

Appendix F

Biological Assessment



October 2026
Nevada Cement Company LLC Stockton Terminal Modernization Project



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Prepared for Nevada Cement Company LLC

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Prepared for

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ABBREVIATIONS

Action Area	area of potential effect
BA	<i>Biological Assessment</i>
BMP	best management practice
CCTC	Central California Traction Company
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CNDDDB	California Natural Diversity Database
cSEL	cumulative sound exposure level
dB	decibel
Delta	Sacramento-San Joaquin Delta
DMPS	Dredge Material Placement Site
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
DWSC	Deep Water Ship Channel
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
Fed. Reg.	Federal Register
FMP	Fisheries Management Plan
FMWT	Fall Midwater Trawl
HAPC	Habitat Area of Particular Concern
IPaC	Information for Planning and Consultation
MHHW	mean higher high water
MHW	mean high water
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fisheries Conservation and Management Act
Nevada Cement	Nevada Cement Company LLC
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
Port	Port of Stockton
Proposed Action	Nevada Cement Company LLC Stockton Terminal Modernization Project
PSU	practical salinity unit
RWQCB	Regional Water Quality Control Board

SEL	sound exposure level
Services	National Marine Fisheries Service and U.S. Fish and Wildlife Service
SFEI	San Francisco Estuary Institute
terminal	Stockton Terminal
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1 Introduction and Project Need

This Biological Assessment (BA) has been prepared to meet consultation requirements under Section 7 of the Endangered Species Act (ESA) of 1973 (as amended). The purpose of this BA is to evaluate the potential effects of the Proposed Action—the proposed **Nevada Cement Company LLC Stockton Terminal Modernization Project**—on listed threatened or endangered species and on designated critical habitat within the Proposed Action’s area of effect (Action Area). In addition, this BA is intended to fulfill consultation requirements under the Magnuson-Stevens Fishery Conservation and Management Act of 1997 (MSA; NMFS 1997). Section 7 and MSA consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS; jointly, the Services) would be initiated by the U.S. Army Corps of Engineers (USACE).

The Nevada Cement Company LLC (Nevada Cement) operates a longstanding bulk cement import and distribution terminal at the Port of Stockton (Port), located along the Stockton Deep Water Ship Channel (DWSC) in San Joaquin County, California. Nevada Cement proposes to replace and upgrade aging upland and marine infrastructure to improve cementitious material receiving and distribution to meet long-term market demand for cement, supplementary cementitious materials, and other construction-related products in Northern California. Modernizing the Stockton Terminal (terminal) would improve efficiency, accommodate larger vessels, and modernize aging infrastructure to maintain a reliable supply of cementitious materials to the Northern California construction markets for decades to come.

As part of the Proposed Action, Nevada Cement would modify its lease with the Port to expand its terminal leasehold from 4.92 acres to 10.98 acres. The existing leasehold reflects only the area occupied by existing permanent storage structures; however, current terminal operations extend across approximately 8.18 acres and include berth operations, truck lanes, and rail facilities. The lease modification would formalize the operational footprint and accommodate planned infrastructure improvements.

1.1 Project Location

The Port is located approximately 75 miles east of San Francisco and 40 miles southeast of Sacramento (Figure 1). It is bisected by the San Joaquin River, which includes the Stockton DWSC, and is divided into the East Complex and the West Complex (Rough and Ready Island). The Proposed Action site is located within the East Complex, which encompasses approximately 680 acres bounded by the Stockton DWSC and turning basin to the north, the Port’s Public Beltline Railroad main lead and the BNSF Railroads to the east and south, and the San Joaquin River to the west.

The Port is situated within Stockton’s urban core, which is characterized by a mix of heavy industrial uses with limited landscape features, older residential neighborhoods, neighborhood commercial

shopping centers, and other commercial and industrial parcels (Figure 2). In the area surrounding the project site, the Port leases property for various industrial uses, including storage tanks, maritime terminals, cementitious materials storage structures, grain silos, railroad facilities, large storage buildings, and stockpiles of commodities unrelated to the Proposed Action.

The Proposed Action is located at 205 Port Road 1 in the northeast corner of the East Complex. The terminal is bounded by the San Joaquin River and Port Roads A, 1, and 2 (Figure 2). Existing rail infrastructure used by Nevada Cement is located on or adjacent to the terminal and just north of Port Road A between Berth 2 and Port Road 2.

Berths 2 and 3/4 are designated as public access berths and are used by multiple tenants. Adjacent users include Penny Newman, a bulk grain facility, to the east, and CalPortland Cement to the west.



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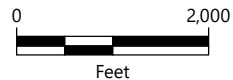
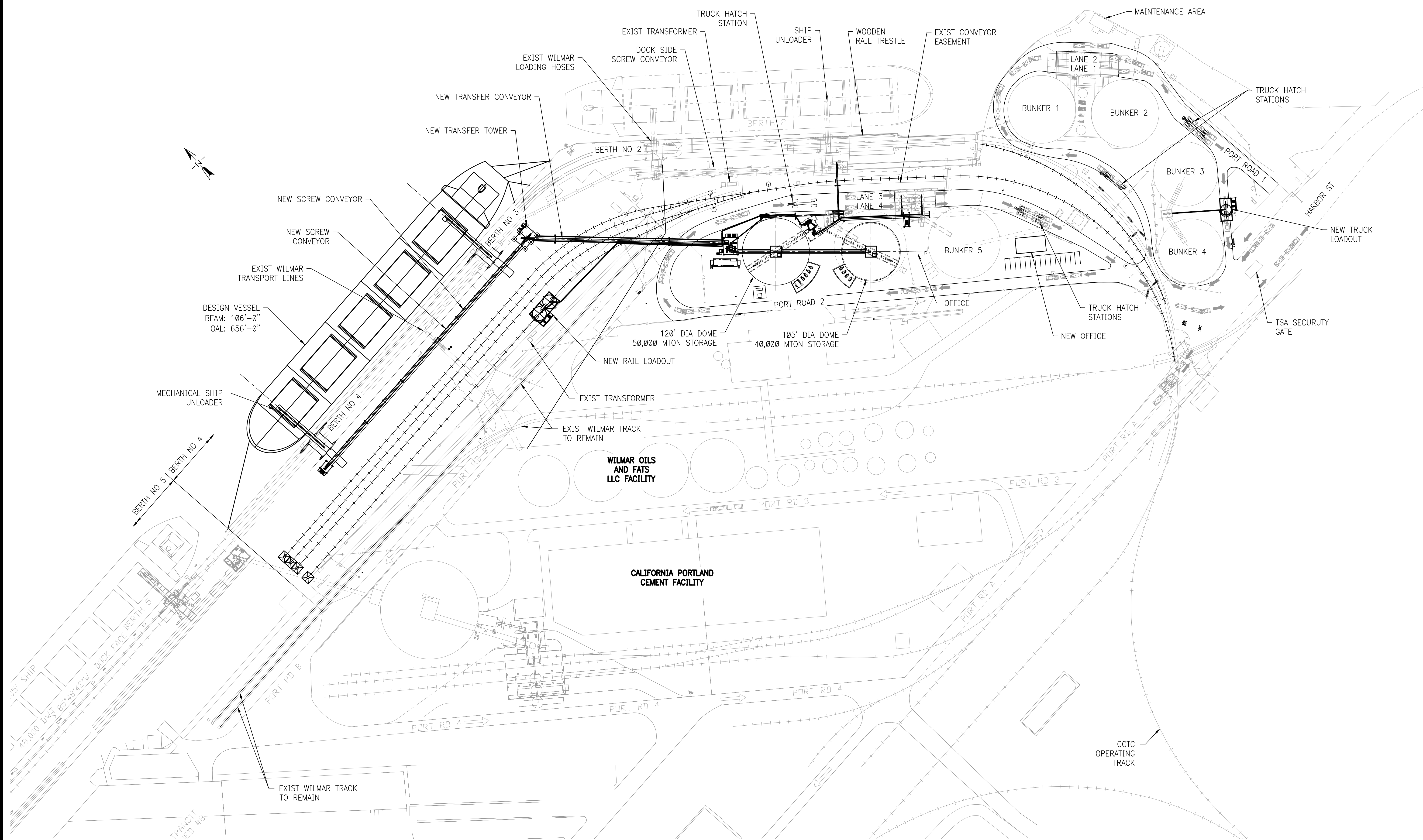
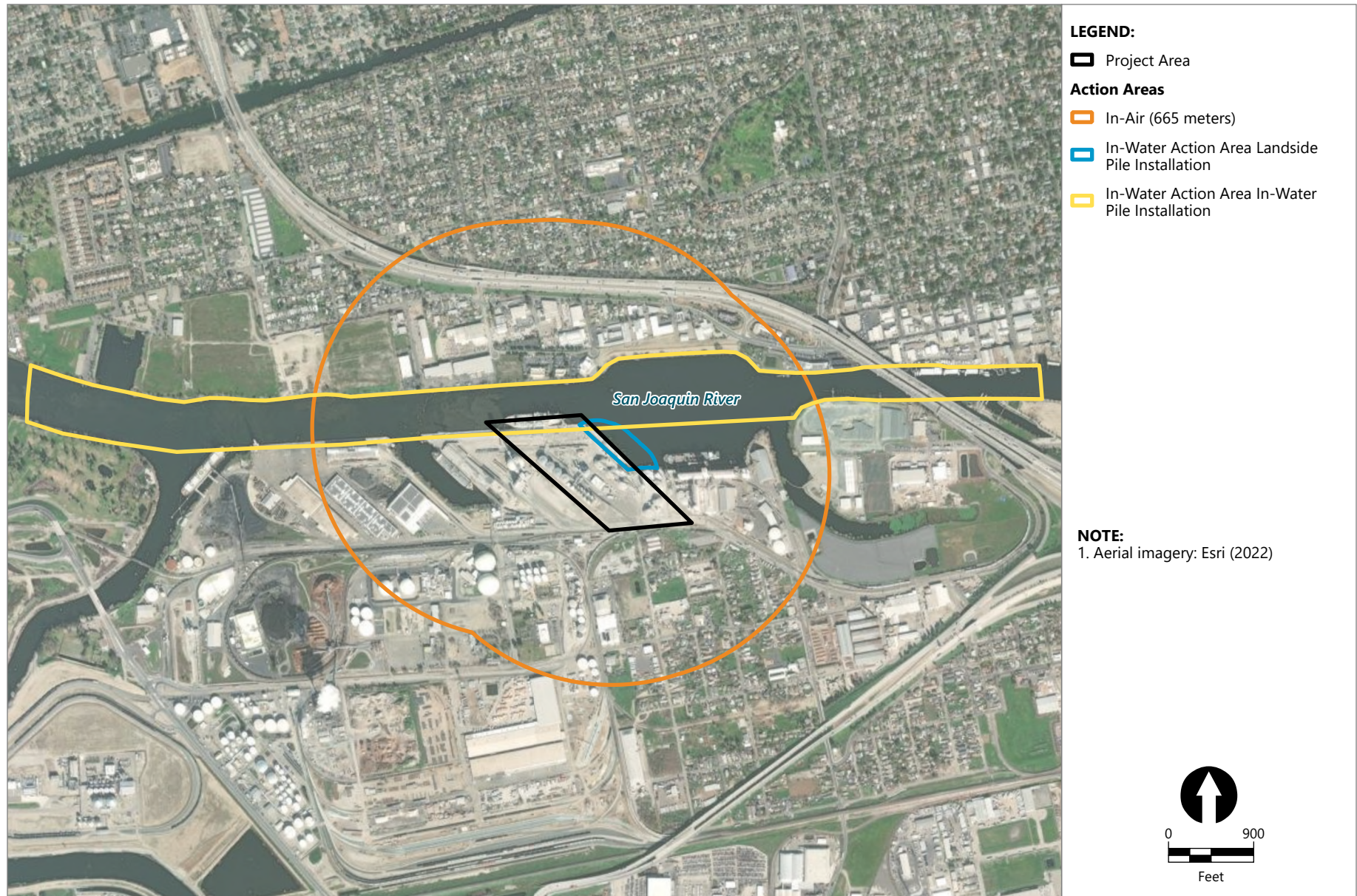


Figure 1
Vicinity Map





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Figure 3
Action Area

1.2 Existing Infrastructure

Berth 2 Structure

The existing Berth 2 is a concrete dock approximately 540 feet long (Photograph 1). Concrete columns and beams support key operational components, including railcar rails, ship unloader gantry rails, the main platform deck, and the existing ship unloader (Photograph 2).

Dock-Mounted Ship Unloader

The existing ship unloader is nearly 40 years old and was designed for smaller vessels. The shiploader has limited horizontal and vertical reach, making it undersized for modern bulk carriers. The restricted arm length prevents efficient access across wider holds, requiring vessels to be repositioned to achieve full cargo discharge (Photograph 2). These limitations to horizontal and vertical reach result in extended unloading times and hold-cleanup durations, increased labor requirements, higher emissions from prolonged vessel activity, and greater fugitive dust generation from manual cleanup of the ship's holds.

Berth 3/4

The existing Berth 3/4 is a 920-foot-long concrete dock, supported by approximately 1,700 timber and concrete piles (Photograph 3). These piles support concrete beams and a concrete sub-deck, while concrete columns and beams carry railcar rails, crane gantry rails, the main platform deck, and Transit Shed 4.

A moored silo ship, the M/V *Golden Arrow*, occupies Berth 3/4 and functions as a floating cementitious material handling terminal that supports associated truck loading operations. Under the Proposed Action, the vessel and associated equipment would be removed, and these operations would cease prior to construction.

Photograph 1
Existing Berth 2 Dock Structure



Photograph 2
Existing Ship Unloader



Photograph 3
Berth 3/4



Bunkers 6 and 7

The existing Bunkers 6 and 7 both have a storage capacity of 8,800 metric tons and dimensions of 130 feet in diameter and 58 feet in height. The reclaim systems used in these bunkers are not automated and require manual intervention via front-end loaders and other material handling equipment to feed materials into pneumatic transport systems. In all cases, reclaimed materials from the existing storage bunkers are ultimately pneumatically conveyed to the truck loading or railcar loading stations for distribution. Both bunkers would be demolished and replaced with higher

capacity-capacity concrete storage domes to more efficiently handle Portland cement or other cementitious materials.

Other Existing Terminal Infrastructure

Materials are unloaded from the ship at Berth 2 using the dock-mounted ship unloader and conveyed via an enclosed existing pneumatic system to seven existing concrete-walled storage structures at the terminal (Photograph 4). The storage structures have concrete walls and roofs of timber, steel, or aluminum. An elevated steel tank associated with rail loadout is also present (Photograph 5). The terminal includes two truck loading stations, each with two lanes (four lanes total; Photograph 6). The current rail infrastructure includes tracks situated atop a wooden trestle that spans from the landside to Berth 2 (Photograph 7). This trestle structure has been downgraded and is now only rated to support the passage of empty railcars. Additionally, placing railcars on Berth 2 is restricted due to the potential disruption of regular berth operations. As such, the existing rail infrastructure supports limited operations. Yard equipment supporting storage reclaim and loading operations includes a sweeper, front-end loaders, and a rail-mounted yard wagon. Twenty-nine air pollution control devices operate at the terminal, most functioning independently. Truck idling times for the proposed operations are consistent with existing operations, typically less than 5 minutes per truck.

Photograph 4
Existing Cementitious Material Storage Bunker



Photograph 5
Existing Railcar Loadout



Photograph 6
Existing Truck Loading Station



Photograph 7
Miscellaneous Building and Rail Operations



1.3 Existing Terminal Operations

Nevada Cement's existing terminal receives, stores, and ships cementitious materials to supply the construction industry in the Stockton area and regional Northern California market. Materials are unloaded from the ship by a dock-mounted ship unloader at Berth 2 and transferred in a fully enclosed existing pneumatic conveying system to seven storage structures at the terminal. The storage structures are concrete-walled with various types of roofs, including timber, steel, and aluminum. There is also one elevated steel tank that holds products associated with the rail loadout.

Ship unloading activities represent the primary source of in-water operational disturbance at the terminal and define baseline conditions against which construction-related effects are evaluated for purposes of this BA.

As noted previously, Berth 3/4 is used to dock M/V *Golden Arrow*, which serves as a floating cementitious material terminal, and supports associated truck loading operations for cementitious material from the *Golden Arrow*.

Reclaim and Loading Systems: Cementitious materials are reclaimed from the storage structures using various systems, including the following:

- **Automated:** Bunkers 1 and 2 are equipped with automated aerated floor systems for material reclaim.
- **Mechanical/Manual:** Bunkers 3 through 7 require manual front-end loaders and other handling equipment to feed materials into pneumatic transport systems.

In all cases, the reclaimed materials are pneumatically conveyed to the truck or railcar loading stations for distribution. The terminal includes four loadout lanes (two areas with two scales each) and one railcar loading station.

Rail and Truck Operations: Railcars are brought into the terminal by the Central California Traction Company's locomotives. Railcars are received, stored, and loaded on site before departing the terminal. Truck traffic enters through the East Gate (a single inbound lane) and splits into two outbound lanes to separate loadout stations:

- Lanes 1 and 2 serve loadout near Bunkers 1 and 2.
- Lanes 3 and 4 serve loadout near Bunkers 5 through 7.

Truck Queuing: After loading, trucks exit via internal Port roads and reconnect with public roads through the East Gate. Queueing is managed through signage, radio communications, and personnel direction, with designated staging areas used depending on terminal activity and material type. During current operations, the terminal typically handles approximately 50 trucks per day for loading. Average truck idling time is less than 5 minutes, though it varies by arrival time. Idling is generally higher during peak traffic periods, which are driven by end-customer and industry practices. Trucks may be turned off if waiting in the staging queue for extended periods. Current and projected peak loading periods are as follows:

- 0000 to 0800 = 50% of truck loading
- 0800 to 1600 = 40% of truck loading
- 1600 to 2400 = 10% of truck loading

Employees are on site during ship unloading and truck and railcar loading operations. In general, the terminal operates Monday through Saturday, with occasional Sunday operations. Ship unloading is typically conducted 24 hours per day for an average 4 to 5 days per vessel discharge.

1.4 ESA-Listed Species and Habitats that May Occur in the Action Area

This BA considers all federal ESA-listed species regulated by the Services in addition to any critical habitat and Essential Fish Habitat (EFH) present in the Action Area. Federally listed threatened or endangered species identified as having the potential to occur in the Action Area (Table 1) could potentially be affected by the Proposed Action. Data sources reviewed include the following:

- USFWS Information for Planning and Consultation (IPaC) report (USFWS 2025)
- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CDFW CNDDDB 2025)
- *Fall Midwater Trawl Monthly Abundance Indices* (CDFW 2025a)
- NMFS EFH Mapper (NMFS 2025a)
- NMFS Critical Habitat Mapper (NMFS 2025b)
- Eelgrass distribution in California dataset (CDFW 2023)

Table 1
ESA-Listed Species and Critical Habitat that May Occur in the Action Area

Species	Federal Status	Critical Habitat
Southern green sturgeon DPS (<i>Acipenser medirostris</i>)	Threatened	Designated, present in Action Area
Delta smelt (<i>Hypomesus transpacificus</i>)	Threatened	Designated, present in Action Area
Central Valley steelhead DPS (<i>Oncorhynchus mykiss</i>)	Threatened	Designated, present in Action Area
Longfin smelt (<i>Spirinchus thaleichthys</i>)	Endangered	None designated

As outlined in Table 1, four federally listed species are known or considered to have the potential to occur in the Action Area, and potential effects to all four species are assessed in this BA.

A search of the California Natural Diversity Database (CNDDDB) within the Stockton West U.S. Geological Survey 7.5-minute quadrangle and surrounding quadrangles (Terminous, Lodi South, Waterloo, Stockton East, Manteca, Lathrop, Union Island, and Holt) identified occurrences of the four federally listed species and nine additional ESA-listed species. A separate query of the USFWS IPaC tool indicated that the known ranges or areas of influence of the nine ESA-listed species and two additional species overlap with the Action Area (Attachment 1; CDFW CNDDDB 2025, USFWS 2025). Based on these sources, the following additional species were identified as potentially present in the Action Area; however, they are not addressed in this BA because suitable habitat is absent within the

Action Area and project activities would not intersect areas used by these species based on their known distribution and life history requirements:

- Giant garter snake (*Thamnophis gigas*)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- Northwestern pond turtle (*Actinemys marmorata*)
- California tiger salamander (*Ambystoma californiense* pop. 1)
- Western spadefoot (*Spea hammondi*)
- Least bell's vireo (*Vireo bellii pusillus*)
- Riparian brush rabbit (*Sylvilagus bachmani riparius*)
- Palmate-bracted bird's beak (*Chloropyron palmatum*)
- Vernal pool fairy shrimp (*Branchinecta lynchi*)
- Large-flowered Fiddleneck (*Amsinckia grandiflora*)
- Monarch Butterfly (*Danaus plexippus*)

Additional information on the species not carried forward in this BA is presented in Attachment 1.

1.4.1 Critical Habitat

Designated critical habitat occurs within the Action Area for three aquatic species: the Southern green sturgeon DPS, delta smelt, and Central Valley steelhead DPS. There is no designated critical habitat for terrestrial species in the Action Area. The closest mapped terrestrial species critical habitat is approximately 20 miles southwest of the Action Area for California red-legged frog (*Rana draytonii*) (NMFS 2025b).

1.4.2 Essential Fish Habitat Assessment

The Action Area is within EFH, as defined in the MSA, for commercially important fish and shark species managed under three federal Fisheries Management Plans (FMPs; NMFS 2025a), as follows:

- **Pacific Coast Groundfish EFH:** The Pacific Groundfish FMP is designed to protect the habitat of 86 species of fish, including rockfish, flatfish, roundfish, some sharks and skates, and other species that associate with the underwater substrate. The following eight species are commonly reported in San Francisco Bay waters: English sole (*Parophrys vetulus*), Pacific sanddab (*Citharichthys sordidus*), starry flounder (*Platichthys stellatus*), lingcod (*Ophiodon elongatus*), brown rockfish (*Sebastes auriculatus*), kelp greenling (*Hexagrammos decagrammus*), leopard shark (*Triakis semifasciata*), and big skate (*Raja binoculata*).
- **Pacific Salmon EFH:** The Pacific Salmon FMP is designed to protect habitat for commercially important salmonid species. Sacramento winter-run Evolutionarily Significant Unit (ESU) Chinook salmon and Central Valley spring-run ESU Chinook salmon may be seasonally present in the Action Area.

Potential effects to EFH associated with the Proposed Action are limited to temporary and localized disturbance of the water column and benthic substrate during in-water construction and are evaluated in the effects analysis sections of this BA.

1.4.3 Habitat Areas of Particular Concern

The Action Area also occurs within an area designated as coastal estuary Habitat Area of Particular Concern (HAPC) for various federally managed fish species within the Pacific Groundfish FMP. Within the Bay and Sacramento-San Joaquin Delta (Delta) region, NMFS has identified two HAPCs, eelgrass beds (*Zostera marina*) and Olympia oyster beds (*Ostrea lurida*). However, neither are present within the Action Area.

The nearest eelgrass beds are documented approximately 80 kilometers northwest of the Action Area near Point Carquinez in Port Costa, California (CDFW 2025b). Oyster beds have never been observed in the project area.

In consideration of these findings, eelgrass beds and Olympia oyster beds would not be impacted by the Proposed Action and are not discussed further in this BA.

1.4.4 Marine Mammal Protection Act Species

Harbor seals may occur intermittently in the San Joaquin River adjacent to the project site. Their presence is largely transitory, as there are no rookeries or suitable haul-out sites regularly utilized by harbor seals within the Port. Habitat for harbor seals within the project area of effect is generally low quality relative to the greater Bay Delta, given the high level of vessel traffic at the Port, the disturbed condition of the San Joaquin River, and the fact that no rookeries or regularly used haul-out sites are present.

Harbor seals, if present, may experience temporary behavioral disturbance associated with construction-related underwater noise, particularly noise associated with pile driving. To minimize the potential for marine mammal disturbance, pile driving activities (if required) would implement soft-start procedures consistent with standard marine construction practices. This would give any harbor seals an opportunity to leave the project area prior to potentially harmful pile-driving noise. Pile-driving effects on marine mammals are assessed in the Bioacoustics Evaluation provided in Attachment 2. Attachment 3 provides a *Protected Species Monitoring Plan* to reduce potential impacts.

2 Description of the Proposed Action

2.1 Construction

Construction is anticipated to occur over a period of about 5 years. In-water work, including pile foundation installation, would be conducted during the approved in-water work window of July 1 through November 30. Work would occur in phases, as outlined in Table 2, with certain components constructed concurrently. Assuming an installation rate of up to 2 marine piles per day and 4 to 20 landside piles per day, marine and landside pile driving is expected to take approximately 62 days and 99 workdays, respectively. Construction activities would be coordinated to proceed alongside ongoing terminal operations to minimize disruption.

