Prepared for

San Diego Regional Water Quality Control Board
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Water Quality

Technical Report

Shipyard Sediment Remediation Site
San Diego Bay, San Diego, CA

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1. INTRODUCTION

The proposed project is the dredging of sediment adjacent to shipyards in the San Diego Bay, the dewatering and possible solidification of the dredged material on-shore, potential treatment of decanted water and subsequent disposal to the San Diego Publically Owned Treatment Works (POTW), 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 (CAO) issued by the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board). The San Diego Water Board is the Lead Agency under the California Environmental Quality Act (CEQA) for the proposed project. The dredging will occur in an area of the Bay defined in the Tentative CAO. The San Diego Water Board is considering the use of one or more staging sites for the dewatering and treatment of the dredged material, as further described in this project description. The sediment remediation footprint and the optional staging sites comprise the project site for the purpose of this study.

This report evaluates the potential water quality impacts from dredging and dewatering activities that may include turbidity, potential for contaminant release, discharge of elutriate water from the barge, and discharge of water from the upland dewatering staging area(s). Mitigation measures are proposed to reduce impacts to water quality from the proposed actions to less than significant. The baseline characteristics of the site are based primarily on previous investigations which have been performed in the project area to define the extents of environmental impacts. These investigations are available for review at the San Diego Water Board offices.

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. 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 this technical study.

1.1 Project Location

The sediment removal 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). 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 three leaseholds on the east (San Diego Gas & Electric Co., and 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 (also referred to as the Proposed Remedial Footprint in the Draft Technical Report for Tentative CAO) is comprised of approximately 15.2 acres subject to dredging and 2.3 acres subject to clean sand cover, primarily under piers. The project consists of marine sediments in the bottom bay waters that contain elevated levels of pollutants above San Diego Bay background conditions.

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 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 presented in Figure 2 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 Systems /BAE Systems 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)

1.2 Report Organization

The remainder of this report is organized as follows:

- Section 2, Existing Environmental Setting, presents the water quality-related regulatory setting, and background information on the current site conditions, including contaminated sediments in the remediation area and potential sediment staging areas identified for dewatering;

- Section 3, Project Impacts and Mitigation Measures, presents a summary of potential impacts and recommended mitigation measures for each impact; and

- Section 4, Cumulative Impacts, presents an evaluation of potential incremental impacts related to water quality that may be anticipated when the proposed project is conducted to other closely related past, present and reasonably foreseeable projects in the vicinity of the project site.

2. EXISTING ENVIRONMENTAL SETTING

This section describes the water quality-related regulatory requirements and environmental setting of the project, which includes the current existing contamination at the Shipyard Sediment Site.

2.1 Regulatory Setting

Clean Water Act. The Clean Water Act (CWA) is a comprehensive piece of legislation that generally includes reference to the Federal Water Pollution Control Act. Overall, the CWA seeks to protect the nation's water from pollution by setting water quality standards for surface water and by limiting the discharge of effluents into waters of the United States. These water quality standards are enforced by the U.S. Environmental Protection Agency (EPA). The CWA also provides for development of municipal and industrial wastewater treatment standards and a permitting system to control wastewater discharges to surface waters. The CWA is the primary federal statute governing the discharge of dredged and/or fill material into waters of United States. Relevant sections include the following:

- **Section 404.** The United States Army Corps of Engineers (ACOE) regulates discharge of dredged or fill material into waters of the United States under Section 404 of the CWA. Activities requiring Section 404 permits are limited to discharges of dredged or fill materials into the waters of the United States. The proposed project will require a 404 Permit from the ACOE for the discharge of dredged and fill materials from and into San Diego Bay.

- **Section 401.** Section 401 of the CWA specifies that any applicant for a federal license or permit to conduct any activity, including but not limited to the construction or operation of facilities that may result in any discharge into navigable waters, shall provide the federal licensing or permitting agency a certification from the State in which the discharge originates or will originate from the State agency with jurisdiction over those waters (San Diego Water Board) that the project will comply with water quality standards, including beneficial uses, water quality objectives, and the State Antidegradation Policy (State Water Resources Control Board Resolution No. 68-16). The proposed project will require a 401 Permit in order to obtain the 404 Permit from the ACOE for the disposal of dredged materials from San Diego Bay and for the discharge of clean sand cover fill to San Diego Bay.

- **Section 303(d).** Section 303(d) of the CWA requires identifying and listing those water bodies that are water quality impaired. Once a water body has been deemed impaired, a total maximum daily load (TMDL) must be developed for each impairing water quality constituent. A TMDL is an estimate of the total load of pollutants from point, nonpoint, and natural sources that a water body may receive without exceeding applicable water quality standards (often with a "factor of safety" included, which limits the total load of pollutants to a level well below that which could cause the standard to be exceeded). Once established, the TMDL is allocated among current and future dischargers into the water body. The receiving water for the project site, as described in greater detail below, is 303(d) listed and is considered impaired for specific constituents.

Rivers and Harbors Act. Section 10 of the Rivers and Harbors Act requires authorization from the ACOE for the construction of any structure in or over any navigable water of the United States, the excavation/or deposition of material in these waters, or any obstruction or alteration in "navigable water." The proposed project will require a Section 10 Permit from the ACOE for the disposal of dredged material.

Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 requires authorization from the ACOE for the transportation of dredged material for the purpose of disposal in the ocean, where it is determined that the disposal will not unreasonably degrade or endanger human health, welfare, or amenities; the marine environment or ecological systems; or economic potentialities. A Section 103 permit will not be required because the material is planned to be disposed at an upland landfill. However, if material was tested and found to be suitable for open water ocean disposal, and an ocean plan was approved by the San Diego Water Board, a Section 103 permit would be required.

Porter-Cologne Water Quality Control Act. The federal CWA places the primary responsibility for the control of water pollution and for planning the development and use of water resources within the states, although it does establish certain guidelines for states to follow in developing their programs.

California's primary statute governing water quality and water pollution is the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Resources Control Board (State Water Board) and the Regional Water Quality Control Boards (Regional Water Boards) broad powers to protect water quality and is the primary vehicle for implementation of California's responsibility under the federal CWA. The Porter-Cologne Act grants the State Water Board and Regional Water Boards the authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater, to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, oil, or petroleum product.

California Ocean Plan. The State Water Board has adopted a Water Quality Control Plan (WQCP) for ocean waters of California called the California Ocean Plan. With the exception of wildlife habitat, the Ocean Plan identifies the same beneficial uses as the WQCB for the San Diego Basin (Basin Plan). The Ocean Plan has similarly established water quality objectives for bacteriological, physical, chemical, radioactive, and biological characteristics. The Ocean Plan also incorporates general requirements for the management of wastes discharged directly into the ocean, effluent quality requirements for waste discharges directly into the ocean, discharge prohibitions, and general provisions. The Ocean Plan is incorporated by reference into the Basin Plan.

Water Quality Control Plan for the San Diego Basin. The Basin Plan is designated to preserve and enhance water quality and protect the beneficial uses of all regional waters (San Diego Water Board, 1994). The Basin Plan is the State implementation of the Federal the Clean Water Act provisions for water quality planning and management contained in 40 CFR 130 and 40 CFR 131. Division 7 of the California Water Code (the Porter-Cologne Act) establishes a regulatory program to protect water quality and to protect beneficial uses of state waters (San Diego Water Board, 1994).

Clean Water Act, Section 303, List of Water Quality Limited Segments. Section 303(d) specifically requires the State to develop a list of impaired water bodies and subsequent numeric TMDLs for whichever constituents impair a particular water body. These constituents include inorganic and organic chemical compounds, metals, sediments, and biological agents. The TMDL is the total amount of a constituent that can be discharged while meeting water quality objectives and protecting beneficial uses. It is the sum of the individual load allocations for point-source inputs (e.g., an industrial plant), load allocations for nonpoint-source inputs (e.g., runoff from urban areas), and natural background, with a margin of safety (San Diego Water Board 2002).

NPDES General Construction Permit. Pursuant to the CWA Section 402(p), which requires regulations for permitting of certain stormwater discharges, the shipyards will require a statewide general NPDES Permit for stormwater discharges from the sediment dewatering staging areas. Under this Construction General Permit, stormwater discharges from construction sites with a disturbed area of one or more acres are required to either obtain individual NPDES permits for storm water discharges or be covered by the Construction General Permit. Coverage under the Construction General Permit is accomplished by completing and filing a Notice of Intent (NOI) with the San Diego water Board. Each Applicant under the Construction General Permit must ensure that a Stormwater Pollution Prevention Plan (SWPPP) is prepared prior to preparing the staging area(s), and is implemented during construction. The primary objective of the SWPPP is to identify, construct, implement, and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site.

General Waste Discharge Requirements for Construction Non-Storm Water Discharges. General Waste Discharge Requirements (WDRs) (Dewatering General Permit) will be issued by the San Diego Water Board, which governs non-storm water, construction-related discharges from activities associated with the upland dewatering staging areas. This permit addresses discharges from activities such as dewatering, water line testing, and sprinkler system testing. The discharge requirements include provisions mandating notification, testing, and reporting of dewatering and testing-related discharges. The General WDRs authorize such construction-related discharges so long as all conditions of the permit are fulfilled.

2.2 Regional Site Conditions

San Diego Bay is a naturally formed, crescent-shaped embayment. It is separated from the Pacific Ocean by Silver Strand Peninsula, a long, narrow sand spit that extends from the City of Imperial Beach to North Island. The mouth of San Diego Bay is about 0.6 mile wide, and is aligned north-to-south between Point Loma and Zuniga Point. From the mouth of the Otay River to the tip of Point Loma, San Diego Bay is about 15 miles long, and varies from 0.2 to 3.6 miles in width. It is 17 square miles in area at Mean Lower Low Water (Wang et al. 1998). The outer half of San Diego Bay is narrow, averaging about 0.6 to 1.2 miles, while the inner half is much wider, averaging about 2.0 to 2.4 miles.

Prior to major filling activities, which began in 1888 and intensified just before and during World War II, San Diego Bay had an area of 21 to 22 square miles, as defined by the mean high tide line of 1918. About six square miles of San Diego Bay, or about 27 percent, have been filled, based on this high tide line (Smith 1976). Only 17 to 18 percent of the original San Diego Bay floor remains undisturbed by dredge or fill (Smith 1976).

