. There is a known colony in Port of Long Beach on Navy Mole. |
| *Nycticorax nycticorax* | Black-crowned Night Heron | None | None | | IUCN_LC-Least Concern | Marsh & swamp \| Riparian forest \| | Colonial nester, usually in trees, occasi | Rookery sites located adjacent to f | **High Potential.** The species is known to forage nest in the immediate project vicinity and has historically nested on Navy Mole. |
| *Egretta thula* | Snowy Egret | None | None | | IUCN_LC-Least Concern | Marsh & swamp \| Meadow & seep \| Riparian forest \| Riparian woodland \| Wetland | Colonial nester, with nest sites situated in protected beds of dense tules. | Rookery sites situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. |
| *Larus californicus* | California Gull | None | None | | CDFW_WL-Watch List \| IUCN_LC-Least Concern | | Littoral waters, sandy beaches, waters and shorelines of bays, tidal mud-flats, marshes, lakes, etc. | Colonial nester on islets in large interior lakes, either fresh or strongly alkaline. | **High Potential.** This species is common in the project vicinity only during the winter (observed foraging and resting in the project vicinity; not a local nester). |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Numenius americanus* | Long-billed Curlew | None | None | | CDFW_WL-Watch List \| IUCN_LC-Least Concern \| NABCI_YWL-Yellow Watch List \| USFWS_BCC-Birds of Conservation Concern | Great Basin grassland \| Meadow & seep | Breeds in upland shortgrass prairies and wet meadows in northeastern California. | Habitats on gravelly soils and gently rolling terrain are favored over others. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. |
| *Pandion haliaetus* | Osprey | None | None | | CDF_S-Sensitive \| CDFW_WL-Watch List \| IUCN_LC-Least Concern | Riparian forest | Ocean shore, bays, freshwater lakes, and larger streams. | Large nests built in tree-tops within 15 miles of a good fish-producing body of water. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. However, no historical nest sites are known from the project vicinity or at the proposed waste disposal site. |
| *Accipiter cooperii* | Cooper's Hawk | None | None | | CDFW_WL-Watch List \| IUCN_LC-Least Concern | Cismontane woodland \| Riparian forest \| Riparian woodland \| Upper montane coniferous forest | Woodland, chiefly of open, interrupted or marginal type. | Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. However, no nest sites are known from the project vicinity or at the proposed waste disposal site and would require surveys to confirm. |
| *Circus cyaneus* | Northern Harrier | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern | Coastal scrub \| Great Basin grassland \| Marsh & swamp \| Riparian scrub \| Valley & foothill grassland \| Wetland | Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. | Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas. | **Low Potential.** Records from Seal Beach National Wildlife Refuge to the east of the project vicinity but no foraging or nesting habitat for this species is present in the immediate project vicinity or at the proposed waste disposal site. |
| *Hydroprogne caspia* | Caspian Tern | None | None | | IUCN_LC-Least Concern \| USFWS_BCC-Birds of Conservation Concern | | Nests on sandy or gravelly beaches and shell banks in small colonies inland and along the coast. | Inland freshwater lakes and marshes; also, brackish or salt waters of estuaries and bays. | **High Potential.** The species is known to forage in the immediate project vicinity. In addition, there is a know nesting population on Pier 400 just to the west of the project site in the Port of Los Angeles. |
| *Thalasseus elegans* | Elegant Tern | None | None | | CDFW_WL-Watch List \| IUCN_NT-Near Threatened | Sand shore | Only 3 known breeding colonies: San Diego Bay, Los Angeles Harbor and Bolsa Chica Ecological Reserve. | Nests on open, sandy, undisturbed beachs and on salt-evaporating pond dikes (San Diego) in association with Caspian tern. | **High Potential.** The species is known to forage in the immediate project vicinity. In addition, there is a known nesting population on Pier 400 just to the west of the project site in the Port of Los Angeles. |
| *Gavia immer* | Common Loon | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern | Great Basin standing waters | Nesting locations at certain large lakes and reservoirs in interior of state, primarily in northeastern plateau region. | Bodies of water regularly frequented are extensive, fairly deep, and produce quantities of large fish. | **Moderate Potential.** The species is known to forage in the immediate project vicinity. |
| *Falco peregrinus anatum* | Peregrine Falcon | Delisted | Delisted | | CDF_S-Sensitive \| CDFW_FP-Fully Protected \| USFWS_BCC-Birds of Conservation Concern | | Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. | Nest consists of a scrape or a depression or ledge in an open site. | **High Potential.** May fly over and forage within the project vicinity. Historical nester within the port. |
| *Riparia riparia* | Bank Swallow | None | Threatened | | BLM_S-Sensitive \| IUCN_LC-Least Concern | Riparian scrub \| Riparian woodland | Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. | Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole. | **Low Potential.** Incidental sightings near the Port of Long Beach. However, the species is not know to commonly occur in the project area and no breeding habitat is present. |
| ***Mammals*** | | | | | | | | | |
| *Perognathus longimembris pacificus* | Pacific pocket mouse | Endangered | None | | CDFW_SSC-Species of Special Concern | Coastal scrub | Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles County. | Seems to prefer soils of fine alluvial sands near the ocean, but much remains to be learned. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Eumops perotis californicus* | Western Mastiff Bat | None | None | | BLM_S-Sensitive \| CDFW_SSC-Species of Special Concern \| WBWG_H-High Priority | Chaparral \| Cismontane woodland \| Coastal scrub \| Valley & foothill grassland | Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral, etc. | Roosts in crevices in cliff faces, high buildings, trees and tunnels. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Lasionycteris noctivagans* | Silver-haired Bat | None | None | | IUCN_LC-Least Concern \| WBWG_M-Medium Priority | Lower montane coniferous forest \| Oldgrowth \| Riparian forest | Primarily a coastal and montane forest dweller, feeding over streams, ponds & open brushy areas. | Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes, and rarely under rocks. Needs drinking water. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Lasiurus xanthinus* | Western Yellow Bat | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern \| WBWG_H-High Priority | Desert wash | Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. | Roosts in trees, particularly palms. Forages over water and among trees. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Microtus californicus stephensi* | South Coast Marsh Vole | None | None | | CDFW_SSC-Species of Special Concern | | Tidal marshes in Los Angeles, Orange and southern Ventura counties. | | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Neotoma lepida intermedia* | San Diego desert woodrat | None | None | | CDFW_SSC-Species of Special Concern | Coastal scrub | Coastal scrub of Southern California from San Diego County to San Luis Obispo County. | Moderate to dense canopies preferred. They are particularly abundant in rock outcrops, rocky cliffs, and slopes. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Nyctinomops femorosaccus* | Pocketed Free-tailed Bat | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern \| WBWG_M-Medium Priority | Joshua tree woodland \| Pinon & juniper woodlands \| Riparian scrub \| Sonoran desert scrub | Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc. | Rocky areas with high cliffs. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Nyctinomops macrotis* | Big Free-tailed Bat | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern \| WBWG_MH-Medium-High Priority | | Low-lying arid areas in Southern California. | Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Sorex ornatus salicornicus* | Southern California Saltmarsh Shrew | None | None | | CDFW_SSC-Species of Special Concern | Salt marsh | Coastal marshes in Los Angeles, Orange and Ventura counties. | Requires dense vegetation and woody debris for cover. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| *Taxidea taxus* | American badger | None | None | | CDFW_SSC-Species of Special Concern \| IUCN_LC-Least Concern | Alkali marsh, alkali playa, alpine, alpine dwarf scrub, bog & fen, brackish marsh, broadleaved upland forest, chaparral, chenopod scrub, cismontane woodland, closed-cone coniferous forest, coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub, desert dunes, desert wash, freshwater marsh, great basin grassland, great basin scrub, interior dunes, Ione formation, Joshua tree woodland, limestone, lower montane coniferous forest, marsh & swamp, meadow & seep, Mojavean desert scrub, montane dwarf scrub, north coast coniferous forest, oldgrowth, pavement plain, redwood, riparian forest, riparian scrub, riparian woodland, salt marsh, Sonoran desert scrub, Sonoran thorn woodland, ultramafic, upper montane coniferous forest, upper Sonoran scrub, valley & foothill grassland | Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. | Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows. | **Low Potential .** No habitat is present for this species in the project vicinity or at the proposed waste disposal site. |
| ***Plants*** | | | | | | | | | |
| *Aphanisma blitoides* | aphanisma | None | None | 1B.2 | | Coastal bluff scrub \| Coastal dunes \| Coastal scrub | Coastal bluff scrub, coastal dunes, coastal scrub. | On bluffs and slopes near the ocean in sandy or clay soils. 3-305 m. | **Moderate Potential.** Nearest occurrence is 8 miles away at Palos Verdes Peninsula near Los Angeles city boundary (CCH 2018). This species may exist at the project site as a waif in unmanaged areas. |
| *Astragalus pycnostachyus var. lanosissimus* | Ventura Marsh milk-vetch | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden \| SB_SBBG-Santa Barbara Botanic Garden | Coastal dunes \| Coastal scrub \| Marsh & swamp \| Salt marsh \| Wetland | Marshes and swamps, coastal dunes, coastal scrub. | Within reach of high tide or protected by barrier beaches, more rarely near seeps on sandy bluffs. 1-35 m. | **No Potential.** Habitat for this species does not exist at the project site. In addition, nearest occurrences are farther north near Santa Monica, CA (CCH 2018). |
| *Astragalus tener var. titi* | coastal dunes milk-vetch | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Coastal bluff scrub \| Coastal dunes \| Coastal prairie | Coastal bluff scrub, coastal dunes, coastal prairie. | Moist, sandy depressions of bluffs or dunes along and near the Pacific Ocean; one site on a clay terrace. 1-45 m. | **No Potential.** Habitat for this species does not exist at the project site. In addition, nearest occurrences are farther north near Inglewood, CA (CCH 2018). |
| *Atriplex coulteri* | Coulter's saltbush | None | None | 1B.2 | SB_RSABG-Rancho Santa Ana Botanic Garden | Coastal bluff scrub \| Coastal dunes \| Coastal scrub \| Valley & foothill grassland | Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland. | Ocean bluffs, ridgetops, as well as alkaline low places. Alkaline or clay soils. 2-460 m. | **Moderate Potential.** There is a historic CNDDB occurrence within 5 miles of the project site. This population is thought to be extirpated due to development in the area, but other populations still persist in the Rolling Hills area (CNDDB 2018, CCH 2018). Species in the Atriplex genus are disturbance and alkali tolerant in general. This species could exist at the project site as a waif in unmanaged areas. |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Atriplex pacifica* | south coast saltscale | None | None | 1B.2 | | Alkali playa \| Coastal bluff scrub \| Coastal dunes \| Coastal scrub | Coastal scrub, coastal bluff scrub, playas, coastal dunes. | Alkali soils. 1-400 m. | **Moderate Potential.** There is a historic CCH specimen collected around 5 miles from the project site. Other collections have been taken in the Rolling Hills area (CNDDB 2018, CCH 2018). Species in the Atriplex genus are disturbance and alkali tolerant in general. This species could exist at the project site as a waif in unmanaged areas. |
| *Atriplex parishii* | Parish's brittlescale | None | None | 1B.1 | USFS_S-Sensitive | Alkali playa \| Chenopod scrub \| Meadow & seep \| Vernal pool \| Wetland | Vernal pools, chenopod scrub, playas. | Usually on drying alkali flats with fine soils. 5-1420 m. | **Moderate Potential.** There is a historic CNDDB occurrence within 5 miles of the project site. This population is thought to be extirpated due to development in the area, but other populations still persist in the general area (CNDDB 2018, CCH 2018). Species in the Atriplex genus are disturbance and alkali tolerant in general. This species could exist at the project site as a waif in unmanaged areas. |
| *Atriplex serenana var. davidsonii* | Davidson's saltscale | None | None | 1B.2 | | Coastal bluff scrub \| Coastal scrub | Coastal bluff scrub, coastal scrub. | Alkaline soil. 0-480 m. | **Moderate Potential**. There is a historic CNDDB occurrence within 5 miles of the project site. This population could be extirpated due to development in the area, but other collections have been taken in the area (CNDDB 2018, CCH 2018). Species in the Atriplex genus are disturbance and alkali tolerant in general. This species could exist at the project site as a waif in unmanaged areas. |
| *Calochortus plummerae* | Plummer's mariposa-lily | None | None | 4.2 | SB_RSABG-Rancho Santa Ana Botanic Garden | Chaparral \| Cismontane woodland \| Coastal scrub \| Lower montane coniferous forest \| Valley & foothill grassland | Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. | Occurs on rocky and sandy sites, usually of granitic or alluvial material. Can be very common after fire. 60-2500 m. | **No Potential**. Geophytes would be unlikely to persist at the project site due to previous development and disturbance at the cruise terminal. No populations would likely establish or persist. Occurences are farther north in the mountains above Los Angeles (CCH 2018). |
| *Calochortus weedii var. intermedius* | intermediate mariposa-lily | None | None | 1B.2 | SB_RSABG-Rancho Santa Ana Botanic Garden \| USFS_S-Sensitive | Chaparral \| Coastal scrub \| Valley & foothill grassland | Coastal scrub, chaparral, valley and foothill grassland. | Dry, rocky calcareous slopes and rock outcrops. 60-1575 m. | **No Potential.** Geophytes would be unlikely to persist at the project site due to previous development and disturbance at the cruise terminal. No populations would likely establish or persist. Occurences are farther north in the mountains around Hacienda Heights (CCH 2018). |
| *Calystegia felix* | lucky morning-glory | None | None | 1B.1 | | Meadow & seep \| Riparian scrub | Meadows and seeps, riparian scrub. | Sometimes alkaline, alluvial. 9-205 m. | **Moderate Potential.** A population was discovered as recently as 2014 in El Dorado Regional Park around 7 miles from the project site (CNDDB 2018). This species seems to tolerate disturbance and could exist as a waif in unmaintained areas. |
| *Centromadia parryi ssp. australis* | southern tarplant | None | None | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Marsh & swamp \| Salt marsh \| Valley & foothill grassland \| Vernal pool \| Wetland | Marshes and swamps (margins), valley and foothill grassland, vernal pools. | Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-975 m. | **Moderate Potential.** Many occurences have been recorded within 5 miles of the project This species is tolerant of disturbance and could exist as a waif in unmaintained areas. |
| *Chloropyron maritimum ssp. maritimum* | salt marsh bird's-beak | Endangered | Endangered | 1B.2 | SB_RSABG-Rancho Santa Ana Botanic Garden \| SB_SBBG-Santa Barbara Botanic Garden | Coastal dunes \| Marsh & swamp \| Salt marsh \| Wetland | Marshes and swamps, coastal dunes. | Limited to the higher zones of salt marsh habitat. 0-10 m. | **Low Potential.** Two occurences are within 5 miles of the project, however both are reported to be extirpated. In addition, no salt marsh habitat exists at the project site. |
| *Crossosoma californicum* | Catalina crossosoma | None | None | 1B.2 | SB_RSABG-Rancho Santa Ana Botanic Garden | Chaparral \| Coastal scrub | Chaparral, coastal scrub. | On rocky sea bluffs, wooded canyons, and dry, open sunny spots on rocky clay. 5-535 m. | **Low Potential.** Occurrences are reported in the Rolling Hills area west of the project site. It is unlikely the project site would support this species though. |
| *Dudleya multicaulis* | many-stemmed dudleya | None | None | 1B.2 | BLM_S-Sensitive \| SB_RSABG-Rancho Santa Ana Botanic Garden \| USFS_S-Sensitive | Chaparral \| Coastal scrub \| Valley & foothill grassland | Chaparral, coastal scrub, valley and foothill grassland. | In heavy, often clayey soils or grassy slopes. 1-910 m. | **Low Potential.** The study area is unlikely to contain clay soils. In addition, there is too much disturbance at the site to maintain a stable population of this genus. |
| *Dudleya virens ssp. insularis* | island green dudleya | None | None | 1B.2 | | Coastal bluff scrub \| Coastal scrub | Coastal bluff scrub, coastal scrub. | Rocky soils. 0-275 m. | **Low Potential.** There is too much disturbance at the site to maintain a stable population of this genus. |
| *Eryngium aristulatum var. parishii* | San Diego button-celery | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Coastal scrub \| Valley & foothill grassland \| Vernal pool \| Wetland | Vernal pools, coastal scrub, valley and foothill grassland. | San Diego mesa hardpan & claypan vernal pools & southern interior basalt flow vernal pools; usually surrounded by scrub. 15-880 m. | **No Potential.** The study area does not have suitable habitat and is outside the optimal elevation range for this species. |
| *Helianthus nuttallii ssp. parishii* | Los Angeles sunflower | None | None | 1A | | Freshwater marsh \| Marsh & swamp \| Salt marsh \| Wetland | Marshes and swamps (coastal salt and freshwater). | 35-1525 m. | **Low Potential.** The study area is outside the elevation range for this species. |
| *Isocoma menziesii var. decumbens* | decumbent goldenbush | None | None | 1B.2 | | Chaparral \| Coastal scrub | Coastal scrub, chaparral. | Sandy soils; often in disturbed sites. 1-915 m. | **Low Potential.** An herbarium specimen was collected on Terminal Island, but the population is believed to be extirpated. May be impacted if dredge is disposed of over land. |