Table 2
Overall Construction Program Schedule

Project Component	Location	Summary of Work ^{1, 2}	In-Water Work?	Calendar Window	Estimated Active Workdays
Marine Infrastructure Improvements on Berth 3/4	Overwater, above and below MHHW	Marine pile installation, dock structural upgrades, gantry rail installation	Yes	June 2027 to November 2028	~155
Ship Unloader and Conveyance System Installation	Upland	Install the new ship unloader and structural/mechanical installation for the conveyance systems	No	December 2028 to June 2029	~180
Barge Loading System	Upland	Structural/mechanical installation for the conveyance systems	No	TBD	~30
Bunker 7 and Upland Modernization Improvements	Upland	Demolition, upland pile driving and foundation construction, utilities, truck and rail improvements, structural/mechanical installation	No	July 2027 to May 2029	~1,370
Bunker 6 Demolition and Replacement	Upland	Demolition, below-grade structure removal, pile driving and foundation construction, and mechanical installation	No	January 2030 to May 2031	~510

Notes:

Active workdays reflect cumulative estimated field days across overlapping construction activities and do not represent continuous construction throughout the calendar window.

All in-water work would occur only during the approved seasonal work window (July 1 to November 30).

Bunker 6 replacement is sequenced following completion of initial modernization improvements to maintain operational capacity and is included as part of the overall project authorization. No in-water work is associated with Bunker 6 activities.

1. See Sections 2.1.3 through 2.1.5 and Appendix A for details of each project component.

2. Construction timing may be adjusted due to market conditions, supply chain issues for equipment, or other commercial factors.

Active construction is anticipated to occur intermittently within the overall “Calendar Windows” identified in Table 2 and would not occur continuously throughout full duration of those windows. Although the overall schedule spans extended calendar periods to accommodate sequencing of construction elements, the proposed project would not conduct any in-water work within the approved work window of July 1 through November 30, and active ground-disturbing construction would occur intermittently and would not occur continuously throughout the calendar windows.

Construction would be sequenced to proceed alongside ongoing terminal operations and coordinated to minimize disruption of cement imports and distribution. Construction hours would not exceed 10 hours per day, 6 days per week, except in extenuating circumstances necessary to maintain the construction schedule.

In-water work includes pile foundation installation, pile installation, and concrete deck formwork and would occur over a maximum of 456 days. Assuming installation of 2 to 20 piles per day depending on pile type, pile driving would occur during 161 workdays over a maximum of 270 calendar days.

No new dredging is proposed for this project. Maintenance dredging of dock areas at Berths 2 and 3/4 would continue to be performed by the Port of Stockton in accordance with existing permits separate from the Proposed Action.

2.1.1 Staging and Equipment

All construction staging and stockpiling would occur on existing paved Port property. The staging areas have previously been used for other construction projects, and site preparation is anticipated to be minimal. Staging of materials and construction equipment would generally be limited to areas within the Nevada Cement terminal or directly adjacent space near Berth 3/4. Open areas on and near Berth 3/4 would be used for staging parts and containers associated with the new ship unloader. Barges may also be moored at the dock in the San Joaquin River for use as additional lay-down areas or for operation of equipment such as cranes.

The project site is accessible from Harbor Street, Port Road 1, or from the San Joaquin River (within which runs the Stockton DWSC).

The Proposed Action is expected to require the following types of heavy machinery for construction:

- **Earthmoving:** Backhoe, compactor, excavator, front-end loader, grader, haul/dump truck, tractor/loader
- **Lifting and rigging:** Cranes (45-, 140-, or 225-ton), forklift, deck winch, man lift
- **Marine:** Barge, tender tug, work skiff
- **Power and air tools:** Compressor (air or other), generator (diesel or other)
- **Pile driving:** Diesel impact hammer, vibratory hammer
- **Concrete handling:** Truck, pumper

- **Welding:** Welding truck/rig
- **Transportation and delivery:** Dump truck, light-duty truck
- **Paving:** Paving equipment

2.1.2 *Demolition and Site Preparation*

The Proposed Action would require the removal of the following existing structures:

- Shed near Bunker 7
- Bunkers 6 and 7, including foundations, floor slabs, and below-grade tunnels
- Shed cover between Bunkers 6 and 7
- Rail loading tank near Bunkers 1 and 2
- Dust filter and associated structural supports between Bunkers 1 and 2
- Shed cover between Bunkers 3 and 4
- Liquids-handling pipeline, which would be removed and repositioned
- Transit Shed 4, including the landside column support piers and foundations and all above-deck structures (e.g., cladding, doors, and ancillary features)

The removal of Transit Shed 4 would include the demolition of all above-deck structures waterside of the retaining wall. The remaining demolition activities would be fully landside of the existing dock structure's retaining wall and would not involve any overwater work conditions.

Various miscellaneous features and equipment, including transformers, light poles, access ramps, utilities, and others, would be removed or demolished. Treated wood piles would be stored on plastic tarps before being disposed of at a Class 2 landfill, such as Foothill Sanitary Landfill and North County Recycling Center and Sanitary Landfill. Navy Drive and West Washington Street are anticipated to be the primary public haul routes into and out of the Port. Port Road A and Port Road 13 would be the primary intra-Port access to the site via the Main Gate.

Demolition would result in ground disturbance and grade modifications. Approximately 19,300 cubic yards of ground disturbance is anticipated as part of the Proposed Action, at a maximum depth of 4 feet below grade. Ground-disturbing activities may include the following:

- Clearing, grubbing, and grading
- Installation of pilings, piers, or footings
- Trenching or directional drilling for utilities
- Installation of utilities vaults
- Any other excavation

2.1.3 *Berth 3/4 Rehabilitation*

Construction at Berth 3/4 would consist of a range of in-water and overwater enhancements, including the following:

- Installation of new steel and precast concrete support piles
- Construction of new concrete support beams
- Installation of new gantry rails
- Installation of a new ship unloader stowage mast anchor pad
- Installation of a new transfer tower foundation and precast concrete support piles
- New dock fenders
- Deck repairs
- Reinforcement of the existing rear retaining wall parallel to the Berth 3/4 face, and construction of a new retaining wall at the intersection of Berths 4 and 5

Work would require excavation, pile installation, and removal. Installation would occur using a vibratory hammer or a single impact hammer (depending on pile type, substrate conditions, and final engineering design) mounted to a crawler crane operating from the Berth 3/4 deck. If the existing dock structure cannot support this type of installation crane, a floating derrick barge would be used to drive these pilings and support the Berth 3/4 construction.

Installation of piles below the mean higher high water (MHHW) would be required for the Berth 3/4 rehabilitation. Installation would require cutting slots in the existing 8-inch-thick concrete deck at Berth 3/4 to accommodate pile driving. The installation of the battered steel pipe piles along the dock's north face would necessitate the removal of existing concrete bracing beams. New fenders would be installed on the dock face to protect the dock. The final design would incorporate replacement bracing to maintain structural integrity. Structural evaluations have confirmed that the existing gantry rails on the eastern portion of Berth 3/4 are adequate to support the new unloader. Required modifications to Berth 3/4 include extension of gantry rails using new pilings, support beams, and rails, and installation of additional piles on the southeast portion of Berth 3/4 to support a new equipment transfer tower. Importantly, these improvements would occur within the footprint of the existing dock structure, with no increase in deck area.

Construction would also include installing new concrete beams and gantry rails, casting new deck sections to replace cutouts made for pile installation, and constructing new below-deck beams and braces connected to the existing dock structure, which would all occur above the MHHW line. The same deck slots used for pile installation would serve in constructing the below-deck beams. Once the piles are in place, the deck slots would be formed, dowels installed, and concrete poured to restore the deck surface. Forms for new concrete beams would be supported by the newly installed piles and existing below-deck structures. A hydraulic crane on the deck would facilitate formwork

and placement of the cast-in-place reinforced concrete beams. The Proposed Action involves using approximately 300 cubic yards of concrete to construct the cast-in-place beams, to build the base pads and piers for the inbound material handling system on Berth 3/4, including the transfer tower, and to replace the deck over the installation slots.

2.1.4 Ship Unloader and Conveyance System and Dock Transfer Tower

Following Berth 3/4 upgrades, a new ship unloader would be delivered to the site and constructed on the newly installed gantry rail along the dock parallel to the berth fender line. The ship unloader components would be sourced from various international locations and delivered to Berth 3/4 in large, pre-assembled sections, shipped via project cargo, and smaller components would be shipped via multiple shipping containers. Upon arrival, the unloader would be assembled on site within a designated area of Berth 3/4, utilizing existing and newly installed gantry rails aligned parallel to the Berth 3/4 face. The new unloader would be equipped with an enclosed conveying system and an on-board air pollution control device to minimize emissions during operations and an electrical equipment room. An electrical equipment room would be constructed on Berth 3/4 to meet the increased power demands of the new ship unloader.

The new Berth 3/4 ship unloader would be the primary receiving equipment for the terminal, with materials conveyed through a new mechanical conveyor system to the proposed new storage domes.

The new dock transfer tower would contain a negatively vented transfer system connecting the dock conveyor to the inbound conveyance system. From the dock transfer tower, inbound materials would be conveyed through a fully enclosed and negatively vented screw conveyor supported on an elevated truss to provide clearance over the rail track. The screw conveyor truss would be supported by three steel bents positioned in the proposed rail yard area and would include air pollution control devices installed at both ends. Materials would then feed a negatively vented bucket elevator supported by a structural steel tower adjacent to the north side of the proposed storage dome replacing Bunker 7.

2.1.5 Barge Loading System

Barge loading equipment would be installed to allow for future barge loading of cementitious material for water-based shipping. This operation would occur at Berth 2.

The existing Berth 2 ship unloader would remain operational and capable of delivering cementitious materials from vessels docked at Berth 2 as a backup system during maintenance or downtime of the new primary unloader at Berth 3/4.

2.1.6 Bunkers 6 and 7 Storage Domes Replacement

The proposed project would replace Bunkers 6 and 7 with monolithically constructed, vinyl-covered, steel-reinforced concrete storage domes. The existing Bunkers 6 and 7 both have a storage capacity of 8,800 metric tons and dimensions of 130 feet in diameter and 58 feet in height. The new domes would be equipped with fully automated cementitious material extraction systems that include sloped, aerated floors that channel materials into an enclosed, negatively pressurized conveying system. This system would distribute materials to multiple destinations and include air pollution control devices.

The dome replacing Bunker 7 would be approximately 125 feet in diameter by 150 feet in height with a storage capacity of 50,000 metric tons. Bunker 6 would remain in service during construction of the dome replacing Bunker 7. Following the successful installation and operation of Bunker 7, Nevada Cement plans to demolish and replace Bunker 6 as part of the proposed project. The dome replacing Bunker 6 would be approximately 105 feet in diameter and 150 feet in height with a storage capacity of 40,000 metric tons. The Bunker 7 storage dome would be constructed entirely on land, on a foundation supported by 1,050 concrete piles; the Bunker 6 storage dome would be constructed entirely on land, on a foundation supported by 730 concrete piles.

Installation of the new storage dome foundation systems and conveyance infrastructure would involve upland pile driving. Assuming an installation rate of 5 to 20 landside piles per day, landside pile driving is expected to take approximately 99 workdays. The domes would be constructed using conventional methods and would include internal systems to support material storage and extraction. The vinyl cover would serve as an inflatable form for the installation of reinforced shotcrete. No air pollution devices are implemented during the construction phase as dust emissions would be negligible. The structural walls of the storage dome would be built using conventional reinforcing steel covered with shotcrete. Once the exterior shell portion of the dome is complete, the positive pressure would be removed, and an interior tunnel would be installed to allow installation of air supply piping and valves. Imported fill, verified as clean per the Department of Toxic Substances Control's (DTSC's) 2001 Clean Imported Fill Material advisory, would be placed to form a sloped concrete floor. A full-coverage aerated floor system would be installed, equipped with a computer-controlled valve and blower system to supply pressurized air to aerate the cementitious materials and promote extraction flow. Equipment buildings housing operational systems, including blowers, would be constructed adjacent to the dome replacing Bunker 7. These systems would require pile foundations, which are already accounted for in the total pile counts

2.1.7 Truck and Rail Loadout Material Handling Systems Installation and Integration with Existing Infrastructure

The Proposed Action includes new, higher capacity material handling equipment that would deliver cementitious material to the surge bins to improve the efficiency of loading trucks. There is an

existing truck loading station adjacent to Bunkers 5 and 6, constituting Truck Loading Lanes 3 and 4. This loading station would allow maintaining the four loadout tanks to be fed by the existing pneumatic transfer system from Bunkers 5 and 6. In addition, the automated dome extraction system would discharge into two distinct material handling systems, one mechanical for feeding the existing four Lanes 3 and 4 tanks for truck loading, and one pneumatic, which would deliver material to the new railcar loadout station.

2.1.7.1 Railcar Loadout

The new railcar loadout system would be fed by a new pneumatic transport line, which would deliver material to two newly proposed elevated surge tanks located at the railcar loading station. These tanks would be equipped with air pollution control systems to manage emissions generated during pneumatic transport.

2.1.7.2 Truck Loading Operation Revitalization

Truck Loadout—Lanes 3 and 4. The existing four elevated loadout surge tanks would be fed by material handling systems from either the new dome, or, as they are currently fed from Bunkers 5 and 6. The existing single-deck truck scales at Lanes 3 and 4 would be replaced with new split-deck scales. This would enable separate weighing and loading of each pod of dual-pod truck trailers, enhancing precision and operational flexibility.

Truck Loadout—Bunkers 3 and 4: The existing truck loading shed would be removed, making way for the installation of a new Truck Loading Station in approximately the same location. The reclaim systems for Bunkers 3 and 4 would be modified to support this updated operation. These revised reclaim systems would utilize the existing pneumatic transport infrastructure to deliver the cementitious materials to a new truck surge tank, which would feed the new loading station. This improvement would streamline material handling operations and enhance the site's flexibility in managing multiple material types.

2.1.7.3 Rail Car Loading Station

A new railcar loading station would be constructed north of Port Road B and south of Berth 3/4. Positioned adjacent to the new rail yard, the new railcar loading station would facilitate efficient transfer of empty and full railcars, keeping operations within the terminal and avoiding disruptions to Port traffic. The loading station would accommodate the loading of up to 45 railcars per day, pending timely industrial switch services provided by the Central California Traction Company (CCTC). The station would feature two 500-ton capacity elevated staging surge tanks filled by an enclosed pneumatic transfer system from the new storage dome reclaim system. Railcars would be loaded via a negatively vented, enclosed handling system connected to a single telescoping loading spout, which would seal against the railcar's fill hatch for dust-free loading. A fully electronic scale,

positioned directly below the spout, would ensure precise and automated loading. The projected loading rate is two railcars per hour.

2.1.7.4 Rail Improvements

The Proposed Action involves several rail improvements on the proposed leasehold area south of and parallel to Berth 3/4, including the following:

- **Re-Establish Industry Leads:** The Proposed Action would rehabilitate and re-establish the lead track that serves the facility off the Port's main rail beltline.
- **Loading Track:** The Proposed Action would build a new loading track capable of accommodating and loading a string of 15 railcars before switching must occur.
- **Staging Track:** The Proposed Action would upgrade and rejoin an existing off-site storage track to the proposed new terminal tracks to improve the exchange of railcars with the Port's short-line operator, CCTC. The rail layout would enable CCTC to switch 30 railcars in one move, decreasing the existing switch moves.
- **Storage Tracks:** Four storage tracks with a total capacity of 60 railcars would be built. This would allow CCTC to deliver more railcars to and from the terminal in fewer trips, which would allow Nevada Cement to operate within the proposed leasehold across multiple shifts and/or days, thus reducing rail traffic across the at-grade crossing on Port Road A. Nevada Cement would have a dedicated track to store its own locomotive, allowing for Nevada Cement to self-perform train movements on the leasehold area instead of relying on CCTC. The rail improvements would also allow Nevada Cement to retire its rail operations on the Berth 2 concrete deck and wooden trestle.

2.1.8 Civil Improvements and Utility Upgrades

2.1.8.1 Railyard Area Enhancements

The primary civil improvements are concentrated in the railyard area. These enhancements include the excavation and regrading of the bank under Transit Shed 4, south of the dock structure's retaining wall, removal of the existing concrete slab and asphalt paving, and the over-excavation of the track area to accommodate the installation of new imported select fill, base material, and ballast for the proposed rail tracks.

Construction of minor piping interconnections to existing pipelines may be required to support the terminal receiving minimal amounts of cementitious materials by railcar to supplement ship delivery.

2.1.8.2 Paving and Rail Connectivity

Existing paving would be removed and replaced to facilitate a new rail connection between the entry track at Port Road A and the new rail yard. Pavement conditions throughout the site would be evaluated to retain and reuse serviceable areas wherever possible to maintain efficient truck

circulation through the terminal. Where required, new pavement would be installed or damaged sections would be repaired.

2.1.8.3 Existing Drainage and Modifications

The project area encompasses several existing subsurface drainage features—including culverts, utility holes, and related infrastructure—within the boundaries of Berth 3/4, Port Road B, and the planned rail yard. While the original design documentation for these underground drainage systems is incomplete, the installations have been verified through survey data. The legacy drainage infrastructure would be modified and reused where feasible, and it would be integrated with new underground drainage systems to manage stormwater from the rail yard and surrounding paved surfaces.

A significant portion of impervious surfaces would be removed and replaced with pervious areas, effectively reducing the volume of stormwater runoff entering the existing collection system. All stormwater generated within the Nevada Cement leasehold would be routed—through either existing or new conveyance systems—into the Port’s established stormwater collection network, ultimately discharging via existing permitted outfalls.

Construction stormwater requirements would be regulated under the National Pollutant Discharge Elimination System (NPDES) program, administered by the Central Valley Regional Water Quality Control Board (RWQCB). The Proposed Action design would comply with the Port’s *Storm Water Development Standards Plan* (Port 2009).

2.1.9 Utility Relocation and Upgrades

Utilities currently serving the Berth 3/4 area and surrounding terminal facilities would be either relocated or decommissioned and replaced with new infrastructure. These utilities include potable water, sanitary sewer, underground electrical systems, and stormwater utilities.

2.1.10 Pile Driving

New foundations would be constructed to support the structures described in Section 2. To install these foundation systems and provide structural stability, 1,856 reinforced concrete piles (16-inch square) would be driven in upland areas. Of these 1,856 landside piles, 1,718 piles are within 200 feet of the waterline and the remaining 138 landside piles are located more than 200 feet from the waterline. The landside pile-driving process is expected to occur over approximately 99 workdays within an overall duration of up to approximately 184 calendar days.

In-water work includes pile foundation installation, pile installation, and concrete deck formwork and would occur over a maximum of 86 days. Assuming installation of up to two marine piles per day, depending on pile type, pile driving would occur over a maximum of 150 days in this time period.

Up to 170 piles would be installed below the MHHW line for Berth 3/4:

- 75 steel pipe piles (24-inch diameter), driven at a battered angle just inside the front face of the dock structure of Berth 3/4
- 65 precast concrete piles (16-inch square), installed vertically at the midsection of Berth 3/4 to support the ship unloader gantry rail beams
- 30 precast concrete piles (16-inch square), installed to support the new material transfer tower

Installation of all the Berth 3/4 piling will require cutting openings, or slots in the existing 8-inch-thick concrete deck at Berth 3/4 to accommodate pile driving. After piling installation, concrete beams, or pile caps would be constructed, and tied into the existing structure, including closing the slot openings required for pile driving.

The 75 steel pipe piles, driven at a battered angle, will require removal of certain existing concrete bracing beams between existing columns. Final design and installation will incorporate replacement bracing to maintain structural integrity.

The 30 precast concrete piles would be installed by creating openings along the south edge of the existing Berth 3 deck. These piles would be placed below the MHHW line, within the slope beneath the deck. The remaining 65 vertical precast concrete piles would be installed without interfering with the existing piles or dock structure.

Installation of the Berth 3/4 area piles would occur using a vibratory hammer or a single impact hammer mounted to a crawler crane operating from the Berth 3/4 deck. If the existing dock structure cannot support this type of installation crane, a floating derrick barge crane would be used to drive these pilings.

2.2 Summary of In-Water Fill and Overwater Coverage

As shown in Table 3, the Proposed Action would result in an increase of 1,097 cubic yard(s) of fill and an increase in the total area of fill of 423 square feet in the San Joaquin River below MHHW line. The increase in fill volume and area is attributable to the installation of seventy-five 24-inch-diameter steel pipe piles and ninety-five 16-inch-square concrete piles below the MHHW line. Note that the Proposed Action does not include the removal of existing fill associated with existing piles below the MHHW line. Overall, the in-water fill area and volume would increase as a result of the Proposed Action.

Table 3
New Fill Below Mean Higher High Water Line

Feature	Material	Quantity	Fill Area (sf)	Volume (cy)
24-inch-diameter pile	Steel pipe	75	255	661
16-inch square pile	Concrete	95	168	436
Total fill below MHHW to be installed	--	170	423	1,097

Table 3 presents the total overwater coverage resulting from constructing the Proposed Action. The Proposed Action will not result in any changes to existing overwater coverage. All project elements will be constrained to the existing footprint of Berths 3/4. As such, construction of the Proposed Action will have no change to overwater coverage.

2.3 Lease Information

As part of the Proposed Action, Nevada Cement seeks to modify its lease with the Port to increase the terminal's leasehold area from 4.92 to 10.98 acres. The 4.92-acre existing leasehold area is reflective of only the areas under existing storage structures. However, current terminal operations occur within, between, and around the storage structures and encompass an area of 8.18 acres, including the area around the Berths 2 and 3 unloading operations, rail storage and loading, and truck lanes serving the various outbound operations by truck. Accordingly, the lease modification would reflect the actual terminal operation area as well as the proposed expanded operation area.

2.4 Post-Construction Terminal Operations

Following construction, terminal operations would remain similar in function but would utilize upgraded equipment to improve speed, flexibility, and capacity. Cementitious materials would be unloaded from vessels at Berth 3/4 and transferred via new enclosed conveyors to the new dome or to existing bunkers. Trucks and railcars would be loaded at modernized stations equipped with dust control systems. The Berth 2 unloader would remain operable for use during maintenance or as supplemental capacity. The upgraded terminal would also support barge loading.

All operations would remain within existing permitted emission thresholds. Emissions from cement handling would be minimized using enclosed pneumatic or mechanical systems with integrated dust collection.

3 Avoidance and Minimization Measures

3.1 General Avoidance and Minimization Measures

- The contractor would fully understand and adhere to the terms and conditions of approvals and permits obtained, as well as all project best management practices (BMPs).
- All construction activities would occur within the designated project footprint.
- Debris-related BMPs are as follows:
 - Closed debris containment booms, floating debris screens, and/or absorbent booms would be positioned beneath and alongside work areas whenever possible. During construction, the barges performing the work would be moored in a position to capture and contain the debris generated during any sub-structure or in-water work. Care would be taken to minimize debris falling into the water.
 - In the event that debris reaches the water, personnel in workboats would immediately retrieve the debris for proper handling and disposal. For small-scale overwater repairs and maintenance, tarps, tubs, or vacuums would be used as appropriate to catch sawdust, debris, or drips.
 - All debris and trash would be regularly collected and disposed of in appropriate waste containers. Discharge of debris or hazardous materials into the project site would be prohibited.
- Stormwater BMPs are as follows:
 - Construction material that could wash or blow away would be covered every night and during any rainfall event.
 - Construction materials would be stored in an area that does not freely drain to the water, is free from standing water and wet soil, and protected from rain. If necessary, materials would be stored on skids or support timbers to keep them off the ground.
 - Adequate erosion control supplies would be kept on site for use during all construction activities to ensure materials are kept out of waterbodies.
- Spill prevention and response BMPs are as follows:
 - All construction-related equipment would be inspected daily and maintained in good working order to minimize the potential for hazardous waste spills. Current hazardous material spill prevention and cleanup plans would be maintained on site. Hammers and other hydraulic attachments would be placed on plywood and covered prior to the onset of rain to prevent run-on and runoff. Spill response materials would be staged at the active work area and on any work barges.

