APPENDIX E

NOISE IMPACT ANALYSIS

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NOISE IMPACT ANALYSIS

SHIPYARD SEDIMENT REMEDIATION PROJECT

SAN DIEGO BAY, CALIFORNIA

LSA

May 2011

NOISE IMPACT ANALYSIS

SHIPYARD SEDIMENT REMEDIATION PROJECT

SAN DIEGO BAY, CALIFORNIA

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LSA Project No. SWB1001A

LSA

May 2011

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FIGURES

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1.0 EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) was retained to prepare a noise impact analysis for the proposed dredging of sediment adjacent to shipyards in the San Diego Bay, located in the City of San Diego and National City, California.

This noise impact analysis provides a discussion of the proposed project, the physical setting of the project area, and the regulatory framework for noise. The report evaluates potential noise impacts associated with the proposed project, and identifies mitigation measures recommended for potentially significant impacts.

Construction equipment used within the proposed staging areas would generate a maximum noise level, or L_{max}, of up to 87 dBA within Cesar Chavez Park and up to 75 dBA at the closest residences to the project site. Due to the size of the staging areas and the mobile nature of construction equipment, the construction activities would not exceed the City of San Diego's 75 dBA L_{eq} or the City of National City's 75 dBA L_{max} thresholds. Adherence to the Cities' construction hours would reduce the short-term noise impacts to below a level of significance.

The increase in traffic flow on the surrounding roads due to construction traffic is expected to be small. The project would add up to 100 daily truck trips to either 28th Street or Bay Marina Drive, less than 2 percent of the existing traffic volumes. Therefore, the associated increase in long-term traffic noise will not be perceptible.

The proposed project would not result in any increase in long-term on-site stationary or off-site mobile sources. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels in the project vicinity, and impacts related to long-term operational noise sources are less than significant.

2.0 INTRODUCTION

2.1 INTRODUCTION

The proposed Shipyard Sediment Remediation Project (proposed project) is the dredging of sediment adjacent to shipyards in the San Diego Bay, the dewatering, solidification and possible solidification of the dredged material on-shore, potential treatment of decanted water and the transport of the removed material to an appropriate landfill for disposal. The purpose of the project is to implement a Tentative Cleanup and Abatement Order issued by the California Regional Water Quality Control Board, San Diego Region (hereinafter the San Diego Water Board). The San Diego Water Board is the Lead Agency under California Environmental Quality Act (CEQA) for the proposed project. The dredging will occur in an area of the Bay defined in the CAO. The San Diego Water Board is considering the use of one or more staging sites for the dewatering and treatment of the dredge, as further described in this project description. The sediment removal footprint and the optional staging sites comprise the project site for the purpose of this study.

2.2 PROJECT LOCATION

The sediment removal site (Shipyard Sediment Site) is located along the eastern shore of central San Diego Bay, extending approximately from the Sampson Street Extension on the northwest to Chollas Creek on the southeast, and from the shoreline out to the San Diego Bay main shipping channel to the west (Figure 1, Project Location). The project consists of marine sediments in the bottom bay waters that contain elevated levels of pollutants above San Diego Bay background conditions. This area is hereinafter collectively referred to as the "Shipyard Sediment Site."

The Shipyard Sediment Site is more specifically bounded by the waters of R.E. Staite facility on the north, the 28th Street Pier on the south, the open waters and shipways of San Diego Bay on the west, and the shoreline of two shipyard facilities on the east (the BAE Systems San Diego Ship Repair Facility [BAE Systems] and the National Steel and Shipbuilding Company Shipyard Facility [NASSCO]). The Shipyard Sediment Site encompasses 63 water acres (46 within the NASSCO leasehold and 17 within the BAE leasehold[1]) of the NASSCO and BAE Systems leaseholds.

The removal of the marine sediments will require upland areas for dewatering, solidification and stockpiling of the materials and potential treatment of decant waters prior to offsite disposal. Therefore, in addition to the open waters of the Shipyard Sediment Site, five upland

[1] Per the Exponent 2003 SI Report and the 2010 Tentative Cleanup and Abatement Order (CAO)

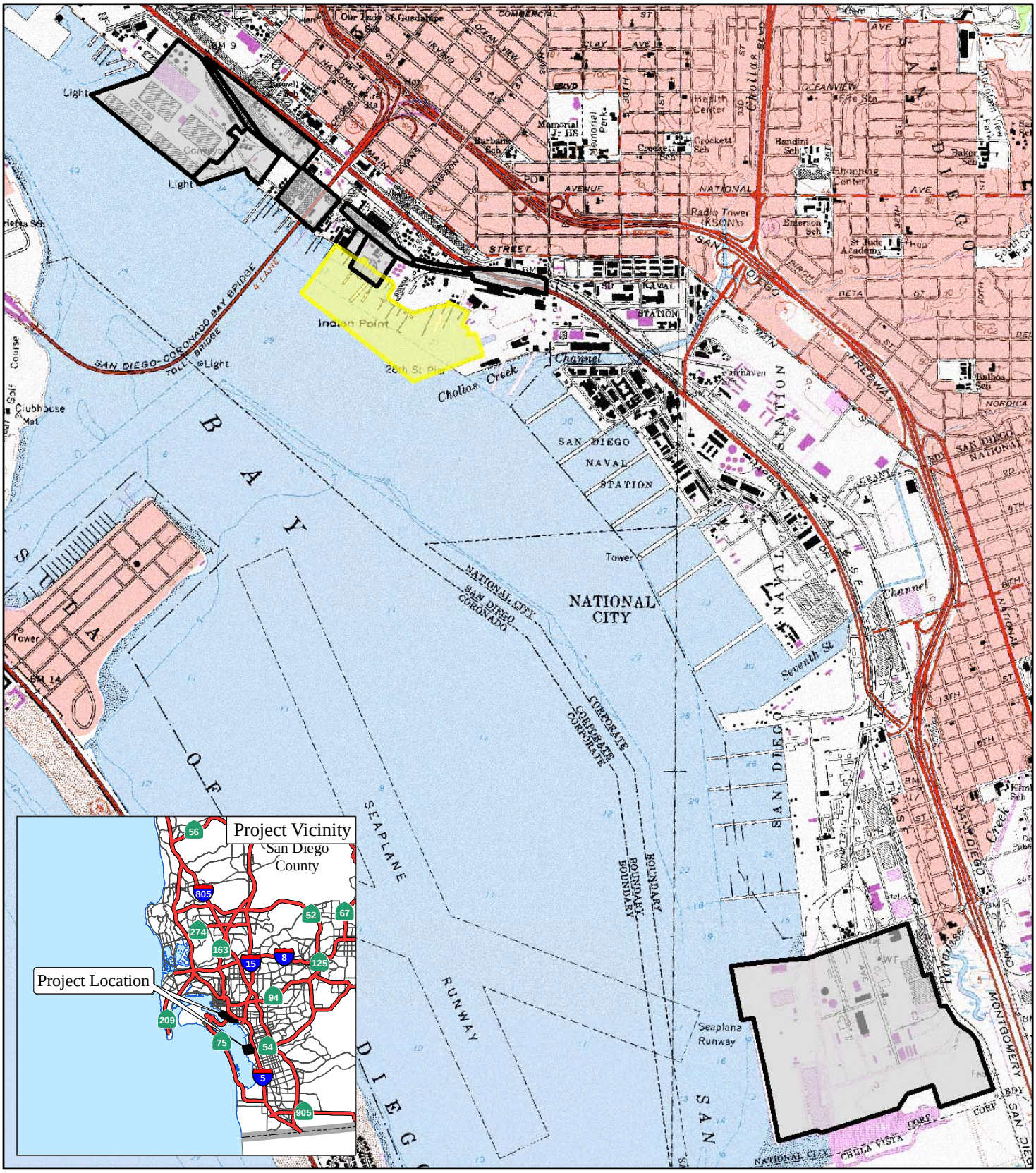

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FIGURE 1

LEGEND

Shipyard Sediment Project Site

Potential Sediment Staging Areas

N

0 1250 2500

FEET

San Diego Sediment Project

Project Location

SOURCE: USGS 7.5' Quad - National City (1975), Point Loma (1994). CA

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areas have been identified by the San Diego Water Board as Potential Sediment Staging Areas. Each of the potential staging areas has more defined usable areas, which are illustrated in Figures 2 through 7 and further described below.

