FINAL
ENVIRONMENTAL ASSESSMENT

FOR THE

SANTA ANA RIVER MARSH DREDGING PROJECT
Newport Beach, Orange County, California

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS
SOUTH PACIFIC DIVISION
LOS ANGELES DISTRICT

July 2012

FINAL
FINDING OF NO SIGNIFICANT IMPACT
SANTA ANA RIVER MARSH
DREDGING PROJECT
NEWPORT BEACH, ORANGE COUNTY, CALIFORNIA

I have reviewed the attached Environmental Assessment (EA) that has been prepared for the proposed Santa Ana River Marsh Dredging Project, located in Newport Beach, Orange County, California. The project proposes to remove nearshore compatible material that would be disposed of in the nearshore at Newport Beach, while material compatible for the LA-3 Ocean Dredged Material Disposal Site would be disposed of there. Material not compatible for ocean disposal would be excavated under dry conditions and disposed of at an upland landfill. All sediment has been tested in accordance with applicable regulations and found to be compatible with the designated disposal areas. The California least tern island within the Marsh would also be cleared and grubbed to improve nesting habitat for the species. Construction would occur between September 2012 and March 2013 to avoid impacts to sensitive species.

The proposed project would serve the following purposes: (1) restore the channels that have experienced shoaling to design depths; (2) restore tidal circulation and flushing within the marsh; (3) prevent water quality problems and stagnation; (4) prevent transition of Marsh habitats, which are used by endangered species; and (5) provide beach nourishment material for local beaches eroded by littoral processes. The primary benefits from the proposed project would be restoration of design channel depths, which would provide improved circulation and tidal flushing necessary to support the salt marsh habitat. Secondary benefits include replenishment of beach sands with placement of some dredged material in the nearshore at Newport Beach.

Alternatives to the proposed action have been included in this document, in compliance with the National Environmental Policy Act. This EA is prepared in compliance with all applicable laws, and regulations including but not limited to the Clean Water Act, the Coastal Zone Management Act, the National Historic Preservation Act, the Endangered Species Act, and the Clean Air Act. The project would not occur until all required permits are obtained for the proposed project.

The EA addresses impacts related to implementation of the proposed project for all environmental resources. The proposed project may result in short term minor and negligible impacts to environmental resources including but not limited to: biological, water, air, noise, and traffic. Mitigation measures have been developed in coordination with the resource agencies to avoid or minimize impacts to environmental resources.

The proposed project has been evaluated pursuant to Section 404(b)(1) of the Clean Water Act. The proposed project complies with the guidelines promulgated by the Administrator, Environmental Protection Agency, under authority of Section 404(b)(1) of the Clean Water Act (33 USC 1344). A Section 401 Water Quality Certification from the California Regional Water Quality Control Board would be obtained prior to construction.

The proposed project activities and related impacts have been analyzed as required by the Coastal Zone Management Act (CZMA) of 1972. The Corps finds this project to be consistent to the maximum extent practicable with the articles and provisions of the CZMA and the California Coastal Act. Coordination occurred with California Coastal Commission (CCC) staff and concurrence on the project was received.

This project complies with Section 106 of the National Historic Preservation Act (36 CFR 800). Dredging and excavation will occur in previously constructed areas, and disposal would occur in areas used for other dredging projects. The environment and setting for proposed construction has been disturbed to such a degree that no significant cultural resources could have persisted. Therefore, in accordance with 36 CFR 800.3(a)(1), the proposed project does not have the potential to cause effects.

Coordination with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service occurred during and after the public review period to ensure compliance with the Endangered Species Act. The project area and vicinity support federally and state listed species, including the light-footed clapper rail, California least tern, western snowy plover, coastal California gnatcatcher, and Belding's savannah sparrow.

I have considered the available information contained in the Environmental Assessment and it is my determination that impacts resulting from the proposed Santa Ana River Marsh Dredging Project will not have a significant adverse effect upon the existing environment or the quality of the human environment. Preparation of an Environmental Impact Statement (EIS), therefore, is not required.

19 JUL 2012
Date

R. Mark Toy, P.E.
Colonel, US Army
Commander and District Engineer

Table of Contents

Figures

Tables

Appendices

1.0 Introduction

The U.S. Army Corps of Engineers (Corps) proposes to remove shoaled sediment within the Santa Ana River Marsh (Marsh), located in the City of Newport Beach, Orange County, California. The proposed project would involve the dredging of sediment from channels within the southern portion of the Marsh to restore habitat design and Marsh function, and the disposal of this material in the nearshore waters of Newport Beach, at the LA-3 Ocean Dredged Material Disposal Site (ODMDS), and at an upland landfill. Without the project, material will continue shoaling in the channels, ultimately reducing water circulation and adversely affecting vegetation, wildlife and benthic/aquatic communities within the marsh.

Additional project features include the clearing and grubbing of the California least tern island (tern island) to remove weedy vegetation and restore nesting habitat.

The purpose of the Final Environmental Assessment (EA) is to address potential impacts that may result from the dredging, disposal and tern island maintenance activities. The dredging and other work would be performed by the Corps. The EA has been prepared in compliance with the National Environmental Policy Act (NEPA). As the proposed project is fully federally funded, and has no local sponsor, a California Environmental Quality Act (CEQA) analysis is not required.

1.1 Project Location

The 92-acre Santa Ana River Marsh site is located in the City of Newport Beach, Orange County, California. The Marsh extends from approximately 0.25 miles to 1 mile upstream of the mouth of the Santa Ana River, on the east side of the River (Figure 1). The site is bounded by Pacific Coast Highway to the south, the Santa Ana River to the west, West Newport Oil property to the east, and a trail extended from 19th Street to the north. The property is shown on the U.S. Geological Survey (USGS) 7.5' Newport Beach topographic quadrangle map in Section 20, T. 6 S., R. 10 W. The proposed dredge footprint totals approximately 16 acres within the 54-acre southern portion of the Marsh property (Figure 2). The tern island totals approximately 7 acres and is located on the southwestern corner of the Marsh (Figure 3).

The disposal site for nearshore compatible dredged material is located in the nearshore waters at Newport Beach, approximately 0.6 miles downcoast of the mouth of the Santa Ana River (Figure 4). Dredged material will be placed in the nearshore environment in waters -16 to -22 feet Mean Lower Low Water (MLLW), approximately 800 feet offshore.

The disposal site for uncontaminated material that is not physically compatible for nearshore waters (due to the amount of fines) is located at the Environmental Protection Agency's (EPA) open ocean disposal site, LA-3, approximately 7.5 nautical miles southeast of Newport Beach (Figure 5). Dredge material will be placed in open ocean waters of approximately 648.8 acres in depths of -1500 to -1675 MLLW.

Material that is neither physically nor chemically compatible with ocean disposal would be disposed of at an upland landfill in Orange County or Los Angeles County.

1.2 Past Prepared Reports

- Phase I General Design Memorandum (GDM) on the Santa Ana River Mainstem, including Santiago Creek (September 1980); U.S. Army Corps of Engineers. The Phase I GDM focused on detailed evaluation of alternatives for the Santa Ana River Mainstem Project, including marsh restoration, which led to the selection of the plan subsequently authorized for construction.
- Marsh Restoration, Lower Santa Ana River Channel (September 1987); Simons, Li & Associates, Inc. This report presented the design analysis and plan for restoration of the 92-acre Santa Ana River Marsh.
- Phase II General Design Memorandum/Supplemental Environmental Impact Statement (GDM/SEIS) on the Santa Ana River Mainstem, including Santiago Creek (August 1988); U.S. Army Corps of Engineers. The Phase II GDM presented the various elements of the recommended plan of improvements for the Santa Ana River Mainstem Project. The report was used as the basis for initiating plans and specifications for the various elements of the project.

1.3 Background

The Santa Ana River Mainstem Project is a regional approach to provide flood control solutions for the Santa Ana River and its tributaries within San Bernardino, Riverside and Orange Counties. Solutions include the construction of Seven Oaks Dam, modifications to Prado Dam, and improvements to the Santa Ana River mainstem from Prado Dam to the Pacific Ocean.

As part of the Corps' Santa Ana River Mainstem Project, the Phase I and Phase 2 GDMs called for modifications to the Santa Ana River Mouth including 1) widening and deepening of the Santa Ana River, 2) merging the Greenville-Banning Channel with the Santa Ana River approximately 1.5 miles upstream of the ocean outlet, and 3) widening the Talbert Channel and relocation of its ocean outlet northwest of the existing outlet. These modifications resulted in the elimination of approximately 8 acres of coastal salt marsh near Pacific Coast Highway.

Construction within the lower reach of the Santa Ana River improved flow rates and water quality, which had been impaired by the continual formation of a "sand plug" at the river mouth (i.e., wave-deposited sand blocking flow from the river mouth into the ocean). Prior to project construction, the sand plug was periodically removed mechanically several times per year to restore flow into the ocean.

The 92-acre Santa Ana River Marsh was acquired, restored, and protected to offset impacts to coastal salt marsh by the Santa Ana River Mainstem Project. Eight acres of the Santa Ana River Marsh site represent mitigation for the loss of 8 acres of coastal salt marsh from construction of the project and an additional 84 acres was restored above and beyond the mitigation requirements for the preservation and enhancement of endangered species habitat. At the time of purchase there were both active and abandoned oil wells on the site, which required extensive cleanup of oil contamination (USACE 1988). Restoration of the Marsh was completed by the Corps in 1992. The site now provides restored coastal salt marsh habitat for a variety of native plants and wildlife, including federally and/or state listed endangered species such as light-footed clapper rail (*Rallus longirostris levipes*) and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*). An approximately 7 acre sand capped island was constructed within the Marsh to provide nesting habitat for the federally endangered California least tern (*Sterna antillarum browni*).

1.4 Authorization

The Santa Ana Mainstem Project was federally authorized by the 74th Congress, on June 22, 1936. The Phase I GDM and Supplemental EIS were completed in 1980 by the Corps, and a supplement to Phase I was issued in 1985. The full authorization language is included in the 1980 Phase I GDM. Additional study was authorized by Congress under the Water Resources Development Act (WRDA) of 1986, Public Law 99-662. The Phase II GDM/SEIS was completed in 1988. Subsequent authorizations were included in the Energy and Water Appropriation Act of 1988 (which included the San Timoteo feature), WRDA 1990 (Santa Ana Trails), WRDA 1996 (Prado Dam, SR 71), and WRDA 2007 (Santa Ana River Interceptor Line protection/relocation).

1.5 Coordination with Resource Agencies

The principal agencies with which this project has been and will continue to be coordinated include: U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), California Coastal Commission (CCC), California Department of Fish and Game (CDFG), and California Regional Water Quality Control Board (Orange County RWQCB). The complete mailing list for copies of the Final EA is included in Appendix A. Comments and suggestions from these agencies were incorporated in the preparation of this Final EA to enhance the degree of environmental commitment and minimize the extent of impact from this project. Responses to comments are included in Appendix E.

2.0 Purpose and Need

Transport of sand from the ocean and sediments from the surrounding watershed, including the Santa Ana River and local runoff, have shoaled the channels of the Marsh. Sediments have shoaled over the past 20 years since the original construction of the Marsh in 1992. This has dampened the tidal cycle, which prevents proper tidal flushing and will eventually generate poor water quality. Populations of benthic and aquatic organisms, which are prey items for many shore birds that use the marsh, may decline, or may not be able to persist in certain areas. Continued shoaling will also create conditions for a transition in the Marsh's intertidal habitats from open water, cordgrass, and pickleweed to less vegetated sand flats, or even upland habitat types. This in turn would limit the diversity of wetland-dependent wildlife species that currently occur. Further, dense weeds have established across the Marsh's California least tern island, preventing this endangered species from nesting there.

The proposed project would serve the following purposes: (1) restore the channels that have experienced shoaling to design depths; (2) restore tidal circulation and flushing within the marsh; (3) prevent water quality problems and stagnation; (4) prevent transition of Marsh habitats, which are used by endangered species; and (5) provide beach nourishment material for local beaches eroded by littoral processes. Removal of the accumulated sediments will increase tidal range and improve circulation of the tidal flow throughout the marsh, which will result in improved water quality and overall habitat quality for wildlife.

3.0 Alternatives

3.1 No Project Alternative

The “No Action” alternative would result in continued shoaling in the Marsh channels, eventually resulting in poorer tidal flushing and circulation and further transition of intertidal habitats that support endangered species to drier upland habitats. The California least tern would continue to have limited nesting opportunities on the tern island. The “No Action” alternative would not meet restoration goals for the Santa Ana River Marsh.

3.2 History of the Development of Alternatives

The following paragraphs provide discussion on the development of alternatives.

The Corps performed geotechnical surveys and sediment sampling, including grain size analysis, bulk chemistry analysis, and toxicity testing for the proposed dredge material, as well as grain size analysis at the proposed nearshore disposal site and on the adjacent beach. Dredging alternatives were developed based on the results of the geotechnical surveys, the amount of shoaling that has occurred, suitability of material for nearshore and ocean disposal, proximity of disposal sites and landfills, the mechanical operations and limitations of available dredges, the duration of the project, and potential impacts to biological resources. Alternatives for clearing and grubbing the tern island were also evaluated.

3.3 Dredging Alternatives Eliminated from Further Consideration

<u>3.3.1 Disposal Alternatives</u>

<u>Onshore Disposal</u>

Onshore disposal was considered for uncontaminated sediments. However, sediment sampling results showed that dredge material was not physically suitable for disposal directly on the exposed beach. Although the sediment was free of harmful chemical contaminants, the grain size of the sediment (a mix of sandy and silty material) was not compatible for placement directly on the beach. Since it could temporarily change the character and appearance of the beach in the disposal area, onshore disposal alternatives are not considered feasible and are eliminated from further consideration. Nearshore disposal, on the other hand, would allow material to mix with other sediment in the littoral zone prior to being carried naturally onto the beach or downcoast, with little or no observable change onshore.

<u>3.3.2 Equipment Alternatives</u>

<u>Clamshell (Bucket) Dredge</u>

For dredging of the Marsh, a clamshell dredge would not be efficient. In order to transport dredged sediment from the Marsh to the nearshore or to the ocean on a scow, a pipeline must be used. Considering the operation of a clamshell dredge, using this equipment to feed a pipeline is not a feasible option. In addition, the clamshell dredge results in higher levels of turbidity at the dredge site and less accuracy in terms of dredging depths. This option is eliminated from further consideration.

Hopper Dredge

Hopper dredges are used to dredge in the open ocean and are too large for the extremely shallow and narrow Marsh channels. This option is eliminated from further consideration.

Underwater Pipeline

A pipeline to the nearshore disposal site would not be placed underwater for the entire distance to the site as this alternative is logistically complicated and may result in increased dredging downtime if pipes are damaged during winter storms. This alternative is not desirable when other less complicated alternatives are available, and is eliminated from further consideration.

Dredging a Sand Trap

A sand trap could be dredged in the Santa Ana River to capture sediment before entry into the Marsh. This option, however, would not address existing shoaling in the Marsh and is not likely to provide long-term benefits of precluding future shoaling. Therefore this option is eliminated from further consideration.

3.4 Proposed Project Description

The following are the specific proposed actions for Marsh dredging and other project activities: (1) dredging and removal of sediment in the Marsh channels to restore design depths; (2) discharge of compatible dredged material in the nearshore at Newport Beach and at the LA-3 ODMDS; (3) disposal of non-compatible material at an upland landfill; (4) clearing and grubbing of the tern island; and (5) environmental monitoring. Environmental commitments to minimize impacts to environmental resources are outlined in Section 8.0.

Sediment removal would take place within the Marsh channels in the southern portion of the Marsh (Figure 2). These Marsh channels total approximately 10,200 linear feet and the flat channel bottoms range in width from 8 to 115 feet depending on the point in time during the tidal cycle.

The proposed dredging project would not preclude the need for future maintenance. Although this EA addresses only this year's project, it is possible that additional dredging may be required in the future. Based on the time it has taken since the initial marsh restoration for shoaling to reach current levels, subsequent dredging may not be required for another 15 to 20 years.

3.4.1 Description of Dredge Material

To determine the suitability of the Marsh dredge materials for discharge in the nearshore at Newport Beach and at LA-3 ODMDS, an investigation was performed by AMEC Geomatrix, Inc. between January and March of 2011. AMEC Geomatrix's investigation report, dated July 2011, presented the findings of the sediment sampling, bulk chemistry testing, geotechnical testing, toxicity and bioaccumulation (Tier III) testing of the Marsh dredge materials (AMEC 2011). The report is enclosed in Appendix B.

Seven dredge areas (A through G) were identified by USACE engineers and the project dredge depths were determined (Figure 6). The project's design elevations ranged from 0.0 to -2.5 ft MLLW. Based on the project's dredge design, AMEC Geomatrix collected sediment from 22 sample locations within the seven dredge areas. AMEC Geomatrix also collected sediment samples from two beach transect locations at West Newport Beach and from the LA-3 reference site.

The sediment samples collected were used to perform chemistry, geotechnical, and toxicity and bioaccumlation testing.

Chemical Testing

Calscience Environmental Laboratories conducted chemical testing of the composite sediment samples collected from the Marsh by AMEC Geomatrix. Each sample was analyzed for general chemistry parameters, metals, and organic chemicals. Not considering physical or bioaccumulation test results, the chemical analysis results showed that the Marsh sediments from all areas tested would be potentially suitable for beach or nearshore placement and that the dredge sediments would have no or minimal toxicity impacts on benthic organisms at the Newport Beach nearshore disposal area.

Geotechnical Testing

Geotechnical testing, including grain size analysis, was performed on sampled sediments. Geotechnical testing results indicated that Areas B and G are considered compatible for nearshore placement. The relatively high fines content of the sediments in Areas A, C, D, E, and F precludes those areas from consideration for either beach or nearshore placement.

The Southern California Dredge Materials Management Team, (SC-DMMT) discussed the results of the bulk chemical and grain size compatibility analyses and concurred with the USACE's receiving beach compatibility determination. The SC-DMMT recommended that Area B and Area G be determined suitable for nearshore placement. No areas were found to be suitable for placement on the beach. The remaining Areas (A, C, D, E, and F) were then subject to toxicity and bioaccumulation testing to determine suitability for ocean disposal at the LA-3 ODMDS site. Table 1 below summarizes the

Corps of Engineers and SC-DMMT receiving beach compatibility determination.

Table 1 Receiving Beach Compatibility		
Designated Area	Beach Compatible	Nearshore Compatible
Area A	No	No
Area B	No	YES
Area C	No	No
Area D	No	No
Area E	No	No
Area F	No	No
Area G	No	YES

Toxicity & Bioaccumulation Testing

Areas (A, C, D, E, and F) were subject to Toxicity and Bioaccumulation testing to determine suitability for ocean disposal at the LA-3 ODMDS site. Toxicity tests were performed for the sediment samples from Areas A, C, D, E, F, and the reference marine sediment sample collected from the LA-3 reference site. The samples were tested for solid-phase (SP) toxicity and Suspended Particulate-Phase Toxicity (SPP).

While Areas D and E were compatible for ocean disposal based on chemistry and grain size analyses, toxicity test results showed that these areas were not suitable for placement at the LA-3 reference site. While these areas did not pass toxicity, it was not apparent from the test results what caused them to fail.

To further determine suitability of Areas A, C, and F for disposal at LA-3, a bioaccumulation evaluation was completed for these areas. The bioaccumulation tests for Areas A, C, F, and the LA-3 reference site were analyzed for metals and organic chemicals. Testing results indicate that the Areas A, C, and F are suitable for ocean disposal at the LA-3 site.

The USACE and the SC-DMMT met on July 27, 2011, to discuss the project's final overall testing results and disposition of the Marsh sediments. Based on grain size, chemistry, toxicity and bioaccumulation testing results, the USACE and SC-DMMT determined that Areas B and G are suitable for nearshore placement; Areas A, C, and F are not suitable for nearshore but are suitable for placement at the LA-3 ODMDS site. Areas D and E are not suitable for nearshore or LA-3 placement, and instead require disposal at an upland landfill. Final determination is summarized in Table 2.

Table 2 Disposal Site per Area	
Area A	LA-3
Area B	nearshore
Area C	LA-3
Area D	landfill
Area E	landfill
Area F	LA-3
Area G	nearshore

The approximate volume of material to be dredged in each area is presented in Table 3. Note that dredge volumes are based on average depths and may change based on variable bathymetry (uneven deposition patterns), or if additional sediment deposits prior to dredging. Dredge area boundaries are also approximate, and some overlap between dredge areas as well as side channel sloughing may occur.

Table 3 Dredge Volumes per Area

Area	Vol (cy)	Vol + OD* (cy)
Nearshore (B, G)	18,000	23,000
LA-3 (A, C, F)	23,000	30,500
Upland Landfill (D, E)	20,000	20,000**
Total	61,000	77,000

*Overdepth (OD) = 0.5 feet
**No overdepth applied to upland landfill areas

3.4.2 Dredging

Proposed dredging would occur to design depths ranging from 0 feet MLLW to -2.5 feet MLLW, and would remove approximately 55,000 cubic yards (cy) of nearshore and LA-3 compatible sediment from the western portion of the project area (Areas A, B, C, F and G) (Figure 6).

Dredging operations would be conducted using a small floating, hydraulic dredge typically used in lakes and ponds. The lightweight, trailer-able, self-propelled dredge would be launched from shore from within the Marsh. The hydraulic dredge is diesel powered and uses a cutterhead to mechanically dislodge the sediment, which would then be pumped through an 8-inch pipeline for transport to the nearshore site and to the offshore barge/scow for transport to LA-3 disposal site.

Water quality monitoring would be performed during dredging and disposal operations, as outlined in Sections 5.4 and 8.0.

The floating dredge draft requires a minimum of 2.5 ft (30 inches) of water to operate, which requires that a consistent water level be maintained within the Marsh during dredge operating hours. The water level will be maintained by manipulating flow at the downstream tide gate and culvert connecting to the northern Marsh. Water flow will be controlled by using a dike and/or weir system. The dike/weir system will likely be achieved through one of several methods including sand bags, steel/concrete sheet pile, and/or concrete barriers (i.e. K-rails). Water levels in the Marsh up to +3.0 MLLW will be maintained to ensure dredge draft requirements are met; water levels above +3.0 MLLW will flow naturally with the tidal cycle. Since the tidal cycle is continually varying over time, and the dredge requires sufficient water for the entire work day, it is necessary to control the water level throughout the nighttime hours so that sufficient water exists within the marsh at the beginning of each work day. During non-work periods exceeding 24 hours (i.e. weekends, holidays), when feasible with the tides and work schedule, the +3.0 MLLW water level maintained in the marsh will be released and tidal flushing returned to its normal cycle until construction resumes during regular working hours.

The 8-inch pipeline would be used to convey dredged sediment from the Marsh. Due to the small diameter pipe size, the distance to pump to the ocean disposal sites exceeds typical pump capability, and a booster pump will likely be required to maintain an efficient flow rate. One booster pump would be located within the designated contractors work area, on the beach adjacent to the south jetty, to support movement of dredge material through the pipeline. The booster pump may be either diesel or electric powered.

Within the Marsh, the 8-inch pipeline would be strategically placed within and along the Marsh channels to avoid impacts to sensitive upland habitats. The pipeline would cross the levee near the downstream tide gate and be placed under the Pacific Coast Highway bridge adjacent to the South Jetty. Ramps would be built over the pipeline to maintain pedestrian and vehicle crossing along the length of the pipeline. Equipment to move and place the pipeline will include land based construction equipment, such as bucket loaders.

The rate of solids delivery through an 8-inch pipeline from the small dredge to the ocean disposal areas is expected to be approximately 50 cubic yards (cy)/hour (hr), or 300 cy per 10 hour work day.

3.4.3 Dredge Disposal

Water quality monitoring would be performed during disposal operations, as outlined in Sections 5.4 and 8.0.

Disposal at LA-3

Uncontaminated material not suitable for the nearshore (Areas A, C and F) would be discharged at the LA-3 ocean disposal site located approximately 7 nautical miles southeast of the Marsh, on the slope of Newport Canyon (Figure 5). Dredge material would be placed in open ocean waters of approximately 649 acres in depths of -1500 to -1675 MLLW. Approximately 31,000 cy of material would be disposed of at LA-3 during this dredging operation.

To dispose at LA-3, the pipeline would continue from the beach into the ocean to a barge offshore of the mouth of the Santa Ana River, outside the surf zone. Scows would dock at the barge to be filled with sediment from the pipeline and would then transit to the LA-3 site via tug boat.

Because dredged material would be mixed with water for hydraulic transport through the pipeline, solid content in the slurry mixture would be limited to about 20 percent. To avoid making approximately 5 times as many trips to the ocean disposal site, water would be removed from the disposal scow prior to leaving the barge for the ocean disposal site. This is generally done by allowing the water overlying the dredged material to overflow from the barge. This is allowed in the case of clean, sediments suitable for ocean disposal that do not have contaminants that would impact water and sediment quality at the site of overflow.

Disposal Site at Newport Beach

The grain size of a portion of the dredge sediments (Areas B and G) is compatible with sediments located in the nearshore environment; therefore these compatible sediments would be discharged in the nearshore waters at Newport Beach. Depositing these sediments nearshore, as opposed to directly on the beach, allows natural mixing with existing littoral material. The sediment that ultimately reaches and nourishes the beach would feel and appear substantially similar to what currently exists on the beach.

The nearshore disposal site is located approximately 3,000 feet southeast of the south jetty at the mouth of the Santa Ana River (Figure 4), offshore of the westernmost portion of the groin field. The rectangular disposal area is approximately 1,000 feet by 200 feet and 4.6 acres, and the center of the disposal area lies approximately 800 feet offshore. Dredged material will be placed in the nearshore environment in waters -16 to -22 feet Mean Lower Low Water (MLLW). This disposal site has been used for previous Corps dredging projects including Santa Ana River Dredging and Upper Newport Bay Dredging.

Approximately 24,000 cy of material would be disposed of in the nearshore during this dredging operation.

For nearshore disposal, the contractor may elect to transport the material using the offshore barge and scows, or use pipeline placed along the beach. For the barge/scow option, the pipeline would continue adjacent the South Jetty directly out to sea to the barge. The scow would then transport the material to the nearshore disposal site.

For the pipeline option, additional pipeline would be laid along the beach, parallel to the shoreline for approximately 0.6 mile, and then offshore approximately 1,000 feet to the nearshore disposal site. If pipeline is placed along the beach, ramps would be built over the pipeline to maintain pedestrian and vehicle crossing along the length of the pipeline. The pipeline along the beach would be removed after disposal in the nearshore is complete.

3.4.4 Excavation and Disposal

Material that is not compatible for LA-3 or nearshore disposal (Areas D and E) would be removed under dry conditions using land based construction equipment and disposed of at an upland landfill. Excavation would occur to design depths ranging from -0.5 feet to -2.5 feet. Approximately 25,000 cy of material would be disposed of at the upland landfill.

There are several candidate landfills within the Orange County and Los Angeles County area. Landfill locations include the cities of Brea, San Juan Capistrano, Irvine, and Azusa (Figure 7). The Contractor will be able to select from any of these available options with prior Corps approval. For project planning purposes, this analysis will evaluate impacts from the location farthest from the project site, which is the City of Azusa, approximately 45 miles from the Marsh.

Material disposed at the landfill must pass a free liquids test in compliance with 40 CFR 264.314 and 265.314. Requirements necessitate that materials not exceed the prescribed moisture content, therefore dredging and extracting the sediment as a slurry in this area is counterproductive to this effort. In order to create drier conditions, the area would be diked off using sheet pile or sandbags and water would be pumped out to enable the use of land based construction equipment.

After dewatering, sediment will be removed from the Marsh channels using front end loaders and brought to an on-site material handling site. The site consists of 0.8 acres between the Marsh channel and the existing access road to be used for excavated material handling, storage, staging, and to allow access between the dozer and trucks. Excavated material will be placed in trucks waiting on the adjacent access road. Since the Marsh channels are relatively narrow and shallow, construction equipment will be relatively smaller in size to minimize impacts to adjacent habitat.

If after excavation the dredge materials are not immediately suitable for landfill disposal due to excess moisture content, a drying additive may be applied to the sediment to quickly dry the soil and allow for faster excavation and transport. Typical drying additives include fly ash, quicklime, or cement. The use of drying additives will be the minimum quantity necessary to reduce the dredge material moisture content the minimum amount necessary for landfill acceptance. If the contractor elects to use a drying additive, the contractor will be required to mix the dredge sediments with the drying additive within the material handling site. The drying additive will be mixed in slurry form to reduce airborne dust. The drying additive will then be removed with the dredge sediments. Additionally, the material handling site will be required to contain all dredge sediments so that no drying additive will leach into the surrounding environment.

The tidally driven water levels in Semeniuk Slough, which is adjacent and connected to the Marsh (Figure 8), would continue to be maintained during the excavation portion of the project. The excavation work will require a dike system that will separate the Semeniuk Slough from the larger body of the marsh, thereby cutting off tidally driven water. A system consisting of submerged and/or exposed pipes possibly supplemented with pumps will be used to connect the Semeniuk Slough with the remainder of the marsh. If pumps are used, the pumps will be located in the work area on the northern boundary of the project area as far from the residential housing as possible.

Water quality monitoring would be performed before and during excavation operations, as outlined in Sections5.4 and 8.0, to minimize impacts to water quality in Semeniuk Slough. If water quality is found to be impacted due to project activities, remedial actions would be taken to improve it. See Section 5.4 for an analysis of impacts to water quality and Section 8.0 for environmental commitments related to water quality.

<u>Haul Routes</u>

The trucks used to haul material excavated from the Marsh channels in Areas D and E may use one or two routes to access the project area. Trucks may use the northbound lanes on Pacific Coast Highway to enter and exit the access road that passes through the Newport Banning Ranch property and onto the Marsh. Trucks may also access the Marsh using the Santa Ana River levee from Victoria Street, entering and exiting via the access gate just north of the upstream tide gate (Figure 9).

The trucks may use the end of the access road, adjacent to the Santa Ana River levee, to turn around as needed. Trucks would use major streets in Huntington Beach and Fountain Valley to reach the 405 Freeway and continue on to the landfill.

The access road that bisects the Marsh is jointly owned by the Federal government and Newport Banning Ranch. The Federal government owns an easement for use of the road for ingress and egress to Federal lands. The access road is frequently used by West Newport Oil Company, who operates the adjacent oil fields, and by the Orange County Sanitation District, who operates a pipeline located under the road that services the water treatment plant across the Santa Ana River.

On the southern boundary of the Marsh, Sunset Street would be used to install and later remove a small dike to support the excavation portion of the project. The end of Sunset Street would be used for ingress and egress of construction equipment and materials only. Storage of equipment would not be permitted in this area. Canal Street and Orange Street would be used to access Sunset Street. The Contractor would use 10 cubic yard dump trucks for the dike placement. In order to minimize traffic and disturbance to the surrounding residential area, use of these streets would be limited to a total of ten days in aggregate.

3.4.5 Tern Island Clearing and Grubbing

The California least tern island would be cleared and grubbed to restore nesting habitat. . Grubbing refers to the removal of vegetation and root mass below the surface. This is typically done by clearing the vegetation and discing the soil to disturb the root system. An existing small roadway would be used to cross the Marsh channel to the tern island. In order to provide bearing support for the construction equipment, the roadway would be temporarily improved using gravel or steel plates (Figure 10). A small bucket loader and dump truck would access the tern island for clearing activities. All vegetation removed from the island would be trucked to a green waste facility. After clearing is complete, the installed roadway would be removed.

3.4.6 Equipment Storage/Staging Areas

A total of approximately 1.0 acre within the Marsh would be cleared of pickleweed and non-native shrubs to create a staging area for dredging and construction equipment (Figure 11). The pipeline would be left in place for the duration of dredging activities. An approximately 0.4 acre parcel owned by the City of Newport Beach, located just south of the Pacific Coast Highway bridge, would be used to store earthmoving equipment and supplies for maintenance of the pipeline and offshore barge (Figure 12). This site has been used extensively for previous construction projects. If required for dredging, the booster pump would likely be placed in this area in order to minimize impacts to the beach.

An approximately 0.7 acre area would be cleared at the westernmost end of the access road, adjacent to the SAR levee, to allow for turn around of trucks hauling sediment to the landfill. This area was previously used by the Orange County Sanitation District for construction and was later re-planted. The Corps would coordinate with the appropriate agencies to use this area for truck turn around.

Staging and access areas would be restored to native Marsh habitat/pre-project conditions after construction is complete.

3.4.7 Project Schedule

Schedule

It is estimated that project construction may take approximately six months. Project activities would occur outside the nesting season for migratory birds sometime between September 2012 and March 2013. Construction would not be performed from March 15^{th} to September 15^{th} to avoid impacts to sensitive species.

Dredging would occur for approximately 4 months. Excavation of non-compatible material would occur for approximately 1 month between September and December to avoid the rainy season. Clearing and grubbing of the tern island would occur for approximately 2 weeks between September 15 and March 15 to avoid impacts to nesting birds. Dredging, excavation, and clearing and grubbing would likely occur concurrently.

While construction activities are limited to fall and winter months due to nesting season, the greater likelihood of storms and severe weather during winter may result in forced down-time for dredging operations. This may influence the dredging schedule. Activities within the marsh are less likely to be impacted due to the Marsh's protected nature; delays would most likely be related to the offshore LA-3 disposal operations. Energetic sea conditions may cause increased difficulty in maintaining the disposal pipeline and in conducting vessel and scow operations. The estimated schedule for dredging includes an estimate of adverse weather days.

Work Hours

The proposed dredging would be limited to daytime hours as required by the City of Newport Beach's noise ordinances. City ordinances outline that construction may occur on weekdays from 7 a.m. to 6:30 p.m. and on Saturdays from 8 a.m. to 6 p.m. No construction is allowed on Sundays or during nighttime hours.

4.0 Affected Environment

The following paragraphs provide discussion of existing environmental resources for the project areas. Affected environment and potential impacts at the LA-3 ODMDS were assessed as part of the site designation process (USEPA/USACE 2005).

4.1 Physical Environment

4.1.1 Santa Ana River Marsh

The Marsh is located near the mouth of the Santa Ana River, which originates at its headwaters in the San Bernardino and San Gabriel Mountains and flows through San Bernardino, Riverside, and Orange Counties, meeting the Pacific Ocean in Newport Beach. The Santa Ana River was uncontrolled until approximately 1903 when the lower Santa Ana River was first confined to a channel after heavy flooding.

The Marsh site was once part of a much larger estuarine system associated with the Santa Ana River delta. Prior to 1920, the coastal wetlands associated with the Santa Ana River comprised 2,950 acres. After the 1920's, the site was diked during the process of land development and tidal circulation was reduced (USACE 1987).

West Newport Oil owned the land now occupied by the Santa Ana River Marsh as part of a larger 500-acre parcel from 1943 (when oil production began) until the land was acquired by USACE for restoration. The restoration plan was approved in 1989 and a 92-acre parcel was acquired by USACE from West Newport Oil (USACE 1988). At the time of purchase there were both active and abandoned oil wells on the site, which required extensive cleanup of oil contamination (USACE 1988). Restoration was completed by USACE in 1992.

At the time of restoration, the City of Newport Beach continued to operate three oil wells on-site, in a 3-acre interest easement (USACE 1988). Two other active wells were diverted off the parcel and all other oil production facilities, including concrete pads and pipes, were removed from the site. Large amounts of crude oil and its derivatives were found in the soil and exposed on the soil surface. Remediation included soil removal and off-site disposal. Soil removal lowered the surface grade throughout the property and allowed the creation of expanded subtidal and intertidal marshland. The marsh was contoured to create channels, mudflats, and tidal salt marsh habitats in three elevation ranges: lower, middle and high marsh habitat (USACE 1987). An island intended for California least tern breeding ("tern island") was also constructed using a design that replicated a "search image" of a least tern nest site across the river at Huntington State Beach (USACE 1987).   Two new flood gates were installed along the eastern bank of the

Santa Ana River to allow for tidal flows into the marsh. An older tide gate downstream was replaced and a second gate was installed upstream of the first gate. The second gate was added to increase tidal flow between the river and northern marsh area (USACE 1989).

4.1.2 Nearshore Disposal Site

The beach receiver site is located within the San Pedro Littoral Cell, which encompasses the beach and nearshore environment from Point Fermin in the northwest to Dana Point in the southeast. The coastline from Sunset Beach to Newport harbor is characterized by relatively wide sandy beaches generally backed by the gently sloping coastal plain.

The predominant littoral drift along the Huntington-Newport Coast is from northwest to southeast, driven by waves and wave-related currents approaching frequently from the west. However, longshore currents may reverse for short periods of time during the summer, as the result of swells approaching the coast from a more southerly direction. Thus, beaches in this area tend to experience a seasonal contrast in the direction of sediment transport (Zoulas 2008).

There are two major submarine canyons in the San Pedro Littoral Cell, the San Gabriel submarine canyon and the Newport submarine canyon. The Newport submarine canyon is located only 33 meters to the south of Newport Pier and thus serves as a significant sediment sink.

Historically, the sources of sand for beaches within the littoral cell included the Santa Ana River, Los Angeles River, and San Gabriel River. These larger rivers were important sources of sediment to local beaches, although their courses across the alluvial plain shifted frequently in response to major flood events. Sediment contributions from the San Gabriel River have decreased, but the Santa Ana River remains an important natural source of sediment, delivering sand to West Newport Beach and Huntington Beach (Zoulas 2008). Sediment delivery by coastal rivers and streams is generally seasonal, with peak stream discharges occurring during and shortly after periods of high rainfall in the winter months. While highly episodic, large magnitude flood events are especially important in supplying sediment to beaches.

Human activity has largely surpassed the natural system as the most important factor influencing sediment delivery to the coast. Dam construction has reduced sediment flux, while artificial beach nourishment projects have contributed positive amounts of sediment to the San Pedro Littoral Cell since the middle of the 20th century. Beach nourishment has been a particularly important source of sediment for Sunset Beach, West Newport Beach, and the Balboa Peninsula.

4.2 Biological Environment

4.2.1 Santa Ana River Marsh

Vegetation

Estuarine Habitats

Mud flats, tidal channels, open water: The subtidal and low intertidal habitats support little to no vegetation. Subtidal algae are present, adhered to the substrate. Eelgrass is not present in the channels.

Salt Marsh Habitats

California Cordgrass Marsh: California cordgrass (*Spartina foliosa*) is a dominant species, often found in monotypic stands in lower elevation areas that are primarily inundated, and exposed only during extreme low tides.

Pickleweed Mats: Pickleweed (*Salicornia virginica* and *S. subterminalis*) characterizes the relatively low vegetation on the intertidal flats that receive daily tidal inundation and exposure. Other common plants among the pickleweed mats are saltwort (*Batis maritime*) and seablite (*Suaeda taxifolia*). Pickleweed is the most widespread vegetation within the marsh, and also occurs on the slopes of the tern island.

Riparian Habitats

Mulefat Scrub: Mulefat (*Baccharis salicifolia*) is a common freshwater riparian shrub, and is dominant in some areas near the marshland margins, above the tidal influence and presumably with some surface or subsurface freshwater influx to reduce soil salinity. Other species within the mulefat scrub community are Emory's baccharis (*Baccharis emoryi*) and the invasive ornamental myoporum (*Myoporium laetum*).

Upland shrubland Habitats

Quailbush scrub: Quailbush (*Atriplex lentiformis*) is a dominant shrub in the highest elevation areas of the site where there is no tidal influence. Other common species are California encelia (*Encelia californica*), mulefat, and Emory's baccharis. This vegetation is similar to coastal sage scrub in its appearance and habitat function.

Ruderal

Several areas within the marsh have very little vegetation cover and are dominated by weedy species. These areas may have been mechanically disturbed or compacted by vehicle traffic. The tern island is also considered ruderal due to the dominance of weedy species on the top of the island.

Access Roads and Developed Areas

An unpaved, gravel access road bisects the marsh. In addition, a second gravel road leads south from the access road to one of West Newport Oil's derricks.

Invertebrates

Weston Solutions, Inc. collected samples of the intertidal and subtidal invertebrate fauna at the Santa Ana River Marsh in February 2010 (Weston 2010). Amphipod species (sand fleas, beach hoppers, and related groups) were dominant among the crustaceans cataloged. The most common and widespread amphipod was *Grandidierella japonica,* a non-native species introduced from Japan, which is abundant in California estuaries (Smith and Carleton 1975). Molluscs were common in the benthic samples, and were dominated by two natives, the California horn snail (*Cerithidea californica*) and the rude barrel bubble (*Acetocina inculta*) which are both widespread in California estuaries and mud flats. The non-native clam species *Venerupis phillipinarum* (Japanese littleneck) was collected at a few sites. The blue mussel (*Mytilus galloprovincialis*) was found in cordgrass along a tidal channel at one sample site. Blue mussel is an invasive Mediterranean species that has become established throughout southern California's bays and estuaries and has displaced native mussels (Geller 1999).

Annelids (segmented worms) were the most abundant invertebrate fauna, with Oligochaetes making up the bulk of the species. Oligochaetes are annelids of fresh water and marsh habitats, generally living within the benthic deposits. Polychaete annelids in the marsh included *Streblospio benedicti, Capitella capitata,* and *Mediomastus* sp., which all are common native species of mud flats and estuaries (Smith and Carleton 1975). All three are tolerant of a range of ecological conditions and *C. capitata* is noted for its tolerance of pollution. Aquatic insects were found in many of the samples, likely owing to relatively low salinity at the time of sampling. The most abundant insects were *Dasyhelea* (biting midges) and chironomids (midges).