3.2 ESA-Listed Species and Habitat-Related Avoidance and Minimization Measures

- In-water work would be conducted between July 1 and November 30 to avoid most of the adult and juvenile migration of listed species.
- The contractor would be required to bring all impact hammer pile-driving equipment online slowly (employ a "soft-start").
- The contractor would conduct a pre-start visual scan of the in-water work area prior to initiating pile driving (impact or vibratory) to identify the presence of ESA-listed fish at the surface and any other notable wildlife observations.
- Prior to the start of any in-water construction that would require impact pile driving, the contractor would approve and implement a *Protected Species Monitoring Plan* (Attachment 3) to protect fish. This plan provides details on the BMPs that would be implemented to reduce noise from impact pile driving in the aquatic environment. It would also identify methods used to monitor and verify sound levels during pile driving activities (if required based on projected in-water noise levels), as well as establish isopleths, zones of exclusion, and procedures (such as halting work) to avoid sound levels exceeding thresholds where ESA-listed fish may be present.
- Biological monitoring would be conducted in accordance with USACE's consultation with NMFS pursuant to ESA and Marine Mammal Protection Act (MMPA) and with the CDFW's requirements pursuant to the California ESA (outside of this ESA consultation).
- To reduce potential impacts from noise due to pile driving, the Proposed Action would implement one or more of the following, as needed:
 - Use vibratory methods for installation of piles to the extent practicable.
 - Implement a soft-start technique for impact driving.
 - Sequence pile installation to minimize the number of impact-driven piles and total impact-driving duration, where practicable.
- Operators of construction equipment and all other project workers would not harass any waterfowl or fish in the project area.
- Affected fish include those that are in any of the following conditions:
 - Dead or moribund at the water surface
 - Showing signs of erratic swimming behavior or other obvious signs of distress
 - Gasping at the surface
 - Showing signs of other unusual behavior

3.2.1 Mitigation for Project Impacts

Mitigation described below is intended to address potential temporary effects to ESA-listed aquatic species associated with in-water pile driving (i.e., underwater noise).

Mitigation for Bioacoustics Impacts of Impact Pile Driving: Section 7.2.3 outlines the potential underwater noise impacts of the Proposed Action. To compensate potential temporary bioacoustics impacts to fish that could exceed conservative cumulative sound exposure level (cSEL) injury-screening threshold under modeling assumptions, 0.0012 fish habitat acre-credit would be purchased from the Liberty Island Conservation Bank, North Delta Conservation Bank, or other fish habitat mitigation bank with available credits and appropriate service area. This mitigation is proposed as a precautionary conservation measure and does not reflect an expectation that take of ESA-listed species would occur. This value was derived using the same equation approved by the CDFW in recent mitigation proposals.¹

Mitigation for Fill/Overwater Coverage: The Proposed Action would result in a nominal increased fill volume in the San Joaquin River associated with the new piles. The Proposed Action would not result in a net increase in permanent overwater coverage and would result only in a nominal increase in in-water fill volume associated with new piles. Additionally, as mentioned in Section 1.4.3, there is no eelgrass or other submerged aquatic vegetation resources nearby that would be impacted by this nominal increase in shading. This BA addresses ESA-listed species and designated critical habitat. Because the Proposed Action would not adversely affect submerged aquatic vegetation and the primary ESA-related stressor is underwater noise from impact pile driving, additional ESA-specific mitigation for shading is not proposed beyond the bioacoustics mitigation described above.

¹ The equation takes the maximum overall area in which the cSEL (injury thresholds) would be exceeded (0.05 acres), multiplies it by the maximum number of days in-water impact pile driving would occur (48 days), and divides that value by the proposed duration of project permits (1,825 days [i.e., 5 years]) to determine the proposed compensatory mitigation value in light of the temporary nature of impact pile driving activities. Mitigation does not consider days with vibratory driving only since there are no fish thresholds for vibratory noise.

4 Action Area

The “action area” is defined as the extent of all areas that may be affected directly or indirectly by the federal action(s) and not merely the immediate area involved in the action (50 Code of Federal Regulation [CFR] 402.02). For the purposes of the analysis, considering the construction activities and based on the interrelated and interdependent actions and potential indirect effects associated with the Proposed Action, the Action Area extends beyond the direct project footprint described in Section 2 (Figure 3). To account for all areas that may be directly or indirectly affected by the Proposed Action, the Action Area includes the Proposed Action’s construction footprint and a maximum 665-meter in-air buffer and 1,584.9-meter underwater buffer, representing the maximum modeled extent of sound attenuation under conservative assumptions. The Action Area encompasses the area that may be affected by airborne and waterborne acoustic impacts of proposed construction and pile driving on both fish and marine mammals and includes portions of the San Joaquin River and adjoining upland areas as shown in Figure 3. The in-air and underwater buffer distances include the estimated distance where construction noise attenuates to ambient conditions. Note that the underwater buffer does not reach the maximum 1,584.9 meters from the action for the majority of the zone due to the topography of the channel. These are the maximum attenuation zones; species and pile specific zones are detailed in the *Protected Species Monitoring Plan* included as Attachment 3.

Potential underwater sound impacts from pile driving to fish are summarized in Section 7.2.3 and detailed in the Bioacoustics Evaluation (Attachment 2), and avoidance and minimization measures are detailed in Section 3. Areas where underwater sound may result in injury (e.g., Permanent Threshold Shift [PTS]) or behavioral disturbance are shown in Figure 3. The Bioacoustics Evaluation also analyzes sound impacts to marine mammal species; however, marine mammals are not evaluated in this BA because they are not ESA-listed. Marine mammals are addressed under the Marine Mammal Protection Act and are not subject to ESA Section 7 consultation for the Proposed Action. In addition to acoustic pathways, the Action Area also encompasses areas that could be affected by temporary in-water turbidity and localized disturbance associated with pile installation and overwater construction activities.

5 Federally Protected Species and Critical Habitat

This section describes the federally listed species that occur or may occur in the Action Area, as identified in Section 4. A discussion of existing species threats and any critical habitat designations (if applicable) are also provided. Recorded species occurrences at or near the Action Area are identified in Section 5, while Proposed Action effects and effects determinations are discussed in Sections 7 and 8, respectively.

5.1.1 Green Sturgeon (Southern DPS)

Life History and Distribution: The southern green sturgeon (*Acipenser medirostris*) DPS includes fish that inhabit the San Francisco Bay and Delta and spawn in the Sacramento River basin. Sub-adults and adults of this species inhabit nearshore oceanic waters, bays, and estuaries, while also migrating to and from freshwater habitats. Freshwater occurrence of this species occurs during the early life history stage (less than 4 years old), and later when adults return to freshwater to spawn (spawn age range of 10 to 15 years old). Spawning occurs in the spring and summer, as recorded in the upper Sacramento River and tributaries such as the Feather, Yuba, and American Rivers. During the juvenile stage, green sturgeon can be distributed throughout the freshwater portions of their habitat the entire year. Juveniles of two apparent size groups (fork length range of 20 to 58 centimeters) have been collected in the Sacramento and San Joaquin rivers and Suisun Bay. However, there are substantial gaps regarding our knowledge of this species' biology, ecology, and habitat within the San Francisco Bay and Delta (USACE 2015).

Little is known about the diet of green sturgeon. Juvenile green sturgeon are presumed to be generalists and opportunists, likely feeding on seasonally abundant drifting and benthic invertebrates. As sturgeon grow, they begin to feed on oligochaetes, amphipods, smaller fish, and fish eggs. When juvenile green sturgeon enter the estuary, their diet shifts to larger benthic food items, though they remain generalists and opportunists, including Asian clams. Although Asian clams are a potential green sturgeon food source, the clams may be a significant source of selenium, which could adversely affect green sturgeon fertility. Subadult and adult green sturgeon are presumed to be secondary consumers and opportunistic predators of macrocrustaceans and bivalves in bay, subtidal, and intertidal habitats (Israel and Klimley 2008). More general feeding data for adult green sturgeon shows that they are eating benthic invertebrates, including shrimp, mollusks, amphipods, and small fish (Moyle et al. 1992).

Critical Habitat: In California, critical habitat for green sturgeon in the Delta includes nearly all waterways up to the elevation of MHHW within the area defined in California Water Code 12220, which includes the Action Area (NOAA 2009).

Occurrence in Action Area: Within the Action Area and during the approved in-water work window (July 1 through November 30), green sturgeon were not encountered during entrainment and community monitoring by USACE and the Port, although these surveys typically occurred in the latter portion of the approved window, when USACE O&M dredging was conducted. Similarly, none have been observed in or adjacent to the Action Area during Fall Midwater Trawl (FMWT) surveys, although FMWT methods are less likely to observe larger green sturgeon individuals. Green sturgeon have been encountered elsewhere in the Stockton DWSC (outside of the Action Area) during entrainment and community monitoring by USACE. Between 2005 and 2024, a total of four green sturgeon individuals were encountered during community monitoring (none were entrained) at Decker and Bradford islands, over 25 miles northwest (downstream) of the Port. Prior to 2005, no green sturgeon had ever been documented in the San Joaquin River or its tributaries (USACE 2015; CDFW 2025a) although there is not sufficient information to establish whether the San Joaquin River system has historically supported a viable green sturgeon population (NMFS 2005a).

There is a small potential for southern DPS green sturgeon to be present in the Action Area during the in-water construction window (USACE 2015; CDFW 2025a) based on past historical conditions, monitoring data, and species characteristics. San Joaquin River waters at the Port may also be frequented during the upstream migration of spawning adults and downstream migration, resting, and foraging of juveniles (Caltrans and Port 2013). The San Joaquin River in this area does not provide suitable spawning habitat for green sturgeon.

Based on historical conditions, monitoring data, and the characteristics of this species, there is a very small potential for green sturgeon to be present in the Action Area.

Threats: A primary factor for the decline of the green sturgeon is the restriction of spawning habitat to a limited area below Keswick Dam. Also contributing to the decline are insufficient flow velocities to initiate the upstream spawning migration (Kohlhorst et al. 1991 as cited in CDFG 2002; NMFS 2008). Reduced flows have been identified as a factor in weakened year class recruitment in the white sturgeon population and are believed to have the same effect on green sturgeon recruitment. In addition to the adverse effects of impassable barriers, numerous agricultural water diversions exist in the Delta along the migratory route of larval and juvenile sturgeon. Entrainment and impingement in water pumps and screens are considered serious threats to sturgeon during their downstream migration. Sturgeon are also susceptible to uptake of contaminants from contaminated sediments through both dermal contact and incidental ingestion of sediments while feeding. Bioaccumulation is also a concern due to their long life. All the above threats were identified by the NMFS Biological Review Team within the Federal Register as potentially affecting the continued existence of the southern green sturgeon DPS (70 Fed. Reg. 17386; April 6, 2005).

5.1.2 Delta Smelt

Life History and Distribution: The delta smelt (*Hypomesus transpacificus*) is a euryhaline fish with a habitat range extending from the lower reaches of the Sacramento and San Joaquin rivers, through the Delta, and into Suisun Bay. This Delta-endemic species is currently found in very low abundance within the Sacramento and Stockton DWSCs. Delta smelt was federally listed as a threatened species under the ESA on March 5, 1993 (58 Fed. Reg. 12854). The state status of delta smelt was first listed as threatened under the California ESA in 1993 and was elevated to endangered on March 4, 2009. On March 24, 2009, the USFWS initiated a 5-year status review of delta smelt. As of April 7, 2010, and as reconfirmed on December 5, 2014 (79 Fed. Reg. 72450), reclassification status of delta smelt to endangered was found warranted but precluded by other higher priority ESA listing actions (75 Fed. Reg. 17667; April 7, 2010).

Presence and abundance of delta smelt is closely associated with salinities between 0 and 7 practical salinity units (PSUs). The upper salinity tolerance for this species is 19 PSU, with a strong preference for habitat near or upstream of the 2 PSU isohaline. Delta smelt are not present in waters over 25°C and are rarely found in water temperatures above 22°C. Spawning habitat is present in dead-end sloughs, near inshore areas of the Delta, and willow freshwater channels of the Delta and Suisun Bay, all areas away from the Port docks. During the fall prior to spawning, delta smelt congregate in upper Suisun Bay and the lower reaches of the Delta. The spawning period is estimated to be from February to June. Delta smelt may prefer spawning over vegetation, if present, but often deposit their eggs over submerged tree branches and stems or in open water over sandy and rocky substrate, and they may even use the shallower areas of Delta levees. Eggs are demersal and adhesive. Newly hatched larvae float near the surface of the water, with movements following tides and discharge. Sommer and Meija (2013) state that delta smelt are more commonly associated with lower salinities and higher turbidities, moderate temperatures, and some tidal influence (USACE 2015).

Larger juveniles and adults are most abundant during the spring and summer in Suisun Bay and the Delta, as evidenced from trawl and trap net catch data. Seasonal migrations occur within a short section of the upper estuary. Juvenile smelt move downstream to San Pablo Bay and Carquinez Strait before turning back to Suisun Bay or upstream sloughs for spawning. During average and high outflow years, delta smelt congregate from upper Suisun Bay to the Sacramento River near Decker Island. During low outflow and drought years, their pre-spawning congregations are centered in the channel of the Sacramento River and are rarely found further downstream in Suisun Bay (USACE 2015).

The primary food for all life stages of the delta smelt are the nauplius, copepodite, copepodid, and adult stages of copepod. Adult smelt will also prey on opossum shrimp (*Neomysis mercedis*) as a secondary food source, and on cladocerans (*Daphnia* spp., *Bosmina* spp.) as a seasonal food source

(USFWS 1993). The pelagic larvae of delta smelt feed on phytoplankton until they are 4 days old, then begin to feed on rotifers on the sixth day and *Artemis nauplii* on the 14th day (USFWS 1993). Within the mixing zone, the pelagic larvae are zooplanktivores and feed on rotifers, copepods, cladocerans, and amphipods (USFWS 1993). Juvenile delta smelt primarily eat planktonic crustaceans, small insect larvae, and mysid shrimp (Moyle 1976).

Critical Habitat: Final critical habitat designation for delta smelt (59 Fed. Reg. 65256; December 19, 1994) encompasses the Delta west to the Carquinez Bridge and includes the Stockton and Sacramento DWSCs.

Occurrence in Action Area: Within the Action Area and during the approved work window, no delta smelt have been encountered during the FMWT between 2014 and 2024, or during entrainment and community monitoring by USACE and the Port (CDFW 2025a). Delta smelt, however, have been encountered in greater abundances during surveys throughout the Sacramento and Stockton DWSCs (outside of the Action Area). Between 2005 and 2014, a total of 52 individuals were encountered during USACE entrainment and community monitoring in the vicinity of the Antioch Bridge, Decker Island, and the Sacramento DWSC, over 25 miles northwest of the Port.

Delta smelt have been encountered at FMWT stations farther from the Action Area, with the nearest delta smelt encountered at sampling station 802 at the confluence of the Sacramento and San Joaquin rivers, approximately 33 miles northwest of the Action Area.

Delta smelt typically spawn in Suisun Bay during late June and early July after moving downstream from the upper estuary (Solano County 2012). After hatching, larvae are dispersed throughout low salinity habitats, generally moving into Suisun Bay, Montezuma Slough, and upriver to the lower Sacramento River below Rio Vista as they mature. Water clarity and water temperature conditions are unfavorable for delta smelt in the central and southern Delta during the summer (Nobriga et al. 2008; Sommer et al. 2011). Based on past monitoring data and this species' characteristics, delta smelt are unlikely to be present in the Action Area during the currently authorized work window (USACE 2015; CDFW 2025a).

Threats: Delta smelt are threatened by loss of estuarine habitat; entrainment during water diversion operations for the Central Valley Project, State Water Project, and the myriad of agricultural diversions; pulses of pesticides; food shortages; and predation by and competition from invasive species (Bennett 2005; SWCA 2009). In 2004, scientific monitoring of aquatic organisms and water quality in the San Francisco estuary revealed a synchronous decline of several pelagic fish species (delta smelt, longfin smelt, striped bass, and threadfin shad; Baxter et al. 2008). This Pelagic Organism Decline is being investigated to better understand how stock-recruitment effects, declines in habitat quality, increased mortality rates, and reduced food availability due to invasive species may be working separately or cumulatively to cause Pelagic Organism Decline.

5.1.3 Steelhead (Central Valley DPS)

Life History and Distribution: The Central Valley steelhead (*O. mykiss*) DPS includes all populations in the Sacramento and San Joaquin rivers and their tributaries. The current distribution ranges from Keswick Dam in the Upper Sacramento River to the Merced River in the San Joaquin River Basin, with distribution primarily limited by impassable dams. Anadromous adults of the Central Valley steelhead DPS make their upstream spawning migrations beginning in July (peaking in September and October) after residing in the ocean for 2 to 3 years. Spawning occurs from December through April. Spawning, incubation, and most rearing occurs away from the Action Area. Juveniles reside in freshwater from 1 to 3 years, primarily near the surface and in the water column above the benthos when over deeper waters. Juveniles feed on diverse aquatic and terrestrial insects and other small invertebrates. Most juvenile Central Valley steelhead are found migrating through the San Francisco Bay and Delta during the spring, although out-migration occurs from December through August (USACE 2015). While juvenile and adult steelhead prey on euphausiid crustaceans, squid, herring, and other small fishes available in the marine environment, their riverine diet is primarily aquatic and terrestrial insects and their larvae, mollusks, amphipod crustaceans, fish eggs, and minnows (NMFS 2005b).

Critical Habitat: Central Valley steelhead DPS critical habitat includes portions of the San Francisco-San Pablo-Suisun Bay estuarine complex, including the Action Area.

Occurrence in Action Area: No steelhead have been encountered during entrainment and community monitoring by USACE and the Port, although these surveys were typically completed during the latter portion of the in-water work window. No steelhead have been encountered during FMWT surveys of the area (both during and outside the proposed work window), although these surveys also typically occur later in the work window (from September through December).

Based on past monitoring data, there is a very small potential for this species to be present in the Action Area during the approved in-water construction window (USACE 2015; CDFW 2025a).

Threats: Factors that limit productivity of steelhead populations include periodic reversed flows due to high water exports (drawing juveniles into large diversion pumps); loss of fish into unscreened agricultural diversions; predation by introduced species; and reduction in the quality and quantity of rearing habitat due to channelization, pollution, bank armoring, and other factors (Dettman et al. 1987; CACSST 1988; Kondolf et al. 1996 as cited in NMFS 2016).

5.1.4 Longfin Smelt

Life History and Distribution: Longfin smelt (*Spirinchus thaleichthys*) is federally listed as an endangered species (89 Fed. Reg. 61029; August 29, 2024). Longfin smelt, a small-sized euryhaline and anadromous fish, was historically among the most abundant fish in the San Francisco estuary

and the Delta. Significant declines in longfin smelt abundance have occurred throughout its range during the past quarter century. Longfin smelt are distinguished by their long pectoral fins, which reach or nearly reach the base of their pelvic fins. They grow a maximum size of about 150 mm (total length) and reach maturity near the end of their second year. As they mature in the fall, adults found throughout San Francisco Bay migrate to brackish or freshwater in Suisun Bay, Montezuma Slough, and the lower reaches of the Sacramento and San Joaquin Rivers. Spawning adults congregate at the upper end of Suisun Bay and in the lower and middle Delta, especially in the Sacramento River channel and adjacent sloughs (USACE 2015). Spawning occurs primarily from January through March, after which most adults die (CDFG 2009a). In April and May, juveniles are believed to migrate downstream to San Pablo Bay. Juvenile longfin smelt are collected throughout the Bay during the late spring, summer, and fall, and occasionally venture offshore as far as the Gulf of the Farallones. Juveniles typically inhabit the middle and lower portions of the water column (USACE 2015). Longfin smelt first begin feeding on copepods and cladocerans. With subsequent growth, their diet expands to include mysids and amphipods, among a variety of lesser food items (CDFG 2009b).

Critical Habitat: There is no final critical habitat designation for longfin smelt. However, in January 2025, more than 91,000 acres of critical habitat were proposed by USFWS to protect the endangered longfin smelt (90 Fed. Reg. 3765–3783). The proposed critical habitat encompasses large portions of the San Francisco Bay Estuary but does not extend into the Action Area.

Occurrence in Action Area: Within the Action Area and during the proposed in-water work window of July through November, no longfin smelt have been near the Action Area during the FMWT between 2014 and 2024, or during entrainment and community monitoring by USACE and the Port. Each of these surveys, however, has occurred only or typically during the latter portion of the in-water work window. Longfin smelt have, however, been encountered in greater abundances during surveys throughout the Sacramento and Stockton DWSCs (outside of the Action Area). Between 2005 and 2014, a total of 919 individuals were encountered during USACE entrainment and community monitoring in the vicinity of the Antioch Bridge, Decker Island, and the Sacramento DWSC, over 25 miles northwest of the Port. Longfin smelt have been encountered at FMWT stations farther from the Action Area, with the nearest longfin smelt encountered at sampling station 807 near Big Break, approximately 26 miles northwest of the Action Area.

Based on past monitoring data and this species' characteristics, there exists a very small potential for this species to be present in the Action Area during the authorized work window (USACE 2015; CDFW 2025a).

Threats: The annual abundance of longfin smelt is significantly and positively correlated with the amount of freshwater flow during spawning and larval periods (Jassby et al. 1995; Stevens and Miller 1983; Baxter 1999). Three factors have been identified as potentially responsible for this significant correlation: 1) a reduction in predation during high flows; 2) increased habitat availability that may

improve survival by reducing intraspecies competition; and 3) an increase in nutrients stimulating the base of the food chain (Stevens and Miller 1983). However, the relationship changed to substantially lower longfin smelt abundance after the introduction of the invasive Amur River clam in the late 1980s. This corresponded with a decline in phytoplankton and zooplankton abundance due to grazing by the Amur River clam (Bennett et al. 2002). Other introduced species such as striped bass and inland silversides have had an impact on longfin smelt populations due to predation (CDFG 2009b). In 2004, numbers of longfin smelt (along with other pelagic species including delta smelt, striped bass, and threadfin shad) exhibited a sharp decline in abundance that has continued to the present. The Pelagic Organism Decline phenomenon is currently under investigation to better understand how stock-recruitment effects, declines in habitat quality, increased mortality rates, and reduced food availability due to invasive species may be working separately or together to contribute to declining abundance of longfin smelt and other pelagic species.

5.1.5 Essential Fish Habitat

The Action Area contains EFH for a variety of pelagic, groundfish, and salmon species covered by the Pacific Coast Salmon FMP and Pacific Groundfish FMP developed by the Pacific Fishery Management Council under the requirements of the MSA (NMFS 2025a). Table 4 lists those fish species covered by these plans identified as utilizing the Action Area, along with the life stage and relative occurrence within the Action Area.

Table 4
Magnuson-Stevens Act Managed Fish Species in the Action Area

Fisheries Management Plan	Species, Common Name	Species, Scientific Name	Life Stage	Relative Occurrence in Action Area
Pacific Groundfish	English sole	<i>Parophrys vetulus</i>	J, A	Not present
	Pacific sanddab	<i>Citharichthys sordidus</i>	E, L, J, A	Present
	Starry flounder	<i>Platichthys stellatus</i>	J, A	Abundant
	Leopard shark	<i>Triakis semifasciata</i>	J, A	Not present
	Big skate	<i>Raja binoculata</i>	J, A	Not present
Pacific Coast Salmon	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	J, A	Seasonally present

Source: IEP 2025

The Magnuson-Stevens Act was enacted to maintain healthy populations of commercially important fish species. Under the Magnuson-Stevens Act, the eight regional Fishery Management Councils are responsible for developing FMPs to manage these species. The 1996 provisions to the Magnuson-Stevens Act included protecting the habitats of species for which there is an FMP; these habitats are designated as EFH. EFH is defined as “those waters and substrate necessary to fish for

spawning, breeding, feeding, or growth to maturity.” EFH can consist of both the water column and the underlying surface (e.g., seafloor) of a particular area, and it includes those habitats that support the different life stages of each managed species. A single species may use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions. The study area is within the EFH for Pacific salmon and Pacific groundfish (NMFS 2025a).

5.1.5.1 Pacific Groundfish Fisheries Management Plan

As described, the study area is within the EFH for Pacific groundfish. The Pacific Groundfish FMP is designed to protect habitat for 86 species of fish, including rockfish, flatfish, groundfish, some sharks and skates, and other species that associate with the underwater substrate.

No Pacific Groundfish FMP species were encountered during 2014 entrainment and community monitoring by USACE, or during entrainment and community monitoring by the Port between 2010 and 2014. No Pacific groundfish species were encountered at stations 911 or 912 during any FMWT surveys between 1967 and 2024. Although the Action Area occurs within EFH for Pacific groundfish, based on the available survey data, it is very unlikely that Pacific groundfish species may be present in the Action Area.

Pacific groundfish EFH could be affected by temporary increases in turbidity and underwater noise. However, the Proposed Action includes implementation of BMPs designed to minimize impacts to fish species and habitat, as described in Section 3. Therefore, the Proposed Action is expected to have temporary and minimal effects on Pacific groundfish EFH.

5.1.5.2 Pacific Salmon Fisheries Management Plan

As described, the Action Area is within the EFH for Pacific salmon. The Pacific salmon FMP includes Chinook and coho salmon, and on occasion includes pink salmon (*Oncorhynchus gorbuscha*), sockeye (*Oncorhynchus nerka*), and chum (*Oncorhynchus keta*).

Near the Action Area, stations 911 and 912, between 1967 and 2024, 13 Chinook salmon have been encountered during the FMWT (last encountered in 2002), and no Chinook salmon have been encountered during entrainment and community monitoring by USACE and the Port. No other Pacific salmon FMP species have been encountered during entrainment and community monitoring by USACE and the Port, or during the FMWT. There exists a small potential for Pacific salmon FMP species to occur in the Action Area.