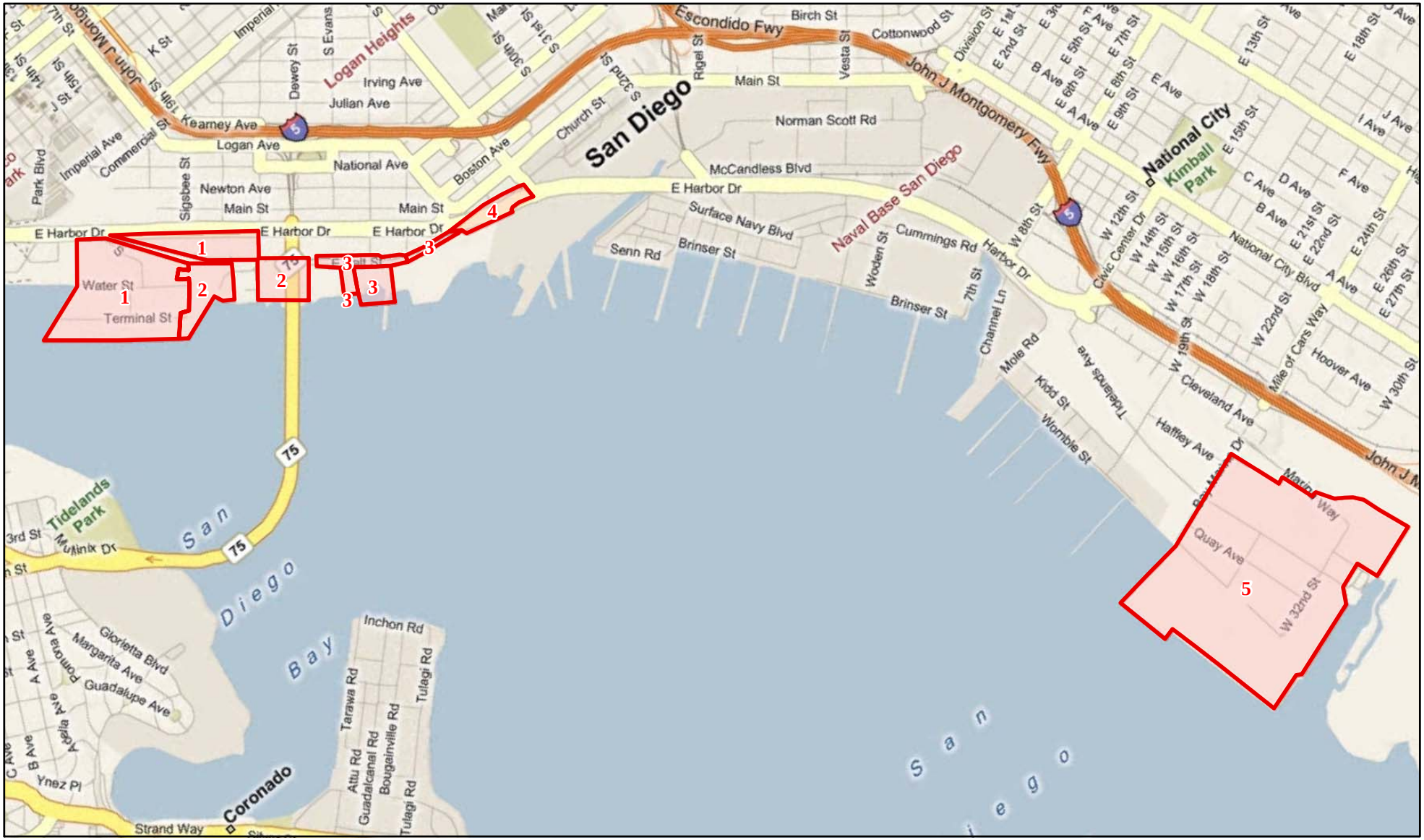
- Staging Area 1: 10th Avenue Marine Terminal and Adjacent Parking (approximately 49.66 potentially usable acres).
- Staging Area 2: Commercial Berthing Pier and Parking Lots Adjacent to Coronado Bridge (approximately 11.66 potentially usable acres).
- Staging Area 3: SDG&E/BAE/BAE and NASSCO Parking Lot (approximately 7.27 potentially usable acres).
- Staging Area 4: NASSCO/NASSCO Parking and Parking Lot North of Harbor Drive (approximately 3.85 potentially usable acres).
- Staging Area 5: 24th Street Marine Terminal and Adjacent Parking Lots (approximately 145.31 potentially usable acres).

2.3 PROJECT SETTING AND SITE DESCRIPTION

The project site is located under the planning jurisdiction of the San Diego Port District and is identified as District 4 in the certified Port Master Plan. The San Diego Port District is a special government entity, created in 1962 by the San Diego Unified Port District Act, California Harbors and Navigation Code, in order to manage San Diego Harbor and administer certain public lands along San Diego Bay. The Port District holds and manages as trust property on behalf of the People of the State of California, including the land occupied by NASSCO and BAE. The Port Master Plan water use designation within the limits of the proposed project is Industrial – Specialized Berthing.

San Diego Bay is designated as a State Estuary under Section 1, Division 18 (commencing with section 28000) of the Public Resources Code. The San Diego Bay shoreline between Sampson and 28th Streets is listed on the Clean Water Act section 303(d) List of Water Quality Limited Segments for elevated levels of copper, mercury, zinc, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) in the marine sediment. These pollutants are impairing the aquatic life, aquatic-dependent wildlife, and human health beneficial uses designated for San Diego Bay. The northeast boundary of the Shipyard Sediment Site occupies this shoreline.

The principal structural components within the Shipyard Sediment Site include the concrete bulkheads, piers and dry dock facilities associated with the two shipyard facilities. Bathymetry at the site varies substantially due to the presence of shipways, dry docks, and berths and ranges from -2 Mean Lower Low Water (MLLW) along the bulkheads to -70 feet MLLW at the BAE dry dock sump area. -2 MMLW as per Merkel & Associates Sept 16, 2010 BAE dry dock sump maintenance dredging project pre-construction eelgrass survey report.