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Lasthenia glabrata ssp. coulteri* | Coulter's goldfields | None | None | 1B.1 | BLM_S-Sensitive \| SB_RSABG-Rancho Santa Ana Botanic Garden | Alkali playa \| Marsh & swamp \| Salt marsh \| Vernal pool \| Wetland | Coastal salt marshes, playas, vernal pools. | Usually found on alkaline soils in playas, sinks, and grasslands. 1-1375 m. | **No Potential.** Habitat for this species does not exist within the study area. |
| *Lycium brevipes var. hassei* | Santa Catalina Island desert-thorn | None | None | 3.1 | | Coastal bluff scrub \| Coastal scrub | Coastal bluff scrub, coastal scrub. | Coastal bluffs and slopes. 30-95 m. | **No Potential.** The study area is outside the elevation range for this species. |
| *Nama stenocarpa* | mud nama | None | None | 2B.2 | | Marsh & swamp \| Wetland | Marshes and swamps. | Lake shores, river banks, intermittently wet areas. 5-500 m. | **Low Potential.** There are two occurrences around 5 miles from the study area. This species perfers freshwater habitats, however. The study area would not support this species. Could be impacted if dredge disposal occurs inland. |
| *Nasturtium gambelii* | Gambel's water cress | Endangered | Threatened | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden \| SB_SBBG-Santa Barbara Botanic Garden | Brackish marsh \| Freshwater marsh \| Marsh & swamp \| Wetland | Marshes and swamps. | Freshwater and brackish marshes at the margins of lakes and along streams, in or just above the water level. 5-305 m. | **Low Potential.** All the occurrences in the Los Angeles Co. area are presumed extirpated. In addition, this species occurs in freshwater to brackish habitats, not salt water habitat associations. The study area does not have suitable habitat for this species. |
| *Navarretia fossalis* | spreading navarretia | Threatened | None | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Alkali playa \| Chenopod scrub \| Marsh & swamp \| Vernal pool \| Wetland | Vernal pools, chenopod scrub, marshes and swamps, playas. | San Diego hardpan and San Diego claypan vernal pools; in swales & vernal pools, often surrouded by other habitat types. 15-850 m. | **No Potential.** Habitat for this species does not exist within the study area, and the area is outside the elevation range for the species. |
| *Navarretia prostrata* | prostrate vernal pool navarretia | None | None | 1B.1 | | Coastal scrub \| Meadow & seep \| Valley & foothill grassland \| Vernal pool \| Wetland | Coastal scrub, valley and foothill grassland, vernal pools, meadows and seeps. | Alkaline soils in grassland, or in vernal pools. Mesic, alkaline sites. 3-1235 m. | **Low Potential.** There is a CNDDB occurrence within 4 miles of the study area. It has not been seen since 1882, and is considered likely extirpated. This species could be impacted if dredge disposal occurs over land. |
| *Nemacaulis denudata var. denudata* | coast woolly-heads | None | None | 1B.2 | SB_RSABG-Rancho Santa Ana Botanic Garden | Coastal dunes | Coastal dunes. | 0-5 m. | **Moderate Potential.** There are two occurrences around 4 miles from the study area. This species may exist at the project site as a waif in sandy unmanaged areas. Could be impacted if dredge disposal occurs over land. |
| *Orcuttia californica* | California Orcutt grass | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Vernal pool \| Wetland | Vernal pools. | 10-660 m. | **No Potential.** Habitat for this species does not exist within the study area. |
| *Pentachaeta lyonii* | Lyon's pentachaeta | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Chaparral \| Coastal scrub \| Valley & foothill grassland | Chaparral, valley and foothill grassland, coastal scrub. | Edges of clearings in chaparral, usually at the ecotone between grassland and chaparral or edges of firebreaks. 30-670 m. | **Low Potential.** There is a CNDDB occurrence within 4 miles of the study area. It is considered likely extirpated. This species could be impacted if dredge disposal occurs over land. |
| *Phacelia stellaris* | Brand's star phacelia | None | None | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden | Coastal dunes \| Coastal scrub | Coastal scrub, coastal dunes. | Open areas. 3-370 m. | **Low Potential.** There are herbarium records of this species in the area, however most are farther north near Redondo Beach or farther east near Westminster. It is unlikely this species will occur in the study area. |
| *Sidalcea neomexicana* | salt spring checkerbloom | None | None | 2B.2 | USFS_S-Sensitive | Alkali playa \| Chaparral \| Coastal scrub \| Lower montane coniferous forest \| Mojavean desert scrub \| Wetland | Playas, chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub. | Alkali springs and marshes. 3-2380 m. | **Low Potential.** The study area does not have suitable habitat for this species. |
| *Suaeda esteroa* | estuary seablite | None | None | 1B.2 | | Marsh & swamp \| Salt marsh \| Wetland | Marshes and swamps. | Coastal salt marshes in clay, silt, and sand substrates. 0-80 m. | **Moderate Potential.** There are four CNDDB occurrences within 5 miles of the study area. This species is adapted to salty coastal settings. Species in this genera tolerate disturbance. This species could exist at the project site in unmanaged areas. |
| *Symphyotrichum defoliatum* | San Bernardino aster | None | None | 1B.2 | BLM_S-Sensitive \| USFS_S-Sensitive | Cismontane woodland \| Coastal scrub \| Lower montane coniferous forest \| Marsh & swamp \| Meadow & seep \| Valley & foothill grassland | Meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. | Vernally mesic grassland or near ditches, streams and springs; disturbed areas. 3-2045 m. | **Low Potential.** Most of the recorded occurrences are from the 1930 and are presumed extirpated. The study area does not provide ideal habitat for this species. |
| ***Habitats*** | | | | | | | | | |
| Southern Dune Scrub | Southern Dune Scrub | None | None | | | Coastal dunes | | | **No Potential.** The study area is heavily developed. This vegetation community is not expected to occur in the study area. |
| Southern Foredunes | Southern Foredunes | None | None | | | Coastal dunes | | | **No Potential.** The study area is heavily developed. This vegetation community is not expected to occur in the study area. |
| Southern Coastal Salt Marsh | Southern Coastal Salt Marsh | None | None | | | Marsh & swamp \| Wetland | | | **No Potential.** The study area is heavily developed. This vegetation community is not expected to occur in the study area. |
| Southern Coastal Bluff Scrub | Southern Coastal Bluff Scrub | None | None | | | Coastal bluff scrub | | | **Low Potential.** The study area is heavily developed. This vegetation community has a low potential to have established on the riprap along the ocean front. |

Potential to Occur:

| Appendix B1: CNDDB Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Long Beach Cruise Terminal Improvement Project | | | | | | | | | |
| SciName | ComName | FedList | CalList | RPlantRank | OthrStatus | Habitats | GenHab | MicroHab | Potential to Occur |

**No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

**Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

**Potential.** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

**High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

| Appendix B2: US Fish and Wildlife Service Additional Species from Eight Quad Scoping Surrounding Long Beach, CA (not on CNDDB scoping list) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **RPlantRank** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| Euphilotes battoides allyni | El Segundo Blue Butterfly | Endangered | None | | XERCES_CI-Critically Imperiled | Coastal dunes | Restricted to remnant coastal dune habitat in Southern California. | Host plant is *Eriogonum parvifolium* ; larvae feed only on the flowers and seeds; used by adults as major nectar source. | **Low Potential.** The closest known records of this species to the project area are from coastal dunes on the west side of Ranco Palos Verdes and along Redondo Beach. No coatal dune habiata is present at or directly adjacen to the projuect site or proposed waste disposal site. The coastal dune host plant (*Eriogonum parvifolium* ) is also unlikely to occur in the project vicinity or at the proposed waste disposal site. |
| Branchinecta sandiegonensis | San Diego Fairy Shrimp | Endangered | None | | IUCN_EN-Endangered | Chaparral \| Coastal scrub \| Vernal pool \| Wetland | Endemic to San Diego and Orange County mesas. | Vernal pools. | **No Potential.** No vernal pools exist at or near the study area. |
| Berberis nevinii | Nevin's Barberry | Endangered | Endangered | 1B.1 | SB_RSABG-Rancho Santa Ana Botanic Garden \| SB_SBBG-Santa Barbara Botanic Garden | Chaparral \| Cismontane woodland \| Coastal scrub \| Riparian scrub | Chaparral, cismontane woodland, coastal scrub, riparian scrub. | On steep, N-facing slopes or in low grade sandy washes. 290-1575 m. | **Low Potential.** There are no occurrence of this species along the coast and the study area is outside its elevation range. |

Potential to Occur:

**No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

**Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

**Moderate Potential** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

**High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

| Appendix B3: California Native Plant Society Additional Species from Eight Quad Scoping Surrounding Long Beach, CA (not on CNDDB or IPaC) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Long Beach Cruise Terminal Improvement Project | | | | | | | | | | |
| **Scientific Name** | **Common Name** | **Lifeform** | **Rare Plant Rank** | **CESA** | **FESA** | **Blooming Period** | **Elevation (m)** | **Habitat** | **MicroHabitat** | **Potential to Occur** |
| *Calochortus catalinae* | Catalina mariposa lily | perennial bulbiferous herb | 4.2 | None | None | (Feb) Mar-Jun | 15-700 | Chaparral, Cismontane woodland, Coastal scrub, Valley and foothill grassland | | **No Potential.** Geophytes would be unlikely to persist at the project site due to previous development and disturbance at the cruise terminal. No populations would likely establish or persist. The occurrences are recorded in the Rolling Hills area to the west. |
| *Calystegia peirsonii* | Peirson's morning-glory | perennial rhizomatous herb | 4.2 | None | None | Apr-Jun | 30-1500 | Coastal bluff scrub, Coastal scrub, Valley and foothill grassland | sandy | **Moderate Potential.** An herbarium record was collected a little over 5 miles from the project site in 1994 (CCH 2018). This species is tolerant of disturbance and could exist as a waif in unmaintained areas. |
| *Camissoniopsis lewisii* | Lewis' evening-primrose | annual herb | 3 | None | None | Mar-May (Jun) | 0-300 | Chaparral (openings), Coastal scrub, Valley and foothill grassland | clay, serpentinite seeps | **Moderate Potential.** An herbarium record was collected a little over 5 miles from the project site in San Pedro (CCH 2018). This species is tolerant of disturbance and could exist as a waif in unmaintained areas. |
| *Cistanthe maritima* | seaside cistanthe | annual herb | 4.2 | None | None | (Feb) Mar-Jun (Aug) | 5-300 | Coastal bluff scrub, Coastal scrub, Valley and foothill grassland | sandy | **Low Potential.** The nearest occurrence is farther north near Santa Monica or Catalina Island. It is unlikely this species will occur in the project boundary due to the development onsite and continual disturbance. |
| *Convolvulus simulans* | small-flowered morning-glory | annual herb | 4.2 | None | None | Mar-Jul | 30-740 | Chaparral (openings), Coastal scrub, Valley and foothill grassland | clay, serpentinite seeps | **Low Potential**. Herbarium records were collected a little over 5 miles from the project site in San Pedro and Rolling Hills (CCH 2018). This species, however, prefers serpentine or wet clay sites. It is unlikely this area will support this species. Could be affected if dredge material is disposed of via an inland route. |
| *Hordeum intercedens* | vernal barley | annual herb | 3.2 | None | None | Mar-Jun | 5-1000 | Coastal dunes, Coastal scrub, Valley and foothill grassland (saline flats and depressions), Vernal pools | | **Moderate Potential.** The nearest occurrence is farther north near Marina Del Rey. This species is easily mistaken for a more common relative. Species in this genus are disturbance tolerant and could be present at the project site. |
| *Juglans californica* | Southern California black walnut | perennial deciduous tree | 4.2 | None | None | Mar-Aug | 50-900 | Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland | alluvial | **No Potential.** Habitat for this species does not exist within the study area, and the area is outside the elevation range for the species. The nearest reported occurrence is north of the project site, near Torrance. |
| *Leptosyne maritima* | sea dahlia | perennial herb | 2B.2 | None | None | Mar-May | 5-150 | Coastal bluff scrub, Coastal scrub | | **No Potential.** Populations in Los Angeles Co. are presumed extirpated. |
| *Lycium californicum* | California box-thorn | perennial shrub | 4.2 | None | None | (Dec) Mar, Jun, Jul, Aug | 5-150 | Coastal bluff scrub, Coastal scrub | | **Low Potential.** Herbarium specimens have been collected within 2 miles of the study area. Most are probably extirpated. The species is not particularly disturbance tolerant and it is unlikely this species has persisted or colonized the project area's habitats. |
| *Phacelia hubbyi* | Hubby's phacelia | annual herb | 4.2 | None | None | Apr-Jul | 0-1000 | Chaparral, Coastal scrub, Valley and foothill grassland | gravelly, rocky, talus | **Moderate Potential.** There are herbarium specimens of this species from 2004 from the Rolling Hills area to the west along the water. This species may exist at the project site in unmanaged areas. |
| *Ribes divaricatum var. parishii* | Parish's gooseberry | perennial deciduous shrub | 1A | None | None | Feb-Apr | 65-300 | Riparian woodland | | **No Potential.** Habitat for this species does not exist within the study area. |
| *Suaeda taxifolia* | woolly seablite | perennial evergreen shrub | 4.2 | None | None | Jan-Dec | 0-50 | Coastal bluff scrub, Coastal dunes, Marshes and swamps (margins of coastal salt) | | **Moderate Potential.** There are many herbarium records (as recent as 2010) of this species in the nearby area and along the coast. Species in this genera tolerate disturbance. This species could exist at the project site in unmanaged areas. |

Potential to Occur:

**No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

**Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

**Moderate Potential.** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

**High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

| Appendix B4: NMFS Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab*** | **Potential to Occur** |
| *Oncorhynchus kisutch* | Coho Salmon - southern Oregon/northern California ESU | Threatened | Threatened | AFS_TH-Threatened | Aquatic \| Klamath/North coast flowing waters \| Sacramento/San Joaquin flowing waters | Federal listing refers to populations between Cape Blanco, Oregon and Punta Gorda, Humboldt County, California. | State listing refers to populations between the Oregon border and Punta Gorda, California. | **Low Potential.** Outside of species and ESU's range. |
| *Oncorhynchus kisutch* | Coho Salmon - Central California Coast ESU | Endangered | Endangered | AFS_EN-Endangered | Aquatic | Federal listing = pops between Punta Gorda & San Lorenzo River. State listing = pops south of Punta Gorda. | Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen. | **Low Potential.** Outside of species and ESU's range. |
| *Oncorhynchus tshawytscha* | Chinook Salmon - California Coastal ESU | Threatened | None | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters | Federal listing refers to wild spawned, coastal, spring & fall runs between Redwood Cr, Humboldt Co & Russian River, Sonoma Co | | **Low Potential.** Outside of species and ESU's range. |
| *Oncorhynchus tshawytscha* | Chinook Salmon - Central Valley spring-run ESU | Threatened | Threatened | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters | Adult numbers depend on pool depth and volume, amount of cover, and proximity to gravel. Water temps >27 C are lethal to adults. | Federal listing refers to populations spawning in Sacramento River and tributaries. | **Low Potential.** Outside of species and ESU's range. |
| *Oncorhynchus tshawytscha* | Chinook Salmon - Sacramento River winter-run ESU | Endangered | Endangered | AFS_EN-Endangered | Aquatic \| Sacramento/San Joaquin flowing waters | Sacramento River below Keswick Dam. Spawns in the Sacramento River, but not in tributary streams. | Requires clean, cold water over gravel beds with water temperatures between 6 and 14 C for spawning. | **Low Potential**. Outside of species and ESU's range. |
| *Oncorhynchus mykiss irideus* | Steelhead - northern California DPS | Threatened | None | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters | Coastal basins from Redwood Creek south to the Gualala River, inclusive. Does not include summer-run steelhead. | | **Low Potential.** Outside of DPS's range. |
| *Oncorhynchus mykiss irideus* | Steelhead - Central California coast DPS | Threatened | None | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters | From Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay basins. | | **Low Potential.** Outside of DPS's range. |
| *Oncorhynchus mykiss irideus* | Steelhead - south-central California coast DPS | Threatened | None | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters \| South coast flowing waters | Federal listing refers to runs in coastal basins from the Pajaro River south to, but not including, the Santa Maria River. | | **Low Potential.** Outside of DPS's range. |
| *Oncorhynchus mykiss irideus* | Steelhead - southern California DPS | Endangered | None | AFS_EN-Endangered | Aquatic \| South coast flowing waters | Federal listing refers to populations from Santa Maria River south to southern extent of range (San Mateo Creek in San Diego County). | Southern steelhead likely have greater physiological tolerances to warmer water and more variable conditions. | **Low Potential.** Few occurrences along this stretch of coast. DPS may be extirpated. |
| *Oncorhynchus mykiss irideus* | Steelhead - California Central Valley DPS | Threatened | None | AFS_TH-Threatened | Aquatic \| Sacramento/San Joaquin flowing waters | Populations in the Sacramento and San Joaquin rivers and their tributaries. | | **Low Potential.** Outside of DPS's range. |
| *Thaleichthys pacificus* | Eulachon | Threatened | None | | Aquatic \| Klamath/North coast flowing waters | Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries. | Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris. | **Low Potential.** Outside of species range. |
| *Acipenser medirostris* | Green Sturgeon - southern DPS | Threatened | None | AFS_VU-Vulnerable \| CDFW_SSC-Species of Special Concern \| IUCN_NT-Near Threatened \| NMFS_SC-Species of Concern | Aquatic \| Klamath/North coast flowing waters \| Sacramento/San Joaquin flowing waters | These are the most marine species of sturgeon. Abundance increases northward of Point Conception. Spawns in the Sacramento, Klamath, & Trinity Rivers. | Spawns at temps between 8-14 C. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock. | **Low Potential.** This species prefers more northern waters around the San Francisco Bay and Columbia River, but in a rare 2008 El Niño year occured as far south as Baja California. |