Pile driving would impact the benthos, which would temporarily impact potential foraging habitat for out-migrating juvenile Chinook salmon. Pacific salmon EFH would also be affected by temporary increases in turbidity and underwater noise. Given the low abundances of Pacific salmon in the Action Area, the short duration of construction, and with implementation of the BMPs described in

Section 3, impacts would be negligible and temporary. Pile driving would result in no permanent loss of critical habitat or function to Chinook salmon EFH.

6 Environmental Baseline and Potential for Occurrence in Action Area

This section describes habitats present in the Action Area and identifies recorded occurrences of special status species. Existing uses of the Action Area are also described. The environmental baseline provides information necessary to determine if the Proposed Action would jeopardize the continued existence of species being considered, and if the Proposed Action can support long-term survival of these species in the Action Area. Additional information is available in Attachments 1 through 3.

6.1 Action Area Habitats

The structures and features within the Action Area are described in detail in Section 2.1. The Stockton DWSC is maintained to a depth of -35 feet mean lower low water (MLLW). The channel edges are riprapped or covered by docks and piers and support very little riparian or aquatic vegetation, and mud and silt characterize the channel substrate. Low DO contents and high water temperatures characterize the water quality during the late summer and early fall.

Invertebrate community composition immediately adjacent to the Action Area was observed and recorded during fish community and entrainment monitoring for USACE O&M dredging in the Stockton DWSC. The most encountered species during 2014 observations made within the dredging area was Asian clams (*Corbicula fluminea*; over 98% total of entrained invertebrates), an invasive species. Leeches (subclass *Hirudinida*) and Siberian prawns (*Palaemon modestus*) were also observed in relatively high numbers. Other species observed in much lower abundance include California floater mussel (*Anodonta californiensis*), various dragonfly species (primarily genus *Phionaeschna*, *Libellula*, *Sympetrum* or *Pantala*), Japanese pond snail (*Viviparis malleatus*), earthworms (subclass *Oligochaeta*), and red swamp crayfish (*Procambarus clarkia*). These findings (significant dominance of introduced species, particularly Asian clams) are consistent with other recent monitoring events adjacent to Port docks and throughout the San Joaquin River (USACE 2015). The invasive nonnative golden mussel was also discovered in 2024 in the Port of Stockton by California Department of Water Resources staff (CDFW 2024).

6.1.1 USACE Entrainment and Community Monitoring

Since 2005, USACE has conducted entrainment and community monitoring during portions of annual Stockton and Sacramento DWSCs maintenance dredging (USACE 2012; USACE 2015,). Monitoring occurs at dredging locations throughout the Stockton and Sacramento DWSCs, which change annually, as well as at Dredge Material Placement Sites (DMPs). Monitoring locations are detailed in the entrainment and community monitoring reports from each respective year. Monitoring methods include bottom trawling against the current to monitor the fish community in the active dredge area, and entrainment monitoring using a mobile entrainment monitoring screen. Monitoring

requirements are focused on state and federally listed threatened and endangered species, as well as CDFW species of special concern, although all fish encountered were counted and identified to the species level (with some exceptions). Benthic invertebrate species and community composition are also observed and recorded.

USACE entrainment and community monitoring has occurred at stations adjacent to the Port dock and within the dredge slurry at the Roberts Island DMPS, mainly in the latter half of the authorized in-water work window. No special status species have been encountered during USACE surveys at these locations.

6.1.2 Port Fish and Water Quality Monitoring

The Port completed entrainment and community monitoring during dredge episodes in the immediate vicinity of the Action Area in 2010, 2012, and 2013. Monitoring locations are detailed in the entrainment and community monitoring reports from each respective year. Monitoring was conducted using the same methods used during USACE entrainment and community monitoring. Dredge episodes occurred at Docks 8, 9, 10, 11, 14, and 15, and dredging was completed during November and December. No special status species were encountered while conducting the entrainment and community monitoring.

6.1.3 California Department of Fish and Wildlife's Fall Midwater Trawl

CDFW's FMWT began in 1967 and has sampled every year except 1974 and 1979 (Stevens and Miller 1983; Feyrer et al. 2007; CDFW 2025a). The FMWT samples at more than 100 stations from San Pablo Bay landward into the Delta. Each station is typically sampled once each month from September through December. Sampling has also occurred during the months of January through June during select years from 2001 and earlier. The FMWT was designed to index the year-to-year relative abundance of juvenile (age 0) striped bass (*Morone saxatilis*) (Stevens and Miller 1983). However, all captured species are identified and measured and the FMWT has become a long-term indicator of population trajectories for several small, pelagic fish, including delta smelt (Moyle et al. 1992; Sommer et al. 2007). FMWT sampling methods are less likely to encounter mature individuals of larger species such as green sturgeon, salmonids, and striped bass.

Two FMWT stations are located near the Action Area: station 911 (immediately downstream of the Roberts Island DMPS, approximately 7,500 meters from nearest point of the Action Area) and station 912 (adjacent to Port Dock 20 approximately 3,200 meters from nearest point of the Action Area). Very few special status species have ever been encountered at these locations during the FMWT during the proposed July through November work window; species encountered include 2 delta smelt, 1 longfin smelt, and 13 Chinook salmon (ESU not specified). All observations were made more than 10 years ago (most recent delta smelt encountered in 1980; most recent longfin smelt encountered in 1986; most recent Chinook salmon encountered in 2002). No steelhead or

green sturgeon have been encountered at stations 911 or 912 during any FMWT surveys during or outside the proposed work window, although the FMWT is less likely to catch adult individuals of these species due to their size (CDFW 2025a).

7 Effects Analysis

This section discusses the direct, indirect, temporary, and permanent effects of the Proposed Action on ESA-listed species and their habitats present or potentially present within the Action Area. “Direct effects” are the direct or immediate effects of the Proposed Action on the species or its habitat. The area of potential direct effect of the Proposed Action includes the Action Area. “Indirect effects” are those that are caused by the Proposed Action but occur later in time and are reasonably certain to occur.

7.1 Potential Effects of Operations

The Proposed Action, including the in-water and upland improvements, would result in an increase in vessels calling on Berth 3/4, but would not otherwise alter in-water operations within the Action Area. Therefore, impacts from the Proposed Action would largely be temporary and limited to within the proposed annual in-water work window of July 1 through November 30. Long-term adverse changes would be limited to temporary loss of benthic habitat from pile installation and minor increases in vessel traffic. The Proposed Action would not result in a change in permanent overwater shading relative to existing conditions.

7.2 Aquatic Species

Aquatic species potentially present in the Action Area may experience impacts from construction-related water quality impacts (e.g., turbidity and sediment suspension, mobilization of chemicals of concern, underwater noise) and temporary or permanent impacts from habitat alteration or overwater shading. A general description of these impacts and their effects on aquatic species is provided in the following subsections. Impact determinations for individual species and habitats are provided in Section 8. These determinations were made in consideration of the respective characteristics of the potentially present species and habitats (e.g., potential for presence in the Action Area during construction).

A cumulative effects analysis that considers impacts from related or foreseeable projects is provided in Section 9. These impacts would also apply to EFH and critical habitat in the Action Area.

7.2.1 *Turbidity and Suspended Sediments*

Pile driving may temporarily disturb benthic sediments and could contribute minor increases of turbidity and suspended sediment in the immediate vicinity of the Action Area during construction. Elevated suspended solids and turbidity resulting from construction may affect marine organisms and aquatic wildlife during various life stages by affecting respiration (clogging gills), reducing visibility and the ability to forage or avoid predators, and altering movement patterns (due to avoidance of turbid waters). Suspended sediments have been shown to affect fish behavior, including

avoidance responses, territoriality, feeding, and homing behavior. Generally, bottom-dwelling fish species are the most tolerant of suspended solids, and filter feeders are the most sensitive. Mobile organisms can generally avoid unsuitable conditions in the field.

Pile driving would be the most significant contributor to turbidity and suspended sediments during construction. However, increases in turbidity and suspended sediment levels related to the proposed construction would be significantly less than similar effects from maintenance dredging that regularly occurs throughout Port of Stockton. The USACE Waterways Experiment Station Technical Report, *Effects of Dredging and Disposal on Aquatic Organisms*, states that “Most organisms tested are very resistant to the effects of sediment suspensions in the water, and aside from natural systems requiring clear water such as coral reefs and some aquatic plant beds, dredging-induced turbidity is not a major ecological concern” (Hirsch et al. 1978). In addition, recent studies by the San Francisco Estuary Institute (SFEI) determined the short-term effects of dredging on sensitive fish species are typically minor, and activities such as pile-driving installation would be less impactful.

Following construction, sediments would disperse due to local tidal forces and currents and would be restored to ambient levels within hours of disturbance. Any turbidity plumes would disperse within hours, and the particulate concentrations would be diluted to levels that would pose no major threat to water quality or aquatic wildlife.

7.2.2 *Benthic Habitat*

Benthic habitat can provide important foraging areas for special status species, especially for steelhead, green sturgeon, and longfin smelt, which forage in the benthos. Because delta smelt feed in the water column, benthic habitat is less important for this species. Oligochaetes and chironomids, which were formerly the dominant steelhead, green sturgeon, and longfin smelt food items produced in the Delta silty and sandy substrates (NMFS 2002), account for less than 0.01% of invertebrates documented during 2014 entrainment monitoring at the Port of Stockton and Rough and Ready Island (USACE 2015). The loss of benthic invertebrates during pile driving activities may decrease the forage value of benthic habitat at the installation location. However, recent examination of benthic invertebrate communities shows strong dominance of Asian clams (USACE 2015), which are a less favorable prey species. Asian clams are partially responsible for significant declines in phytoplankton within the Delta, which adversely affects the abundance of prey species consumed by green sturgeon, salmonids, and smelt (USFWS 2011; Clarke 2015; Martin 2006).

Following sediment-disturbing activities such as pile driving, disturbed areas are usually recolonized quickly by benthic organisms (Newell et al. 1998). Studies have indicated that even relatively large areas disturbed by dredging activities, an activity that disturbs the benthic community more than pile driving, are usually recolonized by benthic invertebrates within 1 month to 1 year, with original levels of biomass and abundance developing within a few months to between 1 and 3 years.

(Newell et al. 1998). Disturbed areas are recolonized, beginning with mobile and opportunistic species (Oliver et al. 1977; Lenihan and Oliver 1995).

Additionally, the benthic environment in the Action Area has been severely impacted by historic Port and military operations, USACE maintenance dredging of the Stockton DWSC, and urban development throughout the City of Stockton. It is therefore unlikely to offer high quality foraging opportunities to special status species.

7.2.3 Underwater Noise

Underwater noise from construction, particularly from pile installation, has the potential to adversely affect fish. Attachment 2 provides detail on potential effects and the bioacoustics modeling that was performed to assess potential impacts to ESA-listed species from pile driving, including pile installation details, underwater noise analysis, and noise attenuation considerations. Only the impacts to ESA-listed fish are discussed in the sections below as there are no ESA-listed marine mammals with potential to be present in the Action Area.

7.2.3.1 Effects Thresholds

Scientific investigations on the potential effect of noise on fish indicate that sound levels below 183 decibel (dB) sound exposure level (SEL) do not appear to result in any acute physical damage or mortality to fish (barotraumas) of any size (Dalen and Knutsen 1986). The Fisheries Hydroacoustic Working Group (including members from the Southwest and Northwest Divisions of NMFS; California, Washington, and Oregon Departments of Transportation; CDFW; and U.S. Federal Highway Administration) issued an agreement to establish threshold criteria to determine the effects of high-intensity sound on fish. While these criteria are not regulatory requirements, they are generally accepted by the resource agencies as viable criteria for underwater noise effects on fish. As outlined in Attachment 2, the established threshold criteria for impulse-type noise to harm fish have been set at 206 dB peak, 187 dB accumulated SEL for fish over 2 grams, and 183 dB for fish less than 2 grams. Noise levels that result in startle responses in steelhead and salmon have been documented to occur at sound levels as low as 150 dB RMS (Halvorsen et al. 2012).

Behavioral effects may include fleeing the temporary cessation of feeding or spawning behaviors, and changes in migratory patterns. Any disturbance to listed fish species that results in altered swimming, foraging, movement along a migration corridor, or any other altered normal behavior is considered harassment. An informal behavioral threshold for vibratory pile driving is also presented in Attachment 2.

7.2.3.2 Underwater Noise Effects to Fish

As outlined in Attachment 2, potential for underwater noise impacts to green sturgeon, delta smelt, steelhead, and longfin smelt from installation of concrete and steel pipe piles by impact hammer is

minimal when considering land morphology constraining the area of effect, the unlikelihood of listed species to be in the project area, the brief duration of construction, and the Proposed Action's avoidance and minimization measures.

Piles installed landside have the largest thresholds for this project. Sound at or exceeding the 187 dB and 183 SEL injury thresholds would occur at a maximum distance of 44.7 meters from the pile-driving footprint, which would not reach the water. Underwater sound at or exceeding the 150 dB SEL behavioral threshold would occur at a maximum distance of 112.2 meters from the pile-driving footprint.

For piles installed in the water, underwater sound at or exceeding the 187 dB injury threshold would occur at a maximum distance of 6.4 meters, underwater sound exceeding the 183 SEL injury thresholds would occur at a maximum distance of 11.8 meters from the pile-driving footprint, and sound at or exceeding the 150 dB SEL behavioral threshold would occur at a maximum distance of 73.6 meters from the pile-driving footprint.

As mentioned in Section 4, the topography of the area would constrain underwater noise transmission, preventing the underwater zones from reaching their maximum size. Implementation of a soft-start technique would ensure that any fish present within their respective zones would have time to vacate the area before pile driving begins in earnest. Displacement from underwater noise would be limited to the duration of concrete pile driving (maximum of 247 days) and steel pipe pile installation (maximum of 38 days). In addition, pile driving would be confined to the environmental work window (July 1 to November 30); hence, underwater noise impacts would be avoided and minimized for fish species. Fish species are not likely to be in the project area due to limited sightings in the project area and distribution of the species. Based on these considerations, ESA-listed fish species are not expected to experience any acute effects or barotraumas from impact pile driving. A more detailed bioacoustics analysis on the extent of the effects of underwater noise is included as Attachment 2.

7.2.4 Overwater Shading

Overwater shading has been demonstrated to reduce the growth rates and potential establishment of aquatic vegetation, decrease primary productivity, alter predator-prey dynamics, change composition of invertebrate assemblages, and reduce the overall density of benthic invertebrates (Glasby 1999; Helfman 1981; Struck et al. 2004; Stutes et al. 2006). As described in Section 2.2, the Proposed Action would result in no changes in overwater coverage. Thus, overwater coverage is expected to have no permanent effect to listed fish species and their habitats relative to existing conditions.

During construction of the project, in-water work vessels, barges, and support boats would cause a temporary increase in overwater shading, which could temporarily impact fish behavior within the footprint of these vessels. However, the shading of the water column and benthic habitat as a result of work vessels, barges, and support boats is temporary, highly localized, and transient. Additionally, any temporary shading impacts would be limited to the proposed in-water work window. As such, temporary shading associated with the footprint of the temporary work vessels, barges, and support boats used during construction of the Proposed Action is not expected to reduce the quality of fish habitat.

7.2.5 *Localized Movement and Migration*

Pile driving activities may temporarily impede migration or localized movement of special status fish species, if present. As described in Sections 5.1.4 through 5.1.7, there is a low likelihood for green sturgeon, delta smelt, steelhead, or longfin smelt to be present in the Action Area during the proposed in-water work window. Activities within the channel may impede localized movement of these species within the project area. Although underwater noise effects (which could impede or limit fish movement) would extend beyond the immediate pile footprint, noise levels from pile driving would be temporary. The Proposed Action is therefore unlikely to result in adverse effects to special status fish movement or migration. Additional detail pertaining to seasonal anadromous fish migration is provided for each fish species in its respective section.

7.2.6 *Estimates for Take of Aquatic Species*

Based on the limited spatial extent of in-water work, the short duration of construction activities, the low likelihood of ESA-listed species being present in the Action Area during pile driving, and the implementation of avoidance and minimization measures described in Section 3, any effects to listed species would be discountable and insignificant and would not rise to the level of take as defined under Section 9 of the ESA.

7.3 Essential Fish Habitat

Potential adverse effects to EFH and MSA-managed fish species as a result of Proposed Action implementation include the following:

- Temporary construction increases in turbidity and suspended sediment
- Temporary mobilization of chemicals of concern during pile driving
- Temporary construction underwater noise, primarily from pile driving
- Temporary and permanent habitat alteration
- Temporary overwater shading

These effects are not specific to EFH and MSA-managed species; rather, they are shared by all aquatic life within the Action Area. As such, the descriptions of these effects in the previous sections

are directly applicable to EFH and MSA-managed fish species. The Proposed Action's avoidance and minimization measures described in Section 3 would limit adverse effects to EFH, and impacts are anticipated to be minor, localized, and short in duration.

8 Effects Determination

For federally listed species and designated critical habitat, the range of conclusions that could result from the effects analysis for the effect determination includes the following:

- **No effect:** the appropriate conclusion when the Proposed Action would not affect federally listed species or critical habitat
- **May affect, is not likely to adversely affect:** the appropriate conclusion when effects on federally listed species are expected to be discountable, or insignificant, or completely beneficial.
 - Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs.
 - Discountable effects are those that are extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.
- **May affect, is likely to adversely affect:** the appropriate conclusion if any adverse effect to federally listed species may occur as a direct or indirect result of the Proposed Action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial (see definitions of “may affect, is not likely to adversely affect”)

To distinguish between insignificant and significant effects on ESA-listed species or critical habitat, one key factor is whether the Proposed Action is significant enough to result in a take. “Take,” as defined in Section 3 of the ESA, refers to activities that “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” (16 United States Code 1532[19], 1988). Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is further defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include but are not limited to breeding, feeding, or sheltering (50 CFR 17.3, 2022).

The effects determinations of all species described in this BA are summarized in Table 5.

Table 5**Effects Determinations for ESA-Listed Species with Potential to Occur in Action Area**

Common Name	Effects Determinations	Critical Habitat Determination
Southern Population of North American Green Sturgeon DPS (<i>Acipenser medirostris</i>)	NLAA	NLAA
Delta Smelt (<i>Hypomesus transpacificus</i>)	NLAA	NLAA
Central Valley Steelhead DPS (<i>Oncorhynchus mykiss</i>)	NLAA	NLAA
Longfin Smelt (<i>Spirinchus thaleichthys</i>)	NLAA	n/a

As described in Section 3, avoidance and minimization measures are proposed that would, to the maximum extent practicable, reduce or eliminate the Proposed Action's potential impacts to federally listed species and EFH for a variety of MSA-managed species. With the implementation of these measures, the following determinations were made:

- Given the small scope of the Proposed Action, short-term nature of turbidity, and the unlikelihood of presence of ESA-listed species in the in-water work area, construction activities below the mean high water elevation (including general construction and pile driving), **may affect, but are not likely to adversely affect**, North American green sturgeon, delta smelt, steelhead (Central Valley DPS), and longfin smelt. During construction, benthic habitat within the project footprint would be disturbed and limited for fish foraging. The Proposed Action would also result in temporary loss of benthic habitat from pile driving. However, based on the very small area of the project area affected compared to available habitat in the area, the potential temporary loss of seafloor habitat from the Proposed Action is expected to be undetectable. The project site is not used by sensitive species for spawning, rearing, or key migration routes. Impacts would be short-term and localized, and benthic habitat (assuming it is present at all) would recolonize following pile driving. Within the Proposed Action footprint, the impacts to fish habitat above would occur in disturbed benthic habitat that lacks biological richness. Because there are no eelgrass beds (CDFW 2025a) within the Proposed Action footprint, the impact on aquatic vegetation, and the fish that reside within such habitat, would be negligible. The avoidance and minimization measures described in Section 3 would be implemented to avoid or reduce impacts to ESA-listed species and temporary construction impacts to the aquatic environment. With implementation of these measures, impacts to the aquatic environment during the brief duration of construction would be mitigated. Additionally, construction of the in-water portions of the Proposed Action would be constrained to the in-water work window spanning from July 1 through November 30.
- For the reasons described above, the Proposed Action would not appreciably diminish the value of designated critical habitat and **may affect, but is not likely to adversely modify**,

critical habitat for green sturgeon, delta smelt, steelhead (Central Valley DPS), and proposed critical habitat for longfin smelt to support the survival and recovery of these species.

- The Proposed Action ***may affect, but is not likely to adversely affect***, EFH in the Action Area during general construction activities (i.e., noise and localized increases in suspended sediment). EFH would also be affected by temporary increases in turbidity and underwater noise. Given the low abundances of Pacific groundfish species and Pacific salmon in the Action Area; the short duration of construction; and with implementation of the BMPs described in Section 3, the impacts are negligible and temporary. There would be no permanent loss in critical habitat or function. Therefore, the Proposed Action would not adversely affect EFH for Pacific groundfish and Chinook salmon. Any effects would be short-term and localized during construction activities.

9 Cumulative Effects Analysis

Cumulative effects under the ESA are those effects of future state or private activities, not involving federal activities that are reasonably certain to occur within the Action Area (50 CFR 402.02). Future federal actions that are unrelated (i.e., not interrelated or interdependent) to the Proposed Action are not considered in this BA because they would be subject to separate consultation pursuant to Section 7 of the ESA.

The majority of actions that might be considered to result in cumulative impacts involve ongoing development and restoration in the Port, including projects sponsored by the Port, the City of Stockton, and private developers that are planned or proposed for construction within the next 3 years. As mentioned in Sections 2.1 and 2.4, the Proposed Action is expected to occur from July 2026 through 2029, with in-water components occurring between July and November of those years. All construction-related impacts from the Proposed Action are expected to be temporary and localized. No future construction activities in the terminal leasehold are currently planned. Therefore, there is no expectation that the Proposed Action would contribute to cumulative impacts associated with preceding or subsequent projects.

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Attachment 1

Special Status Species Potentially Present in the Proposed Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

San Joaquin County, California



Local office

San Francisco Bay-Delta Fish And Wildlife

☎ (916) 930-5603

📅 (916) 930-5654

650 Capitol Mall

Suite 8-300
Sacramento, CA 95814

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

-
1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
 2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Riparian Brush Rabbit <i>Sylvilagus bachmani riparius</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6189	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake <i>Thamnophis gigas</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened
Northwestern Pond Turtle <i>Actinemys marmorata</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

Amphibians

NAME	STATUS
California Tiger Salamander <i>Ambystoma californiense</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened
Western Spadefoot <i>Spea hammondi</i> No critical habitat has been designated for this species.	Proposed Threatened

Fishes

NAME	STATUS
Longfin Smelt <i>Spirinchus thaleichthys</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9011	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> Wherever found There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Valley Elderberry Longhorn Beetle <i>Desmocerus californicus dimorphus</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp <i>Lepidurus packardii</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Large-flowered Fiddleneck <i>Amsinckia grandiflora</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5558	Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/1616>

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Delta Smelt <i>Hypomesus transpacificus</i>	Final

For information on why this critical habitat appears for your project, even though Delta Smelt is not on the list of potentially affected species at this location, contact the local field office.

<https://ecos.fws.gov/ecp/species/321#crithab>

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The [data](#) in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey. Please review the 'Steps to Take When No Results Are Returned' section of the [Supplemental Information on Migratory Birds and Eagles document](#) to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
<https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation->

[measures.pdf](#)

- Supplemental Information for Migratory Birds and Eagles in IPaC

<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply).