Fish and Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act set forth a number of new mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate "essential fish habitat" (EFH) for all managed species. The Act defines EFH as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

For the Pacific region, EFH has been identified for a total of 89 species covered by three fishery management plans (FMPs) under the auspices of the Pacific Fishery Management

Council. The Santa Ana River and surrounding waters provide habitat for several of these species.

Two native benthic fish species were identified during invertebrate sampling by Weston Solutions in 2010, including longjaw mudsucker (*Gillichthys mirabilis*) and a post-larval goby that could not be identified to species. The marsh is much smaller and provides less habitat diversity, tidal flow, and open access to the ocean than other southern California coastal salt marshes, where fish ecology has been studied in detail. Thus, the Santa Ana River Marsh would not be expected to support similar fish community assemblages, but should be expected to have high overall fish productivity. There are no special status fish species known to occur in the Santa Ana River Marsh. One special status fish, tidewater goby (*Eucyclogobius newberryi*)(Federally endangered), occurs in estuaries elsewhere in the southern California region and habitat at the marsh may be suitable. The species has not been identified in past surveys of the marsh, however, and the likelihood of its occurrence in the project area is low. The other regional special-status fish species occur in freshwater streams rather than brackish water lagoons, and would not be expected at the marsh.

Additional data on fish found within the Marsh comes from Corps post-restoration sampling from June 1996 to February 1997 and July to August 2000. The common species found within the marsh were California killifish (*Fundulus parvipinnis*), diamond turbot (*Hypsopsetta guttalata*), longjaw mudsucker (*Gillichthys mirabilis*), staghorn sculpin (*Leptocottus armatus*), and California halibut (*Paralichthys californicus*), in addition to arrow goby (*Clevelandia ios*) and topsmelt (*Atherinops affinis*).

<u>Birds</u>

Wetland and upland habitats of the Santa Ana River marsh provide habitat for a diverse assemblage of birds. The Santa Ana River Watershed Association (SAWA) has conducted wintering bird surveys at the Santa Ana River Marsh in recent years.

Sixty-two species were documented using the marsh and adjacent areas during winter 2010 surveys. The most abundant species were shorebirds, which were seen foraging on the mudflats. Species include short-billed dowitcher (*Limnodromus griseus*) and sandpipers (*Calidris* spp.). Several gull species used the site including California gulls (*Larus californicus*) and ring-billed gulls (*Larus delawarensis*).

Six species of "dabbling" ducks (*Anas* sp.), such as mallard (*A. platyrhynchos*) and green-winged teal (*A. carolinensis*) were documented wintering within the marsh in 2009 and 2010, using open water habitats. Two species of diving ducks, lesser scaup (*Aythya affinis*) and bufflehead (*Bucephala albeola*), and three grebe species also use open water habitats at the marsh. Belted kingfisher (*Ceryle alcyon*) has used perch sites around the

Marsh while foraging in adjacent channel habitat.

Wading birds, including great egret (*Ardea alba*) and great blue heron (*A. herodias*) are seen regularly in the marsh. Nesting sites for both species are considered sensitive resources (CDFG 2010), but nesting has not been documented at the Santa Ana River Marsh.

Birds of prey observed within the vicinity of the Marsh include osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus*), and red-tailed hawk (*Buteo jamaicensis*).

Wildlife

There have been no inventories of other vertebrates at the Santa Ana River Marsh. However, Zedler (1982) briefly described herpetofauna and mammal fauna of southern California marshes. The Marsh is expected to support a similar assemblage of these species.

Herpetofauna occurring in estuaries is limited to relatively few species. No regional amphibians or reptiles require estuary habitat, though several species make use of it, especially the northern marsh margins. Pacific treefrog (*Hyla regilla*) and western toad (*Bufo borealis*) may use slightly brackish waters at the margins of true estuaries (Zedler 1982; Springer 1988). Most reptiles use terrestrial burrows for shelter and thus can only use marsh habitats during low tide. Several lizards and snakes, including western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Gerrhonotus multicarinatus*) and gopher snake (*Pituophis melanoleucus*) forage in saltmarsh habitats but spend most of their lives in the adjacent non-tidal lands (Zedler 1982).

A variety of small mammals such as shrews, bats, voles, and mice occur in saltmarsh habitats. Voles and harvest mice may live year-around in saltmarshes. Numerous other species such as raccoons and mustelids may use the marsh habitats intermittently, but rely primarily on adjacent non-tidal habitats (Springer 1988). Domestic and feral dogs and cats are also known to frequent the Marsh, presumably crossing from surrounding residential areas at low tide.

4.2.2 Nearshore Disposal Site

Marine Vegetation and Substrate

Nearshore habitats in the vicinity of the Santa Ana River mouth consist primarily of unvegetated sand substrate. A wide sandy beach extends from the Santa Ana River mouth downcoast to the Newport Beach Pier. A groin field and the south jetty of the river stabilize this section of beach downcoast from the Santa Ana River mouth. Offshore, the substrate consists primarily of sand bottom, but scattered patch reefs with elevations to 10 feet are found offshore from the river mouth at about 25 to 35 feet water depth. These reefs are located deeper the nearshore disposal area, which occurs to approximately 22 feet water depth.

Invertebrates

Shallow water sand bottom habitats off the open coast present an unstable environment of shifting sands. The open coast sand bottom habitat is the harshest and most unstable in the intertidal. Sand bottom organisms can be divided into an infaunal and epifaunal community. The infaunal community is made up of the organisms that live within the sand. This community is comprised primarily of small (1 to 3 mm) worms, crustaceans and molluscs with short lifespans. Typically the infaunal community undergoes a seasonal cycle of decrease during winter storms and recolonization in the spring. The epifaunal community is comprised of a much lower diversity of larger organisms such as sea pens, tube worms, sand dollars and sea stars which live on the surface of the sand and are typically longer lived (Davis and VanBlaricom, 1978). Since a limited number of species are adapted to the harsh open coast sand bottom environment, this community tends to be characterized by a similar set of species throughout mainland southern California (Davis and VanBlaricom, 1978; Morin et al., 1985, 1988).

Organisms found at Huntington State Beach during several surveys (Straughan 1982) were characteristic of southern California sandy beaches. Among the species recorded by Straughan was the pismo clam (*Tivela stultorum*).

Pismo clam (*Tivela stultorum*) is an important invertebrate species that once supported a significant commercial fishery. Pismo clams live in sandy areas from the intertidal zone to depths of 80 feet and may come together in beds in certain areas. Pismo clams can move rapidly through sediment due to the development of a foot. They use the foot to bury themselves to a depth of approximately 2 to 6 inches. The minimum legal size for Pismo clam harvesting is 4.5 inches and is reached at about the age of 5 years.

Pismo clam has been surveyed by the California Department of Fish and Game since 1948 at several California beaches including those at Pismo Beach, Morro Bay, Cayucos, Monterey County, and from Santa Barbara County to San Diego County, and is known to occur at Newport Beach.

To provide a baseline for the Santa Ana River project, the Corps conducted seasonal surveys of the shallow subtidal biota in the vicinity of the Santa Ana River mouth during 1988 to 1991. The most widespread organism was the tube worm (*Deopatra ornata*). Hardy worms and crustaceans typical of the southern California shallow open coast sand bottom environment, also dominated the samples. A sand dollar bed with densities up to 70 per square meter was found between 15 and 25 feet water depths upcoast from the river mouth.

The scattered reefs off the Santa Ana River mouth were overgrown with gorgonians (*Muricea* spp.). The lack of plant cover on these reefs is probably related to the high turbidity that is frequently found around the river mouth.

Fish and Essential Fish Habitat

The Santa Ana River and surrounding waters provide habitat for several species with identified EFH.

As part of the marine biological baseline studies for the Santa Ana River project, the Corps sampled nearshore fishes in the vicinity of the Santa Ana River mouth. Overall the most abundant species were jacksmelt (*Atherinopsis californiensis*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*) and California corbina (*Menticirrhus undulatus*). These species are all typical of southern California nearshore soft bottom habitats. In May of 1988, large numbers of spiny dogfish (*Squalus acanthias*) were caught.

The California grunion (*Leuresthes tenuis*) has been known on many southern California beaches, including Surfside/Sunset, Huntington Beach, and Newport Beach. Grunion inhabit the nearshore waters from the surf to a depth of approximately 60 feet, and during spring and summer months they leave the water at night to spawn on beaches. For four consecutive nights, beginning on the nights of the full and new moons, spawning occurs after high tides and continues for several hours. Spawning typically occurs from March through August, and occasionally in February and September. Peak spawning is late March to early June. California grunion is managed as a game species by the California Department of Fish and Game.

Birds

With the open ocean, sandy beach, rocky jetties, wetlands, and tidal waters in the vicinity of the Santa Ana River mouth, the nearshore waters form a rich complex for marine birds.

Common bird species in the ocean waters offshore the Marsh include the California brown pelican (*Pelecanus occidentalis*), surf scoter (*Melinita perspicillata*), western gull (*Larus occidentalis*), western grebe (*Aechmophorus occidentalis*), and double-crested (*Phalacrocorax auritus*), Brandt's (*P. pencillatus*) and pelagic (*P. pelagicus*) cormorants. The sandy beach is used by a variety of shorebirds including sanderling (*Calidrus alba*), willet (*Catotrophorus semipalmatus*), marbled godwit (*Limosa fedoa*) and black-bellied plover (*Pluvialis dominica*). The tidal portions of the Santa Ana River have extensive sand bars and shallows that are used by thousands of gulls and terns for roosting, bathing and preening (Massey 1980). Gulls and terns, including the California least tern (*Sterna* *antillarum browni*), forage in the Santa Ana River channel as well as in the adjacent Talbert Channel and Greenville-Banning Channel.

Wildlife

Species expected to occur regularly in the nearshore coastal waters off the Santa Ana River mouth would be the California gray whale (*Eschrichtius robustus*), the Pacific bottlenose dolphin (*Tursiops truncatus*), the common dolphin (*Delphinus delphis*), the California sea lion (*Zalophus californicus*), and the harbor seal (*Phocas vitulina*). All marine mammals are protected by the Marine Mammal Protection Act of 1972.

The Newport submarine canyon, located approximately 3 miles downcoast from the Santa Ana River mouth, offshore of Newport Pier, does sometimes attract deepwater marine mammals near to shore. Sperm whales (*Physeter catodon)* are seen occasionally in this area (Kelly 1991) and a pygmy whale (*Kogia breviceps*) was once found washed ashore near Bolsa Chica State Beach.

California gray whales pass through southern California twice yearly during their annual migration from feeding grounds in the Bering and Chukchi Seas of Alaska to calving lagoons off Baja California. Southbound whales are seen from December through February and tend to travel via the offshore island shelves and banks rather than along the mainland (Dohl et al. 1981). The northbound migration occurs in two phases. Many adult and immature animals pass through southern California in February and March. Northward migrating mother-calf pairs follow in March, April, and May. Migrating gray whales observed within 6 miles of the mainland coast represent approximately 24 percent of the total. Most gray whales sighted in nearshore coastal waters are adult or immature animals on their northward migration. This species was removed from the endangered species list in 1994 because of its recovery to its pre-whaling abundance.

Pacific bottlenose dolphins regularly occur in the nearshore coastal waters off Orange County (Defran and Kelly 1990). Dolphin pods are sighted more regularly along the northern part of the Orange County coast, including the beaches upcoast and downcoast of the Santa Ana River mouth, than in any other place. During the 1990 study of this species in Orange County, 64 percent of the sightings were between north Newport Beach and Bolsa Chica. Within this area, dolphins often exhibited hunting behavior or were actually observed chasing, catching, and eating fish.

California sea lions and harbor seals are common in the nearshore waters of Orange County and would be expected to occur offshore from the Santa Ana River mouth. There are no major pinniped hauling grounds in Orange County (Hanan 1990), but individuals of these species occasionally haul out on offshore rocks and rocky beaches in south Orange County as well as on offshore buoys, including the buoy offshore from the entrance to Newport Harbor.

4.3 Threatened and Endangered Species

Federally-listed Threatened or Endangered species which are known to occur in the vicinity of the project area include: light-footed clapper rail (*Rallus longirostris levipes*), California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius alexandrinus nivosus*), and coastal California gnatcatcher (*Polioptila californica californica*). The Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), a state listed endangered species, is also known to occur in the Marsh. Special status birds documented in the marsh during winter 2010 and previous years include light-footed clapper rail, Belding's savannah sparrow, and coastal California gnatcatcher.

4.3.1 Santa Ana River Marsh

Light-footed clapper rail

The light-footed clapper rail, a Federally Listed Endangered Species (Federal Register, October 13 1970), is a year-round resident in tidal salt marshes, generally where dense stands of cordgrass (*Spartina foliosa*) are available for nesting and foraging. Light-footed clapper rails primarily use cordgrass vegetation for nesting and roosting cover.

Nesting season is typically March through August. Optimal nesting sites are located in the tall cordgrass of the lower littoral zone, densely vegetated and high enough to avoid inundation at the highest tides, yet low enough in the marsh to be protected from upland predators (Zembal and Massey 1983). Their home range sizes are approximately 1 to 4 acres (Zembal et al. 1989).

Historically, clapper rails were much more common but their habitat has been substantially reduced or degraded by land use conversion and other human impacts to coastal marshlands throughout the region.

In 2006, light-footed clapper rails were documented in the Santa Ana River Marsh for the first time, when at least four breeding pairs were reported (Zembal et al. 2007). Nests have not been found to date, but rails have been present and have exhibited breeding behavior every year since first detected there. One pair was detected in the southern Marsh, but outside of the proposed dredge limits, for the first time in 2011 (Figure 13). Five additional pairs were found in the northern Marsh area.

California Least Tern

The California least tern is Federally listed as endangered (Federal Register, June 2 1970). The least tern is a seasonal migrant that nests on sandy beaches from Baja California, Mexico to San Francisco, California between April and September. The least tern is present in the area mid-April to late August, and is known to forage in the open waters of the ocean, Santa Ana River, and Marsh. They are suspected to winter in South America.

The least tern is a plunge diver, and generally feeds within 2 miles of its nest site in estuaries, rivers, streams, and nearshore waters. Their diet consists almost entirely of small fishes, particularly northern anchovy and topsmelt.

The species has declined primarily because of human disturbance to its sandy beach nesting habitat.

An important nesting colony of the California least tern is located at Huntington State Beach, just west of the Santa Ana River mouth. A 7.5 acre area has been fenced off to protect the nesting colony and was designated as a California Least Tern Nesting Sanctuary. Censuses from 1978 to 1982 estimated breeding pair numbers ranging from 70 to 122 (Atwood and Minsky 1983). In 2008, approximately 400 breeding pairs were observed there, establishing 454 nests and producing 267 fledglings (Marschalek 2009). In 2011, 500 breeding pairs, 700 nests, and 100 fledglings were observed (Hoffman, pers. comm., 2012).

Least terns have been found to use all the waters in the vicinity of the colony for foraging (Collins et al. 1979). The areas fished by terns included the open ocean, the Santa Ana River, the flood control channels, the Marsh, vernal pools between Magnolia Avenue and the Southern California Edison power plants, and Victoria Pond.

In general, fishing efforts by least terns appear to be highly opportunistic, utilizing a variety of areas wherever fish of suitable size were available. The birds seem to prefer areas near the nesting colony once a nest is established. Some preference for foraging marsh channel areas was noted during the time of peak hatching of chicks when small fish were required. The open ocean areas were very heavily utilized particularly later in the season. Least terns have also been observed to fish in the Santa Ana River from the mouth to Adams Avenue about 3 miles inland (Massey 1980).

To date, California least terns have not been known to nest on the tern island created in the Marsh. However, the marsh may still be important to least terns for other aspects of their life histories, including (1) pre-nesting overnight roosting habitat away from nesting colonies; (2) feeding habitat during nesting; (3) feeding habitat post-fledging, when protected waters are important; and (4) post-fledging roosting or loafing habitat.

Western Snowy Plover

The western snowy plover is Federally listed as threatened (Federal Register, March 5 1993). The nesting season for plovers is from March 1 to September 15 and preferred nesting habitat includes sand spits, dune-backed beaches, beaches at creek and river mouths, and salt pans associated with lagoons and estuaries (USFWS 1999b). The plover forages on marine-estuarine invertebrates and terrestrial and marine-associated insects in the wet sand along the water's edge, including those associated with kelp wrack washed ashore on sandy beaches.

Population declines in southern California are attributed largely to human disturbance and raking of beaches (Page and Stenzel 1981). Historically, western snowy plovers nested in Orange County from Upper Newport Bay to Anaheim Bay, but the only nesting site found in the county during field surveys in the 1970s was at the Bolsa Chica wetlands, approximately 7 miles northwest of the Marsh (USFWS 2007). In some years, they have been documented both nesting and wintering at the California least tern site at Huntington State Beach (Hamilton and Willick 1996; Powell 1996).

Wintering snowy plovers may use the Santa Ana River Channel, the mud flats of the Marsh, and the beach for roosting.

Critical habitat for western snowy plover occurs at Bolsa Chica Reserve and at the Santa Ana River mouth (Huntington State Beach colony). In 2011 FWS also proposed critical habitat at Balboa Beach, approximately 4 miles downcoast of the mouth of the Santa Ana River. No critical habitat occurs within the project area.

<u>Coastal California Gnatcatcher</u>

The coastal California gnatcatcher is federally listed as threatened (Federal Register, March 30 1993). Coastal California gnatcatcher has peak egg laying in April and May, and nesting season is considered from February through August. Coastal California gnatcatchers are diurnal and active yearlong, and they feed primarily on insects, spiders, and seeds (USFWS 2000; Zeiner et al. 1990).

The coastal California gnatcatcher does not migrate and is strongly associated with Diegan and Riversidian coastal sage scrub (Atwood 1988; USFWS 2000). These types of sage scrub communities occur in Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties at elevations below 3,000 feet on the coastal side of the mountains. Gnatcatchers are found primarily at elevations below 2,000 feet and are most numerous in low, dense coastal scrub habitats in arid washes, on mesas, and on slopes of coastal hills (Zeiner et al. 1990). Home ranges for the coastal California gnatcatcher range from 13 to 39 acres (USFWS 2000).

Decline has been attributed to destruction of habitat for human development (Atwood 1990), but nest parasitism by brown-headed cowbird (*Molothrus ater*) has apparently been equally, if not more, important (USFWS 1999a; Zeiner et al. 1990).

Coastal California gnatcatcher inhabit the bluffs adjacent to the project area. A gnatcatcher was recorded at the Marsh during winter bird surveys in 2007/2008 (SAWA 2010), in the *Atriplex* on the northern edge of the access road, near the levee; however this species was not seen during winter 2009/2010 surveys. The gnatcatcher was observed in generally unsuitable habitat and, given the season of the occurrence, was likely a dispersing individual.

The Marsh and surrounding land provide only a small area of marginally suitable breeding habitat for coastal California gnatcatcher, along the levee on the west side of the marsh. Due to its small size, narrow linear configuration, and isolation from other suitable habitat or coastal California gnatcatcher populations, the habitat is not suited to support a sustainable population. The Marsh and adjacent area may serve as infrequent "stopover" habitat for dispersing individuals or as foraging habitat.

<u>Belding's Savannah Sparrow</u>

The Belding's savannah sparrow, a State listed endangered species, is a small songbird that inhabits some coastal salt marshes of southern California year-round. The Belding's savannah sparrow has a very close association with pickleweed (*Salicornia virginica*), spending most of its life in or near dense, higher elevation stands in the coastal salt marsh. Pickleweed stands are above the highest spring tide and are the preferred nesting sites. The nests are built a few inches off the ground and fixed in place where the pickleweed grows densely and provides good cover. Nesting occurs through the spring and early summer and the last chicks are typically fed between July and August (Massey 1979).

The females use dry pickleweed twigs in building their nests. The males use the highest branches as sunning perches and in establishing breeding territories. The birds are also known to eat the succulent growing tips of pickleweed branches. Generally, however, the birds prefer a diet of insects, foraging on the ground in all three littoral zones of the Marsh and in the maritime zone.

Pairs of Belding's savannah sparrow have been observed in the pickleweed within the Marsh. Breeding territories were first documented at the Santa Ana River Marsh in 1996, when 17 territories were observed. Numbers have fluctuated in subsequent years (36 in 2001; 34 in 2006; and 29 in 2010).

4.3.2 Nearshore Disposal Site

State or federally listed threatened and endangered species that potentially occur in the vicinity of the nearshore disposal site, and along the beach where the pipeline may be extended, include the California least tern and Western snowy plover..

California Least Tern

The California least tern is described in Section 4.3.1. The tern nests near the receiver site at Huntington State Beach. The tern forages in the open waters of the ocean, Santa Ana River, and Marsh, and may use the nearshore disposal site for foraging. This species is present in the vicinity of the receiver sites from mid-April to late August.

Western Snowy Plover

The closest documented nesting of snowy plovers to the Santa Ana River mouth in recent years is in the Bolsa Chica wetlands approximately 6 miles northwest of the Marsh. They have been documented in some years both nesting and wintering at the California least tern site at Huntington State Beach (Hamilton and Willick 1996; Powell 1996). Wintering snowy plovers may also use the Santa Ana River Channel, the mud flats of the Marsh, and the beaches upcoast and downcoast for roosting.

Western snowy plovers were not observed nesting within the Huntington Beach Least Tern colony during the 2010 season. One to 3 adults were observed foraging on the beach throughout the season (SAWA 2010).

4.4 Water Quality

4.4.1 Santa Ana River Marsh

Water quality samples were collected from 6 sites within the Marsh in February 2010. Dissolved oxygen, temperature, and pH were relatively similar at all of the sites and did not indicate any ecological stressors. Dissolved oxygen ranged from 9.79 mg/L to 13.48 mg/L; temperature ranged from 54^{o}F to 60^{o}F; pH ranged from 7.81 to 8.09 (Weston Solutions 2010). All six sites had very low salinity values (0.28 ppt to 6.12 ppt) relative to seawater (35 ppt), which was assumed to be attributed to increased fresh water flows due to recent rains at the time of the survey. Historical studies have measured salinity levels in the Marsh at 14 ppt to 34.5 ppt (CWIS 1997).

In general, water samples were clean with trace amounts of metals and nutrients detected (Weston Solutions 2010). No PAHs, chlorinated pesticides, organophosphorus pesticides, or dissolved metals were detected above reporting limits.

However, water quality in the Marsh varies daily and seasonally, primarily due to tidal influence and flushing via the tide gate system. Water quality can also be influenced locally by freshwater inputs, including urban runoff from storm drains, as well as growth of aquatic vegetation. The commonly measured water quality parameters discussed above (e.g., salinity, temperature, and dissolved oxygen) may vary daily, seasonally, and across the Marsh, where a gradient may form as distance from the tide gates and other water inputs changes.

4.4.2 Nearshore Disposal Site

Marine water pollution in southern California's nearshore waters is mostly terrestrial in origin. Runoff from the Santa Ana River contributes sediments and associated contaminants to the Orange County nearshore marine environment. The Santa Ana River has no measurable discharge to the ocean during most of the year (USACE 2001). Most of the flows result from short, intense winter storms and discharge is variable from year to year, with most of the discharge from the Santa Ana River occurring between January and April. Contaminant concentrations in Santa Ana River storm flows are similar to those in other southern California coastal rivers that convey urban runoff to the ocean, such as the Los Angeles River, the San Gabriel River and Ballona Creek.

A comparison of contaminant levels in the tissues of mussels from the Huntington Beach Pier, approximately 3.6 miles upcoast from the Santa Ana River mouth, and from offshore the entrance channel to Newport Harbor, 11 miles downcoast from the river mouth, indicated that shellfish in nearshore Orange County waters near the Santa Ana River mouth are not bioaccumulating harmful levels of contaminants (USACE 2001). This supports that nearshore marine water quality near the Santa Ana River mouth is generally good.

Sediment contaminant data are available for stations at approximately 20 feet water depth offshore of the Huntington Beach Generating Station, approximately 1.2 miles upcoast from the river mouth, and from approximately 20 feet water depth offshore of Bolsa Chica State Beach, approximately 5.4 miles upcoast from the river. The data show that except for mercury in a single sediment sample offshore of Bolsa Chica State Beach, all sediment samples had concentrations of contaminants well below the level that has been shown to affect marine life.

In deeper water, at 200 feet, directly offshore of the Santa Ana River mouth, sediments in the vicinity of the Orange County Sanitation District wastewater outfall are regularly monitored by the District. Most contaminant levels are below the NOAA Effects Range Low (ERL) levels (USACE 2001) and almost all are below Effects Range Medium (ERM) levels at which effects are likely to occur. A few organic contaminants associated with the discharge sometimes exceed ERM levels in the vicinity of the outfall.

4.5 Air Quality

4.5.1 Santa Ana River Marsh and Nearshore Disposal Site

Local Climate

The Santa Ana River Marsh is located in the South Coast Air Basin (SCAB), which has a Mediterranean climate characterized by mild winters, when most rainfall occurs, and warm, dry summers. The most important climatic and meteorological characteristics influencing air quality in the study area are the persistent temperature inversions, predominance of onshore winds, mountain ridge and valley topography, and prevalent sunlight. Average summer temperatures at the mouth of the Santa Ana River (Costa Mesa-Newport Area) range from a high of 23°C (74°F) to a low of 16°C (61°F), while average winter temperatures range from a high of 18°C (64°F) to a low of 8°C (46°F) (USACE, 2001).

Air Quality Standards and Attainment Status

The quality of the surface air (air quality) is evaluated by measuring ambient concentrations of pollutants that are known to have deleterious effects on public health. The degree of air quality degradation is then compared to the current National and California Ambient Air Quality Standards (NAAQS and CAAQS, respectively). Because of unique meteorological problems in the state, and because of differences of opinion by medical panels established by the California Air Resources Board (CARB) and the USEPA, there is considerable difference between state and Federal standards currently in effect in California. In general, the CAAQS are more stringent than the corresponding NAAQS. Those standards currently in effect in California are listed in Table 4.

Table 4. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]	National Standards[2]	
			Primary[3,4]	Secondary[3,5]
Ozone (O_3)	8-hour[6] 1-hour	0.070 ppm (137 μg/m^{3}) 0.09 ppm (180 μg/m^3)	0.075 ppm (147 μg/m^3) --	Same as Primary Standard
Carbon Monoxide (CO)	8-hour 1-hour	9.0 ppm (10 mg/m^3) 20.0 ppm (23 mg/m^3)	9.0 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	-- --
Nitrogen Dioxide (NO_2)	Annual Avg. 1-hour	0.030 ppm (57 μg/m^3) 0.18 ppm (339 μg/m^3)	0.053 ppm (100 μg/m^3) 0.100 ppm (188 μg/m^3)	0.053 ppm (100 μg/m^3) --
Sulfur Dioxide (SO_2)	24-hour 3-hour 1-hour	0.04 ppm (105 μg/m^3) -- 0.25 ppm (655 μg/m^3)	-- -- .075 ppm (196 μg/m^3)	-- 0.5 ppm (1300 μg/m^3) --

Pollutant	Averaging Time	California Standards[1]	National Standards[2]	
			Primary[3,4]	Secondary[3,5]
Respirable Particulate Matter (PM_{10})	24-hour Ann. Arith. Mean	50 $\mu g/m^3$ 20 $\mu g/m^3$	150 $\mu g/m^3$ --	Same as Primary Standard
Suspended Particulate Matter ($PM_{2.5}$)[7]	24-hour Ann. Arith. Mean	-- 12 $\mu g/m^3$	35 $\mu g/m^3$ 15 $\mu g/m^3$	Same as Primary Standard
Sulfates (SO_4)	24-hour	25 $\mu g/m^3$	NS	NS
Lead (Pb)	30-day Avg. Calendar Qtr. Rolling 3-Month Avg.	1.5 $\mu g/m^3$ NS NS	NS 1.5 $\mu g/m^3$ 0.15 $\mu g/m^3$	NS Same as Primary Standard
Hydrogen Sulfide (H_2S)	1-hour	0.03 ppm (42 $\mu g/m^3$)	NS	NS
Vinyl Chloride	24-hour	0.010 ppm (26 $\mu g/m^3$)	NS	NS
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more due to particles when relative humidity is less than 70% (CA only)	NS	NS

Notes: NS = no standard; ppm = parts per million; $\mu g/m^3$ = microgram per cubic meter; mg/m^3 = milligrams per cubic meter

1. California standards for O_3, CO, SO_2 (1 and 24 hour), NO_2, and PM_{10} and visibility reducing particles are values that are not to be exceeded. SO_4, Pb, H_2S, and Vinyl Chloride standards are not to be equaled or exceeded.
2. National Standards (other than O_3, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The O_3 Standard is attained when the fourth highest eight hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year within a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25ºC and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25ºC and a reference pressure of 760 torr; ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
6. On June 2, 2010, the U.S. EPA established a new 1-hour SO2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The EPA also revoked both the existing 24-hour SO2 standard of 0.14 ppm and the annual primary SO2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA.
7. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
8. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

Source: California Air Resources Board 2010 (http://www.arb.ca.gov)

Existing Air Quality

The SCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties and all of Orange County. The potential for adverse air pollution conditions in the SCAB is high, particularly during the period from June through September. Poor ventilation caused by generally light winds and shallow vertical mixing is frequently insufficient to adequately disperse the large quantities of emissions generated in the basin. During the summer, these factors together with the long hours of sunlight result in the formation of high concentrations of ozone. During the winter, the same factors produce stagnant air that allows pockets of high concentrations of carbon monoxide to form.

High pollutant impacts can occur when land breezes transport onshore emissions over the ocean, then return them with the onset of the sea breeze to recombine with local emissions. This "sloshing" effect is known to produce high ozone concentrations in the SCAB during the warmer months of the year.

Although air quality within the SCAB has improved since the 1970's, levels of a number of pollutants still exceed air quality standards. The California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) have classified the SCAB as being in non-attainment of the CAAQS and NAAQS for O3, PM2.5, and PM10. The CARB has also classified the SCAB as being in non-attainment of the CAAQS for NO2. Table 5 provides the maximum air quality concentration recorded in 2007 through 2010 for the pollutants O3, PM2.5 and PM10.

Table 5 Ambient Air Quality Summary

Pollutant Standards	2007	2008	2009	2010
Ozone (O_3)				
Maximum 1-hour concentration (ppm)	0.082	0.094	0.087	0.097
Maximum 8-hour concentration (ppm)	0.072	0.079	0.072	0.076
Number of Days Standard Exceeded				
CAAQS 1-hour (>0.09 ppm)	0	0	0	1
CAAQS 8-hour (>0.070 ppm)	2	5	3	2
NAAQS 8-hour (>0.075 ppm)	0	3	0	1
Particulate Matter (PM2.5)				
National maximum 24-hour concentration (*u*g/m^3)	46.8	32.6	39.2	19.9
State maximum 24-hour concentration (*u*g/m^3)	46.8	32.6	39.2	19.9
State annual average concentration (*u*g/m^3)	*	10.3	9.4	*
Number of Days Standard Exceeded				
CAAQS 24-hour (>50 *u*g/m^3)	*	*	*	*
NAAQS 24-hour (>150 *u*g/m^3)	*	0	3.5	0
Particulate Matter (PM_{10})				

National maximum 24-hour concentration (ug/m^3)	74.0	42.0	56.0	34.0
State maximum 24-hour concentration (ug/m^3)	74.0	41.0	55.0	34.0
State annual average concentration (ug/m^3)	*	*	23.2	*
Number of Days Standard Exceeded				
CAAQS 24-hour (>50 ug/m^3)	*	*	6.1	*
NAAQS 24-hour (>150 ug/m^3)	0	0	0	0

* Insufficient or no data available to determine value
Monitoring Stations:
Costa Mesa (2850 Mesa Verde Drive East, Costa Mesa, CA)
Mission Viejo (26081 Via Pera, Mission Viejo, CA)
Source: California Air Resources Board 2012 (http://www.arb.ca.gov)

The largest contributors to air pollutants in the SCAB are mobile sources. On-road motor vehicles account for 64% of the volatile organic compounds (VOC), 91% of the nitrogen oxides (NOx), and 98% of the CO emitted in the SCAB (SCAQMD 2007). Other sources of pollution include off-road vehicles; industries; petroleum processing, storage, and transfer; fuel combustion; and solvent use.

4.6 Noise

4.6.1 Santa Ana River Marsh

There are no federal or state standards limiting construction noise. Many cities and counties have provisions in their noise ordinance that address construction noise levels and hours of operation. The City of Newport Beach Municipal Code Section 10.28.040 restricts construction noise during nighttime hours and on Sundays. Construction may occur Monday through Friday between the hours of 7 a.m. and 6:30 p.m. and on Saturday between the hours of 8 a.m. and 6 p.m.

The project area is located near noise sensitive land uses, specifically a residential area. Other neighboring land uses include an operational oil field. Vehicular traffic is the major source of noise in the area and noise levels are generally low. Construction performed by the Sanitation District has frequently occurred along the access road bisecting the Marsh.

4.6.2 Nearshore Disposal Site

The nearshore disposal site is located approximately 1000 feet offshore. Nearby sensitive land uses include a residential area along the beach, with vehicular traffic as the major source of noise. Noise levels in this area are generally low. The City of Newport Beach Municipal Code Section 10.28.040 would restrict construction noise in this area.

4.7 Land Use and Recreation

4.7.1 Santa Ana River Marsh

The Santa Ana River Marsh is zoned as open space in the City of Newport Beach Local

Coastal Program Coastal Land Use Plan.

The site is generally bounded by the Pacific Coast Highway to the south, the Santa Ana River to the west, Newport Banning Ranch property (currently used by West Newport Oil Company) to the east, and a trail extended from 19th Street to the north. The Orange County Sanitation District operates a wastewater pipeline which crosses the marsh property between the northern and southern marsh areas. There are three active oil production wells on an easement within the Santa Ana River Marsh site, owned and operated by the City of Newport Beach. Other nearby land uses include the Orange County Sanitation District Treatment Plant 2 directly across the Santa Ana River from the restored marsh; Huntington State Beach, including a protected least tern breeding colony; a series of restored marsh sites managed by the Huntington Beach Wetlands Conservancy; active petroleum production; and residential and commercial development. The Newport Banning Ranch lands to the east have been proposed for re-use as residential development (Newport Banning Ranch LLC 2009).

Recreation at the marsh site is limited to the Santa Ana River (east) levee bike path, where the public can travel by foot, skate, or bike from upstream areas to Pacific Coast Highway. Homeowners along the southern boundary of the marsh have access to open water within the marsh site for non-motorized boating, via numerous boat docks that existed prior to marsh acquisition and restoration, and that were allowed to remain.

4.7.2 Nearshore Disposal Site

The nearshore receiver site would be located off of Newport Beach, a popular recreation destination, in the area known as West Newport. The beach itself is zoned as Parks and Recreation under the City of Newport Beach Local Coastal Program Coastal Land Use Plan. Recreation uses in this area are typical for southern California beaches and include activities such as walking, picnicking, sunbathing, swimming, surfing, diving, and fishing. With Newport Bay (entrance) located 5 miles down coast of the Santa Ana River mouth, there may be some boating and sailing activities in the vicinity.

City of Newport Beach General Plan

The City of Newport Beach General Plan (updated) was approved on November 7, 2006. The plan focuses on conserving the existing pattern of land uses and establishes policies for their protection and long term maintenance as well as identifying strategies for enhancing and revitalizing areas to their full potential. The General Plan also provides guidance to preserve the qualities that define the natural and built environment.

Coastal Land Use Plan

The City of Newport Beach adopted a Coastal Land Use Plan on July 14, 2009, in accordance with the California Coastal Act. The plan sets forth goals, objectives, and policies that govern the use of the land and water in the coastal zone within the City of Newport Beach, with the exception of Newport Coast and Banning Ranch. Topics such as public access, recreation, marine environment, land resources, development, and industrial development are addressed in the plan.

4.8 Aesthetics

4.8.1 Santa Ana River Marsh

Unique visual resources within the City of Newport Beach include rolling hills and ocean views, including they bay, sandy beaches, rocky shores, wetlands, canyons, and coastal bluffs. The aesthetic character of the immediate project area is dominated by open space at the marsh, adjacent (north) Talbert Regional Park, and the Santa Ana River, which although channelized, provides scenic views of open water and wildlife (i.e., birds). However, other surrounding land uses, including a mixture of residential and industrial uses, limit this open space character. Farther west, across the river, is Orange County Sanitation Treatment Plant 2. To the east is an oil field operated by the City of Newport Beach, and a bluff lined with residential homes. There are additional residences immediately south of marsh, and the Pacific Coast Highway crosses the Santa Ana River nearby.

4.8.2 Nearshore Disposal Site

The aesthetic character of the receiver site off of Newport Beach is dominated by open ocean to the south, and sandy beach and beachfront residences landward. The mouth of the Santa Ana River is up coast (southwest) approximately 3,500 feet.

4.9 Cultural Resources

Cultural resources include prehistoric archaeological sites, historic archaeological sites, and historic structures, and consist of artifacts, food waste, structures, and facilities made by people in the past. Prehistoric archaeological sites are places that contain the materials remains of activities carried out by the native population of the area (Native Americans) prior to the arrival of Europeans in southern California. Artifacts found in prehistoric sites include flaked stone tools such as projectile points, knives, scrapers, and drills; ground stone tools such as manos, metates, mortars, and pestles for grinding seeds and nuts; and bone tools, such as awls. Prehistoric sites and features include hearths, bedrock mortars, rockshelters, rock art, and burials.

Historic archaeological sites are places that contain the material remains of activities carried out by people during the period when written records were produced after the arrival of Europeans. Historic archaeological materials usually consist of refuse, such as bottles, cans, and food waste, deposited near structure foundations. Archaeological investigation of historic period sites is usually supplemented by historic research using written records. Historic structures include houses, commercial structures, industrial facilities, and other structures and facilities more than

50 years old.

4.9.1 Santa Ana River Marsh

The area of potential effects (APE) was surveyed for the presence of cultural resources in 1985 as part of the original studies for the Santa Ana River Project. None were observed within this particular area. In addition, the area is previously disturbed, and unlikely to contain intact buried archeological resources.

4.9.2 Nearshore Disposal Site

From an archeological perspective, the environment and setting for proposed construction has been previously disturbed to such a degree that no significant cultural resources could have survived. The nearshore disposal site has been used for past Corps dredging projects. No intact cultural resources are present.

4.10 Local and Marine Traffic

4.10.1 Santa Ana River Marsh

Major roadways in the region include Pacific Coast Highway (Highway 1), which runs south of the marsh in a northwest to southeast direction. State Route 55 (SR-55) intersects with the Pacific Coast Highway about 2 miles southeast of the Santa Ana River mouth, and runs in a southwest to northeast direction. Another major roadway is Interstate 405 (I-405), approximately 4.5 miles north of the marsh. These roadways are maintained by the California Department of Transportation (Caltrans).

Within the vicinity of the marsh, primary north-south roadways include Brookhurst Street which lies to the northwest of the marsh site. This roadway typically caries traffic volumes in the 20,000 to 65,000 vehicles per day range. Another major artery is Superior Avenue, which intersects with Pacific Coast Highway about 1 mile southeast of the Santa Ana River mouth, and runs in a southwest to north east direction. At the marsh, an access road transects the marsh in an east-west direction with its entrance at the Pacific Coast Highway. The nearest major east-west roadway includes Victoria Street, a four-lane divided road, which crosses the Santa Ana River about 1.4 miles upstream of the Pacific Coast Highway bridge.

4.10.2 Nearshore Disposal Site

Newport Bay entrance is located about 5 miles down coast of the Santa Ana River mouth, however, minimal to no marine traffic is anticipated in the vicinity of the proposed receiver sites. Given the depths of the proposed nearshore receiver site, marine traffic would likely be limited to small recreational watercraft.

5.0 Environmental Effects

This section addresses potential impacts that could occur during maintenance dredging and excavation of the Santa Ana River Marsh, disposal of compatible material in the nearshore waters at Newport Beach, disposal of non-compatible materials at an upland landfill, and clearing and grubbing of the California least tern island. The LA-3 ODMDS is a permitted ocean disposal site for which all impacts have been previously described and evaluated as part of the site designation process (USEPA/USACE 2005). Impacts resulting from upland disposal are primarily focused on air quality, transportation, and noise along the haul route; impacts to other resources at the upland disposal area are not anticipated. It is estimated that construction may take approximately six months. Construction is scheduled to occur between September 15, 2012 and March 1, 2013 to avoid impacts to sensitive species. Impacts from the Recommended Alternative and the "No Action" alternative are assessed below. Alternatives that are not feasible and are eliminated from further consideration can be found in Section 3.3.

5.1 Physical Environment

5.1.1 Santa Ana River Marsh

Modifications to the existing bottom topography of the Marsh would be expected as a result of the proposed dredging project. Local changes to the bathymetry would result due to the removal of sediments from the Marsh Channels. Impacts to the Marsh bathymetry would not be considered significant as sediment would be removed to design depths and removal of sediments would improve the functioning of the Marsh environment.