| Appendix B4: NMFS Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab*** | **Potential to Occur** |
| *Haliotis cracherodii* | Range Black Abalone | Endangered | None | IUCN_CR-Critically Endangered | Marine intertidal & splash zone communities | Mid to low rocky intertidal areas. | Black abalone live on rocky substrates in intertidal and shallow subtidal reefs (to about 18 feet deep) along the coast. They typically occur in habitats with complex surfaces and deep crevices that provide shelter for juveniles and adults. Because they occur in coastal habitats, black abalone can withstand extreme variations in temperature, salinity, moisture, and wave action (NMFS). | **Moderate Potential.** This species could occur in the rip rap environment along oceans edge. |
| *Haliotis sorenseni* | Range White Abalone | Endangered | None | | Marine intertidal & splash zone communities | Rocky pinnacles and deep reefs in Southern California; especially those off the Channel Islands. | White abalone live on rocky substrates alongside sand channels, which tend to accumulate the algae they eat. Live at depths of at least 80 feet to over 200 feet. | **Moderate Potential.** This species could occur in the rip rap environment along oceans edge. |
| *Chelonia mydas* | Green Sea Turtle - East Pacific DPS | Threatened | None | IUCN_EN-Endangered | Marine bay | Marine. | Completely herbivorous; needs adquate supply of seagrasses and algae. | **Moderate Potential**. Species is known to occupy warm water outfall at the Haynes Generating Station near the mouth of the san gabriel River 4.5 miles east of the project site, but is not known to forage outside the outfall area. |
| *Lepidochelys olivacea* | Olive Ridley Sea Turtle | Endangered | None | IUCN_VU-Vulnerable | Marine | Marine | Tropical and subtropical waters including protected, shallow, marine and estuarine waters, bays and lagoons, to offshore areas. Nesting occurs on upper beaches. | **Low Potential**. Occasional visitor to California waters but rarely present at any one time or location. |
| *Dermochelys coriacea* | Leatherback Sea Turtle | Endangered | None | IUCN_CR-Critically Endangered | Marine | Marine | Open ocean. Also seas, gulfs, bays, and estuaries. Seldom approaches land except for nesting. | **Low Potential**. Occasional visitor to California waters but rarely present at any one time or location. |
| *Caretta caretta* | North Pacific Loggerhead Sea Turtle | Endangered | None | IUCN_EN-Endangered | Marine | Marine | Open sea to more than 500 miles from shore, mostly over continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers; mainly warm temperate and subtropical regions not far from shorelines | **Low Potential**. Occasional visitor to California waters but rarely present at any one time or location. |
| *Balaenoptera musculus* | Blue Whale | Endangered | None | IUCN_EN-Endangered | Marine | Marine | Mainly pelagic; generally prefers cold waters and open seas, but young are born in warmer waters of lower latitudes | **Low Potential.** Species is occasionally observed just outside the outer harbor. However, no suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Balaenoptera physalus* | Fin Whale | Endangered | None | IUCN_EN-Endangered | Pelagic | Pelagic | Pelagic; usually found in largest numbers 25 miles or more from shore. Young are born in the warmer waters of the lower latitudes. | **Low Potential.** Species is a seasonal migrant and frequently observed just outside the outer harbor. However, no suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Megaptera novaeangliae* | Humpback Whale | Endangered | None | IUCN_LC-Least Concern | Marine | Marine | Habitat includes the open ocean and coastal waters, sometimes including inshore areas such as bays. Summer distribution is in temperate and subpolar waters. In winter, most humpbacks are in tropical/subtropical waters near islands or coasts. | **Low Potential.** Species is a seasonal migrant and frequently observed just outside the outer harbor. However, no suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Orcinus orca* | Southern Resident Killer Whale | Endangered | None | | Near shore, pelagic | Near shore, pelagic | Mainly in coastal waters, but may occur anywhere in all oceans and major seas at any time of year | **Low Potential.** Species range center in the Puget Sound region with furthest records south to Central California. The project vicinity and the waste disposal vicinity are outside of the known range for this species. |

| Appendix B4: NMFS Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | |
| **SciName** | **ComName** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab*** | **Potential to Occur** |
| *Eubalaena japonica* | North Pacific Right Whale | Endangered | None | IUCN_EN-Endangered | Marine | Marine (North Pacific) | Near shore, Pelagic, Bearing Sea Shelf, Gulf of Alaska | **Low Potential. C**onsidered to be one of the rarest whale species and population size is estimated to be only a few hundred individuals. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Balaenoptera borealis* | Sei Whale | Endangered | None | IUCN_EN-Endangered, MMPA Depleted | Marine | Marine | Generally in deep water; along edge of continental shelf and in open ocean. | **Low Potential.** Population for the North Pacific is estimated at only 8,600 individuals. Typically observed in deep water far from the coast or along the continental shelf. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Physeter macrocepha* | Sperm Whale | Endangered | None | IUCN_VU-Vulnerable, MMPA Depleted | Marine | Marine | Tends to occur near productive waters, and often near continental shelves. Females generally restricted to waters with surface temperatures warmer than about 15 degrees C and rarely found in waters less than 1000 m deep. Males, although primarily found in deep water, are sometimes found in waters 200 to 1000 m deep. | **Low Potential.** Observed in deep water between Long Beach and Avalon island. Prefers deep water along continental shelfs and marine trench/canyons associated with productive upwellings. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Arctocephalus townsendi* | Guadalupe Fur Seal | Threatened | Threatened | CDFW_FP-Fully Protected, IUCN_NT-Near Threatened, MMPA Depleted | Marine intertidal & splash zone communities \| Protected deepwater coastal communities | Breeds on Isla de Guadalupe off of Mexico, occasionally found on San Miguel, San Nicolas, and San Clemente islands. | Prefers shallow, nearshore island water, with cool and sheltered rocky areas for haul-outs. | **Low Potential.** Small breeding population known on the northern Channel Islands (San Miguel Island) although the majority of the population breeds in Mexico on Guadalupe Island. Breeding habitat includes coastal rocky areas and caves. Uncommonly observed species during the non-breeding season. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |

*Microhabitat details from CNDDB 2018 or NatureServe 2018

Potential to Occur:

**No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

**Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

**Moderate Potential.** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

**High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

| Appendix B5: NMFS MMPA Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **MMPA Status** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Berardius bairdii* | Baird's Beaked Whale | MMPA Depleted | None | None | | Pelagic | Pelagic | Typically occurs in waters deeper that 1000m. Found over the continental slope and areas with submarine escarpments. | **Low Potential.** Infrequently observed in shallow nearshore waters. Preferred habitat is pelagic and associated with deep water. No prime habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the project vicinity . |
| *Ziphius cavirostris* | Cuvier's Beaked Whale | MMPA Protection | None | None | IUCN_LC-Least Concern | Pelagic | Pelagic | Typically occurs in deep offshore tropical and temperate waters. | **Low Potential.** Infrequently observed in shallow nearshore waters. Preferred habitat is pelagic and associated with deep water. No prime habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the immediate project vicinity . |
| *Kogia sima* | Dwarf Sperm Whale | MMPA Protection | None | None | | Pelagic | Pelagic | Found and temperate and tropical seas. Forages in deep water at can dive to 300 meters. Almost never observed at the water's surface. | **Low Potential.** Rare species to observe in Southern California waters. Preferred habitat is pelagic and associated with deep water. No prime habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the immediate project vicinity . |
| *Pseudorca crassidens* | False Killer Whale | MMPA Protection | None | None | | Pelagic | Pelagic | Found in tropical, subtropical, and temperate waters although not abundant anywhere. Generally in deep, offshore waters. | **Low Potential.** Rare species to observe in Southern California waters. Preferred habitat is pelagic and associated with deep water. No prime habitat for the species is present on or directly adjacent to the project site or proposed waste disposal area. No records of the species from the immediate project vicinity . |
| *Eschrichtius robustus* | Gray Whale (Western North Pacific) | MMPA Depleted | Endanger | None | IUCN_CR-Critically Endangered | Pelagic | Pelagic | Found along the coast of eastern Asia. | **Low Potential.** The project vicinity and proposed waste disposal site fall outside the species' primary range and any occurrences would be highly incidental. |
| *Eschrichtius robustus* | Gray Whale (Eastern North Pacific) | MMPA Protection | Delisted | None | IUCN_LC-Least Concern | Pelagic | Pelagic | Found along the west coast of North America. Summers in the Bering and Chukchi Seas but occasionall visitors to the Pacific coast in Northern California. | **Moderate Potential.** Species is a seasonal migrant and frequently observed just outside the outer harbor. |
| *Mesoplodon carlhubbsi* | Hubb's Beaked Whale | MMPA Protection | None | None | | Pelagic | Pelagic | Range is limited to the North Pacific Ocean. Species rarely observed and limited to deep waters. | **Low Potential.** No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Orcinus orca* | Killer Whale | MMPA Protection | None | None | | Pelagic | Nearshore pelagic | Resident, trasient, and migratory populations off the west coast of North America in bays/sounds as well as the open ocean. | **Low Potential.** Occasionally observed off coast from Point Vicente (Rancho Palos Verdes) and San Pedro. Rarely near shore. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Balaenoptera acutorostrata* | Minke Whale | MMPA Protection | None | None | IUCN_LC-Least Concern | Pelagic | Nearshore pelagic | In bays/sounds as well as the open ocean. | **Low Potential.** Occasionally observed offshore near Orange County. Animals in nearshore waters off California are generally considered residents. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Kogia breviceps* | Pygmy Sperm Whale | MMPA Protection | None | None | | Pelagic | Seward of continental shelf, also coastal waters | Found in mid-and deep water and near the ocean flor | **Low Potential.** Rarely observed at the waters surface. Prefer deep water. No records of this species from the project vicinity. In addition, no suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Globicephala macrorhynchus* | Short Finned Pilot Whale | MMPA Protection | None | None | | Pelagic | Pelagic tropical and temperate waters | Prefer deep waters (associated with squid prey habtat) | **Low Potential.** Historic resident population around Santa Catalina Island believed to be extirpated. Occasional sightings off San Diego. Species is found inshore mainly in spring off southern California. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |

| Appendix B5: NMFS MMPA Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **MMPA Status** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Mesoplodon stejnegeri* | Stejneger's Beaked Whale | MMPA Protection | None | None | | Pelagic | Cold, temperate, or subarctic water of the North Pacific Ocean | Deep offshore waters and seaward of the continental slope | **Low Potential.** Prefers deep waters (associated with squid prey). No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Phocoenoides dalli* | Dall's Porpoise | MMPA Protection | None | None | IUCN_LC-Least Concern | North Pacific Ocean from Gulf of Alaska and Bering sea south to Japan (to west) and U.S/Mexico border (to east) | Pelagic, nearshore pelagic | Species may move inshore near the California coast in the winter and spring. Observed in the open ocean as well as bays and sounds. | **Low Potential.** Records of this species in Santa Monica Bay and the San Pedo Channel but none close to shore near the Port of Long Beach. |
| *Phocoena phocoena* | Harbor Porpoise | MMPA Protection | None | None | IUCN_LC-Least Concern | North Atlantic and North Pacific in coastal and offshore waters | Pelagic, nearshore pelagic | Bays, estuaries, harbors, and fjords | **Low Potential.** Range on the west coast of North America extends from the Beaufort Sea south to Monterey Bay, California. The project area and waste disposal site are outside the known range for this species. |
| *Lissodelphis borealis* | Northern Right Whale Dolphin | MMPA Protection | None | None | IUCN_LC-Least Concern | North Pacific Ocean. On the west coast of North America from the Gulf of Alaska to Baja California. | Pelagic, deep cold waters | deep water on outer continental shelf | **Low Potential.** Uncommon species in nearshore southern California waters. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Lagenorhynchus obliquidens* | Pacific White Sided Dolphin | MMPA Protection | None | None | IUCN_LC-Least Concern | Kamchatka Peninsula, Amchitka Island, and Kodiak Island south into Sea of Japan and along entire Pacific coast of Japan, and south to tip of Baja California in the eastern Pacific | Pelagic | Seaward edge of continental slope. Close to shore in areas of deep water. | **Moderate Potential.** Species has been infrequently observed in the outer harbor. Outer harbor may prove foraging opportunities in the form of schooling fish. |
| *Grampus griseus* | Risso's Dolphin | MMPA Protection | None | None | | Temperate and tropic waters worldwide | Pelagic | Deep offshore waters and edge of the continental shelf. However, can also occur in nearshore waters. | **Low Potential.** Numerous records offshore near Catalina Island and the Channel Islands. Infrequently seen close to shore and no known records from the Port of Long Beach. |
| *Delphinus delphis* | Short-Beaked Common Dolphin | MMPA Protection | None | None | IUCN_LC-Least Concern | Worldwide in tropical and temperate oceans | Nearshore pelagic | Asspcoated with prey-rich upwellings near underwater ridges and continental shelves. | **Moderate Potential.** *Delphinus sp.* have been infrequently observed in the outer harbor. Outer harbor may prove foraging opportunities in the form of schooling fish. |
| *Stenella coeruleoalba* | Striped Dolphin | MMPA Protection | None | None | IUCN_LC-Least Concern | Worldwide in subtropical and temperate oceans | Pelagic, seward of continental shelf | Asspcoated with prey-rich upwellings near underwater ridges and continental shelves. | **Low Potential.** Uncommon species in nearshore southern California waters. No suitable habitat for this species exists in the project vicinity or in the vicinity of the proposed waste disposal site. |
| *Tursiops truncatus* | Common Bottlenose Dolphin | MMPA Protection | None | None | IUCN_LC-Least Concern | Worldwide in tropical, subtropical, and temperate oceans | Nearshore pelagic, coastal | Bay/sound, lagoon, estuary, tidal river | **High Potential.** *Tursiops sp.* have been observed in the outer as well as the inner harbor. Sightings right off of the Queen Mary Dock. |
| *Zalophus californianus* | California Sea Lion | MMPA Protection | None | None | IUCN_LC-Least Concern | West coast of North America, shallow waters from Canada to U.S./Mexico border | Coastal waters, upwellings | Sancy beaches, docks, buoys, jetties, rocky coves | **High Potential.** Known to occur in the project area year-round. Sightings from the inner as well as the outer harbor. |
| *Mirounga angustirostris* | Northern Elephant Seal | MMPA Protection | None | None | IUCN_LC-Least Concern | Eastern and Central North Pacific Ocean from Gulf of Alaska to Baja California | Breeding habitat includes offshore islands in southern California and Mexico | Deep water, sandy beaches, care rock/talus/scree | **Low Potential.** Known occurencess from offshore islands (Catalina Island and Channel Islands) and offshore of Orange County. Unlikely to occur in Port of Long Beach or proposed waste disposal vicinity based on habitat and historical records. |
| *Callorhinus ursinus* | Northern Fur Seal | MMPA Depleted | None | None | IUCN_VU-Vulnerable | North Pacific Ocean. Bearing Sea to Baja California. | Pelagic | open ocean, rocky and sandy beaches | **Low Potential.** Uncommon species nearshore. Prefers open ocean except during the breeding season, when the species is found on offshore islands. Unlikely to occur in Port of Long Beach or proposed waste disposal vicinity based on habitat and historical records. |

| Appendix B5: NMFS MMPA Species from Eight Quad Scoping Surrounding Long Beach, CA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Long Beach Cruise Terminal Improvement Project** | | | | | | | | | |
| **SciName** | **ComName** | **MMPA Status** | **FedList** | **CalList** | **OthrStatus** | **Habitats** | **GenHab** | **MicroHab** | **Potential to Occur** |
| *Phoca vitulina richardii* | Pacific Harbor Seal | MMPA Protection | None | None | IUCN_LC-Least Concern | North Pacific Ocean. From Aleutian Islands in Alaska to Baja California, Mexico. | Marine, coastal | Bay/sound, lagoon, estuary, tidal river, tidal flat, shore | **High Potential.** Known to occur in the project area year-round. |
| *Eumetopias jubatus* | Steller Sea Lion | MMPA Protection | Delisted | None | IUCN_NT-Near Threatened, MMC SSC | California north to the Bering Strait | Nearshore, pelagic | Nearshore islands, tidal flats, shores, and in coastal waters | **Low Potential.** Majority of occurrences between the Channel Islands and Oxnard and off the coast of Long Beach. Occurences in the harbor would be incidental and rare. |