Proper interpretation and use of your eagle report

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC
<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases [birds of concern](#), including [Birds of Conservation Concern \(BCC\)](#), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the [Nationwide avoidance and minimization measures for birds](#) document, and any other project-specific avoidance and minimization measures suggested at the link [Measures for avoiding and minimizing impacts to birds](#) for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles document](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Belding's Savannah Sparrow <i>Passerculus sandwichensis</i> <i>beldingi</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8	Breeds Apr 1 to Aug 15
Bullock's Oriole <i>Icterus bullockii</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 21 to Jul 25
California Gull <i>Larus californicus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Clark's Grebe <i>Aechmophorus clarkii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31

Common Yellowthroat <i>Geothlypis trichas sinuosa</i>	Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	
Lawrence's Goldfinch <i>Spinus lawrencei</i>	Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	
Northern Harrier <i>Circus hudsonius</i>	Breeds Apr 1 to Sep 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8350	
Nuttall's Woodpecker <i>Dryobates nuttallii</i>	Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	
Oak Titmouse <i>Baeolophus inornatus</i>	Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	
Olive-sided Flycatcher <i>Contopus cooperi</i>	Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	
Santa Barbara Song Sparrow <i>Melospiza melodia graminea</i>	Breeds Mar 1 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5513	
Tricolored Blackbird <i>Agelaius tricolor</i>	Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	

Western Grebe *aechmophorus occidentalis*

Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/6743>

Western Screech-owl *Megascops kennicottii cardonensis*

Breeds Mar 1 to Jun 30

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wrentit *Chamaea fasciata*

Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie *Pica nuttalli*

Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9726>

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (🟡)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (I)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

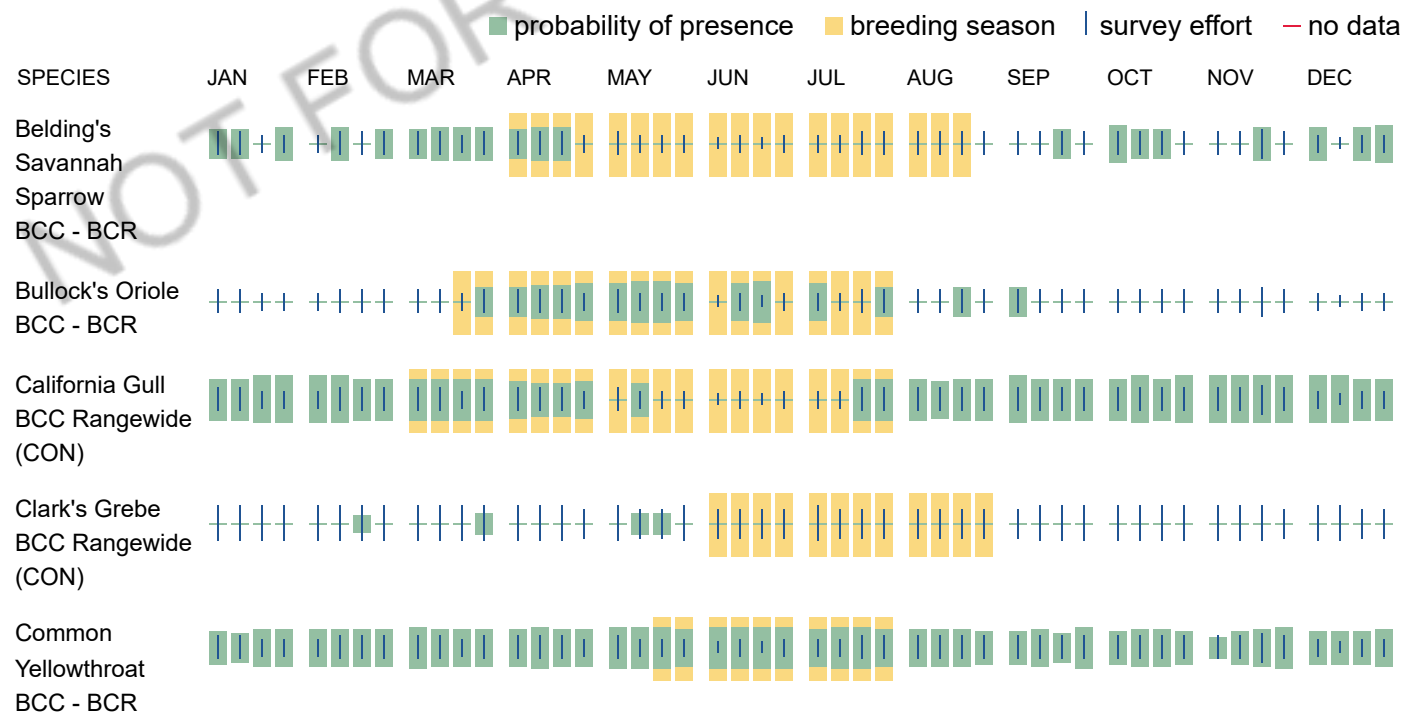
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Avoidance & Minimization Measures for Birds](#) describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see

when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the [Bald and Golden Eagle Protection Act](#) and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in

your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Bald and Golden Eagle Protection Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

[R1UBTx](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix A
CNDDDB Export Table

Scientific Name	Common Name	Taxonomic Group	Federal Status	California Status	Habitats	General Habitat	Micro Habitats	Likelihood of Occurrence in Action Area
Spirinchus thaleichthys pop. 2	longfin smelt - San Francisco Bay-Delta DPS	Fish	Endangered	Threatened	Aquatic Estuary Marine bay Sacramento/San Joaquin flowing waters	Pelagic and anadromous within the Sacramento-San Joaquin River Delta, San Francisco Bay, and Gulf of the Farallones. Spawns in lower freshwater reaches of Sacramento and San Joaquin Rivers. First year in Suisun Bay; later SF Bay or Gulf of the Farallones.	Occurs in salinities ranging from pure freshwater to pure saltwater; typically salinities ranging from 14-28 parts per thousand (ppt). Generally occupies water temperatures from 61-68F, with spawning occurring in water temperatures from 41-58F.	Low to Moderate
Acipenser medirostris pop. 1	green sturgeon - southern DPS	Fish	Threatened	None	Aquatic Estuary Marine bay Sacramento/San Joaquin flowing waters	Spawning site fidelity. Spawns in the Sacramento, Feather and Yuba Rivers. Presence in upper Stanislaus and San Joaquin Rivers may indicate spawning. Non-spawning adults occupy marine/estuarine waters. Delta Estuary is important for rearing juveniles.	Spawning occurs primarily in cool (11-15 C) sections of mainstem rivers in deep pools (8-9 meters) with substrate containing small to medium sized sand, gravel, cobble, or boulder.	Low to Moderate
Hypomesus transpacificus	Delta smelt	Fish	Threatened	Endangered	Aquatic Estuary	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay.	Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	Low to Moderate
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Fish	Threatened	None	Aquatic Sacramento/San Joaquin flowing waters	Populations in the Sacramento and San Joaquin rivers and their tributaries.		Low to Moderate
Thamnophis gigas	giant gartersnake	Reptiles	Threatened	Threatened	Marsh & swamp Riparian scrub Wetland	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation	This is the most aquatic of the gartersnakes in California.	None
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Insects	Threatened	None	Riparian scrub	Occurs only in the Central Valley of California, in association with blue elderberry (Sambucus	Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	None
Actinemys marmorata	northwestern pond turtle	Reptiles	Proposed Threatened	None				None
Lepidurus packardi	vernal pool tadpole shrimp	Crustaceans	Endangered	None	Valley & foothill grassland Vernal pool Wetland	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	Pools commonly found in grass-bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	None
Sylvilagus bachmani riparius	riparian brush rabbit	Mammals	Endangered	Endangered	Riparian forest	Riparian areas on the San Joaquin River in northern Stanislaus County.	Dense thickets of wild rose, willows, and blackberries.	None
Vireo bellii pusillus	least Bell's vireo	Birds	Endangered	Endangered	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.	None
Spea hammondi	western spadefoot	Amphibians	Proposed Threatened	None	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.	None
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Amphibians	Threatened	Threatened	Cismontane woodland Meadow & seep Riparian woodland Valley & foothill grassland Vernal pool Wetland	Lives in vacant or mammal-occupied burrows throughout most of the year; in grassland, savanna, or open woodland habitats.	Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	None

Attachment 2

Bioacoustics Evaluation

Memorandum

April 3, 2026

To: Ed Williams, Eagle Materials

From: Delaney Inman and Michelle Havey, Anchor QEA

Re: Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

Introduction

The *Nevada Cement Company LLC Stockton Terminal Modernization Project* (the Proposed Action) includes pile driving to support rehabilitation of Berth 3/4, the replacement of Bunkers 6 and 7, and the installation of new foundations to support structures as described in the *Biological Assessment* (BA), prepared to assess potential effects on federal endangered species. Underwater noise from pile driving has the potential to adversely affect fish and marine mammals. Both the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS) require that the effects of underwater noise from construction on fish and marine mammals be evaluated as part of the permitting process. This memorandum presents a summary of the bioacoustics evaluation conducted to assess the Proposed Action's potential underwater noise impacts from pile driving on fish and marine mammals potentially present in the action area.

Key Project Components

As described in the BA, 24-inch steel pipe piles would be installed with a vibratory hammer, and 16-inch concrete piles would be installed with an impact hammer. To comply with the approved in-water work window for salmonoids in the action area, pile driving would occur only between July 1 and November 30. The bioacoustics evaluation presented here is based on a worst-case scenario: it includes modeling of a combination of the most noise-intensive pile types, the highest possible number of piles per day, and multiple 16-inch concrete piles being installed landside at the same time. A summary of piles planned for installation is presented in Table 1. The location of permanent piles is shown in Figures 1 through 8.

The Proposed Action includes avoidance and minimization measures specifically addressing potential adverse effects to aquatic habitats and species from pile installation. These measures include the following:

- Any in-water construction activities (i.e., pile driving) would occur during the approved environmental work window (July 1 to November 30) over 3 years to be protective of special status species.

- Construction would take place 6 days a week during daylight hours and would not exceed 10 hours per day.
- To reduce potential impacts from noise due to pile driving, the Proposed Action would implement one or more of the following, as needed:
 - Use vibratory methods for installation of piles to the extent practicable.
 - Implement a soft-start technique.
 - Use a bubble curtain or cushion block if an impact hammer is employed.

It should be noted that the area of impact occurs in an area under regular use for commercial marine transportation.

Table 1
Proposed Action Pile Details

Temporary or Permanent	Pile Diameter/ Sheet Thickness (inches)	Pile Material	Installation Method	Approximate Water Depth (meters) at Installation Location ¹	Attenuation Method	Number of Piles	Piles Per Day ²	Number of Days	Estimated Number of Impact Strikes for Each Pile Type ²	Vibratory Minutes for Each Pile Type (per day) ²
Permanent	24-inch	Steel pipe (batter piles)	Vibratory	10.6	None	75	2	38	n/a	60
Permanent (in-water)	16-inch	Square concrete	Impact	4.7	Bubble curtain and wood cushion blocks	95	2 to 4	24 to 48	270	n/a
Permanent (landside remote)	16-inch	Square concrete	Impact	30.5 to 61 meters from waterline	Wood cushion blocks	76	4 to 5	16 to 19	350	n/a
Permanent (landside dome)	16-inch	Square concrete	Impact	30.5 to 61 meters from waterline	Wood cushion blocks	1,642 ³	10 to 20	83 to 165	350	n/a

Notes:

1. Approximate depth or range of depths at high tide.
2. Piles per day, minutes, and strikes per pile are approximate, based on input from the project engineer.
3. Project design shows that 1,856 16-inch concrete piles will be installed landside. Of the 1,856 piles, 76 are remote piles and 1,780 are dome piles. 138 of these dome piles are more than 200 feet from the waterline and are therefore not included in this analysis.

Vibratory hammers generally produce less sound than impact hammers and are often employed as an avoidance measure to reduce the potential for adverse effects on fish that can result from impact pile driving. There are no established injury or behavioral criteria for fish from vibratory pile driving, as resource agencies have not identified adverse effects on fish resulting from vibratory pile driving (Caltrans 2020). Thus, formal fish analyses presented in this memorandum are limited to effects from impact hammer installation. Potential behavioral effects from vibratory hammer installation have also been provided for reference.

Acoustic Criteria

Fish

Acoustic criteria intended to protect fish from harm and mortality due to pile-driving activities were adopted by the California Department of Transportation (Caltrans), the Federal Highway Administration, CDFW, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Northwest and Southwest Regions in 2008 (Fisheries Hydroacoustic Working Group 2008). These criteria are referred to as “interim injury criteria,” and NOAA Fisheries routinely uses these criteria to evaluate underwater noise impact thresholds for pile-driving noise impacts to fish, as listed in Table 2.

Table 2
NOAA Fisheries Fish Injury and Behavior Thresholds (Impact Pile Driving)

Injury		Behavior
Peak	Cumulative SEL	
206 dB (all fish)	• 187 dB (fish size of 2 grams or more) • 183 dB (fish size of less than 2 grams)	150 dB RMS (all fish)

Notes:

Source: Fisheries Hydroacoustic Working Group 2008

dB: decibel

RMS: root-mean-square

SEL: sound exposure level

NOAA Fisheries developed a worksheet titled “NMFS Multi-Species Pile Driving Calculator” to calculate the distances within which various injury criteria are exceeded (NOAA 2025). A worksheet was completed for each of the Proposed Action’s pile-driving activities; these worksheets are provided as Attachment 1. This worksheet also provides an informal behavioral threshold for fish during vibratory pile driving. This threshold is 150 decibel (dB) root-mean-square (RMS) for all fish, the same as for impact hammer installation. As mentioned above, these isopleths are provided for reference in sections below but are not formal. The Analysis Methods section of this memorandum describes how the required variables were determined for the Proposed Action.

Marine Mammals

In 2018, NMFS produced advanced acoustic threshold determination guidance for marine mammals to evaluate potential exposure to injurious and disturbance levels of sound, referred to as Levels A and B, respectively (NOAA 2018). This guidance specifies methodologies for determining the received levels, or acoustic thresholds, at which marine mammals are expected to experience temporary or permanent shifts in hearing sensitivity due to acute, incidental exposure to underwater anthropogenic noise.

Level A Impacts

The determination of the permanent hearing threshold shifts (PTS) onset isopleths (i.e., injury distances) in this memorandum is based on the “NMFS Multi-Species Pile Driving Calculator” referenced above (NOAA 2025). Sound source levels are measured as either peak sound pressure level (peak) or cumulative sound exposure level (SEL) for impulsive sound and as SEL for non-impulsive sound. Table 3 identifies the impact pile driving and vibratory pile driving acoustic thresholds established in the 2018 guidance for each hearing group for onset of PTS.

The Multi-Species Pile Driving Calculator (NOAA 2025) includes several methods for calculating the PTS isopleth distances of various marine mammal hearing groups based on noise levels generated by impulsive (i.e., impact) or non-impulsive (i.e., vibratory) pile driving. The variables used in the Multi-Species Pile Driving Calculator (NOAA 2025) include the following: pile-driving source sound level, number of piles per day, activity duration (number of strikes or minutes of pile driving), and transmission loss. Worksheets were completed for the Proposed Action’s pile-driving activities; these worksheets are provided as Attachment 1. The Analysis Methods section describes how the required variables were determined for the Proposed Action.

The only marine mammal that has potential to occur in the action area is the harbor seal, a member of the phocid pinniped hearing group. Thus, the acoustic threshold is only presented for phocid pinnipeds in subsequent sections of this memo.

Table 3
NOAA Fisheries In-Water Level A Acoustic Thresholds (PTS Onset) for Marine Mammals

Criterion	Level A Hearing Groups, PTS Onset (Received Sound Level)
	Phocid Pinnipeds (e.g., Harbor Seal)
Impulsive Sound Source (Impact Pile Driving)	
Peak	218 dB
Cumulative SEL	185 dB
Non-Impulsive Sound Source (Vibratory Pile Driving)	
Cumulative SEL	201 dB

Notes:

Source: NOAA 2018

The recommended accumulation period is 24 hours.

Dual Thresholds (impulsive): Use one resulting in largest effect distance (isopleth).

SEL thresholds incorporate frequency weighting functions.

All dBs are referenced to 1 micro Pascal (re: 1uPa).

Level B Impacts

The determination of the disturbance isopleths (i.e., behavioral distances) in this memorandum is based on the output of a 15 log *R* practical (or semicylindrical) spreading loss (PSL) model also presented in the Multi-Species Pile Driving Calculator (NOAA 2025). Table 4 identifies the impact pile driving and vibratory steel sheet driving acoustic thresholds established in the 2018 guidance (NOAA 2018) for marine mammals. The PSL model calculates the distance to pile-driving disturbance thresholds based on noise levels generated by impulsive (i.e., impact) or non-impulsive (i.e., vibratory) pile driving. The variables used in the PSL model include the site ambient sound level (if available), source sound level, and transmission loss. The PSL model worksheet was completed for the Proposed Action's pile-driving activities (Attachment 1). The Analysis Methods section describes how the required variables were determined for the Proposed Action.

Table 4
NOAA Fisheries In-Water Level B Acoustic Thresholds (Behavioral Disturbance) for Marine Mammals

Marine Mammals	Impact Pile Driving Disturbance Threshold ¹	Vibratory Pile Driving Disturbance Threshold ¹
Cetaceans	160 dB RMS	120 dB RMS
Pinnipeds		

Notes:

Source: NOAA 2018

All decibels are referenced to 1 micro Pascal (re: 1uPa).

1. Based on NOAA Fisheries guidance (NOAA 2018).

In-Air Noise

There is a possibility that harbor seals will haul out or come out of the water to rest on land during pile driving activities. Because there are no established in-air behavioral or injury disturbance thresholds for marine mammals, the in-air harassment zone for harbor seals was conservatively defined as the area in which pile-driving noise has not yet attenuated to ambient sound levels. Based on noise studies, airborne sound from a single source (i.e., a “point” source) radiates uniformly outward in a spherical pattern as it travels away from the source. In this memorandum, the determination of the in-air noise zone is based on the output of the formula shown in Equation 1, which calculates construction noise levels at specific distances from a point-source sound. The Analysis Methods section describes how the variables required for this formula were determined for the Proposed Action.

Equation 1

$$L_{max} = L_{max,50\ ft} - 25 \cdot \log(D/D_0)$$

where:

L_{max}	=	highest A-weighted sound level occurring during noise event while noise is being measured
$L_{max,50\ ft}$	=	highest A-weighted sound level measured for construction activities at the reference distance of 50 feet
D	=	distance from noise source
D_0	=	reference measurement distance of 50 feet

Analysis Methods

Source Sound Levels

Source sound levels for pile driving were obtained from the *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish: Appendix I, Compendium of Pile Driving Sound Data* (compendium; Caltrans 2020). The compendium includes pile-driving noise monitoring data for a variety of pile sizes installed at projects in California, Oregon, Washington, Alaska, New York, Nebraska, Hawaii, Florida, Virginia, and Idaho. The compendium was reviewed to identify projects with comprehensive noise monitoring data for pile driving most similar to that of the Proposed Action (i.e., projects in close proximity or having similar pile-driving depths and with peak, cumulative SEL, and RMS monitoring data).

As detailed in Table 1, pile installation water depths vary from 4.7 to 10.6 meters. The 24-inch steel batter piles will be installed in approximately 10.6 meters of water, while the 16-inch concrete piles

installed in water will be placed in approximately 4.7 meters of water. Additionally, 1,856 16-inch concrete piles will be installed landside, 1,718 of which are located between 100 and 200 feet of the waterline. Caltrans guidance recommends that piles driven within 200 feet of the water be evaluated for underwater effects to fish and marine mammals; therefore, these piles are analyzed in this report (Caltrans 2020).

There are limited data for piles driven on land. The existing data suggest that, in most cases, underwater noise levels generated by pile driving on land are lower than those generated by pile driving directly into water, primarily due to decoupling of the pile surface from the water. The attenuation rate normally assumed for hydroacoustic analysis is 4.5 dB per doubling of distance; however, attenuation through the ground is greater than that in water, ranging from 6.0 dB for hard rocky soil or industrial areas to 8.4 dB for soft silty or sandy soils. The landside piles for this project will be driven in a developed, rocky, industrial area; therefore, the 6.0-dB attenuation rate is most appropriate. Using Equation 4-1 from the compendium, this equates to an attenuation factor, or transmission loss constant, of 20 (CalTrans 2020). Accordingly, an attenuation factor, or transmission loss constant, of 20 was applied in the analysis rather than the standard transmission loss constant of 15 typically used for in-water pile driving (Attachment 1).

An air bubble curtain is a commonly used device for reducing underwater noise levels during in-water pile driving. Air bubble curtains may be confined, which are most often used in situations where there is potential for high-water current velocities, or unconfined. Unconfined systems, such as the system proposed for this project, are appropriate for low-current areas. Unconfined bubble curtain systems have achieved attenuation ranging from 5 to 30 dB, depending on factors such as whether the system is multiple or single stage, its configuration relative to the piles, and currents. Due to this range of results, no specific sound level reduction is recommended in the compendium. Therefore, this memorandum applies the most conservative estimate of a 5-dB reduction from the use of a bubble curtain during installation of the waterside 16-inch concrete piles.

The Washington State Department of Transportation (2006) conducted a study to evaluate the effectiveness of several cushion-block material types in reducing underwater sound generation during the driving of 12-inch-diameter steel pipe piles. The study results showed reductions in sound levels relative to having no cushion block in place from 4 to 5 dB (nylon cushion blocks) up to 11 to 26 dB (wood cushion blocks). However, no specific sound level reduction is recommended in the compendium (Caltrans 2020) due to the limited nature of the study. Accordingly, this memorandum, does not assume any reduction from use of a wood cushion block for the installation of 16-inch concrete piles, either waterside or landside.

24-Inch-Diameter Steel Pipe Batter Piles

The most comparable source sound level data for impact hammer installation of 24-inch-diameter steel pipe piles included in the compendium were collected during construction of the Prichard Lake

Pumping Station (Caltrans 2020). This reference project included installation of 24-inch-diameter steel pipe piles in Sacramento, California (Table 5). This project was selected due to its pile size. There was no project in the compendium with a similar water depth to this project. The pile installation water depth at Prichard Lake Pumping Station ranged from 0.25 to 3 meters.

Table 5
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Coefficient
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
24-inch-diameter steel pipe (source sound, no attenuation)	--	0	153	0	15

16-Inch Square Concrete Piles (In-Water)

The most comparable source sound level data for impact hammer installation of 16-inch-square concrete piles included in the compendium were collected during construction of the Westside Boat Launch (Caltrans 2020). This reference project included installation of 16-inch square concrete piles in Bodega Bay, California (Table 6). This project was selected due to its pile size and pile installation water depth of 2 meters, which most closely reflects depths for the Proposed Action's pile locations. A 5-dB reduction was applied for the use of a bubble curtain.

Table 6
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Constant
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
16-inch-diameter concrete (source sound, no attenuation)	193	160	168	0	15
16-inch-diameter concrete (source sound, 5-dB attenuation for use of bubble curtain)	188	155	163	5	15

16-Inch-Square Concrete Piles (Landside, Within 200 Feet)

The most comparable source sound level data for impact hammer installation of 16-inch square concrete piles included in the compendium were collected during construction of the Westside Boat Launch (Caltrans 2020). This reference project included installation of 16-inch-diameter concrete piles in Bodega Bay, California (Table 7). This project was selected due to its pile size, which most

closely reflects depths for the Proposed Action's pile locations. There are no reference projects in the compendium where piles are installed landside, so this project, with a water depth of 2 meters, was most appropriate. There is a possibility that two pile driving crews will run simultaneously for this project element. Should this occur, there will be an increase in the noise levels generated by the activity. As necessitated by the rules for decibel addition, a 3 dB increase was applied to the source sound for the possibility of simultaneous installation of two piles (WSDOT 2020). As mentioned above, an attenuation transmission loss constant of 20 was applied for these calculations.

Table 7
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Constant
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
16-inch-diameter concrete (source sound, no attenuation)	193	160	168	0	20
16-inch-diameter concrete (source sound, no attenuation, two piles driven simultaneously)	196	163	171	0	20

Pile-Driving In-Air Noise

The Proposed Action occurs in an industrial area, where ambient noise levels are typically higher than in less-developed areas. Common daytime outdoor ambient sound levels for industrial areas have been measured at 67 A-weighted decibels (dBA) and ambient sound levels in high-density urban areas at 78 dBA (Engineering Toolbox 2003, WSDOT 2020). The more conservative ambient noise level of 67 dBA is applied for this analysis. Pile driving, both impact and vibratory, typically generate a noise level of 105 dBA at 50 feet from construction. Pile driving of two piles simultaneously will generate a noise level of 108 dBA at 50 feet from construction, based on the rules for decibel addition referenced above (WSDOT 2020).

Estimated Noise-Generating Assumptions

General Assumptions

NOAA Fisheries worksheets were used to calculate distances to the marine mammal injury (Level A) thresholds shown in Table 3 for vibratory and impact pile driving. The variables used in each Level A evaluation include the source sound levels described in the previous section, the default values listed here, as well as the Proposed Action-specific details outlined in the sections below.

The PSL model was used to calculate the distances to the marine mammal behavioral (Level B) disturbance thresholds shown in Table 4 for vibratory and impact pile driving. The variables used in

each Level B evaluation include the source sound levels described in the previous section, the default values listed here, as well as the Proposed Action-specific details outlined in the sections below.

Vibratory Driving of 24-Inch Steel Pipe Piles

The project engineers provided estimates of the duration to install a single pile and number of piles per day for vibratory installation of 24-inch steel pipe piles. Installation would take 30 minutes per pile, with a maximum of two piles per day installed (sequentially, not simultaneously), for a total maximum duration of 60 minutes of sound production within a 24-hour period over approximately 38 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario.

Impact Driving of 16-Inch Concrete Piles (In-Water)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles in-water. Installation would take 270 strikes per pile, with a maximum of four piles per day installed (sequentially, not simultaneously), for a total maximum of 1,080 strikes within a 24-hour period over approximately 24 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario: it includes modeling the maximum sound production to install ninety-five 16-inch concrete piles in-water.

