3.5 MARINE WATER QUALITY

This section of the Revised Analysis of Public Trust Resources (APTR) describes the environmental setting related to marine water quality offshore and down coast of the Broad Beach Restoration Project (Project) area, including within the Point Dume State Marine Conservation Area, and reviews potential effects of the beach nourishment and dune restoration project on public trust resources and values. The information presented in this section is intended to inform the California State Lands Commission (CSLC) as it considers whether to issue a lease for those portions of the Project within the CSLC's jurisdiction. As noted in Section 1, *Introduction*, because implementation of the Project by the Broad Beach Geologic Hazard Abatement District (BBGHAD or Applicant) is statutorily exempt from the California Environmental Quality Act (CEQA) (pursuant to Pub. Resources Code, §§ 26601 and 21080, subd. (b)(4)), the scope of review and analysis provided here is limited to those areas where impacts to public trust resources and values may occur.

As defined in Section 13050 of the California Water Code, water-quality inputs of concern include discharges that create pollution, contamination, or nuisance; or that release toxic substances deleterious to humans, fish, bird, or plant life. The significance of many water-quality impacts is inextricably linked to adverse effects on marine and estuarine species and habitats (see Section 3.3, *Marine Biological Resources*). Consideration of impact significance would also include affects on public trust uses such as swimming and surfing. Marine water quality in the Broad Beach vicinity is most directly influenced by discharge from onsite wastewater treatment systems (OWTS), drainage from Trancas Creek, and runoff from several storm drains. Section 3.7.6, *Utilities and Service Systems,* describes the existing utility infrastructure. Potential effects on marine sediment quantity are discussed in Section 3.1 *Coastal Processes, Sea Level Rise, and Geologic Hazards*.

3.5.1 Environmental Setting Pertaining to the Public Trust

<u>CSLC Lease Area and Public Trust Impact Area</u>

The CSLC Lease Area and Public Trust Impact Area includes Broad Beach and the western portions of Zuma Beach, with proposed beach and dune restoration construction activities extending laterally for approximately 6,200 feet from Trancas Creek Lagoon on the east to Lechuza Point on the west and vertically from the inland limits of dune construction to the seaward limits of proposed beach nourishment (refer to Figures 1-1 and 1-2). The area encompasses approximately 46 acres of proposed beach and dune construction on Broad Beach, as well as construction staging at the west end of Zuma Beach Parking Lot 12, 1,000 feet of Zuma Beach used for stockpiling of imported sand adjacent to the parking lot, and vehicle access from the parking lot to Broad Beach. The area of potential impact for marine water quality includes offshore waters and ocean floor in the vicinity of Broad Beach, down coast along and offshore of Zuma Beach and Westward Beach to Point Dume. These beaches support sensitive estuarine habitats at Trancas lagoon and Zuma Beach wetlands. Impacts to Trancas Creek Lagoon are discussed in detail below due to its proximity to Broad beach while those to Zuma Wetlands are not discussed due to its distance from Broad Beach.

BBGHAD Inland Project Area

The BBGHAD Inland Project Area includes three quarries proposed as sand supply sources, and the sand transportation routes inland of Pacific Coast Highway (PCH), that would be used by heavy haul trucks to transport sand to Broad Beach (see Figure 1-2). These areas have limited potential for effects on marine water quality and are not discussed further in this section.