Several major freshwater basins drain into San Diego Bay. These basins include the Sweetwater River, which drains to the south-central portion of San Diego Bay; Chollas Valley, which drains to the central portion of the Bay; and Otay River and Telegraph Canyon, which drain to southern San Diego Bay. In the winter, when San Diego County receives most of its precipitation, fresh water enters San Diego Bay via storm drains, urban runoff, streams, and flood control channels. In the summer, freshwater flows into San Diego Bay are minimal, and evaporation of water from the surface of the Bay increases. San Diego Bay is an “inverse” embayment, where evaporation exceeds freshwater inputs, creating a net inflow of ocean water.

Tides in San Diego Bay are classified as mixed diurnal/semi-diurnal, with the semidiurnal component dominant (Largier 1995). Generally, the tides in San Diego Bay consist of two low and two high tides per day on an approximately two-week, spring-neap tidal cycle that is associated with the phase of the moon. Tides do not follow a 24-hour cycle, so some days experience only three of the four tides within the calendar day.

Tidal exchange in San Diego Bay exerts control over the flushing of contaminants, salt and heat balance, and residence time of water (Chadwick 1997). The ebb and flood of tides mix ocean and San Diego Bay waters. Tides produce currents, induce changes in salinity, and alternately expose and wet portions of the shoreline. Tidal flushing and mixing are important for dispersing pollutants, maintaining water quality, and moderating water temperature that has been affected by exchange with the atmosphere or heating.

Primarily, water quality in north-central San Diego Bay is affected by tidal flushing and currents. Water quality also is influenced locally by freshwater inflows. Portions of San Diego Bay are listed as impaired water bodies under CWA Section 303[d] by the San Diego Water Board due to excessive concentrations of one or more contaminants (San Diego Water Board 2007). A total of 172 acres of San Diego Bay are designated as contamination hot spots, which are a management priority in the TMDL process. Hot spots are identified as having toxic sediments and degraded benthic communities, due to both point and non-point sources.

The 1997 National Sediment Quality Survey determined that San Diego Bay and offshore areas around San Diego appear to have the most significant sediment contamination within the EPA Region 9 (USEPA 1997). Major contaminants found in San Diego Bay include chlorinated hydrocarbons, polychlorinated biphenyls (PCBs), toxic components of petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), heavy metals, and organotins such as tributyltin (DoN 1998). The Shipyard Sediment Site is listed on the CWA Section 303[d] list as San Diego Bay Shoreline, between Sampson and 28th Streets.

Beneficial uses of surface waters are designated under the CWA Section 303[d] in accordance with regulations contained in 40 CFR 131. San Diego Bay, as listed in the Basin Plan, has multiple designated beneficial uses. These designations address water quality, not the apportioning or consumption of the available resources. These long-term beneficial uses include: industrial service supply (IND), shellfish harvesting (SHELL), commercial and sport fishing (COMM), contact water recreation (REC-1), non-contact water recreations (REC-2), estuarine habitat (EST), marine habitat (MAR), wildlife habitat (WILD), preservation of biological habitats of special significance (BIOL), Rare/Threatened/Endangered Species (RARE), navigation (NAV), spawning, reproduction, and/or early development (SPWN), and migration of aquatic organisms (MIGR). An adverse effect or impact on a beneficial use occurs where there is an actual or threatened loss or impairment of that beneficial use. The Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. The Pacific Ocean is the sole receiving water for the proposed project site. The long-term beneficial uses for the Pacific Ocean include: aquaculture (AQUA), IND, SHELL, COMM, REC-1, REC-2, MAR, WILD, BIOL, RARE, NAV, SPWN, and MIGR.

Water quality characteristics (e.g., salinity, temperature, and dissolved oxygen [DO]) form a gradient within San Diego Bay: waters in northern San Diego Bay being similar to ocean conditions; waters in southern San Diego Bay being strongly affected by shallow depths, fresh water inflows, and insulation; and waters in central San Diego Bay being intermediate in character. The turbidity (i.e., the amount of particulate matter in suspension in the water column) of San Diego Bay waters is affected by phytoplankton blooms; inputs of fine sediments from surface runoff during and after storms; and sediment resuspension by winds, waves, and human activities. Consequently, an increase in turbidity can limit light penetration and the level of primary production. Turbidity in San Diego Bay varies both temporally and spatially.

Data collected for the Bay Protection Toxic Cleanup Program (Fairey et al., 1996) were used to place portions of San Diego Bay on the CWA Section 303[d] list. The mouth of

Chollas Creek, which discharges just south of the NASSCO leasehold, is listed for sediment toxicity and benthic community degradation. Chollas Creek consists of freshwater flow with elevated suspended solids containing significant chemical pollutants. Chollas Creek was placed on the CWA Section 303[d] List of Water Quality Limited Segments in 1996 for the metals cadmium, copper, lead and zinc. On 29 June 2005 the San Diego Water Board adopted a TMDL for metals in Chollas Creek. Urban runoff discharges from the City of San Diego's Municipal Separate Storm Sewer System (MS4) are considered to be one of the leading causes of receiving water quality impairments in the Chollas Creek Watershed. The designated beneficial uses for Chollas Creek are defined as REC-1, REC-2, WILD, and Warm Freshwater Habitat (WARM).

The CWA 303[d] listing of San Diego Bay Shoreline at the mouth of Chollas Creek extends from the weir downstream of the Belt Street Bridge, bounded on the north by the NASSCO pier and to the south by the Naval Base San Diego (NBSD) Pier 1, and extends to the end of the piers. The estimated total area is 15 acres.

2.3 Project Site Conditions

The NASSCO and BAE Systems leaseholds, portions of which lie in the Shipyard Sediment Site, are adjacent to each other, have a similar range of water depths, and lie within the same hydrologic and biogeographic area. The total combined San Diego Bay water acres included in the NASSCO and BAE Systems leaseholds is approximately 56 acres.

There are multiple potential sources of contaminants to San Diego Bay in the region of the Shipyard Sediment Site including: past activities at the shipyards, storm water drains that discharge into the shipyard leaseholds, nonpoint surface water discharge through Chollas Creek, surface water runoff from the roadway between the properties, fill material added to the shoreline, and accidental releases from ships.

As mentioned above in the regional settings section, there are three major freshwater basins that drain into San Diego Bay. The Chollas Valley basin drains to the central portion of the Bay, through Chollas Creek, which is located just south of the Shipyard Sediment Site. Chollas Creek, placed on the CWA Section 303[d] List of Water Quality Limited Segments in 1996 for metals, is known to discharge a plume that blankets the Shipyard Sediment Site (Exponent 2003). The plume carries suspended particles, and because of the high affinity of contaminants for particles, most of the toxic chemicals in the plume are likely to be attached to these suspended particles.

All of these sources can contribute toxic chemicals to the shipyard leaseholds and adjoining bay areas, thereby degrading overall water quality.

3. PROJECT IMPACTS AND MITIGATION MEASURES

This section outlines potential impacts and mitigation measures to be implemented based on information presented in the Tentative CAO and a general understanding of the marine environment in San Diego Bay. The potential water quality impacts to be evaluated for the project are from dredging, unloading of dredged material to onshore dewatering area, onshore dewatering, and under pier clean sand cover.

The San Diego Water Board identified constituents of primary concern (primary COCs), which are associated with the greatest exceedance of background and highest magnitude of potential risk at the Shipyard Sediment Site (San Diego Water Board 2010). A greater concentration relative to background suggests a stronger association with the Shipyard Sediment Site, and a higher potential for exposure reduction via remediation. Secondary contaminants of concern (secondary COCs) are contaminants with lower concentrations relative to background, and are highly correlated with primary COCs and would be addressed in a common remedial footprint. Based on these criteria, the primary COCs for the Shipyard Sediment Site are copper, mercury, HPAHs, PCBs, and Tributyltin (TBT), and the secondary COCs are arsenic, cadmium, lead, and zinc.

The potential water quality impacts to be evaluated for the project are from dredging, unloading of dredged material to onshore dewatering area(s), onshore dewatering, and under pier clean sand cover. These activities could lead to increased turbidity due to resuspension of sediment and release of primary and secondary COCs into the water column. In order to preserve and enhance water quality and protect the beneficial uses in the Bay, the potential impacts to water quality will be mitigated to meet the sediment and water quality objectives as defined in the Tentative CAO and the Basin Plan.

3.1 <u>Project Characteristics</u>

The shipyard site sediments are known to contain both primary and secondary COCs; therefore, water quality could be degraded during dredging and barge loading, resulting in potentially significant impacts to beneficial uses in San Diego Bay. The release of COCs from resuspended particulate material will be re-deposited and some resuspended contaminants may also dissolve into the water column and be available for uptake by biota.

Sediments are resuspended not only from the dredge bucket, but also by other mechanisms associated with dredging such as spillage, prop wash, and anchor systems.

Chemical release can occur when bed sediments are suspended in the water column and increased turbidity can itself degrade acceptable levels of habitat quality for organisms in the water column. Re-deposition may occur near the dredge area or, depending on the environmental conditions and controls, resuspended sediment may be transported to other locations in the water body. Further, sediment dredging activities are planned such that a sufficient volume of contaminated sediment is removed; however, removing all particles of contaminated sediment is neither practical nor feasible.

The impacts to water quality during the project as a result of resuspension of contaminated sediments and release of COCs from resuspended contaminated sediments are the following:

- Decrease in DO;
- Changes in pH;
- Turbidity (i.e., decrease in water clarity); and
- Toxicity to aquatic receptors.

In the event that one of more of these impacts described above occurs during the project, impairment and/or degradation to beneficial uses in San Diego Bay are possible. Potential impacts to water quality and measures to mitigate these impacts are discussed in the sections below.

3.2 Dredging Operations

There are two scheduling options for completion of the remedial action. The first scheduling option would occur for 7 months of the year and is expected to take 2 to 2.5 years to complete. The second scheduling option is continuous dredging operations expected to take approximately 12.5 months. Regardless of the selected scheduling option, sediment removal efforts will be followed by a period of post-remedial monitoring activities. The post-remediation monitoring requirements are part of the proposed project and are not mitigation for the remediation efforts.