*Habitat details from NatureServe 2018 AND NOAA Fisheries Species Directory

Potential to Occur:

**No Potential:** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

**Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

**Moderate Potential.** Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

**High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

# Appendix C Site Photographs

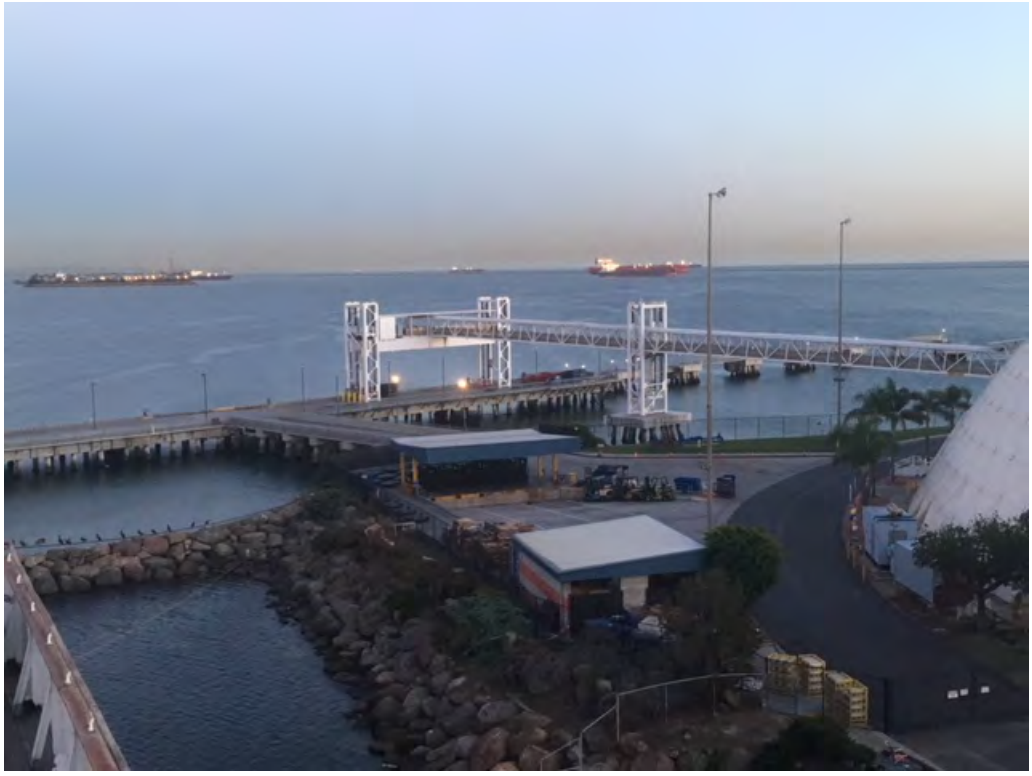


Photo 1: Facing southeast- View of passenger gangway for Long Beach Cruise Terminal.

Photo 2: Facing southeast- View of passenger gangway with cruise liner at berth for Long Beach Cruise Terminal.

# Appendix C: Site Photographs

Photo 3: Facing east- View of dock with cruise liner at berth for Long Beach Cruise Terminal.

Photo 4: Facing northeast- View of northern mooring dolphin.

Photo 5: Facing southwest- View of Long Beach Cruise Terminal building seen from dock.

Photo 6: Facing north- View of catwalk to northern mooring dolphin.

# Appendix C: Site Photographs

Photo 7: Facing south- View of catwalk to passenger gangway.

Photo 8: Facing south- View of catwalk to passenger gangway.

# Appendix C: Site Photographs

Photo 9: Facing northwest- View from dock of Long Beach Cruise Terminal building and passenger gangway.

Photo 10: Facing north- View from dock of Long Beach Cruise Terminal building, passenger gangway and southern catwalk.

## Appendix C: Site Photographs

Photo 11: Facing northwest- Close-up view from dock of Long Beach Cruise Terminal building and passenger gangway.

Photo 12: Facing northwest- Close-up view from dock of passenger gangway.

Photo 13: Facing northwest- Close-up view of passenger gangway.

Photo 14: Facing north- Close-up view of passenger gangway.

# Appendix C: Site Photographs

Photo 15: Facing northeast- View of southern catwalk to passenger gangway.

Photo 16: Facing east- View of southern catwalk.

Photo 17: Facing southeast- View of southern catwalk to southern mooring dolphin.

Photo 18: Facing west- View of parking garage.

Photo 19: Facing northwest- View of parking garage proposed expansion area.

Photo 20: Facing southwest- View of parking garage and street (expansion area).

Photo 21: Facing northwest - Overview of parking expansion area and Queen Mary.

Photo 22: Facing north- Overview of study area and Queen Mary.

Photo 23: Facing northeast- Overview of study area, Long Beach Cruise Terminal building and Queen Mary.

Photo 24: Facing northwest- Overview of study area and parking lots.

Photo 25: Facing west- Overview of study area and parking lots.

Photo 26: Facing west- Overview of study area and electrical station.

Photo 27: Facing east- Overview of study area, Long Beach Cruise Terminal building and southern catwalk.

Photo 28: Facing east- View of passenger gangway and southern catwalk.

Photo 29: Facing east- View of southern catwalk.

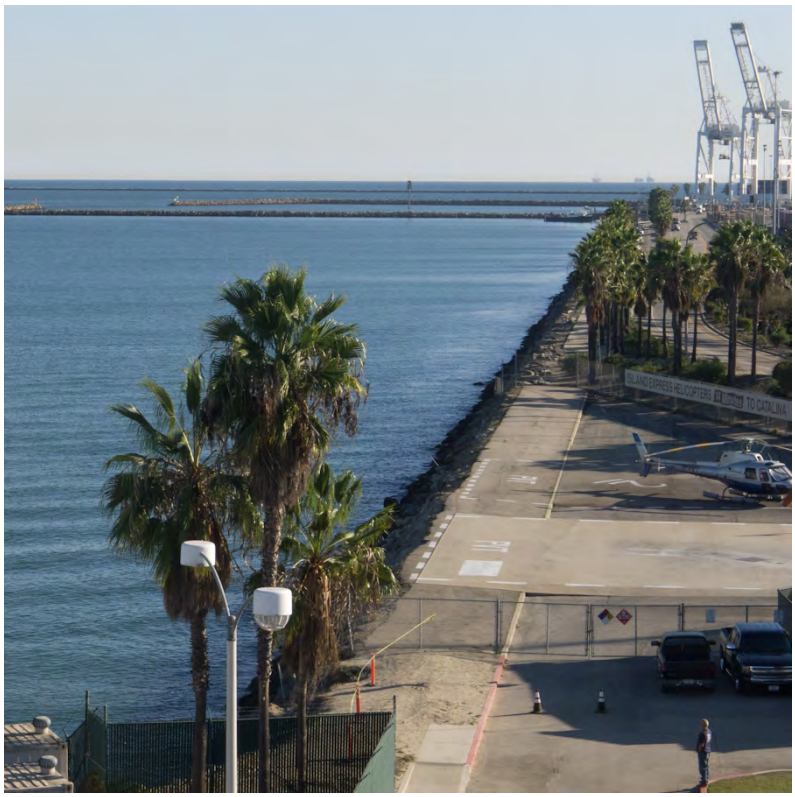


Photo 30: Facing southeast- View of coastline and helipad.

# Appendix C: Site Photographs

Photo 31: Facing south- View of surrounding area.

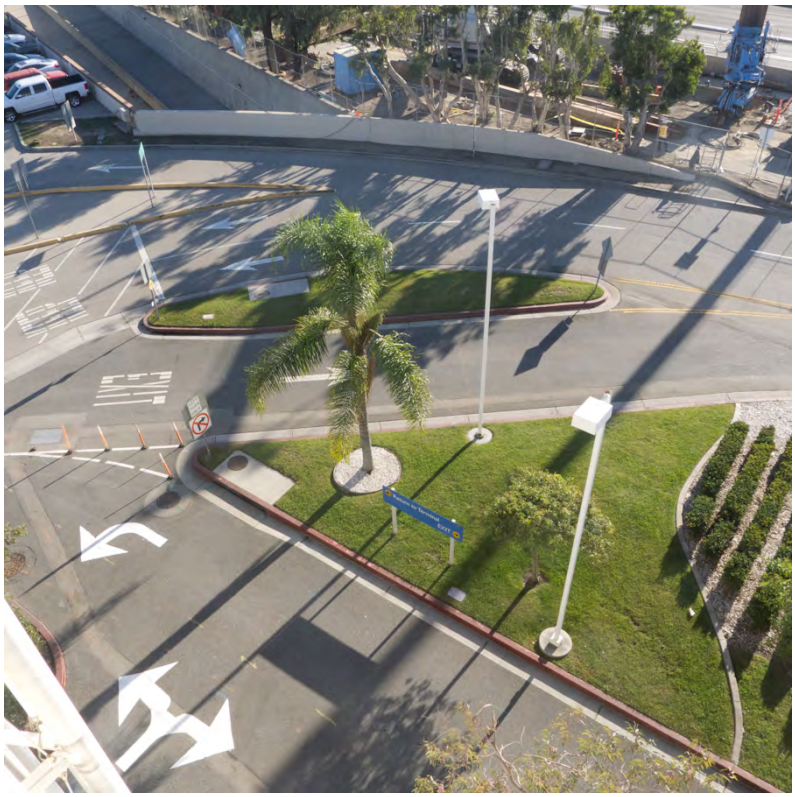


Photo 32: Facing south- View of study area streets.

# Appendix C: Site Photographs

Photo 33: Facing southwest- View of study area streets.

Photo 34: Facing northeast - View of catwalks and coastline.

Photo 35: View of rip rap environment near project area.

Photo 36: Facing south - View of rip rap environment.

Photo 37: View of a mooring dolphin piling.

Photo 38: Facing northeast- View of mooring dolphin pilings.

Photo 39: Barge conducting Port maintenance activity during recon visit.

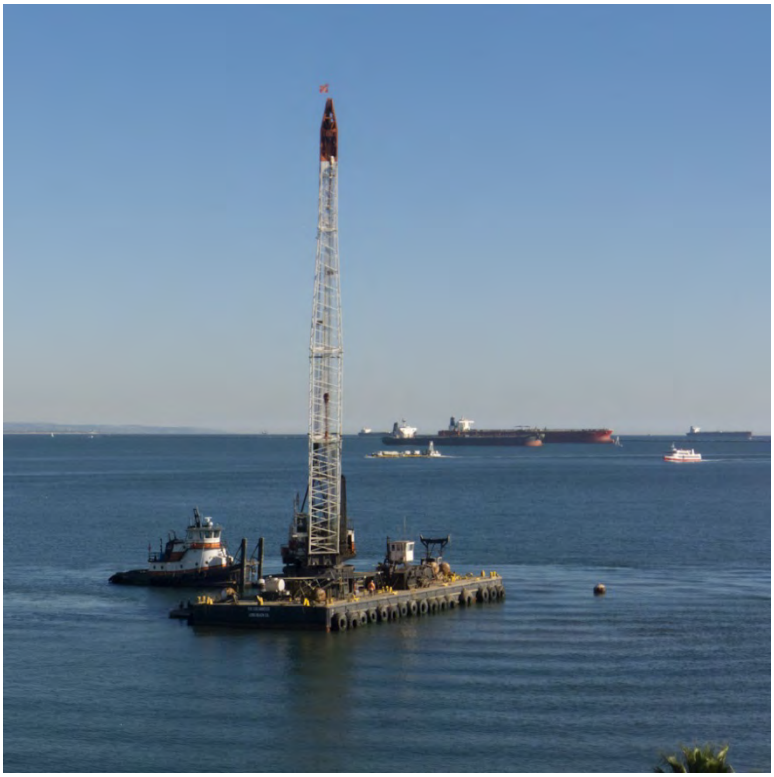


Photo 40: Barge conducting Port maintenance activity during recon visit.

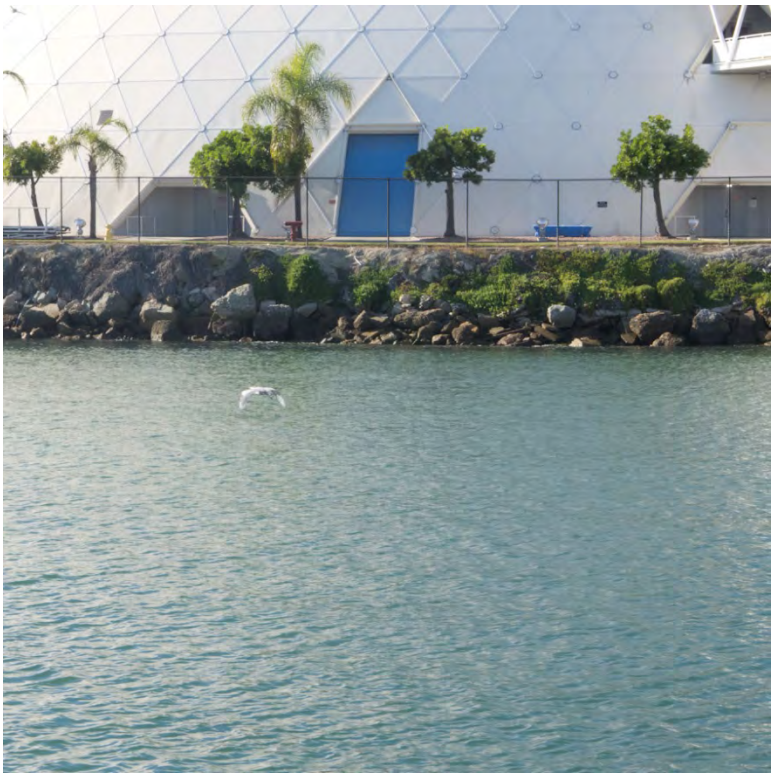


Photo 41: Facing northwest- View of rip rap environment near Long Beach Cruise Terminal Building.

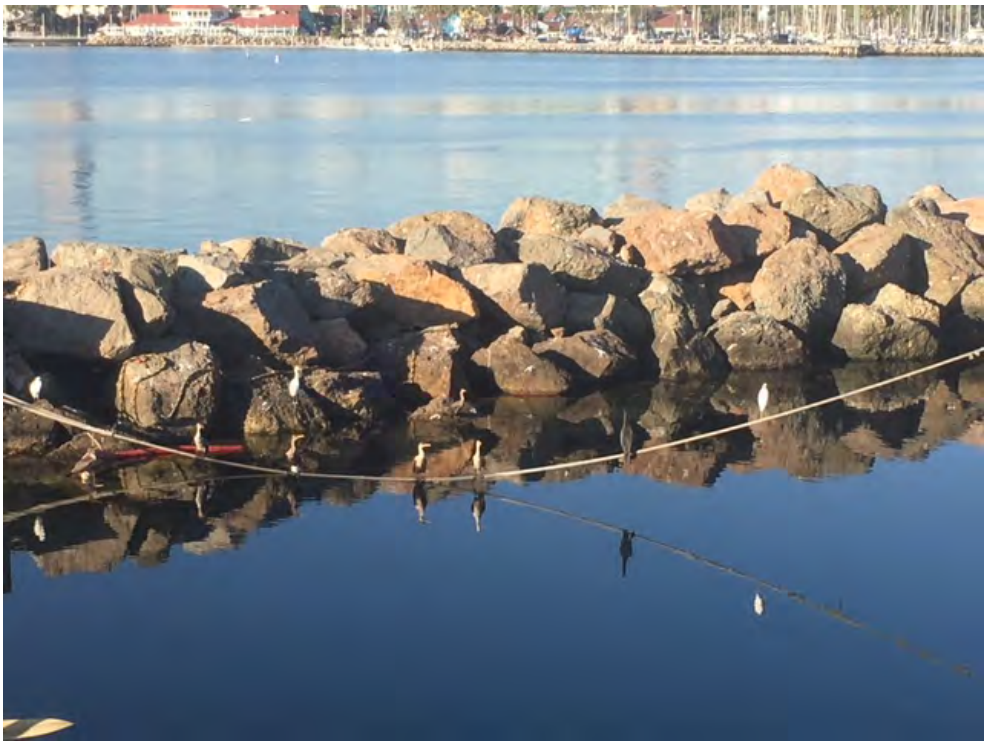


Photo 42: Facing north- View of rip rap environment and birds near Queen Mary (Double-crested Cormorants and Snowy Egrets).