5.1.2 Nearshore Disposal Site

Modifications to the existing bottom topography of the nearshore disposal area would be expected as a result of the proposed project. Local, but minor, changes to the bathymetry would result due to deposition of sediments in the nearshore.

The disposal site is at depths of -16 to -22 feet MLLW, the most desirable location for the purposes of beach nourishment. Sediments deposited in the nearshore would dissipate over time via wave action, eventually washing onto and replenishing the beach. The proposed discharge in nearshore waters would result in temporary beach accretion, resulting in probable increases in recreational use.

The San Pedro Littoral Cell is severely depleted of natural sediment inputs, and discharge of dredged materials in the nearshore waters would provide much needed sediment to the system.

Disturbances resulting from dredge material discharge would not significantly degrade the value of intertidal and subtidal beach environments. No significant, adverse effects on the physical environment would occur as a result of the proposed project.

5.1.3 No Action Alternative

The "No Action" alternative would have the impact of not providing material for the littoral system. The San Pedro Littoral Cell, already severely depleted of natural sediment inputs, would not benefit from input of dredged sediments in the nearshore waters.

5.2 Biological Environment

5.2.1 Santa Ana River Marsh

Vegetation

Any vegetation within the immediate project area would be eliminated by the construction activities because of site excavation and substrate removal. Given the location of sediment removal, it is expected that only cordgrass and a minimal amount of fringing pickleweed would be removed from the Marsh channels. Approximately 0.33 acre of cordgrass would be removed.

Pickleweed, salt grass, and non-native vegetation would also be removed at the staging areas within the Marsh.

The prolonged inundation of vegetation, due to the need to maintain 36 inches of water in the Marsh for dredging, may result in the loss of some intertidal vegetation. Conversely, the prolonged dry conditions in the excavation area may also result in the loss of intertidal vegetation.

It is expected that vegetation would re-establish in the impacted areas after construction is complete and the Marsh’s tidal cycle is fully restored. Cordgrass habitat is expected to re-establish in the Marsh channels over time as sediments settle. Cordgrass habitat that is known to have been occupied by light-footed clapper rail in the southern Marsh would be left in place. The cleared staging areas would be restored after construction with native marsh vegetation.

Pre- and post-dredge vegetation surveys would be performed to document acreage of cordgrass and pickleweed habitat impacted by construction activities. The Marsh channels would be monitored for one year after construction to evaluate the re-establishment of cordgrass. If cordgrass does not re-establish, planting may be performed in appropriate areas based on availability of suitable channel depths.

Pre- and post-dredge visual eelgrass surveys would be performed at low tide to determine the presence or absence of eelgrass in the Marsh channels. If eelgrass is found in the Marsh, the Corps would coordinate further with NMFS on eelgrass mitigation and monitoring.

With the implementation of mitigation measures, the proposed project is not expected to cause any significant adverse impacts to Marsh vegetation. Any impacts would be minimal and localized..

Invertebrates

Dredging and excavation activities inherently cause a disturbance and redistribution of bottom sediments which would persist for the duration of the operation. Some invertebrates, especially small crustaceans and mollusks of the infauna, may be relocated with the dredged material and deposited in the nearshore site. Some would be smothered, some would become food for opportunistic shorebirds, and others would survive at the new location.

Invertebrates, epifauna, and infauna may be exposed to suspended sediment concentrations during dredging and up to 24 hours later. Dredging operations may cause some clogging to gills and suspension feeding apparatuses, resulting in smothering to invertebrates in the immediate vicinity.

Invertebrates are expected to recover from the disturbance upon completion of the project, re-colonizing from sediments transported to the southern Marsh from the Santa Ana River and the northern Marsh.

The benthic community would be sampled in the month prior to and quarterly during the year after construction to survey for re-colonization. If the benthic invertebrate community has not sufficiently recovered, the Corps would further coordinate with the resource agencies to evaluate causes of decline, and develop plans for additional monitoring and/or remediation as necessary.

With the implementation of mitigation measures, the impacts to invertebrates are expected to be minimal, temporary, and not significant.

Fish and Essential Fish Habitat

Dredging in the Marsh could affect fish resources in a variety of ways. The dredging process could result in direct loss of foraging habitat and invertebrate prey items, but perhaps more important is the turbidity associated with this activity. Fish may be exposed to suspended sediment concentrations during dredging and up to 24 hours later. Dredging operations may cause some clogging to gills, resulting in smothering to fish in the immediate vicinity.

It is expected that most fish would avoid the immediate project area during dredging operations because of the increased turbidity, noise levels, and oxygen depletion caused by dredging bottom sediment. The dredging operation and water quality will be monitored to ensure that substantial increases in turbidity or decreases in dissolved oxygen are restricted to the immediate area around the dredge (see Section 8.0). Turbidity curtains would be used around the dredge to minimize the migration of turbidity plumes in the Marsh. Any such dredge-related impacts would be temporary, controlled, and therefore, insignificant.

On the beneficial side, dredging would increase water circulation and tidal influence in the Marsh and indirectly benefit fish resources. Also, dredging activities sometimes suspend infauna and epifauna to temporarily enhance fish feeding activities.

Fish are expected to re-colonize the dredge area from the Santa Ana River and the northern Marsh after construction is complete. Impacts to EFH are minimal and short term, and would not result in a significant, adverse impact.

Birds

Construction activities may temporarily degrade water quality and increase ambient noise levels, which could cause disturbances to some birds. Increased levels of activity within the Marsh may decrease waterfowl use of the water for resting and the use of any nearby structures for roosting. Sediment removal activities would also remove mudflats, which are used by shorebirds for foraging. Dredging operations would occur over a short duration, only during daytime hours, and would be localized within the Marsh. Birds are expected to vacate the area and find alternate foraging and roosting locations during construction activities. Birds are also expected to generally acclimate to construction noise, which occasionally occurs in the Marsh due to projects conducted along the access road by OCSD. All construction activities would take place outside the breeding season for birds.

Birds would benefit from the improved water circulation and tidal flows in the Marsh, which would maintain Marsh habitats and ecosystem diversity. Dredging activities may also suspend invertebrates to temporarily enhance foraging opportunities.

With the implementation of mitigation measures, adverse impacts to birds would be avoided, and impacts would be considered less than significant.

Wildlife

The Santa Ana River Marsh supports mostly small species of wildlife. Since dredging and excavation would occur in inundated areas, wildlife is expected to be mostly impacted by noise and vibrations during construction. Removal of vegetation on the tern island may remove habitat for small reptiles and mammals, however the slopes of the island would remain intact and provide refuge for these species. Wildlife is expected to vacate areas of high disturbance during construction, and return after construction is complete. Disturbance to wildlife species would be of a short duration, only during daytime hours, and would be localized within the Marsh. Impacts to wildlife are considered less than significant as any disruptions to pre-construction foraging or movement behaviors would be temporary and wildlife activities are expected to return to normal upon project completion.

5.2.2 Nearshore Disposal Site

Marine Vegetation

Less than significant impacts to marine vegetation are expected as the sandy nearshore disposal area has minimal or no marine vegetation. Eelgrass would not be supported in the high energy nearshore environment and the nearest kelp communities are located over 5 miles away, at such distance from the disposal site as to be beyond the area of impact.

Invertebrates

The potential biological and physical effects of using dredged material for nearshore replenishment include coverage and disturbance of fauna by dredged material, and temporary turbidity increases within the nearshore disposal areas, which can cause clogged gills and breathing apparatuses. The turbidity levels are expected to be relatively low because the material disposed in the nearshore would be composed of predominantly sandy material that would settle out of the water column quickly. Furthermore, the volume of sediment is relatively small (25,000 cubic yards) and sediments would be disposed of over an approximately 4.6 acre area. Dredging operations would occur only during daytime hours, and turbidity would dissipate at night. Impacts to invertebrates in the nearshore environment would be temporary and short term in nature and no significant impacts are expected.

Pismo clams may be present at Newport Beach. Pipeline placement may occur on the beach, however these activities would be restricted to the dry sand, except in the area where the pipeline will enter the ocean to the nearshore disposal site. Sediment would be disposed of over a large nearshore site and would replenish the beach over a long period of time. Impacts to Pismo clam are expected to be minimal and not significant.

Fish and Essential Fish Habitat

Federal action agencies that fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH, and respond in writing to the fishery service's recommendations.

Some fish may avoid the immediate disposal area due to increases in suspended sediments. Invertebrate prey items may be buried with sediments disposed in the nearshore, however some prey items are expected to be released in the nearshore with the dredge sediments. Fish species may be attracted to the area to feed on mollusks, crustaceans, and other organisms which may have been caught up in, or exposed by, the dredged material. Fish would likely avoid the zone of highest turbidity immediately around the disposal barge or pipeline outfall. Even in this area, turbidity levels are expected to subside during nighttime hours and upon completion of the nearshore disposal operations.

Given the temporary nature of disposal and that nearshore disposal would replenish the beach over a long period of time, no significant impacts are expected. Disposal would occur outside the grunion spawning season, and would not include direct beach placement; therefore, no impacts to grunion would occur.

Birds

Placement and removal of the temporary disposal pipeline on the beach may disturb roosting and foraging birds during nearshore disposal activities. These placement and removal activities would be short term and birds are expected to find alternate locations on the beach to roost and forage. The pipeline areas could be used by birds once the pipeline is in place and construction activities in these areas are completed. Construction activities would resume to remove the pipeline, after which the beach would be restored to its original condition.

Maintenance and patrol of the pipeline would be required, but would not pose a more significant impact than that already created by City of Newport Beach lifeguard patrols. Equipment and vehicles operating on the beach would drive slowly to allow birds and beachgoers ample time to move away from oncoming equipment. Equipment operators would be trained to avoid birds foraging and roosting on the beach.

Dredging disposal activities attract many birds to the disposal areas to feed on invertebrates that may have been caught up and exposed in the dredged material as it is released into the water. Construction would occur outside the breeding bird season and no significant adverse impacts to birds are expected from this project.

Wildlife

Some marine mammals may be found near the disposal site. Disposal activities may attract marine mammals to feed on invertebrates exposed in the disposed sediments. Marine mammals are expected to be acclimated to marine traffic off the coast of Newport Beach and Newport Harbor, and disposal activities would not be significantly more disturbing than this traffic. If marine mammals did appear in the nearshore disposal area, they are expected to avoid areas of high activity and turbidity. No adverse impacts to marine mammals are expected from the proposed project.

5.2.3 No Action

The impacts associated with dredging, construction, and disposal would not occur under the "No Action" alternative. Continued shoaling, however, would continue to dampen the tidal cycle in the Marsh and degrade circulation, water quality, and Marsh habitat. This degraded condition would have the potential to affect biological resources and endangered species within the Marsh.

5.3 Threatened and Endangered Species

5.3.1 Santa Ana River Marsh and Nearshore Disposal Site

5.3.1.1 Light-footed clapper rail

Approximately 0.33 acre of cordgrass habitat would be removed from the southern Marsh due to construction (Figure 14). However, cordgrass habitat that was observed as supporting a pair of light-footed clapper rail in 2011 would be left in place. The majority of clapper rails found in the Marsh are concentrated in the cordgrass habitat in the northern Marsh, outside of current project limits.

Construction activities would occur outside the breeding season, which would avoid adverse impacts to the light-footed clapper rail. Resident birds are expected to use the northern Marsh for foraging during construction activities. Furthermore, construction activities would be temporary and would occur only during daytime hours.

Deepening of the Marsh channels would benefit the clapper rails by preventing domestic and feral dogs and cats from crossing the channels at low tide and disturbing roosting and nesting birds.

Pre- and post-dredge vegetation surveys would be performed to document acreage of cordgrass habitat impacted by construction activities. The Marsh channels would be monitored for one year after construction to evaluate the re-establishment of cordgrass habitat. If cordgrass does not re-establish, planting may be performed in appropriate areas based on availability of suitable channel depths.

Per coordination with the USFWS, to further minimize impacts the Corps would modify the dredge footprint and pull back 3 feet from vegetated banks, based on observations in the field and pre-dredge mapping.

With the avoidance of breeding season and known occupied habitat and the implementation of mitigation measures, the proposed project may affect, but is not likely to adversely affect the light-footed clapper rail.

5.3.1.2 California Least Tern

Impacts to California Least Tern would be avoided by constructing outside the nesting season. California Least Tern generally arrive in southern California in mid-April and depart in mid-September, while construction would occur between September 15 and March 15. Therefore, construction would not occur while least tern are present in the area.

The California least tern would benefit from the proposed clearing and grubbing of the tern island, which would restore nesting habitat. Per coordination with USFWS, to further improve the tern island any holes and damage to the fencing surrounding the island would be repaired. The beneficial effects from the proposed project may affect, but are not likely to adversely affect the California least tern.

5.3.1.3 Western Snowy Plover

Construction activities would occur outside the breeding season for the western snowy plover. Dredging and excavation would remove some of the mudflats where snowy plover may forage and roost during winter months. However, the plover is expected to vacate the immediate area and find alternate foraging and roosting sites at the beach and adjacent wetland areas during construction activities.

Placement and removal of the temporary disposal pipeline on the beach may disturb roosting and foraging plover during nearshore disposal activities. Pipeline placement and removal activities would be short term and birds are expected to find alternate locations on the beach to roost and forage during that time. The pipeline areas could be used by birds once the pipeline is in place and placement activities in these areas are completed. Activities would resume to remove the pipeline, after which the beach would be restored to its original condition.

Placement of the temporary disposal pipeline would not interfere with snowy plover foraging, as most plovers forage on the wet sand, and most of the pipeline would be placed on the dry beach. The birds also typically run and fly short distances along the beach, therefore the pipeline would not present a barrier for foraging plovers in the vicinity.

Maintenance and patrol of the pipeline would be required, but would not pose a more significant impact than that already created by City of Newport Beach lifeguard patrols. Equipment and vehicles operating on the beach would drive slowly to allow plovers ample time to move away from oncoming equipment. Equipment operators would be trained to avoid birds foraging and roosting on the beach.

Dredge material deposited in the nearshore is expected to disperse via wave action over the course of several months to replenish the beach. No dredge material will be disposed of on or near snowy plover habitat.

Critical habitat for the western snowy plover would not be impacted by the proposed project.

By scheduling construction outside the breeding season and placing the disposal pipeline outside of foraging areas in the surf zone (except where it crosses the surf to reach the disposal location or barge), adverse impacts to western snowy plover would be avoided. The pipeline would be placed on the beach temporarily and would not adversely impact plover foraging, roosting, or movement. The proposed project may affect but is not likely to adversely affect the Western Snowy Plover.

5.3.1.4 Coastal California Gnatcatcher

No suitable nesting habitat for gnatcatcher exists within the project area. The closest suitable nesting habitat is located at least 800 feet from the project area, on the adjacent bluffs. Gnatcatcher may forage in the vicinity of the project area, however they would be expected to avoid construction areas and forage elsewhere during periods of high activity. Construction would occur outside most of the breeding season for gnatcatcher and would occur only during daytime hours. Adverse impacts would be avoided, and the proposed project is expected to have no effect on the Coastal California Gnatcatcher.

5.3.1.5 Belding's Savannah Sparrow

Construction would occur outside the breeding season for the Belding's savannah sparrow. Approximately 1.0 acre of pickleweed dominant vegetation would be removed at the staging areas, however these areas would be restored after construction is complete. The large patch of occupied pickleweed habitat in the southern Marsh, east of the tern island, would remain undisturbed. Resident birds are expected to avoid areas of high activity and relocate to alternate foraging and roosting areas in undisturbed portions of the Marsh. Furthermore, construction activities would be temporary and would occur only during daytime hours.

With the avoidance of breeding season and occupied sparrow habitat, impacts to

Belding's savannah sparrow would be less than significant.

5.3.2 No Action

Under the "No Action" alternative, impacts to threatened or endangered species may occur in the future as continued shoaling further dampens the tidal cycle, preventing circulation and tidal flushing in the Marsh, and degrading water quality. Accumulation of sediments would further convert unique coastal salt marsh habitats, currently occupied by endangered species, to more unsuitable upland type habitats.

5.4 Water Quality

5.4.1 Santa Ana River Marsh

Temporary physical and chemical changes in water quality characteristics would result due to re-suspension of bottom sediments during dredging activities. However, since contaminant levels for all dredge areas were within acceptable limits, impacts to water quality due to contaminants during dredging activities are expected to be minimal and not significant.

Due to the fine sediments present in the Marsh, dredging activities would impact turbidity levels. Increased levels of turbidity and suspended solids levels are associated with decreases in dissolved oxygen, which would be expected in the immediate vicinity of the dredging operations. Increased turbidity would result in a decrease in light penetration and cause a general decline in aquatic primary productivity. Any appreciable turbidity increase may also cause clogging of respiratory and feeding apparatuses of fish and filter feeders. Motile organisms, however, are expected to evacuate and avoid the dredging area and temporarily relocate to an undisturbed area.

Increases in turbidity would be localized and short term. Connections to the Marsh channels (via the tide gate and culverts) would be blocked during dredging to keep a consistent water level in the Marsh. This would prevent much of the turbidity from entering the Santa Ana River and northern Marsh. Silt curtains would also be used to minimize turbidity outside the dredge area. Water from the Marsh would only be released during extended periods of inactivity, during which time turbidity levels are expected to decrease as sediments settle. Dredging would occur for approximately four months, and would only occur Monday through Saturday during daytime hours. Turbidity levels would decrease during non-activity at nights and on Sundays.

Furthermore, it is expected that higher levels of turbidity are a natural occurrence in the Marsh due to the constant tidal fluctuations and movement of water and sediments in and out of the Marsh. Considering the existing tidal flows and turbidity, as well as the mitigation measures to be implemented, impacts to turbidity due to dredging activities are expected to be localized, short term, and not significant.

Further sediment testing found that Areas D and E were not suitable for ocean disposal at LA-3. These sediments would be excavated in dry conditions and would be disposed of at an upland landfill. Since these areas would be blocked from the remaining Marsh and water would be removed to create dry conditions, excavation activities in Areas D and E would not directly impact water quality.

If necessary to reduce the moisture content of the dredge materials for landfill acceptance, a drying additive may be applied to the sediments after dewatering of the marsh channels. The drying additive will be mixed with the dredge sediments within the material handling site and will be removed with the dredge sediments. The material handling site will be required to contain all dredge sediments so that no drying additive will leach into the surrounding environment.

Exchange with the Semeniuk Slough would be maintained during excavation activities to ensure the water there does not become stagnant while cut off from the Marsh. Silt curtains would be used to prevent excessive turbidity in the Slough during dredging activities.

Clearing and grubbing of the tern island would not directly impact water quality since activities would be performed above the Marsh Channels in the upland environment on the flat top portion of the island. Construction equipment would cross the Marsh channel to gain access to the island, however these crossings would be infrequent and short term. Furthermore, the crossing would be temporarily improved using gravel or steel plates, which would minimize the equipments' direct contact with the water in the Marsh channel.

Dredging and construction activities would comply with the 401 Water Quality Certification. Water quality monitoring would be performed during dredging and construction operations to minimize impacts due to the implementation of the proposed project. Section 8.0 discusses environmental commitments related to water quality monitoring.

With the implementation of mitigation measures, the proposed dredging and excavation is not expected to cause significant or adverse impacts to water quality.

5.4.2 Nearshore Disposal Site

Disposal activities likely contribute only a small percentage of the total turbidity found in the nearshore environment when compared with that created by natural erosion of the beach, storm run-off from terrestrial habitats, and resuspension of solids by waves, currents, and maritime traffic. High levels of turbidity resulting from the disposal operations are usually restricted to the immediate vicinity of the disposal area and tend to dissipate rapidly. Dredge sediments to be disposed of in the nearshore are coarser grained and are expected to settle out of the water column quickly. Sediments were also found to be free of chemical contaminants. Therefore, the proposed nearshore disposal is not expected to cause significant changes in water quality.

Furthermore, the sediment grain size and chemical analysis results were coordinated with the concerned resource agencies, including the DMMT. The resource agencies approved the disposal of the appropriate sediments in the nearshore. See Section 1.5 for details on coordination with the resource agencies.

Disposal activities would also comply with the 401 Water Quality Certification. Water quality monitoring would be performed during disposal operations to minimize impacts. Section 8.0 discusses environmental commitments related to water quality monitoring.

Considering the short duration and the localized nature of nearshore disposal, as well as the implementation of water quality monitoring, impacts due to disposal of dredged sediments in the nearshore are not expected to be significant.

5.4.3 No Action

Under the "No Action" alternative, sediments would continue to accumulate in the Marsh channels, which would prevent proper circulation and tidal flushing. Water quality would degrade as Marsh channels are expected to become more stagnant, cut off from substantial tidal influence. Fully and partially inundated Marsh habitats that rely on tidal influence and flushing would be expected to degrade as well with the further dampened tidal cycle.

5.5 Air Quality

The air quality analysis presented in this section addresses potential local and regional effects from the emissions generated from dredging and disposal activities associated with the alternatives carried forward for analysis.

5.5.1 SAR Marsh, Nearshore and Upland Disposal Sites

Emissions sources associated with the proposed action include the dredge (hydraulic cutterhead) equipment, disposal operations (booster pump station for pipeline and tug boat), clearing and excavation equipment, trucks to transport excavated material to an upland landfill, and workers commuting to the work site. Dredging, disposal, excavation, and clearing and grubbing activities would occur during day light hours (up to 11.5 hours weekdays; 10 hours on Saturdays), 6 days a week. The entire operation may take approximately 6 months to complete.

The air emissions from the proposed action are comprised of short-term temporary “construction” emissions from on- and off-site sources. No new permanent stationary operating emission sources would be constructed/operated. Onsite air pollutant emissions would principally consist of exhaust emissions from heavy-duty diesel- and gasoline-powered equipment, as well as fugitive particulate matter from soil disturbed during excavation and clearing and grubbing activities. Offsite exhaust emissions would result from transport of the excavated material from the marsh to an upland landfill by trucks and workers commuting to and from the work site.

A detailed air quality analysis performed for the proposed action is located in Appendix C. Description of the assumptions used in quantifying the total emissions from these sources is included in the following paragraphs and in Appendix C.

Carbon monoxide (CO), volatile organic compounds (VOC) or reactive organic gases (ROG), oxides of nitrogen (NOx), sulfur oxide (SOx), particulate matter (PM10) emissions were calculated using an estimated fleet mix of equipment. A list of estimate equipment is included in Appendix C.

Ozone precursor emissions from on-and off-site restoration activities were calculated using emission factors and methods from the California Air Resources Board (CARB) Emission Factors (EMFAC2007) model and SCAQMD CEQA Air Quality Handbook (SCAQMD 1993). Appendix C presents the maximum annual ozone precursor emissions from on-site exhaust sources. Also refer to Appendix C for spreadsheets that list all assumptions used in quantifying emissions.

<u>Impact of Emissions</u>
Project-related emissions would contribute limited quantities of CO, VOC, NOx, SOx, and PM10 and other pollutants to the air. Table 6 below lists the total pounds per day and tons per year for emissions during the proposed activities. The table also compares the estimated worst-case project emissions with daily threshold levels identified by the SCAQMD and yearly de minimis threshold levels established by the USEPA (40 CFR 93.153). Although it is unlikely, the daily emissions calculations assume a worst-case scenario of the dredging, excavation, disposal and clearing and grubbing operations implemented concurrently. Additionally, the analysis assumes a worst-case travel distance to an upland landfill in Los Angeles County (i.e., about 92 miles roundtrip). There are other potential landfills in closer distance that the construction contractor may use instead.

Table 6 Summary of Estimated Project Emissions for the Proposed Action

Total Project Emissions - Daily	**Pounds Per Day**				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
On-Site (Dredging/Excavation)	24.20	68.36	141.87	6.17	11.01
Off-Site (On-Road)	33.96	139.93	410.14	0.54	19.87
Total	58.16	208.30	552.01	6.71	30.88
SCAQMD Daily Significance Levels*	**75**	**550**	**100**	**150**	**150**
Total Project Emissions - Yearly	**Tons Per Year**				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
On-Site (Dredging/Excavation)	0.34	0.88	2.24	0.18	0.20
Off-Site (On-Road)	0.54	2.36	6.18	0.01	0.30
Total	0.88	3.24	8.42	0.18	0.50
de minimis Thresholds	**10**	**100**	**100**	**100**	**70**

As presented in Table 6 and in Appendix C, estimated emissions for the proposed action are below the General Conformity de minimis thresholds for the ozone precursors VOC and NOx, as well as other pollutants. Daily NOx emissions are notably higher compared to the other pollutants and above the identified SCAQMD daily significance levels. This is primarily due to truck exhaust emissions from transporting the excavated material to a landfill. All other identified pollutants are below the significance levels, and all subject pollutants are below the de minimis Federal standards established.

The excavation and associated disposal operation is estimated to occur over a relatively short time period (about one month). The on-road (vehicle trips including haul trucks) analysis assumes an average of 18 trucks that may be in use at the same time, making up to 4 trips or cycles a day. Due to the mobile nature of transporting the excavated material from the marsh to a potential upland landfill (worst-case distance assumed to be approximately 46 miles one-way), truck exhaust emissions would not be concentrated at one location (not a point source). Additionally, a truck trip or cycle is not likely to begin at the same location at the marsh, but may begin from truck company's location in route to the landfill. Truck routes to the upland landfill would utilize freeways for the majority of the trip, and therefore, most of the exhaust emissions would not adversely affect any sensitive receptors.

Under this worst-case (although unlikely) scenario of all operations being implemented concurrently, NOx emissions would be considered adverse. However, due to the short-term temporary nature of the various proposed activities, particularly with the proposed excavation and associated disposal operations, as well as the fact that these emissions would not be a stationary source, emission impacts are not considered significant. The proposed action would not expose sensitive receptors to substantial pollutant concentrations for any significant length of time. Air quality conditions would stabilize after completion of the proposed action.

The dredging, disposal, excavation, and clearing and grubbing operations may release objectionable odors originating from the dredged/excavated material. The equipment themselves used during the proposed activities may also create objectionable odors. These odors would be short-term and temporary in nature as the dredged/excavated material would be transported from the marsh (either via pipeline or truck) to the disposal sites. Although odor impacts may be adverse, it would not significantly affect a substantial number of people. Therefore, potential odor impacts caused by the proposed action would be less than significant.

The proposed activities are subject to Federal, state, and county air quality regulations and standards. The Corps or its contractor would be required to obtain and to observe all applicable SCAQMD or State Air Resources Board (ARB) permits. Compared to the hundreds of tons of pollutants emitted in Orange County each day, the levels of pollutants from the dredge drive, booster pump, and truck engine exhaust are small, but still adverse. Impacts, however, would be temporary, and would be mitigated as necessary by measures required by the SCAQMD. Such measures may include (1) retarding injection timing of diesel-powered equipment for NOx control, and (2) using reformulated diesel fuel to reduce reactive organic compounds (ROC) and sulfur dioxide (SO2). Therefore, air quality emission impacts are not considered significant.

Requirements of Determination of Conformity

The Clean Air Act (CAA), 40 CFR Part 93.153 states that a conformity determination is required for each pollutant where the total of direct and indirect emissions in a non-attainment or maintenance area caused by a Federal action would exceed the de minimis Federal standards established in 40 CFR 93.153. A conformity determination regarding the Federal action of restoration and habitat management would only be mandated if the direct and indirect emissions from the proposed activities exceed the identified thresholds. As per the calculations in Appendix C, the CO, VOC, NOx, SOx and particulate matter emissions fall well below these de minimus levels as prescribed in 40 CFR 93.153(b). Therefore, this Proposed Action conforms to the Federal Clean Air Act as amended in 1990 and, as required, a Record of Non-Applicability has been prepared instead of a conformity determination (Appendix C).

5.5.2 No Action

This alternative would not result in any dredging, excavation or disposal of sediment from with Santa Ana River Marsh. Therefore, no air quality impacts would result under the No Action Alternative.

5.6 Noise Level

5.6.1 SAR Marsh, Nearshore Disposal Site, and Upland Disposal Haul Route

For a relatively long-term noise exposure resulting from construction activities, a CNEL (Community Noise Equivalent Level) up to 65 decibels (dBA) is generally acceptable for noise sensitive land uses, including residences, schools, hospitals, and churches. A CNEL up to 75 dBA is often considered acceptable for office building and other commercial activities (Figure 15).

However, for short-term construction activities, levels considerably higher may be acceptable because of the temporary nature of the activity. A CNEL up to 90 dBA for noise sensitive land uses and up to 100 dBA for offices and commercial activities would not be considered unacceptable and is often found in the vicinity of many construction sites in many urban areas throughout the country.

Construction noise would be generated by the use of heavy land based equipment, dredging equipment, watercraft (tugboats, barges, scows), trucks, pumps, and human activity within the project area. Noise levels during construction are expected to reach approximately 85 to 90 decibels (dB) at the source, and would be comparable to those that have occurred during periodic construction by Orange County Sanitation District along the access road.

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source increases. For a single point source like a construction bulldozer, the sound level decreases by approximately 6 dBs for each doubling of distance from the source. Noise levels from construction are estimated at approximately 87 dBA at 50 feet dropping to 81 dBA at 100 feet, 67 dBA at 500 feet, 61 dBA at 1,000 feet, and to 57 dBA at 1,500 feet from the source.

Distances between construction equipment and sensitive noise receptors (such as the adjacent housing community) would vary based on the location of construction activities at a given time. Dredging activities would occur immediately adjacent to residences in the southernmost Marsh channels, and would be as far as 1,300 to 1,400 feet near the access road. Excavation would occur immediately adjacent to the residences and up to 400 to 500 feet away. Disposal in the nearshore would occur approximately 1,500 feet from residences, while the booster pump and pipeline would be as close as 50 to 100 feet from residences.

Temporary increases in truck traffic used to transport dredged material to the landfill would also produce noise disturbance within and near the construction corridors. Truck traffic would pass as close as 130 feet from residences across from the access road.

Construction traffic would also pass immediately adjacent to residences on the route to Sunset Street (used for ingress and egress of excavation equipment) via Canal Street and Orange Street (Figure 9). It is anticipated that use of Sunset, Orange, and Canal Streets would be limited to approximately ten days. Increased construction traffic would produce temporary, localized noise for brief periods, but it would not create any permanent, adverse noise impacts.

Construction would only occur during daytime hours per the City of Newport Beach's Municipal Code (Section 10.28.040) and the noise generated would diminish the farther the sensitive noise receptors are from the construction site. Furthermore, construction would be temporary, lasting approximately 6 months. Excavation activities would last approximately 1 month, and dredging would last approximately 4 months. Residents would be notified as to when construction would be likely to occur adjacent to their residence.

Due to the temporary nature of the noise impacts and with the incorporated mitigation measures, noise impacts would be less than significant.

5.6.2 No Action

This alternative would avoid all noise impacts associated with the proposed project for the time being. However, a "no action" response may result in continued shoaling and decreased circulation within the Marsh. The need for dredging would be even greater, and delaying the project now could result in a more extensive project in the near future.

5.7 Land Use and Recreation

5.7.1 Santa Ana River Marsh and Nearshore Disposal Site

The proposed action would not create incompatibilities between existing or planned uses with nearby or adjacent land uses. The proposed action would result in the restoration of the marsh channel design depths, tidal circulation and flushing within the marsh, and marsh habitats that are used by endangered species. This would be a benefit to natural resources, particularly with coastal salt marsh plant and wildlife species. This would be consistent with the existing and planned uses and zoning of this site as identified in the City of Newport Beach General Plan and Coastal Land Use Plan.

The proposed action may generate some nuisance impacts, such as temporary noise and dust, and may interfere with traffic to local residences adjacent to the marsh or recreationists using the Santa Ana River levee bike path. The segment of the south levee bike path between Victoria Street and Pacific Coast Highway may be closed during excavation and upland disposal activities. This would be an impact to recreationist traveling down to the ocean. However, the west (opposite) levee bike path would be available for recreationist to use and maintain access to Pacific Coast Highway.

Additionally, if the west levee bike path is closed, this would be temporary and short in duration. The west levee bike path would be reopened once excavation and upland disposal activities are completed. Potential impacts would be temporary and not significant.

Access to the beach would be maintained during all dredging, excavation, and disposal activities. The dredged material pipeline would run from the marsh across the south levee bike path, under the Pacific Coast Highway bridge adjacent to the South Jetty. For dredge material placement on scows for disposal at LA-3, the pipeline would run parallel to the South Jetty directly out to sea. For disposal in the nearshore, the pipeline would either utilize the same alignment as for LA-3 disposal or run along the beach, parallel to the shoreline approximately 0.6 miles, and then offshore approximately 1,000 feet to the nearshore disposal site. Ramps would be built over the pipeline to maintain pedestrian and vehicle crossing along the length of the pipeline. Therefore, impacts associated with the pipeline would be minimal and not significant.

Dredging may temporarily interfere with water-based recreational activities within the immediate vicinity of the dredge footprint and nearshore disposal site. These activities include swimming, boating, kayaking, fishing, and surfing. The environmental impacts and disturbances to such activities are expected to be minimal due to the large size of the beach and the availability of adjacent areas to recreate.

Disposal of a relatively small amount of sediment (25,000 cubic yards) would occur in the nearshore over an approximately 4.6 acre area. Sediment would dissipate over time and replenish the beach slowly, therefore impacts to surfing are expected to be minimal and not significant.

The proposed action would not occur during the summer months; thus, potential impacts during heavy recreation use months would be avoided. Impacts to water-based recreation would be temporary, localized, and not significant. The Corps would coordinate with the Coast Guard District regarding dredging activities; therefore, impacts to recreational vessels would be insignificant.

To further minimize potential impacts to land use and recreation, the Corps shall coordinate with the appropriate agency for access and use of the access road to minimize disturbance of routine operations. In the event of any temporary levee bike path or other trail closure, the public would be notified of the closure, and appropriate signs would be posted to ensure safe access and, or, bypass/detour of the affected segment.

5.7.2 No Action

The No Action Alternative would not result in dredging, excavation, or disposal activities. It would not conflict with applicable land use plans or policies, or result in incompatibilities between existing or planned uses in the area. The No Action Alternative would not create nuisance impacts for local residents and sensitive receptors. Additionally, the No Action Alternative would not conflict with the enjoyment of the open space, beach, and ocean.

5.8 Aesthetics

5.8.1 Santa Ana River Marsh and Nearshore Disposal Site

The aesthetic qualities of the dredge area (i.e., the marsh) would not be significantly impaired as a result of the presence of the dredge and other supporting equipment. The dredge is relatively small in size to accommodate the channel depths of the marsh. Due to the dredge size, dredging capacity (rate), and tidal constraints within the marsh, the dredge may be in operation for up to 6 months. Impacts to the visual resources due to dredging would be temporary and therefore not significant.

A number of additional heavy equipment, including a crane, excavators, tractors, loaders, a dozer, and trucks would be on site to excavate Areas D and E, and clear and grub the least tern island. This work is estimated to take approximately 1 month to complete. The presence of heavy equipment within the marsh would be an impact to visual resources; however, due to the short-term and temporary nature of the work, impacts would not be significant.

The clearing of staging areas near the excavation area would remove trees and vegetation currently serving to block views of the oil operations from the local residents along the Marsh channel. Removal of this vegetation would impact visual resources for these residents during construction. To mitigate these impacts, the Corps would replace and restore screening vegetation that is removed along the excavation area. Where possible, in coordination with property owners of the access road, the Corps would restore with native, Marsh compatible vegetation that would reach equal height, density, and quality as the vegetation currently in place.

For disposal of the dredged material, a pipeline would be used to transport the material from the marsh to scows offshore to be taken to LA-3, or to the nearshore disposal site. As a result, the pipeline would be situated on at least part of the beach, either extending straight out to the ocean along the mouth of the Santa Ana River, or southeast along the beach parallel to the shoreline approximately 3,500 feet where it would then extend out to the nearshore site approximately 1,000 feet offshore. The presence of the pipeline, scows, tugboat, and support boat would be a minimal visual impact considering the wide beach on which the pipeline would be placed, and the view of open ocean would remain unaffected. Disposal activities would be temporary and visual resources would return to existing conditions once work is completed.

Implementation of the proposed action would not cause permanent changes to the viewshed, but would maintain the natural characteristic of the marsh. Construction equipment and its operation would result in minimal impacts to visual resources during construction, but this would be temporary and short-term in nature. Therefore, impacts to visual resources would not be significant.

5.8.2 No Action

No dredging, excavation, clearing and grubbing, or associated disposal activities are proposed under the No Action Alternative. As a result, the marsh channels would not be deepened to design depths. With no action, over the long term, habitat types within the marsh are likely to change due to continued sedimentation within the marsh channels. This may impact the visual character of the marsh.

5.9 Cultural Resources

5.9.1 Santa Ana River Marsh

Dredging will occur in areas previously disturbed during original construction of the Marsh in 1992. The environment and setting for proposed construction was disturbed to such a degree that no significant cultural resources could have survived.

Therefore, the proposed project would not have an effect on historic properties.

5.9.2 Nearshore Disposal Site

From an archeological perspective, the environment and setting for proposed construction has been previously disturbed to such a degree that no significant cultural resources could have survived. The nearshore disposal site has been used for past Corps dredging projects.

Therefore, the proposed project would not have an effect on historic properties.

5.10 Local and Marine Traffic

5.10.1 Santa Ana River Marsh and Upland Disposal Haul Route

No public roads would be closed to traffic as a result of the dredging, excavation, clearing and grubbing, or disposal actions. Minimal traffic would be generated on roadways in the area of the proposed project from workers commuting to and from the site and from haul trucks transporting material to an upland disposal site. It is anticipated that approximately 15 workers would commute to and from the work site each day, entering the site either through the Newport Oil Company access road off of Pacific Coast Highway, or onto the south levee from access points at the Pacific Coast Highway Bridge or Victoria Street. The proposed action may take approximately 6 months, depending on weather delays. Workdays are estimated at 10 to 12 hours during the day, six days a week. Potential impacts to local traffic conditions associated with commuting workers would be negligible.

Temporary loss of street parking may occur at Sunset Street due to the presence of construction equipment during daytime hours. The project was developed to minimize the loss of parking and minimize impacts to the Newport Shores community by limiting the time the Contractor may use the street. During project construction, the Contractor is limited to using Sunset Street for a total of 10 days (discontinuous). Residents of the community would be notified prior to the use of Sunset Street as a construction haul route.

Additional traffic impacts could occur as a result of transport of excavated material to an upland landfill site. There are several candidate landfills within the Orange and Los Angeles County area, including within the cities of Brea, San Juan Capistrano, Irvine, and Azusa. It is estimated that about 10 to 23, 20-cubic yard trucks, making about 4 trips per day, could be used to transport material to the upland landfill site. Estimated duration for the hauling of material to an upland landfill site is about 1 month.

The haul route would depend upon the upland landfill site selected by the construction contractor. However, trucks would enter and exit the marsh site either through the Newport Oil Company access road or at the south levee access point at Victoria Street. From there, trucks would likely access either I-405 by way of Brookhurst Street, or SR-55 by way of the Pacific Coast Highway, both of which are major roadways that can accommodate this type of traffic, to travel to the upland landfill site using freeways. Traffic on local roadways may slow or momentarily stop as trucks enter and exit the marsh site. Given the limited duration and the use of major roadways, potential traffic impacts resulting from truck trips would be minimal and not significant.

To minimize impacts to traffic, the contractor shall prepare and implement a traffic control plan, per City of Newport requirements, that specifies appropriate traffic control measures for project construction activities, as applicable. The contractor shall be responsible for obtaining all applicable permits for transporting of material to the upland landfill site.

5.10.2 Nearshore Disposal Site

Disposal of dredged material at the nearshore receiver site and at LA-3 may take approximately 6 months to complete. Minimal to no marine traffic is anticipated in the vicinity of the nearshore receiver site; therefore, no impacts to marine traffic are expected to occur. Potential impacts related to transport of the dredged material to LA-3 by scow and tugboat is expected to be minimal. Equipment will be properly marked and notifications will be posted to minimize potential concerns. The contractor would move the disposal equipment for U.S. Coast Guard, law enforcement, and rescue vessels if necessary.

To minimize impacts to marine traffic, all marine-based equipment shall be properly marked. Appropriate notifications of the proposed work and duration will be made and posted to the U.S. Coast Guard, and other appropriate agencies.

5.10.3 No Action

No dredging, excavation, clearing and grubbing, or disposal actions would occur under the No Action Alternative. Therefore, no transportation impacts are anticipated

6.0 Cumulative Impacts

Under NEPA, a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (40 CFR 1508.70).

The Corps has coordinated with OCSD, the City of Newport, and Orange County Public Works regarding other construction or maintenance activities scheduled to occur in the vicinity at the same time as this project.

OCSD has two projects scheduled in the vicinity of the proposed Marsh project. These include a levee repair project and an ocean outfall beach box repair project. Air quality impacts may be greater due to the use of additional construction equipment in the area. Impacts to recreation on the levee bike trail may also be greater, however the Corps would continue to coordinate schedules with OCSD to ensure minimal impacts to recreation in the area. Water quality impacts may be greater due to the simultaneous ocean outfall project. The Corps has coordinated with RWQCB and OCSD to discuss water quality monitoring efforts to ensure impacts are minimized. Impacts to air quality, recreation, and water quality would be temporary and are not expected to be significant. OCSD is required to comply with environmental laws and regulations, obtain required permits, and comply with permit conditions for their proposed projects.