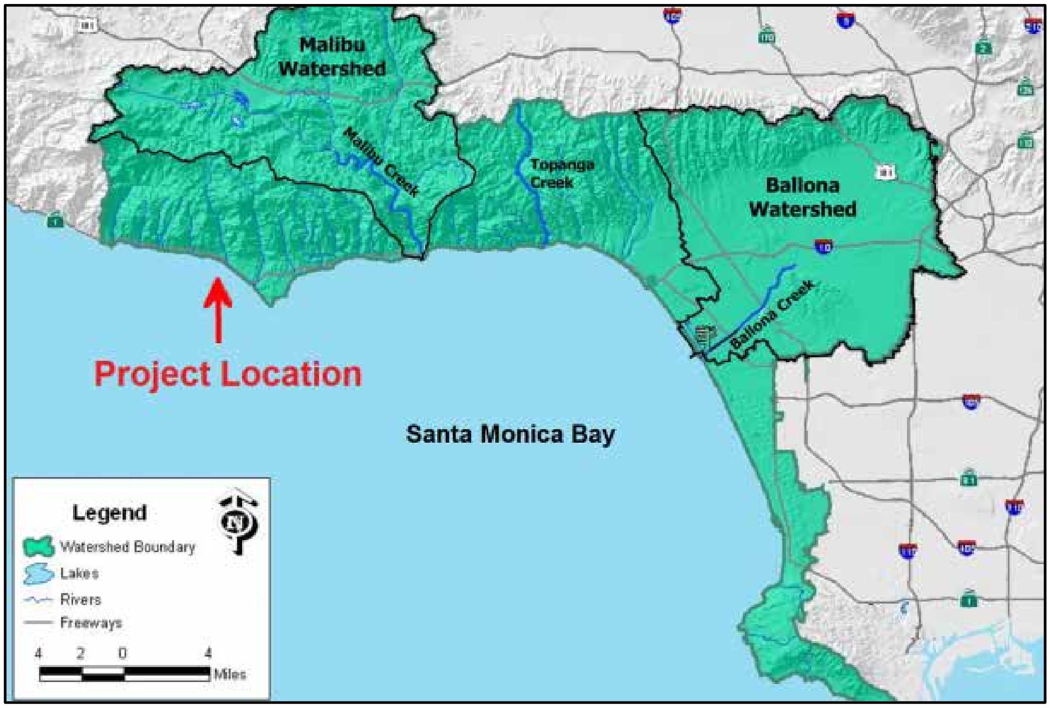
Santa Monica Bay Watershed

Trancas Watershed. The Trancas watershed is drained by Trancas Creek, a perennial stream, which is located at the eastern end of the CSLC Lease Area. The mouth of the creek is often blocked by a sand berm (Illustration 3.5-1) which prevents tidal exchange and causes the creek water to pond during seasonal high flows forming a lagoon (Santa Monica Bay Restoration Plan 2008). The Trancas lagoon is exposed to marine tidal influences during winter months but isolated from the ocean as stream flows decline and sand barriers develop. Lagoon habitat is predominately freshwater despite periodic saltwater influences (City of Malibu 1995).

Illustration 3.5-1*. Trancas Lagoon is often filled with runoff from Trancas Creek and obstructed from drainage to the ocean by fluvial deposits.*

Santa Monica Bay Watershed Management Area (SMBWMA). The CSLC Lease and Public Trust Impact Areas lie within the SMBWMA, which drains an area of approximately 414 square miles (mi^2) into Santa Monica Bay (see Figure 3.5-1). The SMBWMA is divided into major watershed units and smaller watersheds following individual canyons and drainages, including 62 identified watersheds within the city of Malibu (MGP 1995). Large coastal watersheds include Ramirez (4.5 mi^2), Las Flores (4.75 mi^2), Solstice (4.43 mi^2), Trancas (8.39 mi^2), and Zuma Canyon (8.86 mi^2), Topanga (19.68 mi^2) and Arroyo Sequit (10.96 mi^2). Broad Beach lies within the Big Sycamore Canyon major watershed and splits the minor boundaries of the Trancas Canyon and Encinal Canyon watersheds.

Figure 3.5-1. Project Location within SMBWMA



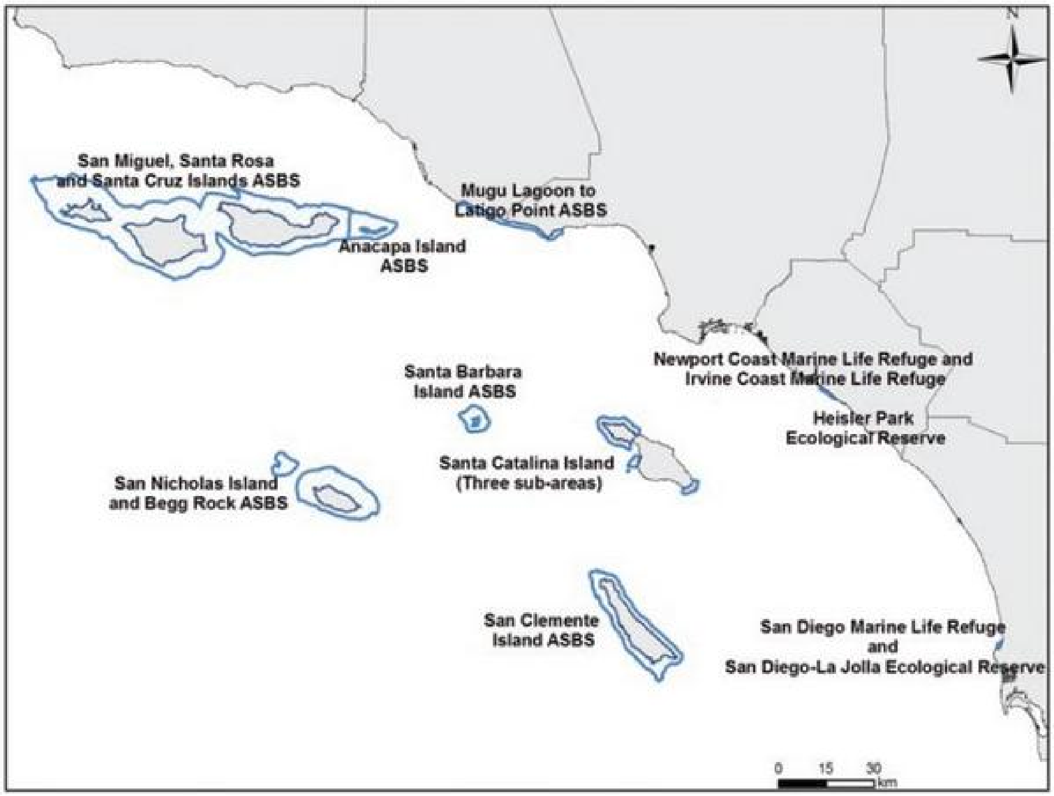
Source: Los Angeles Regional Water Quality Control Board (LARWQCB) 2007b.