Photo 43: Facing northwest- View of adjacent Queen Mary (north of project area).

Photo 44: Facing north- View of adjacent Queen Mary (north of project area).

# Appendix D Marine Mammal Impact Calculators

## Appendix D: Marine Mammal Noise Modeling Calculators

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

**VERSION 2.0: 2018**

KEY

| | |
|---|---|
| | **User Provided Information** |
| | **NMFS Provided Information (Technical Guidance)** |
| | **Resultant Isopleth** |

**STEP 1: GENERAL PROJECT INFORMATION**

| | | |
|---|---|---|
| **PROJECT TITLE** | Long Beach Cruise Terminal Improvement Project | |
| **PROJECT/SOURCE INFORMATION** | WSDOT technical BA guidance; value in RMS SPL box is actually SELcum value WSDOT 2018 (Anacortes Ferry Terminal example). RMS SPL would be 189 dBrms; changed to SELcum (initial value 175) per NMFS recommendations | *subtracted 7 dB from 175 selcum dB for bubble curtains; value used was 168 dB selcum |

Please include any assumptions

| | |
|---|---|
| **PROJECT CONTACT** | Ken Mierzwa, GHD; 707-443-8326 |

**STEP 2: WEIGHTING FACTOR ADJUSTMENT**

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

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

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

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

**STEP 3: SOURCE-SPECIFIC INFORMATION**

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

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

**$SEL_{cum}$**

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

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

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

**PK**

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

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

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

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

**RESULTANT ISOPLETHS***

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

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

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

| | |
|---|---|
| **Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = $SEL_{ss}$ + 10 Log (# strikes)** | **203.3** |

**$SEL_{cum}$**

| | |
|---|---|
| **Source Level (Single Strike SEL)** | 168 |
| **Number of strikes per pile** | 675 |
| **Number of piles per day** | 5 |
| **Propagation (xLogR)** | 15 |
| **Distance of single strike SEL measurement (meters)** | 10 |

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

**PK**

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

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

**RESULTANT ISOPLETHS***

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

| Hearing Group | Low-Frequency Cetaceans | Mid-Frequency Cetaceans | High-Frequency Cetaceans | Phocid Pinnipeds | Otariid Pinnipeds |
|---|---|---|---|---|---|
| **$SEL_{cum}$ Threshold** | 183 | 185 | 155 | 185 | 203 |
| **PTS isopleth to threshold (meters)** | **224.7** | **8.0** | **267.6** | **120.2** | **8.8** |
| **PK Threshold** | 219 | 230 | 202 | 218 | 232 |
| **PTS PK isopleth to threshold (meters)** | **#NUM!** | **#NUM!** | **#NUM!** | **#NUM!** | **#NUM!** |

**WEIGHTING FUNCTION CALCULATIONS**

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

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

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

**VERSION 2.0: 2018**

KEY

| | |
|---|---|
| | **User Provided Information** |
| | **NMFS Provided Information (Technical Guidance)** |
| | **Resultant Isopleth** |

**STEP 1: GENERAL PROJECT INFORMATION**

| | |
|---|---|
| **PROJECT TITLE** | |
| **PROJECT/SOURCE INFORMATION** | Anacortes Ferry Terminal. WSDOT 2019 (BA Noise guidance, Table 7-15), Laughlin 2012; with 7dB reduction with bubble curtains per NMFS; RMS SPL IS 170-7= 163 |

Please include any assumptions

| | |
|---|---|
| **PROJECT CONTACT** | ken.mierzwa@ghd.com |

**STEP 2: WEIGHTING FACTOR ADJUSTMENT**

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

¥ 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** | 5 |
| **Duration to drive a single pile (minutes)** | 31.5 |
| **Duration of Sound Production within 24-h period (seconds)** | 9450 |
| **10 Log (duration of sound production)** | 39.75 |
| **Propagation (xLogR)** | 15 |
| **Distance from source level measurement (meters)** | 11 |

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

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

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

**RESULTANT ISOPLETHS**

| 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)** | **19.4** | **1.7** | **28.7** | **11.8** | **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** |

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

# A: 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** | Long Beach Cruise Terminal Improvement Project |
| **PROJECT/SOURCE INFORMATION** | Loudest aspect of underwater dredging is anticipated to be associated with the tugboat engine, estimated as 170 dBrms (at 1 meter) (Veirs et al. 2016). |
| Please include any assumptions | |
| **PROJECT CONTACT** | Ken.Mierzwa@ghd.com |

**STEP 2: WEIGHTING FACTOR ADJUSTMENT**

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

| | | |
|---|---|---|
| **Weighting Factor Adjustment (kHz)¥** | 2.5 | |

¥ 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 47), 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)** | 170 |
| **Duration of Sound Production (hours) within 24-h period** | 10 |
| **Duration of Sound Production (seconds)** | 36000 |
| **10 Log (duration of sound production)** | 45.56 |
| **Propagation (xLogR)** | 15 |

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

**RESULTANT ISOPLETHS**

| Hearing Group | Low-Frequency Cetaceans | Mid-Frequency Cetaceans | High-Frequency Cetaceans | Phocid Pinnipeds | Otariid Pinnipeds |
|---|---|---|---|---|---|
| **$SEL_{cum}$ Threshold** | 199 | 198 | 173 | 201 | 219 |
| **PTS Isopleth to threshold (meters)** | **12.6** | **1.1** | **18.7** | **7.7** | **0.5** |

**WEIGHTING FUNCTION CALCULATIONS**

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

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

# Appendix E: Marine Mammal Mitigation and Monitoring Plan

# Marine Mammal Mitigation and Monitoring Plan (4MP)

Long Beach Cruise Terminal Improvement Project
Prepared for ATKINS
3780 Kilroy Airport Way, Suite 740
Long Beach, CA 90806

**GHD** | 3760 Kilroy Airport Way, Suite 130, Long Beach, CA 90806, USA

11183495 | 30 | Report No 5 | September 2019

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# List of Acronyms

| | |
|---|---|
| APE- | American Piledriving Equipment |
| BHC- | Board of Harbor Commissioners |
| CEDA- | Central Dredging Association |
| CFR- | Code of Federal Regulations |
| cy- | cubic yards |
| dB- | decibels |
| dBA- | A-weighted sound level decibels |
| $dB_{peak}$- | peak decibels |
| $dB_{rms}$- | root mean squared decibel units |
| FEIR- | Final Environmental Impact Report |
| ft- | feet |
| ft-lbs- | Foot pound-force |
| HF- | high-frequency |
| Hz- | Hertz |
| IHA- | Incidental Harassment Authorization |
| in- | inches |
| kHz- | kilohertz |
| kNm- | kiloNewton meters |
| km- | kilometers |
| $km^2$- | square kilometers |
| LA- | Los Angeles |
| lbs- | pounds |
| LF- | low-frequency |
| m- | meters |
| $m^2$- | square meter |
| MF- | mid-frequency |
| mm- | millimeters |
| MMPA- | Marine Mammal Protection Act |
| NMFS- | National Marine Fisheries Service |
| NOAA- | National Oceanic and Atmospheric Administration |
| OW- | otariid pinnipeds |
| POLB- | Port of Long Beach |
| PSLM- | Practical Spreading Loss Model |
| PSO- | Protected Species Observer |
| PTS- | permanent threshold shifts |
| PW- | phocid pinnipeds |
| RMS- | root mean squared |
| SEL- | sound exposure level |
| $SEL_{cum}$- | cumulative sound exposure level |
| TTS- | temporary threshold shifts |

| | |
|---|---|
| USC- | U.S. Code |
| ZOI- | Zones of Influence |

# 1. Overview

This Marine Mammal Mitigation and Monitoring Plan (4MP) is included as part of an Incidental Harassment Authorization (IHA) application. The IHA application is requested to allow for the unavoidable incidental take of marine mammals resulting from proposed improvements to the Long Beach Cruise Terminal dock on Pier H at the Port of Long Beach (POLB).

Carnival Corporation & PLC ("Carnival") proposes to make improvements to its berthing facilities at the Long Beach Cruise Terminal at the Queen Mary located at Pier H in the POLB, Long Beach, California (Appendix A, Figure 1 – Vicinity Map). These improvements are to accommodate a new, larger, class of cruise ship that holds up to 4,000 passengers and to improve safety at the berth related to swells. The improvements will entail all actions and activities necessary to safely moor and service the larger vessel and the associated increase in passenger numbers (the Proposed Project).

Implementation of the Proposed Project requires the dredging of approximately 35,400 cubic yards (cy) of dredge material from the existing berth and immediate surrounding area (Appendix A, Figure 2 – Project Area), disposal of the dredged material, as well as providing berth improvements such as the installation of new high-capacity mooring dolphins, fenders, and a new passenger bridge system. Pile driving equipment will be used to perform these improvements.

The Proposed Project will involve in-water pile driving and dredging activities from November 15, 2019 to as late as April 15, 2020 that are expected to exceed National Marine Fisheries Service (NMFS) underwater noise thresholds for marine mammals and result in incidental take of select marine mammal species under the Marine Mammal Protection Act (MMPA) of 1972 Section 101 (a)(5)(D). The MMPA (16 United States (U.S.) Code (USC) 1362) of 1972 prohibits the "taking" of marine mammals and restricts the import, export, or sale of marine mammals. Take is defined as "the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." Harassment includes disruption of behavioral patterns. The MMPA specifies injury to marine mammals as "Level A Harassment" and disturbance as "Level B Harassment" (16 USC 1361 et seq). Specifically, the MMPA defines Level A Harassment as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" and Level B Harassment as "acts that have the potential to disturb (but not injure) a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (50 Code of Federal Regulations (CFR) 216.3). The MMPA permits activities that result in negligible impacts on marine mammals and that do not adversely affect subsistence of these species through the issuance of its IHA permit. This 4MP is included with the Project's IHA application to provide mitigation and monitoring measures to minimize marine mammal take.

# 2. Project Description

## 2.1 Background

The Proposed Project site is currently leased to Carnival by POLB and Urban Commons LLC, the master tenant from the City. These leases were originally acquired for Carnival's relocation in 2003 from Los Angeles' San Pedro Port to the POLB, when it moved the vessels from the Port of Los Angeles to POLB. The Carnival Cruise Lines Relocation Project Final Environmental Impact Report (FEIR) (November 2000) assessed the implications of the original relocation to POLB (POLB 2000). Four vessels currently call on the POLB Cruise Terminal. The *Carnival Splendor,* with an approximate capacity of 3,012 passengers, typically sails one day a week for cruises from seven to 14 days in duration. The *Carnival Imagination* (2,056 passengers) and *Carnival Inspiration* (2,054 passengers) vessels call on the terminal four days a week (combined) for three to four-day cruises. The *Carnival Miracle* occasionally docks at the POLB (scheduled for seven calls in 2019) and has a capacity of 2,124 guests. The company also arranged to lease the entirety of an onsite dome and, in early 2018, it opened the newly-renovated dome as a passenger terminal and 'home-ported' a 3,012-passenger vessel to Long Beach. Carnival transports approximately 600,000 passengers a year into the POLB for embarkation and debarkation. As stated previously, Carnival has run the Long Beach Cruise Terminal since 2003, the United States' only privately-operated cruise terminal. It is one of the busiest terminals in North America, with ships docking at the facility five days per week resulting in a more than a 70% utilization rate. The increased size of the vessel is expected, under current economic conditions, to generate an additional 50,000 passengers per year.

## 2.2 Project Objectives

The purpose of the Proposed Project is to make improvements at the existing berth and its environs to enable new Vista-class ships to safely moor and be serviced. Also, the Proposed Project would resolve safety issues in the existing parking structure and vessel mooring. The improvements will enable the home-porting of the 4,008-passenger *Carnival Panorama* at POLB, which is planned for arrival in Long Beach in 2019. This will be the first new Carnival ship based in Southern California in 20 years, providing additional economic growth for the City of Long Beach and the Southern California region. The *Carnival Panorama* will be replacing the 3,012 *Carnival Splendor*, which is currently home-ported at Long Beach until December 2019, as the largest craft operating out of Carnival's POLB wharf.

## 2.3 Project Location

The POLB is located in San Pedro Bay within the southwest portion of the City of Long Beach in southern Los Angeles (LA) County, California. Figure 1 (Appendix A, Figure 1 – Vicinity Map) serves as a map of the Long Beach region, indicating the Project vicinity. State Route 47 (via Interstate 110 Freeway) and the Interstate 710 Freeway provide access to the site from the surrounding area.

The POLB is administered by the City of Long Beach Harbor Department and encompasses 3,200 acres, with 31 miles of waterfront, 10 piers, and 80 berths. The POLB is the second-busiest container seaport in the United States, handling trade valued at more than $180 billion annually, with the aim of creating the world's most modern, efficient, and sustainable seaport. In 2004, The Board of Harbor Commissioners (BHC) directed the POLB to establish a Green Port Policy. The POLB complied and the BHC adopted the policy in January 2005. This policy serves as a guide for decision making and established a framework for environmentally friendly POLB operations.

The Project Area is located adjacent to Royal Mail Ship Queen Mary (Pier J), at Pier H within the Queen Mary Seaport at 231 Windsor Way (Appendix A, Figure 2 – Project Area). The Queen Mary Seaport is located at the south end of the Interstate 710 Freeway, directly across Queensway Bay from downtown Long Beach.

## 2.1 Dates and Duration of Construction Activities

The Proposed Project will progress with pile driving, followed by or concurrent with dredging, and then tower and bridge construction. Construction activities will take place from November 15, 2019 to April 15, 2020 (maximum in-water work window). In total, pile driving (both impact and vibratory hammer driving) is expected to take a maximum of 26 working days while dredging is expected to be less than 30 working days (specific to this IHA). The only pile driving (impact and vibratory hammer driving) proposed to occur over this period is the installation of 49 36-inch steel pipe piles. Only one pile driver (impact or vibratory) will be used at any given time. These piles form the structural support for two concrete formed moorings (designed to provide for large ship berthing) and the tower portion of the passenger bridge. Dredging will be conducted during the same time period, and may be concurrent with pile driving activities.

# 3. Noise Sources Marine Mammal Acoustic Thresholds

## 3.1 Anticipated Project-related Construction Noise

### 3.1.1 Impact Pile Driving

Proposed Project impacts will include instances of noise and vibration related to the use of an impact pile driver during discrete periods of time associated with the installation of 49, 36-inch (in), steel piles. Impact pile drivers are known to produce extremely high levels of noise, both in-air and underwater (Buehler et al. 2015). The impact pile driver will be a DELMAG D100 or D80. According to DELMAG's specs for the D100-13, the energy per blow ranges from 214 to 360 kiloNewton meters (kNm). This is equivalent to 157,838 to 265,552 ft-lbs (foot pound-force) (DELMAG 2018). Generally impact hammers with greater force (per blow) produce higher levels of noise in terms of dB (decibels) (Buehler et al. 2015).

### 3.1.2 Vibratory Pile Driving

Project impacts will include instances of noise and vibration related to the use of a vibratory hammer associated with pile installation. Vibratory hammers are “oscillatory hammers that vibrate the pile, causing the sediment surrounding the pile to liquefy and allow pile penetration” (Buehler et al. 2015). Vibratory hammers are frequently employed as a mitigation measure to reduce environmental impacts on aquatic wildlife since they generally produce noise levels 10 to 20 dB lower than impact pile drivers. However, while peak sound levels may be lower for vibratory hammers than impact hammers, the total energy generated in-water can be similar since vibratory hammers operate continuously and take a longer period of time to install a pile than impact hammers. A vibratory hammer that could be used on this Project is the APE (American Pile Driving Equipment, INC) model 200-6 vibro (driving force of 271 tons) (APE 2011).

### 3.1.3 Dredging

Dredging at the Carnival Cruise dock will elevate underwater noise levels in the Project Area. Operations would involve the use of tugboats and clamshell dredgers. Dredging operations will occur in an area parallel to the existing dock and dolphin structures used by the Carnival Cruise ships. Typically, this would involve two tugboats and one clamshell dredger, running continuously. Underwater reference values for similar non-impulsive boat engine/dredge noise were obtained for this equipment from a Central Dredging Association (CEDA) summary paper on underwater sound, a study on underwater dredging sound in New York, and a study on underwater ship noise (Reine et al. 2012, Jones et al. 2015, Veirs et al. 2016). Airborne noise reference values were obtained for this equipment from the Federal Highway Administration (FHWA) Road Construction Noise Model (RCNM) and are reprinted below (FHWA 2006). Based on existing reference values, the dredge/tug engine would produce the highest levels of noise associated with the dredging construction phase. Note that these sound power levels for the tugboat are conservative; they would only occasionally run at full power under certain scenarios.