The City of Newport has indicated a desire to excavate Semeniuk Slough, which is adjacent and connected to the Marsh, but the Corps is not aware of definite plans or a schedule. If the City project does occur at the same time (or later), the City will be required to test the sediment, have an appropriate and approved plan for disposal, comply with environmental laws and regulations, obtain required permits, and comply with permit conditions. Simultaneous construction could reduce cumulative environmental impacts in some regards, as work may be conducted more efficiently. Air quality and transportation impacts may be greater with additional equipment and a larger work area, but impacts would be temporary and are not expected to be significant.

Due to the extremely shallow design depths of the Slough and Marsh, and the dampened tidal flows in the back portion of the Marsh and the Slough, the water quality and sedimentation in the Marsh would not be substantially impacted if the Slough were not dredged.

Given compliance with the environmental commitments in this EA and those required by project permits, the proposed project would not result in significant cumulative impacts.

7.0 Compliance

7.1 National Environmental Policy Act (NEPA) of 1969 (42USC4321 et seq., PL 91-190); Council on Environmental Quality Regulations for Implementing NEPA, 40 CFR Parts 1500 to 1508; USACE Regulations for Implementing NEPA, 33 CFR Part 220.

This EA has been prepared in accordance with the requirements of NEPA of 1969 (42 USC 43221, as amended) and the CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508), dated 1 July 1988. NEPA requires that agencies of the Federal Government shall implement an environmental impact analysis program in order to evaluate "major federal actions significantly affecting the quality of the human environment." A "major federal action" may include projects financed, assisted, conducted, regulated, or approved by a federal agency. NEPA regulations are followed in the preparation of this EA.

Section 102 of the NEPA requires that all federal agencies use a systematic, interdisciplinary approach to protection of the human environment; this approach will ensure the integrated use of the natural and social sciences in any planning and decision making that may have an impact upon the environment.

Council of Environmental Quality's (CEQ) Regulations on implementing NEPA (40 C.F.R. § 1500 et seq.). These regulations provide for the use of the NEPA process to identify and assess the reasonable alternatives to proposed actions that avoid or minimize adverse effects of these actions upon the quality of the human environment.

The NEPA was established to ensure that environmental consequences of federal actions are incorporated into Agency decision-making processes. It establishes a process whereby parties most affected by impacts of a proposed action are identified and opinions solicited.

This EA has been prepared to address impacts and develop environmental commitments associated with the proposed project. Similar to the EIS process, the Draft EA is circulated for public review and appropriate resource agencies, environmental groups, and other interested parties provide comment on document adequacy. Comment responses are incorporated into the Final EA and the Corps District Engineer signs a Finding of No Significant Impact (FONSI), if it is determined the project will not have a significant impact upon the existing environment or the quality of the human environment. Subsequently, the Final EA and FONSI are made available and distributed to the public. If it is determined the project will have a significant impact upon the existing environment or the quality of the human environment, an EIS would be required.

ER-200-2-2, 33 CFR 230, March 1988. This regulation provides guidance for implementation of the procedural provisions of the National Environmental Policy Act (NEPA) for the Civil Works Program of the Corps. It supplements Council on Environmental Quality (CEQ) regulations 40 CFR 1500-1508, November 29, 1978, in accordance with the CEQ regulations.

Wherever the guidance in this regulation is unclear or not specific, the reader is referred to the CEQ regulations. This regulation is applicable to all Corps responsibility for preparing and processing environmental documents in support of civil works functions.

7.2 Clean Water Act of 1972 (33 USC 1251 et seq.)

The Clean Water Act (CWA) was passed to restore and maintain chemical, physical, and biological integrity of the Nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into aquatic and marine environments. Under Section 404, the Corps issues permits for discharge of dredge or fill materials into waters of the U.S. including wetlands and other special aquatic sites. A Section 401 water quality certification or waiver from the RWQCB is also necessary for issuance of a Corps permit. Additional water quality permitting requirements may include compliance with the Section 402 National Pollution Discharge Elimination System (NPDES) General Construction Permit for Storm Water Discharges Associated with Construction Activity (including the development of a Storm Water Pollution Prevention Plan [SWPPP]) issued by the State Water Resources Control Board (SWRCB) for projects that will disturb 1 or more acres (0.4 ha).

The Corps does not issue itself a permit for civil works projects. Therefore, a Section 404(b)(1) analysis is prepared and included in Appendix D. Section 404(b)(1) addresses project related impacts to the waters of the United States and provides appropriate mitigation measures to minimize impacts. Section 230.10(a)(2) of the 404(b)(1) guidelines states that an alternative is practicable if it is available and capable of being done after taking into consideration costs, existing technology and logistics in light of overall project purposes.

The Corps applied for a Section 401 Water Quality Certificate (WQC) and submitted a request to California Regional Water Quality Control Board (RWQCB), Santa Ana Region. The Corps has received a draft 401 WQC, which outlines the conditions of the permit (Appendix E). The Corps will continue to coordinate with the RWQCB and receive a final 401 WQC prior to construction.

This Final EA is prepared in compliance with the Section 404 of the Clean Water Act. Environmental commitments to minimize impacts to waters of the United States are included in this Final EA.

7.3 Endangered Species Act of 1973 (16 USC 1531 et seq.)

The Endangered Species Act (ESA) protects threatened and endangered species by prohibiting federal actions that would jeopardize continued existence of such species or result in destruction or adverse modification of any critical habitat of such species. If adverse impacts to listed species are anticipated, Section 7 of the Act requires consultation regarding protection of such species be conducted with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) prior to project implementation. During the planning process, the USFWS and the NMFS evaluate potential impacts of all aspects of the project on threatened or endangered species. Their findings are contained in letters that provide an opinion on whether a project will jeopardize the continued existence of endangered species or modify critical habitat. If a jeopardy opinion is issued, the resource agency will provide reasonable and prudent alternatives, if any, that will avoid jeopardy. A non-jeopardy opinion may be accompanied by reasonable and prudent measures to minimize incidental take caused by the project.

The proposed project will not adversely affect federally listed endangered or threatened species and formal consultation under Section 7 of the ESA is not required. USFWS and NMFS received the Draft EA and their comments were incorporated into this Final EA. The Corps initiated informal consultation with USFWS for the light-footed clapper rail, California least tern, and western snowy plover. Informal consultation was completed and concurrence was received (Appendix E). Coordination with USFWS would continue during construction to ensure impacts to threatened and endangered species are minimized.

7.4 Coastal Zone Management Act of 1976 (PL 92-583; 16 USC 1456 et seq.)

Under the Coastal Zone Management Act (CZMA), any federal agency conducting or supporting activities directly affecting the coastal zone must demonstrate the activity is, and proceed in a manner, consistent with approved State's Coastal Zone Management Program, to the maximum extent practicable. As no federal agency activities are categorically exempt from this requirement, the Corps has initiated coordination with CCC staff. The CCC received the Negative Determination (ND) and the Draft EA during the public review period. Concurrence on the ND was received in a letter dated May 25, 2012 (Appendix E).

7.5 Clean Air Act of 1969 (42USC7401 et seq.); CAA Amendments of 1990 (PL101-549)

The Federal Clean Air Act of 1970 directs the attainment and maintenance of National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants (e.g., ozone, carbon monoxide). Under the Clean Air Act, the USEPA must approve a State Implementation Plan (SIP), which defines the actions to be taken, and the time schedule for achievement of attainment, when a geographical area is classified as "non-attainment." The USEPA implements the New Source Review (NSR) and Prevention of Significant Deterioration (PSD) regulations in areas of "attainment."

Under Section 176(c) of the Clean Air Act Amendments (CAAA) of 1990, the Corps must make a determination of whether the Proposed Action "conforms" with the State Implementation Plan (SIP). Conformity is defined in Section 176(c) of the CAAA as compliance with the SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards. However, if the total direct and indirect emissions from the Proposed Action are below the General Conformity Rule de minimis emission thresholds, the Proposed Action would be exempt from performing a comprehensive Air Quality Conformity Analysis, and would be considered to be in conformity with the SIP. A Record of Non Applicability would be written instead.

Emissions that would result from Proposed Actions are subject to the rules and regulations of the SCAQMD. These rules and regulations are designed to achieve defined air quality standards that are protective of public health. To that purpose they limit permissible emissions from projects, and specify emission controls and control technologies for each type of emitting source in order to ultimately achieve State and Federal air quality standards.

Project emissions are not expected to exceed "de minimis" levels established as a criteria for a finding of conformity. As per the calculations in Appendix C, the CO, VOC, NOx, SOx and particulate matter emissions fall well below these de minimus levels as prescribed in 40 CFR 93.153(b). Therefore, this Proposed Action conforms to the Federal CAA as amended in 1990 and, as required, a Record of Non-Applicability has been prepared. The project is in compliance with the CAA.

7.6 National Historic Preservation Act of 1966 (16 USC 470 et seq.)

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to take into account the effects of their undertakings on cultural resources eligible for the National Register of Historic Places. The action must demonstrate compliance with the NHPA, Public Law 89-665; 16 U.S.C. 470-470m, as amended, 16 U.S.C. 460b, 470l-470n, and 36 CFR 800, as amended (August 5, 2004). The Corps has an executed Programmatic Agreement for the entire Santa Ana River Project. This document puts the Corps in compliance with the act.

7.7 Magnuson-Stevens Fishery Management and Conservation Act, as amended.

This Final EA contains an EFH Assessment as required by the Magnuson-Stevens Act. Although construction will occur within Essential Fish Habitat, the USACE has determined that the proposed project would not result in a substantial, adverse impact. In compliance with the coordination and consultation requirements of the Act, the Draft EA was sent to the NMFS for their review and comment. Comments on the Draft were received and incorporated into this Final EA.

8.0 Environmental Commitments

The following is a summary of environmental commitments that have been developed to minimize the impacts associated with construction of the proposed project.

General

1. Prior to construction, the Corps shall provide a 14-day notification of planned activities to appropriate agencies and the surrounding community, and post information bulletins containing work schedules and work areas at appropriate offices. Community associations to be notified include Far West Newport Residents Association, Lido Sands Community Association, Newport Shores Community Association, and West Newport Beach Association. Project areas and equipment will be appropriately marked and lighted.

2. All dredging, disposal, and construction activities will remain within the boundaries specified in the plans. There will be no disposal of dredge material outside of the project area or within any adjacent aquatic community.

Physical Environment

PE-1. Dredging would only occur in areas with sediments compatible for the nearshore and LA-3, as determined by sediment sampling completed in February 2011 and approved by the EPA. Non-compatible material would be excavated and disposed of at an upland landfill.

Biological Resources

BR-1. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with and disturbance to fish and wildlife.

BR-2. Construction shall occur between September 15 and March 15, outside the breeding season for birds.

BR-3. Benthic invertebrates shall be sampled in the month prior to and quarterly during the year after construction to survey for re-colonization. If the benthic invertebrate community has not recovered, the Corps would further coordinate with the resource agencies to evaluate causes of decline, and develop plans for additional monitoring and/or remediation as necessary.

BR-4. All staging areas would be restored with appropriate native vegetation after construction is complete. The staging areas would be monitored and weeded for one year after construction to evaluate the re-establishment of vegetation in those areas, specifically pickleweed. If vegetation is not properly re-establishing, re-planting would be performed.

BR-5. Visual pre-dredge eelgrass and caulerpa surveys would be performed at low tide in the Marsh to document presence or absence of these species. If eelgrass or caulerpa is found in the Marsh, the Corps would coordinate further with NMFS.

BR-6. Equipment and vehicles operating on the beach would drive slowly to allow birds ample time to move away from oncoming equipment. Equipment operators would be trained to avoid birds foraging and roosting on the beach.

BR-7. Dune habitats on the beach would be avoided during placement of the disposal pipeline.

BR-8. Construction activities would be monitored regularly by a qualified biologist.

Threatened and Endangered Species

TE-1. Pre- and post-dredge vegetation surveys would be performed to document acreage of cordgrass and pickleweed habitat impacted by construction activities.

TE-2. The Marsh channels would be monitored for one year after construction to evaluate the re-establishment of cordgrass. If cordgrass does not re-establish, planting may be performed in appropriate areas based on availability of suitable channel depths.

TE-3. Cordgrass habitat that is known to have been occupied by light-footed clapper rail in the southern Marsh would be left in place.

TE-4. Staging areas, dominant with pickleweed, would be restored after construction is complete as described in BR-4. The large patch of occupied pickleweed habitat in the southern Marsh, east of the least tern island, would remain undisturbed.

TE-5. As in BR-6, equipment and vehicles operating on the beach would drive slowly to allow plovers ample time to move away from oncoming equipment. Equipment operators would be trained to avoid plovers foraging and roosting on the beach.

TE-6. Any holes or damage in the fencing surrounding the tern island would be repaired.

TE-7. Per coordination with the USFWS, the Corps has modified the dredge footprint with a commitment to pull back 3 feet from vegetated banks, based on observations in the field and pre-dredge mapping, in order to minimize impacts to the light-footed clapper rail.

Water Quality

WQ-1. The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface and ground waters.

WQ-2. The Contractor shall implement Water Quality Monitoring, including turbidity, transmittance, dissolved oxygen, pH, temperature, total suspended solids (TSS), total recoverable hydrocarbons (TRPH), nutrients, and bacteria at the dredge and nearshore disposal sites for the duration of the dredging activities. Water quality samples shall be taken from designated areas repeatedly throughout dredging.

WQ-3. Exchange with the Semeniuk Slough would be maintained during excavation activities to ensure the water there does not become stagnant while cut off from the Marsh. Water quality monitoring would be performed in the Slough during dredging and excavation activities to ensure impacts are minimized in that area.

WQ-4. For clearing activities on the least tern island, the crossing would be temporarily improved using gravel or steel plates, which would minimize the equipments' direct contact with the water in the Marsh channel.

WQ-5. The amount of drying additives, if used, will be the minimum quantity necessary to reduce the dredge material moisture content the minimum amount necessary for landfill acceptance. If the contractor elects to use a drying additive, the contractor will be required to mix the dredge sediments with the drying additive within the material handling site. The drying additive will be mixed in slurry form to reduce airborne dust. The drying additive will then be removed with the dredge sediments. The material handling site will be required to contain all dredge sediments so that no drying additive will leach into the surrounding environment.

Air Quality

AQ-1. The Contractor shall obtain and observe all applicable SCAQMD or State Air Resources Board (ARB) permits.

AQ-2. To reduce air quality impacts, trucks idling shall be limited to no more than 30 minutes.

Noise

NO-1. Construction would only occur during daytime hours per the City of Newport Beach's Municipal Code (Section 10.28.040). Construction may occur Monday through Friday between the hours of 7 a.m. and 6:30 p.m. and on Saturday between the hours of 8 a.m. and 6 p.m.

NO-2. Residents would be notified as to when construction would be likely to occur adjacent to their residence.

NO-3. The booster pump for the 8-inch pipeline would be located as far from residences as possible.

Land Use and Recreation

LR-1. In the event of any temporary levee bike path or other trail closure, the public would be notified of the closure, and appropriate signs would be posted to ensure safe access and, or, bypass/detour of the affected segment.

LR-2. The Corps shall coordinate with the appropriate agencies/land owners for access and use of the access road to minimize disturbance of routine operations.

Aesthetics

AE-1. The Contractor shall replace potted screening vegetation that is removed along the excavation area.

AE-2. The Corps shall restore screening vegetation that is cleared for staging areas. Where possible, in coordination with road property owners, the Corps would restore with native vegetation that would reach equal height, density, and quality for screening purposes.

Cultural

CR-1. Pursuant to 36 C.F.R. § 800.13, in the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property the Contractor shall immediately suspend all work in any area(s) where potential cultural resources are discovered. The Contractor shall not resume construction in the area surrounding, i.e., immediately adjacent to, the potential cultural resources until the Corps of Engineers has complied with 36 CFR 800.13.

Traffic

TR-1. The Contractor shall prepare and implement a traffic control plan, per City of Newport requirements, that specifies appropriate traffic control measures for project construction activities, as applicable. The Contractor shall be responsible for obtaining all applicable permits for transporting of material to the upland landfill site.

TR-2. All marine-based equipment shall be properly marked. Appropriate notifications of the proposed work and duration will be made and posted to the U.S. Coast Guard, and other appropriate agencies.

9.0 Conclusion

The Corps has concluded that the proposed Santa Ana River Marsh Dredging and Excavation Project has been designed and scheduled to avoid, minimize, and mitigate the probable effects on the environment. Minimization measures will be implemented to avoid significant adverse effects. Construction would occur outside the nesting season for birds, including threatened and endangered species. Dredge materials found compatible for the nearshore and LA-3 would be disposed of accordingly. Non-compatible materials would be disposed of at an upland landfill. Construction activities would occur during daytime hours only, in accordance with local noise ordinances. Water quality, including turbidity and pH, would be monitored to ensure minimal impacts to water quality.

This EA, and coordination with the appropriate public agencies, indicates that the proposed project would not have a significant impact upon the existing environment or the quality of the human environment. As a result, preparation of an Environmental Impact Statement (EIS) is not required.

10.0 List of Preparers

This EA was prepared by:

Erin Jones, Preparer, Biological Sciences Environmental Manager, Corps
Tiffany Bostwick, Preparer, Biological Sciences Environmental Manager, Corps
Steve Dibble, Preparer, Archaeologist, Corps

This EA was reviewed by:

Hayley Lovan, Reviewer, Chief, Ecosystem Planning Section, Corps
Raina Fulton, Reviewer, Acting Chief, Environmental Resources Branch, Corps
Jodi Clifford, Reviewer, Chief, Environmental Resources Branch, Corps
Chuck Mesa, Reviewer, Coastal Engineer, Coastal Engineering Section, Corps

11.0 References

Amec Geomatrix (AMEC). 2011, Santa Ana River Marsh Investigation, Sediment Sampling, Bulk Chemistry Testing, Geotechnical, Testing, and Tier III Toxicity and Bioaccumulation Testing, Newport Beach, California, Report. July.

Atwood, J.L. and D.E. Minsky. 1983. Least tern foraging ecology at three major California breeding colonies. Western Birds 14:57-72.

Atwood, J.L., S.H. Tsai, C.H. Reynolds, J.C. Luttrell, and M.R. Fugagli. 1998. Factors affecting estimates of California Gnatcatcher territory size. Western Birds 29:269-279.

Atwood, J.L. 1990. Status review of the California gnatcatcher (Polioptila californica). Unpublished technical report. Manomet Bird Observatory, Manomet, Massachusetts. 79 pp.

Collins, C.T., D.D. Rypka, B.W. Massey, & J.L. Atwood. 1979. California Least Tern banding project, 1979. State of California, Resources Agency, Department of Fish and Game.

CWIS California Wetland Information System, 1997. Accessed at http://ceres.ca.gov/wetlands/geo_info/so_cal/santa_ana.html, May 2010.

Davis, N., Van Blaricom, G. R. 1978. Spatial and temporal heterogeneity in a sand bottom epifaunal community of invertebrates in shallow water. Lirnnol. Oceanogr 23. 417-427

Defran, R.H., Kelly, D.L., Shultz, G.M., Weaver, A.C. and Espinoza, M.A. 1990. Occurrence and movements of the bottlenose dolphin (Tursiops truncatus) in the Southern California Bight. Marine Mammal Science.

Doh1, T.P., Norris, K.S., Guess, R.C., Bryant, J.P., Honig, M.W. 1981. Cetacea of the Southern California Bight, Vol 111, Part 2, Principal investigator's reports. Summary of marine mammal and seabird surveys of the Southern California Bight area 1975-78. Flnal report to the Bureau of Land Management. NTIS PB81-248-171 Natlonal Technical Information Service, Springfleld, VA

Geller, J.B. 1999. Decline of a native mussel masked by sibling species invasion. Conservation Biology 13:661-664.

Hamilton, R.A. and D. R. Willick. 1996. Birds of Orange County, California: Status and Distribution. Sea and Sage Audubon Society, Santa Ana, California. 150 pp. + Appendices.

Hoffman, S. 2012. Personal Communication, California least tern. March 26.

Marschalek, D.A. 2009. California Least Tern Breeding Survey: 2008 Season. California Department of Fish and Game South Coast Region, San Diego, California. 23 pp. + Appendices.

MASSEY, B. W. 1979. Belding's Savannah Sparrow. Southern California Ocean Studies Consortium, California State University, Contract No. DACW09-78-C-0008, U.S. Army Corps of Engineers, Los Angeles District. 29 p.

Morin, A., 1985. Variability of design estimates and the optimization of sampling programs for stream benthos. Can. J. Fish. aquat. Sci. 42: 1530-1534.

Page, G. W., Lynne E. Stenzel, David W. Winkler, and Christopher W. Swarth. 1983. Spacing out at Mono Lake: breeding success, nest density, and predation in the snowy plover. Auk 100: 13-24.

Powell, A. N. 1996. Western snowy plover use of state-managed lands in southern California, 1995. Calif. Dept of Fish and Game, Wildl. Manage. Div., Bird and Mammal Conservation Program Rep 96-03, Sacramento. 14 pp.

SAWA (Santa Ana Watershed Association). 2010. Activity of the California Least Tern at Huntington State Beach, Orange County, California, 2010.

Smith, R.I. and J.T. Carlton (eds.). 1975. Light's Manual: Intertidal Invertebrates of the California Coast, 3rd ed. University of California Press, Berkeley. 716 pp.

Springer, P.F. 1988. Saline emergent wetland. Pages 126-127 in K.E. Mayer and W.F. Laudenslayer (eds.), Guide to Wildlife Habitats of California. California Division of Forestry and Fire Protection, Sacramento. 166 pp.

USACE (U.S. Army Corps of Engineers). 1980. Phase I General Design Memorandum (GDM) on the Santa Ana River Mainstem, including Santiago Creek. September.

USACE (U.S. Army Corps of Engineers). 1987. Marsh Restoration Design Report, Lower Santa Ana River Channel. prepared by Simons, Li & Associates, Inc. September.

USACE (U.S. Army Corps of Engineers). 1988. Phase II General Design Memorandum/ Supplemental Environmental Impact Statement (GDM/SEIS) on the Santa Ana River Mainstem, including Santiago Creek. August.

USEPA/USACE. (U. S. Environmental Protection Agency & U. S. Army Corps of Engineers). 2005. Final Environmental Impact Statement for the Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay Orange County, California. July.

USFWS (U.S. Fish and Wildlife Service). 1999a. Endangered and Threatened Wildlife and Plants; Determination of Whether Designation of Critical Habitat for the Coastal California Gnatcatcher is Prudent. 50 CFR Part 17. Federal Register Vol. 64: 5957-5963.

USFWS (U.S. Fish and Wildlife Service). 1999b. Designation of Critical Habitat for the Pacific Coast Population of the Western Snowy Plover: Final Rule. 50 CFR Part 17. Federal Register Vol. 64: 68508-68544.

USFWS (U.S. Fish and Wildlife Service). 2000. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Coastal California Gnatcatcher; Final Rule. 50 CFR Part 17. Federal Register Vol. 65: 63680-63743.

USFWS (U.S. Fish and Wildlife Service). 2007. Recovery plan for the Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus). USFWS, Sacramento, California. 751 pp.

Weston Solutions, Inc. 2010. Santa Ana River Marsh Benthic Invertebrate Survey and Water Chemistry Report.

Zedler, J.B. 1982. The ecology of southern California coastal salt marshes: a community profile. FWS/OBS-81/54, USDI Fish and Wildlife Service, Washington, DC. 110 pp.

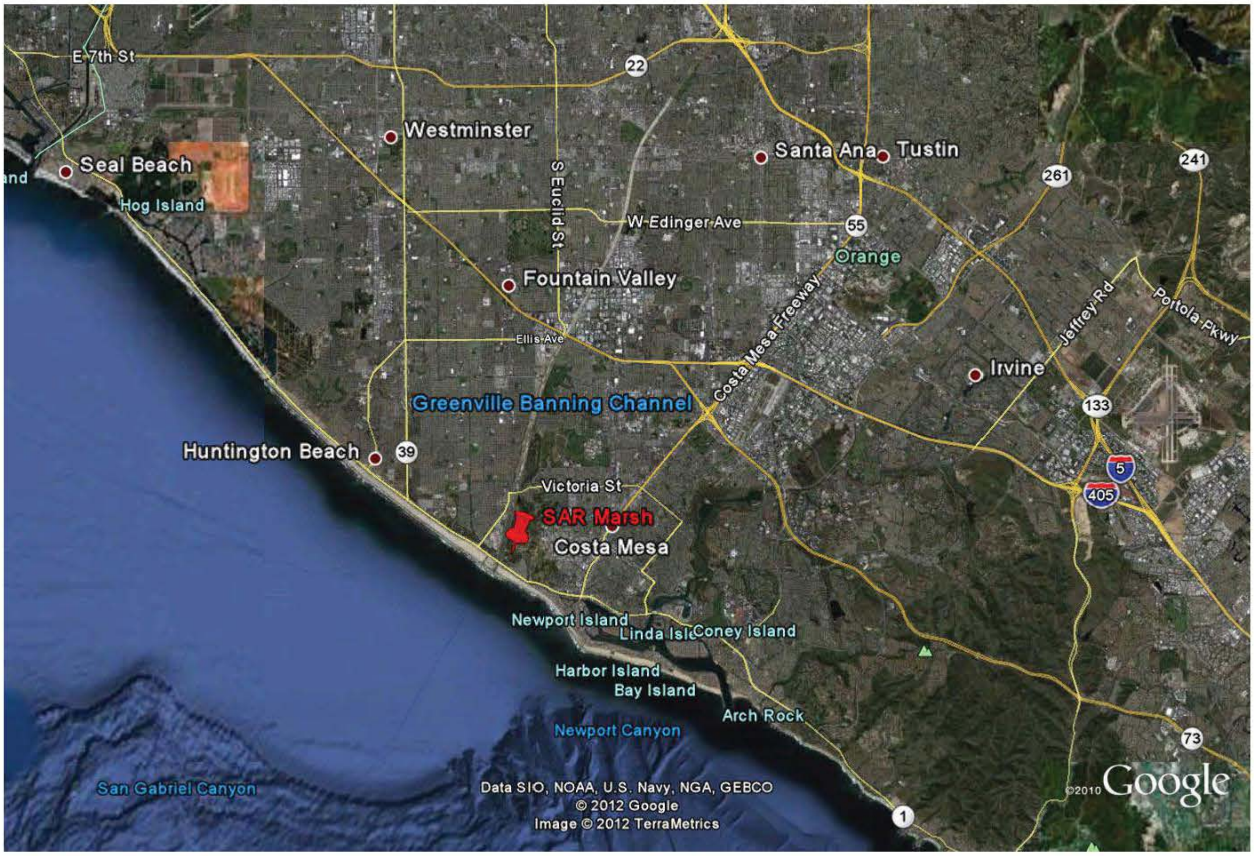
Zoulas, James G. 2008. Beach changes in the San Pedro Littoral Cell, southern California, 1930-2007. University of California, Los Angeles. Dissertation.

Zeiner, D.C., W. F. Laudenslayer, Jr., K.E. Mayer, M. Shite. Editors. 1990. California's Wildlife. Volume 2. Birds. California Department of Fish and Game (CDFG). Sacramento, CA. 731 pp.

Zembal, R., S. Hoffman, C. Gailband, and L. Conrad. 2007. Light-footed clapper rail management, study, and propagation in California, 2006. Report prepared on behalf of Clapper Rail Recovery Fund and Huntington Beach Wetlands Conservancy for California Department of Fish and Game Wildlife Branch, Nongame Wildlife Unit, 2007-02.

Zembal, R. and B. W. Massey. 1983. Light-footed clapper rail: distribution, nesting strategies, and management. Cal-Neva Wildlife Transactions: 97-103.

Zembal, R., B.W. Massey, and J.M. Fancher. 1989. Movements and activity patterns of the light-footed clapper rail. Journal of Wildlife Management 53:39-42.



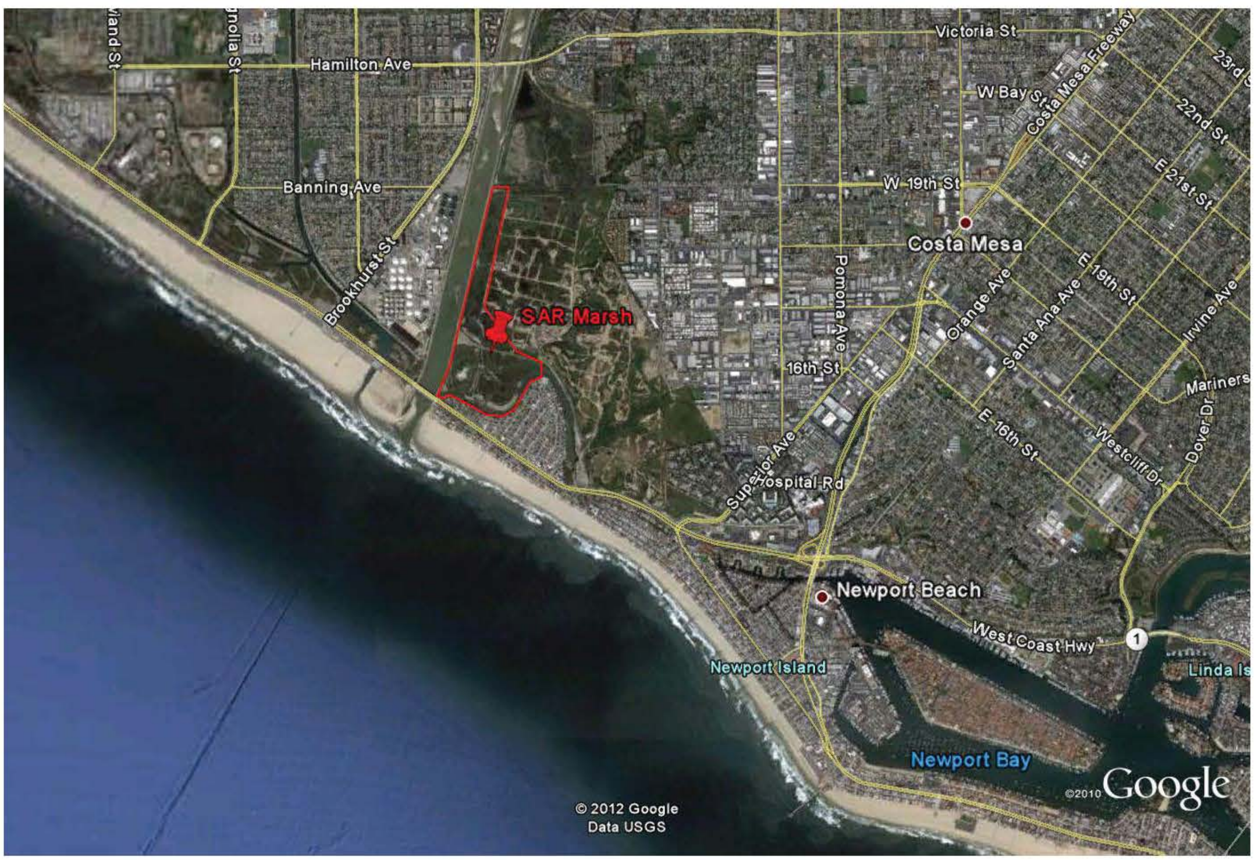


FIGURE 1: Project Location Regional/Vicinity

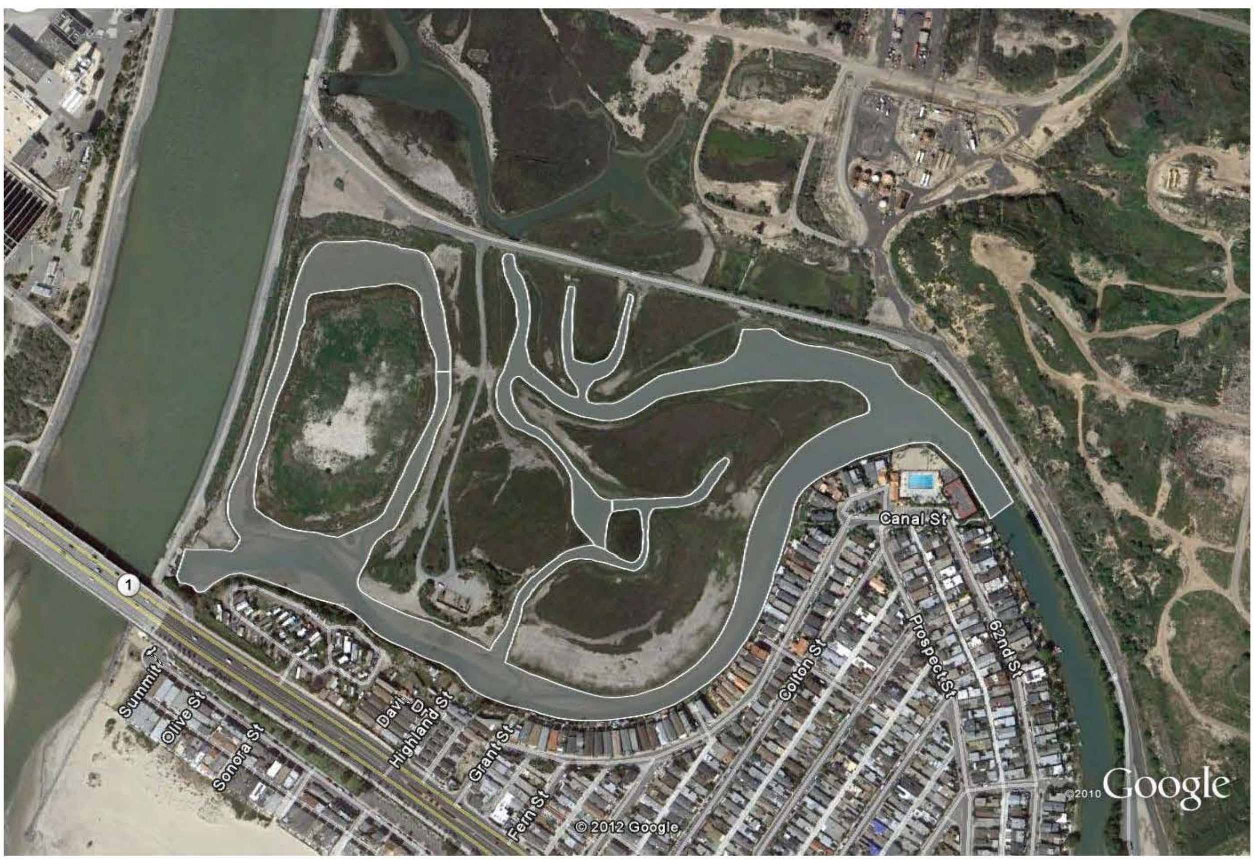


FIGURE 2: Dredge Footprint

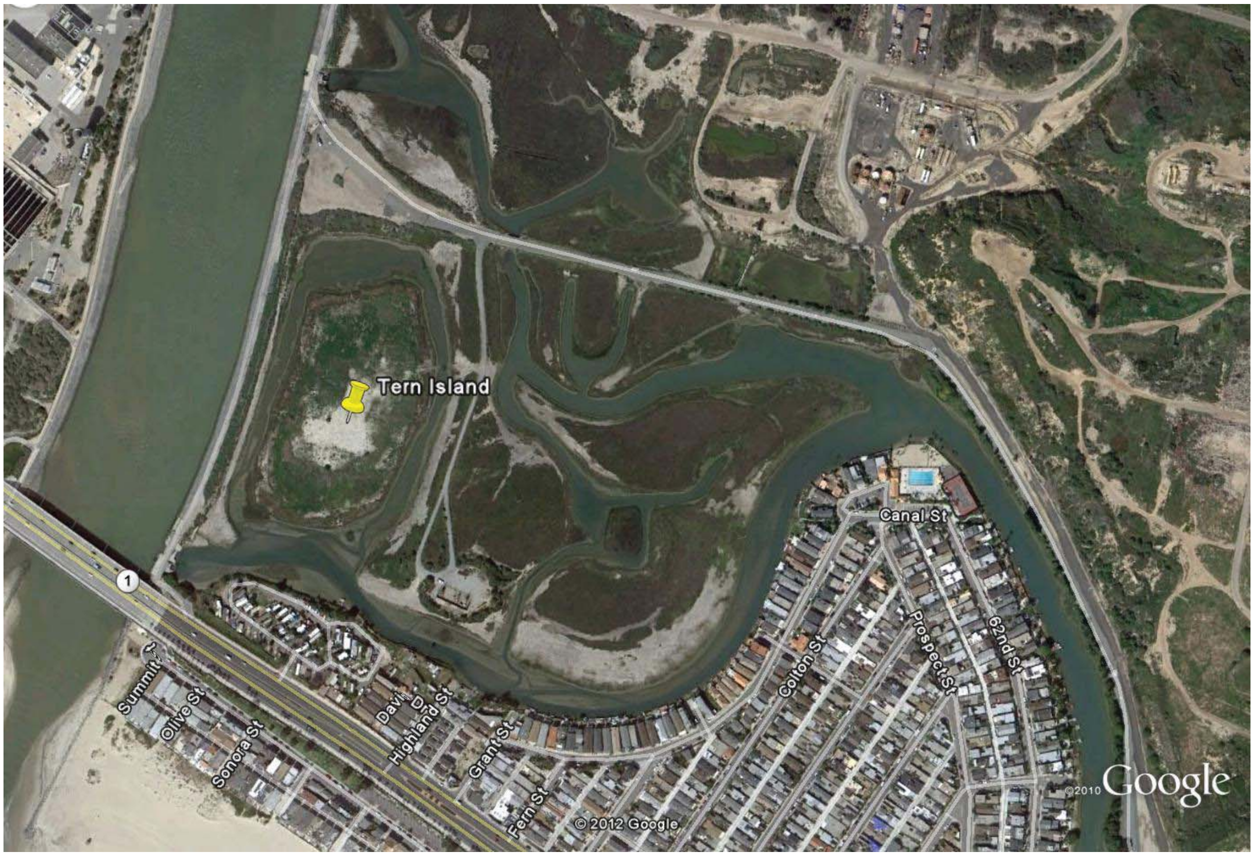


FIGURE 3: California Least Tern Island

FIGURE 4: Nearshore Disposal Site

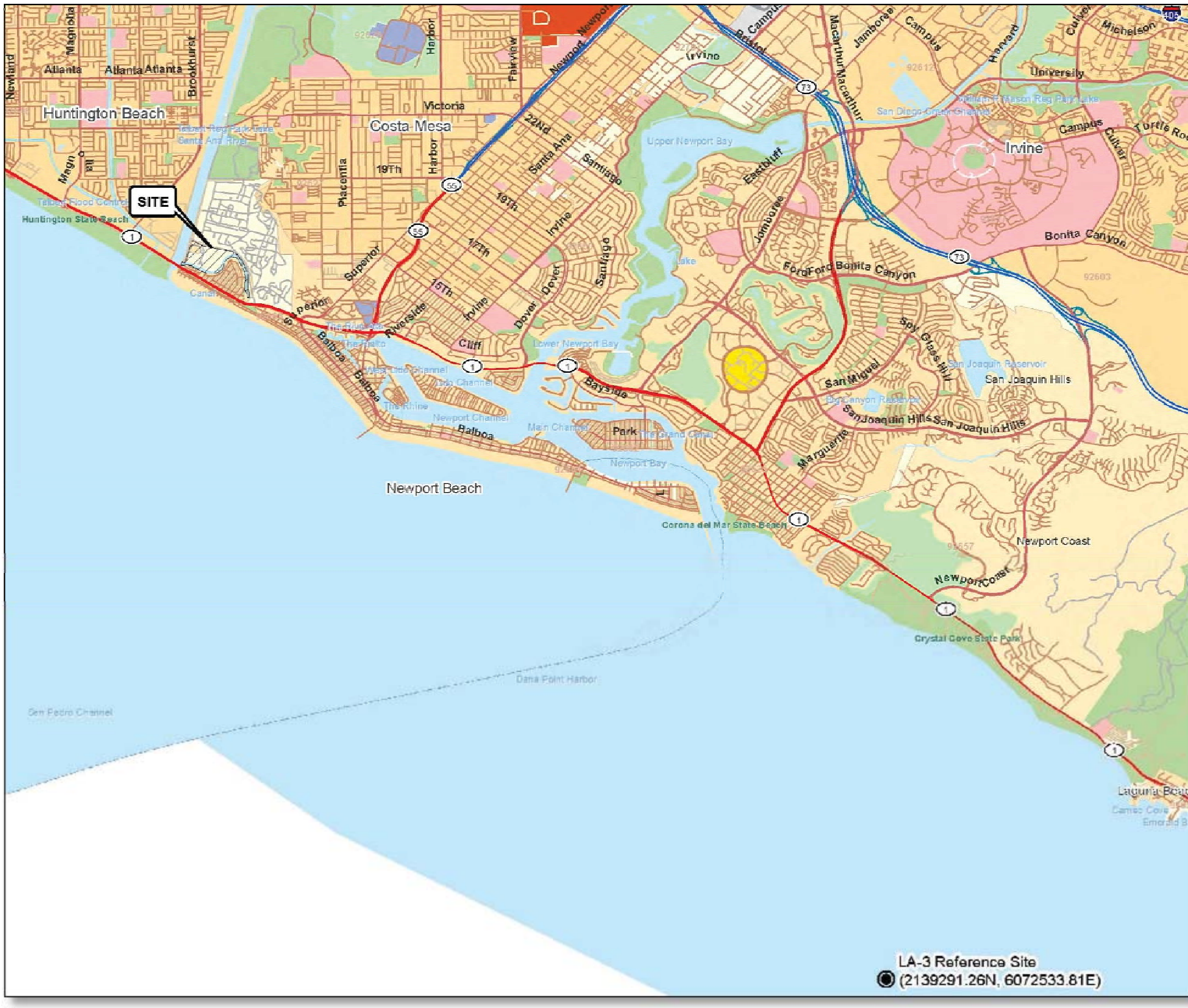
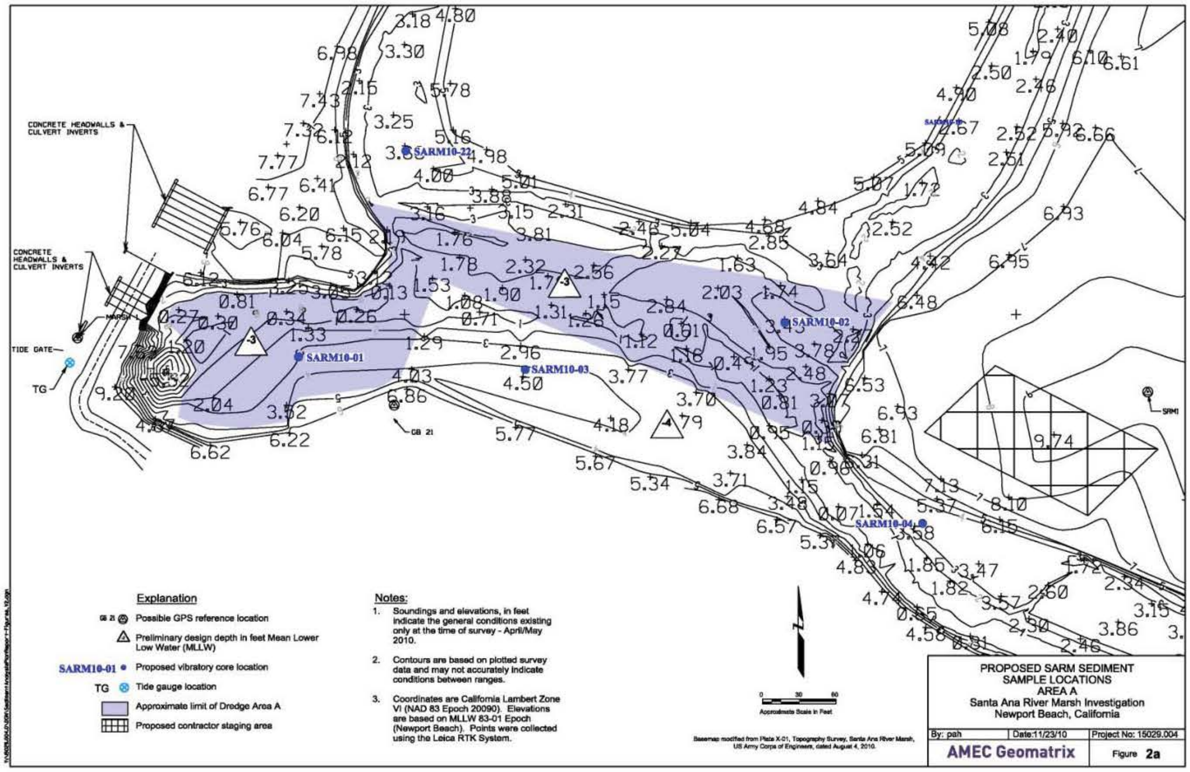