<u>Marine Water Quality</u>

The State Water Resource Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) enforce established water quality standards in California. The SWRCB designates State water-quality protection areas to protect marine species or biological communities from undesirable alterations in natural water quality. Areas of special biological significance (ASBS) are a subset of the State water-quality protection areas. These areas are considered intrinsically valuable or have recognized value to humanity for scientific study, commercial use, recreational use, or esthetic reasons. Broad Beach is located within the Mugu Lagoon to Latigo Point ASBS, which extends along 24 miles of coastline (Figure 3.5-2). On October 11, 2011, the U.S. Environmental Protection Agency (USEPA) approved a final list of waterbodies for inclusion in the Los Angeles RWQCB (LARWQCB) Clean Water Act (CWA) Section 303(d) list of impaired waterbodies. The 303(d) list includes the following impairments:

- Nearshore/offshore waters throughout the Bay–dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyls (PCBs) in tissue and sediment, debris, sediment toxicity, and fish consumption advisories;
- Trancas Beach (Broad Beach)–fish consumption advisories for DDT and PCBs, and elevated coliform density; and
- Zuma Beach (Westward Beach)–fish consumption advisories for DDT and PCBs, and indicator bacteria.

Figure 3.5-2. ASBS within Southern California



Source: Southern California Coastal Water Research Project (SCCWRP) 2004.

The SWRCB and California Coastal Commission (CCC) have designated Critical Coastal Areas (CCAs) statewide that are directed at improving degraded water quality and providing extra protection from nonpoint source pollution to marine areas with recognized high resource value. CCAs often overlap with SWRCB designated ASBS and include impaired water bodies identified in the Section 303(d) list, marine managed areas, wildlife refuges, waterfront parks, and beaches. CCAs along the Bay coast include: Ballona Creek; Santa Monica Canyon, Topanga Canyon Creek, Malibu Creek, and the coastal area west of Latigo Point, corresponding to ASBS Number 24.

Water contaminants could be introduced to water bodies through freshwater inflow and urban discharges.

Freshwater Inflow. Freshwater inflow to the Bay comes from surface runoff, creeks, and rivers, as well as dry streambeds that terminate in the Bay. Rainfall and the associated freshwater inflow to the Bay are episodic within any given year, and also vary substantially among years (Jenkins and Wasyl 2005). California's coastal climate varies in cycles that last 20 to 30 years (Goddard and Graham 1997). Discharges and inflows into the bay affect marine water quality by acting as transport for pollutants (e.g., oil, fuel, and lubricant drips and leaks from automobiles that are washed down a watershed by runoff) and sediment to enter the Bay through runoff and intentional discharges.

Urban Discharge and Runoff. The coastline along much of Santa Monica Bay is heavily urbanized, with a large population living along and inland of the shoreline and with numerous outfalls that discharge contaminants generated by anthropogenic sources such as industrial discharges, treated and untreated effluent, and other materials into the Bay. Additionally, due to the Mediterranean climate of much of southern California, pulses of storm water runoff carry concentrated contaminants, which have accumulated onshore during long dry spells, into the marine waters of the Bay over relatively short storm durations. Although some synthetic organic contaminants sorb onto fine sediment particles and are initially deposited near the discharge location, they can be repeatedly resuspended by surface gravity waves, internal waves, or coastal currents, and transported far from the source (Noble and Xu 2003). Other contaminants, such as bacterial and viral pathogens, can remain suspended in the water column where they are transported over great distances by coastal currents. These discharges contribute to the water quality, turbidity, and visibility of the Bay as well as within the Public Trust Impact Area. Potential urban discharges in the waters offshore of the CSLC Lease Area may include OWTS effluent from the houses along Broad Beach using OWTS, especially those with leach fields on the ocean side of the home. Such discharges may also affect down coast areas. See Section 3.7.6, *Utilities and Service Systems* for information regarding utility infrastructure and impacts to infrastructure.

<u>Seawater Physiochemistry</u>

The physical and chemical properties of seawater, such as seawater clarity, temperature, dissolved oxygen, salinity, hydrogen-ion concentration, nutrients, seawater metals, and dissolved organic compounds, and bacteria, are regularly used to evaluate marine water quality. Throughout the Bay, the Southern California Coastal Water Research Project (SCCWRP), the Surface Water Ambient Monitoring Program, and the California Cooperative Oceanic Fisheries Investigations conduct regional assessment programs. This subsection examines seawater clarity and nutrients, since the Project implementation would have the potential to affect turbidity through increased beach sand erosion and increased nutrient loading from OWTS leachate.