## 3.2 Underwater Noise Acoustic Thresholds

Marine mammals are known to occur year-round in the Project vicinity and an increase in underwater noise (associated with pile driving and dredging) could potentially impact marine mammals through permanent injury to hearing, temporary injury to hearing, and masking (through auditory interference) of important communication calls (National Oceanic and Atmospheric Administration (NOAA) 2016). Since marine mammals (depending on species) may heavily rely on their hearing for intraspecific communication, the identification of food resources, navigation, etc., permanent and temporary impacts to their hearing could significantly impact individual animals (NMFS 2018a).

Underwater noise impacts to marine mammals were modeled based on the NMFS 2018 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS 2018a). The guidance describes the thresholds at which marine mammals may experience permanent or temporary injurious impacts to their hearing. Threshold shifts are defined by NMFS as “the received levels… at which individual marine mammals are predicted to experience changes in

their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to underwater anthropogenic sound sources" (NMFS 2018a). NMFS defines permanent threshold shifts (PTS) as Level A Harassment and behavioral disturbance as Level B Harassment.

We used the NMFS Optional User Spreadsheet Tool (Version 2.0) to estimate underwater marine mammal thresholds for the onset of injurious permanent threshold shifts (PTS; Level A) as a result of impulsive and non-impulsive noise (NMFS 2018b). To evaluate marine mammal behavioral disturbance (Level B) from underwater construction noise, we used the Practical Spreading Loss Model (PSLM), recommended by NMFS (2012) for spherical-spreading noise. Noise modeling methods are described further in the Project's Noise Technical Report and IHA application (GHD 2019a, GHD 2019b).

### *Applicable Marine Mammal Noise Thresholds*

Data discussing PTS (which permanently impacts hearing), TTS (which temporarily impacts hearing), and behavioral disturbance thresholds for underwater noise impacts on marine mammals were obtained from NMFS (2018a) and NOAA Fisheries (2018a) guidance. Reference values are reprinted below.

Table 3.1 Marine Mammal PTS, TTS, and Behavioral Disruption Thresholds for Underwater Noise *

| Hearing Group[a] | Generalized Hearing Range[a] | PTS Onset Threshold[a] | | TTS Onset Threshold[a] | Behavioral Disturbance Threshold[b] | |
|---|---|---|---|---|---|---|
| | | Impulsive | Non-impulsive | | Impulsive | Non-impulsive |
| Low-frequency (LF) cetaceans (baleen whales) | 7 Hertz (Hz) to 35 kilohertz (kHz) | $SEL_{cum}$ (Cumulative Sound Exposure Level): 183<br>$dB_{peak}$: 219 | $SEL_{cum}$ :199 dB | $SEL_{cum}$: 179 dB | 160 $dB_{rms}$ (Root Mean Squared Decibels) | 120* $dB_{rms}$ |
| Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, | 150 Hz to 160 kHz | $SEL_{cum}$: 185<br>$dB_{peak}$:: 230 | $SEL_{cum}$ :198 dB | $SEL_{cum}$: 178 dB | | |
| High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, *cephalorhynchid*, *Lagenorhynchus cruciger* & *L. australis*) | 275 Hz to 160 kHz | $SEL_{cum}$: 155<br>$dB_{peak}$:: 202 | $SEL_{cum}$ :173 dB | $SEL_{cum}$: 153 dB | | |
| Phocid pinnipeds (PW) (underwater) (true seals) | 50 Hz to 86 kHz | $SEL_{cum}$: 185<br>$dB_{peak}$:: 218 | $SEL_{cum}$ :201 dB | $SEL_{cum}$: 181 dB | | |
| Otariid pinnipeds (OW) (underwater) (sea lions and fur seals) | 60 Hz to 39 kHz | $SEL_{cum}$: 203<br>$dB_{peak}$:: 232 | $SEL_{cum}$ :219 dB | $SEL_{cum}$: 199 dB | | |

[a]NMFS 2018a; generalized hearing range representative of the group based on an incomplete sampling of species

[b]NOAA Fisheries 2018b

Notes:

*The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level

## 3.3 Airborne Noise Acoustic Thresholds

An increase in airborne noise (associated with pile driving and dredging) could impact marine mammals at haul-out sites in the project vicinity. To investigate in-air noise impacts to marine

mammals in the Project vicinity, we used the PSLM recommended by NMFS (2012) for spherical-spreading noise.

#### *Applicable Noise Thresholds*

NOAA Fisheries (2018a) has provided the following guidance on in-air noise behavioral disruption thresholds for Harbor Seals and non-Harbor Seal pinnipeds. These thresholds are reprinted below for reference. Behavioral disruption guidance has not been published by NOAA at this time for other marine mammal groups, such as cetaceans. Cetaceans are not expected to experience any airborne noise impacts from construction activities in the Project Area.

Table 3.2 Marine Mammal Behavioral Disruption Thresholds for In-Air Noise (Level B Harassment) (NOAA Fisheries 2018b)

| Marine Mammal Group[a] | Behavioral Disruption Threshold[a] |
|---|---|
| Harbor Seals | 90 $dB_{rms}$ |
| Non-harbor seal pinnipeds | 100 $dB_{rms}$ |

[a]NOAA Fisheries 2018b

# 4. Marine Mammals Covered under the IHA and Potential to Be Affected by Project Noise

## 4.1 Humpback Whale (*Megoptera novaeangliae*), California/Oregon/ Washington Stock

### 4.1.1 Potential to Occur in Project Area

Humpback Whales are seasonal migrants (spring and fall) past the POLB and are frequently observed in the open ocean outside the outer harbor (MBC Applied Environmental Sciences 2016, iNaturalist 2019). Two live Humpback Whales have been documented in the Port of Los Angeles (one in June of 2016 and one in April of 2017) by Harbor Breeze Cruises (HappyWhale 2019, OBIS SEAMAP 2019). Based on species migration patterns, Humpback Whales could be present in the Project vicinity during the proposed construction season (fall and into winter) (NOAA Fisheries 2018d).

### 4.1.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures (specifically, using bubble curtains to limit underwater construction noise propagation to within the Port Complex, use of PSO's, and shutting down vibratory pile driving if a Humpback Whale approaches the Level B Zone of Influence (ZOI)), both Level A and Level B take of Humpback Whales will be effectively avoided (described further in Section 6). With implementation of this shut down procedure, no whales will experience Level B harassment by behavioral disruption, Level A PTS, Level A TTS, or physical injury as a result of

Project activities. No impacts are expected to occur to the species, and therefore no take is requested.

## 4.2 Gray Whale (*Eschrichtius robustus*), Eastern and Western North Pacific Stocks

### 4.2.1 Potential to Occur in Project Area

Eastern North Pacific Gray Whales seasonally migrate past the POLB. Southward migrations occur in January and February, with movements back to the north in March and April (Hildebrand et al. 2012). Jefferson et al. (2013) reported only six Gray Whales during extensive warm season (May through October) aerial transect monitoring of the Southern California Bight in 2008-2013. Two strandings have been reported in the POLB vicinity: one in 2000 and one in 2017 (MEC Analytical Systems 2002, Serna 2017).

The Western North Pacific stock of the species has a very low potential to actually occur in the Project vicinity. Recent tracking data on Gray Whales tagged off of Sakahalin Island, Russia (Western North Pacific population) revealed cross-basin movements. Tagged individuals crossed the Pacific Ocean from Russia to British Columbia, and then migrated south along the Pacific coast to Baja California (Mate et al. 2015). Since it is impossible to tell individuals from the Eastern and Western North Pacific populations apart without genetic testing, we must assume that some of the federally endangered Western population could occasionally be present in California waters (NOAA Fisheries 2018c). Given the small population size of the Western North Pacific stock and the distances involved, if present near the Project vicinity they may comprise a very small percentage of observations. Presence during construction season is expected to be extremely unlikely but not impossible. There are at least 19 documented occurrences of this species in the Port Complex. Almost all records are from the late winter (February) and early spring (March through April). However, there is one documented occurrence of this species near the Southeast Basin in the Port Complex from December of 2017. Most records of this species are from just outside the Port Complex in San Pedro Bay, with three records from August through November and over 40 records in December (HappyWhale 2019, OBIS SEAMAP 2019).

### 4.2.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures (specifically, using bubble curtains to limit underwater construction noise propagation to within the Port Complex, use of PSO's, and shutting down vibratory pile driving if a Gray Whale approaches the Level B ZOI), both Level A and Level B take of Gray Whales will be effectively avoided (described further in Section 6). With implementation of this shut down procedure, no whales will experience Level B harassment by behavioral disruption, Level A PTS, Level A TTS, or physical injury as a result of Project activities. No impacts are expected to occur to the species, and therefore no take is requested.

## 4.3 California Sea Lion (*Zalophus californianus*), U.S. Stock

### 4.3.1 Potential to Occur in Project Area

California Sea Lions are known to occur in the Project vicinity year-round. There are recent sightings of this species from the inner as well as the outer harbor (MBC Applied Environmental Sciences 2016, iNaturalist 2018, Laura McCue NOAA, pers. comm). The closest marine mammal "regular-use" haul-out site to the Project Area is approximately 3 kilometers (km) away along the breakwater directly south of the Project. However, pinnipeds may use buoys or rip rap in the harbor that are less than 1 km from Project activities. This species has a high potential of occurring in the Project vicinity during construction activities.

### 4.3.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures, the Project will have a negligible impact on the California Sea Lion, U.S. Stock. Project-related noise is expected to impact only 0.9% of the total U.S. Stock. Overall, the U.S. Stock is generally considered to be increasing (based on pup counts from 1975-2011). However, in 2013, NOAA declared an UME for the stock, due to a high number of pup strandings (reasons for strandings are unknown) (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 2,264 individuals, with the anticipation that certain individuals may be "taken" multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or US Stock and have no impact on long-term recruitment or survival or this species. No breeding rookeries occur within the Port Complex, and any take will be limited to foraging or loafing individuals.

## 4.4 Pacific Harbor Seal (*Phoca vitulina richardii*), California Stock

### 4.4.1 Potential to Occur in Project Area

This species is known to occur in the Project vicinity year-round and is said to occasionally follow cruise ships to forage on organisms churned up from the harbor bottom and on food thrown off the deck by passengers (MBC Applied Environmental Sciences 2016, iNaturalist 2018, M. Peters, Carnival Cruise Lines, pers. comm.). However, no Harbor Seals were observed in the immediate Project Area during the 2013-2014 biological study (MBC Applied Environmental Sciences 2016) or during GHD's two-day site visit. The closest marine mammal "regular-use" (i.e. known basking site) haul-out site to the Project Area is approximately three km away along the breakwater directly south of the Project. However, pinnipeds may use buoys or rip rap in the harbor that are less than one km from Project activities. Presence within the larger Project vicinity is probable although not continuous and generally not in large numbers, based on available information.

### 4.4.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures, the Project will have a negligible impact on the Pacific Harbor Seal, California Stock. Project-related noise is expected to impact only 3.2% of the total California Stock. The estimated minimum population size for this species is considered to be 20,109, and current population estimates put the stock at 30,968 individuals. The population increased from 1981 to 2004, but subsequent surveys have indicated possible stock declines (NOAA Fisheries 2018c).

Impacts to the stock will primarily be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 998 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, Level A take is only requested for five Pacific Harbor Seals. No physical injuries (i.e. barotraumas), other than PTS, are expected to occur to Pacific Harbor Seals within the Level A ZOI. No mortalities are expected. Level A and Level B take requested for this species will not affect the viability of the population, species, or US Stock and have no impact on long-term recruitment or survival or this species. No breeding rookeries occur within the Port Complex, and any take will be limited to foraging or loafing individuals.

## 4.5 Short-beaked Common Dolphin (*Delphinus Delphis*), California/Oregon/Washington

### 4.5.1 Potential to Occur in Project Area

Both species of Common Dolphins have been reported in the Project vicinity. In general, the Short-beaked Common Dolphin is reported as more abundant than the Long-beaked Common Dolphin, with the former making up an estimated 72 percent of individuals observed in the Southern California Bight during a 2008-2013 monitoring effort (Jefferson et al. 2013). MBC Applied Environmental Sciences (2016) reported Common Dolphins on only one of 12 monthly survey events during 2013-2014 studies; a pod of 40 animals was observed in February 2014 in Study Zone 20, on the Port of Los Angeles side. MBC Applied Environmental Sciences did not attempt further identification. OBIS SEAMAP Data has records of the species within 6.7 km southwest of the POLB breakwater and 17.6 km from the Project Area (OBIS SEAMAP 2019). Based on the available information, one or both forms of Common Dolphins may be present within the Project vicinity but presence is likely occasional and of short duration. The only known documented occurrences in the Port Complex are from the winter months.

### 4.5.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures, the Project will have a negligible impact on the Short-beaked Common Dolphin, California/Oregon/Washington Stock. Project-related noise is expected to impact only 0.1% of the total California/Oregon/Washington Stock. Short-beaked Common Dolphins are considered to be the most abundant cetacean off the coast of California. The abundance off this species is known to increase during warm-water periods in Southern California. However, the

overall status of the stock (e.g. decreasing or increasing) is not currently known (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 955 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California/Oregon/Washington Stock and have no impact on long-term recruitment or survival or this species.

## 4.6 Long-beaked Common Dolphin (*Delphinus capensis*), California Stock

### 4.6.1 Potential to Occur in Project Area

Both species of Common Dolphins have been reported in the Project vicinity. Positive identification is not always possible in the field. MBC Applied Environmental Sciences (2016) reported Common Dolphins on only one of 12 monthly survey events during 2013-2014 studies; a pod of 40 animals was observed in February 2014 in Study Zone 20, on the Port of Los Angeles side. OBIS SEAMAP has records of this species within 22 km northwest of the Port of Los Angeles breakwater and 30 km from the Carnival dock (OBIS SEAMAP 2019). Based on the available information, one or both forms of Common Dolphins may be present within the Project vicinity but presence is likely occasional and of short duration. The only known documented occurrences in the Port Complex are from the winter months.

### 4.6.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures, the Project will have a negligible impact on the Long-beaked Common Dolphin, California Stock. Project-related noise is expected to impact only 1% of the total California Stock. The species is considered to be increasing in southern California waters. However, a formal analysis of stock trends has not been performed at this time (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 955 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California Stock and have no impact on long-term recruitment or survival or this species.

## 4.7 Common Bottlenose Dolphin (*Tursiops truncatus*), California Coastal Stock

### 4.7.1 Potential to Occur in Project Area

At the POLB, *Tursiops sp*. have been observed in the outer as well as the inner harbor. Although not abundant, they were observed during five of 12 monthly sampling events during the most recent (2013-2014) biological survey (MBC Applied Environmental Sciences 2016). There have been recent sightings of this species near the Queen Mary Dock and elsewhere in the Project vicinity (MBC Applied Environmental Sciences 2016, iNaturalist 2018, Laura McCue NOAA, pers. comm.). OBIS SEAMAP has records of the species from within 6.4 km south of the POLB breakwater and 8.1 km from the Carnival dock (OBIS SEAMAP 2019). This species has a moderate potential of occurring in the Project vicinity during construction activities.

### 4.7.2 Anticipated Impacts of Project Noise on the Species

With implementation of mitigation measures, the Project will have a negligible impact on the Common Bottlenose Dolphin, California Coastal Stock. Project-related noise may impact up to 27.2% of the total California Stock. Based on mark-recapture data, the stock appears to be stable and may potentially be growing (NOAA Fisheries 2018c).

Impacts to the stock will be limited to Level B disturbance, which will be temporary and of a short-duration. Level B take is requested for 123 individuals, with the anticipation that certain individuals may be “taken” multiple times. With implementation of mitigation measures, no Level A take is anticipated or requested. Level B take requested for this species will not affect the viability of the population, species, or California Coastal Stock and have no impact on long-term recruitment or survival or this species.

## 4.8 Summary of Expected Take

The Proposed Project and its associated activities have the potential to take marine mammals through construction activities involving in-water pile driving. Other activities such as dredging are not expected to result in take as defined under the MMPA. No take was calculated for dredging noise per NMFS guidance (Personal Comm. Wendy Piniak at NMFS on March 19, 2019). Table 4.1 (below) presents total requested Project-related take from impact and vibratory pile driving. We anticipate that, with the presence of PSOs on site for the duration of construction activities, that actual take may actually be considerably smaller. However, requested take below is based on worst case scenarios that involve taking “unique animals.” It is more likely that a few resident individuals (particular California Sea Lions) may actually be taken multiple times over the duration of pile driving activities. However, our calculations are based on the assumption that an animal can only be taken one time per 24-hour period.