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LEGEND

Potential Sediment Staging Areas

FIGURE 2

0 1250 2500

FEET

SOURCE: Bing Maps (2008)

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San Diego Sediment Project

Potential Sediment Staging Locations Index

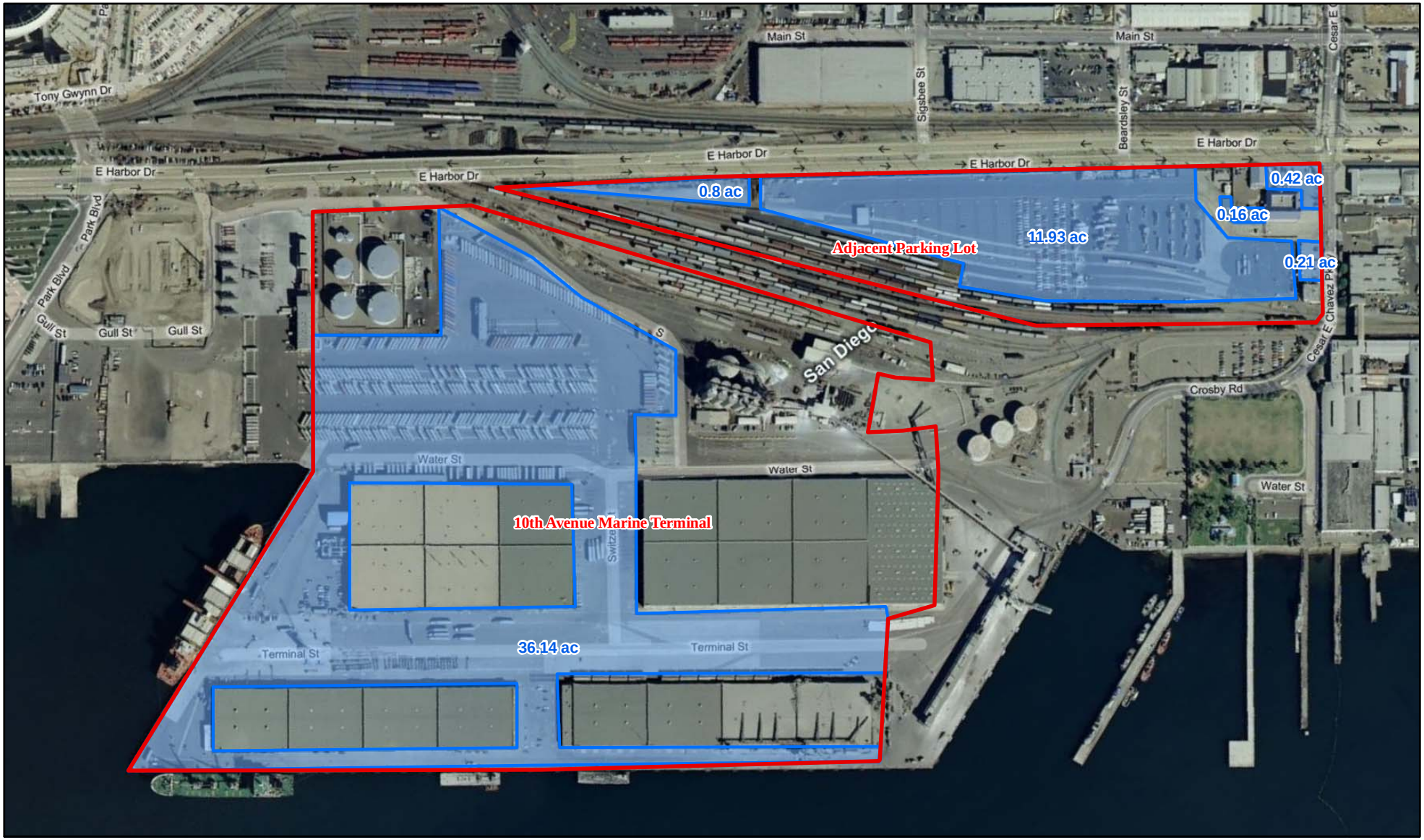

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FIGURE 3

LEGEND

Potential Sediment Staging Area 1

Usable Areas (with Acreage)

0 225 450

FEET

SOURCE: Bing Maps (2008)

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San Diego Sediment Project

Potential Sediment Staging Area 1
10th Avenue Marine Terminal and Adjacent Parking Lot

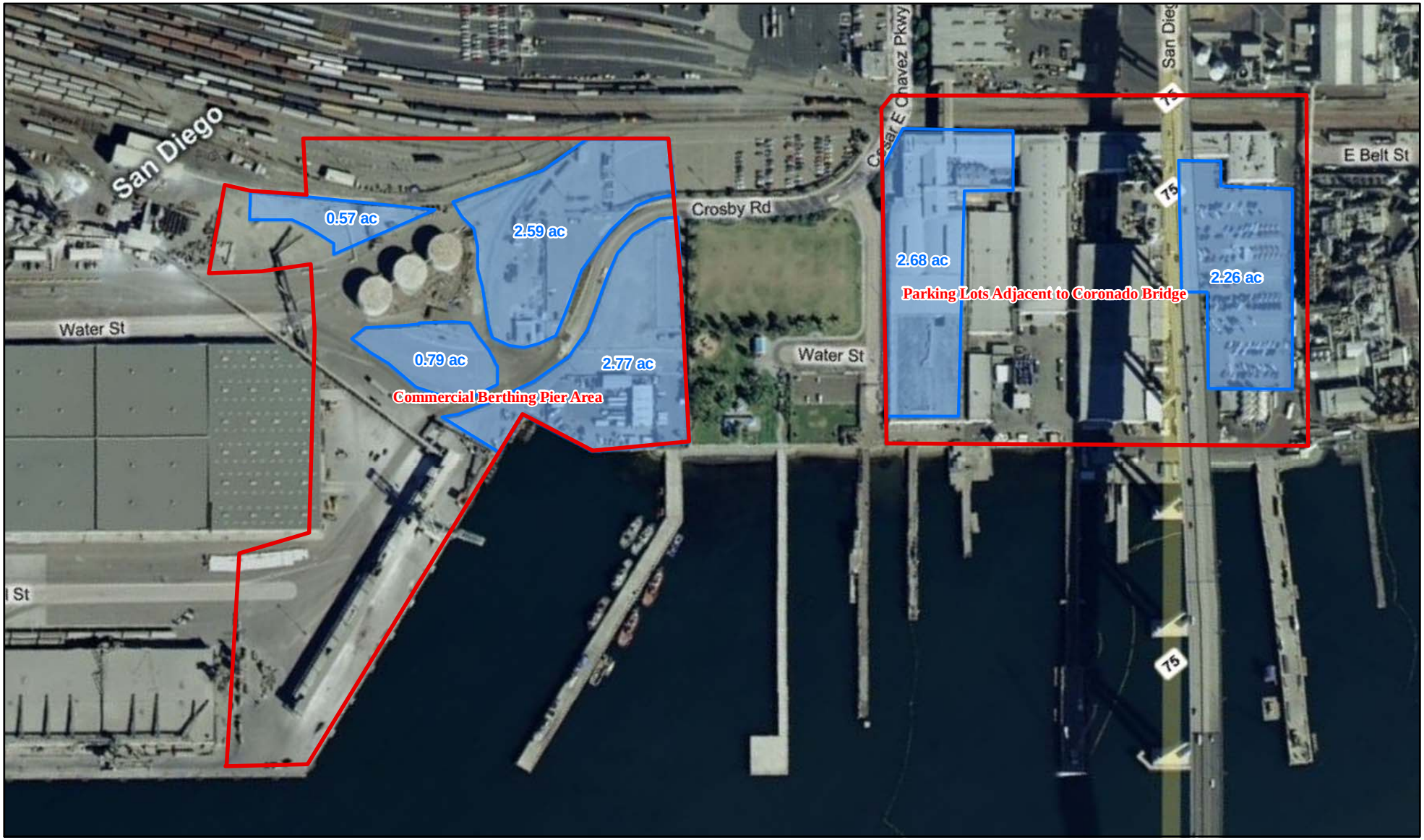

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FIGURE 4

LEGEND

Potential Sediment Staging Area 2

Usable Areas (with Acreage)