Sediment will be dredged by mechanical means using an environmental clamshell bucket, such as the Cable Arm Environmental Clamshell®, and placed into sealed barges. Once filled, barges will be moved to an onsite pier or offsite staging area(s) within San Diego Bay identified by the San Diego Water Board. Prior to sediment unloading, a concrete-based reagent may be added to the sediment load in the barge to facilitate its dewatering and drying. The material will then be unloaded using a large track excavator equipped with a standard bucket and transferred to an onshore dewatering area to dry in preparation for hauling offsite. Once sufficiently dewatered, the material will be loaded onto trucks and be hauled to either a solid waste or hazardous waste landfill, depending on its characteristics. Under pier clean sand cover operations will likely be performed after sediment removal operations are fully completed. Clean sand cover activities include hydraulic placement of sand from a barge or from shore.

Water quality may be temporarily degraded during dredging by excess turbid water leaking/spilling over barge barriers back into the Bay. Exposing deeper subsurface sediments with potentially higher concentrations of COCs to the water column could result in long-term degradation of water quality if these sediments were to be left in place. Water quality impacts associated with contaminated suspended solids would be associated with the remobilization of sediment-bound contaminants. COCs released into the water column can potentially be transported out of the area by wave action or tidal currents.

Dredging operations should be configured to limit the turbidity caused by the actual sediment removal. By reducing the amount of turbidity (i.e., increased suspended solids) in the water column caused by dredging, the water quality impacts related to the release of contaminants bound to the dredged sediments will also be reduced. Therefore, the following discussion assumes that the potential impacts to water quality due to the effects of dredging operations (turbidity and release of COCs) are mitigated by implementing operational controls and physical water quality control elements.

During sediment removal operations, dredging and barge loading will include the following conditions that may potentially lead to impacts to water quality:

- Oil and/or fuel discharges from mechanical equipment;
- Operator overfilling bucket;
- Debris preventing the dredge bucket from fully closing;
- Vessel propeller wash during barge repositioning;
- Damage (e.g., ripping) of silt curtain during dredging;

- Overloading of the dredged material barge(s); and
- Spillage during loading.

3.2.1 Operational Controls

Dredging operations, as related to the project, will involve the use of a barge-mounted crane equipped with an environmental bucket such as the Cable Arm Environmental Clamshell®. The Cable Arm Environmental Clamshell® is equipped with vertical side plates that reduce sediment loss during bucket closing, flatter sediment cut reducing the potential for sediment resuspension caused by potholes, and indicator switches at the four corners (i.e., left, right, top, bottom) of the clamshell seal. The switches are positioned in these locations to inform the operator if and where the bucket is failing to close. By using a Cable Arm Environmental Clamshell®, the loss of sediments during dredging activities is reduced; however, there will be minimal releases of suspended solids and resuspension of sediment to the water column during dredging operations.

The dredge operators should use automatic rather than manual monitoring of the dredging operations, which will allow continuous data logging with automatic interpretation and adjustments to the dredging operations for real-time feedback for the dredge operator. Automatic systems should also be used to monitor turbidity and other water quality conditions in the vicinity of the dredging operations to facilitate real-time adjustments by the dredging operators to control temporary water quality effects. The automatic systems should include threshold level alarms so that the operator or other appropriate project personnel recognize that a particular system within the operation has failed. This alarm notification will reduce impacts as it will immediately be identified resulting in a shut down or modification of the operations.

Considering that drying the sediment so that it can be hauled away is the most critical activity in the process of moving the sediments from the barge to the dewatering area and ultimately to the landfill, the effective removal without spillage of the water is of key importance to the project. The dredge contractor shall ensure that free waters from the dredging process (loading the dredge material barge and offloading dredged material to onshore) does not re-enter the Bay, as this will be strictly prohibited.

The dredge contractor shall implement standard BMPs for minimizing resuspension, spillage, and misplaced sediment during dredging operations, as the deposition of such material would increase turbidity and compromise cleanup efforts. Such BMPs should include:

- The contractor shall not stockpile material on the bottom of the bay floor and shall not sweep or level the bottom surface with the bucket. This operational control will minimize impacts of turbidity as well as migration of impacted sediment into the surrounding areas.

- The contractor shall use and maintain silt curtains that enclose the area of dredging and shall minimize the times in which these curtains are temporarily opened, to contain suspended sediments.

- The contractor shall ensure the bucket is entirely closed when withdrawn from the water and moved to the barge. This action requires extra attention when debris is present to make sure debris does not prevent the bucket from completely closing. Two closure switches shall be on each side of the bucket near the top and bottom to provide an electrical signal to the operator that the bucket is closed. Use of the switches will minimize the potential of sediment leaking from the bucket into the water column during travel to the surface.

- The contractor shall not overfill the digging bucket because overfill results in material overflowing back into the water. Use of instrumentation such as Clamvision® will allow the operator to visualize in real time the depth of cut which should be designed to prevent overfilling and minimize impact to the water column.

- The contractor shall utilize wide pocket material barges having watertight containments to prevent return water from re-entering the Bay. The contractor shall not overfill the material barge to a point where overflow or spillage could occur. Each material barge shall be marked in such a way to allow the operator to visually identify the maximum load point. The marking should allow sufficient interior free board to prevent spillage in rough water such as ship wakes during transit. Initiating the material barge marking will minimize impact of load spillage during transit to the unloading area.

- The contractor shall not use weirs as a means to dewater the scow and shall allow additional room for sediment placement. Preventing this action will minimize the introduction of turbidity to the water column.

- The contractor shall place material in the material barge such that splashing or sloshing does not occur, which could send sediment back into the water. Splashing can be controlled by restricting the drop height from the bucket. This operational control will minimize the introduction of sediment, in the form of turbidity, into the water column as well as the creation of a decontamination hazard on the surface of the material barges.

- The contractor shall not wash the bucket or material barge over areas that were previously dredged, as this action could re-contaminate those areas. This operational control will minimize re-contamination of previously dredged areas.

- If the use of a grate to collect debris is required, the contractor shall not allow material to pile up on the grid and flow or slip from the grid back into the water. The debris scalper shall be positioned in such a way as to be totally contained on the shore side of the unloading operations. The dredge operator will visually monitor for debris build-up and alert the support personnel on the barge to assist in clearing the debris, as necessary. Debris that is derived from dredging activities will be removed from the grate by the clamshell bucket and placed in a contained area on the dredge barge or in a second material barge for subsequent removal to the onshore dewatering facility.

- The contractor shall restrict barge movement and work boat speeds (i.e., reducing propeller wash) in the dredge area. The remedial design should identify the various areas where this operational control should be used. The use of this operational control will minimize the impact of resuspension into the water column by propeller wash.

Accidental oil or fuel spills that could potentially occur during the proposed dredging operations could impair and/or degrade water quality in the bay, depending on the severity of the spill. Such events are likely to be localized spills of lighter, refined diesel fuels, gasoline, and lubricating oils that are highly toxic to marine life. The potential for the occurrence of petroleum-product leaks or spills is low, but the potential for significant, long-term effect on marine resources is moderate to high.

As an operational control element, all oil and fuel shall be housed in a secondary containment structure to ensure if spilled or leaked it will be prevented from entering the water column. The inclusion and implementation of a Dredging Management Plan (DMP) containing Standard Operating Procedures (SOPs) for the project will assist the dredge contractor in preventing accidental spills and providing the necessary guidelines to follow in case of an oil or fuel spill. Together, these will reduce the potential for a significant long-term impact to less than significant. The DMP will include the following measures to prevent accidental oil/fuel spills during construction activities:

- Personnel involved with dredging and handling the dredged material will be given training on the potential hazards resulting from accidental oil and/or fuel spills. This operational control will provide the personnel with an awareness of the materials they are handling as well as the potential impact to the environment. This increased awareness will assist in minimizing impacts to the water column as a result of spills.

- All equipment will be inspected by dredge contractor personnel before starting the shift. These inspections are intended to identify typical wear or faulty parts that may contain oil or fuel. This operational control will minimize the potential of impacts during the operations by identifying potential impacts due to wear of important sub-systems.

- Personnel will be required to visually monitor for oil or fuel spills during construction activities. This operational control will minimize impacts associated with leaks or spills and will provide additional mitigation over the automatic systems identified above.

- In the event that a sheen or spill is observed, the equipment will be immediately shut down and the source of the spill identified and contained. Additionally, the spill will be reported to the applicable agencies presented in the DMP. This operational control will minimize impacts to the water quality both in volume and duration as the operations will be immediately shut down and the source of the impact will be identified and remedied.

- The shipyards currently have oil/fuel spill kits located at various locations onsite for routine ship repair operations. All personnel associated with dredging activities will be trained on where these spill kits are located, how to deploy the oil sorbent pads, and proper disposal guidelines. As an additional mitigation step, the dredging barge shall have a full complement of oil/fuel spill kits on board to allow for quick and timely implementation of spill containment.

- The use of oil booms will be deployed surrounding the dredging activities. In the event that a spill occurs, the oil and/or fuel will be contained within the oil boom boundary. This operational control will be the last line of defense against accidental oil/fuel spill occurrences. The oil boom shall be deployed along the entire length of the outer silt curtain.

In addition to providing SOPs to prevent accidental oil/fuel spills during construction activities, the DMP addresses several potential issues related to dredging and presents potential solutions. This includes the identification of dredging needs; a methodology and process for determining dredging priorities and scheduling; the feasibility and requirements for expedited permitting; Quality Assurance Protection Plan (QAPP) to comply with regulatory requirements; alternatives for control and operation of dredging equipment, and BMPs to implement in the event of equipment failure and/or repair.

Typical BMPs for equipment failure or repair include: communication to project personnel, proper signage and/or barriers alerting others of potentially unsafe conditions, all repair work shall be conducted on land and not over water, repair work involving use of liquids shall be performed with proper spill containment equipment (e.g., spill kit), and a contingency plan identifying availability of other equipment or subcontracting options. The use of operational controls will serve to mitigate this potential impact to water quality to less than significant. A regulatory oversight contractor may be used by the San Diego Water Board. The regulatory oversight contractor should be responsible for adherence to this operational control and such adherence should be verified by the San Diego Water Board.

3.2.2 Physical Water Quality Control Elements

3.2.1

3.2.2

3.2.2.1 Silt Curtains

As a supplemental protective measure, the contractor will also be required to institute physical water quality protection elements throughout the dredging process. The main physical measure used to contain the loss of suspended sediments from the dredging area will be the use of inner and outer boundary floating silt curtains deployed entirely around the dredging area at all times. Double silt curtains will be utilized for containment of the dredge area; configurations, technologies, and actual locations of silt curtains in relation to the dredge barge will be finalized during the design phase of the project. Figures 3 and 4 illustrate the two common configurations of dredge operations and silt curtains to minimize turbidity. Configurations shown in the figures are for illustrative purposes only.