Water clarity, transparency, transmissivity, ambient light penetration, turbidity, and suspended-solid concentrations all reflect how well water transmits light. Turbidity decreases the clarity of seawater and can limit the penetration of ambient light in the upper reaches of the water column. It is largely determined by the concentration of suspended particulate matter and, within the upper water column, turbidity dictates the depth of the euphotic zone. The base of the euphotic zone is where ambient light intensity is reduced to roughly one percent of surface illumination, which is the minimum necessary for phytoplankton growth. Turbidity increases in coastal waters as a result of phytoplankton blooms, storm and freshwater runoff, sediment resuspension, and wastewater discharges from seafloor outfalls. Transmissivity varies markedly over time, and has its highest variability within this nearshore region (Nezlin et al. 2004). On average, the lowest water clarity is found at the end of April, when upwelling winds are typically at their maximum. When combined with increased turbidity near the seafloor from wave resuspension, a mid-depth maximum in transmissivity (water clarity) is often observed in the nearshore region. This vertical distribution differs from that of the other seawater properties, which tend to steadily increase or decrease with depth.

In addition to ambient light intensity, phytoplanktonic photosynthesis depends on the availability of inorganic nutrients, particularly phosphates and nitrates. Factors that influence nutrient concentrations include upwelling, biological processes, wastewater disposal, and stormwater runoff. For the most part, concentrations of nitrate, phosphate, and silicate are negligible within the euphotic zone due to rapid uptake by phytoplankton. However, sewage and surface-water runoff can contain high levels of nitrogen and phosphate, and can locally alter nutrient levels within receiving waters.

Excessive nutrient loading, as often seen from fertilizer and untreated sewage effluent, can lead to harmful phytoplankton (algal) blooms within surface waters and impact dissolved-oxygen levels. Within the Bay, marine impacts are primarily caused by recurring blooms of *Alexandrium* and *Pseudo-nitzschia* that produce potent neurotoxins (Schnetzer et al. 2007). These neurotoxins accumulate in fish and shellfish that are ingested by mammals, including humans, and cause paralytic and amnesic shellfish poisoning. Bioaccumulation of algal toxins through the food web has been linked to significant wildlife mortality events of fish, birds, and marine mammals.

<u>Inland Quarry Sand Source Sand Quality</u>

Based on Applicant-prepared studies, the quarry sand materials were determined to be free of contamination and suitable for beach nourishment and dune construction (see Appendix J). The sand sources at the quarry sites were formed in pre-industrial times and have not been exposed to modern sources of pollution. Further, they are far removed from potential contamination sources and are upslope/upstream from urbanization or drainage sources. In addition, all quarry materials are comprised of over 92.5 percent sand and, therefore, are not likely to hold onto any contaminants.

3.5.2 Selected Regulations Pertaining to the Marine Water Quality

State and other statutes related to marine water quality are listed in Table 3.3 in Section 3.0, *Issue Area Analysis*. In addition, in December 1988, California and the USEPA established the Santa Monica Bay National Estuary Program to recognize the need to restore and protect the Bay and its resources. The program's coalition of governments, environmentalists, scientists, industry, and the public was charged with developing and implementing a Comprehensive Conservation Management Plan for Bay protection and management. The resulting Bay Restoration Plan was approved by the Governor in December 1994 and by the USEPA in 1995. The Plan's goal, to reduce pollutant loadings to the Bay from point and nonpoint sources, was designed to prevent degradation of the marine ecosystem, protect beaches, and minimize risks to human health. The Plan identified key problems and recommended actions to mitigate them. The Santa Monica Bay Restoration Project was established to implement the Plan. In 2003, the project formally became the Santa Monica Bay Restoration Commission, an independent non-regulatory State agency charged with implementing the nearly 250 actions identified in the plan that target critical problems such as polluted urban runoff, degraded wetlands, and risks to public health associated with seafood consumption and swimming near storm-drain outlets.

3.5.3 Public Trust Impact Criteria

This section describes criteria for evaluating the significance of Project-related activities or incidents that may result in impacts to marine water resources. In general, the persistence, extent, and amplitude of such impacts dictate their significance. Although the thresholds of significance for water-quality impacts are based on quantitative limits promulgated in existing standards, guidelines, and permits, interpretation of unacceptable changes in seawater conditions often require some judgment. For example, standards contained in a particular permit may be outdated, or a discharge may be causing previously unrecognized water-quality impacts. In other instances, perceived impacts may be a statistical artifact, for example, from a naturally occurring outlier in the distribution of ambient conditions. Thus, the significance of potential project-related changes in seawater properties must be gauged against the backdrop of naturally occurring variability within the Bay.