0 150 300

FEET

SOURCE: Bing Maps (2008)

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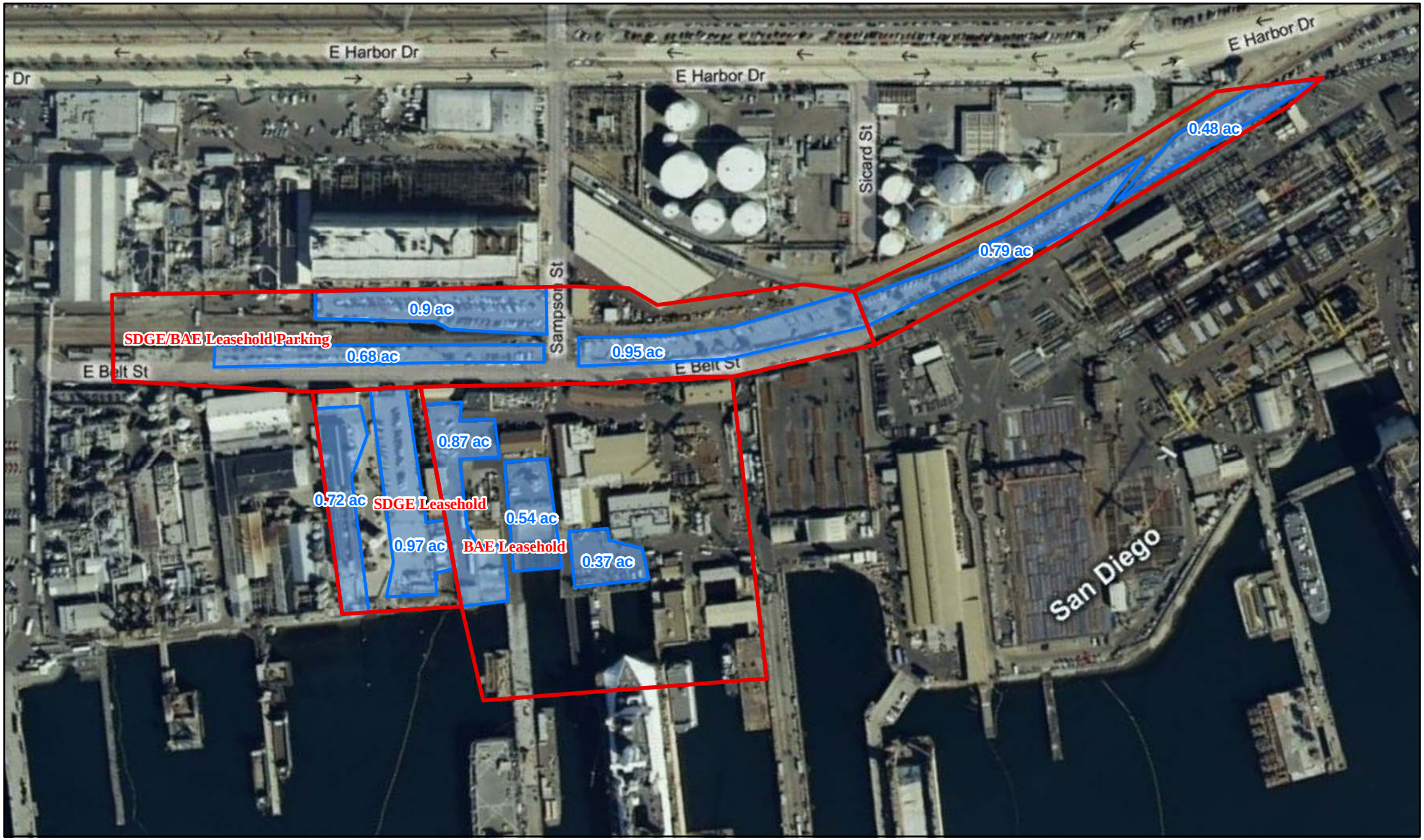
San Diego Sediment Project

Potential Sediment Staging Area 2
Commercial Berthing Pier Area and Parking Lots Adjacent to Coronado Bridge



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LEGEND

Potential Sediment Staging Area 3

Usable Areas (with Acreage)