Impact Driving of 16-Inch Concrete Piles (Landside Remote)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles above the waterline. Installation would take 350 strikes per pile, with a maximum of 5 piles per day installed, for a total maximum of 1,750 strikes within a 24-hour period over approximately 15 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario; it includes modeling the maximum sound production to install seventy-six 16-inch concrete piles in the dry.

Impact Driving of 16-Inch Concrete Piles (Landside Dome)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles above the waterline. Installation would take 350 strikes per pile, with a maximum of 10 to 20 piles per day installed (based on one or two concurrent hammers), for a total maximum of 3,500 to 7,000 strikes within a 24-hour period over 83 to 165 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario: it includes modeling the maximum sound production to install one thousand six hundred forty-two 16-inch concrete piles in the dry.

Analysis Results

Fish

The variables (i.e., source sound levels, pile strikes per day, and transmission loss) described previously were entered into the NOAA Fisheries worksheets (NOAA 2025) to identify the distances to various fish injury and behavior thresholds for the Proposed Action's pile-driving activities. These results are presented in Table 8 and the pile driving worksheets are included as Attachment 1.

Figures 1 through 4 illustrate the sound pressure radii for physical injury or mortality and behavioral effects to fish from proposed pile-driving activities.

Peak or Cumulative Injury

Although several fish species could be in the vicinity of impact pile driving, the likelihood of injury is proportionate to the low likelihood of presence within the action area and the limit of effects to the duration of construction. Employment of soft-start techniques for impact pile driving would further limit the potential for injury. To experience injury from high sound pressure levels, exposed fish species would need to remain within the onset of physical injury zones shown in Figures 2 through 4 during impact pile driving.

The likelihood of fish occurrence within the peak physical injury zones shown in Figures 2 through 4 during the maximum 161 to 270 days of pile driving over 3 years between July 1 and November 30 is low. There is low to moderate potential for occurrence within the larger cumulative SEL onset of physical injury zones during the pile-driving period. Fish species may occur in these areas during the upstream migration of spawning adults and downstream migration, resting, and foraging of juveniles. There is no suitable spawning habitat for any fish species within the area potentially affected by pile driving. In addition, the onset of physical injury area generally lacks the quality forage and cover favored by fish species in the area, and high levels of vessel activity within this industrialized reach of the San Joaquin River likely further limits the presence of fish species within the physical injury zones shown in Figures 2 through 4.

The implementation of soft-start techniques for impact pile driving would encourage any individual fish within the project area to flee to adjacent suitable habitat. Soft-start techniques include bringing pile-driving or other loud equipment online slowly (as described in Section 4 of the BA), providing fish with the opportunity to disperse from the project area.

Based on the analysis presented, very few (if any) fish are expected to be present or remain within the onset of physical injury zone during pile driving. Fish presence would likely be limited to transitory presence during migration or foraging. Therefore, the potential risk of injury to fish is low to moderate.

Behavioral Effects

Within the areas shown on Figures 1 through 4, pile driving may result in behavioral impacts to fish species. This may include temporary abnormal behavior indicative of stress or a startle response. These responses are likely to diminish after a few pile strikes or as fish leave the area (Caltrans 2020).

The areas of the San Joaquin River immediately upstream and downstream of the pile-driving zone of effect would provide startled fish sufficient space to escape to open-channel waters, and elevated sound levels should not result in significant effects on these individuals. Adjacent channel areas provide habitat of similar or higher quality and adequate carrying capacity to support individual fish that are temporarily displaced during the pile driving. As described in Section 4 of the BA, construction equipment would be brought online slowly to further provide fish the opportunity to exit the pile-driving area of effect. For these reasons, and given that effects would be limited to the very brief construction period, the behavioral effects to fish from pile driving are anticipated to be minimal.

Marine Mammals

The variables (i.e., source sound levels, duration of sound production, and transmission loss) described previously were entered into the Marine Mammal Worksheet (NOAA 2020) to identify the distances to various marine mammal injury and behavior thresholds for the Proposed Action's pile-driving activities.

Based on source noise data available for the project pile types, the Multi-Species Calculator for vibratory hammer driving was used for 24-inch-diameter steel piles and 16-inch-diameter concrete piles to estimate the distances to physical injury (Level A) thresholds and to behavioral (Level B) thresholds. The results are summarized in Table 9, and the pile driving reports are included as Attachment 1. Figures 5 through 8 illustrate the sound pressure isopleths for physical injury for phocid pinnipeds and behavioral effects to all marine mammals from proposed pile-driving activities.

Land features would constrain a portion of the sound waves from propagating into adjacent waters. Therefore, the effective maximum PTS isopleth distances are less than some of the values presented in Table 9.

Table 8
Anticipated Underwater Noise Effects and Distances to Fish Injury and Behavior Thresholds (Pile Driving with Impact and Vibratory Hammer)

Pile Type	Hammer Type	Attenuation (dB)	Source Sound ¹			Maximum Number of Strikes or Vibratory Minutes per Pile	Maximum Number of Piles per Day	Maximum Strikes or Minutes per Day	SEL, Accumulated	Injury		Behavior ¹	
			Peak Sound (dB)	SEL (Single Strike)	RMS (dB)					Distance to 206 dB Peak (Meters)	Distance to 187 dB SEL (Meters)	Distance to 183 db SEL (Meters)	Distance to 150 dB SEL (Meters)
24-inch Steel pipe	Vibratory	0	--	--	153	30 minutes	2	60 minutes	--	--	--	--	15.8
16-inch Concrete (in-water)	Impact	5	188	155	163	270 strikes	4	1,080 strikes	185	0.6	7.7	14.3	73.6
16-inch Concrete (landside remote)	Impact	0	193	160	168	350 strikes	5	1,750 strikes	192	2.2	18.7	29.6	79.4
16-inch Concrete (landside dome, 1 pile at a time)	Impact	0	193	160	168	350 strikes	10	3,500 strikes	195	2.2	26.4	31.6	79.4
16-inch Concrete (landside dome, 2 piles simultaneously)	Impact	0	196	163	171	350 strikes	20	7,000 strikes	201	3.2	44.7	44.7	112.2

Notes:
1. These source sound levels are inclusive of the applied attenuation.
Source sound levels used are the same as noted in Tables 5 through 7.
All threshold distances are rounded to the nearest whole number.

Table 9
Estimated Distances to Marine Mammal Injury and Behavior Thresholds (Pile Driving with Impact or Vibratory Hammer)

Pile Type	Hammer Type	Attenuation (dB)	Source Sound (at 10 Meters) ¹			Distance (Meters) to Cumulative Marine Mammal Injury Thresholds	Distance (Meters) to Behavioral Threshold ¹	Distance (Meters) to In-Air Behavioral Harassment Threshold
						Phocid Pinnipeds		
			Peak Sound (dB)	SEL (Single Strike)	RMS (dB)	195 dB	160 dB RMS (Impact) 120 dB RMS (Vibratory)	
24-inch Steel pipe	Vibratory	0	--	--	153	3.5	1,584.9	500
16-inch Concrete (in-water)	Impact	5	188	155	163	12.6	15.8	
16-inch Concrete (landside remote)	Impact	0	193	160	168	27.0	25.1	
16-inch Concrete (landside dome, 1 pile at a time)	Impact	0	193	160	168	38.2	25.1	
16-inch Concrete (landside dome, 2 piles simultaneously)	Impact	0	196	163	171	76.3	35.5	665

Notes:
Source sound levels used are the same as noted in Tables 5 through 7.
All threshold distances are rounded to the nearest whole number.
1. These source sound levels are inclusive of the applied attenuation.

Conclusions

Note that the distances shown in Tables 10 and 11, illustrated in Figures 1 through 10, and described in this memorandum represent a conservative modeling scenario when considering the following:

- Sound impacts are effectively eliminated when sound waves encounter a physical obstruction such as the shoreline.
- Avoidance and minimization measures would be implemented, including the following:
 - Limiting in-water pile driving activities to the approved environmental work window (July 1 to November 30)
 - Instructing the contractor to use the preferred vibratory drivers to the extent feasible
 - Using soft-start techniques
 - Using a single impact hammer at a time with a cushion block

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Figures

- Figure 1 Fish Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
- Figure 2 Fish Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
- Figure 3 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
- Figure 4 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
- Figure 5 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer
- Figure 6 Marine Mammal Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
- Figure 7 Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
- Figure 8 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
- Figure 9 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
- Figure 10 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer
- Figure 11 Marine Mammal Harassment Zone (In-Air)
- Figure 12 Marine Mammal Harassment Zone (In-Air and 2 Piles Simultaneously)

Attachments

- Attachment 1 NMFS Multi-Species Pile-Driving Acoustic Impact Worksheets (Level A)

Figures



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Figure 1
Fish Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

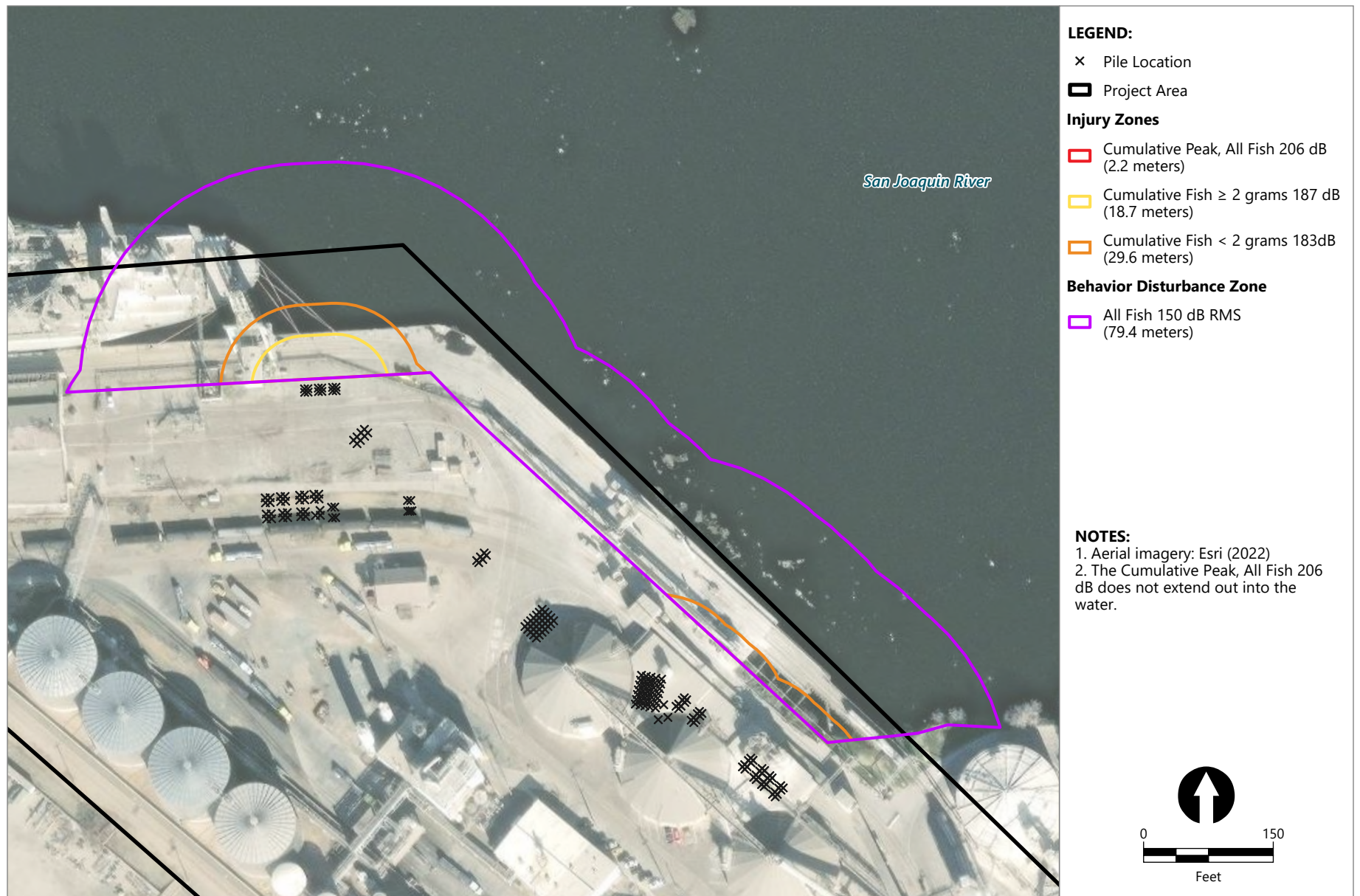


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Figure 2
Fish Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Figure 3
Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Figure 4
Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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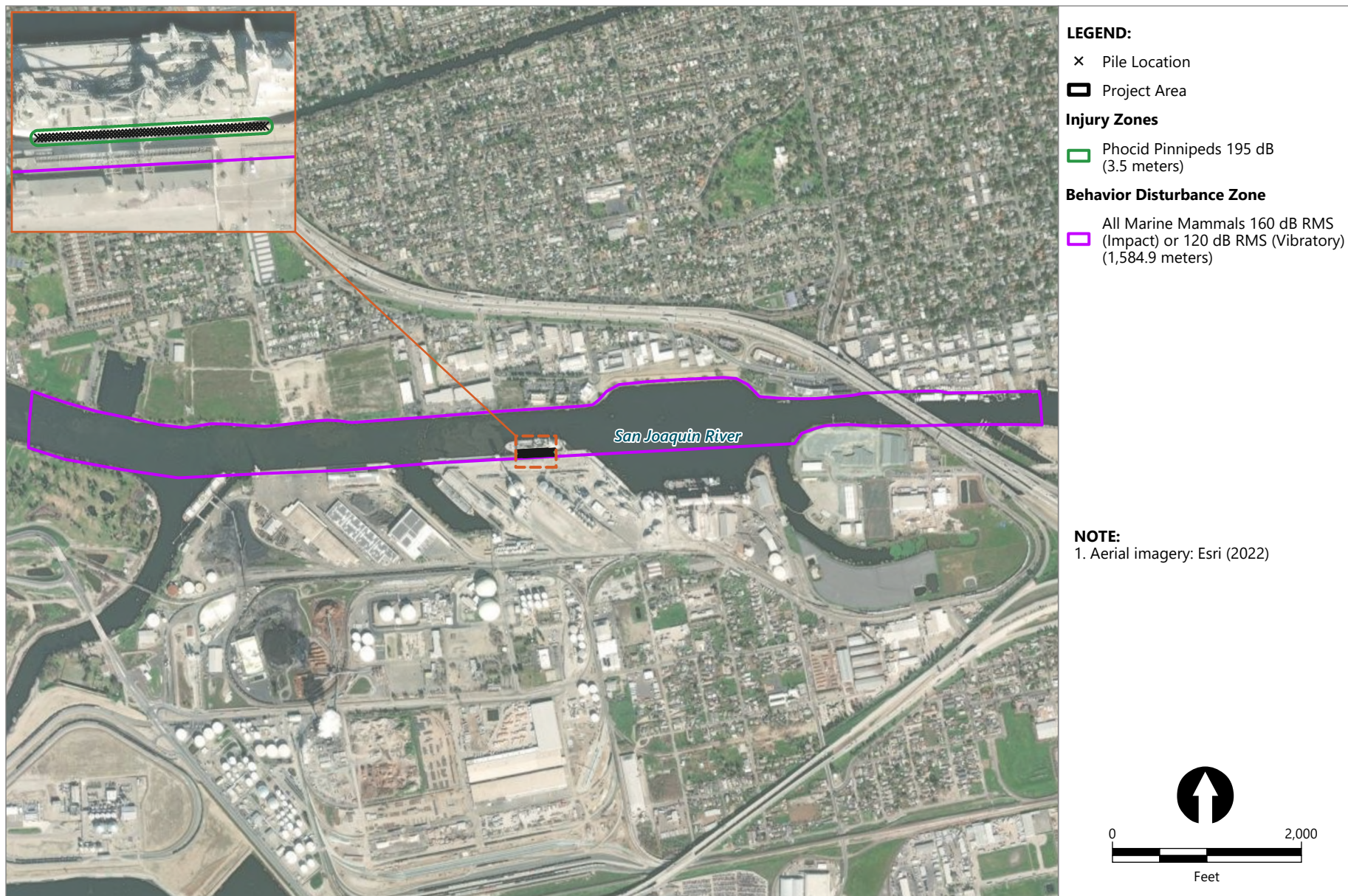
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Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer

Figure 5

Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Filepath: \\GSTFile01\GIS\Jobs\PortofStockton_0377\Maps\NCC_TerminalModernization\BioacousticsEvaluation\BioacousticsEvaluation.aprx | AQ_BE_Fig6_MarineMammalDisturbanceZone_24InchSteelPiles_VibratoryHammer



Figure 6
Marine Mammal Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

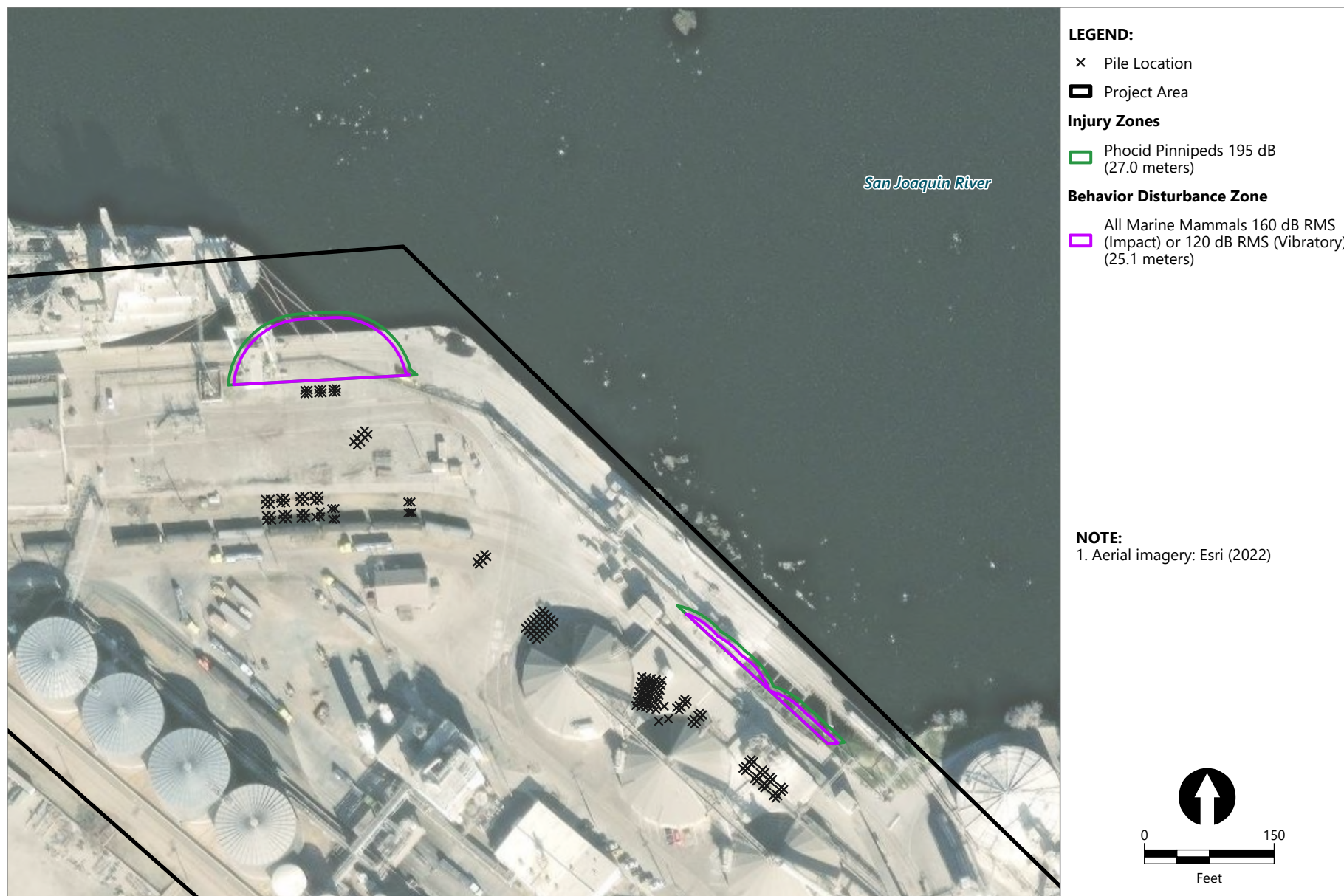


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Figure 7
Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Filepath: \\GSTFile01\GIS\Jobs\PortofStockton_0377\Maps\NCC_TerminalModernization\BioacousticsEvaluation\BioacousticsEvaluation.aprx | AQ_BE_Fig8_MarineMammalDisturbanceZone_16InConcretePiles_ImpactHammer_LandsideRemote



Figure 8
Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Figure 9
Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

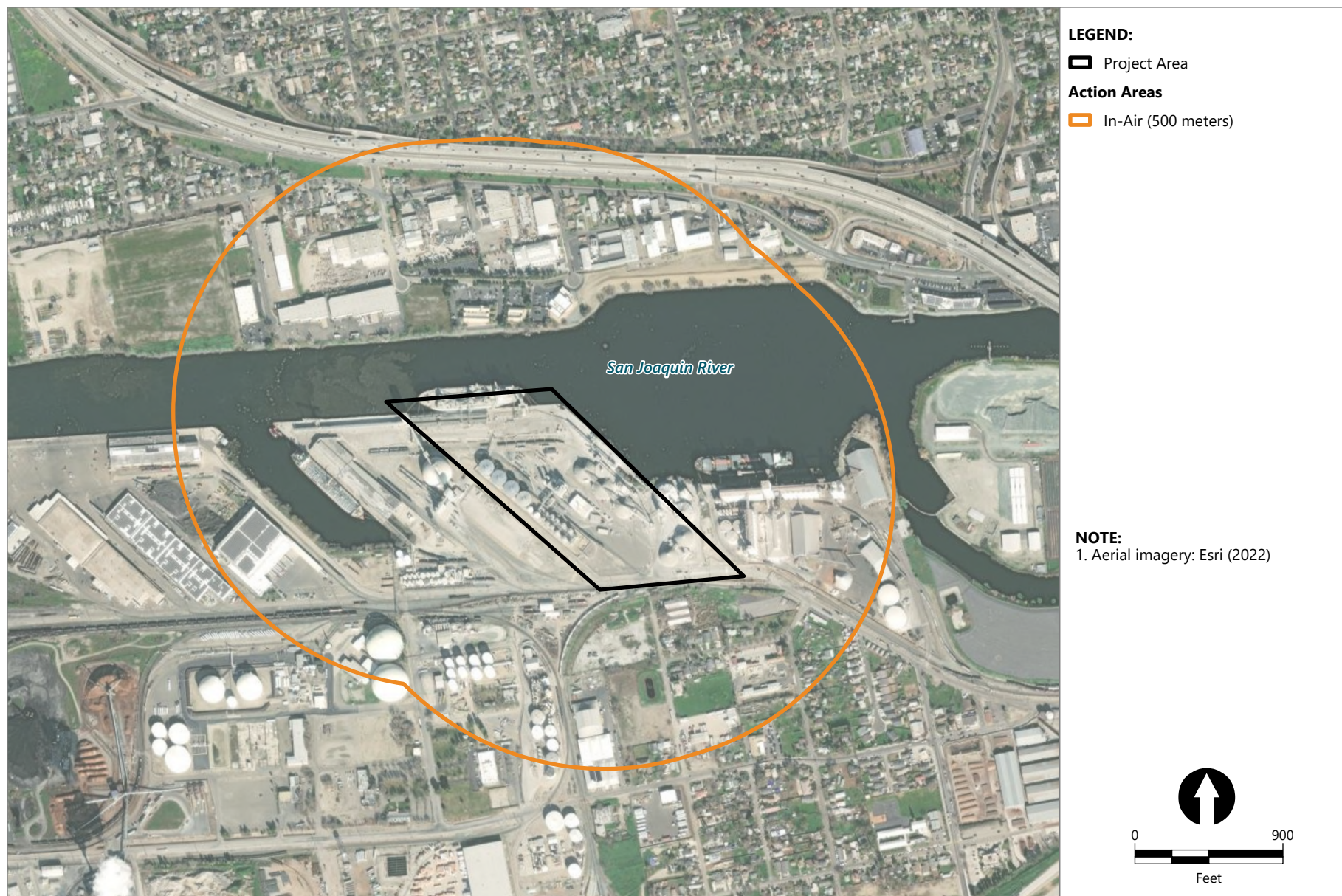


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Figure 10
Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer

Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

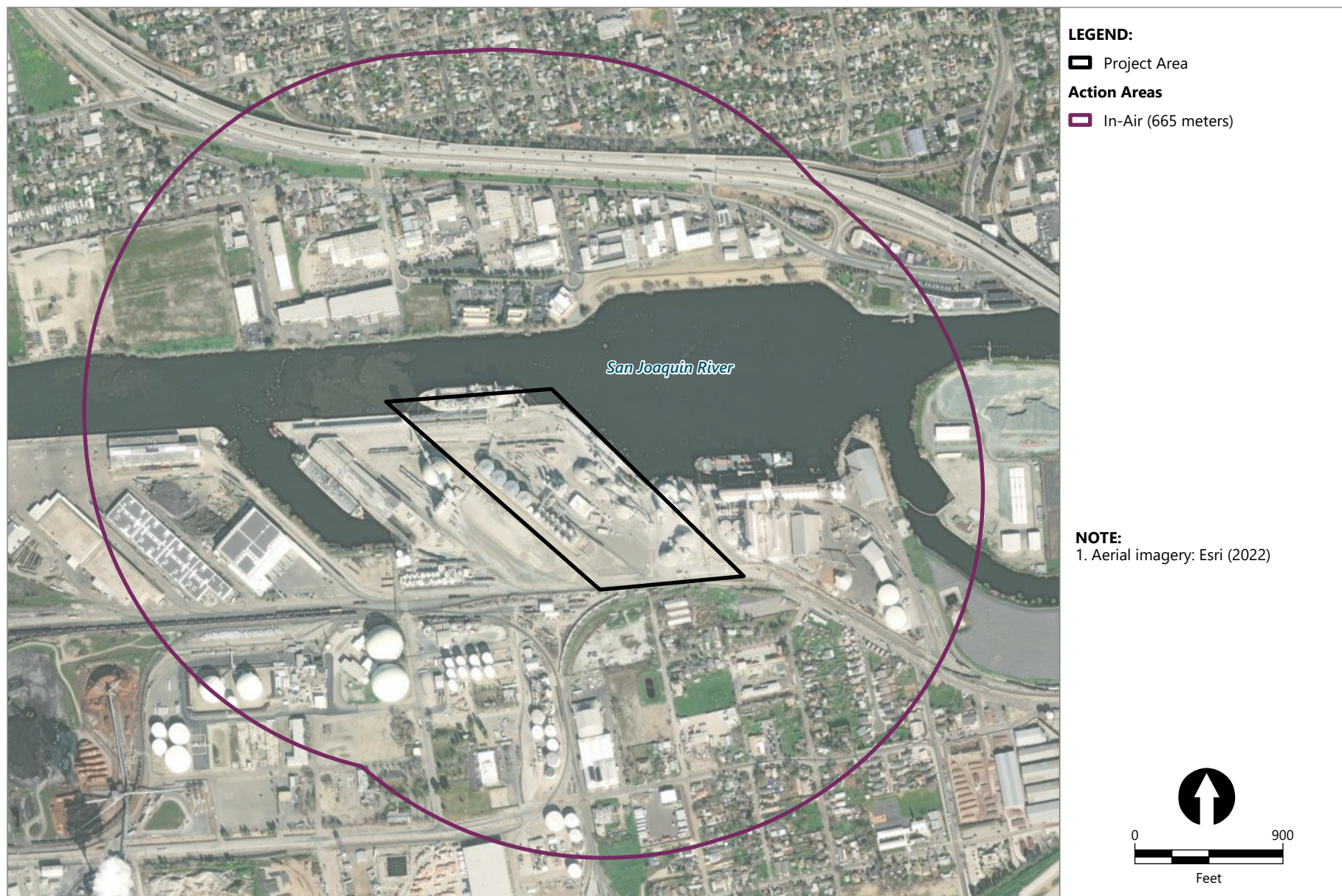


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Filepath: \\GSTFile01\GIS\Jobs\PortofStockton_0377\Maps\NCC_TerminalModernization\BioacousticsEvaluation\BioacousticsEvaluation.aprx | AQ_BE_Fig11_MarineMammalHarassmentZoneInAir



Figure 11
Marine Mammal Harassment Zone (In-Air)

Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation



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Filepath: \\GSTFile01\GIS\Jobs\PortofStockton_0377\Maps\NCC_TerminalModernization\BioacousticsEvaluation\BioacousticsEvaluation.aprx | AQ_BE_Fig12_MarineMammalHarassmentZoneInAir_2PileSimultaneously



Figure 12
Marine Mammal Harassment Zone (In-Air and 2 Piles Simultaneously)
 Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

Attachment 1

NMFS Multi-Species Pile-Driving Acoustic Impact Worksheets (Level A)

VIBRATORY PILE DRIVING REPORT

VERSION 2.0-Multi-Species: 2024

Nevada Cement

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN

(if OTHER INFO or NOTES get cut-off, please include information elsewhere)

PROJECT INFORMATION	RMS
Sound pressure level (dB)	153
Distance associated with sound pressure level (meters)	10
Transmission loss constant	15
Number of piles per day	2
Duration to drive pile (minutes)	30
Duration of sound production in day	3600
Cumulative SEL at measured distance	189

OTHER INFO 24-inch steel pipe pile, 30 minutes per pile, max of 2 per day, 60 minutes total

NOTES extra information

Attenuation 0

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

BEHAVIOR
RMS Isopleth
ISOPLETHS (meters)
ISOPLETHS (feet)

NO FISHES

ISOPLETHS (meters)

ISOPLETHS (feet)

SEA TURTLES

PTS ONSET	BEHAVIOR
SEL _{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	ISOPLETHS (feet)
ISOPLETHS (feet)	ISOPLETHS (feet)

NO SEA TURTLES

ISOPLETHS (meters)

ISOPLETHS (feet)

MARINE MAMMALS

	LF Cetacean	MF Cetaceans	HF Cetaceans	PW Pinniped	OW Pinnipeds
UD INJ ONSET (SEL _{cum} isopleth, meters)	2.7	1.0	2.2	3.5	1.2
AUD INJ ONSET (SEL _{cum} isopleth, feet)	8.9	3.4	7.2	11.4	3.8
	ALL MM	NO HF CET.	NO VHF CET.	Phocids present	NO OTARIIDS
Behavior (RMS isopleth, meters)	1,584.9	NO LF CET.			
Behavior (RMS isopleth, feet)	5,199.8				

IMPACT PILE DRIVING REPORT

VERSION 2.0-Multi-Species: 2024

Nevada Cement

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN

(if OTHER INFO or NOTES get cut-off, please include information elsewhere)

PROJECT INFORMATION

	PEAK	SEL _{ss}	RMS
Single strike level (dB)	188	155	163
Distance associated with single strike level (meters)	10	10	10
Transmission loss constant	15		
Number of piles per day	4		
Number of strikes per pile	270		
Number of strikes per day	1080		
Cumulative SEL at measured distance	185		

OTHER INFO 16-inch concrete pile, in-water, 270 strikes per pile, max of 4 per day, 1080 strikes total

NOTES 0

Attenuation 5

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

	ONSET OF	PHYSICAL INJURY		BEHAVIOR
	Peak	SEL _{cum} Isopleth		RMS
	Isopleth	Fish ≥ 2 g	Fish < 2 g	Isopleth
ISOPLETHS (meters)	0.6	7.7	14.3	73.6
Isopleth (feet)	2.1	25.4	46.9	241.4

Fishes present

SEA TURTLES

	PTS ONSET		BEHAVIOR
	Peak Isopleth	SEL _{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	0.0	0.6	1.6
Isopleth (feet)	0.0	1.9	5.2

NO SEA TURTLES

MARINE MAMMALS

	LF Cetacean	HF Cetaceans	VHF Cetaceans	PW Pinniped	OW Pinnipeds
AUD INJ ONSET (Peak isopleth, meters)	0.1	0.0	1.2	0.0	0.0
AUD INJ ONSET (Peak isopleth, feet)	0.2	0.1	3.8	0.2	0.1
AUD INJ ONSET (SEL _{cum} isopleth, meters)	14.2	1.8	22.0	12.6	4.7
AUD INJ ONSET (SEL _{cum} isopleth, feet)	46.7	6.0	72.3	41.5	15.5
	ALL MM	NO HF CET. NO VHF CET. Phocids present NO OTARIIDS			
Behavior (RMS isopleth, meters)	15.8	NO LF CET.			
Behavior (RMS isopleth, feet)	52.0				

IMPACT PILE DRIVING REPORT

VERSION 2.0-Multi-Species: 2024

Nevada Cement

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN

(if OTHER INFO or NOTES get cut-off, please include information elsewhere)

PROJECT INFORMATION	PEAK	SELss	RMS
Single strike level (dB)	193	160	168
Distance associated with single strike level (meters)	10	10	10
Transmission loss constant	20		
Number of piles per day	5		
Number of strikes per pile	350		
Number of strikes per day	1750		
Cumulative SEL at measured distance	192		

OTHER INFO16-inch concrete pile, landside, 350 strikes per pile, max of 5 per day, 1,750 strikes total

NOTES0

Attenuation0

RESULTANT ISOPLETHS		FISHES				
(Range to Effects)		ONSET OF		PHYSICAL INJURY	BEHAVIOR	
		Peak	SEL _{cum} Isopleth		RMS	
		Isopleth	Fish ≥ 2 g	Fish < 2 g	Isopleth	
ISOPLETHS (meters)		2.2	18.7	29.6	79.4	
Isopleth (feet)		7.3	61.3	97.2	260.6	
		SEA TURTLES				
		PTS ONSET		BEHAVIOR		
		Peak Isopleth	SEL _{cum} Isopleth	RMS Isopleth		
ISOPLETHS (meters)		0.1	2.6	4.5		
Isopleth (feet)		0.4	8.7	14.7		
		MARINE MAMMALS				
		LF Cetacean	HF Cetaceans	VHF Cetaceans	PW Pinniped	OW Pinnipeds
AUD INJ ONSET (Peak isopleth, meters)		0.4	0.1	3.5	0.3	0.1
AUD INJ ONSET (Peak isopleth, feet)		1.2	0.5	11.6	1.0	0.5
AUD INJ ONSET (SEL _{cum} isopleth, meters)		29.5	6.3	40.9	27.0	12.9
AUD INJ ONSET (SEL _{cum} isopleth, feet)		96.8	20.7	134.3	88.6	42.3
		ALL MM	NO HF CET. NO VHF CET. Phocids present NO OTARIIDS			
Behavior (RMS isopleth, meters)		25.1	NO LF CET.			
Behavior (RMS isopleth, feet)		82.4				

IMPACT PILE DRIVING REPORT**VERSION 2.0-Multi-Species: 2024**

Nevada Cement

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN

(if OTHER INFO or NOTES get cut-off, please include information elsewhere)

PROJECT INFORMATION

	PEAK	SEL _{ss}	RMS
Single strike level (dB)	193	160	168
Distance associated with single strike level (meters)	10	10	10
Transmission loss constant	20		
Number of piles per day	10		
Number of strikes per pile	350		
Number of strikes per day	3500		
Cumulative SEL at measured distance	195		

OTHER INFO 16-inch concrete pile, in-water, 350 strikes per pile, max of 10 per day, 7,000 strikes total

NOTES 0

Attenuation 0

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

	ONSET OF	PHYSICAL INJURY		BEHAVIOR
	Peak	SEL _{cum} Isopleth		RMS
	Isopleth	Fish ≥ 2 g	Fish < 2 g	Isopleth
ISOPLETHS (meters)	2.2	26.4	31.6	79.4
Isopleth (feet)	7.3	86.7	103.7	260.6

Fishes present

SEA TURTLES

	PTS ONSET		BEHAVIOR
	Peak Isopleth	SEL _{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	0.1	3.7	4.5
Isopleth (feet)	0.4	12.3	14.7

NO SEA TURTLES

MARINE MAMMALS

	LF Cetacean	HF Cetaceans	VHF Cetaceans	PW Pinniped	OW Pinnipeds
AUD INJ ONSET (Peak isopleth, meters)	0.4	0.1	3.5	0.3	0.1
AUD INJ ONSET (Peak isopleth, feet)	1.2	0.5	11.6	1.0	0.5
AUD INJ ONSET (SEL _{cum} isopleth, meters)	41.7	8.9	57.9	38.2	18.2
AUD INJ ONSET (SEL _{cum} isopleth, feet)	136.9	29.2	189.9	125.3	59.8
	ALL MM	NO HF CET. NO VHF CET. Phocids present NO OTARIIDS			
Behavior (RMS isopleth, meters)	25.1	NO LF CET.			
Behavior (RMS isopleth, feet)	82.4				

IMPACT PILE DRIVING REPORT
VERSION 2.0-Multi-Species: 2024
Nevada Cement

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN
 (if OTHER INFO or NOTES get cut-off, please include information elsewhere)

PROJECT INFORMATION	PEAK	SEL _{ss}	RMS
Single strike level (dB)	196	163	171
Distance associated with single strike level (meters)	10	10	10
Transmission loss constant	20		
Number of piles per day	20		
Number of strikes per pile	350		
Number of strikes per day	7000		
Cumulative SEL at measured distance	201		

OTHER INFO **16-inch concrete pile,** in-water, 350 strikes per pile, max of 20 per day, 7,000 strikes total, 2 piles at a time

NOTES **0**

Attenuation **0**

RESULTANT ISOPLETHS		FISHES				
(Range to Effects)		ONSET OF		PHYSICAL INJURY	BEHAVIOR	
		Peak	SEL _{cum} Isopleth		RMS	
		Isopleth	Fish ≥ 2 g	Fish < 2 g	Isopleth	
ISOPLETHS (meters)		3.2	44.7	44.7	112.2	
Isopleth (feet)		10.4	146.5	146.5	368.1	
Fishes present						
		SEA TURTLES				
		PTS ONSET		BEHAVIOR		
		Peak Isopleth	SEL _{cum} Isopleth	RMS Isopleth		
ISOPLETHS (meters)		0.2	7.5	6.3		
Isopleth (feet)		0.5	24.5	20.7		
NO SEA TURTLES						
		MARINE MAMMALS				
		LF Cetacean	HF Cetaceans	VHF Cetaceans	PW Pinniped	OW Pinnipeds
AUD INJ ONSET (Peak isopleth, meters)		0.5	0.2	5.0	0.4	0.2
AUD INJ ONSET (Peak isopleth, feet)		1.6	0.7	16.4	1.5	0.7
AUD INJ ONSET (SEL _{cum} isopleth, meters)		83.4	17.8	115.6	76.3	36.4
AUD INJ ONSET (SEL _{cum} isopleth, feet)		273.5	58.4	379.4	250.2	119.4
		ALL MM	NO HF CET. NO VHF CET. Phocids present NO OTARIIDS			
Behavior (RMS isopleth, meters)		35.5				
Behavior (RMS isopleth, feet)		116.4				

Fishes present

NO SEA TURTLES

Attachment 3

Protected Species Monitoring Plan



April 2026
Nevada Cement Company LLC Stockton Terminal Modernization Project



Protected Species Monitoring Plan

Prepared for Nevada Cement Company LLC

April 2026

Nevada Cement Company LLC Stockton Terminal Modernization Project

Protected Species Monitoring Plan

Prepared for

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205 Port Road 1
Stockton, California 95203

Prepared by

Anchor QEA
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San Francisco, California 94105

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APPENDICES

Attachment 1	Marine Mammal Monitoring Forms
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ABBREVIATIONS

DPS	distinct population segment
FT	federal threatened
Nevada Cement	Nevada Cement Company LLC
MMPA	Marine Mammal Protection Act
NOAA	National Oceanic and Atmospheric Administration
OPR	Office of Protected Resources
PE	proposed endangered
plan	Protected Species Monitoring Plan
Port	Port of Stockton
project	Nevada Cement Company LLC Stockton Terminal Modernization Project
PSO	protected species observer
terminal	Stockton Terminal

1 Introduction

The proposed *Protected Species Monitoring Plan* (plan) for the **Nevada Cement Company LLC Stockton Terminal Modernization Project** (project) covers monitoring during all construction activities associated with pile installation and removal. Monitoring will involve observing construction activities and the surrounding marine environment for signs of protected species and potential threats to these species. The plan will be amended as necessary to ensure compliance with all applicable permits once they are issued. The monitoring plan is designed to provide sufficient flexibility for Protected Species Observers (PSOs) to use their best scientific judgement for unforeseen events to allow for optimal protection of protected species.

This document describes the plan for implementing the monitoring activities and includes the following information:

- **Section 1:** Introduction
- **Section 2:** Communication protocol during monitoring
- **Section 3:** Construction area monitoring protocol and locations
- **Section 4:** Protected species identification
- **Section 5:** Monitoring reporting protocol
- **Attachment 1:** Field data forms

This document is intended to be a living document that may be augmented during construction if new information becomes available or if an improved methodology to implement the monitoring is identified.

1.1 Project Description

The project would improve and upgrade an existing bulk cementitious material receiving and distribution facility to meet long-term market demand for cement, supplementary cementitious materials, and other construction-related products in Northern California. Cementitious products, such as domestically manufactured cement, and alternatives, such as fly ash, are experiencing increasing regional supply constraints, while in high demand in the region. The project would improve the terminal's efficiency, accommodate larger vessels, and modernize aging infrastructure to maintain reliable cementitious material supply for decades to come.

Originally constructed around 1933 and reconfigured in 1990 for bulk materials shipping and storage facility for cement, the Stockton Terminal (terminal) has been operated by multiple entities, most recently Martin Marietta Materials and Lehigh Hanson. Nevada Cement Company LLC (Nevada Cement) acquired the terminal in 2023 and continues operating the existing facility while pursuing modernization. The project is located in the Port of Stockton (Port) at 205 Port Road 1 in the City of

Stockton, California. The terminal is in the northeast corner of the Port's East Complex and is bounded by the San Joaquin River, Port Road A, Port Road 1, and Port Road 2 (Figure 1).

As part of the project, Nevada Cement seeks to modify its lease with the Port to expand its terminal leasehold area from 4.92 to 10.98 acres. The existing leasehold reflects only the area occupied by existing permanent storage structures. However, current terminal operations extend across approximately 8.18 acres and include berth operations, truck lanes, and rail facilities. The lease modification would formalize the operational footprint and accommodate planned infrastructure improvements.

The project includes the following key project objectives:

- Improve and modernize the terminal to allow Nevada Cement to accept complementary imported products, increase throughput, and satisfy regional demand for cementitious material in the Northern California markets.
- Upgrade the terminal to more efficiently utilize terminal power, update environmental controls, and improve the safe and efficient handling of cementitious material.
- Upgrade and increase the overall utilization of the existing Berth 3/4 dock to support the new ship unloading equipment, comply with current design standards, and increase the life of the berth structure.
- Increase the reliable supply of cement and cementitious materials to meet the growing demand of the region through faster unloading and increased storage capacity.

Protected species monitoring will only be necessary during pile driving and removal activities associated with the Berth 3/4 rehabilitation and dome construction at Bunkers 6 and 7.

Figure 1
Vicinity Map



2 Communication Protocol

2.1 Construction Manager and Project Staff Roles

Each monitoring day, the PSOs will check in with the pile driver operator and construction foreman to determine which activities will be occurring that day and what the anticipated schedule is for pile driving. The PSOs and pile driver operator will ensure that there is a direct line of communication in the event that work must be stopped. Table 1 will provide contact information of key personnel prior to construction.

Table 1
Key Personnel

Role	Contact	Phone	Email
Project Management			
Construction Management and Pile Driver Operator			
Biological Resources			
Agency Contacts (National Marine Fisheries Service)			
Primary Protected Species Observer			
Alternate Protected Species Observer			

During impact installation of one 16-inch concrete pile at a time (both in-water and landside), only a single PSO will be required (Figures 3 and 4). Two PSOs may be needed for vibratory installation of 24-inch steel piles and the concurrent installation of two 16-inch concrete piles, because the PSO may be unable to effectively monitor the extent of the larger shutdown zone for these activities (Figures 2 and 5). PSOs must have direct contact with the pile driver operator and any other PSOs. Communication will be primarily via cellular phone. Each PSO will have a list of contact phone numbers, including other PSOs, the pile driver operator, construction manager and foreman, monitoring coordinator, project manager, contractor, and other management and staff. This list will be assembled and distributed before the start of construction.

A construction radio should be provided to the PSOs as an alternative or backup to a cellular phone for more immediate contact with the foreman for pile-driving operation.

2.2 Protected Species Observers

PSOs will be deployed in strategic locations around the area of potential effects at all times during pile driving and removal. Each PSO will be tasked with continuously scanning their viewshed within the shutdown zones, documenting all protected species, and if protected species are seen, closely tracking their behaviors and locations and communicating observations to the rest of the monitoring crew. PSOs will have a clear understanding of the location of various zones that pertain to each type of pile activity and the associated no-start/shutdown zone and will continually coordinate and update each other as well as other crew members, as appropriate.

If visibility precludes PSOs from viewing their designated viewshed (because of fog or poor lighting), then pile-driving activities will not be allowed or alternate methods or locations of monitoring must be employed (e.g., repositioning the monitoring location). PSOs will be consistently updated on pile-related construction activities in a manner that will allow them to make adjustments to provide accurate and appropriate observations.

Coordination between PSOs and contractors will occur at least once per day prior to the start of work. This coordination will include a review of the pile-related work schedule and any protected species issues that could potentially occur. Other details provided to the PSOs will include construction location, number and type of piles, and the type of hammer to be used. Any changes in the pile-related work schedule will be conveyed to the PSOs at least 30 minutes prior to implementation, when possible.

Each PSO will work, on average, 8 to 10 daylight hours per day. If necessary, the number of PSOs will be increased and/or their positions will be changed to ensure full visibility of the area of potential effects and to ensure early sighting of any protected species that enters the monitoring zone. PSOs will have no other responsibilities while making observations.

2.2.1 *Minimum Qualifications*

All PSOs will be trained in protected species observation and will have good eyesight and identification skills. The PSOs will receive training that covers detection, identification, and distance estimation (i.e., estimating the distance an animal is from the pile) of all protected species potentially found in and around the project site (identified in Section 4). Each PSO will have the experience and ability to conduct field observations and collect data according to this protocol. They will be experienced with directional orienteering, using binoculars and spotting scopes, efficiently accessing and referencing protected species identification materials, understanding safety protocol, and writing field notes and entering data into the field datasheets. Each PSO will be properly equipped with necessary gear during their shift, including binoculars, field guides, compass, cellular phone, and a backup power source.

The observers are required to meet the following minimum qualifications for monitoring protected species:

- Visual acuity in both eyes (correction is permissible) sufficient to detect moving targets at the water surface and ability to estimate target size and distance
 - Binoculars or a spotting scope may be required to correctly identify the target.
- Advanced education or related professional experience 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 in accordance with assigned protocols (this may include academic experience)
- Experience or training in field identification of protected species (cetaceans, pinnipeds, and fish)
- Sufficient training or experience with pile-driving operations, general construction site activities, and industrial sites to ensure personal safety during observations
- Writing skills sufficient to prepare a report of observations, including the number, type, and location of protected species observed; the behavior of protected species 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 protected species; and other information listed in this plan and as required by the permits
- Ability to communicate orally, by radio, cell phone, or in person, with project personnel to provide real-time information on protected species observed in the area

All protected species that are near an applicable no-start/shutdown zone will be closely monitored, and every precaution will be taken to avoid any harm. If an individual shows signs of distress or unexpected behavior, even while they are well outside of an applicable shutdown zone, a stop-work order will be issued, as described in the following section.

3 Monitoring

3.1 Soft-Start Protocol

In order to reduce the presence of protected species in the area of potential effect (action area), the contractor will implement a soft-start protocol for impact pile driving. Contractors will provide an initial set of strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced energy strike sets. This soft-start protocol must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

3.2 No-Start/Shutdown Zone and Stop-Work Protocol

A qualified PSO will monitor protected species within the project boundaries up to the areas where noise levels are determined to exceed background noise levels (this is considered the no-start/shutdown zone). Pre-driving monitoring of both the in-air and in-water zones will be conducted to confirm that the no-start/shutdown zones are clear of protected species, and pile driving may commence when PSOs have declared the no-start/shutdown zone to be clear of protected species.

The PSO(s) will be positioned at the location(s) shown in Figures 2 through 5, if feasible, to provide full observer coverage of the project area. Driving activities will be conducted only during normal business hours (daylight hours) and when weather conditions are adequate for visual monitoring of animals within the designated no-start/shutdown zone.

The PSO has the authority to stop construction if a protected species approaches or enters the no-start/shutdown zone; however, notification will first be directed to the contractor to suspend work. The no-start/shutdown zones for each construction activity are summarized in Table 1. In-air harassment zones apply to marine mammals that are hauled out or resting on surfaces above the water surface.

Table 2
Summary of Level A, Level B, and In-Air Zones (Marine Mammals)

Hearing Group	Activity Type	Level A Injury Zone (meters)	Level B Harassment Zones (meters)	In-Water No-Start/Shutdown Zones (meters)	In-Air Harassment Zones (meters)	In-Air No-Start/Shutdown Zones (meters)
Phocid pinnipeds	Vibratory installation of 24-inch steel piles	3.5	1,584.9	1,584.9	500	500
	Impact installation of 16-inch concrete piles (in-water)	12.6	15.8	15.8		
	Impact installation of 16-inch concrete piles (landside remote)	27.0	25.1	27.0		
	Impact installation of 16-inch concrete piles (landside dome)	38.2	25.1	38.2		
	Impact installation of 16-inch concrete piles (landside dome, two piles simultaneously)	76.3	35.5	76.3	665	665

Note:

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

Monitoring for protected species will occur within the immediate project area and beyond the edge of the no-start/shutdown zone for each activity. However, protected species are not expected to be observed in or near the project area as the action area is not a desirable habitat for protected species due to the nature of routine operations at the facility.