FIGURE 5: LA-3 Open Ocean Disposal Site



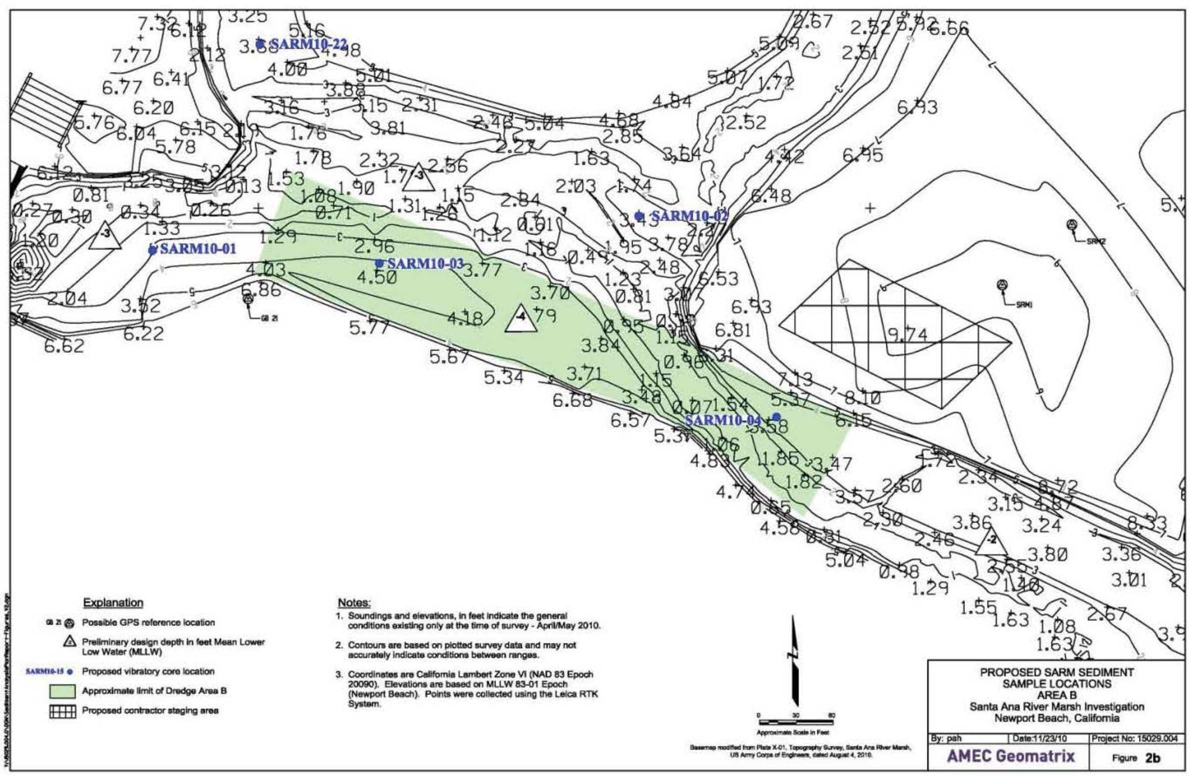
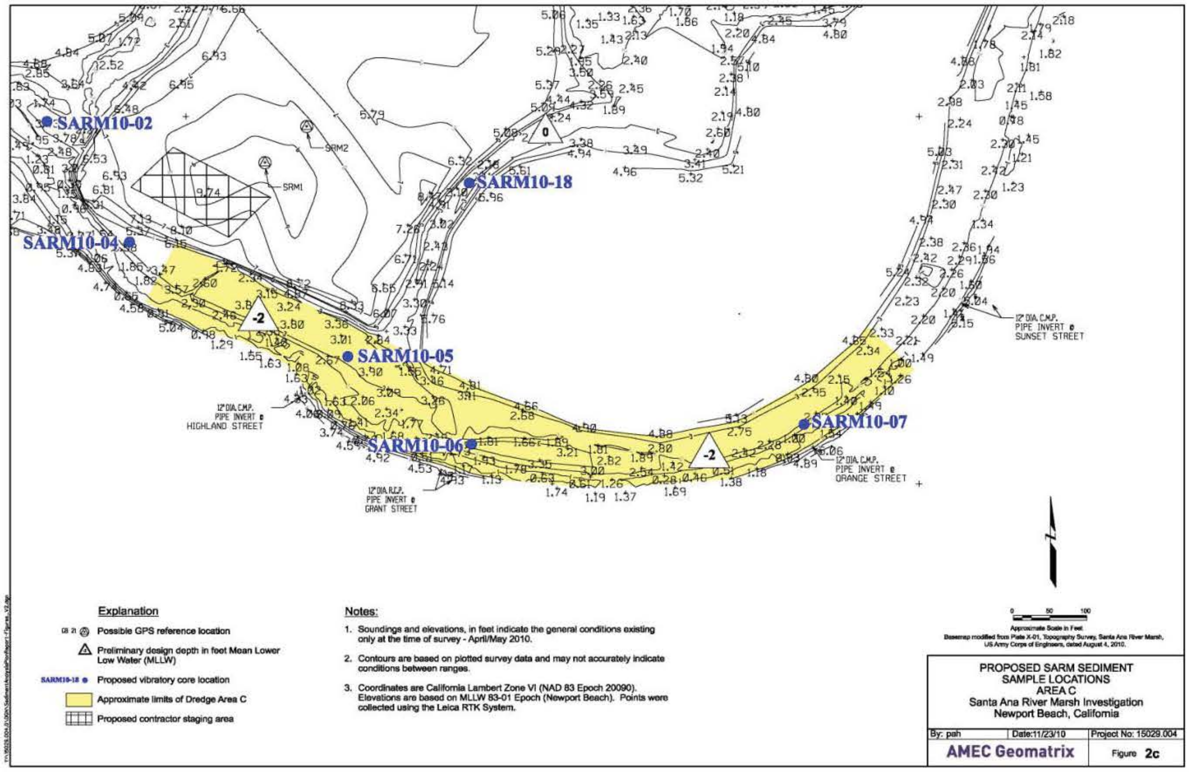


FIGURE 6: Dredge Areas A and B



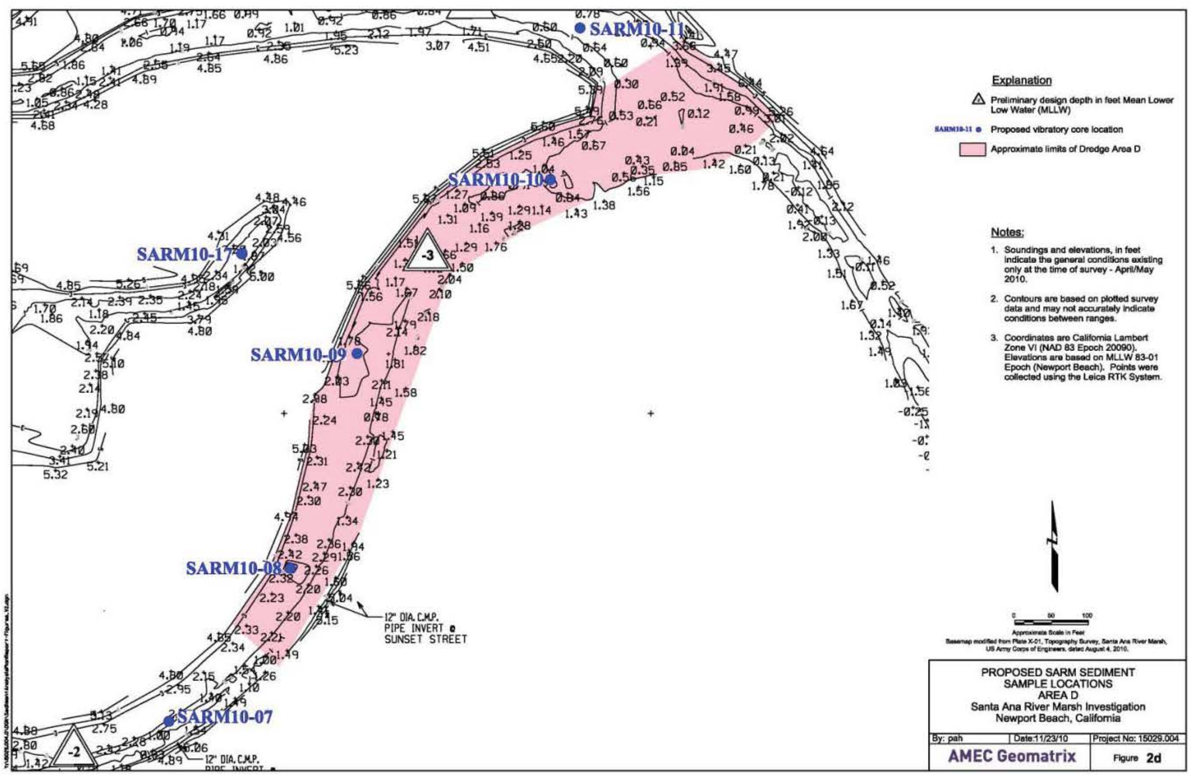
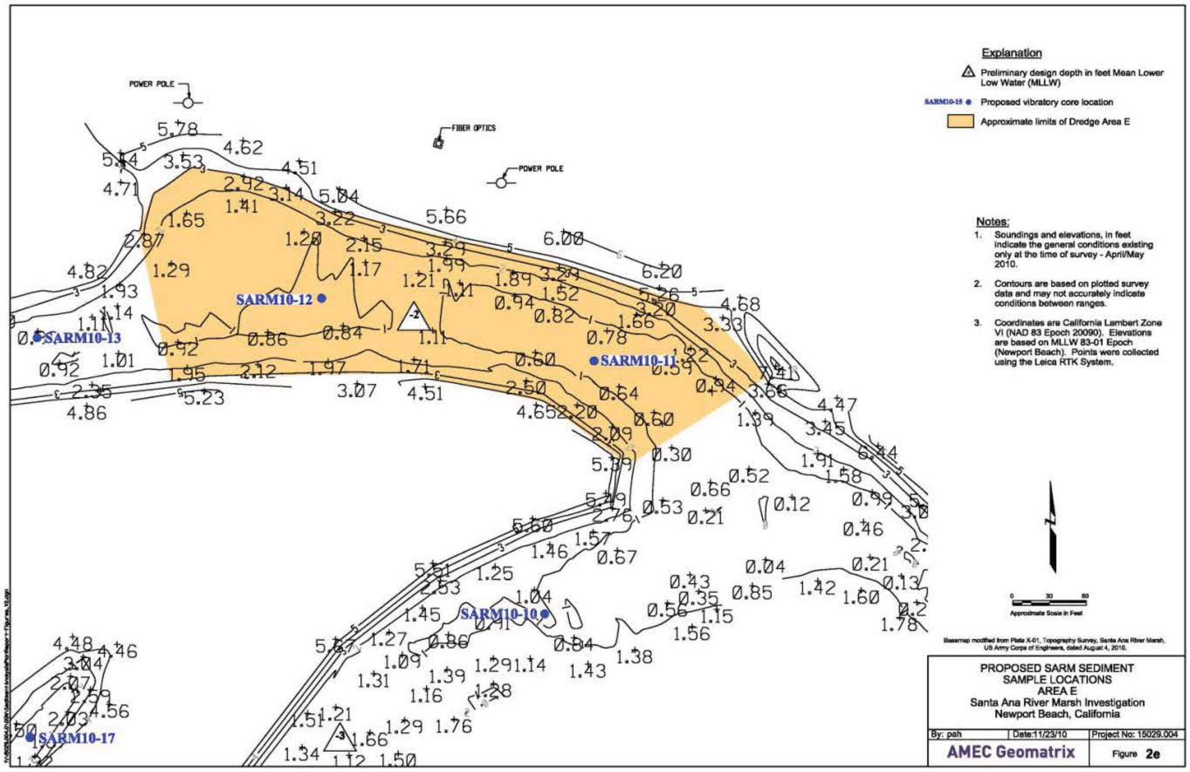


FIGURE 6: Dredge Areas C and D



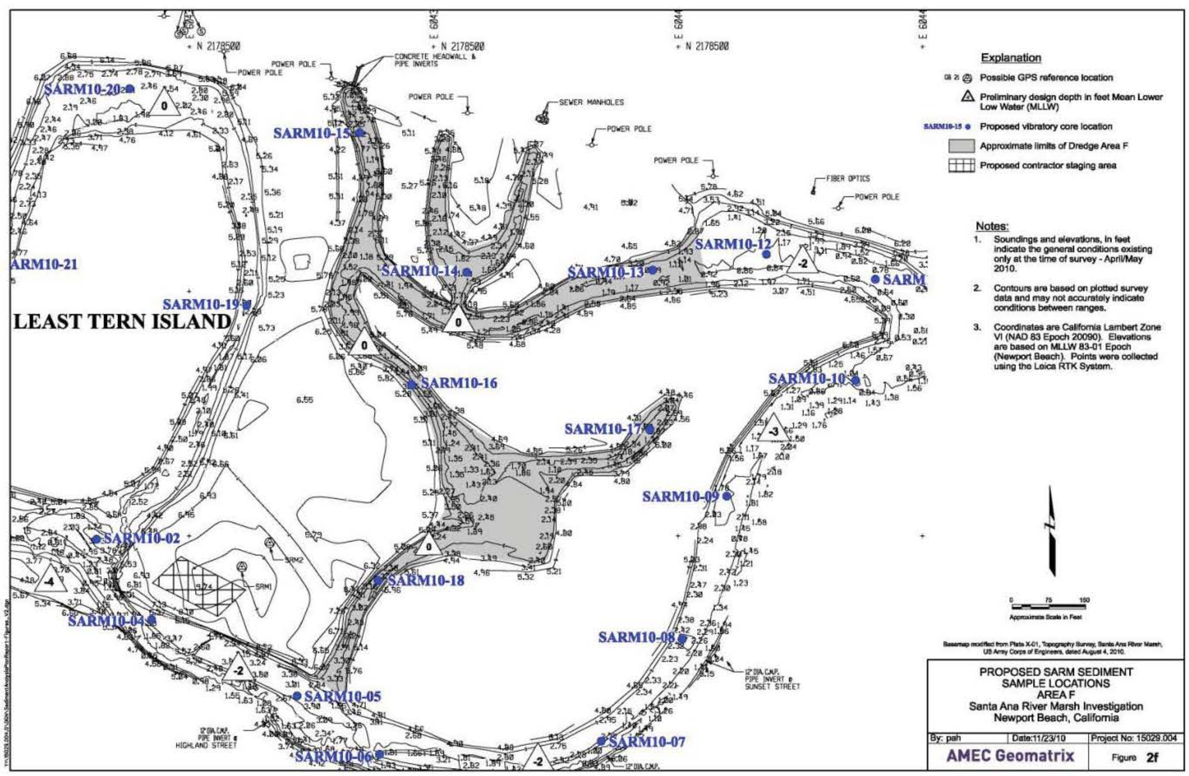


FIGURE 6: Dredge Areas E and F

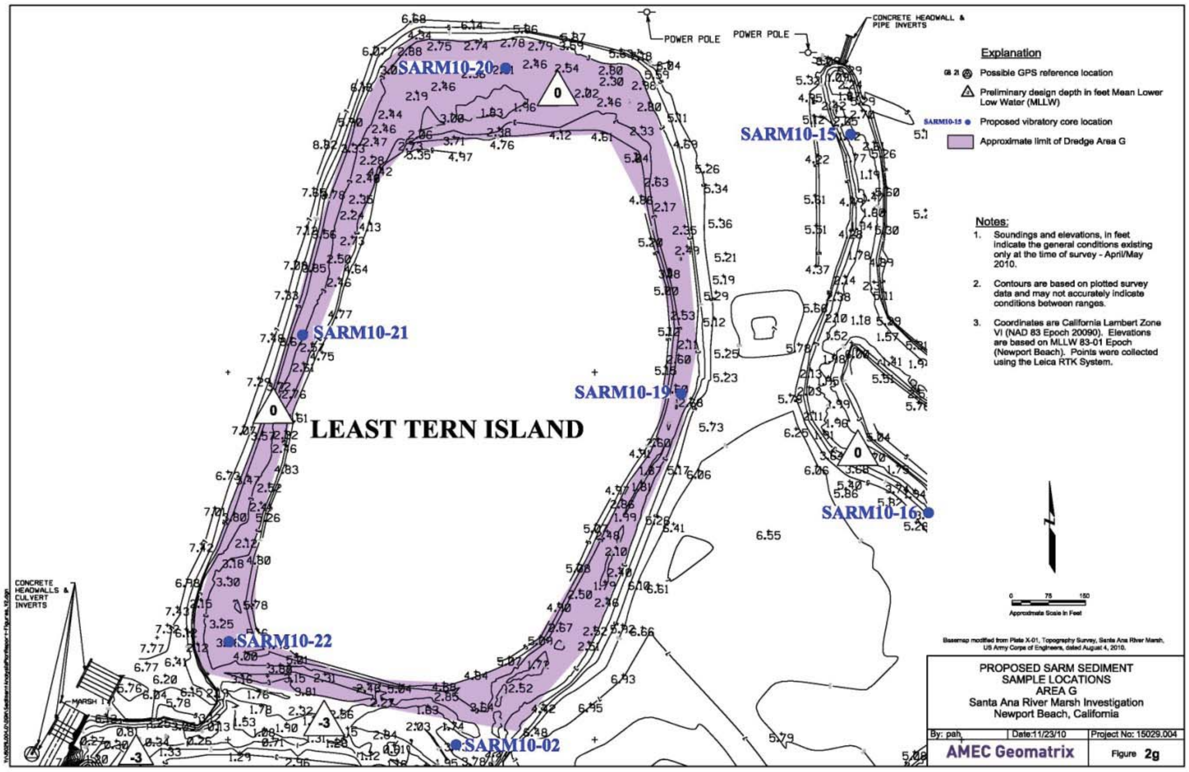


FIGURE 6: Dredge Area G

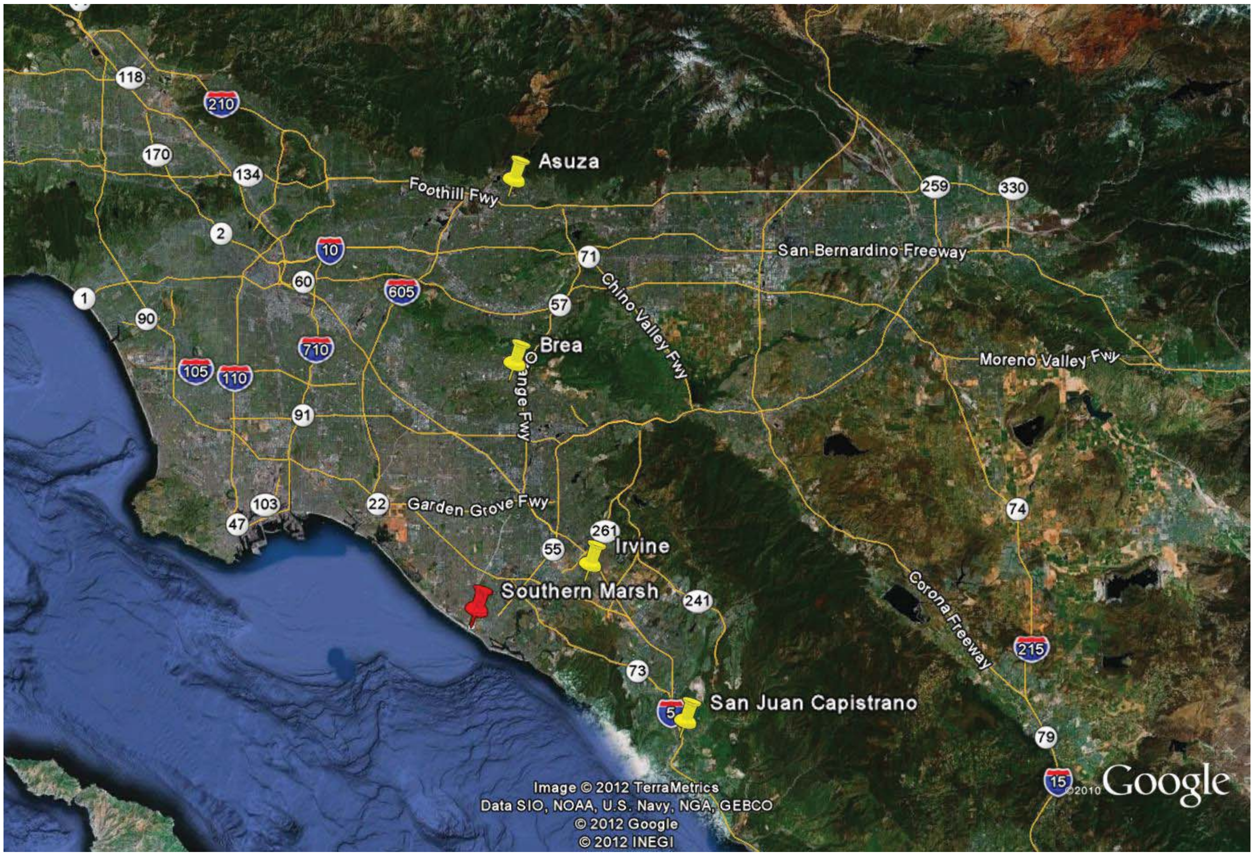


FIGURE 7: Landfill Locations

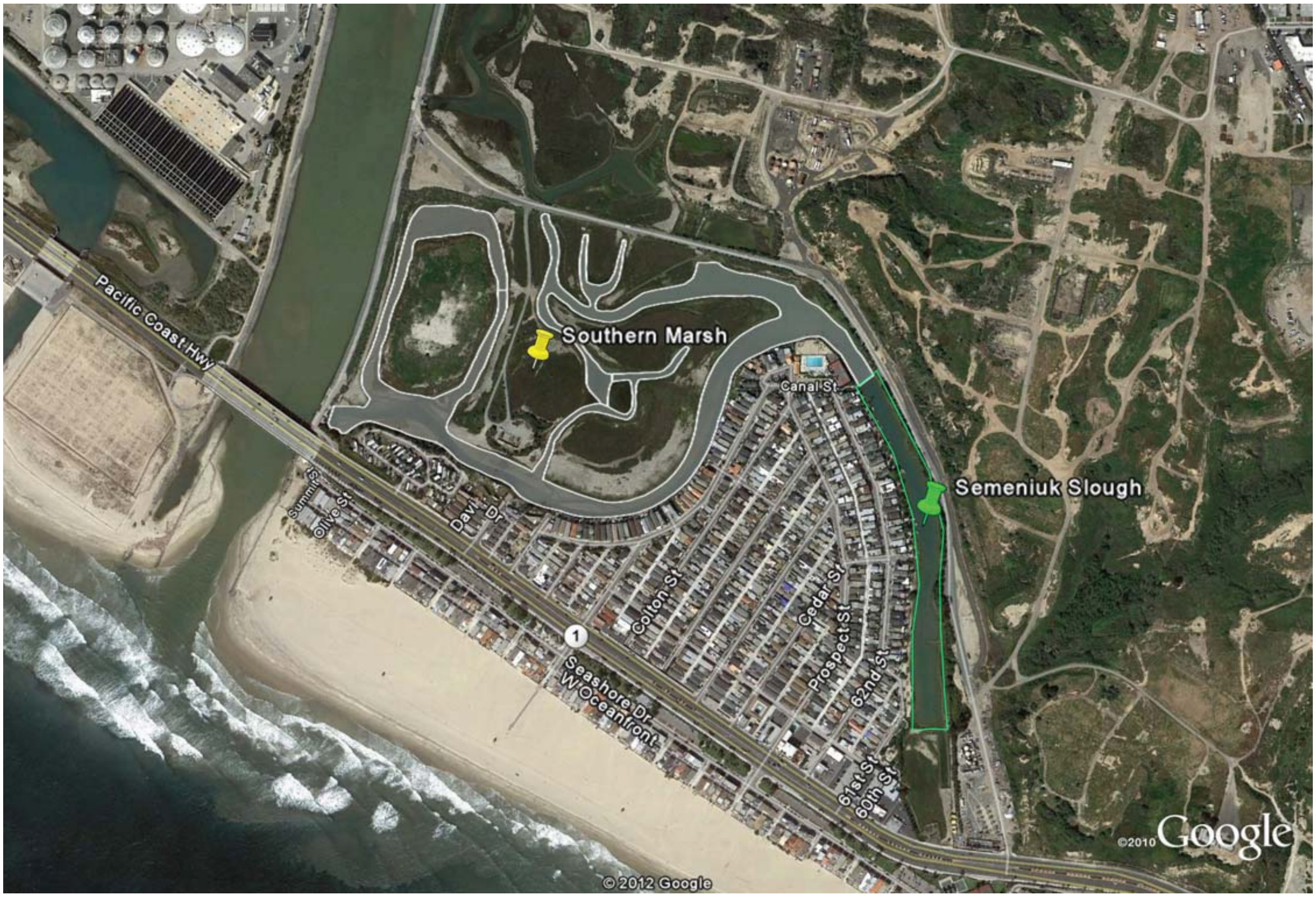


FIGURE 8: Semeniuk Slough

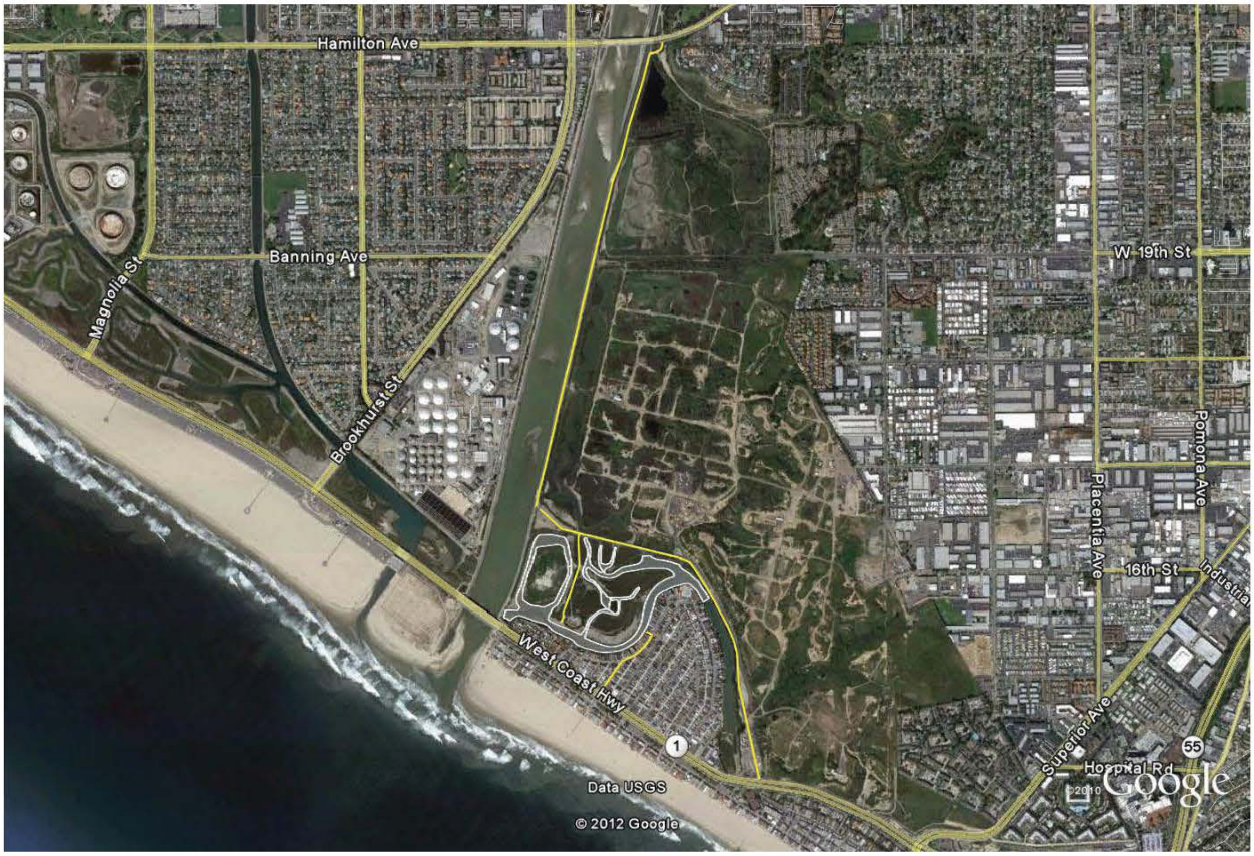


FIGURE 9: Haul Routes

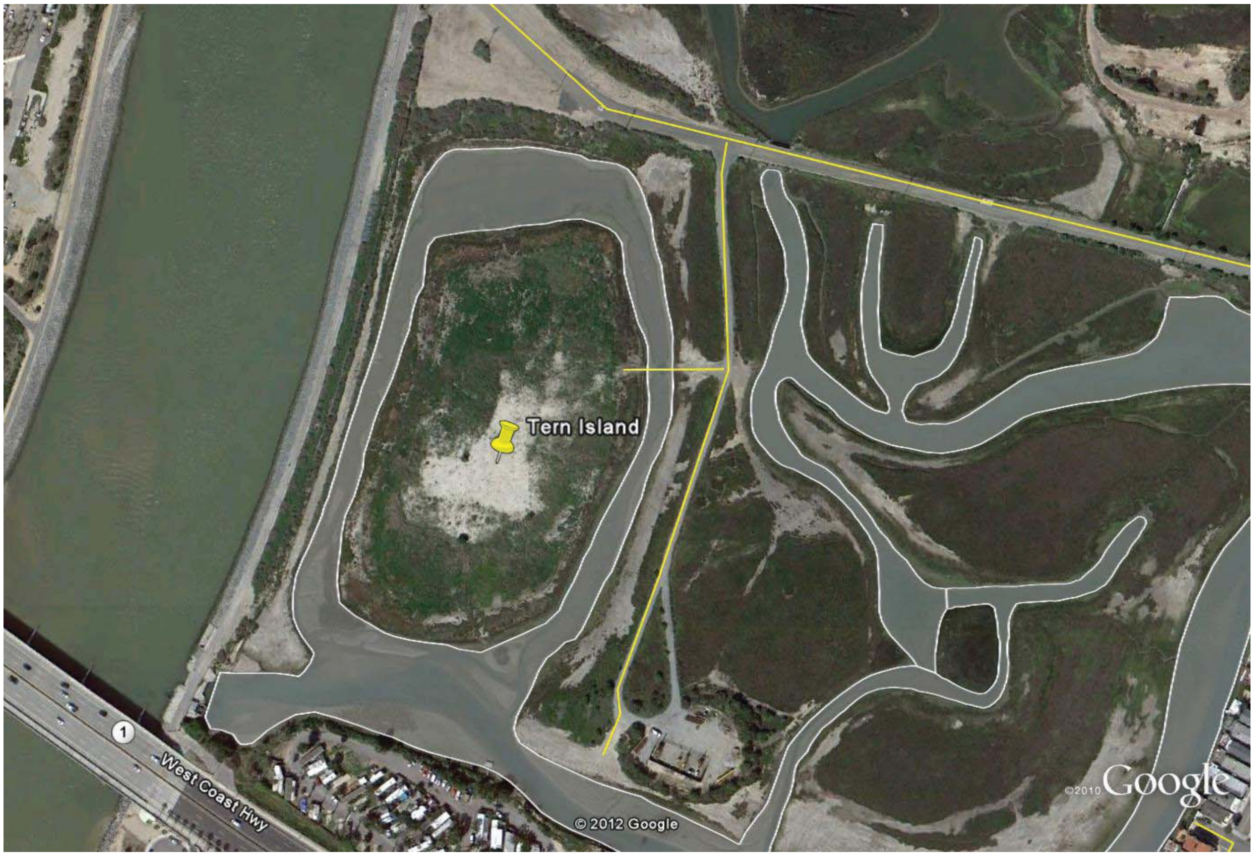


FIGURE 10: Tern Island Crossing

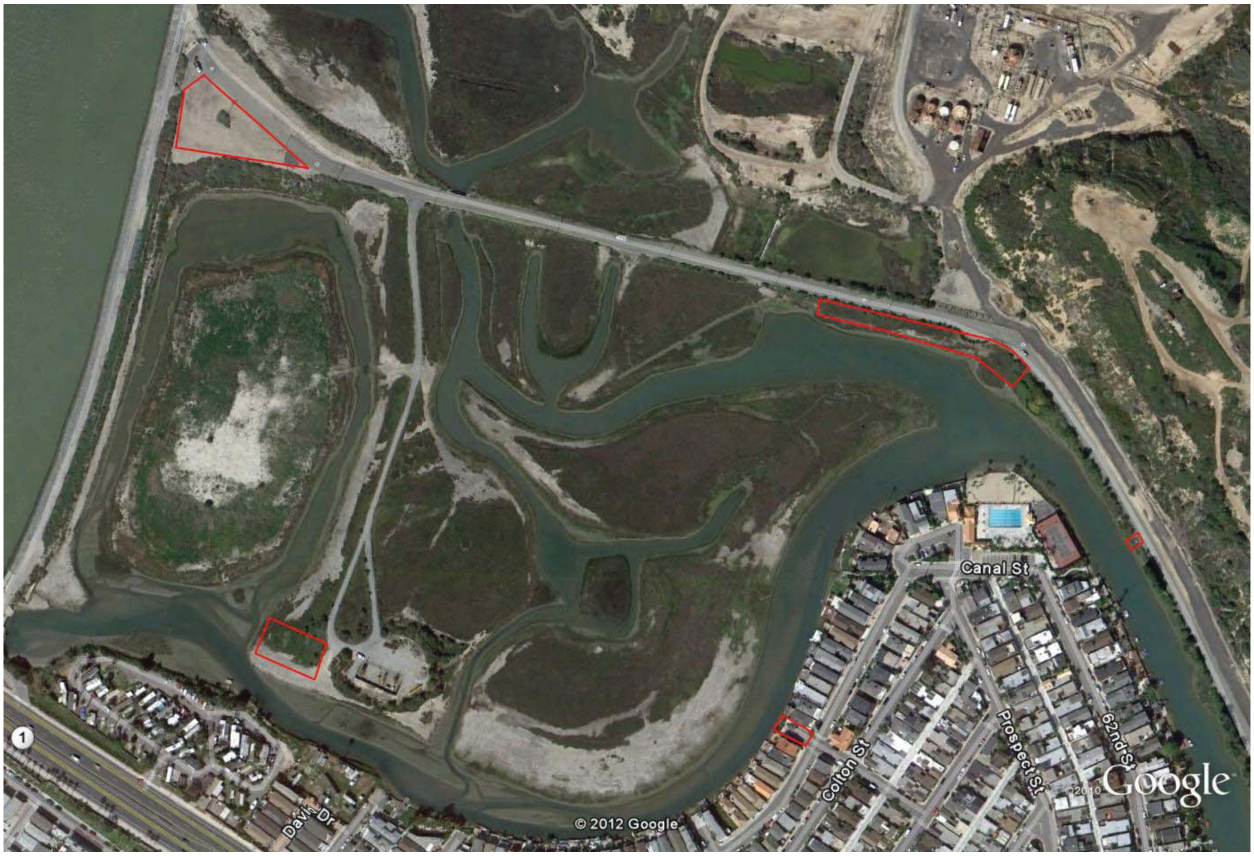


FIGURE 11: Marsh Staging Areas

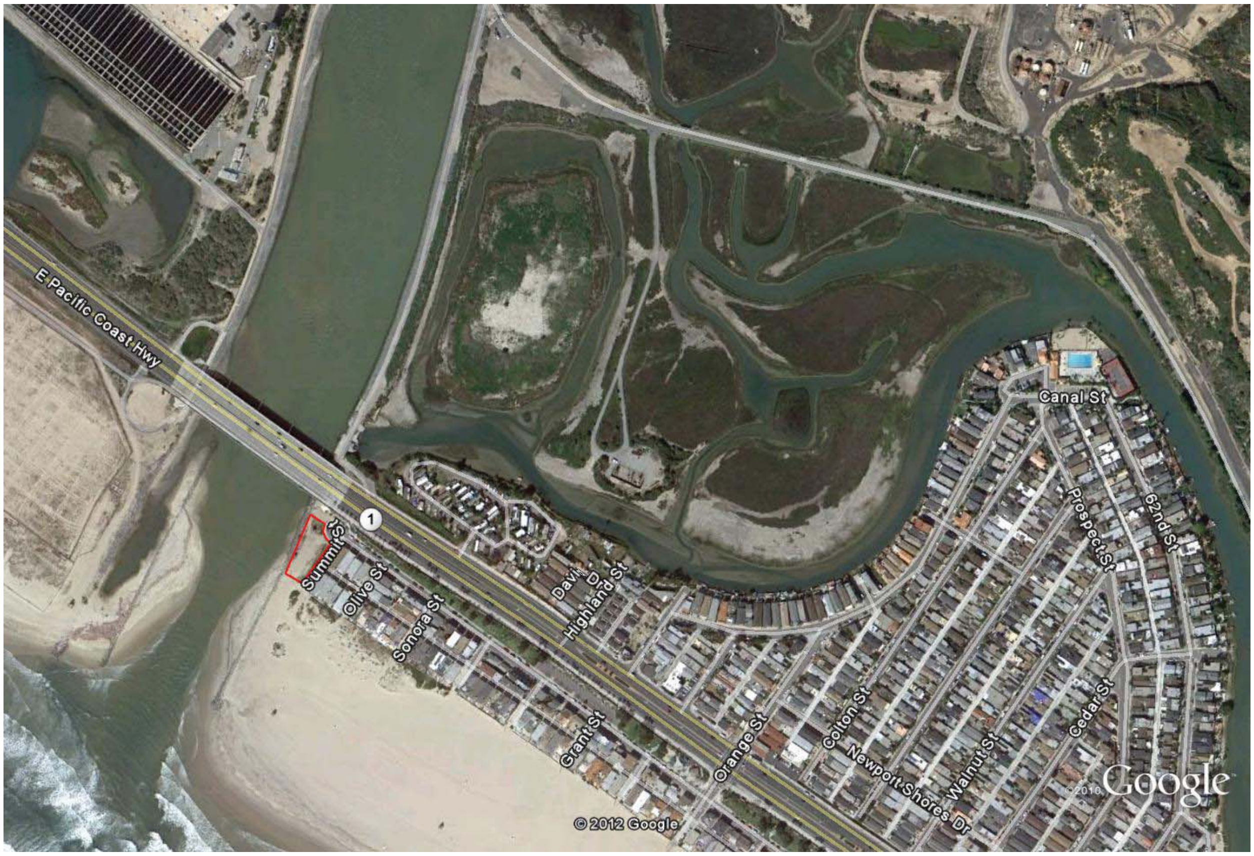


FIGURE 12: Beach Staging Area

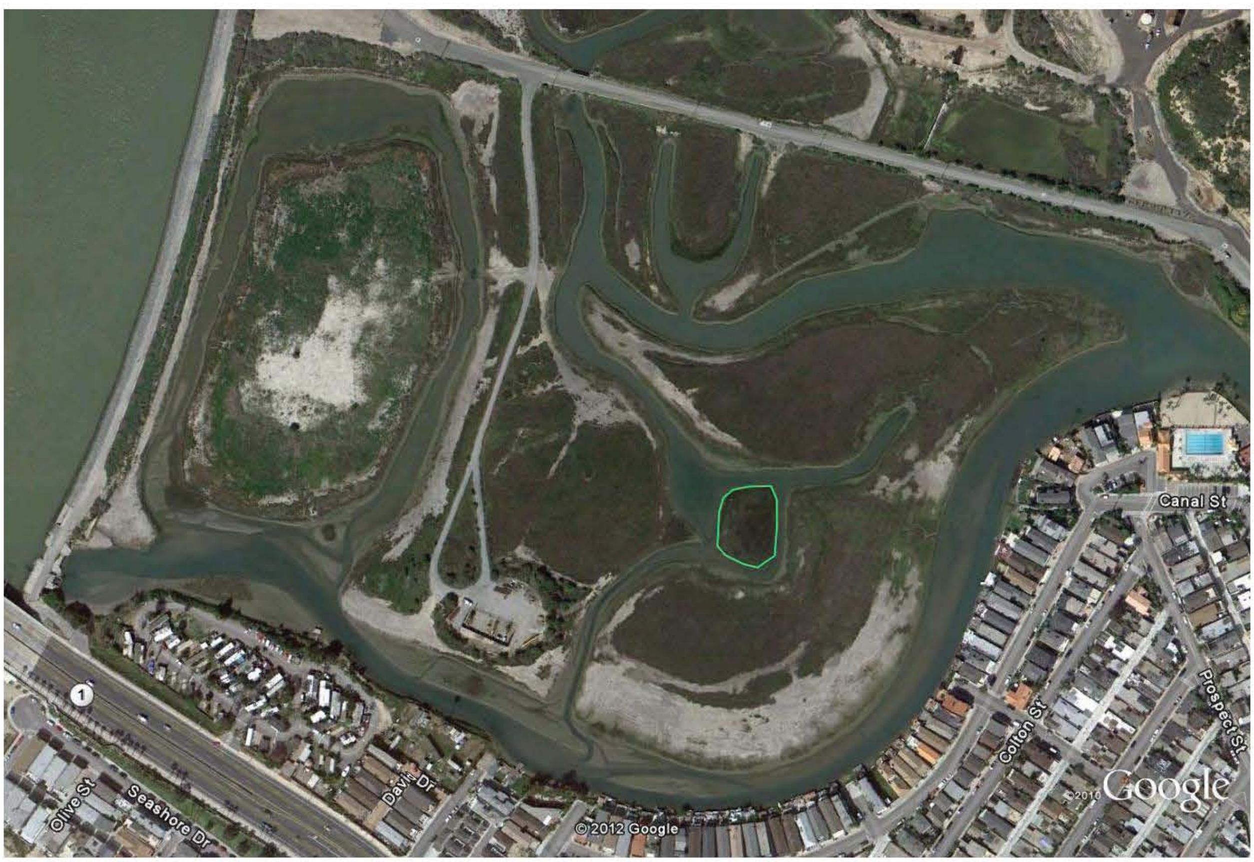


FIGURE 13: Light-footed Clapper Rail
Observed Rails and Southern Marsh Known Occupied Habitat