FIGURE 5

0 150 300

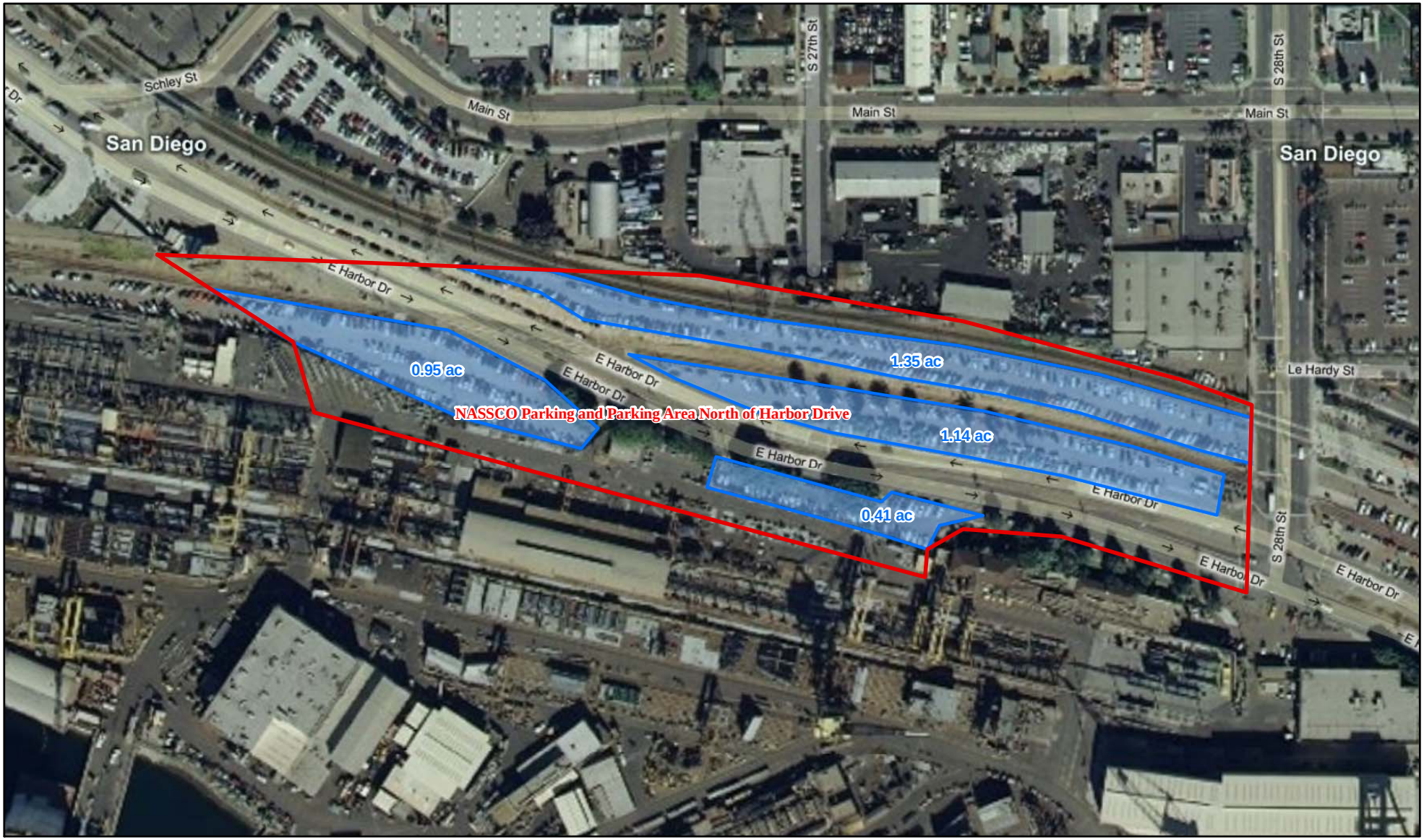
FEET

SOURCE: Bing Maps (2008)

R:\SWB1001\GIS\SDGE_and_BAE_Leaseholds_and_Parking.mxd (1/26/11)

San Diego Sediment Project

Potential Sediment Staging Area 3
SDG&E Leasehold/BAE Leasehold/BAE and NASSCO Parking



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LEGEND

Potential Sediment Staging Area 4

Usable Areas (with Acreage)

FIGURE 6

N

0 100 200

FEET

SOURCE: Bing Maps (2008)

R:\SWB1001\GIS\NASSCO_and_Area_North_Harbor_Drive_Parking.mxd (1/26/11)

San Diego Sediment Project

Potential Sediment Staging Area 4
NASSCO Parking and Parking Area North of Harbor Drive

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LEGEND

Potential Sediment Staging Area 5

Usable Areas (with Acreage)

FIGURE 7

0 400 800

FEET

SOURCE: Bing Maps (2008)

R:\SWB1001\GIS\24thSt_MarineTerminal.mxd (2/23/2011)

San Diego Sediment Project

Potential Sediment Staging Area 5
24th Street Marine Terminal and Adjacent Parking Areas

The marine habitat within the Shipyard Sediment Site consists of 63 open water acres (46 within the NASSCO leasehold and 17 within the BAE leasehold) containing both vegetated and unvegetated subtidal soft bottom habitats, pier pilings and bulkhead walls. The vegetated habitat species include sparse beds of eelgrass (*Zostera marina*). The entire extent of the Shipyard Sediment Site shoreline is artificially stabilized, generally consisting of a vertical sheet pile bulkhead and a seawall. The marine habitat types include vertical bulkhead walls and dock structures, vegetated and non-vegetated soft bottom subtidal habitats, and open water. These habitats support marine plants, invertebrates, and fishes.

The five potential Staging Areas consist primarily of leasehold lands and associated parking areas in the immediate vicinity of the Shipyard Sediment Site. The actual usable areas within each potential Staging Area are comprised of open, paved portions that could be used for the dewatering, solidifying and drying of the dredged marine sediments. Staging Areas 1 through 4 are located within the City of San Diego and are designated in the City's General Plan as Industrial Employment. Staging Area 5 is located within the City of National City and is designated in the City's existing General Plan as Industrial – Tidelands Manufacturing and is under the jurisdiction of the San Diego Unified Port District. National City is currently updating their General Plan; the proposed Land Use designation for Staging Area 5 in the updated General Plan is San Diego Unified Port District (land uses governed by the Sand Diego Port Master Plan).

2.4 PROJECT BACKGROUND

The California Regional Water Quality Control Board (RWQCB), San Diego Region, hereinafter referred to as the San Diego Water Board, alleges that several agencies and/or parties caused or permitted the discharge of waste to the Shipyard Sediment Site resulting in the accumulation of waste in the marine sediment. The contaminated marine sediment has caused conditions of contamination or nuisance in San Diego Bay that adversely affect aquatic life, aquatic-dependent wildlife, human health, and San Diego Bay beneficial uses. The San Diego Water Board determined that issuance of a Cleanup and Abatement Order (CAO) was the appropriate regulatory tool to use for correcting the impairment at the Shipyard Sediment Site.

CAOs are issued under the authority of the California Water Code (Section 13304). As defined in the State Water Board's Water Quality Enforcement Policy (adopted November 17, 2009), "CAOs may be issued to any person who has discharged or discharges waste into State waters in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water Board or the State Water Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the State and creates, or threatens to create, a condition of pollution or nuisance (discharger). The CAO requires the discharger to clean up the waste or abate the effects of the waste, or both, or, in the case of

threatened pollution or nuisance, take other necessary remedial action, including, but not limited to, overseeing cleanup and abatement efforts."

A CAO requires dischargers to clean up the pollution to background levels or the best water quality that is reasonable. At a minimum, cleanup levels must fully support beneficial uses, unless the Regional Water Board allows a containment zone. The CAO determined that cleaning up to a background sediment quality level at the Shipyard Sediment Site is economically infeasible. Therefore, the CAO established alternative cleanup levels for the project that are the lowest technologically and economically achievable levels, as required under the California Code of Regulations Title 23 section 2550.4(e). These alternative levels are described below in the Project Characteristics section.

This Program EIR addresses the cleanup project as identified in the Tentative Cleanup and Abatement Order No. R9-2011-0001, dated September 15, 2010.

2.5 PROJECT GOALS AND OBJECTIVES

The primary goal of the project is to improve water quality in San Diego Bay, consistent with:

- Protect the quality of the waters of San Diego Bay for use and enjoyment by the people of the state by executing a shipyard sediment clean-up project consistent with the provisions of Tentative Cleanup and Abatement Order (CAO) No. R9-2011-0001.
- Attain cleanup levels as included in the Tentative CAO No. R9-2011-0001 (judged to be technologically and economically feasible as defined in Section 2550.4 of Title 23 of the CCR, pursuant to Resolution No. 92-49).
- Remediate areas identified in Attachment 2 of Tentative CAO No. R9-2011-0001.
- Minimize adverse effects to aquatic life beneficial uses, including Estuarine Habitat (EST), Marine Habitat (MAR), and Migration of Aquatic Organisms (MIGR).
- Minimize adverse effects to aquatic-dependent wildlife beneficial uses, including Wildlife Habitat (WILD), Preservation of Biological Habitats of Special Significance (BIOL), and Rare, Threatened, or Endangered Species (RARE).
- Minimize adverse effects to human health beneficial uses, including Contact Water Recreation (REC-1), Non-contact Water Recreation (REC-2), Shellfish Harvesting (SHELL), and Commercial and Sport Fishing (COMM).
- Implement a clean up plan that will have long-term effectiveness.
- Minimize adverse effects to the natural and built environment.
- Avoid or minimize adverse impacts to residential areas.

- Result in no long term loss of use of shipyard and other San Diego Bay-dependent facilities.
- Minimize short term loss of use of shipyard and other San Diego Bay-dependent facilities.