The floating silt curtain will be comprised of connected lengths of Type III geotextile fabric. It is intended to supplement the operational controls described in the section above by helping to control and contain migration of (contaminated) suspended sediments at the water surface and at depth. This in turn will help protect surrounding submerged areas from accumulation of resuspended solids originating from the dredging work.

A continuous length of floating silt curtain will be arranged to fully enclose the dredging equipment and the scow barge being loaded with sediment. The silt curtain will be supported by a floating boom in open water areas (such as along the bayward side of the dredging areas). Along pier edges, the contractor will have the option of connecting the silt curtain directly to the structure. In either case, the contractor would be required to continuously monitor the silt curtain for damage, dislocation, or gaps and immediately fix any locations where it is no longer continuous or where it has loosened from its supports.

The bottom of the silt curtain shall be weighted with ballast weights or rods affixed to the base of the fabric. These weights are intended to resist the natural buoyancy of the geotextile fabric and lessen its tendency to move in response to currents. Extending the silt curtain further or all the way to the bay floor would be problematic and potentially counter-productive. This is because at lower tides the geotextile fabric would be in contact with sediments at the mudline, potentially folding up on the seabed; and when subsequently moved by current flow or lifted by rising tide it would cause increased sediment disturbance, generating an additional source of sediment resuspension and turbidity. Therefore, the floating silt curtain around the dredging unit will be deployed in a manner that includes a gap above the seafloor to allow for the tidal ranges and fluctuations, and to sufficiently allow for dredge operation. The outer silt curtain surrounding the remediation site shall be deployed in a manner dependent on site-specific conditions including, but not limited to, depth, current velocities, existing infrastructure for curtain deployment, and proximity of sensitive habitat (i.e., essential fish habitat).[1]

Where feasible and applicable, curtains will be anchored and deployed from the surface of the water to just above the substrate. If necessary, silt curtains with tidal flaps will be installed to facilitate curtain deployment in areas of higher flow. Additional curtains

[1] United States Army Corps of Engineers: Engineer Research and Development Center. 2008. Technical Guidelines for Environmental Dredging of Contaminated Sediments. ERDC/EL TR-08-29.

may be required by resource agencies to isolate environmentally sensitive areas like essential fish habitat and eelgrass.

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 has the effect of preventing fine-grained sediments from passing across the line of the pipe.

. The use of silt curtains will effectively contain the resuspension of suspended sediments and prevent the dispersal of COCs outside the dredging area to a less than significant impact. Monitoring of water quality outside the silt curtains is discussed below in Section 3.2.2.2.

3.2.2.2 Water Quality Monitoring

In addition to the deployment of silt curtains, another supplemental protective measure to reduce impacts to water quality is physical monitoring. The Tentative CAO indicates that monitoring during remedial activities is required. Post-remediation monitoring is also required to verify that remaining pollutant concentrations in the sediments will not unreasonably affect beneficial uses in San Diego Bay (See Section 3.6). The post-remediation monitoring requirements are part of the proposed project and are not mitigation for the remediation efforts. The Tentative CAO requires that, prior to beginning remediation efforts, a Remedial Monitoring Plan (RMP) will be required to describe the remediation and monitoring activities. The RMP, as it pertains to potential impacts to water quality during construction activities, will describe the following, consistent with the Tentative CAO:

- Water quality monitoring to demonstrate that implementation of the selected remedial activities does not result in violations of water quality standards outside of the construction area.

- Sediment monitoring to confirm that the selected remedial activities have achieved target cleanup levels within the remedial footprint.

Water quality compliance will be predicated upon the Water Quality Control Plan for the San Diego Basin (i.e., the Basin Plan) turbidity objectives (Chapter 3, page 30) and DO objectives (Chapter 3, page 22), and will have specific compliance criteria based on comparisons with ambient conditions within San Diego Bay. Dissolved oxygen levels shall not be less than 5.0 mg/l during dredging activities.

Table 1 identifies the ambient turbidity levels within San Diego Bay and the corresponding turbidity criteria expressed as either a finite amount or percentage above ambient conditions.

Table 1 – Turbidity Compliance Criteria as per the Basin Plan

Ambient Turbidity	Compliance Criteria
0-50 NTU	20% over ambient turbidity levels
50-100 NTU	10 NTU
>100 NTU	10% over ambient turbidity levels

Water quality monitoring will be conducted using two methodologies: daily visual monitoring and enhanced water quality monitoring.

Visual Water Quality Monitoring

Daily visual monitoring will be conducted during construction activities (dredging and clean sand cover). A detailed worksheet describing both the visual turbidity plume as well as documenting all conditions and any additional debris encountered during the observational period will be reported on a daily basis. Photographs of operational elements of the dredging will also be taken to visually document conditions. All observer reports will be included in the Final Cleanup and Abatement Report.

During active dredging activities, the trained observer will conduct daily qualitative (visual) turbidity monitoring from a high vantage point to ensure water quality objectives for turbidity are not observed outside the silt curtains. If turbidity limits are exceeded, the observer has the authority to halt dredging activities to allow for additional BMPs to be implemented for turbidity containment. Following implementation of additional BMPs, visual turbidity monitoring will resume to ensure the effectiveness of the additional BMPs.

Enhanced Water Quality Monitoring

The Tentative CAO presents two methodologies to assess compliance of water quality monitoring goals during in-water construction activities. The two methodologies presented assume that silt curtains would not be deployed during in-water construction activities; therefore, the frequency of water quality measurements would be on a daily basis and the sample measurement locations would be on an arc around the dredge. Water quality monitoring requirements are discussed in further detail in the Draft Technical Report for the Tentative CAO No. R9-2011-0001 (San Diego Water Board 2010), and are summarized below.

In the event that silt curtains are not deployed during any phase of the in-water construction activities, enhanced water quality monitoring will be performed daily to obtain real-time data so that changes in water quality can be detected as they occur and resolution achieved. The enhanced water quality monitoring will evaluate turbidity levels (measured in Nephelometric Turbidity Units [NTUs]) and DO levels to demonstrate that remedy implementation does not result in violations of water quality standards outside the construction area specifically at a distance of 500 ft from the dredging activity as the point of compliance. As per the Tentative CAO, the frequency of water quality monitoring may be reduced if three days of daily monitoring (performed at the start of dredging activities) shows that no samples exceed water quality targets. In this event, water quality monitoring will be reduced from daily to weekly. Monitoring frequency will return to daily if a significant change in operations occurs.

As per the Tentative CAO, one of two methods may be employed for enhanced water quality monitoring if silt curtains are not deployed:

- A model of turbidity and synoptic measures developed for ambient conditions. The model will aid in determining if monitored turbidity would likely result in unacceptable water quality. Four samples will be collected from each of two arcs (250 ft and 500 ft from the dredge zone) for a total of eight samples from a depth of 10 ft below the water surface and compared to synoptic “ambient” measurements outside the construction area, including Bay conditions and effects of non-shipyard activities; or

- Synoptic real-time monitoring at two arcs (250 ft and 500 ft from the dredge zone) from a depth of 10 ft below the water surface and at ambient locations in the Bay. The 250 ft and 500 ft measurements will be compared to real-time ambient measurements to determine if an exceedance is observed (defined as more than the error rate of the monitors' measurement ability); appropriate corrective actions will be taken in the dredge area.

The samples collected, for either method selected, from the 250 ft arc are intended to warn of potential problems with the point of compliance at the 500 ft arc. If silt curtains are not deployed, the selection of the water quality monitoring method described above will be presented in the RMP. With respect to water quality, if turbidity or DO are not compliant at 250 ft, the construction activities will be adjusted to reduce turbidity and raise DO to achieve compliance. If turbidity or DO problems are found at 500 ft from the construction area, then remediation activities will be halted while BMPs and alternate remedial methods (i.e., equipment) are evaluated (San Diego Water Board 2010).

If silt curtains are deployed during in-water construction activities it is assumed that less frequent water quality measurements (once per week) would be required coupled with daily visual monitoring described above. The enhanced water quality monitoring program will include water quality observations taken at selected stations around the perimeter of the deployed silt curtains. Proposed sample stations based on predicted silt curtain configurations throughout the remedial project should be presented in the RMP. Monitoring of turbidity inside the outer silt curtain (of the double silt curtain) and outside (bayward) of the outer silt curtain shall be implemented. This operational control will allow all appropriate project personnel to effectively monitor the water quality as well as the overall removal operations. Weekly monitoring will be conducted during light hours at least one hour following the beginning of active dredging. The monitoring will evaluate inshore, offshore, and reference (ambient) turbidity levels (measured in NTUs) and DO.

Monitoring data will be partitioned into depth profiles for comparative purposes. The top depth profile will include those waters from the surface down to -2 meters, the middle depth profile will include all reading from -2 meters down to +2 meters from the bottom, and the bottom depth profile will include the bottom 2 meters. Accurate data collection and processing will be ensured by implementing real time data collection and extensive infield QA/QC. Depth profile averaged data will be compared to a reference station to determine compliance criteria.

If the quantitative monitoring indicates that a turbidity exceedance is detected (as per the compliance criteria presented in Table 1), water samples will be collected from the station that is out of compliance. Water samples will be collected at the depth at which the exceedance occurs (depth of maximum turbidity) and will be chemically analyzed for the primary and secondary COCs identified in the Tentative CAO. The primary COCs for the Shipyard Sediment Site are copper, mercury, HPAHs, PCBs, and TBT, and the secondary COCs are arsenic, cadmium, lead, and zinc. Analytical results will be included in the Final Cleanup and Abatement Report. Sediment monitoring during dredging activities is intended to confirm that remediation has achieved target cleanup levels within the remedial footprint. This confirmation sampling is necessary because sediment resuspension and chemical release are unavoidable during dredging (USACE 2008). Resuspended particulate material will be re-deposited and some resuspended contaminants may also dissolve into the water column and be available for uptake by biota.

As per the Tentative CAO, sediment monitoring will occur in footprint polygons (Figure 5) and will be implemented immediately after the dredging contractor has confirmed that dredge depths within the footprint area have been achieved. Confirmation sediment sampling will consist of surface (0 to 2 cm depth interval) sediment sample collection in each footprint polygon (San Diego Water Board 2010). Sediment concentrations in a horizon that represents the first undisturbed depth beneath the dredge depth will be measured. COCs that will be monitored and compared to background sediment chemistry levels include copper, mercury, HPAHs, TBT, and PCBs. The background sediment chemistry levels are presented in Table 2 and discussed in further detail in the Draft Technical Report for the Tentative CAO (San Diego Water Board 2010).