Based on these considerations, impacts to marine water quality would be considered to have a major adverse effect if any of the following conditions were to occur as a result of the Project:

- Discharges that create pollution, contamination, or nuisances as defined in Section 13050 of the California Water Code;
- Release of toxic substances that would be deleterious to humans, fish, bird, or plant life;
- Measurable increases in contaminant concentrations compared to background concentrations within National Marine Sanctuaries, Marine Protected Areas, ASBS, CCAs, or ESHAs, such as coastal wetlands and kelp beds;
- Exceedance of water-quality objectives identified in applicable SWRCB or RWQCB documents (e.g., the California Toxics Rule [SWRCB 2005], California Ocean Plan [SWRCB 2012], or Basin Plan [LARWQCB 2007a]), including: a significant reduction in the transmittance of natural light after initial mixing; and creation of a visible oil sheen on the surface of the receiving waters, or marine release of fluids contaminated with oil and grease or dissolved aromatic-hydrocarbon concentrations, exceeding specified limits.

This impact analysis considers the CSLC Lease Area and Public Trust Impact Area in its existing setting, subsequent to the 2010 emergency rock and sand bag revetments installation.

3.5.4 Public Trust Impact Analysis

The severity of potential Project impacts are a function of the Project's location within the physiographic environment, the physicochemical properties of the receiving waters, the circulatory and dispersive capacity of the regional oceanographic regime, and any existing contamination in sand added to the beach.

The Project could adversely impact marine water quality, particularly during construction activities. Deposition of 450,000 cy of sand onto Broad Beach and its distribution by heavy equipment would increase the amount of sand exposed to coastal erosion processes, which would affect turbidity of the waters immediately offshore of Broad Beach as well as within the Public Trust Impact Area down coast from Broad Beach, particularly along Zuma Beach. New sand introduced to Broad Beach may also introduce contaminants that could affect marine water quality.

Impact MWQ-1: Project Implementation Impacts due to Turbidity or Other Impairment of Area Waters

Project construction and nourishment/renourishment activities may increase turbidity in, or result in a violation of other water quality standards for, nearshore waters (Minor Adverse Effect, Class Mi).

<u>Impact Discussion (MWQ-1)</u>

Hard structures such as rock revetments along the coast disrupt the natural transport of sand along the coast. As part of the long-term strategy for protection of private property, including homes and septic systems, from coastal erosion, the emergency revetment placed in 2010 would be buried as part of the proposed Project beneath a new system of sand dunes in the landward edge of the widened, nourished beach. This shore protection would remain buried unless severe beach erosion or other conditions preclude maintaining sufficient beach width for protection.

Initial construction of the Project and backpassing events would involve movement and redistribution of large quantities of sand by heavy construction equipment and its redistribution through wave action along the beach adding to nearshore turbidity. Initial construction impacts on turbidity would be short-term and confined to the vicinity of Broad Beach while longer term redistribution of sand would mimic natural processes. Following the initial nourishment, the beach profile is projected to erode over 5 to 10 years. After 10 years following the initial nourishment event, this erosion is expected to trigger the Project's proposed one-time additional nourishment, with impacts to marine water quality similar to the initial Project. In total, this renourishment is projected to extend the lifetime of the beach and dunes system to approximately 10 to 20 or more years, when the revetment would again become exposed.

Turbidity increases from the Project activities would be localized to the nearshore marine environment and would be temporary. Because seafloor sediments within the nearshore environments consist of well-sorted sands, nearly all suspended particulates would settle out of the water column rapidly, and any initial turbidity increase would become imperceptible before the last sand particle settles on the seafloor. This is especially true because the nourishment/renourishment activities would not directly interact with the marine environment. Nourishment would only potentially and indirectly affect nearshore waters where ambient seawater clarity is naturally lower and far more variable than in offshore areas the Bay.

The potential also exists for leaks or spills of oil or fuel from construction equipment. Earthmoving equipment, such as bulldozers and scrapers, would operate on Broad Beach during the initial 8-month nourishment, the follow-up 6-month renourishment event approximately 10 years later, and backpassing activities. A 20-truck fleet would be also used to transport sand to the beach, with approximately 30 trucks per hour entering and exiting the staging area from 7:00 AM to 6:00 PM. All equipment and material for the Project would be stored at the Zuma Beach Parking Lot 12, with beach access provided near the western end of the parking lot. Leaks or spills are considered low probability if the equipment is well maintained, and all fueling is restricted to the staging area. However, equipment can malfunction or suffer damage when operating in a dynamic environment like a beach resulting in a release of oil or fuel on public trust lands. See Section 3.7.5 *Public Health and Safety Hazards* for a full discussion on release of hazardous materials.

During construction, monitoring of impacts to waters of the U.S. would be needed to assess turbidity levels, with adaptive management activities and/or corrective action measures taken should monitoring indicate unacceptable turbidity levels above ambient conditions. Ensuring that sand is placed high on the beach profile as part of dune system installation would also minimize indirect effects of additional sand or disturbance within the nearshore environments, with commensurate minimization in potential turbidity. These minimization measures are identified below in the Avoidance and Minimization Measures (AMMs) subsection of this impact discussion. Therefore, Project nourishment / renourishment activities would result in minimal impacts to marine water quality.

<u>Avoidance and Minimization Measures</u>

Implementation of the following AMMs would address this impact.