2.6 PROJECT CHARACTERISTICS

The project addressed in this Program EIR is the implementation of Tentative CAO No. R9-2011-000, which requires that remedial actions be implemented within the Shipyard Sediment Site. Remedial actions may include dredging, capping, and/or natural recovery depending upon a number of factors, including levels of contamination in the sediment and site accessibility. The CAO determined that dredging and disposal of sediments is the proposed remedy for approximately 15.2 acres of the site and is expected to generate approximately 143,400 cubic yards of contaminated marine sediment. The CAO also indicate that if cleanup criteria for chemical constituents of concern in the sediments cannot be attained by dredging (for example, contaminants extend more deeply than anticipated or there is an obstacle due to a hard substrate) some dredge areas may be capped in-place with sand. In addition to the 15.2 acres targeted for dredging, approximately 2.3 acres of the project site are inaccessible or under-pier areas that will be remediated by one or more methods other than dredging, most likely by sand capping.

There are two scheduling options for completion of the remedial action. The first scheduling option is expected to take 2 to 2.5 years to complete. Under this option, the dredging operations would occur for 7 months of the year and would cease from April through August during the endangered California least tern breeding season.

The second option is to implement the remedial plan with continuous dredging operations, which would be expected to take approximately 12.5 months to complete. This scenario assumes that the dewatering, solidification and stockpiling of the materials would occur simultaneously and continuously with the dredging. Also assumed under this compressed schedule option is that dredging operations could proceed year-round, including during the breeding season of the endangered California least tern, which ranges from April through August of each year.

Both scheduling options would be followed by a period of post-remedial monitoring. The preferred schedule will be determined during the final design phase. However, both schedule options are included in the analysis for the technical studies and Program EIR.

The project includes the dredging and/or capping of the contaminated soils; vessel transport to shore; dewatering, stockpiling and testing of dredged materials at a landside staging location; and truck transport of dredge materials to the appropriate landfill disposal facility. Each of these components is further described below.

Dredging and Capping Operations

The project involves environmental dredging which, unlike navigational or construction dredging, is performed specifically for the removal of contaminated sediment while minimizing the spread of contaminants to the surrounding environment during dredging operations. The proposed project includes the dredging and removal of approximately 143,400 cubic yards of contaminated sediment from the Shipyards Sediment Site. The cubic yard amount was identified in the CAO and includes a one foot over-dredge assumption.

Silt curtains and/or air curtains will be placed around the dredge area, including the dredge barges. The silt curtain will consist of a geotextiles fabric curtain with a floatation boom at the upper hem and ballast weights at the lower hem. The silt curtain will act as a physical barrier that will limit access to the portions of the site where the dredging operations are occurring. The silt curtain will also contain any resuspended particles from migrating outside of the active dredging area. Air curtains may be used in conjunction with silt curtains to contain resuspended sediment, to enhance worker safety, and allow barges to transit into and out of the work area without the need to open and close silt curtain gates. Air curtains are formed by laying a perforated pipe along the mudline and pumping air continuously through the piping. The upwelling of the tiny bubbles to the surface of the water prevents fine-grained sediments from passing across the line of the pipe.

It is anticipated that the dredging would utilize a derrick barge equipped with a closed environmental bucket such as the Cable Arm® Environmental Clamshell in order to maintain water quality. The dredge material will be placed on material barges and transported with the help of tug boats to a landside staging area. All barges will be outfitted with a water recovery system to collect the water deposited on the barges during dredging operations; the objective is to ensure that no water collected during the operations re-enters the Bay.

Due to the presence of infrastructure, such as piers and pilings, dredging is constrained in several locations within the project site. Therefore, contaminated areas under piers and pilings will be remedied through subaqueous, or in-situ, capping. In-situ capping is the placement of clean material on top of the contaminated sediment. The capping material is typically clean sand, silty to gravelly sand, and/or armoring material. Effective capping requires sufficient cap thickness, careful cap placement to avoid disturbance, and maintenance to ensure cap integrity from future disturbances. Sand capping would involve the transport of capping material to the site (possibly via truck or barge) and placement of the materials over contaminated sediment. The capping operations will require a materials barge outfitted with a stone slinger truck, hoppers, and conveyors to move and place the capping materials over the contaminated marine sediments.

Onshore Dewatering and Treatment

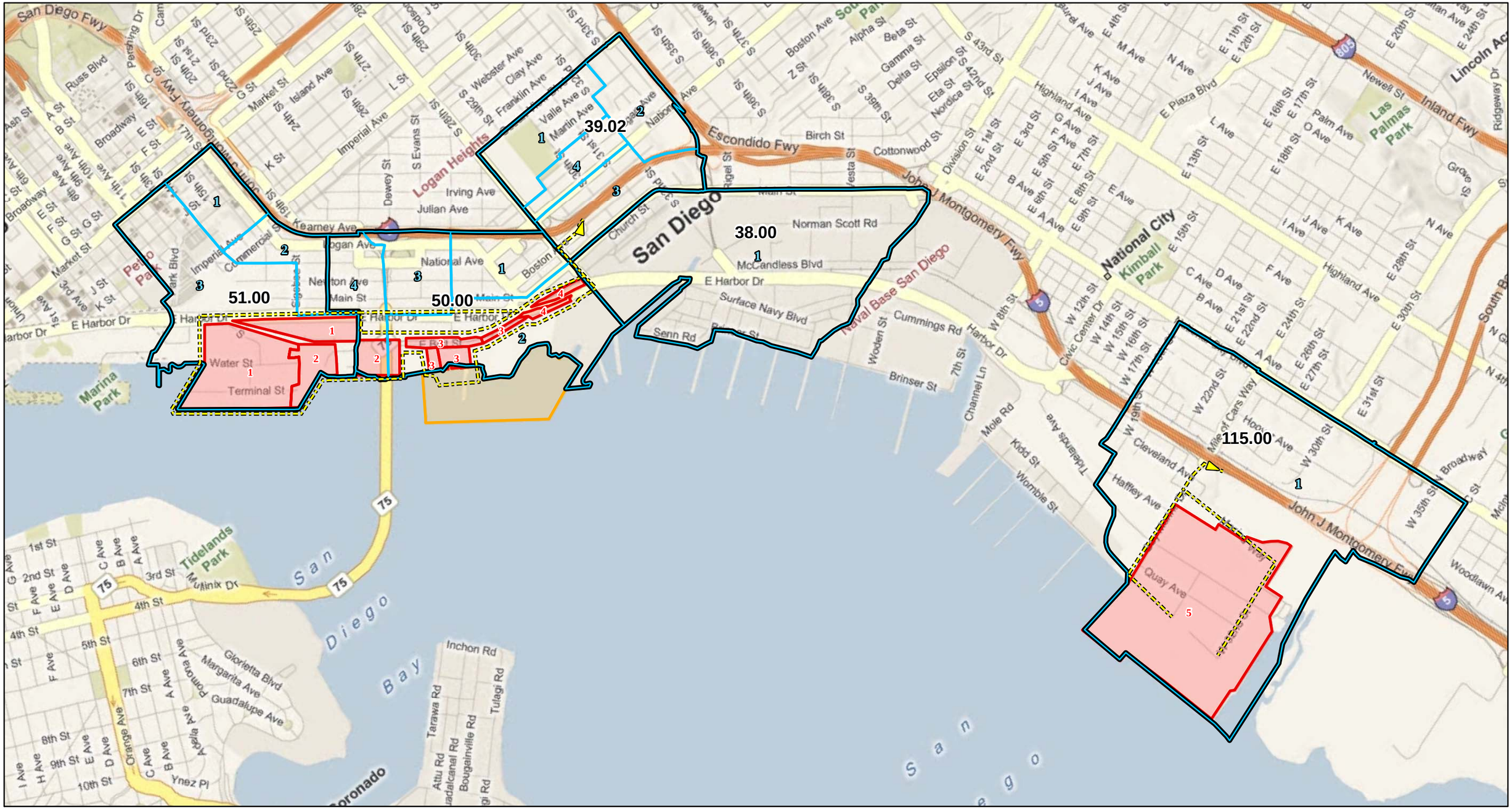
The proposed project requires a landside sediment management site with sufficient space and access to stockpile, dewater, and transport the removed dredge material. Although the exact area required for sediment management will be determined during the final design phase, it is estimated that 2 to 2.5 acres would be required. Five potential staging areas have been identified.