Table 2 – Background Sediment Chemistry Levels

Chemical of Concern	Background Sediment Chemistry Level[1]
Copper in mg/kg	121
Mercury in mg/kg	0.57
HPAHs[2] in µg/kg	663

PCBs[3] in µg/kg	84
Tributyltin in µg/kg	22

[1] Equal to the 2005 Reference Pool's 95% upper predictive limits shown in Section 18 of the Technical Report. The background levels for metals are based on the %fines:metals regression using 50% fines, which is conservative because the mean fine grain sediment at the Shipyard Investigation Site is 70% fines.

[2] HPAHs = sum of Fluoranthene, Perylene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene.

[3] PCBs = sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

The implementation of physical water quality monitoring coupled with control elements such as silt curtains and sediment and water quality monitoring will serve to mitigate potential impacts to water quality to less than significant levels.

3.3 Unloading Operations

The following conditions that may potentially lead to impacts to water quality during sediment unloading operations include:

- Overfilling of the unloading bucket; and
- Swinging the bucket from barge to truck.

At the sediment unloading area, the material barge is moored and the unloading operations begin. This sediment unloading operation is normally accomplished using one or more track mounted excavators (track mounted lattice boom cranes with buckets have also been employed). The types of buckets used for the sediment unloading operations range from standard open excavator buckets to hydraulically closed buckets, and in the case of a boom crane, a environmental clamshell bucket. During unloading operations, the excavator or crane will grab a volume of dredged material and swing from the barge to the trucks.

Overfilling of the unloading bucket is a common issue during the sediment unloading process. Depending on the specific unloading area, the space between the material barge and the dock/unloading surface where the excavator or crane is located can be rather wide, more than 4 ft. While the overfilled excavator bucket is swinging from the barge to the truck, passing over the space between the barge and dock, sediment could potentially spill out of the bucket into the water column. Sediment material that enters the water column can cause short-term increase in TSS locally, decrease DO, decrease water clarity, and potentially remobilize COCs in the water column, thereby degrading water quality. These impacts can impair and degrade beneficial uses in San Diego Bay.

Mitigation measures to compensate for overfilling the bucket should include the determination of the swing radius of the unloading equipment. Prior to mobilization, a steel plate should be placed between the material barge and the hardscape to prevent spillage from falling directly into the water. This “spill” plate shall be sufficiently large enough to cover the swing radius of the unloading equipment. The spill plate is designed to prevent any “drippings” from falling between the material barge and dock where the unloading equipment is stationed. The spill plate will be positioned so that any “dripped” material/water either runs back into the material barge or onto the unloading dock, which will be lined with an impermeable material and bermed to contain excess sediment/water. No water or sediment should re-enter the Bay, as this is strictly prohibited. As a secondary containment measure, filter fabric material can be placed over the spill plate and between edges of the barge and unloading dock to prevent any drippings from falling into the Bay. Upon completion of unloading a material barge, the spill plate will be thoroughly rinsed so that excess sediment is drained into the material barge or onto the unloading dock (depending on spill plate positioning) and then placed on the lined dock until the next unloading sequence.

A conceptual illustration of the spill plate configuration is shown in Figure 6. Additionally, implementing the following operational controls will mitigate the potential for spillage of sediment into the water column:

- The contractor shall ensure the bucket is entirely closed when withdrawn from the barge and moved to the truck. This action requires extra attention when debris is present to make sure debris does not prevent the bucket from completely closing.

- The contractor shall ensure the bucket is completely empty of sediment prior to being moved back to the barge to minimize sediment being spilled over the dock.

The use of operational controls and a spill plate will serve to mitigate this potential impact to water quality to less than significant. A regulatory oversight contractor may be used by the San Diego Water Board. The regulatory oversight contractor should be responsible for adherence to this operational control and such adherence should be verified by the San Diego Water Board.

3.4 Dewatering Operations

The conditions that may potentially lead to impacts to water quality during sediment onshore dewatering operations include:

- Breach in containment pad; and
- Improper disposal of decant water from containment cell.

Potential impacts to water quality associated with a breach in the pad containment is decant water flowing into the Bay causing turbid conditions, which can lower levels of DO, decrease water clarity, and increase existing concentrations of suspended solids. Additionally, if the decant water flowing back into the water column contains COCs, degradation of water quality can occur and increased toxicity to aquatic organisms is accentuated. These impacts can impair and degrade beneficial uses in the Bay. A breach in the dewatering pad could potentially occur if an excavator penetrates through the bottom of the pad while attempting to load sediment for transport.

Potential impacts to water quality associated with improper disposal of decant water from the containment cell is decant water exceeding City of San Diego requirements for discharge of waste water to the sanitary sewer system.

3.4.1 Mitigating a Breach in Dewatering Pad Containment from Excavator

The proper mitigation to this potential impact is the design and construction of an adequate decant water/stormwater containment area. The containment area shall consist of berms (k-rails and/or dry dock blocks) surrounding the area to mitigate for a potential breach in the pad that may lead to potential decant water/stormwater to the land adjacent to the dewatering containment area and potentially flowing into the Bay or into the water table. The area(s) adjacent to the dewatering containment cell may be unpaved; therefore, in the event of a breach in the cell, decant water may infiltrate through the ground surface and into the ground water. The containment cell should be designed so that stormwater run off/run on from adjacent areas to the cell cannot enter into the dewatering area.

To prevent a breach in the dewatering pad, the use of a savaging layer of sand to provide a visual indicator to the excavator operator that he/she is getting close to the containment liner, or the use of closely spaced k-rails and dry dock blocks at key points (i.e., corners) to prevent the operator from getting to the containment liner, should be designed and implemented. These methods would serve to mitigate this potential impact to water quality to less than significant because the equipment will be prevented from riding on the pad. A regulatory oversight contractor may be used by the San Diego Water Board. The regulatory oversight contractor should be responsible for adherence to this operational control and such adherence should be verified by the San Diego Water Board.

3.4.2 Mitigating Improper Disposal of Decant Water from the Sediment Drying/Dewatering Areas

The proper mitigation to this potential impact is routine testing of decant water prior to discharge to the sanitary sewer system. The containment area will consist of a small, depressed area (sump) within the dewatering cell. The containment cell will be designed to meet a performance standard of “no discharge” so that stormwater run off cannot enter the Bay or adjacent areas. The cell will also be designed to ensure that run on from adjacent areas to the cell cannot enter the dewatering area. The decant water will be collected in the sump in the depressed area and will be pumped to large capacity holding tanks. Prior to any discharge to the sanitary sewer system, the decant water will be analytically tested following the discharge requirements for the San Diego POTW.

If water samples were to exceed the City of San Diego requirements for discharge of waste water to the sanitary sewer system the water will be taken off site for treatment and subsequent disposal. The City of San Diego local limits are re-evaluated annually and are subject to change. The City of San Diego also has the authority to regulate other pollutants not listed under the standard local limit pollutants list based on historical site use and site-specific pollutants (i.e., PCBs). At the time of this report, the following pollutants are currently limited by the City of San Diego:

- pH (5-12.5)
- Oil and Grease (500 mg/L)
- Dissolved Sulfides (1.0 mg/L)
- Flash Point (>140˚F)
- Temperature (<150 ˚F)

- Cyanide (Total) (1.9 mg/L)
- Cadmium (1.0 mg/L)
- Chromium (5.0 mg/L)
- Copper (11.0 mg/L)
- Lead (5.0 mg/L)
- Nickel (13.0 mg/L)
- Silver (n/a)
- Zinc (24.0 mg/L)

Discharge times and flow rates at each staging area will be regulated by the City of San Diego under an industrial discharge permit so the sanitary sewer system does not become overloaded and that downgradient transfer stations and process facilities have the required capacity to accept the volume of water discharged.

An industrial and/or general construction stormwater permit may be required at each of the proposed staging areas. A SWPPP containing BMPs that defines how stormwater will be controlled in the containment area prior to discharge to the sewer system will be required. The SWPPP BMPs would include soil and erosion control (e.g., sloping, draining, and barriers) and good housekeeping (e.g., hazardous materials storage and handling and traffic control).

These methods would serve to mitigate this potential impact to water quality to less than significant.

3.5 Water Quality Impacts Related to Under Pier Clean Sand Cover

The conditions that may potentially lead to impacts to water quality during under pier clean sand cover operations include improper design of the sand cover thickness.

As presented in the Tentative CAO, portions of the remedial areas (2.4 ac) are located under piers and cannot be feasibly dredged without potential significant impacts to infrastructure. Therefore, it is assumed that a clean sand cover will be spread evenly in these under pier areas identified as containing contaminated sediments. It is assumed that the final engineering plan will be designed to illustrate where the sand cover will be placed in relationship to the anticipated dredge “cut” depths adjacent to the piers where covering will occur. It is assumed that the sand cover will not only be placed on top of the sediment under the piers, but also along the sides at an engineered slope designed to prevent lateral migration of contaminated sediment due to propeller wash, flow and tidal induced erosion. The source and type of sand required for the subaqueous cover will be presented in the final engineering plans.

Potential impacts to water quality could result from the improper design of the sand cover thickness and/or improper placement methods. An improperly designed sand cover thickness and placement methodology can cause turbid conditions and release contaminants into the water column by the following mechanisms:

- Failure to isolate contaminated sediments below the benthic environment;
- Failure to stabilize contaminated sediments to keep them from being re-suspended and transported to other areas; and
- Failure to reduce the transport (flux) of dissolved contaminants into the overlying water column.

Although a final engineering plan has not been developed, the clean sand cover thickness must be designed to prevent substantial bioturbation (mixing and overturning) of underlying contaminated sediments, erosion (e.g., propeller wash), and the upward chemical migration into the sand cover. The sand cover design will consider the uptake of bioaccumulative contaminants (i.e., PCBs) by aquatic organisms either directly from the sediments or by foraging on benthos. In order to eliminate this pathway for contaminant uptake, the in-situ cover should physically isolate the sediments from benthic or epibenthic organisms. To design a sand cover component for this function, the bioturbation potential of indigenous benthic infauna will be evaluated. The physical isolation component of the sand cover may include separate sub-components for isolation, bioturbation and consolidation. The sand cover should also be designed to stabilize the contaminated sediments being covered, and prevent them from being resuspended and transported offsite. The other function of this design component should be to make the sand cover itself resistant to erosion. Factors to consider during the design phase are propeller wash, flow and tidal induced erosion. To address chemicals, the sand cover design should consider advection and diffusion transport. Modeling migration should be used to obtain an estimate of the required thickness of granular sand cover material for chemical isolation.