AMM MWQ-1a: Prepare and Implement Turbidity Monitoring Plan. A Turbidity Monitoring Plan shall be implemented during Project construction and nourishment/renourishment activities to monitor any effects to water clarity in offshore of and down coast from Broad Beach. The Plan shall be submitted to the California State Lands Commission (CSLC) staff for approval, in consultation with the Los Angeles Regional Water Quality Control Board, at least 2 weeks before Project mobilization and shall include, at a minimum, the following elements:

- Details on how the Applicant will continually evaluate construction-related turbidity relative to natural (background) turbidity occurring in unaffected areas during Project construction and nourishment/renourishment activities;
- Requirements for a qualified observer to record turbidity from a suitable vantage point during each day of dredging and construction; and
- Specific adaptive management activities and/or corrective action measures should include monitoring to indicate unacceptable turbidity levels above ambient conditions.

AMM MWQ-1b. Prepare Pollution Prevention Plan and Implement Best Management Practices (BMPs). The Applicant shall prepare a Pollution Prevention Plan, or Stormwater Pollution Prevention Plan (SWPPP), in accordance with Project plans and specifications and applicable regulations (e.g., State Construction Stormwater National Pollutant Discharge Elimination System permit requirements). The Plan shall be submitted to California State Lands Commission (CSLC) staff for review and approval at least 2 weeks prior to commencement of onsite Project activities. The Plan shall include a list of all heavy equipment and shall require all equipment to be stored and fueled in the Zuma Beach Parking Lot 12, which shall be conspicuously demarcated. The Project contractor shall ensure that the BMPs described in the Plan are implemented. Documentation that the BMPs are being implemented shall be maintained on site and shall be readily accessible for review by CSLC staff and any other authorities having jurisdiction. BMPs shall include, but not be limited to:

- Heavy equipment and construction activities shall be restricted to the defined construction areas, as demarcated by the Project engineer. Additionally, vehicles and personnel shall only use existing access roads to the maximum degree feasible.
- All equipment used onsite shall be properly maintained such that no leaks of oil, fuel, or residues will occur. No vehicle fueling shall occur on the beach or dune areas. Provisions shall be in place to remediate any accidental spills, in both the terrestrial and marine environments.
- Waste, such as removed materials, chemicals, litter, and sanitary waste at the Project site, shall be properly disposed of at a permitted off-site facility.

AMM MB-2c (Sand Placement Footprint Limitation) would apply to construction activities to limit sand deposition areas. **AMM HAZ-2** (Develop Hazardous Material Spill Prevention Control and Countermeasure Plan) would also apply to limit potential for hazardous materials release to the marine environment.

Rationale for Avoidance and Minimization Measure(s)

Monitoring turbidity during Project activities as required under AMM MWQ-1a would trigger responses to minimize turbidity impacts to the extent practical. Additionally, limiting the extent of backpassing to onshore areas within a defined reach would reduce potential disruption of nearshore sands. In addition, AMM MB-2c would minimize sand and shoreline disturbance and reduce the likelihood of increased turbidity within nearshore marine environments. Project activities would result in increased turbidity during construction activities and during equilibration after nourishment or backpassing, but this turbidity would be a minor adverse effect with application of these AMMs. Implementation of BMPs in the Plans required under AMMs MWQ-1b and HAZ-2 will reduce the potential for a release of oil and fuel. Impacts are considered to be minor with implementation of the avoidance and minimization measures.

Impact MWQ-2: Beach Nourishment and Backpassing Impacts to Trancas Lagoon

Beach nourishment and construction activities would occur near the mouth of Trancas Creek potentially affecting tidal exchange and the natural functioning of Trancas Lagoon (Minor Adverse Effect, Class Mi).

Impact Discussion (MWQ-2)

The Project's beach nourishment footprint would narrow at the east end of Broad Beach, just short of the mouth of Trancas Creek where it forms Trancas Lagoon. The mouth of the creek is generally blocked by a sand berm, which prevents tidal exchange and causes the creek water to pond during seasonal high flows. At certain times of the year, the lagoon may even extend eastward down the beach for several hundred feet (Illustration 3.5-2). The beach nourishment would result in substantial widening of the beach west and up drift of the Lagoon, and the new 300-foot-wide beach would generally coincide with the western boundary of the lagoon. The addition of significant amounts of new sand to this system immediately up drift of the lagoon may incrementally increase the length of periods between episodic breaching as part of natural lagoon processes which is caused by overtopping of the beach by impounded lagoon water, flooding, or by high tides and wave action Thus, the frequency and duration of lagoon breeching may be slightly altered by the Project as sand erodes from Broad Beach and moves down coast to and beyond the beach fronting the lagoon. However, these changes are not anticipated to be substantial or to lead to any major changes in lagoon water quality as the added sand would likely incrementally increase the width, but not the height of the berm. In addition, the lagoon system is well adapted to prolonged seasonal closures, which are a natural part of this ecosystem.