The staging area will require site preparation and construction of a pad. The site will be graded and compacted (if necessary) and a sealing liner will be put in place. An asphalt pad will then be constructed. The drying area will be surrounded by k-rails and sealed with foam and impervious fabric to form a confined area.

The dredged sediment, depending upon physical characteristics, will either be off-loaded from the materials barge by an excavator and put into dump trucks for placement in the staging area or treated with pozzilonics in the barge, then off-loaded into trucks for placement in the staging area for curing and sampling. In either event, the sediment will then be mixed with a cement-based reagent (pozzilonics) to accelerate the drying. The sediment will be spread out and rotated frequently to further accelerate the drying process. The drains located in the drying area will be isolated from the rest of the stormwater system at the site. If the excess water from the drying area does not meet industrial wastewater permit requirements, and cannot be discharged into the City sewage system, the water will be dealt with as contaminated waste and removed from the site by a licensed waste hauler. All collected water will be tested and disposed of in accordance with local, state, and federal requirements. After drying, soil sampling will be conducted and all dredged material will be loaded directly onto trucks for disposal at an approved upland landfill.

Transportation and Disposal

Once the dredge materials have been dried and tested, they will be loaded onto trucks for disposal at an approved landfill. Based on input from the Shipyards, it has been assumed that 85 percent of the material will be transported from the staging area to Otay Landfill, approximately 15 miles southeast of the Shipyard Sediment Site. Trucks departing from potential Staging Areas 1 through 4 would access the I-5 south via E. Harbor Drive and 28th Street; trucks departing from Staging Area 5 would access the I-5 south either directly from Bay Marina Drive or from W. 32nd Street to Marina Way to Bay Marina Drive. The preferred route to Otay Landfill is via I-5 south to Highway 54 east, to I-805 south (Figure 8). Although the sediment is not known to be classified as California hazardous material, it will be tested upon removal and prior to disposal. It is assumed for the purposes of this study that up to 15% of the material will require transport to a Class III facility, most likely the Kettleman Hills Landfill in Kings County, California, near Bakersfield. Based on the excavation quantity of 143,400 cubic yards, and accounting for an additional 15 percent of bulk material due to the dewatering and treatment process, it is estimated that up to 250 truck



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LEGEND

- Census Tracts
- Census Block Groups
- Potential Sediment Staging Areas
- Shipyard Sediment Project Site
- Potential Haul Routes

0 1000 2000
FEET

SOURCE: Bing Maps (2008), U.S. Census Bureau (2000)

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FIGURE 8

San Diego Sediment Project

Study Area Census Tracts and Haul Routes

trips per week could be required over an approximately 12.5 month period to remove the material. The total quantity of treated sediment to be hauled is approximately 164,910 cy. The total number of trips is estimated to be 13,500 trips, with approximately 12–13 cy/trip. These estimates will be finalized during the design phase.

2.7 METHODOLOGY RELATED TO NOISE IMPACT ASSESSMENT

Evaluation of noise impacts associated with a proposed project typically includes the following:

- Determine the short-term construction noise impacts on on-site and off-site noise-sensitive uses with industry-recognized noise emission levels for construction equipment
- Determine the long-term operational noise impacts, including vehicular traffic and aircraft activities, on on-site and off-site noise-sensitive uses
- Determine the required mitigation measures to reduce short-term and long-term noise impacts from all sources

2.8 CHARACTERISTICS OF SOUND

Sound is increasing to such disagreeable levels in our environment that it can threaten our quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that result in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale (i.e., dBA) to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. For example, 10 decibels (dB) are 10 times more intense than 1 dB, 20 dB are 100 times more intense, and 30 dB are

1,000 times more intense. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source such as highway traffic or railroad operations, the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. However, the predominant rating scales for human communities in the State of California are the Equivalent-Continuous sound level (L_{eq}) and Community Noise Equivalent (CNEL) based on A-weighted decibels (dBA). L_{eq} is the total sound energy of time-varying noise over a sample period. CNEL is the time-varying noise over a 24-hour period, with a weighting factor of 5 dBA applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and with a weighting factor of 10 dBA from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). The noise adjustments are added to the noise events occurring during the more sensitive hours. Day-night average noise (L_{dn}) is similar to the CNEL but without the adjustment for nighttime noise events. CNEL and L_{dn} are normally exchangeable and within 1 dB of each other. Other noise-rating scales of importance when assessing annoyance factor include the maximum noise level, or L_{max}, and percentile noise exceedance levels, or L_N. L_{max} is the highest exponential time-averaged sound level that occurs during a stated time period. It reflects peak operating conditions and addresses the annoying aspects of intermittent noise. L_N is the noise level that is exceeded "N" percent of the time during a specified time period. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the lowest noise level experienced during a monitoring period. It is normally referred to as the background noise level.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise

exposure in excess of 75 dBA increasing body tensions and thereby affecting blood pressure, functions of the heart, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. Dizziness and loss of equilibrium may occur between 160 and 165 dBA. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table A lists "Definitions of Acoustical Terms." Table B shows "Common Sound Levels and Their Sources." Table C shows "Land Use Compatibility for Exterior Community Noise" recommended by the California Department of Health, Office of Noise Control.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, 1991.

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Baseline
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc., 1998.

Table C: Land Use Compatibility for Exterior Community Noise

Land Use Category	Noise Range (L_{dn} or CNEL), dB			
	I	II	III	IV
Passively-used open spaces	50	50–55	55–70	70+
Auditoriums, concert halls, amphitheaters	45–50	50–65	65–70	70+
Residential: low-density single-family, duplex, mobile homes	50–55	55–70	70–75	75+
Residential: multifamily	50–60	60–70	70–75	75+
Transient lodging: motels, hotels	50–60	60–70	70–80	80+
Schools, libraries, churches, hospitals, nursing homes	50–60	60–70	70–80	80+
Actively used open spaces: playgrounds, neighborhood parks	50–67	—	67–73	73+
Golf courses, riding stables, water recreation, cemeteries	50–70	—	70–80	80+
Office buildings, business commercial and professional	50–67	67–75	75+	—
Industrial, manufacturing, utilities, agriculture	50–70	70–75	75+	—

Source: Office of Noise Control, California Department of Health, 1976.

Noise Range I—Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Noise Range II—Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Noise Range III—Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Noise Range IV—Clearly Unacceptable: New construction or development should generally not be undertaken.