During clean sand cover, the contractor should place the initial layers of the cover in thin lifts by hydraulically placing the material from a barge. This placement method reduces the vertical impact and lateral spreading of the cover material, thus reducing the potential for resuspending the contaminated surface sediments. Controlled placement also minimizes the mixing of cover and underlying sediment by allowing the sediment to slowly gain strength before subsequent layers are deposited. Operational controls such as silt curtains should be employed during the sand cover placement.

Turbidity resulting from sand cover placement is not expected to be substantial, since the material will be predominantly sandy material with fairly rapid settling rates, and is also typically confined to the immediate vicinity of the sand covering and is of short duration (minutes to several hours). However, the turbidity that typically results from dredging operations does pose a potential significant impact.

Water quality monitoring should be conducted during sand cover operations to measure DO and turbidity so that water quality impacts are mitigated to less than significant. Monitoring activities during sand covering should be described in the RMP as described in Section 3.2.2.2. Additionally, as part of the project and to comply with the Tentative CAO, post-remediation sampling activities should include testing of the sand cover integrity and sediment sampling adjacent to the under pier sand covered areas to confirm that the selected remedial activities have achieved target cleanup levels within the remedial footprint. Post-remediation sampling is described below in Section 3.6.

The design of a proper sand cover thickness, implementing controlled placement methods coupled with operational controls and physical monitoring activities, will serve to mitigate the potential impact to water quality to less than significant.

3.6 Post-Remediation Monitoring

The discussion of post-remediation monitoring is not intended to address potential significant impacts to water quality during dredging and clean sand cover activities. The discussion of post-remediation monitoring is intended to provide context to the overall remediation project and briefly describe how long-term water quality will be assessed at the Shipyard Sediment Site. The post-remediation monitoring requirements are part of the proposed project and are not mitigation for the remediation efforts.

As per the Tentative CAO, post-remediation monitoring will be required to be initiated at years two and five and potentially continue for a period of up to 10 years after remediation activities are completed. Therefore, a Post-Remedial Monitoring Plan

(PRMP) will be required to be submitted prior to initiation of the remedial cleanup activities. The PRMP will be designed to verify that remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses.

For human health and aquatic dependent wildlife beneficial uses, post-remediation monitoring will include:

- Sediment chemistry monitoring to ensure that post-remediation surface-area weighted average concentrations (SWACs) are maintained at the site following cleanup. Analyses of surface sediment samples will include sediment bulk chemistry of the parameters PCBs, copper, mercury, HPAHs, and TBT, and sediment conventional parameters (e.g., grain size and Total Organic Carbon [TOC]).

- Sediment samples will undergo bioaccumulation testing using the 28-day *Macoma sp.* test.

As per the Tentative CAO, the frequency of sediment sampling and analyses (chemical, physical, and bioaccumulation) will occur at two and five years post-remediation and, depending on the results at year five post-remediation, may also occur at ten years post-remediation. The goals of the sediment chemistry monitoring are to demonstrate that the post-remedial site-wide SWACs are at or below threshold target levels for specific COCs. SWACs will be calculated as presented in the Draft Technical Report for the Tentative CAO (San Diego Water Board 2010).

The goals of bioaccumulation testing are to show decreasing bioaccumulation over time such that at two years' post-remediation, the average of stations sampled shows bioaccumulation levels below what was measured in the Shipyard SI Report (Exponent, 2003) and that this decreasing trend continues at year five post-remediation and, if determined necessary, at year ten post-remediation.

For aquatic life beneficial uses, post-remediation monitoring will include sediment chemistry, and toxicity bioassays to verify that post-remedial conditions have the potential to support a healthy benthic community (San Diego Water Board 2010). In addition, post-remediation monitoring will include benthic community condition assessments to evaluate the overall impact of remediation on the benthic community recolonization activities. The purpose of assessing benthic community conditions as part of post-remedy monitoring is to demonstrate the remediation will successfully create conditions that would be expected to promote re-colonization of a healthy benthic community.

4. CUMULATIVE IMPACTS

The evaluation of potential cumulative impacts of this project with other projects in and around San Diego Bay is the incremental impact of the project when added to other closely related past, present and reasonably foreseeable probable future projects. Although there are no other contaminated sediment dredging projects currently scheduled for implementation in the Bay, the San Diego Water Board anticipates that regularly scheduled maintenance dredging projects may occur in the Bay over the next several years.

To estimate the likely volume of these potential dredging actions, the San Diego Water Board has provided maintenance and environmental dredging records for the 11-year period from 1994 to 2005. These records show an average of approximately 245,000 cy of material was dredged from the Bay each year, with yearly totals ranging from 0 to 763,000 cy. While the dredge volume proposed for this project (approximately 143,400 cy) represents a significant dredge volume, the overall volume of impacts related to dredging projects in San Diego Bay is expected to be within these historical ranges and will not lead to significant cumulative impacts to water quality if appropriate mitigation measures are adopted as recommended above.

Because of the potential for a project involving contaminated sediment removal to occur concurrently with the Shipyard Sediment Site remedial effort in the next 10 years, discussions with the San Diego Water Board regarding a coordinated water quality monitoring effort and/or the sharing of water quality monitoring data should be initiated and continued throughout the duration of the project. Discussions should include distance(s) between sites and proposed timing of in-water activities that will involve potential impacts to water quality, selection of appropriate water quality reference sampling locations in the Bay, configuration of silt curtains, and coordination of expected commercial and recreational vessel traffic.

5. REFERENCES

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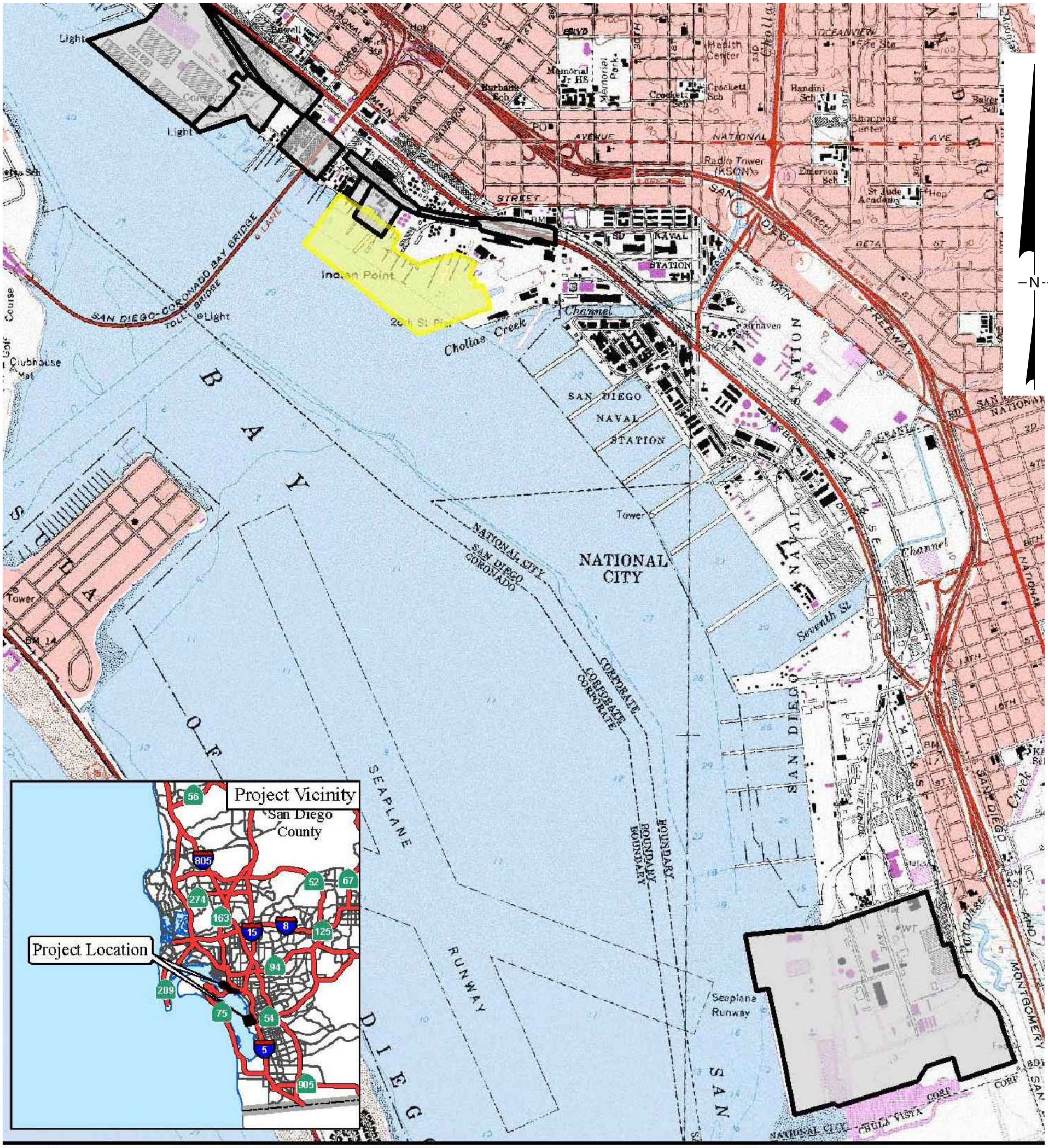

LEGEND

Shipyard Sediment Project Site

Potential Sediment Staging Areas

REFERENCE:
MERKEL & ASSOCIATES 2010
ESSENTIAL FISH HABITAT
ASSESSMENT FOR THE BAE SYSTEMS
LEASEHOLD PROJECTS, SAN DIEGO
BAY, CALIFORNIA.