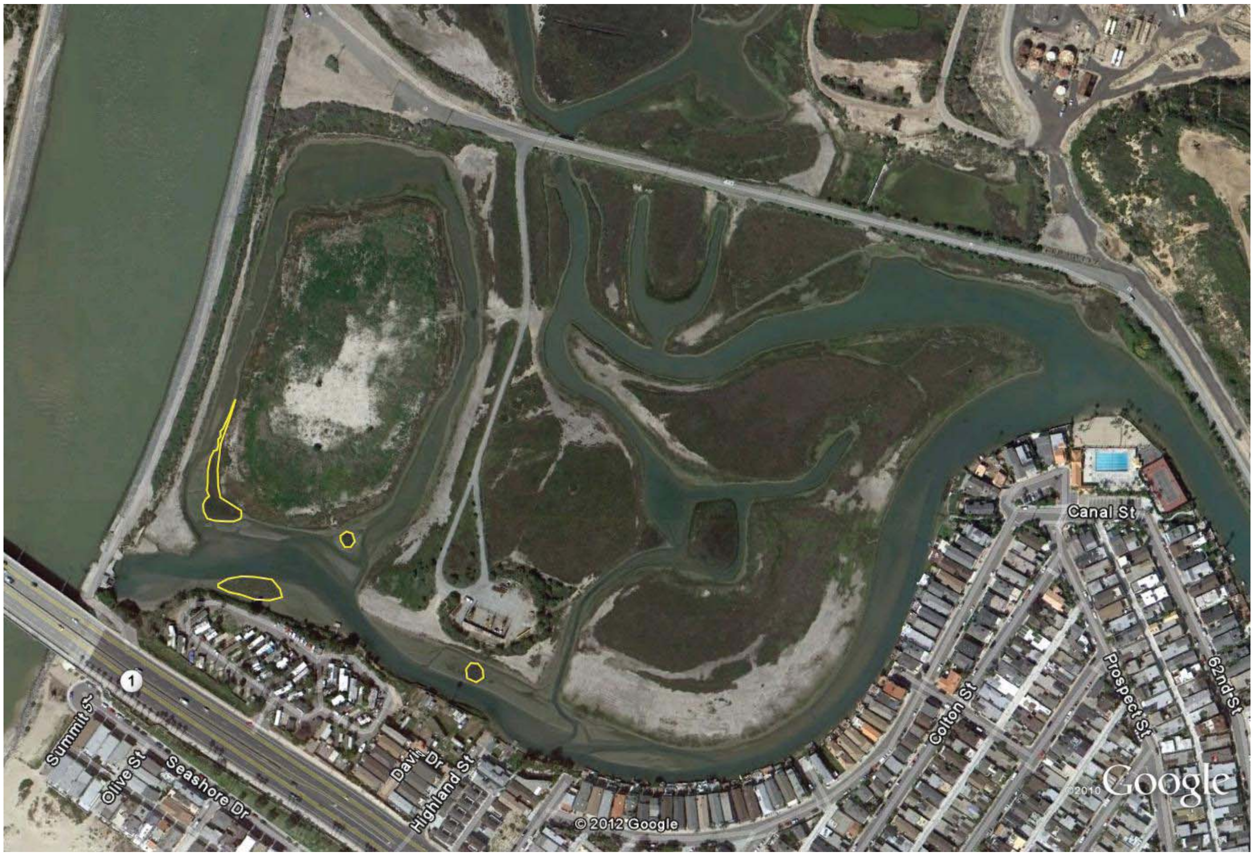


FIGURE 14: Southern Marsh Impacted Cordgrass

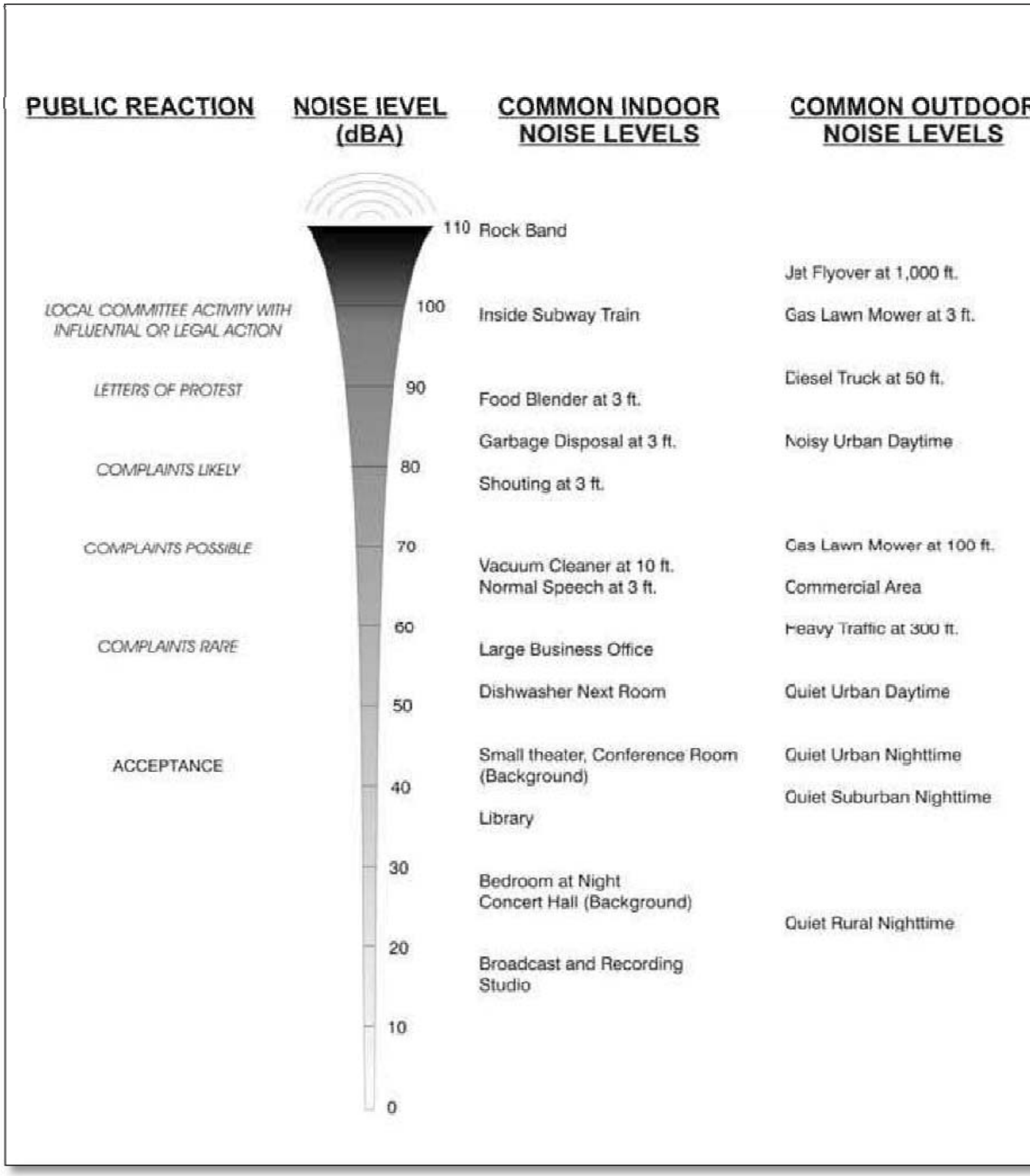


FIGURE 15: Perceived Noise Levels

Appendix A: Mailing List

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, CA 92009
Attn: Christine Medak

Dr. Charles Lester
Executive Director
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219
Attn: Larry Simon

National Marine Fisheries Service
Attn: Adam Obaza
501 West Ocean Blvd., Suite 4200
Long Beach, CA 90802

California Department of Fish & Game
Attn: Matt Chirdon
4949 View Ridge Avenue
San Diego, CA 92123

Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105
ATTN: Allan Ota

Mr. David Gibson, Executive Officer
California RWQCB, Santa Ana Region
Attn: Doug Shibberu
3737 Main Street, Suite 500
Riverside, California 92501

U.S. Army Corps of Engineers
South Pacific Division, CESPD-PDC
1455 Market St, 20th Floor
San Francisco, CA 94103
ATTN: Nedenia Kennedy

U.S. Army Corps of Engineers
Regulatory Division
P.O. Box 532711
ATTN: Corice Farrar
Los Angeles, California 90053-2325

City of Newport Beach
Attn: Robert Stein, Assistant City Engineer
3300 Newport Blvd.
Newport Beach, CA 92663

South Coast Air Quality Management District
21865 Copley Dr.
Diamond Bar, CA 91765-4182
Attn: Dr. Barry Wallerstein

Milford Wayne Donaldson
State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

Orange County Water District
Attn: Richard Zembal
18700 Ward Street
Fountain Valley, CA 92708

Orange County Sanitation District
Attn: Mr. Hardat Khublall
10844 Ellis Avenue
Fountain Valley, CA 92708

Orange County Public Works
Flood Control Division, Santa Ana River Project
Attn: Mr. Lance Natsuhara
P.O. Box 4048
Santa Ana, CA 92702-4048

Santa Ana Watershed Association
P.O. Box 5407
Riverside, CA 92517
Attn: Sue Hoffman

Mr. Michael Daily
Newport Shores Community Association
238 62nd Street
Newport Beach, CA 92663

Sea & Sage Audubon Society
PO Box 5447
Irvine CA 92616-5447

Huntington Beach Wetlands Conservancy
PO Box 5903
Huntington Beach, CA 92615

Surfrider Foundation
Newport Beach Chapter
PO Box 12754
Newport Beach, CA 92658

Newport Beach Public Library
1000 Avocado Ave.
Newport Beach, CA 92660

State Clearing House
1400 Tenth Street, Room 121
Sacramento, CA 95814

Mr. Craig Batley
West Newport Beach Association
2901 Newport Blvd.
Newport Beach, CA 92663

Kennie Jo Rizzo
Newport Shores Community Association
Via E-Mail

Ed Guilmette
P.O. Box 1187
Costa Mesa, CA 92627

Philip Bettencourt
110 Newport Center Dr., S. 200
Newport Beach, Ca. 92660

Everette Phillips
Via E-Mail

Jim Mosher
2210 Private Road
Newport Beach, CA 92660

Sean Pence
3 Canal Circle
Newport Beach, CA92663

Ms. Suzanne Skov
Allen Matkins Leck Gamble Mallory & Natsis LLP
1900 Main Street, 5th Floor
Irvine, CA 92614

Tom McCloskey
West Newport Oil Company
P.O. Box 1487
Newport Beach, CA 92659

William Seitz
318 62nd Street
Newport Beach, CA 92663

Patrick Alford
City of Newport Beach
3300 Newport Boulevard
Newport Beach, CA 92663

Terry Welsh
3086 Ceylon
Costa Mesa, CA 92626

Mike Mohler
Project Manager
Newport Banning Ranch, LLC
1300 Quail Street, Ste. 100
Newport Beach, CA 92660

Ken & Jo Barrett
1 Canal Circle
Newport Beach, CA 92663

Paul Leveque
4 Canal Circle
Newport Beach, CA 92663

Gary Belt
432 Colton St.
Newport Beach, CA 92663

Steve Ray
Via E-Mail

George Lesley
500 Canal Street
Newport Beach, CA 92663

Orange County Sanitation District
Attn: Mr. Ron Coss
10844 Ellis Avenue
Fountain Valley, CA 92708

Orange County Sanitation District
Attn: Mr. George Robertson
10844 Ellis Avenue
Fountain Valley, CA 92708

Michael Fennessy
Orange County Environmental Health
1241 East Dyer Road, Suite 120
Santa Ana, CA 92705

Appendix B: Sediment Sampling Results

TABLE OF CONTENTS

Page

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLES

TABLE OF CONTENTS
(Continued)

FIGURES

APPENDIXES

SANTA ANA RIVER MARSH INVESTIGATION

Sediment Sampling, Bulk Chemistry Testing, Geotechnical Testing, and Tier III Toxicity and Bioaccumulation Testing
Newport Beach, California

1.0 INTRODUCTION

AMEC Geomatrix, Inc. (AMEC), has prepared this Investigation Report on behalf of the US Army Corps of Engineers, Los Angeles District (USACE) to present the findings of the sediment sampling, bulk chemistry testing, geotechnical testing, and Tier III toxicity and bioaccumulation (Tier III) testing at the Santa Ana River Marsh (SARM), located in Newport Beach, California (the site; Figures 1 and 2). This Investigation Report was prepared in accordance with the USACE August 4, 2010 Scope of Work (SOW; USACE, 2010a) including the Modification to the SOW (dated December 6, 2010; USACE, 2010b), the Modification No. 2 to the Scope of Work (dated February 23 and 24, 2011; USACE, 2011a and 2011b), and our Cost Estimates dated September 23, 2010, January 12, 2011, and March 1, 2011 (Contract No. W912PL-10-D-0022, Task Order No. 0004), and contains an evaluation of potential dredged material from the SARM for beach nourishment. This work was performed in support of planning and permitting for the USACE maintenance dredging project. This project included sediment core collections, beach transect sampling, sediment chemistry testing, sediment toxicity and bioaccumulation analyses, and geotechnical testing in accordance with requirements outlined in the following documents:

- Ocean Dumping Regulations (40 CFR 220-228), the Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual (i.e., the Green Book – U.S. Environmental Protection Agency [USEPA] & USACE [1991]);

- Draft Regional Implementation Agreement (RIA) for the Evaluation of Dredged Material for Ocean Dumping (USACE & USEPA,1993);

- Assuring the Adequacy of Environmental Documentation for Construction and Maintenance Dredging of Federal Navigation Projects (USACE, 2006); and

- Overdepth Dredging and Characterization Depth Recommendations (USACE, 2007).

2.0 BACKGROUND

Maintenance dredging is required to return the SARM to its original design dimensions. Sediments to be dredged require environmental evaluation of sediment quality to support planning and permitting for dredging, beach or nearshore placement, and/or ocean disposal. The SARM maintenance project is authorized as follows:

- Rivers and Harbors Act of 1899 (33 USC 403 et.seq.);
- Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (P.L. 92-532); and
- Federal Water Pollution Control Amendments of 1972, aka Clean Water Act.

The estimated volume of sediments accumulated beyond design depths in the SARM is 85,000 cubic yards (based on the April/May 2010 bathymetric survey). It is proposed to place suitable dredged sediments, in terms of chemical composition and grain size, on West Newport Beach or in the nearshore adjacent to West Newport Beach. Dredged sediments that are determined to be unsuitable for beach or nearshore placement but are not contaminated would be placed at the LA-3 Ocean Dredged Material Disposal Site (LA-3 site). Contaminated material would not be dredged.

2.1 OBJECTIVE

Our objective was to assist the USACE in collecting data necessary to evaluate the chemical, geotechnical, and toxicological properties of the sediments to be dredged within the SARM, and to collect data for evaluating the geotechnical properties of the beach sediments at the West Newport Beach replenishment/nourishment areas.

2.2 SCOPE OF WORK

The USACE's SOW included the following:

- prepare a Sampling and Analysis Plan (SAP);
- prepare a Health and Safety Plan (HASP);
- prepare a Bioassay Analysis Plan (BAP) for the Tier III testing;
- collect sediment cores from 22 USACE-designated locations in the SARM using a vibracore or hydraulic jack hammer corer;
- collect approximately 20 gallons of sediment from each proposed dredge area in the SARM for Tier III testing;
- collect sediment grab samples from 16 USACE-designated locations in the West Newport Beach replenishment/nourishment areas (beach transect sampling);
- collect a reference sediment sample from the LA-3 reference site;

- collect site water from the SARM for suspended particulate-phase (SPP) toxicity testing;
- archive and freeze sediment core samples collected in the SARM;
- perform chemical analyses on composite sediment samples and geotechnical testing of individual depth-discrete samples collected in the SARM;
- perform geotechnical testing of sediment grab samples collected in West Newport Beach replenishment/nourishment areas;
- perform a Tier III analysis on select composite sediment samples collected in the SARM (Areas A, C, D, E, and F) and the LA-3 reference site;
- perform bioaccumulation analyses on select composite sediment samples collected in the SARM (Areas A, C, and F) and the LA-3 reference site;
- prepare lithologic logs of all sediment cores and grab samples;
- perform a Tier II evaluation using the results of the composite sediment samples to determine the suitability of placement of dredged sediments on West Newport Beach replenishment/nourishment areas or in the nearshore adjacent to West Newport Beach;
- perform a Tier III evaluation using the results of composite sediment samples collected in Areas A, C, D, E, and F to determine the suitability of open ocean disposal of dredged sediments at the LA-3 site;
- maintain quality assurance and quality control; and
- prepare a draft and final report of the findings.

Copies of the August 4, 2010 SOW, the December 6, 2010 Modification to the SOW, and the February 23 and 24, 2011 Modification No. 2 to the SOW are provided in Appendix A.

3.0 PREFIELD ACTIVITIES

Prefield activities performed by AMEC included: (1) preparation of a SAP and HASP specific to this project (AMEC, 2010); (2) subcontracting with a marine sediment coring contractor having a marine vessel and with laboratories capable of performing the required chemical, geotechnical, and Tier III testing of the sediment samples; and (3) notifying the United States Coast Guard (USCG), City of Newport Beach Lifeguards, and West Newport Oil Company of our planned activities.

AMEC prepared the SAP in accordance with the USACE's SOW (AMEC, 2010a,b). The SAP was submitted to and approved by the USACE and the Southern California Dredged Materials

Management Team (SC-DMMT) before commencing the field work. Copies of the SAP and HASP are included in Appendix B.

AMEC prepared the BAP in accordance with the USACE's SOW (AMEC, 2011). The BAP was approved by the USACE before commencing additional field work (collection of the reference sediment sample from the LA-3 reference site and site water from the SARM) and the Tier III testing. A copy of the BAP is included in Appendix C.

AMEC subcontracted TEG Oceanographic Services (TEG) of Santa Cruz, California to perform the marine sediment core sampling at the SARM. TEG provided two barges, the *R/V Lily Pad* and the *R/V Seadog,* as the working platforms to conduct the coring. The beach transect sampling was conducted by AMEC Geomatrix and AMEC Earth & Environmental (AMEC E&E) on their vessel out of San Diego, the *R/V Vallela*. AMEC subcontracted Kinnetic Laboratories, Inc. (Kinnetic), of Santa Cruz, California to perform the marine sediment sampling at the LA-3 reference site using a bucket dredge. Kinnetic used its research vessel the *DW Hood* to conduct the sediment sampling. AMEC subcontracted Calscience Environmental Laboratories, Inc., (Calscience) of Garden Grove, California to perform the chemical analysis of the sediment and tissue samples. AMEC's soil testing lab in Newport Beach, California and AP Engineering and Testing, Inc., (AP) of Pomona, California performed the geotechnical testing of the sediment samples. Nautilus Environmental, LLC (Nautilus) was subcontracted to conduct Tier III analyses.

The USACE's SOW required that Mr. Tom McCloskey of the West Newport Oil Company, the City of Newport Beach Lifeguards and the USCG be notified of the field activities at least two weeks before the start of work. AMEC promptly notified these parties as required. The USCG requested the coordinates of the sampling locations in the SARM which AMEC provided before commencing the field activities.

4.0 FIELD ACTIVITIES

Field activities performed by AMEC during the sediment sampling program included oversight of the sediment coring operations, lithologic logging and photographing of the sediment cores, collecting and documenting samples for geotechnical and chemical characterization, compositing approximately 20 gallons of sediment collected from each area in the SARM for Tier III testing, collection of grab sediment samples from the West Newport Beach replenishment/nourishment areas, collection of a reference sediment sample from the LA-3 reference site, and collecting site water from the SARM. The SARM coring operations were conducted from January 18, 2011 to January 25, 2011, and demobilization and site cleanup was completed on January 27, 2011. Sampling at West Newport Beach replenishment/nourishment areas was performed on January 21, January 27, and

February 8, 2011. The reference sediment sample collected from the LA-3 reference site occurred on March 10, 2011. Sampling of the site water from the SARM was conducted on March 11, 2011. All field activities were conducted as described in the SAP or as directed by the onsite USACE personnel. Onsite USACE staff provided oversight and/or instructions to AMEC and TEG during the coring operations. The field activities are summarized in the following sections.

4.1 NAVIGATION AND TARGET POSITIONING

The navigation system onboard TEG's coring barges consisted of a Furuno NAVNET WAAS enabled differential global positioning system (DGPS) and navigation software. The reported accuracy of the DGPS is approximately 3 to 10 feet. To confirm the accuracy of the DGPS during the coring activities in the SARM, the coordinates of a known benchmark was recorded daily. The two benchmarks used were brass discs, one within the SARM (SRM 1) and one near the tide gate on the outside of the SARM (MARSH 1). The DGPS outputs coordinates in latitude and longitude referenced to the North American Datum of 1983 (NAD 83), which were subsequently converted by AMEC to California State Plane Zone 6 coordinates. The accuracy of the DGPS averaged less than 8.5 feet from the benchmarks and these data are provided in Table 1.

Once at the desired position, spuds were used to hold the barge on station while the vibracore or hydraulic jack hammer corer was lowered into the water. TEG and AMEC recorded the coordinates of the actual sediment core locations. A list of the sediment core location designations and their coordinates is provided in Table 2.

During the sampling at the West Newport Beach replenishment/nourishment areas, AMEC E&E used a Trimble Pathfinder ProXRT DGPS (Trimble DGPS) to locate the onshore beach transect sample locations and a Garmin 162 GPS plotter equipped with a Garmin 21 DGPS (Garmin DGPS) onboard the *R/V Vallela* to locate the offshore beach transect sampling locations. The Garmin DGPS unit was mounted to the top of the boat's davit to survey the boat's position during the offshore beach transect sampling. The Trimble DGPS is accurate to approximately 1 foot and the Garmin DGPS is accurate to approximately 4 feet. A list of the beach transect grab sample location designations and their coordinates is provided in Table 3.

During the sampling of the reference sediment sample at the LA-3 reference site, Kinnetic used a Garmin 215D series DGPS mounted to an A-frame and navigation software onboard the *DW Hood* to locate the LA-3 reference site. The reported accuracy of the DGPS is approximately 3 to 10 feet. Once at the desired position, a bucket dredge was lowered into the water. Kinnetic and AMEC recorded the coordinates of the actual reference sediment sample location. The reference sediment sample designation and the coordinates are provided in Table 2.

4.2 MUDLINE ELEVATIONS

A tide gauge was installed at the mouth of the SARM to record the ebb and flow of the tide within the marsh. To estimate the mudline elevation at each coring location the water depth was measured immediately prior to drilling by lowering a tape measure equipped with a weight at the end. Initially, AMEC estimated the tide elevation in feet above Mean Lower Low Water (MLLW) level by using National Oceanic and Atmospheric Administration (NOAA) tide charts from the nearby Santa Ana River Entrance tide gauge. The NOAA tide predictions used for this project were from the Los Angeles reference station and corrected for the Santa Ana River Entrance station.

By subtracting the water depth from the tidal stage, the mudline elevation was estimated. However, on the second day of sampling, it was apparent that the Santa Ana River Entrance tide gauge was not accurately predicting the tide elevations within the SARM. After downloading and reviewing the water level data recorded by the tide gauge installed at the mouth of the SARM, it was confirmed that the NOAA tide predictions were inaccurate for the SARM. The SARM is hydraulically connected to the Santa Ana River through two tide gates, one located at the mouth of the SARM and the other located upstream. There are also culverts with metal flaps that outlet into the Santa Ana River and drain the SARM waters during low tide. During high tide, these metal flaps close the culvert outlets. The tide gates restrict the flow of water between the SARM and the Santa Ana River causing some difficulty in predicting the tidal stage within the SARM when using NOAA tide tables. Without correct real-time tidal elevations, AMEC and the USACE decided that the most accurate alternative for determining the mudline elevations in the SARM was to use the mudline elevations measured during the USACE April/May 2010 bathymetric survey. This decision was made in the field on January 20, 2011. After the fieldwork was completed, the tide gauge at the mouth of the SARM was downloaded to check mudline elevations in post processing. The mudline elevations generally concurred with the USACE bathymetric survey; except for three sediment core locations (SARM10-03, SARM10-16, and SARM10-20) (Table D-2). Based on the SARM tide gauge and USACE bathymetric survey, the estimated mudline elevations at SARM10-03 were approximately 1.2 and 3.0 feet MLLW, respectively. SARM10-03 is located in an area of the SARM that is hydrologically dynamic. Therefore, it is expected that the mudline elevation will change with time at this location. Based on the SARM tide gauge and USACE bathymetric survey, the estimated mudline elevations at SARM10-16 were approximately 0.6 and 3.8 feet MLLW, respectively. SARM10-16 is located within one of the narrow channels of the SARM, and the SARM tide gauge may not accurately represent the tidal elevation at this location. There is likely a lag time between the tidal elevation at SARM10-16 and the SARM tide gauge.

This lag time may be a result of the additional time required for water to drain from the narrow channels of the SARM to the main channel of the SARM. Based on the SARM tide gauge and USACE bathymetric survey, the estimated mudline elevations at SARM10-20 were approximately 3.7 and 2.3 feet MLLW, respectively. SARM10-20 is located just north of the Least Tern Island. This area of the SARM is generally not subject to increased water flow velocities (as seen in the main channel of the SARM) due to the changing tides, and as a result may have accumulated additional sediment after the USACE completed their bathymetric survey in April/May 2010. The tide gauge data are provided in Appendix D.

During the sampling at the West Newport Beach replenishment/nourishment areas, the elevations for the onshore beach transect locations were estimated by using a Trimble Pathfinder ProXRT DGPS, which is accurate to approximately 1 foot. At each offshore beach transect sampling location, AMEC E&E used a Garmin 135 depth sounder to measure the depth to the seafloor bottom and estimated the tide elevation by using NOAA predicted tides from the Los Angeles reference station.

The estimated mudline elevation relative to the MLLW at each sediment core sampling location is provided in Table 4. The approximate elevations for the beach transect grab sampling locations are provided in Table 3.

4.3 CORING OPERATIONS

Marsh sediment samples were collected using either a vibracore or a hydraulic jack hammer corer. Coring was conducted in the SARM from January 18, 2011 through January 25, 2011.

In the SOW the USACE identified 22 sediment core locations within seven dredge areas of the SARM. Approximately 20 gallons of sediment was collected from each of the seven dredge areas so that there would be enough sediment to conduct a Tier III analysis if the sediment was determined to be incompatible with West Newport Beach and nearshore. The collection of 20 gallons of sediment required multiple cores to be collected at each coring location. A total of 69 cores were collected from 22 locations. Table 4 shows the number of cores collected at each location. The USACE designated seven areas, which are summarized below.

- Area A includes sample locations SARM10-01 and SARM10-02.
- Area B includes sample locations SARM10-03 and SARM10-04.
- Area C includes sample locations SARM10-05 through SARM10-07.
- Area D includes sample locations SARM10-08 through SARM10-10.

- Area E includes sample locations SARM10-11 and SARM10-12.
- Area F includes sample locations SARM10-13 through SARM10-18.
- Area G includes sample locations SARM10-19 through SARM10-22.

The vibracore locations and designated areas are shown on Figures 2 and Figures 3a through 3g.

Before each coring attempt, TEG rinsed the core barrel of the vibracore or hydraulic jack hammer corer with marsh water and then lined it with a new polyethylene liner. Upon reaching the coordinates for a target coring location, TEG used spuds to anchor the barge and then lowered the vibracore or hydraulic jack hammer corer into the water using an A frame and winch system on the barge's deck.

In the SOW, the USACE specified the required penetration depth for each coring location. At each location, the core barrel was advanced to the required penetration depth or refusal, whichever was shallowest. The target penetration depth at each location was two feet greater than the project elevation (i.e., project overdepth elevation plus one foot). TEG used 4-inch diameter, aluminum core barrels with varying lengths that allowed them to core to the appropriate target penetration depth at each location. Typically, a core barrel that allowed TEG to core to a depth greater than the project overdepth elevation plus one foot was used. The core penetration depths are provided in Table 4. TEG recorded the drilling time and depth of penetration at each coring location. These were used to estimate the rate of penetration which is provided in Table 5. If the target penetration depth was not reached on the first attempt, then up to two additional attempts were made to reach the target depth.

After coring was completed, TEG retrieved the core equipment via the barge's winch system and the length of sediment collected in the core barrel (recovery) was measured with a tape measure. The core recoveries for the sediment core borings are provided in Table 6. After measuring the core, TEG placed the sediment in a polyvinyl chloride core tray. TEG then ferried the cores from each location via a jon boat to AMEC's staging area where the longest core was placed on a table for photographing, logging, and sampling by AMEC.

The SARM is a tidal marsh and is heavily influenced by high and low tides. Some coring locations were found to be dry except at the highest tides. These tidal restrictions made for difficult working conditions with some coring locations only reachable during short time windows. At two locations, SARM10-03 and SARM10-04, the mudline elevations were too high to reach with the barge. For these locations a sediment core was collected using the barge as close as it could get to the proposed location and a hand pushed core was collected at the proposed location to retrieve the uppermost shoaled sediment that was unreachable by the barge. This method was approved by USACE personnel onsite on January 25, 2011. These hand pushed core locations were named SARM10-03-SO and SARM10-04-SO and were photographed, logged, and sampled as the upper portion of SARM10-03 and SARM10-04, respectively. Each hand pushed core was pushed until refusal was encountered.

4.3.1 Marine Sediment Sampling

AMEC collected marine sediment samples in general accordance to the SOW and SAP. Chemical, archive, geotechnical, and Tier III sample collection procedures are described below. A summary of the depth intervals of sediment samples collected for chemical and Tier III testing are provided in Table 7. A summary of the depth intervals of sediment samples collected for geotechnical testing are provided in Table 8. Chemical and archive samples were collected first from each core followed by geotechnical and then Tier III sample collection.

4.3.1.1 Chemical Samples

AMEC collected samples for bulk chemical testing in accordance with the SAP. If more than one core was collected from a sediment coring location, only the core with the most recovery was sampled for the bulk chemical testing. AMEC collected a vertical composite for chemical analyses by scraping sediment from the mudline to the project overdepth plus one foot or maximum recovery if project overdepth plus one foot was not recovered. The composite of the core was collected using a stainless steel scoop and combined in cleaned stainless steel bowls. One new 16-ounce glass jar with a Teflon-lined lid was filled and placed on hold for archive while the rest of the sample was covered and placed on ice to form the composite sediment sample specified in the SAP. The composite samples were formed by homogenizing all sediment samples collected in each project area using a stainless steel scoop in a large stainless steel bowl. Three 16-ounce glass jars and a new, one gallon, resealable plastic bag were filled with the homogenized sediment. Additionally, where multiple cores were collected at a location, a chemical archive sample was collected from the second core to be placed on hold within AMEC E&E's freezers. The jars and plastic bags were labeled in accordance with the SAP, placed in resealable plastic bags, and placed in a cooler containing ice.

All chemical samples were handled under standard chain-of-custody protocols and recorded on lithologic logs (Appendix E). At the end of each day when a composite sediment sample was formed, the chemical samples were relinquished to Calscience, a California state-certified laboratory, to perform the bulk chemistry analyses. Calscience froze the archive samples and will retain them for a period of one year from when they were received.

Sampling equipment, stainless steel scoops, and stainless steel bowls, were washed in an Alconox solution and double-rinsed with deionized water before each use. These decontamination procedures were in accordance with the SAP.

4.3.1.2 Geotechnical Samples

Sediment for geotechnical testing was collected from each sampling location. If more than one core was collected from a sample location, only the core with the most recovery was sampled. Samples were collected from each lithologic unit identified within a core. Layers were identified in the field based on changes in material types and characteristics. Generally, material was collected for geotechnical testing from lithologic units that were thicker than approximately 0.5 feet. Each sample was placed in a new, one gallon, resealable plastic bag. The bags were sealed, labeled in accordance with the SAP, and placed in a dry container until analyzed.

Sampling data were also recorded on the lithologic logs (Appendix E). The samples were relinquished to AP or AMEC's soil testing lab, under standard chain-of-custody protocols, to perform geotechnical testing.

4.3.1.3 Tier III Toxicity and Bioaccumulation Samples

The Tier III samples were collected from the SARM to determine the suitability of open ocean disposal for the dredged sediments. The samples were collected at elevations ranging from approximately 4.5 to -5.0 feet MLLW (Table 7). After the chemical, archive, and geotechnical samples were collected, the remaining sediment from each sediment core sampling location was placed in a pre-cleaned stainless steel mixing vessel. Each Tier III sample was formed by homogenizing all sediment samples collected in each project area using a stainless steel mixer in a stainless steel mixing vessel. Each Tier III sample was placed in four 5-gallon plastic buckets lined with polyethylene bags. The buckets were labeled in accordance with the SAP and kept cold by placing bags of ice over the sealed buckets. The Tier III samples were relinquished to Nautilus, a California state-certified laboratory, using standard chain-of-custody protocols and were placed on hold pending the grain size compatibility analysis. Nautilus stored the samples in a 4 degrees Celsius cold room.

4.4 BEACH TRANSECT GRAB SAMPLING

AMEC E&E collected marine sediment samples from offshore sample locations using a Van Veen grab sampler. The onshore samples were collected by hand using a pre-cleaned stainless steel scoop. Offshore beach transect grab sampling at West Newport Beach nearshore was conducted on January 27, 2011. Onshore beach transect grab sampling at West Newport Beach was conducted on January 21, 2011 and February 8, 2011.

The USACE indicated in the SOW that the beach transect portion of the fieldwork would include collection of 8 sediment grab samples from 2 beach transects for a total of 16 grab samples (sample locations designated with the prefix WNpBNA10-#-#; Table 3).

Beach transect sampling consisted of collecting surface grab samples at elevations between +12 and -30 feet MLLW, at approximately 6 foot vertical intervals (8 samples per transect) at the beach placement site. A total of two transects were sampled at the locations shown on Figure 4.

A Trimble DGPS or GARMIN DGPS was used to locate each sample location along a beach transect. Upon reaching each offshore sample location, AMEC E&E lowered a Van Veen grab sampler using a davit into the water. Once a sample was collected, the Van Veen grab sampler was brought onto the boat and its contents were placed into a new, one gallon, resealable plastic bag. The bags were sealed, labeled, and placed in a dry container until analyzed. No diving was performed during sampling as directed by the USACE.

All samples were logged (Appendix E) and handled under chain-of-custody protocols. The samples were relinquished to either AMEC's soil testing lab or AP for geotechnical testing.

4.5 LA-3 Reference Site Sediment Sampling

AMEC collected a marine sediment sample from the LA-3 reference site using a pre-cleaned stainless steel bucket dredge. The sampling at the LA-3 reference site was conducted on March 10, 2011. A total of one reference sediment sample was collected at the coordinates provided by the USACE as shown in Table 2 and on Figure 5.

A Garmin 215D series DGPS was used to locate the reference sediment sample location at the LA-3 reference site. Upon reaching the sample location, Kinnetic lowered a bucket dredge using a davit into the water and approximately 20 gallons of sediment was collected. Once the sample was collected, the bucket dredge was brought onto the boat. Sediment for the bulk chemistry testing was placed into new 16-ounce glass jars and a new, one gallon, resealable plastic bag. The chemical samples were relinquished to Calscience to perform the bulk chemistry analyses. Sediment for geotechnical testing was placed into a new, resealable plastic bag. The bags were sealed, labeled, and placed in a dry container until analyzed. The sample was relinquished to AMEC's soil testing lab. Sediment for the Tier III sample was placed in six 5-gallon plastic buckets lined with polyethylene bags. The buckets were labeled and kept cold by placing bags of ice over the sealed buckets. The Tier III samples were relinquished to Nautilus.

The reference sediment sample was logged (Appendix E) and handled under chain-of-custody protocols. A summary of the approximate depth interval of the reference sediment sample collected for chemical and Tier III testing is provided in Table 7. A summary of the approximate depth interval of the reference sediment sample collected for geotechnical testing is provided in Table 8.

4.6 SITE WATER SAMPLING

AMEC collected site water from the SARM for the SPP toxicity testing using 10 new, 5-gallon, plastic carboys. The sampling at the SARM was conducted on March 11, 2011. The site water was sampled at the location shown on Figure 2. Before collecting the site water, AMEC rinsed the inside of each carboy with site water. Once the carboy was rinsed, AMEC lowered the carboy approximately 0.5 feet into the water and filled the carboy with site water. The carboys were labeled and kept cold by placing bags of ice over the sealed containers. The site water samples were relinquished to Nautilus using standard chain-of-custody protocols.

4.7 DOCUMENTATION AND LITHOLOGIC LOGGING

Documentation by AMEC staff during the sediment coring and beach transect sampling activities included summarizing the daily field activities in a field log book and photodocumentation. AMEC also photographed and prepared a field lithologic log for each sediment core. Documentation was performed in accordance with the SAP. A copy of the field log book is provided in Appendix D. Photographs of cores and field activities are included in Appendix F. During photographing and logging, AMEC measured the lengths of the cores recovered and recorded them on the lithologic logs. The lengths of core recovery are summarized in Table 6.