The protected species monitoring protocol as described in the regulatory permits and associated consultation documents is summarized as follows:

- Each day of the project where pile-driving activities are conducted, monitoring will take place from 15 minutes prior to initiation of pile-driving activity through the completion of pile-driving activity for the day. If no protected species are observed within or approaching the no-start/shutdown zones, the PSO will notify the contractor once the 15-minute pre-driving monitoring has been completed so work can be initiated. If a break in pile driving and monitoring occurs for more than 30 minutes, another 15-minute period of pre-driving monitoring will be required. Pre-driving monitoring will be conducted to ensure that the no-start/shutdown zone is clear of protected species. Pile driving may commence when the PSO has declared the no-start/shutdown zone to be clear of protected species.

- If protected species are found within the no-start/shutdown zone, the PSO will notify the contractor immediately, and pile driving will be delayed until the protected species voluntarily moves out of the area, as determined by the PSO. After the last sighting of a protected species and no further sightings inside the no-start/shutdown zone have occurred for a period of no less than 15 minutes, construction may commence. If a protected species is sighted within the no-start/shutdown zone after pile driving has begun, the PSO will notify the contractor to suspend work until the protected species has voluntarily moved beyond the no-start/shutdown zone. Prior to resuming pile driving, the pre-activity monitoring procedures described previously will be implemented.
- Any observation of a protected species within the no-start/shutdown zone will be recorded in the daily observation log and will include the date, time, location of the observation, species identification, number of protected species observed, bearing and direction of travel relative to pile activity location, and the behavior of the protected species.
- Additionally, any observation of a protected species outside of the no-start/shutdown zone will be recorded during daily monitoring. If a protected species is seen within the channel but outside of the no-start/shutdown zone, then activity will continue; however, the protected species will be monitored by the PSO. Any protected species reaction and behavior will be documented on the daily observation log by the PSO.

3.2.1 *Stop-Work Protocol*

Following issuance of a stop-work order, the protected species will be closely monitored, and updates of location and behavior will be provided to the construction manager at appropriate intervals, likely less than 15 minutes apart. The protected species will continue to be monitored while it is within the no-start/shutdown zone until it has clearly moved out of and away from the zone, and the species has not been observed for at least 15 minutes, or when the end of the workday is reached. If a stop-work order is issued, the project manager and monitoring coordinator will collaborate to confirm next steps.

After confirming with the project manager and monitoring coordinator, work will resume once the project manager has notified the contractor that the protected species has moved outside of and is headed away from the no-start/shutdown zone or has not been observed for at least 15 minutes. The monitoring coordinator will also coordinate with agencies to alert them to the presence of a protected species within the shutdown zone.

3.3 Potential Monitoring Locations

The PSOs must be equipped with binoculars and specific daily logs to document data. The PSOs will be able to see the entire zone from their monitoring location(s). PSOs will be deployed in strategic locations around the area of potential effects at all times during in-water pile driving and removal.

One PSO will be required for each pile-driving activity; therefore, if two piles are being driven simultaneously, then two PSOs would be needed.

The monitoring location for each pile-driving activity is shown in Figures 2 through 5. The in-air no-start/shutdown zone depicted in Figure 4 will need to be monitored for hauled-out marine mammals during the driving of a single pile. The in-air zone depicted in Figure 5 will need to be monitored for hauled-out marine mammals during the driving of two piles simultaneously.

Figure 2
Marine Mammal No-Start/Shutdown Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer

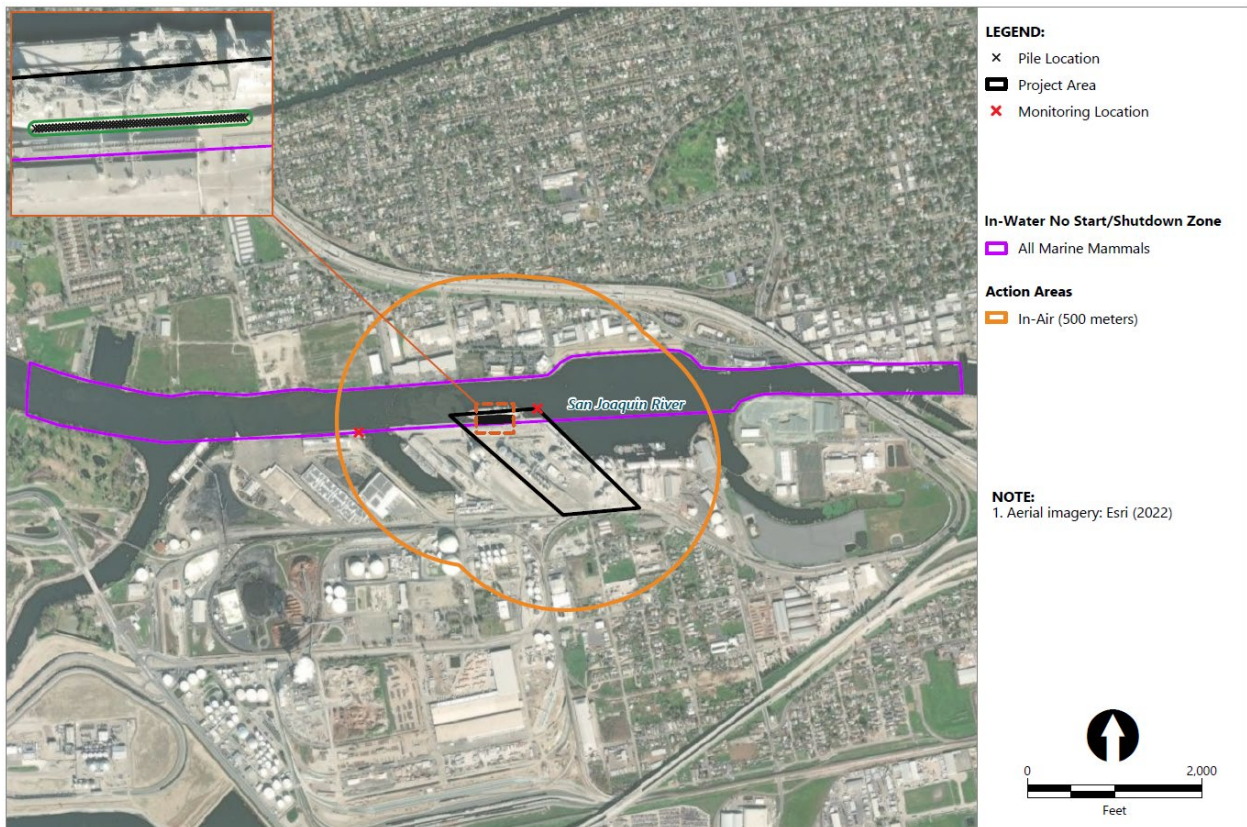


Figure 3
Marine Mammal No-Start/Shutdown Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer

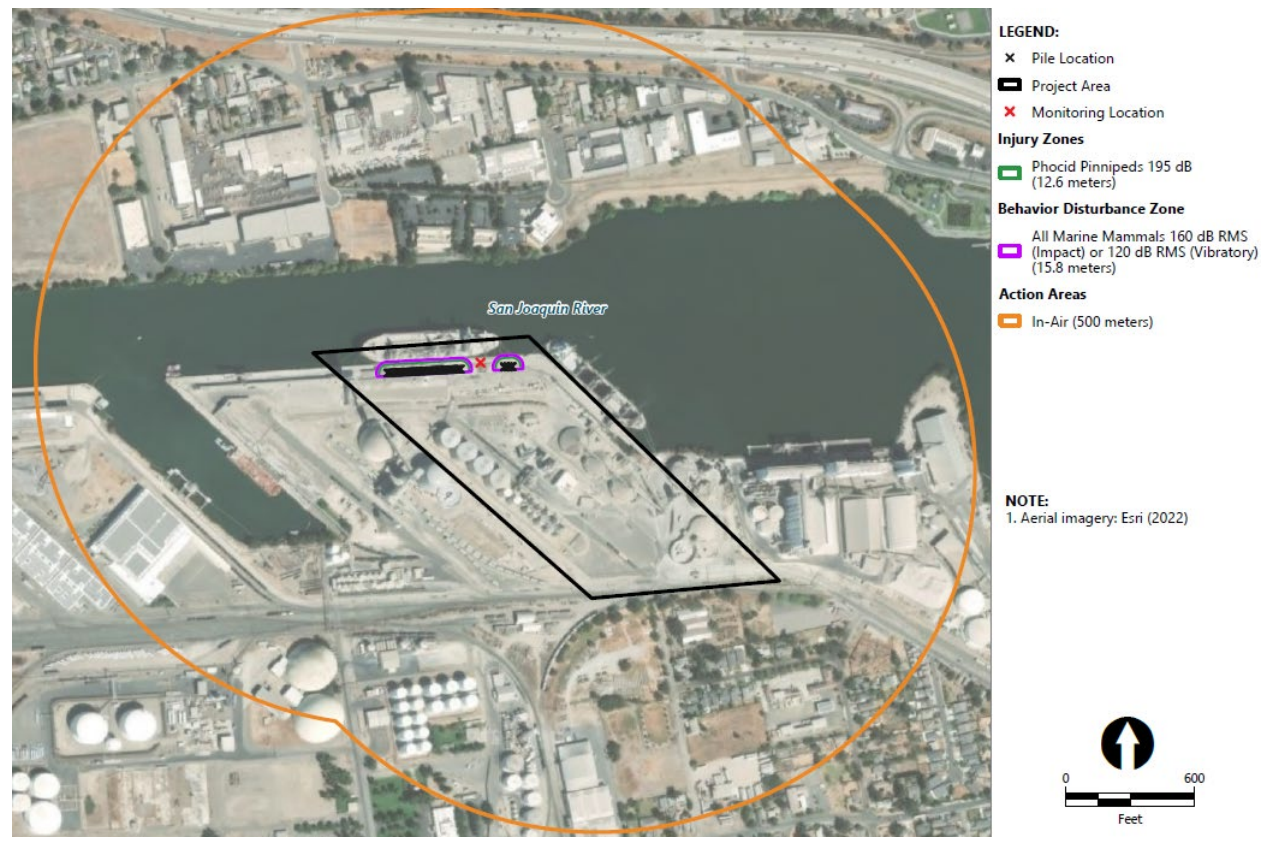


Figure 4
Marine Mammal No-Start/Shutdown Zone, 16-Inch Square Concrete Piles (Landside), Impact Hammer

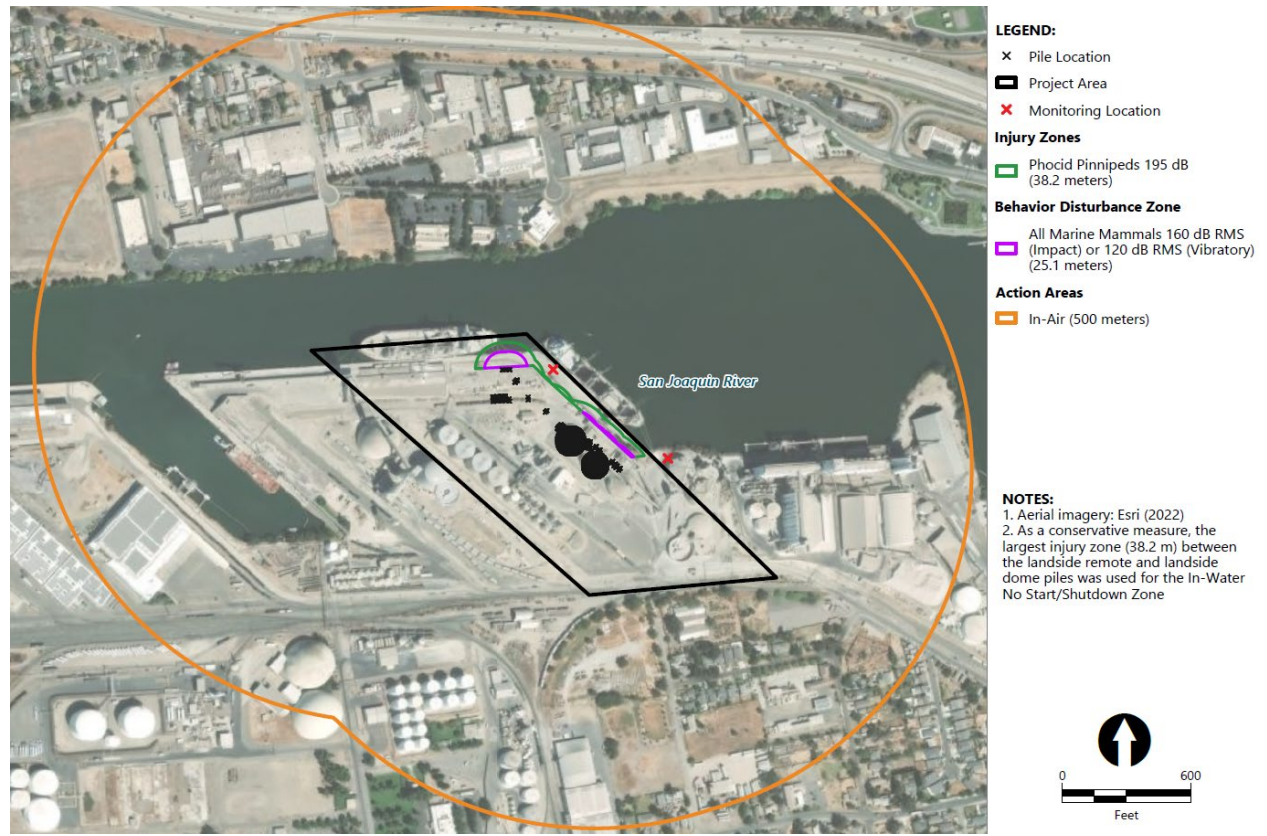
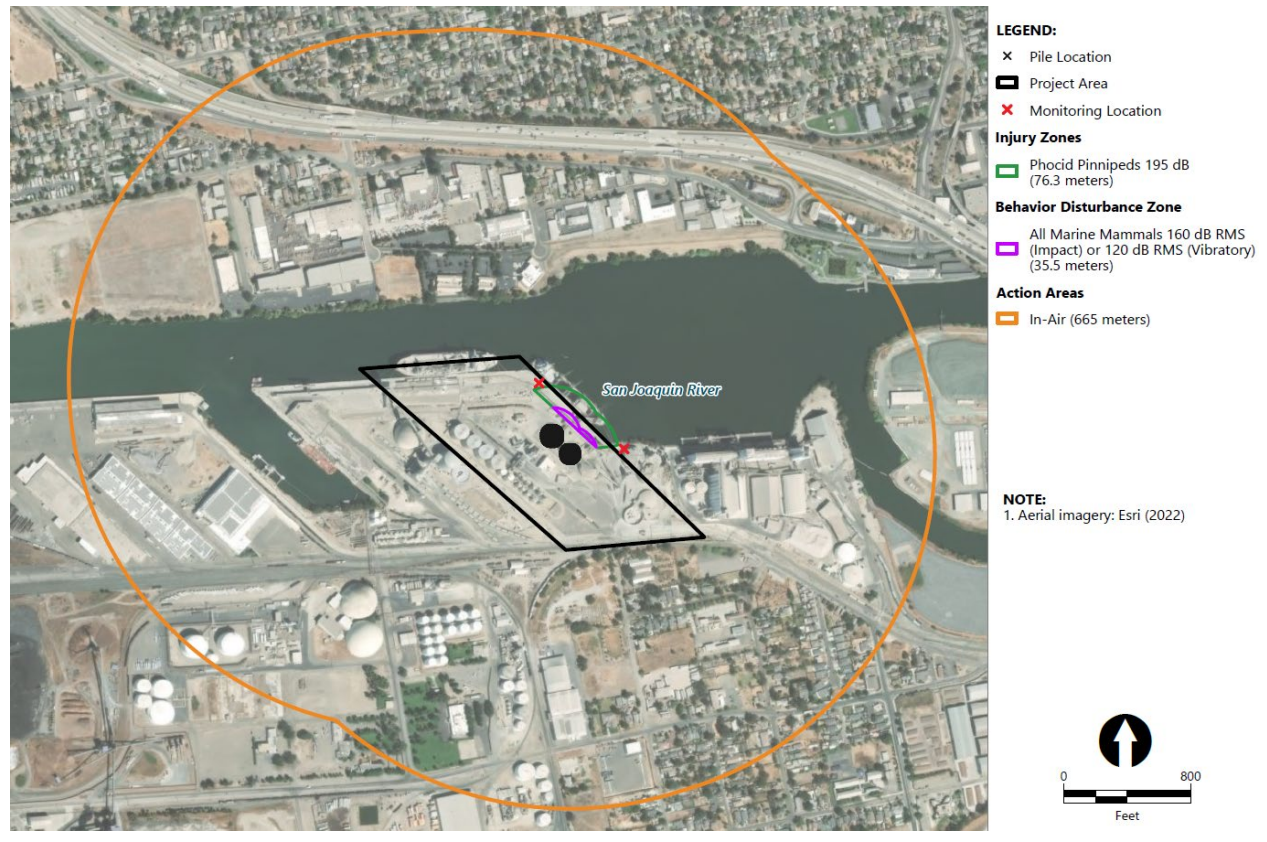


Figure 5
Marine Mammal No-Start/Shutdown Zone, 16-Inch Square Concrete Piles (Landside and Two Piles Simultaneously), Impact Hammer



4 Protected Species

The only marine mammal species known to be present within the San Joaquin River adjacent to the project site, is the Pacific harbor seal (*Phoca vitulina*). There are also four protected fish species that may occur in the project area; however, harassment and injury zones would not be monitored because such zones cannot be effectively observed from land. PSOs will be able to identify all five protected species that have the potential to be around the project site and will note sightings of these species on monitoring forms (Table 3).

Table 3
Protected Species with the Potential to Occur in the Monitoring Area

Scientific Name	Common Name	Special Status
<i>Phoca vitulina</i>	Harbor seal	MMPA
<i>Acipenser medirostris</i>	Southern green sturgeon DPS	FT
<i>Hypomesus transpacificus</i>	Delta smelt	FT
<i>Oncorhynchus mykiss</i>	Central Valley steelhead DPS	FT
<i>Spirinchus thaleichthys</i>	Longfin smelt	PE

4.1 Species With Possibility to Be Near the Site

Harbor Seal

Characteristics for field identification:

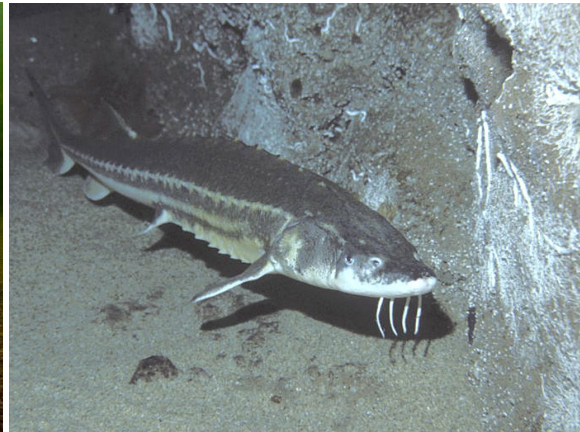
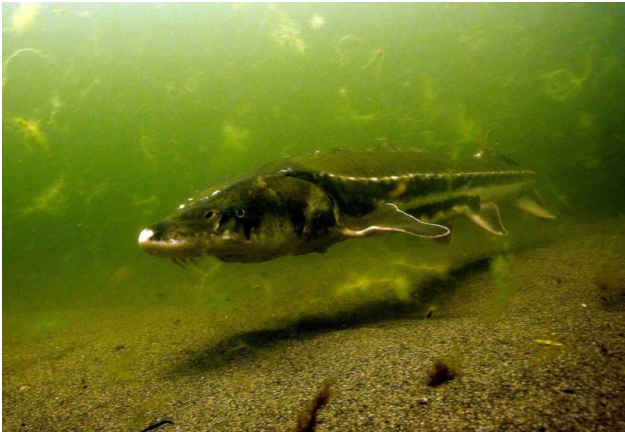
- Adults 5- to 6-feet long and up to 300 pounds
- Spotted coats in a variety of shades
- True or crawling seals, small flippers, move on land by flopping on their bellies
- No external ear flaps



Southern Green Sturgeon DPS

Characteristics for field identification:

- Adults 4.5- to 6.5-feet long and up to 350 pounds
- Olive-green coloration
- Barbels closer to the mouth than the snout tip
- Long, slender snout



Delta Smelt

Characteristics for field identification:

- Adults 2- to 3-inches long
- Bluish-grey and nearly translucent
- Slender body
- Blue sheen on sides of body



Steelhead

Characteristics for field identification:

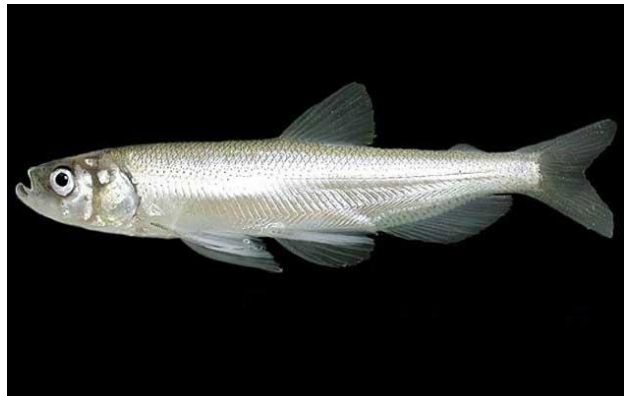
- Adults 23 inches or longer
- Silvery body with green back and pink or red lateral line
- Large mouth with maxillary bone that extends to the rear of the eye
- Mouth is pure white inside
- Square tail



Longfin Smelt

Characteristics for field identification:

- Adults up to 6-inches long
- Pale olive dorsal region, silvery white in water
- Longer pectoral fin than Delta smelt
- Larger eye than Delta smelt



5 Reporting

5.1.1 *Species Sighting Form and Daily Monitoring Log*

A protected species sighting form will be completed each survey day. This form will include details on the monitoring conditions (e.g., weather, visibility), monitoring start and stop times, and each protected species sighting. Information documented for sightings includes the distance from the individual to the pile-driving activity, behavior, pile-driving activity at the time of sighting, and any response to the pile-driving activity.

A daily monitoring log will also be completed each survey day, summarizing important observations and applicable aspects of construction. The daily monitoring log will summarize important details noted by the PSOs in a format that readily conveys these details to interested and appropriate parties. These details include the pile type, pile driver, start and stop times for protected species monitoring and construction activities, and any no-start/shutdown times.

Field data forms are included as Attachment 1 to this document.

5.1.2 *Reporting Dead or Injured Animals*

In the event that any personnel involved in the construction activities discovers an injured or dead marine mammal, the lead PSO shall report the incident to the Resident Engineer and the Office of Protected Resources (OPR), National Oceanic and Atmospheric Administration (NOAA) (PR.ITP.MonitoringReports@noaa.gov) as soon as feasible. If the death or injury was clearly caused by the specified activity, pile-related activities must cease until NOAA OPR is able to review the circumstances of the incident. Pile-related activities must not resume until notified by NOAA.

The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable)
- Species identification (if known) or description of the animal(s) involved
- Condition of the animal(s) (including carcass condition if the animal is dead)
- Observed behaviors of the animal(s), if alive
- If available, photographs or video footage of the animal(s)
- General circumstances under which the animal was discovered

Attachment 1

Marine Mammal Monitoring Forms

Protected Species Sighting Form

Monitoring Location:				Observer:				Date:	
Weather Conditions: ☐ Sunny ☐ Overcast ☐ Rain ☐ Whitecaps Average temp: Other conditions:									
Environmental Conditions Limiting MMM: ☐ None ☐ Yes - describe:									
PSM Start Time:				PSM End Time:					
Pile Activity (Begin, End, Breaks):									
Monitoring Type: ☐ Vibe ☐ Impact				Communication during Monitoring:					
Species	Species #	Time Begin	Time End	Duration	PD Distance (feet)	Notes	Behavior	Reactions to Pile Activity	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	
				____ Hours ____ Minutes			☐ Swimming ☐ Foraging ☐ Resting ¹ ☐ Intermittent ☐ Other ²	☐ No pile activity ☐ None observed ☐ Yes ²	

Notes:

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

2. Describe behavior or reaction to pile activity here.

Daily Monitoring Log

Lead Monitor:

[illegible]

Notes:

1. If unable to confirm proper ramp up procedures were followed, notify the construction manager.
2. For breaks longer than one hour, ramp up procedures must be repeated. Please start a new data line.