PROJECT LOCATION
WATER QUALITY TECHNICAL REPORT
SHIPYARD SEDIMENT SITE PROJECT
SAN DIEGO, CALIFORNIA

Geosyntec consultants

DATE: MARCH 2011

PROJECT NO. SC0552

FIGURE 1

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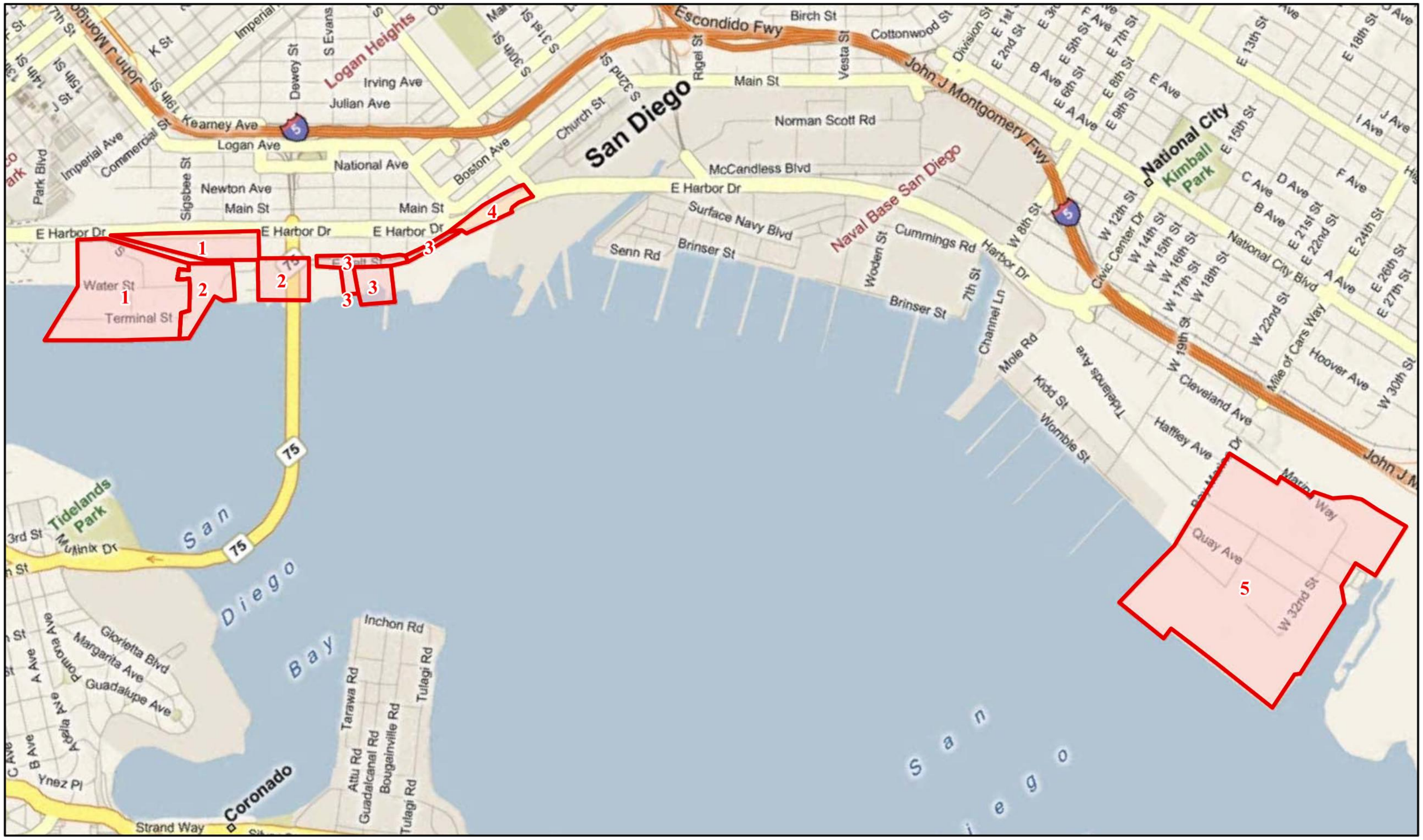

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Potential Sediment Staging Areas

FIGURE 2

0 1250 2500

FEET

POTENTIAL SEDIMENT STAGING AREAS
WATER QUALITY TECHNICAL REPORT
SHIPYARD SITE PROJECT
SAN DIEGO, CALIFORNIA

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DATE:	MARCH 2011	FIGURE
PROJECT NO.	SC0552	2

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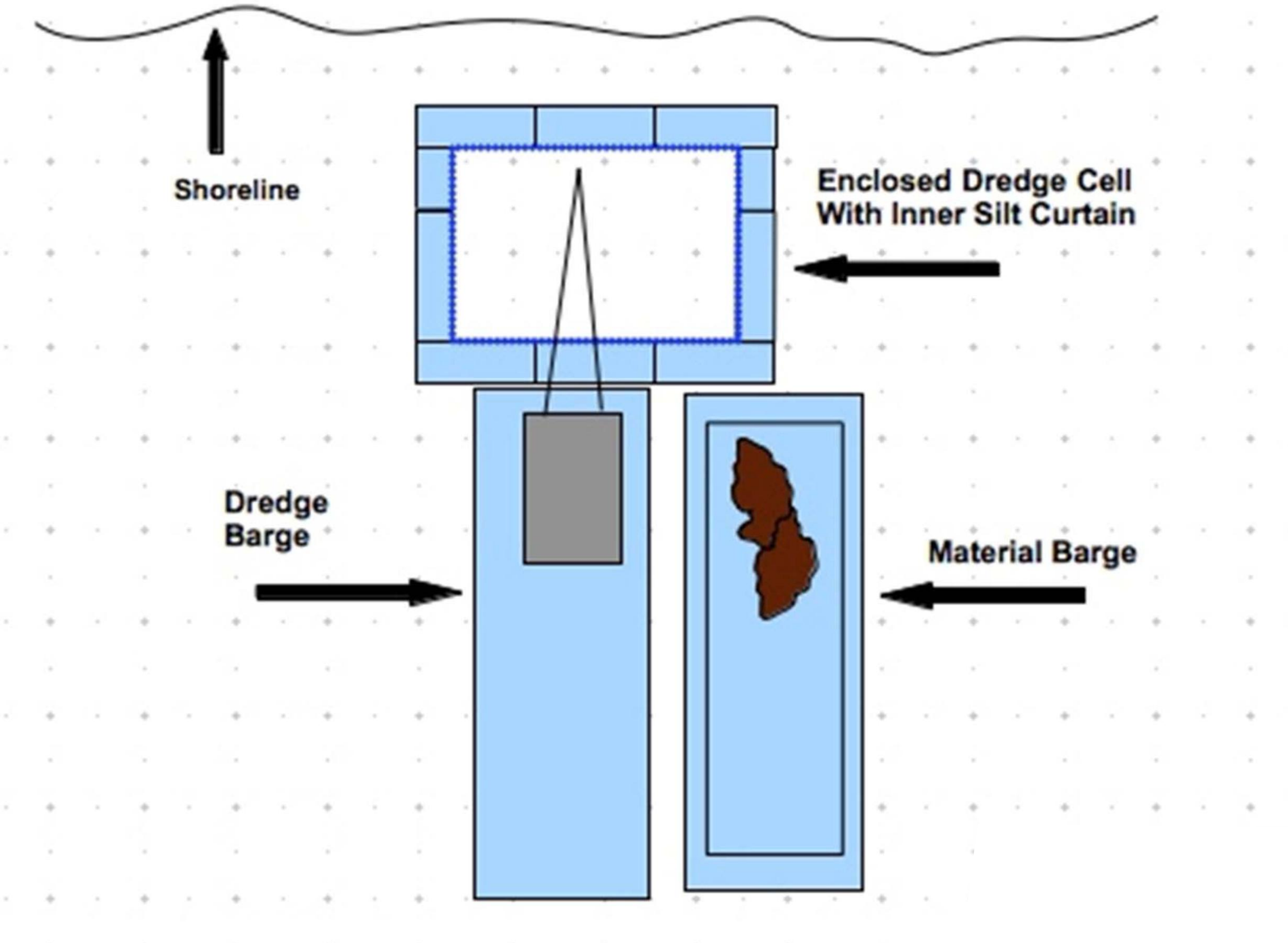

SILT CURTAIN CONTAINMENT: FLOATING DREDGE CELL
WATER QUALITY TECHNICAL REPORT
SHIPYARD SITE PROJECT
SAN DIEGO, CALIFORNIA

Geosyntec consultants	DATE: MARCH 2011	FIGURE 3
	PROJECT NO. SC0552	

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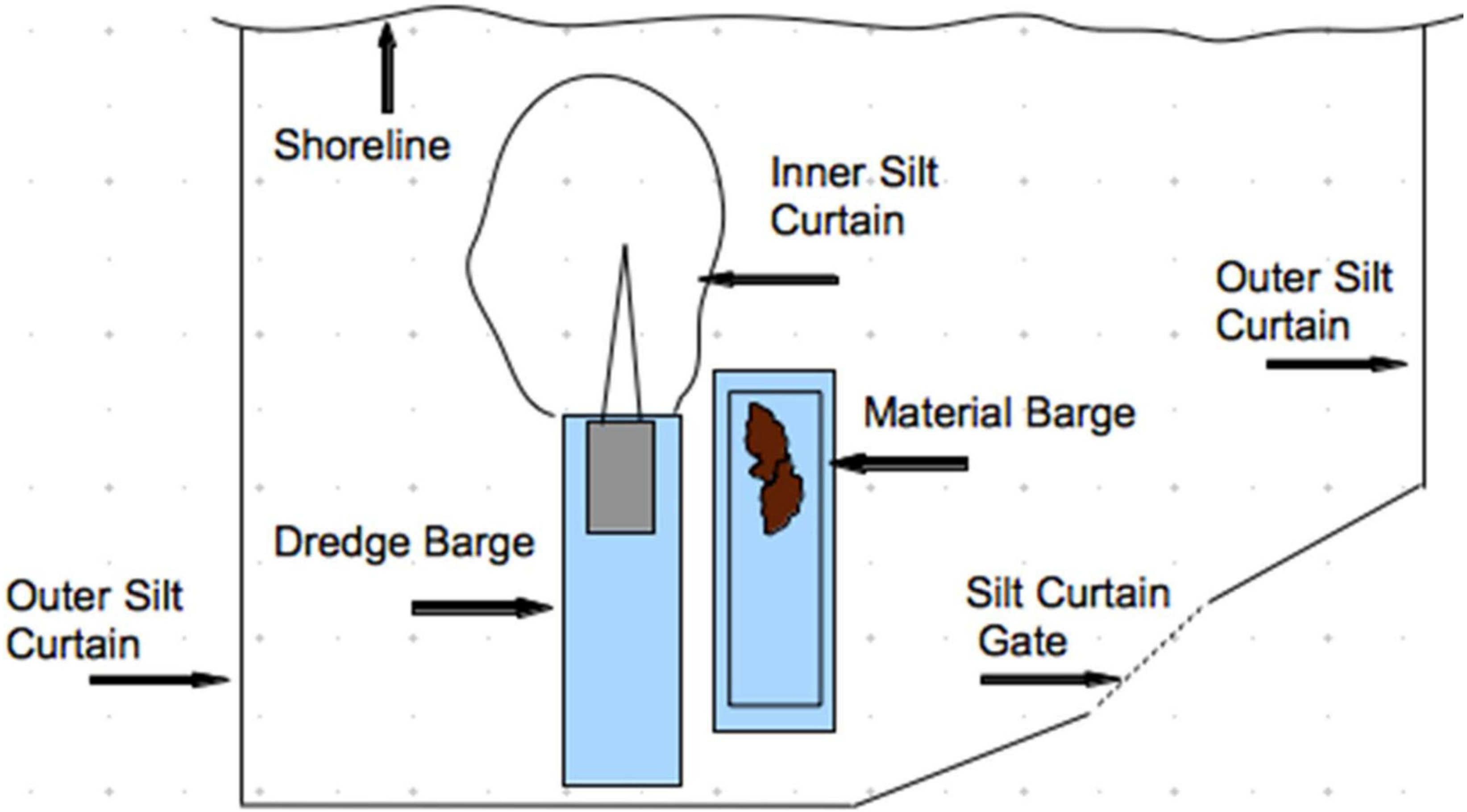