In accordance with the SAP, sediments were described by “visual manual procedures” as outlined in the American Society of Testing and Materials (ASTM) Standard D2488. AMEC recorded additional comments (e.g. descriptions of organic material and if present, trash, and biological organisms) on the lithologic logs. Copies of the lithologic logs are provided in Appendix E. The lithologic logs also include information such as the mudline elevation, penetration time, depth of penetration, sampling methods, and coordinates at each sampling location. AMEC compared the field descriptions to the results of samples submitted for geotechnical testing. If there were differences between the field descriptions and the geotechnical sample results, AMEC edited the field descriptions to agree with the testing results.

5.0 LABORATORY TESTING

The following subsections provide a summary of the chemical, geotechnical, and Tier III testing completed for this investigation.

5.1 CHEMICAL TESTING

Calscience conducted chemical testing of the composite sediment samples prepared from the SARM as indicated in the SAP. Each sample was analyzed for general chemistry parameters, metals, and organic chemicals. The specific chemicals measured and the analytical method for each analysis is provided in Table B-1 (Appendix B). Results of the chemical testing and chain-of-custody documentation are provided in Appendix G.

5.2 GEOTECHNICAL TESTING

AMEC's soil lab and AP conducted the geotechnical testing of sediment samples for physical parameters. Geotechnical testing included grain size and hydrometer analysis by ASTM D422 and Atterberg limits by ASTM D4318. Sediment samples collected by vibracore or hydraulic jack hammer coring were tested for grain size, hydrometer, and Atterberg limits. The grab samples collected along the beach transects were tested for grain size. Hydrometer analyses were performed on selected fine grained units from the beach transect sampling locations. Results of the geotechnical testing and chain-of-custody documentation are provided in Appendix H.

5.3 TIER III TOXICITY AND BIOACCUMULATION TESTING

Based on recommendations provided by SC-DMMT, Areas A, C, D, E, and F were found to not be suitable for disposal at the beach or nearshore (see Section 6.3.4). Toxicity and bioaccumulation tests were performed for these areas and the LA-3 reference site to determine suitability for disposal at the LA-3 site. The SC-DMMT recommended that Areas B and G be determined suitable for nearshore placement. As requested by the USACE, Nautilus conducted the Tier III toxicity testing of the composite sediment samples prepared for Areas A, C, D, E, F, and the reference sediment sample collected from the LA-3 reference site as indicated in the BAP (Appendix C). Tier III bioaccumulation tests were also performed on sediment samples prepared for Areas A, C, D, E, F, and the LA-3 reference site. The samples were tested for solid-phase (SP) toxicity, SPP toxicity, and bioaccumulation. Based on the results of these tests, Areas D and E were found to not be suitable for disposal at the LA-3 site. Therefore, tissues from the bioaccumulation tests for the remaining areas (Areas A, C, F, and the LA-3 reference site) were analyzed for metals and organic chemicals by Calscience. Specific chemicals measured and the analytical method for each analysis is provided in the BAP. Results of the Tier III testing and chain-of-custody documentation are provided in Appendix I.

6.0 DATA EVALUATION

The following subsections provide a summary of the data quality review, chemical compatibility analysis, grain size compatibility analysis, and Tier III evaluation completed for this investigation.

6.1 DATA QUALITY REVIEW OF CHEMISTRY DATA

AMEC and the analytical laboratory followed specific quality assurance/quality control (QA/QC) procedures to evaluate analytical data generated for this investigation. These procedures included the analysis of method blank, matrix spike/matrix spike duplicate (MS/MSD), standard reference material (SRM), laboratory duplicate, and laboratory spike samples.

Calscience prepared and analyzed laboratory method blank and MS/MSD samples to assess the potential effects of laboratory conditions and analysis. Data accuracy was assessed based on percent recoveries (%REC) from spiked samples, expressed as a percent of the true or known concentration of the assessed constituent. Data precision was estimated by comparing analytical results from laboratory duplicate samples by calculating the relative percent difference (RPD) of the two results. Calscience prepared a duplicate of the composite sample prepared for Area G (MCC10-G Dup) and tissue samples 2C (2C Dup), 9W (9W Dup), 16W (16W Dup), and 6C (6C Dup). AMEC performed an RPD evaluation of the primary sample and laboratory duplicate sample prepared for Area G and the tissue samples (see Data Validation Report in Appendix J for further discussion).

Data from these QA/QC samples were evaluated to assess precision, accuracy, completeness, and data usability. The QA/QC review was performed in general accordance with USEPA Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Review (USEPA National Functional Guidelines) (USEPA, 2008 and USEPA, 2010), and a summary of the review is presented in Appendix J. All sediment and tissue samples and associated QA/QC samples were analyzed within the method holding times. The completed data validation forms for each laboratory report prepared by Calscience are provided in Appendix J.

6.2 CHEMICAL COMPATIBILITY ANALYSIS

Chemical compatibility for using dredged sediments from the SARM for beach replenishment/nourishment was evaluated by comparing chemical concentrations to the NOAA Effects Range Low (ERL) and Effects Range Medium (ERM) screening guidelines for marine sediments. These sediment quality benchmarks provide concentrations that are intended to be protective of benthic species that live on and in the sediment. They were developed from studies that measured sediment chemical concentrations and toxicity to benthic organisms. The ERL screening value is the lower 10th percentile concentration of the available sediment toxicity data where sediments were shown to be toxic to test organisms. The ERL screening value is typically interpreted as the value at which toxicity may begin to be observed in sensitive species. The ERM screening value is the median concentration of the available sediment toxicity data where sediments were shown to be toxic to test organisms (Buchman, 2008).

ERL and ERM screening values are not available for all chemicals analyzed in this investigation. To evaluate potential impacts associated with chemicals that have no ERL or ERM screening values, the sediment concentrations were compared to marine sediment screening values recommended by the Northwest Regional Sediment Evaluation Framework (RSET, 2006). The Regional Sediment Evaluation Team (RSET) is a cooperative state and federal agency team with representatives from state agencies in Idaho, Oregon, and Washington, the USACE, USEPA, U.S. Fish and Wildlife Service, and NOAA. RSET provides screening values (SL1 values) that are intended to identify chemical concentrations that are at or below levels at which there is no reason to believe dredged material disposal would result in unacceptable adverse impacts to benthic organisms.

Sediments are assumed to have chemical compatibility for beach replenishment/nourishment if the measured values are below the screening guidelines discussed above. This decision is straightforward when the detected concentration or reporting limits (RLs) for chemicals reported are below the screening values. In cases where the RLs of non-detected chemicals are above the screening values, the decision has greater uncertainty because the analysis has not conclusively demonstrated that the chemical, if present, is below a level of concern. Chemicals that fall into this category are identified below.

6.2.1 General Chemistry Parameters

The results of general chemistry parameters in sediment samples collected from Areas A through G (MCC10-A through MCC10-G) and the LA-3 reference site (SARM10-LA3) are summarized in Table 9. No sediment screening values are available for these parameters. As such an ERL, ERM, or RSET evaluation for these parameters could not be performed.

6.2.2 Metals and Organotin Compounds

Composite and LA-3 reference site sediment samples were analyzed for 10 metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc (Table 10). Only one sediment sample (MCC10-E) from the SARM had reported metals concentrations (copper and nickel) above the ERL screening values. None of the reported metal concentrations exceeded the ERM screening values. Copper and nickel were detected in sample MCC10-E at 38.6 and 25.9 milligrams per kilogram (mg/kg), respectively. These concentrations exceed the ERL screening value for copper (34 mg/kg) and nickel (20.9 mg/kg) but are below the ERM screening value of 270 and 51.6 mg/kg, respectively. The ERL for nickel was also exceeded in the reference sediment (SARM10-LA3) with a value of 21.1 mg/kg. Since no ERM exceedances were observed in the sediment samples collected for this investigation, there is no need to calculate an ERM quotient (ERM_q) as described in the SAP.

Sediment samples were also analyzed for four organotin compounds, including dibutyltin, monobutyltin, tetrabutyltin, and tributyltin. The results for organotin compounds are summarized in Table 10. These compounds were not detected above the RLs ranging from 4.0 to 7.9 micrograms per kilogram (µg/kg) in any of the sediment samples collected during this investigation. ERL, ERM, and RSET screening values are not available for these compounds.

6.2.3 Polychlorinated Biphenyls

Sediment samples were analyzed for 8 polychlorinated biphenyl (PCB) Aroclors and 44 individual PCB Congeners (Table 11). Only one of the eight PCB Aroclors was detected in two of the sediment samples analyzed. PCB Aroclor 1260 was detected at concentrations of 12J and 5.5J µg/kg (where the J value indicates that the analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample) in samples MCC10-E and MCC10-F, respectively. Various PCB Congeners were detected in samples MCC10-C, MCC10-D, MCC10-E, and MCC10-F. ERL, ERM, and RSET screening values are not available for PCB Aroclor 1260 and the individual PCB Congeners.

The total concentration of the 8 PCB Aroclors and 44 PCB Congeners detected in the sediment samples were calculated by Calscience. ERL and ERM screening values for “Total PCBs” were compared to the total concentrations of PCB Aroclors and PCB Congeners calculated by Calscience. The concentrations of total PCB Aroclors in samples MCC10-E (12J µg/kg) and MCC10-F (5.5J µg/kg) were below the ERL screening value of 22.7 µg/kg. The concentrations of total PCB Congeners in samples MCC10-C (16 µg/kg), MCC10-D (7.2J µg/kg), MCC10-E (6.1J µg/kg), and MCC10-F (3.1J µg/kg) were also below the ERL screening value of 22.7 µg/kg.

The RL (26 µg/kg) achieved for total PCB Aroclors for sediment sample SARM10-LA3 was above the ERL screening value of 22.7 µg/kg, but below the ERM screening value of 180 µg/kg.

6.2.4 Semi-Volatile Organic Compounds

Sediment samples were analyzed for 26 polynuclear aromatic hydrocarbons (PAHs), 16 phenols, and 6 phthalates (Table 12). In addition, Calscience calculated the total low molecular weight PAHs (LPAH), total high molecular weight PAHs (HPAH), and the total concentration of the 26 PAHs (TPAH) that were detected in each sediment sample.

ERL and ERM screening values are available for 13 of the PAH compounds analyzed in the sediment samples. ERL and ERM screening values are also available for LPAH, HPAH, and TPAH. RSET values for four of the detected PAH compounds without ERL or ERM screening values (benzo(b)fluoranthene [3200 µg/kg], benzo(g,h,i)perylene [670 µg/kg], benzo(k)fluoranthene [3200 µg/kg], and indeno(1,2,3-c,d)pyrene [600 µg/kg]) are also available. The sediment concentrations of all individual PAHs with screening values and LPAH, HPAH, and TPAH were below their respective ERL, ERM, or RSET screening values.

The RLs achieved for acenaphthene for samples MCC10-D (17 µg/kg), MCC10-E (20 µg/kg), and SARM10-LA3 (26 µg/kg) are slightly above the ERL screening value of 16 µg/kg but are below the ERM screening value of 500 µg/kg.

Three of the 16 phenols were detected in some of the sediment samples collected during this investigation. 2-Chlorophenol was detected in samples MCC10-F and MCC10-G at concentrations of 18J* and 63J* µg/kg (where the J* value indicates that the analyte is qualified as estimated as a result of AMEC's data validation process), respectively. 3/4-Methylphenol was detected in samples MCC10-B, MCC10-C, MCC10-D, and MCC10-F at concentrations ranging from 3.2J to 9.8J µg/kg. Phenol was detected at concentrations of 17J* and 64J* µg/kg in samples MCC10-C and MCC10-G, respectively. There are no ERL or ERM screening values for these compounds; however, RSET values are available for 4-methylphenol and phenol. The reported concentrations for these compounds were below the RSET values for 4-methylphenol (670 µg/kg) and phenol (420 µg/kg).

Four of the six phthalates (bis(2-ethylhexyl) phthalate [DEHP], butylbenzyl phthalate, diethyl phthalate, and di-n-butyl phthalate) were detected in each sediment sample. In addition, dimethyl phthalate was detected in composite sediment samples MCC10-B through MCC10-G and SARM10-LA3. No ERL or ERM screening values are available for these phthalates. The detected phthalate concentrations are below the RSET screening values for DEHP (1,300 µg/kg), butylbenzyl phthalate (63 µg/kg), diethyl phthalate (200 µg/kg), dimethyl phthalate (71 µg/kg), and di-n-butyl phthalate (1,400 µg/kg), except for the following sediment samples.

- Butylbenzyl phthalate was detected at 77 µg/kg and 80 µg/kg in sediment samples MCC10-D and SARM10-LA3, respectively.

- Dimethyl phthalate was detected at 210 µg/kg, 340 µg/kg, and 470 µg/kg in sediment samples MCC10-G, MCC10-F, and MCC10-E, respectively.

6.2.5 Chlorinated Pesticides

Sediment samples were analyzed for 31 pesticides (Table 12). In addition, Calscience calculated the total concentration of DDT metabolites that were detected in each sediment sample.

Six (2,4'-dichloro-2,2-bis(p-chlorophenyl) ethylene [2,4'-DDE], 4,4'-dichloro-diphenyl-dichloroethylene [4,4'-DDD], 4,4'-DDE, 4,4'-dichloro-diphenyl-trichloroethane [4-4'-DDT], beta-benzene cyclohexane [beta-BHC], and dieldrin) of the 31 pesticides analyzed were detected in the sediment samples collected during this investigation. 2,4'-DDE was detected in samples MCC10-C and MCC10-D at concentrations of 1.1J and 1.8 µg/kg, respectively. There is no ERL or ERM screening value for 2,4'-DDE; however, a RSET value is available for p,p'-DDE. The reported 2,4'-DDE concentrations are below the RSET value of 16 µg/kg for p,p'-DDE. 4,4'-DDD was detected in one of the seven composite samples (MCC10-D) and the LA-3 reference sediment sample (SARM10-LA3) at concentrations above the ERL screening value of 2 µg/kg. However, these concentrations are below the ERM screening value of 20 µg/kg for 4,4'-DDD. 4,4'-DDE was detected in samples MCC10-C through MCC10-F and SARM10-LA3 at concentrations above the ERL screening value of 2.2 µg/kg but were below the ERM screening value of 27 µg/kg. 4,4'-DDT was detected in one sample (MCC10-D) at a concentration of 0.56J µg/kg, which is below the ERL screening value of 1 µg/kg. The concentration of total DDTs, calculated by Calscience, in sediment samples MCC10-C through MCC10-F and SARM10-LA3 were reported at concentrations that exceed the ERL screening value for total DDTs (1.58 µg/kg) but are below the ERM screening value of 46.1 µg/kg.

Beta-BHC was detected in samples MCC10-A through MCC10-D and MCC10-G at concentrations ranging from 0.46J to 1.6J,J* µg/kg. There is no ERL, ERM, or RSET screening value for this pesticide.

Dieldrin was detected in samples MCC10-A, MCC10-D, and MCC10-F at concentrations of 0.50J µg/kg, 3.7 µg/kg, and 0.89J µg/kg, respectively. These concentrations exceed the ERL of 0.02 µg/kg but are less than the ERM of 8 µg/kg for dieldrin.

The pesticide chlordane was not detected in sediment samples but the RLs achieved were above the ERL and ERM screening values. The RLs achieved for 4,4'-DDT and dieldrin were also above the ERL screening values but below their respective ERM screening values.

6.2.6 Chemical Compatibility Summary

Based on the chemical analysis of the sediment samples and comparison to sediment screening values for the protection of benthic organisms, the SARM sediments from all areas tested are deemed to be suitable for beach or nearshore replenishment/nourishment actions. Only copper, nickel, DDT metabolites (4,4'-DDD, 4,4'-DDE, and total DDTs), and dieldrin were detected at concentrations that exceeded their respective ERL screening values in some of the sediment samples collected during this investigation. Their concentrations did not exceed their respective ERM screening values. Therefore, it is unlikely that these compounds would pose a substantial threat to benthic organisms. Two phthalates (butylbenzyl phthalate and dimethyl phthalate) were detected in sediment samples that exceeded their respective RSET screening values.

Acenaphthene, 4,4'-DDT, chlordane, and dieldrin had RL values that exceeded their respective ERL screening values, which creates some uncertainty in making a compatibility decision. It is not possible to determine with certainty that these chemicals are not present at concentrations that exceed their respective ERL screening values. The RL values for these compounds were below their respective ERM screening values, except for chlordane.

Chlorinated pesticides are ubiquitous in many Southern California marine environments, particularly in bays and estuaries (Schiff et al., 2006). The occurrence of these chemicals is widespread due to their use in agriculture to control pests; as a result of aerial deposition; and as a consequence of the manufacture of these chemicals locally and their accidental or illicit disposal. Due to their persistence, it is not uncommon to encounter pesticides at low levels in the marine environment, particularly in locations such as bays and estuaries that drain agricultural areas. However, the presence of these chemicals in trace amounts would not be expected to result in deleterious impacts at the West Newport Beach replenishment/nourishment areas.

Comparing the chemical levels in the sediment composite samples collected from the SARM to available guideline levels indicates that the proposed sediments would have no or minimal toxicity impacts on benthic organisms at the West Newport Beach replenishment/nourishment areas. Although the chemicals tested for in this study do not constitute a complete list of all the potential contaminants that may occur in the study area, it does represent the contaminants of concern that are most commonly observed in coastal areas and were identified in the project-specific SAP.

6.3 GRAIN SIZE COMPATIBILITY ANALYSIS

AMEC performed a grain size compatibility analysis on the samples collected from Areas A through G in accordance the Requirements for Sampling, Testing, and Data Analysis of

Dredged Materials provided by the USACE. These designated areas have been defined based on projected dredge depth and marsh geometry. The guidelines used and the results of the compatibility analysis are provided below.

6.3.1 USACE Guidelines

The Los Angeles District of the USACE has established quantitative guidelines for determining the compatibility of dredge sediments (Areas A through G) with a proposed receiving area (West Newport Beach). Grain size distribution envelopes are developed for the receiving area sediments that represent the finest and coarsest gradation limits between and including the 9.50 mm (3/8”) and 0.075 mm (#200) sieves. A composite gradation curve is then developed for each designated area, where a composite gradation is defined as the mean gradation (weighted average) of all sediment types encountered in a designated area. Dredged sediments in a designated area having a composite gradation curve that falls within the finest and coarsest gradation envelopes of the receiving area are considered to be grain size compatible with the receiving area sediments. Dredged sediments can also be considered compatible with the receiving sediments if dredged sediments are coarser than the coarsest limit envelope of the receiving sediments and not restricted for aesthetic reasons, and the amount of material passing the No. 200 sieve on a composite gradation curve does not exceed the finest limit of the receiving sediments by more than 10 percent.

6.3.2 Sediment Descriptions

The lithologic sediments encountered in Areas A, B, F, and G were predominately sand and in Areas C, D, and E were predominately silt and clay. Based on the grain size data, presented in Table 13 and Appendix H, the approximate range in percentage of fines passing the No. 200 sieve for each designated area are as follows:

- Area A: 3 to 94 percent;
- Area B: 2 to 82 percent;
- Area C: 1 to 95 percent;
- Area D: 34 to 98 percent;
- Area E: 94 to 96 percent;
- Area F: 5 to 93 percent; and
- Area G: 4 to 56 percent.

Atterberg limits for sediment samples are presented on Table 14.

The lithologic sediments encountered in the beach transect grab samples were predominately poorly graded sand, while two of the samples (WNpBNA10-1-1 and WNpBNA10-2-1) primarily consisted of silt (Table 15 and Appendix H).

6.3.3 Grain Size Compatibility Summary

The finest and coarsest gradation limits for the receiving beach sands are shown on Figure 6 and summarized in Table 16. The fines content (passing No. 200 sieve) of the beach sand ranges from approximately 0 to 73 percent.

The composite gradations for Areas A through G are shown on Figure 7 and summarized in Table 16. The mean percentage of fines passing the No. 200 sieve for each designated area ranges from 17 to 95 percent as follows:

- Area A: 35 percent;
- Area B: 17 percent;
- Area C: 54 percent;
- Area D: 77 percent;
- Area E: 95 percent;
- Area F: 41 percent; and
- Area G: 21 percent.

Most of the composite curves from the designated areas do not fall completely within the gradation limits of the beach sediments. For the coarse grained portion, the curves are about 1 to 2 percent below the coarsest limit. For the fine grained portion, five (Areas A, B, C, F, and G) of the seven curves fall within the limits, and the other two (Areas D and E) lie above the finest limit from approximately the No. 170 sieve and finer. However, only the curve for Area E has a fines content exceeding that of the finest limit by more than 10 percent.

Based on the USACE guidelines, the dredge sediments from all areas, except Area E, appear to be physically compatible with sediments on the receiving beach and nearshore area. Dredge sediments from Area E are not physically compatible with the proposed receiving area because the fines content of these sediments exceeds the finest limit of the receiving beach sample by more than 10 percent.

6.3.4 Southern California Dredged Materials Management Team Determination

The SC-DMMT met and discussed the results of the chemical and grain size compatibility analyses. The SC-DMMT recommended that Areas B and G be determined suitable for nearshore placement. No Areas were found to be suitable for beach nourishment. Based on this recommendation, the USACE has determined Areas B and G to be suitable for nearshore placement. The remaining Areas (A, C, D, E, and F) were then subject to Tier III testing to determine suitability for ocean disposal at the LA-3 site.

6.4 TIER III TOXICITY EVALUATION

A complete report for the Tier III toxicity testing and bioaccumulation exposures is provided in Appendix I. All tests met applicable QA/QC criteria as described further in the final toxicity report. A summary of key findings is provided below.

6.4.1 Suspended Particulate-Phase Toxicity

Results for the SPP tests are summarized in Table 17. Mean normal development of surviving bivalve embryos (*M. galloprovincialis*) (percent normal alive) ranged from 91 to 94 percent in the three laboratory controls, above the Green Book's 70 percent quality control criterion for zooplankton tests (Section 11.1.5, USEPA & USACE 1991). Percent normal alive bivalve embryos in the receiving water ranged from 90 to 93 percent across the three receiving controls tested. Because the salinity of the receiving water upon arrival (11.4 parts per thousand [ppt]) was below the tolerance range of bivalve larvae (approximately 25 ppt), the salinity was increased with the addition of artificial salts to 30 ppt. Percent normal alive in the three artificial salt method controls ranged from 90 to 97 percent, indicating the salt addition did not introduce toxicity to the sample. For the bivalve larvae development test, statistically significant reductions were observed in the 100 percent elutriate concentration for Areas C and D sediments, with 0 and 46 percent normal alive, respectively. No effect was observed in any of the other elutriate concentrations tested, which ranged from 88 to 98 percent normal development.

Mean survival of mysids (*A. bahia*) in the laboratory controls ranged from 88 to 98 percent, while mean survival of inland silverside minnows (*M. beryllina*) ranged from 98 to 100 percent across all laboratory controls. No toxicity was observed in the mysid or the inland silverside minnow tests; with mean percent survival ranging from 80 to 100 percent in all undiluted elutriate exposures.

6.4.2 Solid-Phase Toxicity

<u>Amphipod</u>

Mean survival of the marine amphipod (*Eohaustorius estuarius*) was 95 and 100 percent in the two home sediment laboratory controls, exceeding the 90 percent EPA quality criterion (Table 18). Mean survival in a control for fine grain sediment size was 84 percent. Mean survival in the LA-3 reference sediment was 86 percent. Survival among the test sites (Areas A, C, D, E, and F) ranged from 30 to 85 percent. There was a statistical decrease in amphipod survival in all sediments with exception of Area A when compared to both the reference sediment.

Polychaete

Although control survival for the initial marine polychaete (*Neanthes arenaceodentata*) test performed March 15, 2011 did meet test acceptability criteria, extreme survival variability among site replicates was observed. The test was therefore repeated on April 1, 2011 (see QA/QC section in Appendix I for further discussion). During the retest, mean survival of the polychaete was 100 percent in the laboratory control, therefore exceeding the 90 percent EPA quality criterion. Polychaete survival in the LA-3 reference sediment exposure was 96 percent. Mean survival among all sites ranged from 96 to 100 percent. There was no statistical decrease in polychaete survival in any of the sediments tested when compared to the LA-3 reference sediment.

6.4.3 Bioaccumulation Survival

Mean survival of marine clams (*Macoma nasuta*) and marine polychaete (*Nereis virens*) exposed to sediments for 28-days during the bioaccumulation tests are summarized in Table 19. Mean survival of clams in the laboratory control and LA-3 reference sediments was 91 and 98 percent, respectively, and ranged from 95 to 97 percent in the test sediments (Areas A, C, D, E, and F). Mean survival did not differ significantly among test and LA-3 reference sediments.

Mean survival of polychaete in the laboratory control and LA-3 reference sediment was 94 and 88 percent, respectively, and ranged from 84 to 94 percent in the test sediments (Areas A, C, D, E, and F). No significant differences were found in polychaete survival among test and LA-3 reference sediments.

6.4.4 Toxicity Confounding Factors Evaluation

The influence of two potential confounding factors on test performance, ammonia and grain size, were assessed and are discussed below.

Ammonia

Ammonia concentrations in the initial sediment porewater and overlying water during the test, as well as documented threshold effects concentrations of ammonia for the species tested, are provided in the Toxicity & Bioaccumulation Testing Report prepared by Nautilus (Appendix I). Un-ionized ammonia concentrations in the 100 percent elutriate concentration for all composite samples (Areas A, C, D, E, and F) exceeded documented threshold effects levels for the bivalve (*M. galloprovincialis*). Significant toxicity was observed only in Areas C and D elutriates, both of which had noticeably higher concentrations of ammonia than that measured in overlying waters for the remaining composite samples. In addition, regression analysis of un-ionized ammonia concentrations in the undiluted elutriates of all sites versus percent normal bivalve embryo development revealed a significant relationship (Figure 8). Ammonia levels did not exceed the toxic threshold concentrations for any of the other species tested. Results indicate that ammonia concentrations had the potential to cause the toxic effects observed in both Areas C and D elutriates with the bivalve embryo development test.

Grain Size

Grain size is a well known potential confounding factor for amphipods (*Eohaustorius estuarius*), needing careful consideration and control to avoid falsely concluding a toxic effect when actual effects may be physically related to grain size (ASTM, 1999; USEPA, 1994; and Nautilus internal data). The sediment control from the amphipod collection site is composed of 100 percent sand, lacking silt and clay fractions. Thus, an additional control sediment comprised of 58 percent silt was tested to better represent the common fine sediments found within bays, harbors and estuaries. This fine sediment control location (Sail Bay located within Mission Bay, San Diego, California) was selected based on a review of sediment characteristics, toxicity, and chemistry values measured during a region-wide marine assessment program in southern California conducted in 2003 (Southern California Coastal Water Research Project [SCCWRP], 2003), as well as a follow-up inter-laboratory screening assessment conducted as a part of the SCCWRP (2008) toxicity program. The sediment is considered to be fine enough to represent that commonly found in harbors and bays in southern California, relatively free of potentially toxic concentrations of contaminants based on comparison to available sediment quality guidelines, and non-toxic in laboratory bioassays.

Mean amphipod survival in laboratory controls with home sediment comprised of 100 percent sand was high at 95 and 100 percent. Mean survival in the fine-grained control sediment was a bit lower at 84 percent. Mean amphipod survival in the site sediments (Areas A, C, D, E, and F) and LA-3 reference sediment ranged from 30 to 86 percent, with sites representing a spectrum of sand/silt/clay fractions. Upon performing linear regression, a significant relationship was found between percent silt in site sediments and amphipod survival (Figure 9), indicating that sediment grain size may have had an influence on amphipod survival during this particular round of tests.

6.4.5 Toxicity Results Summary

Suspended Particulate-Phase Tests

No toxicity was observed to mysids (*A. bahia*) and inland silverside minnows (*M. beryllina*) in any of the elutriates tested as well as bivalve embryos (*M. galloprovincialis*) exposed to elutriates from Areas A, E, and F. Toxicity to bivalve embryos was observed in elutriates from

Areas C and D, but effects were limited to that in only the highest concentration tested. Median lethal effect concentrations (LC^{50}) in elutriates from these two areas exceeded 100 percent, indicating the results would pass ocean disposal criteria at LA-3. Effects that were observed appear attributable to ammonia concentrations.

Solid-Phase Tests

No toxicity was observed to marine polychaetes (*Neanthes arenaceodentata*). Statistical effects relative to the LA-3 reference sample were, however, observed for marine amphipods (*Eohaustorius estuarius*) in composite sediments from Areas C, D, E, and F. The degree of effect, however, was less than 20 percent in both Areas C and F sediments, thus passing ocean disposal criteria as cited in the Green Book. The effect observed in sediments from Areas D and E was greater than 20 percent, but it is worth noting that a strong relationship was observed between percent silt and amphipod survival among all samples tested. It is possible that grain size was responsible for the observed effects. This hypothesis could be addressed further with additional testing.

6.4.6 Southern California Dredged Materials Management Team Determination

The SC-DMMT met on April 27, 2011, to discuss the results of the Tier III toxicity tests. Composite Areas D and E had marine amphipod (*Eohaustorius estuarius*) survival in the solid-phase (SP) toxicity test that were both significantly different from the reference and greater than 20% less than the reference. No composite area was significantly different from the reference for the marine polychaete (*Neanthes arenaceodentata*) SP toxicity test. The SC-DMMT recommended that Areas A, C, and F be determined suitable for ocean disposal pending results of the bioaccumulation tissue analyses and that Areas D and E be determined not suitable for ocean disposal. Based on this recommendation, Tier III bioaccumulation evaluation was completed for Areas A, C, and F, but not for Areas D and E.

6.5 TIER III BIOACCUMULATION EVALUATION

Results for bioaccumulation of chemicals in marine clam (*Macoma nasuta*) and marine polychaete (*Nereis virens*) tissues during a 28-day exposure are provided in Appendix I and Tables 20 through 22. Consistent with Tier III Green Book procedures, the accumulation of chemicals in the tissues was evaluated two ways: 1) a comparison was made to the latest US Federal Drug and Administration (FDA) guidelines for the consumption of fish and shellfish; and 2) a statistical comparison was conducted between accumulation of chemicals in reference tissue relative to that in the site tissues using Student's t-tests. One-tailed t-tests were performed following log transformation of the data. One-half of the detection limit was used to calculate means and perform statistical comparisons for non-detect data.

A third way to evaluate bioaccumulation results is to compare tissue burdens with sediment loads by calculating bioconcentration factors (BCFs) equal to the concentration of a specific compound in tissues divided by its concentration in the sediments. This comparison was performed for those chemicals that have no FDA guideline value and were statistically elevated relative to that in the LA-3 reference tissue.

In addition to the above comparisons, a review of the online USACE and USEPA Environmental Residue-Effects Database (ERED) (USACE & USEPA, 2010), was performed for those chemicals that were statistically elevated in site tissues relative to that in the reference tissues. This comparison was also performed for those circumstances where chemicals observed in the site tissues were lacking in the reference tissues, thus hampering valid statistical comparisons.

6.5.1 Metals and Organotin Compounds

Tissue samples were analyzed for 10 metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc (Table 20). All of the metals with the exception of silver and mercury were detected in clam and polychaete tissues from each site. Silver was detected only in clams from three replicate test chambers containing sediment from Area A, Area F, and the LA-3 reference site. The concentrations of silver detected were only slightly above the RL of 0.05 mg/kg. Mercury was detected in all tissues with the exception of clams exposed to sediments from Area C. No concentrations of any of the metals analyzed exceeded available FDA guidelines for the consumption of fish and shellfish (FDA, 2009). Furthermore, no metal concentrations in site tissues (Areas A, C, and F) differed statistically from that measured in the LA-3 reference tissue.

Tissue samples were also analyzed for four organotin compounds, including dibutyltin, monobutyltin, tetrabutyltin, and tributyltin (Table 20). None of the organotin compounds were detected in any of the tissues analyzed.

6.5.2 Polychlorinated Biphenyls

Tissue samples were analyzed for 8 PCB Aroclors and 54 individual PCB Congeners (Table 21). A single Aroclor, Aroclor 1248, was detected in clams exposed to Areas C and F sediments, and in polychaetes exposed to sediments from Areas A, C, and F. A maximum mean concentration of 23.8 µg/kg was measured in polychaetes exposed to Area A sediments. No PCB Aroclors were detected in the LA-3 reference tissue. Multiple PCB congeners were also detected in Area C and F clam tissues and in polychaetes exposed to sediments from Areas A, C, and F. PCB Congener 153 was also detected in polychaetes exposed to the LA-3 reference sediment. All of the concentrations detected were well below the FDA guideline value of 1,000 µg/kg for the consumption of fish and shellfish. Many of the detections were estimated values below the RLs, and few were detected in all replicate composites from a single site. Because there were no PCB detections in the LA-3 reference tissue, with the exception of PCB Congener 153, meaningful statistical comparisons to concentrations in tissues from the sites were not possible.

A review of the ERED database further found that total PCB concentrations measured in clam and polychaete tissues exposed to sediments from the SARM were much less than concentrations which have been found to be related to effects on growth, survival, reproduction, or behavior in a variety of benthic-dwelling organisms.

6.5.3 Semi-Volatile Organic Compounds

Tissue samples were analyzed for 18 PAHs, 16 phenols, and 6 phthalates (Table 22). Individual PAH compounds and phthalates were detected in tissues from both clams and polychaetes exposed to sediment from all sites and the LA-3 reference location. Phenols were not detected in any of the tissue samples analyzed with the exception of phenol in Area C clam tissues and the LA-3 reference site clam and polychaete tissues.

Polynuclear Aromatic Hydrocarbons

Multiple PAHs were detected in all tissues with the exception of clams exposed to Area A sediments and polychaetes exposed to LA-3 reference sediments where only naphthalene was detected at concentrations near the RL of 10 µg/kg. FDA guidelines are not available for PAHs in tissues, however most values were within two times of the RLs or estimated (less than the RL but greater than the method detection limit). Furthermore, detection of PAHs among composite replicates for each site was inconsistent. Of the four sites, only naphthalene and phenanthrene were present above the RL in all five replicates in polychaetes exposed to Area A sediments. The maximum mean concentration of any of the PAHs measured was observed in polychaetes exposed to sediment from Area A; 75.8 µg/kg for phenanthrene, 36.0 µg/kg for naphthalene, and 48.2 µg/kg for pyrene. Statistically elevated PAH concentrations were observed in polychaetes exposed to sediment from Areas A, C, and F primarily due to limited concentrations of PAHs detected in the LA-3 reference tissue. With the exception of naphthalene, these statistical comparisons have limited meaning due to non-detect values in the LA-3 reference tissue. No statistical differences in PAH concentrations in clam tissue were observed between the three sites and reference tissue. A review of the ERED database also found the concentrations of PAHs measured in clam and polychaete tissues to be well below values found to have caused effects on growth, survival, reproduction, or behavior in a variety of sediment-dwelling organisms.

A third way to evaluate bioaccumulation results is to compare tissue burdens with sediment loads by calculating BCFs. BCFs were calculated for total PAHs in those tissues with PAH concentrations that were statistically elevated relative to that in the reference tissue (polychaete tissues for Areas A, C, and F). BCF values for total PAHs were all less than 10 ranging from less than 1 in several samples to 7.4 in polychaetes exposed to sediment from Area A. According to EPA guidance, proposed dredged-material contaminants with BCFs greater than 1,000 should be further evaluated for bioaccumulation potential. The BCF values for these analytes are more than two orders of magnitude below the guidance value, suggesting the bioaccumulation potential is limited.

Phthalates

Several phthalates were detected in both clam and polychaete tissues. The most prevalent phthalate detected was DEHP which was elevated statistically in clams exposed to sediments from Area C (mean of 688 µg/kg) relative to that measured in the reference clam tissues. In addition, DEHP (mean concentration 149 µg/kg), butylbenzyl phthalate (mean concentration 22 µg/kg), diethyl phthalate (mean concentration 16 µg/kg), and dimethyl phthalate (mean concentration 9.1 µg/kg) were statistically elevated in polychaete tissue samples from Area A. In Area F, DEHP (mean concentration 122 µg/kg), butylbenzyl phthalate (mean concentration 31.4 µg/kg) and dimethyl phthalate (mean concentration 6.6 µg/kg) were also statistically elevated when compared to reference polychaete tissues. Butylbenzyl phthalate was less than three times that in the reference tissue and dimethyl phthalate was only slightly above the RL of 5 µg/kg. FDA guidelines are not available for phthalates in tissues and limited data is available in the ERED Database. Available effects data concentrations are much greater than those values measured in the test sediment tissues for the SARM. The lowest tissue effects concentration found for DEHP was 3,000 µg/kg in the water flea *Daphnia magna* related to reducing reproduction (Sanders et al., 1973). Furthermore a recent review of laboratory and field studies indicates that phthalate esters do not biomagnify in aquatic food-webs (Gobas et al., 2003). This finding, along with the low concentrations measured, limits the bioaccumulative concern for this class of compounds. BCF values of less than 100 were observed for all phthalates measured in this study for the SARM.

6.5.4 Chlorinated Pesticides

Tissue samples were analyzed for 27 pesticides (Table 22). A breakdown product from the legacy chlorinated pesticide DDT (4’4-DDE) was detected in clam tissues from three sites (Areas A, C, and F) evaluated and the LA-3 reference site. The greatest mean concentration measured was in the reference clam tissue (2.4 µg/kg), well below the FDA action level of 5000 µg/kg for consumption of fish and shellfish. DDT and its metabolites were not detected in any of the polychaete tissues.

The chlorinated pesticide trans-nonachlor was also detected in polychaete tissues from three areas (Areas A, C, and F) and the LA-3 reference site, with a maximum mean concentration of

2.5 μg/kg in polychaetes exposed to sediments from Area F. Endrin was detected near the RL of 2.0 μg/kg in polychaete tissue in one replicate for Area C. Alpha-chlordane was detected near the RL of 2.0 μg/kg in polychaetes exposed to sediments from Area F in one replicate as well. A statistical difference was noted for alpha-chlordane, but the meaning of this observation is limited as the one detection was near the reporting limit and no detections were observed in the reference tissue. No other statistical differences for chlorinated pesticides were observed in any of the tissues analyzed relative to that observed in the reference tissues.

A review of the ERED database further found that chlorinated pesticide concentrations measured in clam and polychaete tissues exposed to sediments from the SARM were much less than concentrations which have been found to be related to effects on growth, survival, reproduction, or behavior in a variety of benthic-dwelling organisms.

7.0 SUMMARY AND CONCLUSIONS

The work described herein was designed to evaluate potential dredged material from the SARM, for beach replenishment/nourishment at West Newport Beach and West Newport Beach nearshore. During the SARM investigation, AMEC collected sediment cores using the vibracore, hydraulic jack hammer core, or hand pushed core methods from seven designated areas and submitted them to laboratories for chemical, geotechnical, and Tier III testing. In addition, AMEC collected a reference sediment sample from the LA-3 reference site for chemical, geotechnical, and Tier III testing, beach transect grab samples from two USACE-designated transects in West Newport Beach for geotechnical testing, and site water from the SARM for the SPP toxicity testing. The data generated in this investigation were used to complete chemical and grain size compatibility analyses in accordance with the SAP. In accordance with the BAP, AMEC completed a Tier III evaluation on select sediment samples collected for the SARM investigation to determine the suitability of open ocean disposal of dredged sediments at the LA-3 site.

The SC-DMMT recommended that Areas B and G be determined suitable for nearshore placement. These two areas were determined to be physically and chemically suitable for nearshore placement. The remaining Areas (A, C, D, E, and F) were determined to be chemically suitable, but not physically suitable for nearshore placement. No Areas were found to be physically suitable for beach nourishment. Based on this recommendation, the USACE determined that Areas B and G are suitable for nearshore placement.

Toxicity results from Areas A, C, and F indicate these sediments are suitable for beach replenishment or ocean disposal. Amphipod (*Eohaustorius estuarius*) toxicity in sediments from Areas D and E exceeded acceptable levels for beach replenishment or ocean disposal, however additional testing may be warranted to ascertain whether the observed effects were related to grain size alone as suggested by correlation results, or some unmeasured chemical(s) that co-vary with percent fines. Composite Areas D and E had amphipod survival in the SP toxicity tests that were both significantly different from the reference and greater than 20 percent less than the reference. No composite area was significantly different from the reference for the polychaete (*Neanthes arenaceodentata*) SP toxicity test. The SC-DMMT recommended that Areas A, C, and F be determined suitable for ocean disposal pending results of the bioaccumulation tissue analyses and that Areas D and E be determined not suitable for ocean disposal. Based on this recommendation, Tier III bioaccumulation evaluation was completed for Areas A, C, and F, but not for Areas D and E.

Measured chemicals did not bioaccumulate from any test sediments at concentrations of potential concern for benthic-dwelling organisms. Maximum concentrations of chemicals measured in tissues were well below available FDA fish and shellfish tissue guidelines for human consumption, below available toxicological effects data for benthic-dwelling organisms, and were similar overall to that measured in the reference tissue. Where accumulation was greater in the reference sediments (i.e. for PAHs), BCF values were more than two orders of magnitude below an EPA guidance value of concern, further suggesting a low bioaccumulation potential. Results indicate that the limiting permissible concentration for those chemicals measured in tissues has been met for bioaccumulation potential. Areas A, C, and F, therefore, should be suitable for ocean disposal at the LA-3 site.