During both nourishment and construction, earthmoving equipment would be staged at Zuma Beach Parking Lot 12 and would cross the beach area below the creek mouth to access Broad Beach. Equipment anticipated to be crossing the area daily includes two bulldozers, two front-end loaders, two scrapers, an excavator, and dozens of heavy haul

Illustration 3.5-2. *Trancas Lagoon. Clockwise from upper left: Aerial view from in front of lagoon showing sand barrier; Ground view from mouth of creek showing lagoon from behind; Ground view of lagoon showing extension of water to the east; Aerial view of lagoon showing extension of water to the east.*

trucks. In the event that the creek was breached during construction operations, or when the lagoon has extended eastward along the beach (Illustration 3.5-2), construction impacts could impede or divert tidal exchange associated with the creek or result in construction impacts to the lagoon waters that would impact nearshore marine water quality.

As part of the Project, the BBGHAD has committed to halt construction activities when Trancas Lagoon is in a breached state, thereby reducing potential impacts related to construction equipment passing through the area of tidal exchange. Additionally, Project construction impacts would be temporary and, with implementation of the AMMs discussed below, would not significantly interfere with the natural functioning of the creek or lagoon. Therefore, this impact would be minor with implementation of AMMs.

<u>Avoidance and Minimization Measures</u>

Implementation of the following AMMs would address this impact.

AMM MWQ-2: Construction Limitations. In the event that the Trancas Lagoon mouth is breached during the initial construction period or at any time during backpassing operations, the Broad Beach Geologic Hazard Abatement District (BBGHAD) will halt construction during high flow episodes where the body of construction equipment would come in contact with flow into or out of the Lagoon. Construction activities would be halted until the creek is no longer in a breached state and there is at least 30 feet of dry sand between the lagoon mouth and Pacific Ocean, and California State Lands Commission (CSLC) staff authorizes recommencement of construction activity.

AMM TBIO-5a (Maintain the Hydrology of Trancas Creek Lagoon) would help to reduce potential construction impacts to tidal exchange and the natural functioning of Trancas Lagoon.

Rationale for Avoidance and Minimization Measure(s)

AMM MWQ-2 would reduce impacts to Trancas Lagoon water quality by restricting the types and timing of activity near the Lagoon. AMM TBIO-5a would also apply and would reduce ongoing impacts to the function of Trancas Creek and Lagoon from nourishment and backpassing. After implementation of these AMMs, impacts would be minor.

Impact MWQ-3: Revetment Retention Impacts Associated with Nutrient Loading of Area Waters

Retention of the revetment would protect Onsite Wastewater Treatment Systems (OWTSs) from wave action and reduce or eliminate contact between marine water and untreated sewage effluent (Beneficial Effect, Class B).

Impact Discussion (MWQ-3)

As discussed above, the emergency revetment placed in 2010 would be buried beneath a new system of sand dunes in the landward edge of the widened, nourished beach as part of the long-term strategy for protection of private property, including homes and septic systems, from coastal erosion. This shore protection would remain buried unless severe beach erosion or other conditions preclude maintaining sufficient beach width for protection. Following the initial replenishment, the beach profile is projected to erode over 5 to 10 years, which would trigger the proposed one-time additional nourishment. This renourishment is projected to extend the lifetime of the beach and dunes system to approximately 10 to 20 years, when the revetment would again become exposed.

Retention of the revetment would have a beneficial effect on marine water quality, as it would protect OWTSs from wave action. Contact between marine water and untreated sewage effluent would result in nutrient loading in the marine water offshore of Broad Beach. Nutrient loading in coastal waters can lead to algal blooms. Certain types of algae emit toxins. Coming into contact with these toxins can cause stomach aches, rashes and more serious problems for humans. Additionally, algal blooms consume large amounts of oxygen that fish, shellfish and other aquatic organisms need to survive. They make water cloudy, reduce the ability of aquatic life to find food, and clog fish gills. Toxins in some algal blooms can sicken or kill pets, marine mammals, fish and shellfish (USEPA 2012). Given that the presence of the existing revetment helps to protect OWTSs from wave action, it reduces these potential impacts and provides a beneficial effect to marine water quality.

Impact MWQ-4: Beach Sand Contaminant Resuspension and New Sand Chemical Compatibility

Initial and Follow-up Nourishment Events, including annual backpassing, would suspend or resuspend contaminants, particularly if onshore quarry sand sources contain contaminants (Negligible, Class N).

Impact Discussion (MWQ-4)

The import and distribution of 600,000 cubic yards of sand to Broad Beach and a near-term loss of approximately 25 percent of sand into the littoral zone could release contaminants from imported sand or resuspend contaminants from offshore sediments associated with the operation of heavy equipment on the intertidal beach. This disruption and could disperse contaminants within the water column and increasing their bioavailability. However, NPDES monitoring of seafloor sediments in the Bay indicates that the sediments are largely uncontaminated compared to other areas of the Bay, and that their physical properties would result in only temporary and localized turbidity increases and negligible impacts associated with contaminant resuspension.