SILT CURTAIN CONTAINMENT: DOUBLE SILT CURTAIN
WATER QUALITY TECHNICAL REPORT
SHIPYARD SITE PROJECT
SAN DIEGO, CALIFORNIA

Geosyntec consultants

DATE:	MARCH 2011
PROJECT NO.	SC0552
FIGURE	4

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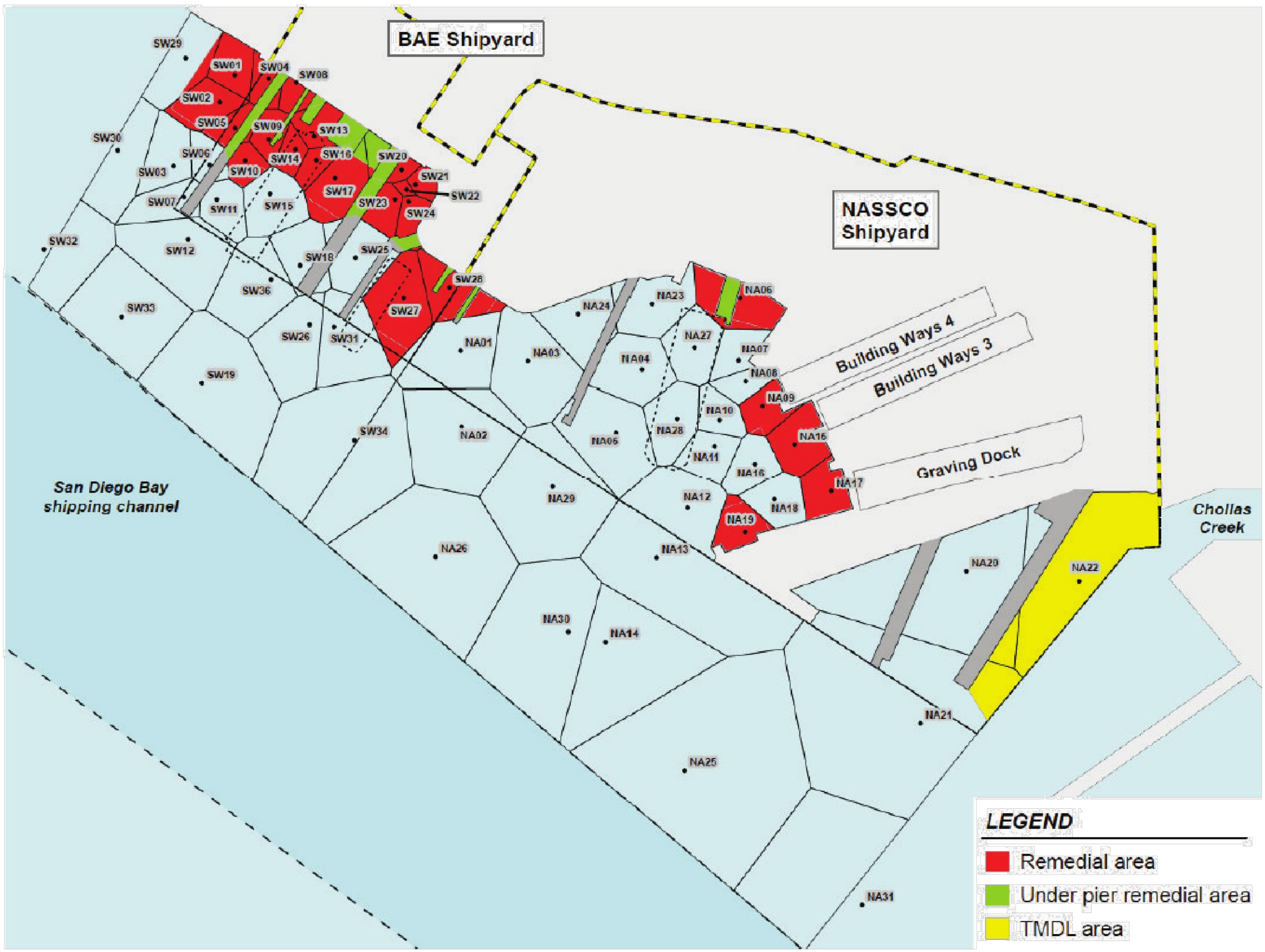

REFERENCE:
EXPONENT 2003 "NASSCO AND SOUTHWEST MARINE DETAILED SEDIMENT INVESTIGATION" REPORT

POLYGONS TARGETED FOR REMEDIATION
WATER QUALITY TECHNICAL REPORT
SHIPYARD SITE PROJECT
SAN DIEGO, CALIFORNIA

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DATE:	MARCH 2011	FIGURE
PROJECT NO.	SC0552	5

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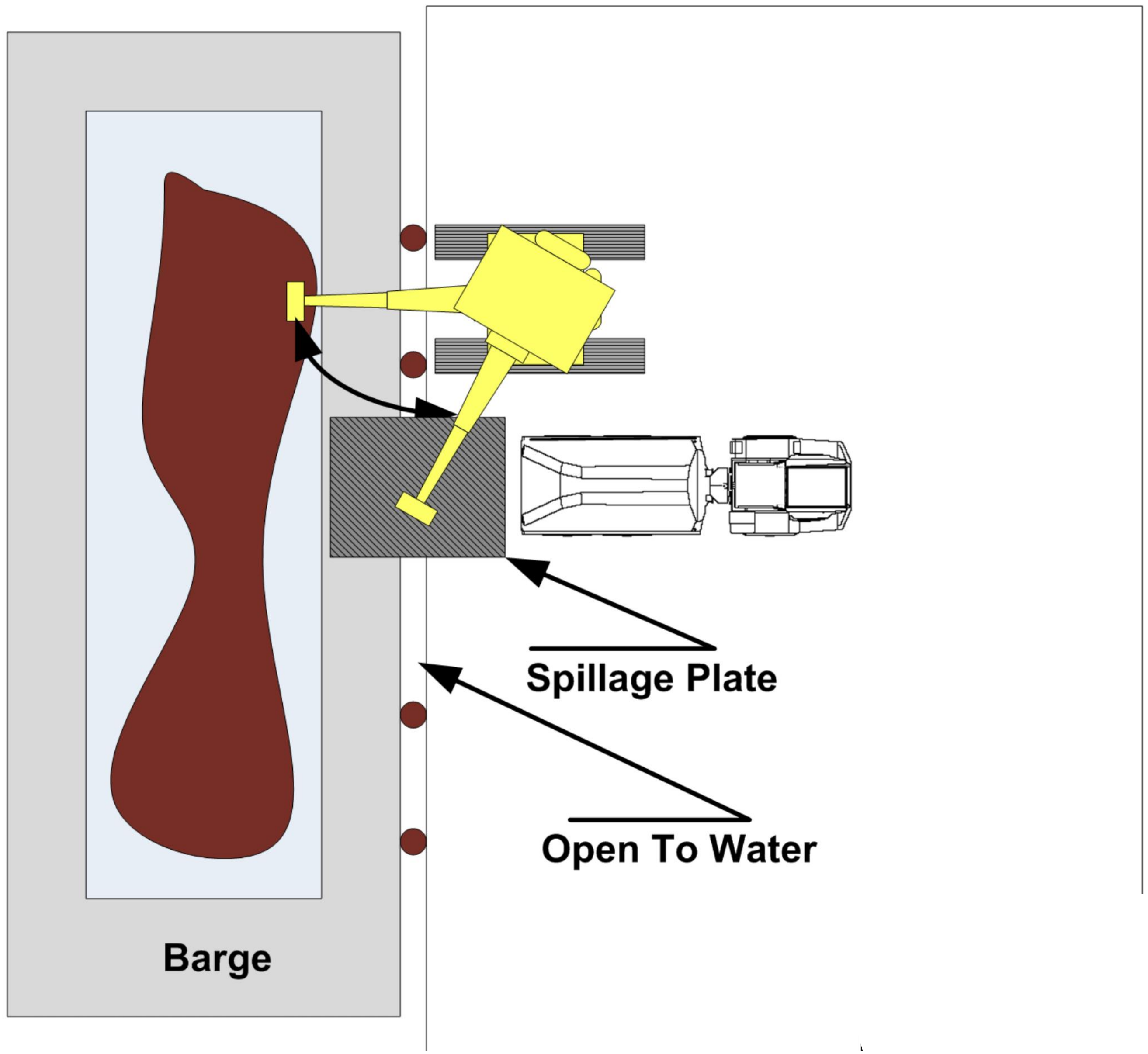

SPILL PLATE MITIGATION MEASURE
WATER QUALITY TECHNICAL REPORT
SHIPYARD SITE PROJECT
SAN DIEGO, CALIFORNIA

Geosyntec consultants

DATE:	MARCH 2011	FIGURE 6
PROJECT NO.	SC0552	

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