Table 4.1 Summary of Total Requested Take (Level B and Level A from Impact and Vibratory Pile Driving)

| Species | Stock | Level B (Harassment) Take | Level A (Injury) Take | Total Take* | Abundance of Stock | Requested Total Take as Percentage of Stock (round up to whole number) |
|---|---|---|---|---|---|---|
| Humpback Whale | California/ Oregon/ Washington | 0 | 0 | 0 | 2,374 | 0% |
| Gray Whale | Eastern North Pacific/Western North Pacific | 0 | 0 | 0 | 290-26,90 (depending on population) | 0%** |
| California Sea Lion | U.S. | 2264 | 0 | 2264 | 257,606 | 0.9% |
| Pacific Harbor Seal | California | 998 | 5 | 998 | 30,968 | 3.2% |
| Short-beaked Common Dolphin | California/ Oregon/ Washington | 955 | 0 | 995 | 969,861 | 0.1% |
| Long-beaked Common Dolphin | California | 955 | 0 | 995 | 101,305 | 1% |
| Common Bottlenose Dolphin | California Coastal | 123 | 0 | 123 | 453-515 | 27.2%** |

*Total take is the large of two numbers (Level A or Level B) as an animal can only be take once per 24-hr period
**Smaller abundance numbers used to estimate Total Take As a Percentage of Stock

# 5. Anticipated Project Impacts

## 5.1 Ensonified Zones of Influence (ZOIs)

The client intends to minimize Level A take by having qualified PSOs onsite during pile driving. These PSOs will have stop work authority to shut down marine pile driving activities immediately if a marine mammal approaches the exclusion zone. We do not anticipate Level A take for Humpback Whales and Gray Whales as they would be unable to enter the monitoring zone without the PSOs observing them from a greater distance (see Table 6.1). Based on all other Level A isopleths calculated for pile driving (Table 5.1 and 5.2), Level A take is only requested for Pacific Harbor Seals. All other species have Level A isopleths smaller than 10 meters (mandatory shut down zone for marine mammals) (Table 5.1) and are expected be readily detected by a PSO when approaching the 10 meter isopleth. Similarly, no Level A take is requested for vibratory pile driving as the Level A isopleths are smaller than or around 10 meters, and any marine mammals would be

visible when approaching within 10 meters of vibratory pile driving activities (Table 5.2). Level B ZOIs for impact and vibratory pile driving are presented in Table 5.3.

Table 5.1 Level A Underwater Ensonified ZOIs For Impact Pile Driving By Species

| Species | Level A Isopleth Radius (m) | Level A ZOI ($km^2$) |
|---|---|---|
| California Sea Lion (Otariid Pinniped) | 8.8 | 0.114852 $km^2$ |
| Pacific Harbor Seal (Phocid Pinniped) | 120.2 | 0.002189 $km^2$ |
| Short-beaked Common Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |
| Long-beaked Common Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |
| Common Bottlenose Dolphin (Mid Frequency Cetacean) | 8.0 | 0.00196 $km^2$ |

Table 5.2 Level A Underwater Ensonified ZOIs For Vibratory Pile Driving By Species

| Species | Level A Isopleth Radius (m) | Level A ZOI ($km^2$) |
|---|---|---|
| California Sea Lion (Otariid Pinniped) | 0.8 | 0.000445 $km^2$ |
| Pacific Harbor Seal (Phocid Pinniped) | 11.8 | 0.003154 $km^2$ |
| Short-beaked Common Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |
| Long-beaked Common Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |
| Common Bottlenose Dolphin (Mid Frequency Cetacean) | 1.7 | 0.000581 $km^2$ |

Table 5.3 Level B Underwater ZOIs For All Marine Mammal Species*

| Construction Activity | Behavioral Disturbance Isopleth Radii (m) | Behavioral Disturbance Ensonified Area ($km^2$) |
|---|---|---|
| Impact Pile Driving | 292.90 | 0.39 |
| Vibratory Hammer | 8,092.10 | 27.42 |

*The underwater ensonified area ($km^2$) was calculated in ArcMap 10.6.1 by clipping isopleth radii to land.

# 6. Monitoring Methods

## 6.1 Observer Qualifications

PSOs will be qualified biologists who have completed a protected species observer training program. PSOs will have the ability to identify marine mammals and able to recognize characteristic behavior types. Curriculum vitaes (CVs) will be provided to NMFS for review and approval at least 14 days in advance of the start of construction.

***Minimum Monitor/PSO Qualifications from NOAA Fisheries – West Coast Region (reprinted) (NOAA Fisheries 2019a)***

- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
- Advanced education in biological science, wildlife management, mammalogy, or related fields (Bachelor's degree or higher is preferred).
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation or experience with vessel operation and pile driving operations to provide for personal safety during observations.
- Writing skills sufficient to prepare a report of observations. Reports should include such information as the number, type, and location of marine mammals observed, the behavior of marine mammals in the area of potential sound effects during construction, dates and times when observations and in-water construction activities were conducted, dates and times when in-water construction activities were suspended because of marine mammals, etc.
- Ability to communicate orally, by radio or in person, with Project personnel to provide real time information on marine mammals observed in the area, as needed.

***Additional Recommended Monitor/PSO Qualifications***

- Considerable experience using binoculars and a spotting scope
- Physical ability to stand and monitor for long periods of time
- Construction monitoring experience (to follow work progress during the day and accurately communicate with the construction manager)

## 6.2 Data Collection

Marine mammal sighting data will be collected in the field by each PSO. An example marine mammal sighting form is proved in Appendix B. Sighting forms will include the following:

- Start and stop times of monitoring and construction activities
- Weather conditions
- Species sighted and number (ID to age or sex if possible)

- Species behavior pre, during, and post-activity (and if behavior changed with implementation of mitigation measures)
- Species direction of travel and behavior
- Concurrent construction activities
- Level A or B Exposure
- Mitigation Measures (i.e. was shut down required)

## 6.3 Equipment

PSOs will be equipped with a suitable means of communicating with the construction manager to ensure efficient communication during all activities (e.g. radios, etc.). PSOs will utilize suitable equipment to identify marine mammals and determine distances, including but not limited to marine binoculars equipped with a reticle (e.g. grid) rangefinder, spotting scopes (20-60 zoom or equivalent), and digital cameras. Equipment will include the following:

- Personal Protective Equipment (PPE)
- Radio
- Cell Phone
- Contact information for observers, contractors, NMFS contacts
- Tide tables
- Beaufort sea state chart
- Marine binoculars with a reticule
- GPS, map, and compass
- Copies of 4MP, IHA, and other relevant permits
- Monitoring forms

## 6.4 Shut Down and Monitoring Zones

Maximum monitoring and exclusion zones for each construction activity are presented in Appendix A, Figures 3-5. Although no take is request for dredging in the IHA (per NMFS recommendations), we propose the option of monitoring marine mammals during dredging noise impacts (below) as monitors will already be required and onsite during dredging as a USACE mandated mitigation measures to protect federally listed Green Sea Turtles (*Chelonia mydas*).

Table 6.1 Proposed Biological Monitoring Zones (Appendix A, Figure 3-5)*

| Source | Level B Monitoring Zone (radius in m**) | | Level A Exclusion Zone (radius in m) | |
|---|---|---|---|---|
| **Impact Pile Driving** | Phocid Pinnipeds | 300 | Phocid Pinnipeds | 50 |
| | Otariid Pinnipeds | 300 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | N/A | Low Frequency Cetaceans | 8100** |
| | Mid-Frequency Cetaceans | 300 | Mid-Frequency Cetaceans | 10 |
| **Vibratory Pile Driving** | Phocid Pinnipeds | 8100 | Phocid Pinnipeds | 50 |
| | Otariid Pinnipeds | 8100 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | 8100 | Low Frequency Cetaceans | 8100** |
| | Mid-Frequency Cetaceans | 8100 | Mid-Frequency Cetaceans | 10 |
| **Dredging*** ** | Phocid Pinnipeds | 100 | Phocid Pinnipeds | 10 |
| | Otariid Pinnipeds | 100 | Otariid Pinnipeds | 10 |
| | Low Frequency Cetaceans | 100 | Low Frequency Cetaceans | 10 |
| | Mid-Frequency Cetaceans | 100 | Mid-Frequency Cetaceans | 10 |

*rounded up to tens' place for ease of monitoring (values from Tables 5.1, 5.2, and 5.3)

**The exclusion zone for Gray and Humpback Whales is from the Vibratory Hammer ZOI. This number is also used as the exclusion zone during impact pile driving as these two activities will occur in close temporal succession.

***Although NMFS does not require monitoring from dredging, USACE guidance for the POLB does require monitors onsite during this activity to monitor for Green Sea Turtles within 100 feet of the dredge. Marine Mammals will also be monitored simultaneously during this time.

As shown in Table 6.1, exclusion (shut down) and monitoring zones have been established to delineate areas where underwater impulsive and non-impulsive construction noise may be injurious or disruptive to marine mammals.

- Exclusion or shutdown zones will be limited to a maximum monitoring radius of 50 meters with the exception of whales. Shut down zones for whales will include the monitoring zone for vibratory pile driving (monitoring radius of 8,100 meters to avoid any take of whales).
- Qualified PSOs will ensure that exclusion and monitoring zones are maintained during construction. If a marine mammal or other sensitive wildlife species approaches the exclusion zone prior to or during construction activities, the PSO will monitor the individual closely. If the species enters the exclusion zone, all pile driving would cease until the animal has left the area and has been gone for at least 15 minutes. If a pinniped or dolphin species enters the monitoring zone, work may continue unless the permitted take quota is close to being reached. If a Gray or Humpback Whale approaches the exclusion zone, all work would cease until the animal has left the area and has been gone for at least 15 minutes.

- Exclusion and monitoring zones were developed from ZOIs (and modified based on noise attenuation/blocking as a result on in-water structures such as breakwaters). Exclusion and monitoring zones will be identified using landmarks and a reticle rangefinder in the field.
- If the animal enters the exclusion zone or appears to be distressed, the PSO will have stop work authority to cease construction activities until the animal has left the area. This will ensure that take is kept to a minimum. Level A take is only requested for five Pacific Harbor Seals.
- If permitted species enter the monitoring zone during construction, exposures will be recorded and documented as a Level B take. If marine mammals enter the Level B zone when construction is not occurring, no take will be recorded.
- If PSOs observe an injured or impaired marine mammal during construction activities (that is a direct result of Proposed Project activities), the PSO will immediately notify NMFS. In addition, they will record the species, date, time, and location of the observation, and take photographs of the animal for documentation purposes. Marine work will cease until NMFS reviews the circumstances of the prohibited take. If the injury (or death) is not related to Proposed Project activities, the PSO will still notify NMFS immediately.

## 6.5 Observer Monitoring Locations

Up to seven qualified PSOs will be present during noise-generating portions of construction to cover the exclusion area (greatest number of monitors will be required to cover the ZOI for vibratory pile driving). PSOs will have an unobstructed 360 degree view of the Project Area and exclusion/monitoring zones. PSO locations are subject to review and approval by POLB, with PSO safety as an important concern. For each construction activity, the following number of PSOs are proposed (Figures 3-5):

a. Vibratory Pile Driving: 7

b. Impact Pile Driving: 7

c. Dredging: 2

## 6.6 Observer Monitoring Schedule

PSO shifts will be limited to a maximum 12 hours of monitoring per 24-hour period.

## 6.7 Monitoring Techniques

This plan draws heavily on noise mitigation measures and Protected Species Observer protocols from the Bureau of Ocean Energy Management (BOEM) NTLs (Notice to Lessees) 2016-G01 and 2016-G02 (BOEM 2016a, BOEM 2016b).

### 6.7.1 Pre-activity (Baseline) Monitoring

A qualified, independent (non-construction personnel, with no other duties), PSO(s) will conduct marine mammal monitoring for a minimum of one day within one week prior to construction activities to establish baseline conditions. Monitoring would be conducted during different tide levels/hours of the day to ensure that temporal marine mammal movements in the Project Area are thoroughly known.

### 6.7.2 Pre-activity Monitoring (Immediately Proceeding Ramp-up Each Day of Noise-generating Marine Construction)

PSOs will be in place and begin monitoring at least 30 minutes prior to the onset of marine construction activities (e.g. prior to the ramp up period). PSOs will give the “all-clear” to the contractor to initiate ramp-up if no marine mammals have been observed in the exclusion zones during this time. If permitted species (other than whales) are present in the monitoring zones, work may commence (and Level B take will be documented).

### 6.7.3 Ramp-up (or “Soft Start”)

Ramp-up will not be initiated unless the exclusion zones are free of marine mammals. The intent of the ramp-up process is to warn marine mammals of impending construction activities so that they may leave the area unimpeded prior to full-force pile driving. Ramp-up (lower power drives or “idling” of equipment) will occur over a period of time between 20 and 40 minutes prior to full-force pile driving.

### 6.7.4 Monitoring During Construction

PSOs will continually scan the area with binoculars and the naked eye during observation periods. Prior to and during construction, PSOs will record a count of all marine mammals species detected, behavioral patterns, location and direction of movement (e.g. bearing), time and concurrent construction activities (as well as start/stop time of construction activity), acoustic or visual disturbance, and weather conditions/tide level. If there is a brief break in work, the monitor will continue to scan the monitoring area.

### 6.7.5 Inclement Weather Conditions

Pile driving may not occur during conditions of limited visibility (heavy fog, heavy rain, and Beaufort sea states above 4) since these conditions would impede PSOs from accurately surveying the exclusion and monitoring zones.

### 6.7.6 Shut Down Procedures

If a permitted species enters or appears likely to enter the exclusion zone, the PSO will immediately radio the contractor and all marine noise-generating activities will immediately cease. Any shut down of marine construction activities on the project following the appearance of a marine mammal in (or in the case of whales, approaching) the exclusion zone (Table 6.1) must be followed by a 20-

minute all-clear period (continuous monitoring will occur during this time). If no species are detected in (or in the case of whales, near) the exclusion zone during this time, ramp-up procedures may be initiated (will be confirmed by PSO radioing contractor with the all-clear).

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 entering or within the monitoring zone (Table 6.1), pile driving 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 20 minute observation time period has elapsed.

#### 6.7.7 Breaks in Construction

Any shut down for unanticipated reasons (e.g. mechanical difficulties) that lasts longer than 20 minutes must be followed by a ramp-up (20-40 minutes lower force strikes or idling).

#### 6.7.8 Post-activity Monitoring

PSOs will continue to monitor for 30 minutes following the cessation of marine construction activities to ensure all potential impacts/exposures are accounted for.

# 7. Reporting

## 7.1 Notification of Intent to Commence Construction

A Project representative will notify NMFS one week prior to Project initiation, to inform them that that construction is imminent.

## 7.2 Final Report

A Project representative will provide NMFS with a draft final report no later than 90 days after the completion of marine construction activities. A final report must be submitted no later than 30 days after receiving comments on the draft from NMFS. The report will include the species and numbers of marine mammals seen within each exclusion and monitoring zone, behavioral observations, and an evaluation of the effectiveness of mitigation measures.

In addition, the report will “discuss the implementation of the Project (i.e., the activities that were actually conducted), the results of the monitoring program, and the implementation of the mitigation measures” and include the following per NOAA Fisheries (2019a) IHA guidance:

- Summary of the activity (dates, times, and specific locations, Project actions, durations and sources actually completed) and any changes from the activities proposed in the application
- Summary of mitigation implementation
- Both detailed monitoring results and a comprehensive summary addressing goals of monitoring plan, including:

- Number, species, and any other relevant information regarding marine mammals observed and estimated exposed/taken during
- Description of the observed behaviors (in both presence and absence of activities)
- Environmental conditions when observations were made

- Assessment of the implementation and effectiveness of prescribed mitigation and monitoring measures

The report will also summarize the following daily data including observer effort data, survey data, and sighting data.

### *Observer Effort Data*

Observer effort data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Date
- Start time/Stop time
- Coordinates of project activities and coordinates of each observer
- Average environmental conditions

### *Survey Data*

Survey data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Time pre-ramp-up survey begins
- Species detected during pre-ramp-up
- Time construction equipment reaches "full-force"
- Species detected during survey
- Any shut down actions

- Time noise-generating construction activities cease

***Sighting Data***

Sighting data will be collected for each day during which Project marine noise impacts may occur. Data collected will include the following:

- Names of contractors/construction company
- Observers' names and affiliations
- Permit numbers
- Date and time of observation
- Latitude and longitude of observer and bearing to species
- Water depth (meters)
- Species ID and certainty of ID; description
- Number of individuals (note if any are juveniles)
- Direction of animals' travel (bearing)
- Construction activity at the time of sighting
- Distance of animal to construction activity
- Level A or B exposure
- If sighting is associated with a shut down, the behavior of the animal before and after the shut down will be included. This type of daily sighting report (e.g. associated with a shut down) will be sent to NMFS within 24 hours of the incident.

## 7.3 Injured or Deceased Marine Mammal

Observers will report any sightings of injured or dead protected species immediately. This will occur whether or not the injury or death is caused by project activities. These sightings will be reported to the NMFS West Coast Marine Mammal Stranding Hotline (1-866-767-6114) (NOAA Fisheries 2019b).