Laboratory testing of sand from the three inland quarries has found this sand to be free of contamination with chemical pollutants. The sand sources at the quarry sites were formed in pre-industrial times and have not been exposed to modern sources of pollution. They are far removed from potential contamination sources and are upslope/upstream from urbanization or drainage sources. Additionally, all quarry materials are comprised of over 92.5 percent sand, which is less susceptible to absorbing contaminants than finer materials. As such, based on Tier I Assessment requirements, quarry material meet standards required to be used for the Project (see Appendix J).

Additional chemical testing of the quarry sand was performed by Moffatt & Nichol (2012) to inform decision-making and provide empirical data regarding the proposed sand material. One chemistry sample from each of the three quarries was tested by a certified analytical laboratory (American Environmental Testing Laboratory in Burbank, CA) for a standard suite of bulk chemistry analyses, as specified in the Inland Testing Manual, as administered by the USEPA and the USACE. The analysis included metals, polyaromatic hydrocarbons, phenols, chlorinated pesticides, and aroclors. Each chemistry sample was comprised of equal portions of four discrete samples taken from stockpile "quadrants." This compositing technique is commonly used to address spatial variability in sediment composition. Chemistry results were compared to established numeric screening guidelines as used by the USEPA and the USACE for material compatibility determinations.

Quarry sand samples resulted in Non-Detectable (ND) measurements for results for polyaromatic hydrocarbons, organic phenols, chlorinated pesticides, and organic aroclors. This means that the constituent being tested for was below the detection limit of the testing lab (CSLC 2013). Table 3.5-1 contains conventional measurements for the quarries, while Table 3.5-2 contains metal measurements for the quarries along with established screening levels for comparison.

Table 3.5-1. Conventional Measurement for Inland Sand Sources

Conventional Measurements	Grimes	P.W. Gillibrand	CEMEX
Percent Solids (total) (%)	98.6	99.9	99.4
Total Organic Carbon (mg/kg)	450	370	440
TPH (total) (mg/kg)	ND	ND	ND
Solids, Volatile (%)	0.79	0.184	0.398
Total Sulfides (mg/kg)	ND	ND	ND
Oil & Grease (mg/kg)	ND	ND	ND

Source: CSLC 2013.
Note: No established screening levels were identified in the report.
ND – Non-Detectable

Table 3.5-2. Metal Measurements for Inland Sand Sources

	RSL		CHHSL	NOAA Screening		Quarries		
Metals	C	NC	Residential	Salt ERL	Salt ERM	Grimes	P.W. Gillibrand	CEMEX
Arsenic (mg/kg)	0.39	22	0.07	8.2	70	1.74	ND	0.232
Cadmium (mg/kg)	1800	70	1.7	1.2	9.6	ND	ND	ND
Chromium (mg/kg)	--	--	100000	81	370	1.7	1.78	1.48
Copper (mg/kg)	--	3100	3000	34	270	2.24	0.748	1.22
Lead (mg/kg)	--	400	150	46.7	218	1.26	0.261	0.705
Mercury (mg/kg)	--	5.6	18	0.15	0.71	ND	ND	ND
Nickel (mg/kg)	--	--	1600	20.9	51.6	1.57	1.12	1.25
Selenium (mg/kg)	--	390	380	--	--	ND	ND	ND
Silver (mg/kg)	--	390	380	1	3.7	ND	ND	ND
Zinc (mg/kg)	--	2300	2300	150	410	10.3	3.68	8

RSL- 'Regional Screening Level' established by the USEPA (www.epa.gov/region9/superfund/prg/)
CHHSL – 'California Human Health Screening Levels' established by the California Office of Environmental Health Hazard Assessment
C – Carcinogenic
NC – Noncarcinogenic
Salt ERL – 'Effects Range Low' contaminant concentration in salt water for which effects are rarely seen
Salt ERM – 'Effects Range Medium' contaminant concentration in salt water for which effects are routinely seen

Chemical analysis results determined that of the analyzed chemicals, none were over any established screening levels. Therefore, using sand from the quarries would have a negligible impact to marine water quality in the vicinity of the Public Trust Impact Area.

3.5.5 Summary of Marine Water Quality Impacts and AMMs

Impact	Class	AMMs
MWQ-1: Project Implementation Impacts due to Turbidity or Other Impairment of Area Waters	**Mi**	**AMM MWQ-1a**: Prepare and Implement Turbidity Monitoring Plan **AMM MWQ-1b**: Prepare Pollution Prevention Plan and Implement Best Management Practices (BMPs) **AMM MB-2c**: Sand Placement Footprint Limitation **AMM HAZ-2**: Develop Hazardous Material Spill Prevention Control and Countermeasure Plan (SPCCP)
MWQ-2: Beach Nourishment and Backpassing Impacts to Trancas Lagoon	**Mi**	**AMM MWQ-2**: Construction Limitations **AMM TBIO-5a**: Maintain the Hydrology of Trancas Creek Lagoon
MWQ-3: Revetment Retention Impacts Associated with Nutrient Loading of Area Waters	**B**	No AMMs recommended
MWQ-4: Beach Sand Contaminant Resuspension and New Sand Chemical Compatibility	**N**	No AMMs recommended