CNEL = community noise equivalent level
dB = decibels
L_{dn} = day-night average noise level

3.0 SETTING

3.1 SENSITIVE LAND USES IN THE PROJECT VICINITY

Certain land uses are considered more sensitive to noise than others. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The sensitive land uses within the vicinity of the proposed project include Cesar Chavez Park located adjacent to Staging Areas 1 and 2, the single family residences along Main Street approximately 300 feet from Staging Area 4, and the multifamily residences adjacent the haul route along 28th Street.

3.2 OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities. Traffic on Interstate 5 (I-5), Harbor Drive, and other local arterials, along with operations within the shipyard and train yard are the dominant sources contributing to area ambient noise levels.

3.3 THRESHOLDS OF SIGNIFICANCE

A project will normally have a significant noise-related effect if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the criteria in the City of San Diego's Progress Guide and General Plan (which are summarized in Significance Determination Thresholds, CEQA, City of San Diego Development Services Department, Land Development Review Division, Environmental Analysis Section, 2007) and Section 12.10 of the City of National City's Municipal Code.

3.3.1 City of San Diego

City of San Diego Progress Guide and General Plan, CEQA Significance Determination Thresholds. The City has adopted the following applicable significance threshold:

- Temporary construction noise that exceeds 75 dBA $L_{eq}(1)$ at a sensitive receptor would be considered significant. Construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m. In addition, construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with the exception of Columbus Day and Washington's Birthday,

or on Sundays, that would create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator in conformance with San Diego Municipal Code Section 59.5.0404.

3.3.1 City of National City

City of National City Noise Control Ordinance. Section 12.10.160 states that it is unlawful to operate or to allow or cause the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays. In addition, noise from construction or demolition activities shall not exceed the maximum noise levels listed in Table D.

Table D: Construction Noise Thresholds (dBA, L_{max})

	Type I Areas - Residential	Type II Areas – Semi-Residential/Commercial
Mobile Equipment	75	85
Stationary Equipment	60	70

Source: City of National City, Municipal Code, 2011.

4.0 IMPACTS AND MITIGATION MEASURES

4.1 SHORT-TERM CONSTRUCTION-RELATED IMPACTS

4.1.1 Short-Term Construction-Related Noise Impacts

Two types of short-term noise impacts would occur during project construction. The first is the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The pieces of heavy equipment to be utilized during construction will be moved to the site and remain for the duration of each construction phase. The increase in traffic flow on the surrounding roads due to construction traffic is expected to be small. The project would add up to 100 daily truck trips to either 28th Street or Bay Marina Drive, less than 2 percent of the existing traffic volumes. The associated increase in long-term traffic noise will not be perceptible. However, there will be short-term intermittent high noise levels associated with trucks passing by from the project site.

The second type of short-term noise impact is related to the noise generated by heavy equipment operating within the project area. The proposed project will be divided into multiple phases throughout project area. The activities that will occur during these phases will include:

- Debris and Pile Removal
- Dredging of the Project Site
- Landside Staging Area – Pad Construction
- Landside Staging Area – Operations
- Covering of Sediment Near Structures

The following construction equipment will be required to complete the above tasks:

- Bulldozers
- Loaders
- Tug Boats
- Excavators
- Trucks
- Cranes
- Paving Equipment

- Rollers
- Rock Slingers
- Barges

Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table E lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor.

Table E: Typical Construction Equipment Noise Levels

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81–96	93
Rock Drills	83–99	96
Jackhammers	75–85	82
Pneumatic Tools	78–88	85
Pumps	74–84	80
Scrapers	83–91	87
Haul Trucks	83–94	88
Cranes	79–86	82
Portable Generators	71–87	80
Rollers	75–82	80
Dozers	77–90	85
Tractors	77–82	80
Front-End Loaders	77–90	86
Hydraulic Backhoe	81–90	86
Hydraulic Excavators	81–90	86
Graders	79–89	86
Air Compressors	76–89	86
Trucks	81–87	86

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman, 1987.
dBA = A-weighted decibels
ft-lb/blow = foot-pounds per below

The following sensitive land uses are located within the vicinity of the proposed construction activities.

Cesar Chavez Park. Cesar Chavez Park is located approximately 75 feet from the edge of Staging Area 2 and 250 feet from the edge of Staging Area 1. Mobile equipment within Staging Area 2 would operate from 75 to 800 feet from Cesar Chavez Park. Standard construction equipment that would generate up to 86 dBA L_{max} at a distance of 50 ft would be required within the staging areas. Multiple construction equipment operating at the same time typically generates noise levels of up to 91 dBA L_{max} at 50 feet. The noise level from activities within Staging Area 2 would range from 67 to 87 dBA L_{max}. Mobile equipment within Staging Area 1 would operate from 250 to 2000 feet from Cesar Chavez Park. The noise level from activities within Staging Area 1 would range from 59 to 77 dBA L_{max}. Due to the size of the staging areas and the intermittent nature of the on-site activities, the 12 hour average noise level is not expected to exceed the City's 75 dBA L_{eq} threshold.

Residential Developments. The closest residences within the City of San Diego to the staging areas are the single-family residences along Main Street. These residences are located at a distance of approximately 300 feet from Staging Area 4. Mobile equipment within Staging Area 4 would operate within 300 to 800 feet of these residences. Noise levels from construction activities within Staging Area 4 would range from 67 to 75 dBA L_{max}. As the maximum noise level is projected to be 75 dBA or lower, the 12 hour average noise level would not exceed the City's 75 dBA L_{eq} threshold.

The closest residences within the City of National City to the staging areas are the single-family residences along Cleveland Avenue. These residences are located at a distance of approximately 750 feet from Staging Area 5. Mobile equipment within Staging Area 5 would operate within 750 to 3,500 feet of these residences. Noise levels from construction activities within Staging Area 5 would range from 54 to 67 dBA L_{max}. These noise levels would not exceed the City of National City's 75 dBA L_{max} threshold.

4.2 LONG-TERM NOISE IMPACTS

Long-term noise impacts are associated with any change in permanent use of the project site by on-site stationary and off-site mobile sources. The proposed project would not result in any increase in long-term on-site stationary or off-site mobile sources. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels in the project vicinity, and impacts related to long-term operational noise sources are less than significant.

4.3 MITIGATION MEASURES

4.3.1 Construction Impacts

A. The City of San Diego Noise Control Officer shall ensure that construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day,

or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with the exception of Columbus Day and Washington's Birthday, or on Sundays, that would create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator in conformance with San Diego Municipal Code Section 59.5.0404.

B. The City of National City Noise Control Officer shall ensure that construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on weekends or holidays as specified in Section 12.10.160 of the City of National City Municipal Code.

C. The following measures can be implemented to reduce potential construction noise impacts on nearby sensitive receptors:

   1. During all site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

   2. The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

   3. The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

4.3.2 Level of Significance after Mitigation

The mitigation measures identified above would reduce temporary construction-related noise impacts to below a level of significance.

5.0 REFERENCES

Bolt, Beranek & Newman. 1987. Noise Control for Buildings and Manufacturing Plants.

City of San Diego, California Environmental Quality Act Significant Thresholds, January 2007.

City of San Diego, Municipal Code Noise Abatement and Control Ordinance.

City of San Diego, Noise Element of the City of San Diego Progress Guide and General Plan.

Federal Highway Administration. 1977. Highway Traffic Noise Prediction Model, FHWA RD-77-108.

United States Environmental Protection Agency (EPA). 1978. Protective Noise Levels: Condensed Version of EPA Levels Document.

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