## 7.4 Means of Coordination

NOAA Fisheries will be provided with contact information for the Project Senior Biologist, PSOs, and the construction manager to facilitate communication during construction. PSOs will be provided with contact information for appropriate NOAA Fisheries staff. For more general communication before, during, and after construction, key senior staff associated with the Project will be identified and a recommended communication protocol will be provided.

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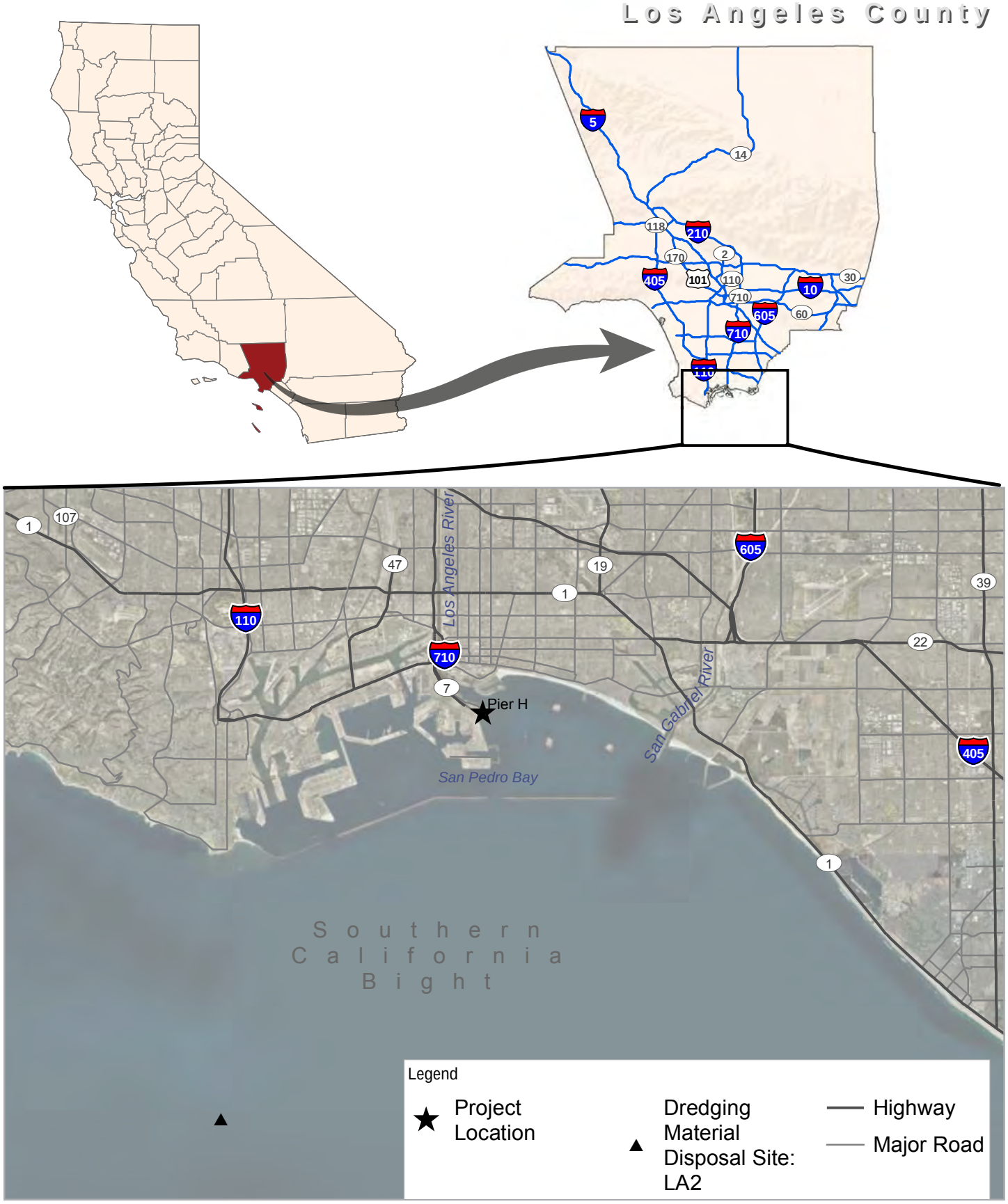
# Appendices

## A. Figures

## B. Observation Log

# Appendix A Figures




Paper Size ANSI A

0 2,000 4,000 6,000

Meters

1 " = 4,828.04 meters

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

GHD

City of Long Beach
Port of Long Beach Carnival Cruise
Lines Terminal Improvement Project

Vicinity Map

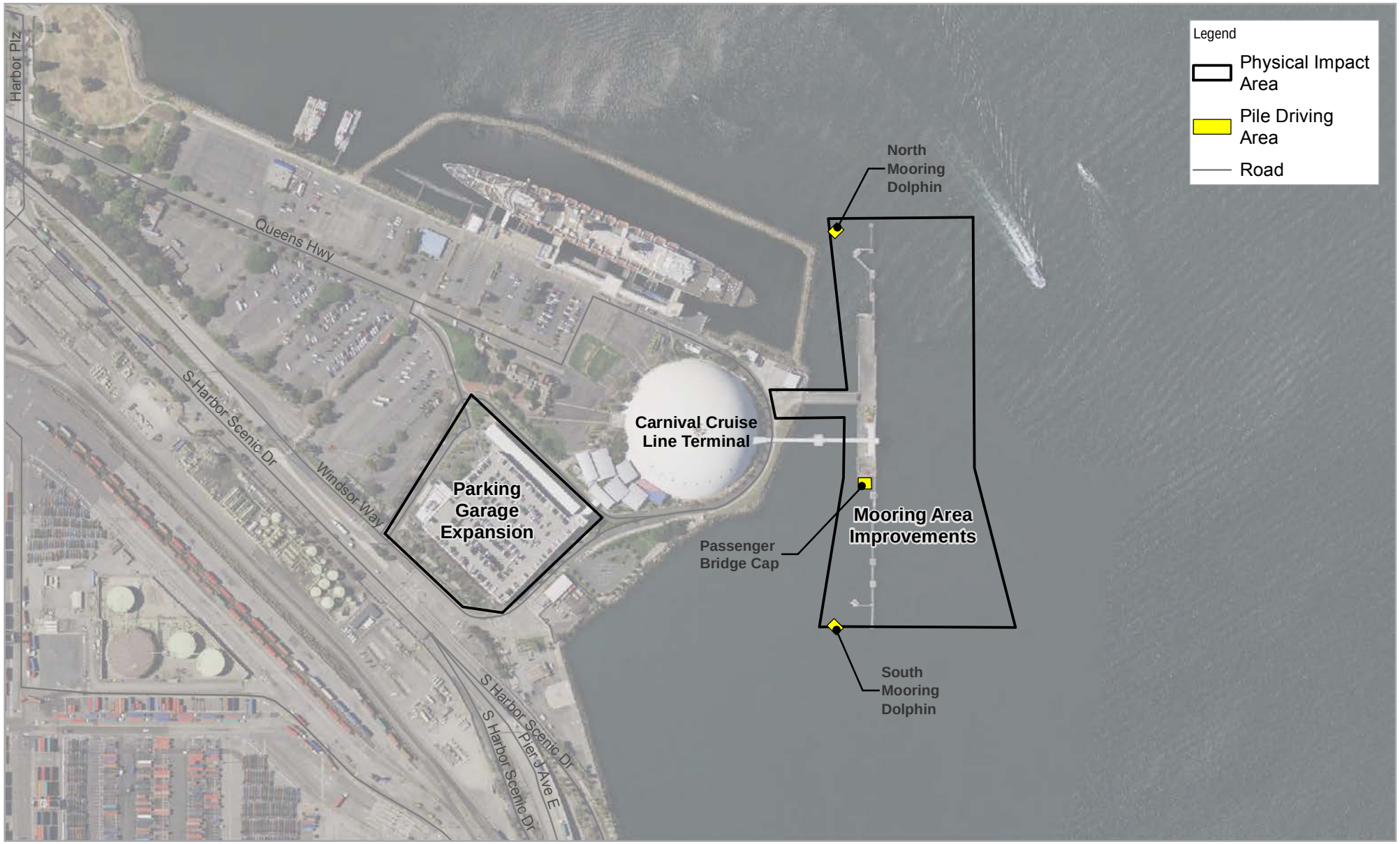
Project No. 11183495
Revision No. -
Date 06/14/2019

FIGURE 01

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\MMMP\11183495_MMMP_001_Vicinity_RevA.mxd
Print date: 14 Jun 2019 - 15:55

Data source: Sources: Esri, USGS, NOAA

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2




Paper Size ANSI A

0 25 50 75 100

Meters

1 " = 121.92 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Project Area

Project No. 11183495
Revision No. -
Date 06/14/2019

FIGURE 02

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\MMMP\11183495_MMMP_002_ProjectArea_RevB.mxd
Print date: 14 Jun 2019 - 15:55

Data source: Project Area Boundary, GHD; The National Map imagery, 2016; . Created by: jclark2

Paper Size ANSI A

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Meters

1 " = 1,318.26 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Vibratory Pile Driving Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 3

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\MMMP\11183495_MMMP_003_PSO_VibPileDriving.mxd
Print date: 22 Aug 2019 - 12:26

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

Paper Size ANSI A

0 360 720 1,080 1,440

Meters

1 " = 1,318.26 m

Map Projection: Lambert Conformal Conic

Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

GHD

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

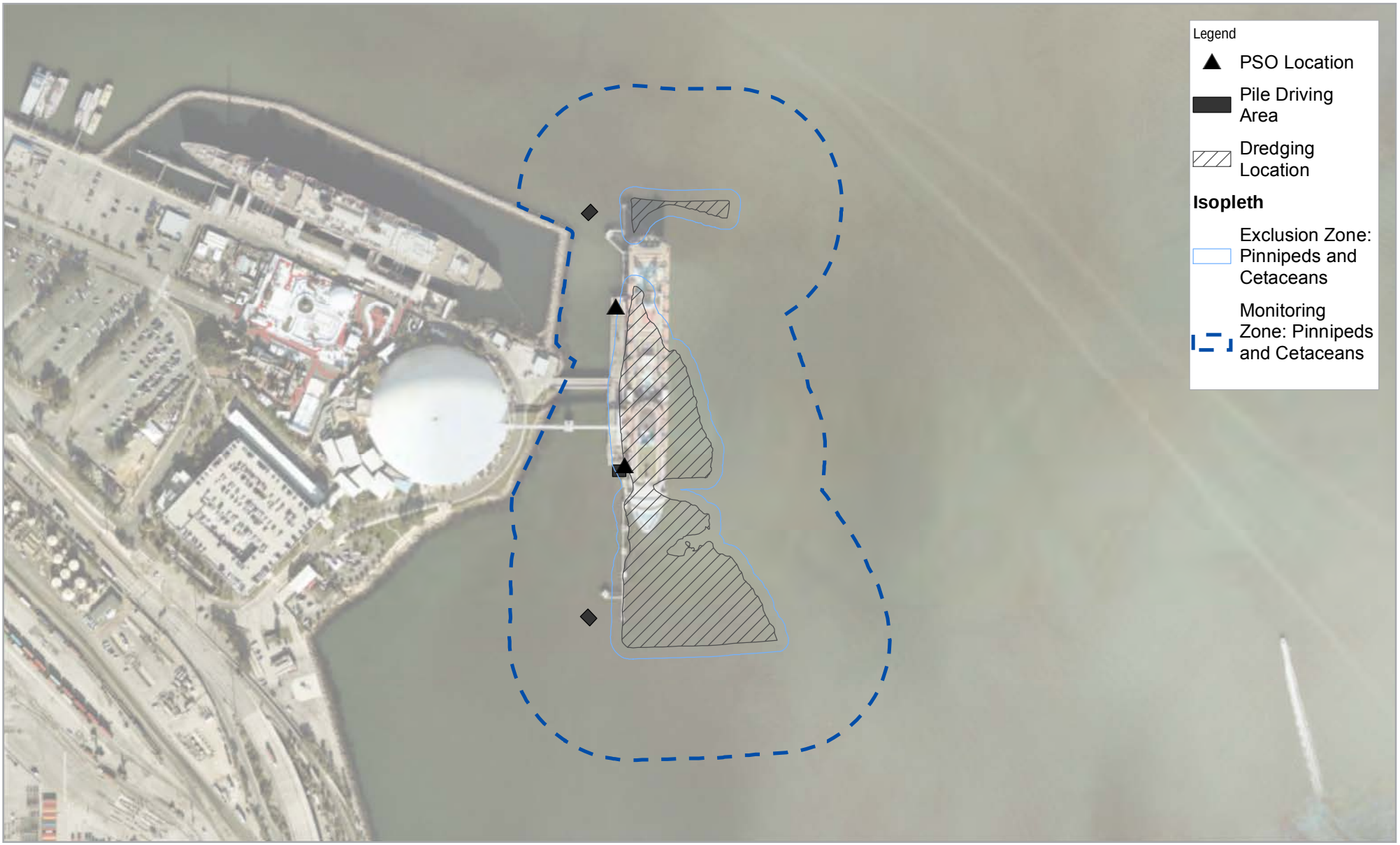
Impact Pile Driving
Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 4

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\MMMP\11183495_MMMP_004_PSO_ImpPileDriving.mxd
Print date: 22 Aug 2019 - 13:11

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2




Paper Size ANSI A

0 30 60 90 120

Meters
1 " = 119.38 m
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California V FIPS 0405 Feet

N

City of Long Beach
Port of Long Beach Carnival Cruise Lines Terminal Improvement Project

Dredging
Proposed Protected Species Observer (PSO) Locations

Project No. 11183495
Revision No. -
Date 08/22/2019

FIGURE 5

\\ghdnet\ghd\US\Sacramento\Projects\111\11183495 Atkins Long Beach Cruz Terminal Imp\08-GIS\Maps\Deliverables\MMMP\11183495_MMMP_005_PSO_Dredging.mxd
Print date: 22 Aug 2019 - 12:35

Data source: Study Area Boundary, Pile driving and dredging locations, Atkins; Isopleths, GHD, 8/22/2019; The National Map imagery, 2016; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jclark2

# Appendix B Observation Log

# MARINE MAMMAL SIGHTING RECORD

Project Name:_____

Monitoring Location:_____

Date: _____

Time Effort Initiated: _____

Time Effort Completed: _____

Page:_____ of _____

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

| Event Code | Sight # (1 or 1.1 if re-sight) | Time / Dur (Start/End time if cont.) | DIR of travel (Bearing Degrees) | Distance to Observer (m) | Distance to Construction Activity (m) | Event | Species | Sighting Cue | Group Size | Presence of Juveniles (Y / N) | Behavior Code (see code sheet) | Construction Type | Mitigation Type | Exposure (Y / N) and Level (A/B) | Behavior Change/ Response to Activity/ Comments/ Human Activity/ Visibility Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E ON PRE / POST CON / S / M OR / E OFF | | : : | | | | | | BL / BO BR / DF SA OTHER | Min: Max: Best: | | | V / I / DG NONE | SS / BC / SD None | | |
| E ON PRE / POST CON / S / M OR / E OFF | | : : | | | | | | BL / BO BR / DF SA OTHER | Min: Max: Best: | | | V / I / DG NONE | SS / BC / SD None | | |
| E ON PRE / POST CON / S / M OR / E OFF | | : : | | | | | | BL / BO BR / DF SA OTHER | Min: Max: Best: | | | V / I / DG NONE | SS / BC / SD None | | |
| E ON PRE / POST CON / S / M OR / E OFF | | : : | | | | | | BL / BO BR / DF SA OTHER | Min: Max: Best: | | | V / I / DG NONE | SS / BC / SD None | | |
| E ON PRE / POST CON / S / M OR / E OFF | | : : | | | | | | BL / BO BR / DF SA OTHER | Min: Max: | | | V / I / DG NONE | SS / BC DW / SD None | | |

## Marine Mammal Observation Record – Code Sheet

**Behavior Codes**

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

**Event**

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

**Construction Type**

| Code | Activity Type |
|---|---|
| V | Vibratory Pile Driving |
| I | Impact Pile Driving |
| DG | Dredging |

**Sighting Cues**

| Code | Sighting Cue |
|---|---|
| BL | Blow |
| BO | Body |
| BR | Breach |
| DF | Dorsal Fin |
| SA | Surface Activity |
| OTHR | Other |

**Marine Mammal Species**

| Code | Marine Mammal Species |
|---|---|
| CSL | California Sea Lion |
| PHS | Pacific Harbor Seal |
| GW | Gray Whale |
| SBCD | Short-beaked Common Dolphin |
| LBCD | Long-beaked Common Dolphin |
| CBD | Common Bottlenose Dolphin |
| OTHR | Other |

**Mitigation Codes**

| Code | Activity Type |
|---|---|
| SS | Soft Start |
| BC | Bubble Curtain |
| SD | Shut down In-Water Work |

**Wave Height**

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

**Visibility**

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

**Weather Conditions**

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

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

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

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

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