8.0 REFERENCES

AMEC Geomatrix, Inc. (AMEC), 2010, Sampling and Analysis Plan, Sediment Sampling, Bulk Chemistry Testing, Geotechnical Testing, and Report, November 24.

AMEC, 2011, Santa Ana River Marsh Maintenance Dredging Project, Bioassay Analysis Plan, Contract No. W912PL-10-D-0022, Amendment to Task Order: 0004, March 14.

ASTM, 1999, Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods. American Society for Testing and Materials, ASTM Designation E1367-99.Buchman, M.F., 2008, NOAA Screening Quick Reference Tables: NOAA OR&R Report 08-1, Seattle Washington, Office of Response and Restoration Division, National Oceanic and Atmospheric Administration, 34 pages.

Gobas, F., C. E.Mackintosh, G. Webster, M. Ikonomou, T.F. Parkerton, K. Robillard, 2003, Bioaccumulation of Phthalate Esters in Aquatic Food-Webs. The Handbook of Environmental Chemistry Vol. 3, Part Q (2003): 201–225. DOI 10.1007/b11467.

Regional Sediment Evaluation Team (RSET), 2006, Northwest Regional Sediment Evaluation Framework, Interim Final: Prepared by U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Washington State Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service, http://www.clu-in.org/download/contaminantfocus/sediments/RSET_Interim_FinalNorthwestRegion.pdf.

Sanders, H.O., Mayer, F.L., Walsh, D.F., 1973, Toxicity, residue dynamics, and reproductive effects of phthalate esters in aquatic invertebrates: Environmental Research 6(1):84-90 (90184).

Schiff, K., Maruya, K., Christenson, K., 2006, Southern California Bight 2003 Regional Monitoring Program: II. Sediment Chemistry, June.

Southern California Coastal Water Research Project (SCCWRP), SCCWRP, 2003, Southern California Bight 2003 Regional Marine Monitoring Survey (Bight 2003) Coastal Ecology Workplan, prepared by: Bight 2003 Coastal Ecology Committee, Prepared for: Commission of Southern California Coastal Water Research Project, June.

SCCWRP, 2008, Southern California Bight 2008 Regional Marine Monitoring Survey (Bight 2008), Coastal Ecology Workplan, prepared by: Bight 2008 Coastal Ecology Committee, Prepared for: Commission of Southern California Coastal Water Research Project, July.

U.S. Army Corps of Engineers (USACE), 2006, CECW-P/CECW-0, Memorandum For Commanders, Major Subordinate Commands, Assuring the Adequacy of Environmental Documentation for Construction and Maintenance Dredging of Federal Navigation Projects, January 17.

USACE, undated, Requirements for Sampling, Testing, and Data Analysis of Dredged Materials.

USACE, 2007, ERDC/TN EEDP-04-37, Overdepth Dredging and Characterization Depth Recommendations, June.

USACE, 2010a, Scope of Work, Santa Ana River Marsh Maintenance Dredging Project, Contract No. W912PL-10-D-0022, AMEC, August 4.

USACE, 2010b, Modification to the Scope of Work, Santa Ana River Marsh Maintenance Dredging Project, Contract No. W912PL-10-D-0022, AMEC, December 6.

USACE, 2011a, Modification No. 2 to the Scope of Work, Santa Ana River Marsh Maintenance Dredging Project, Contract No. W912PL-10-D-0022, AMEC, February 23.

USACE, 2011b, Modification No. 2 to the Scope of Work, Santa Ana River Marsh Maintenance Dredging Project, Contract No. W912PL-10-D-0022, AMEC, February 24.

USACE & U.S. Environmental Protection Agency (USEPA), 1993, Draft Regional Implementation Agreement (RIA) for the Evaluation of Dredged Material for Ocean Disposal, 19pp, April 13.

USACE & USEPA, 2010, Environmental Residue-Effects Database (ERED). http://el.erdc.usace.army.mil/ered/

USEPA & USACE, 1991, Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual, USEPA-503/8-91/001, February.

USEPA, 1994, Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods. June 1994. Environmental Protection Agency, Office of Research and Development. EPA 600/R-94/025.

USEPA, 2008, USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., June.

USEPA, 2010, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., January.

U.S. Food and Drug Administration (FDA), 2009, National Shellfish Sanitation Program Section IV.04 Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood. http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FederalStatePrograms/NationalShellfishSanitationProgram/UCM053987.

TABLES

amec

TABLE 1

REFERENCE LOCATIONS FOR CHECKING ACCURACY OF DGPS UNIT[1]

Santa Ana River Marsh Investigation
Newport Beach, California

Benchmark	Date	Surveyed Coordinates[2]				Measured Coordinates[3]				Difference Between Surveyed and Measured Coordinates (feet)
		Northing[4] (feet)	Easting[4] (feet)	Latitude[5] (DD)	Longitude[5] (DD)	Northing[4] (feet)	Easting[4] (feet)	Latitude[5] (DD)	Longitude[5] (DD)	
Brass Disc Near Tide Gauge (Marsh 1)	1/18/2011	2177481.006	6042232.715	33.63102	-117.95653	2177477.12	6042225.65	33.63101	-117.95656	8.1
Brass Disc Located Near Oil Derricks Within the Santa Ana River Marsh (SRM 1)	1/19/2011	2177437.215	6043107.856	33.63094	-117.95366	2177450.11	6043097.92	33.63097	-117.95369	16.2
	1/19/2011	2177437.215	6043107.856	33.63094	-117.95366	2177435.54	6043098.70	33.63093	-117.95369	9.3
	1/20/2011	2177437.215	6043107.856	33.63094	-117.95366	2177434.32	6043099.18	33.63093	-117.95368	9.1
	1/20/2011	2177437.215	6043107.856	33.63094	-117.95366	2177443.86	6043109.49	33.63095	-117.95365	6.8
	1/21/2011	2177437.215	6043107.856	33.63094	-117.95366	2177441.58	6043100.32	33.63095	-117.95368	8.7
	1/23/2011	2177437.215	6043107.856	33.63094	-117.95366	2177442.76	6043102.87	33.63095	-117.95367	7.5
	1/23/2011	2177437.215	6043107.856	33.63094	-117.95366	2177440.95	6043101.83	33.63095	-117.95368	7.1
	1/24/2011	2177437.215	6043107.856	33.63094	-117.95366	2177439.74	6043101.81	33.63094	-117.95368	6.6
	1/25/2011	2177437.215	6043107.856	33.63094	-117.95366	2177442.12	6043104.38	33.63095	-117.95367	6.0
	1/25/2011	2177437.215	6043107.856	33.63094	-117.95366	2177443.30	6043106.43	33.63095	-117.95366	6.3

Notes:
1. DGPS = Differential global positioning system.
2. Surveyed coordinates of benchmarks provided by U.S. Army Corps of Engineers, Los Angeles District.
3. Measured coordinates surveyed by TEG Oceanographic Services using a Furuno NAVNET DGPS unit.
4. Northings and eastings are referenced to California State Plane, Zone 6.
5. Latitudes and longitudes are in decimal degrees (DD) and are referenced to North American Datum of 1983 (NAD 83).

TABLE 2

COORDINATES OF SEDIMENT SAMPLE LOCATIONS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Core Location ID	Northing [1] (feet)	Easting [1] (feet)	Latitude [2] (DD)	Longitude [2] (DD)
Area A	SARM10-01	2177473.37	6042417.38	33.63100333	-117.95592500
	SARM10-02	2177491.28	6042805.83	33.63107000	-117.95465000
Area B	SARM10-03-SO[3]	2177461.95	6042596.81	33.63098000	-117.95533500
	SARM10-03	2177472.31	6042593.94	33.63100833	-117.95534500
	SARM10-04-SO[3]	2177326.17	6042924.90	33.63062167	-117.95425000
	SARM10-04	2177313.01	6042914.03	33.63058500	-117.95428500
Area C	SARM10-05	2177161.22	6043220.05	33.63018167	-117.95327167
	SARM10-06	2177039.48	6043394.63	33.62985500	-117.95269167
	SARM10-07	2177070.32	6043846.21	33.62996000	-117.95121000
Area D	SARM10-08	2177289.57	6044014.69	33.63057000	-117.95066833
	SARM10-09	2177582.34	6044101.16	33.63137833	-117.95040000
	SARM10-10	2177813.39	6044364.71	33.63202500	-117.94954667
Area E	SARM10-11	2178017.11	6044406.59	33.63258667	-117.94942000
	SARM10-12	2178072.95	6044181.21	33.63273000	-117.95016333
Area F	SARM10-13	2178045.32	6043941.78	33.63264333	-117.95094833
	SARM10-14	2178039.30	6043567.23	33.63261000	-117.95217833
	SARM10-15	2178323.70	6043348.63	33.63338167	-117.95291167
	SARM10-16	2177808.74	6043459.96	33.63197167	-117.95251833
	SARM10-17	2177708.13	6043938.31	33.63171667	-117.95094167
	SARM10-18	2177416.92	6043384.56	33.63089167	-117.95274500
Area G	SARM10-19	2177965.90	6043122.08	33.63238833	-117.95363667
	SARM10-20	2178415.16	6042874.21	33.63361167	-117.95447500
	SARM10-21	2178061.14	6042602.05	33.63262667	-117.95535000
	SARM10-22	2177662.15	6042482.88	33.63152500	-117.95572000
LA-3 Reference Site [4]	SARM10-LA3	2139291.26	6072533.81	33.52740000	-117.85506667

Notes:
1. Northings and eastings are referenced to California State Plane, Zone 6.
2. Latitudes and longitudes are in decimal degrees (DD) and are referenced to North American Datum of 1983 (NAD 83).
3. A step-out location was cored by hand to obtain a longer sample in an area not accessible by the barge.
4. LA-3 Ocean Dredged Material Disposal reference site.

TABLE 3

COORDINATES AND SAMPLING ELEVATIONS FOR BEACH TRANSECT GRAB SAMPLE LOCATIONS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sample ID	Date	Approximate Elevations (feet MLLW [1])	Northing [2] (feet)	Easting [2] (feet)	Latitude [3] (DD)	Longitude [3] (DD)
Beach Transect 1	WNpBNA10-1-1	1/27/2011	-29.7	2174080.73	6042095.46	33.62166667	-117.95680000
	WNpBNA10-1-2		-23.8	2174700.91	6042374.55	33.62338333	-117.95591667
	WNpBNA10-1-3		-17.8	2175044.48	6042507.03	33.62433333	-117.95550000
	WNpBNA10-1-4		-11.9	2175218.26	6042636.73	33.62481667	-117.95508333
	WNpBNA10-1-5	1/21/2011	-6	2175332.81	6042679.20	33.62513333	-117.95495000
	WNpBNA10-1-6		0	2175687.92	6042847.38	33.62611667	-117.95441667
	WNpBNA10-1-7		+6	2175790.35	6042889.65	33.62640000	-117.95428333
	WNpBNA10-1-8	2/8/2011	+12	2175875.00	6042919.77	33.62663396	-117.95418895
Beach Transect 2	WNpBNA10-2-1	1/27/2011	-29.9	2173946.49	6042514.44	33.62131667	-117.95541667
	WNpBNA10-2-2		-23.9	2174590.69	6042809.15	33.62310000	-117.95448333
	WNpBNA10-2-3		-17.9	2174904.60	6042900.54	33.62396667	-117.95420000
	WNpBNA10-2-4		-11.9	2175066.09	6043040.19	33.62441667	-117.95375000
	WNpBNA10-2-5	1/21/2011	-6	2175163.19	6043036.70	33.62468333	-117.95376667
	WNpBNA10-2-6		0	2175494.22	6043194.33	33.62560000	-117.95326667
	WNpBNA10-2-7		+6	2175572.31	6043241.28	33.62581667	-117.95311667
	WNpBNA10-2-8	2/8/2011	+12	2175683.29	6043285.45	33.62612360	-117.95297752

Notes:
1. MLLW = Mean Lower Low Water level.
2. Northings and eastings are referenced to California State Plane, Zone 6.
3. Latitudes and longitudes are in decimal degrees (DD) and are referenced to North American Datum of 1983 (NAD 83).

TABLE 4

MUDLINE ELEVATIONS AND TOTAL DEPTHS OF SEDIMENT CORE BORINGS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Core Location ID [1]	Date	Time [2]	Number of Sediment Cores Collected	Estimated Mudline Elevation [3, 4] (feet MLLW)	Project Design Elevation [3] (feet MLLW)	Project Overdepth Elevation Plus One Foot [3] (feet MLLW)	Sediment Core Penetration Depth [5] (feet MLLW)
Area A	SARM10-01	1/24/2011	11:10	3	3.0	-3.0	-5.0	-5.0
	SARM10-02	1/24/2011	12:20	3	3.4	-3.0	-5.0	-5.0
Area B	SARM10-03-SO[6]	1/25/2011	14:14	1	4.0	-4.0	-6.0	2.0
	SARM10-03	1/25/2011	14:14	3	3.0	-4.0	-6.0	-7.5
	SARM10-04-SO[6]	1/25/2011	13:15	1	3.6	-4.0	-6.0	2.1
	SARM10-04	1/25/2011	13:15	3	2.1	-4.0	-6.0	-7.5
Area C	SARM10-05	1/24/2011	13:50	2	3.0	-2.0	-4.0	-5.0
	SARM10-06	1/23/2011	13:35	3	2.0	-2.0	-4.0	-5.0
	SARM10-07	1/23/2011	13:13	2	1.0	-2.0	-4.0	-5.5
Area D	SARM10-08	1/23/2011	10:40	4	2.3	-3.0	-5.0	-5.2
	SARM10-09	1/23/2011	11:42	3	2.0	-3.0	-5.0	-5.0
	SARM10-10	1/23/2011	12:31	2	1.0	-3.0	-5.0	-5.0
Area E	SARM10-11	1/21/2011	12:08	5	0.7	-2.0	-4.0	-4.3
	SARM10-12	1/21/2011	10:00	6	0.9	-2.0	-4.0	-4.1
Area F	SARM10-13	1/20/2011	10:25	2	1.0	0.0	-2.0	-2.5
	SARM10-14	1/20/2011	9:46	2	1.7	0.0	-2.0	-1.3
	SARM10-15	1/20/2011	11:20	3	1.9	0.0	-2.0	-1.6
	SARM10-16	1/20/2011	12:28	2	3.8	0.0	-2.0	0.8
	SARM10-17	1/20/2011	13:00	3	1.9	0.0	-2.0	-3.1
	SARM10-18	1/21/2011	8:43	3	3.1	0.0	-2.0	-1.9
Area G	SARM10-19	1/19/2011	13:51	3	2.6	0.0	-2.0	-0.4
	SARM10-20	1/19/2011	10:26	3	2.3	0.0	-2.0	-1.3
	SARM10-21	1/19/2011	11:48	3	3.0	0.0	-2.0	-1.5
	SARM10-22	1/19/2011	15:10	4	3.2	0.0	-2.0	-0.8

Notes:
1. Where multiple sediment cores were collected at a location, the longest core recovered was photographed, logged, and sampled.
2. Time is when depth to water was measured and is in Pacific Standard Time.
3. Mudline and project elevations relative to Mean Lower Low Water (MLLW) level.
4. Estimated mudline elevations of the sediment core locations are based on the U.S. Army Corps of Engineers, Los Angeles District April/May 2010 bathymetric survey.
5. Elevation at the bottom of the sediment boring relative to MLLW level.
6. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.

TABLE 5

CALCULATED RATE OF PENETRATION FOR SEDIMENT CORE BORINGS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Core Location ID [1]	Date	Depth of Penetration (feet)	Penetration Time (minute: seconds)	Rate of Penetration (feet/minute)
Area A	SARM10-01	1/24/2011	8.0	5:00	1.6
	SARM10-02	1/24/2011	8.5	5:00	1.7
Area B	SARM10-03-SO[2]	1/25/2011	2.0	NA[3]	NA
	SARM10-03	1/25/2011	10.5	3:00	3.5
	SARM10-04-SO[2]	1/25/2011	1.5	NA	NA
	SARM10-04	1/25/2011	9.6	5:00	1.9
Area C	SARM10-05	1/24/2011	8.0	3:00	2.7
	SARM10-06	1/23/2011	7.0	4:00	1.8
	SARM10-07	1/23/2011	6.5	5:00	1.3
Area D	SARM10-08	1/23/2011	7.5	1:30	5.0
	SARM10-09	1/23/2011	7.0	3:00	2.3
	SARM10-10	1/23/2011	6.0	3:00	2.0
Area E	SARM10-11	1/21/2011	5.0	5:00	1.0
	SARM10-12	1/21/2011	5.0	4:00	1.3
Area F	SARM10-13	1/20/2011	3.5	1:00	3.5
	SARM10-14	1/20/2011	3.0	2:00	1.5
	SARM10-15	1/20/2011	3.5	1:30	2.3
	SARM10-16	1/20/2011	3.0	3:00	1.0
	SARM10-17	1/20/2011	5.0	3:00	1.7
	SARM10-18	1/21/2011	5.0	4:00	1.3
Area G	SARM10-19	1/19/2011	3.0	3:00	1.0
	SARM10-20	1/19/2011	3.6	2:00	1.8
	SARM10-21	1/19/2011	4.5	4:00	1.1
	SARM10-22	1/19/2011	4.0	2:30	1.6

Notes:

1. Where multiple sediment cores were collected at a location, the longest core recovered was photographed, logged, and sampled.
2. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.
3. NA = Not applicable.

TABLE 6

MUDLINE ELEVATIONS AND CORE RECOVERY FOR SEDIMENT CORE BORINGS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Core Location ID [1]	Date	Time [2]	Project Design Elevation [3] (feet MLLW)	Project Overdepth Elevation Plus One Foot [3] (feet MLLW)	Estimated Mudline Elevation [3,4] (feet MLLW)	Length of Core Recovered (feet)
Area A	SARM10-01	1/24/2011	11:10	-3.0	-5.0	3.0	5.4
	SARM10-02	1/24/2011	12:20	-3.0	-5.0	3.4	7.0
Area B	SARM10-03-SO[5]	1/25/2011	14:14	-4.0	-6.0	4.0	1.8
	SARM10-03	1/25/2011	14:14	-4.0	-6.0	3.0	6.0
	SARM10-04-SO[5]	1/25/2011	13:15	-4.0	-6.0	3.6	1.5
	SARM10-04	1/25/2011	13:15	-4.0	-6.0	2.1	6.7
Area C	SARM10-05	1/24/2011	13:50	-2.0	-4.0	3.0	6.0
	SARM10-06	1/23/2011	13:35	-2.0	-4.0	2.0	6.3
	SARM10-07	1/23/2011	13:13	-2.0	-4.0	1.0	5.9
Area D	SARM10-08	1/23/2011	10:40	-3.0	-5.0	2.3	6.6
	SARM10-09	1/23/2011	11:42	-3.0	-5.0	2.0	6.1
	SARM10-10	1/23/2011	12:31	-3.0	-5.0	1.0	5.5
Area E	SARM10-11	1/21/2011	12:08	-2.0	-4.0	0.7	4.3
	SARM10-12	1/21/2011	10:00	-2.0	-4.0	0.9	4.3
Area F	SARM10-13	1/20/2011	10:25	0.0	-2.0	1.0	3.1
	SARM10-14	1/20/2011	9:46	0.0	-2.0	1.7	2.5
	SARM10-15	1/20/2011	11:20	0.0	-2.0	1.9	3.3
	SARM10-16	1/20/2011	12:28	0.0	-2.0	3.8	2.7
	SARM10-17	1/20/2011	13:00	0.0	-2.0	1.9	3.6
	SARM10-18	1/21/2011	8:43	0.0	-2.0	3.1	3.8
Area G	SARM10-19	1/19/2011	13:51	0.0	-2.0	2.6	2.8
	SARM10-20	1/19/2011	10:26	0.0	-2.0	2.3	2.5
	SARM10-21	1/19/2011	11:48	0.0	-2.0	3.0	3.0
	SARM10-22	1/19/2011	15:10	0.0	-2.0	3.2	2.0

Notes:
1. Where multiple sediment cores were collected at a location, the longest core recovered was photographed, logged, and sampled.
2. Time is when depth to water was measured and is in Pacific Standard Time.
3. Mudline and project elevations relative to Mean Lower Low Water (MLLW) level.
4. Estimated mudline elevations of the sediment core locations are based on the U.S. Army Corps of Engineers, Los Angeles District April/May 2010 bathymetric survey.
5. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.

TABLE 7

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR CHEMICAL COMPOSITE AND TIER III TOXICITY AND BIOACCUMULATION TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID [1]	Date	Sample ID	Chemical Composite Sample ID [2]	Tier III Composite Sample ID [3]	Sample Depth Interval (feet)	Sample Elevation Interval [4] (feet MLLW)	Estimated Mudline Elevation [5] (feet MLLW)	Project Design Elevation [4] (feet MLLW)	Project Overdepth Elevation Plus One Foot [4] (feet MLLW)
Area A	SARM10-01	1/24/2011	SARM10-01	MCC10-A	SARM-T-A	0.0 to 5.4	3.0 to -2.4	3.0	-3.0	-5.0
	SARM10-02	1/24/2011	SARM10-02			0.0 to 7.0	3.4 to -3.6	3.4	-3.0	-5.0
Area B	SARM10-03-SO [6]	1/25/2011	SARM10-03-SO	MCC10-B	SARM-T-B	0.0 to 1.8	4.0 to 2.2	4.0	-4.0	-6.0
	SARM10-03	1/25/2011	SARM10-03			0.0 to 6.0	3.0 to -3.0	3.0	-4.0	-6.0
	SARM10-04-SO [6]	1/25/2011	SARM10-04-SO			0.0 to 1.5	3.6 to 2.1	3.6	-4.0	-6.0
	SARM10-04	1/25/2011	SARM10-04			0.0 to 6.7	2.1 to -4.6	2.1	-4.0	-6.0
Area C	SARM10-05	1/24/2011	SARM10-05	MCC10-C	SARM-T-C	0.0 to 6.0	3.0 to -3.0	3.0	-2.0	-4.0
	SARM10-06	1/23/2011	SARM10-06			0.0 to 6.3	2.0 to -4.3	2.0	-2.0	-4.0
	SARM10-07	1/23/2011	SARM10-07			0.0 to 5.9	1.0 to -4.9	1.0	-2.0	-4.0
Area D	SARM10-08	1/23/2011	SARM10-08	MCC10-D	SARM-T-D	0.0 to 6.6	2.3 to -4.3	2.3	-3.0	-5.0
	SARM10-09	1/23/2011	SARM10-09			0.0 to 6.1	2.0 to -4.1	2.0	-3.0	-5.0
	SARM10-10	1/23/2011	SARM10-10			0.0 to 5.5	1.0 to -4.5	1.0	-3.0	-5.0
Area E	SARM10-11	1/21/2011	SARM10-11	MCC10-E	SARM-T-E	0.0 to 4.3	0.7 to -3.6	0.7	-2.0	-4.0
	SARM10-12	1/21/2011	SARM10-12			0.0 to 4.3	0.9 to -3.4	0.9	-2.0	-4.0
Area F	SARM10-13	1/20/2011	SARM10-13	MCC10-F	SARM-T-F	0.0 to 3.1	1.0 to -2.1	1.0	0.0	-2.0
	SARM10-14	1/20/2011	SARM10-14			0.0 to 2.5	1.7 to -0.8	1.7	0.0	-2.0
	SARM10-15	1/20/2011	SARM10-15			0.0 to 3.3	1.9 to -1.4	1.9	0.0	-2.0
	SARM10-16	1/20/2011	SARM10-16			0.0 to 2.7	3.8 to 1.1	3.8	0.0	-2.0
	SARM10-17	1/20/2011	SARM10-17			0.0 to 3.6	1.9 to -1.7	1.9	0.0	-2.0
	SARM10-18	1/21/2011	SARM10-18			0.0 to 3.8	3.1 to -0.7	3.1	0.0	-2.0

amec

TABLE 7

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR CHEMICAL COMPOSITE AND TIER III TOXICITY AND BIOACCUMULATION TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID [1]	Date	Sample ID	Chemical Composite Sample ID [2]	Tier III Composite Sample ID [3]	Sample Depth Interval (feet)	Sample Elevation Interval [4] (feet MLLW)	Estimated Mudline Elevation [5] (feet MLLW)	Project Design Elevation [4] (feet MLLW)	Project Overdepth Elevation Plus One Foot [4] (feet MLLW)
Area G	SARM10-19	1/19/2011	SARM10-19	MCC10-G	SARM-T-G	0.0 to 2.8	2.6 to -0.2	2.6	0.0	-2.0
	SARM10-20	1/19/2011	SARM10-20			0.0 to 2.5	2.3 to -0.2	2.3	0.0	-2.0
	SARM10-21	1/19/2011	SARM10-21			0.0 to 3.0	3.0 to 0.0	3.0	0.0	-2.0
	SARM10-22	1/19/2011	SARM10-22			0.0 to 2.0	3.2 to 1.2	3.2	0.0	-2.0
LA-3 Reference Site [7]	SARM10-LA3	3/10/2011	SARM10-LA3	SARM10-LA3	SARM10-T-LA3	0.0 to 0.5	-1480 to 1481	1480	NA [8]	NA

Notes:
1. Where multiple sediment cores were collected at a location, the longest core recovered was photographed, logged, and sampled for chemical composite testing. All sediment cores recovered were sampled for Tier III composite testing. Samples collected for chemical composite testing are also shown on the lithologic logs (Appendix C).
2. Chemical archive samples collected from the longest cores were submitted to Calscience Environmental Laboratories, Inc., and will be kept frozen for a period of one year from the date they were collected. If a second core was collected at a sediment core location, a second chemical archive sample was collected from the additional core and will be kept frozen at the AMEC Earth and Environmental, Inc., San Diego office for a period of one year from the date they were collected.
3. Tier III composite samples were kept in a 4 degrees Celsius cold room at Nautilus Environmental and placed on hold pending the grain size compatibility analysis.
4. Sample interval and project elevations relative to Mean Lower Low Water (MLLW) level.
5. Estimated mudline elevations of the sediment core locations are relative to MLLW level and are based on the U.S. Army Corps of Engineers, Los Angeles District April/May 2010 bathymetric survey.
6. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.
7. LA-3 Ocean Dredged Material Disposal reference site.
8. NA = Not applicable.

TABLE 8

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR GEOTECHNICAL TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Date	Geotechnical Sample ID [1]	Sample Depth Interval (feet)	Sample Elevation Interval [2] (feet MLLW)	Estimated Mudline Elevation [3] (feet MLLW)	Project Design Elevation [2] (feet MLLW)	Project Overdepth Elevation Plus One Foot [2] (feet MLLW)
Area A	SARM10-01	1/24/2011	SARM10-01-G1	0.0 to 2.5	3.0 to 0.5	3.0	-3.0	-5.0
		1/24/2011	SARM10-01-G2	2.5 to 4.8	0.5 to -1.8	3.0	-3.0	-5.0
		1/24/2011	SARM10-01-G3	4.8 to 5.4	-1.8 to -2.4	3.0	-3.0	-5.0
	SARM10-02	1/24/2011	SARM10-02-G1	0.0 to 2.5	3.4 to 0.9	3.4	-3.0	-5.0
		1/24/2011	SARM10-02-G2	2.5 to 3.0	0.9 to 0.4	3.4	-3.0	-5.0
		1/24/2011	SARM10-02-G3	3.0 to 4.3	0.4 to -0.9	3.4	-3.0	-5.0
		1/24/2011	SARM10-02-G4	4.3 to 5.5	-0.9 to -2.1	3.4	-3.0	-5.0
		1/24/2011	SARM10-02-G5	5.5 to 7.0	-2.1 to -3.6	3.4	-3.0	-5.0
Area B	SARM10-03-SO[4]	1/25/2011	SARM10-03-SO-G1	0.0 to 1.8	4.0 to 2.2	4.0	-4.0	-6.0
	SARM10-03	1/25/2011	SARM10-03-G1	0.0 to 0.5	3.0 to 2.5	3.0	-4.0	-6.0
		1/25/2011	SARM10-03-G2	0.5 to 1.5	2.5 to 1.5	3.0	-4.0	-6.0
		1/25/2011	SARM10-03-G3	1.5 to 3.5	1.5 to -0.5	3.0	-4.0	-6.0
		1/25/2011	SARM10-03-G4	3.5 to 6.0	-0.5 to -3.0	3.0	-4.0	-6.0
	SARM10-04-SO[4]	1/25/2011	SARM10-04-SO-G1	0.0 to 1.5	3.6 to 2.1	3.6	-4.0	-6.0
	SARM10-04	1/25/2011	SARM10-04-G1	0.0 to 2.2	2.1 to -0.1	2.1	-4.0	-6.0
		1/25/2011	SARM10-04-G2	2.2 to 5.5	-0.1 to -3.4	2.1	-4.0	-6.0
		1/25/2011	SARM10-04-G3	5.5 to 6.7	-3.4 to -4.6	2.1	-4.0	-6.0

amec

TABLE 8

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR GEOTECHNICAL TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Date	Geotechnical Sample ID [1]	Sample Depth Interval (feet)	Sample Elevation Interval [2] (feet MLLW)	Estimated Mudline Elevation [3] (feet MLLW)	Project Design Elevation [2] (feet MLLW)	Project Overdepth Elevation Plus One Foot [2] (feet MLLW)
Area C	SARM10-05	1/24/2011	SARM10-05-G1	0.0 to 2.8	3.0 to 0.2	3.0	-2.0	-4.0
		1/24/2011	SARM10-05-G2	2.8 to 4.5	0.2 to -1.5	3.0	-2.0	-4.0
		1/24/2011	SARM10-05-G3	4.5 to 6.0	-1.5 to -3.0	3.0	-2.0	-4.0
	SARM10-06	1/23/2011	SARM10-06-G1	0.0 to 1.5	2.0 to 0.5	2.0	-2.0	-4.0
		1/23/2011	SARM10-06-G2	1.5 to 3.0	0.5 to -1.0	2.0	-2.0	-4.0
		1/23/2011	SARM10-06-G3	3.0 to 4.5	-1.0 to -2.5	2.0	-2.0	-4.0
		1/23/2011	SARM10-06-G4	4.5 to 6.3	-2.5 to -4.3	2.0	-2.0	-4.0
	SARM10-07	1/23/2011	SARM10-07-G1	0.0 to 1.2	1.0 to -0.2	1.0	-2.0	-4.0
		1/23/2011	SARM10-07-G2	1.2 to 4.7	-0.2 to -3.7	1.0	-2.0	-4.0
		1/23/2011	SARM10-07-G3	4.7 to 5.6	-3.7 to -4.6	1.0	-2.0	-4.0
Area D	SARM10-08	1/23/2011	SARM10-08-G1	0.0 to 1.7	2.3 to 0.6	2.3	-3.0	-5.0
		1/23/2011	SARM10-08-G2	1.7 to 5.5	0.6 to -3.2	2.3	-3.0	-5.0
		1/23/2011	SARM10-08-G3	5.5 to 6.6	-3.2 to -4.3	2.3	-3.0	-5.0
	SARM10-09	1/23/2011	SARM10-09-G1	0.0 to 2.0	2.0 to 0.0	2.0	-3.0	-5.0
		1/23/2011	SARM10-09-G2	2.0 to 5.0	0.0 to -3.0	2.0	-3.0	-5.0
		1/23/2011	SARM10-09-G3	5.0 to 6.1	-3.0 to -4.1	2.0	-3.0	-5.0
	SARM10-10	1/23/2011	SARM10-10-G1	0.0 to 3.0	1.0 to -2.0	1.0	-3.0	-5.0
		1/23/2011	SARM10-10-G2	3.0 to 5.0	-2.0 to -4.0	1.0	-3.0	-5.0
		1/23/2011	SARM10-10-G3	5.0 to 5.5	-4.0 to -4.5	1.0	-3.0	-5.0

TABLE 8

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR GEOTECHNICAL TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Date	Geotechnical Sample ID [1]	Sample Depth Interval (feet)	Sample Elevation Interval [2] (feet MLLW)	Estimated Mudline Elevation [3] (feet MLLW)	Project Design Elevation [2] (feet MLLW)	Project Overdepth Elevation Plus One Foot [2] (feet MLLW)
Area E	SARM10-11	1/21/2011	SARM10-11-G1	0.0 to 4.3	0.7 to -3.6	0.7	-2.0	-4.0
	SARM10-12	1/21/2011	SARM10-12-G1	0.0 to 3.8	0.9 to -2.9	0.9	-2.0	-4.0
Area F	SARM10-13	1/20/2011	SARM10-13-G1	0.0 to 3.1	1.0 to -2.1	1.0	0.0	-2.0
	SARM10-14	1/20/2011	SARM10-14-G1	0.0 to 1.0	1.7 to 0.7	1.7	0.0	-2.0
		1/20/2011	SARM10-14-G2	1.0 to 2.5	0.7 to -0.8	1.7	0.0	-2.0
	SARM10-15	1/20/2011	SARM10-15-G1	0.0 to 1.1	1.9 to 0.8	1.9	0.0	-2.0
		1/20/2011	SARM10-15-G2	1.1 to 1.8	0.8 to 0.1	1.9	0.0	-2.0
		1/20/2011	SARM10-15-G3	1.8 to 3.3	0.1 to -1.4	1.9	0.0	-2.0
	SARM10-16	1/20/2011	SARM10-16-G1	0.0 to 1.0	3.8 to 2.8	3.8	0.0	-2.0
		1/20/2011	SARM10-16-G2	1.0 to 2.7	2.8 to 1.1	3.8	0.0	-2.0
	SARM10-17	1/20/2011	SARM10-17-G1	0.0 to 1.0	1.9 to 0.9	1.9	0.0	-2.0
		1/20/2011	SARM10-17-G2	1.0 to 3.6	0.9 to -1.7	1.9	0.0	-2.0
	SARM10-18	1/21/2011	SARM10-18-G1	0.0 to 2.1	3.1 to 1.0	3.1	0.0	-2.0
		1/21/2011	SARM10-18-G2	2.1 to 3.8	1.0 to -0.7	3.1	0.0	-2.0

TABLE 8

SUMMARY OF SEDIMENT SAMPLES COLLECTED FOR GEOTECHNICAL TESTING

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Date	Geotechnical Sample ID [1]	Sample Depth Interval (feet)	Sample Elevation Interval [2] (feet MLLW)	Estimated Mudline Elevation [3] (feet MLLW)	Project Design Elevation [2] (feet MLLW)	Project Overdepth Elevation Plus One Foot [2] (feet MLLW)
Area G	SARM10-19	1/19/2011	SARM10-19-G1	0.0 to 1.0	2.6 to 1.6	2.6	0.0	-2.0
		1/19/2011	SARM10-19-G2	1.0 to 2.8	1.6 to -0.2	2.6	0.0	-2.0
	SARM10-20	1/19/2011	SARM10-20-G1	0.0 to 1.0	2.3 to 1.3	2.3	0.0	-2.0
		1/19/2011	SARM10-20-G2	1.0 to 2.5	1.3 to -0.2	2.3	0.0	-2.0
	SARM10-21	1/19/2011	SARM10-21-G1	0.0 to 0.5	3.0 to 2.5	3.0	0.0	-2.0
		1/19/2011	SARM10-21-G2	1.0 to 3.0	2.0 to 0.0	3.0	0.0	-2.0
	SARM10-22	1/19/2011	SARM10-22-G1	0.3 to 2.0	2.9 to -1.2	3.2	0.0	-2.0
LA-3 Reference Site [5]	SARM10-LA3	3/10/2011	SARM10-LA3-G1	0.0 to 0.5	-1480 to -1481	1480	NA [6]	NA

Notes:
1. Where multiple sediment cores were collected at a location, the longest core recovered was photographed, logged, and sampled. Samples collected for geotechnical testing are also shown on the lithologic logs (Appendix C).
2. Sample interval and project elevations relative to Mean Lower Low Water (MLLW) level.
3. Estimated mudline elevations of the sediment core locations are relative to MLLW level and are based on the U.S. Army Corps of Engineers, Los Angeles District April/May 2010 bathymetric survey.
4. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.
5. LA-3 Ocean Dredged Material Disposal reference site.
6. NA = Not applicable.

TABLE 9

CONCENTRATIONS OF GENERAL CHEMISTRY PARAMETERS IN SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

General Chemistry	Units	Area A (MCC10-A)	Area B (MCC10-B)	Area C (MCC10-C)	Area D (MCC10-D)	Area E (MCC10-E)	Area F (MCC10-F)	Area G (MCC10-G)	LA-3 Reference Site [1] (SARM10-LA3)
Ammonia (as N) [2]	mg/kg dwt [3]	3.3	4.4	7.4	5.7	5.1	3.9	<0.27 [4]	1.3
HEM: Oil & Grease	mg/kg dwt	56	70	77	64	75	73	74	52
HEM-SGT: TRPH [5]	mg/kg dwt	50	46	53	41	69	55	51	<26
Total Solids	%	75.4	70.2	67.7	59.2	50.9	67.4	74.4	37.9
pH	pH Units	8.24	7.74	7.95	8.01	8.15	8.08	7.59	7.94
Dissolved Sulfides	mg/kg dwt	<0.10	<0.050	<0.10	<0.10	<0.050	<0.050	<0.050	<0.10
Total Sulfides	mg/kg dwt	45	210	210	300	20	18	13	6.1
Total Organic Carbon	% dwt [6]	0.34	0.74	0.96	1.5	2.0	0.83	0.51	2.5
Total Volatile Solids	% dwt	0.97J* [7]	0.90J*	1.4J*	1.6J*	1.8J*	1.1J*	0.74J*	2.8

Notes:
1. Sediment sample collected from the LA-3 Ocean Dredged Material Disposal reference site.
2. N = nitrogen.
3. mg/kg dwt = milligrams per kilogram dry weight.
4. < = not detected at or above the laboratory reporting limit indicated.
5. TRPH = total recoverable petroleum hydrocarbons
6. % dwt = percent dry weight.
7. J* = The analyte is qualified as estimated as a result of AMECs data validation process.

TABLE 10

CONCENTRATIONS OF METALS AND ORGANOTIN COMPOUNDS IN SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

Analytes	Units	Area A (MCC10-A)	Area B (MCC10-B)	Area C (MCC10-C)	Area D (MCC10-D)	Area E (MCC10-E)	Area F (MCC10-F)	Area G (MCC10-G)	LA-3 Reference Site [1] (SARM10-LA3)	NOAA ERL [2]	NOAA ERM [3]
Metals											
Arsenic	mg/kg dwt [4]	1.82	2.19	2.68	4.04	8.01	3.84	2.68	5.5J-* [5]	8.2	70
Cadmium	mg/kg dwt	0.137	0.209	0.532	0.642	0.668	0.354	0.178	0.944	1.2	9.6
Chromium	mg/kg dwt	14.1	16.4	23.4	28.9	47.3	19.8	13.1	39.5	81	370
Copper	mg/kg dwt	9.29J-*	14.4J-*	21.2J-*	27.5J-*	**38.6**	16.8	9.67	25.0	34	270
Lead	mg/kg dwt	5.99	8.9	19.1	28.3	31	11.9	5.55	14.6J+* [6]	46.7	218
Mercury	mg/kg dwt	0.0443	0.0312	0.0641	0.0705	0.0873	<0.0297 [7]	<0.0269	0.0604	0.15	0.71
Nickel	mg/kg dwt	7.53J-*	8.79J-*	12.9J-*	17.5J-*	**25.9**	11.4	7.74	**21.1**	20.9	51.6
Selenium	mg/kg dwt	0.0670J [8]	0.221	0.296	0.286	0.487	0.233	0.0754J	0.901	-- [9]	--
Silver	mg/kg dwt	0.0423J	0.102J	0.182	0.212	0.248	0.103J	0.0497J	0.356	1.0	3.7
Zinc	mg/kg dwt	40.6J* [10]	54.4J*	81.5J*	100J*	117	56.6	44.3	77.0	150	410
Organotin Compounds											
Dibutyltin	µg/kg dwt [11]	<4.0	<4.3	<4.4	<5.1	<5.9	<4.5	<4.0	<7.9	--	--
Monobutyltin	µg/kg dwt	<4.0	<4.3	<4.4	<5.1	<5.9	<4.5	<4.0	<7.9	--	--
Tetrabutyltin	µg/kg dwt	<4.0	<4.3	<4.4	<5.1	<5.9	<4.5	<4.0	<7.9	--	--
Tributyltin	µg/kg dwt	<4.0	<4.3	<4.4	<5.1	<5.9	<4.5	<4.0	<7.9	--	--

Notes:
1. Sediment sample collected from the LA-3 Ocean Dredged Material Disposal reference site.
2. NOAA ERL = National Oceanic and Atmospheric Administration Effect Ranges Low. Concentrations that are equal to or exceed the screening level are shown in **BOLD**.
3. NOAA ERM = National Oceanic and Atmospheric Administration Effect Ranges Medium.
4. mg/kg dwt = milligrams per kilogram dry weight.
5. J-* = The analyte is qualified as estimated, but the result may be biased low as a result of AMEC's data validation process.
6. J+* = The result is an estimated quantity, but the result may be biased high as a result of AMEC's data validation process.
7. < = not detected at or above the laboratory reporting limit indicated.
8. J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
9. -- = NOAA ERL and ERM values are not available for this analyte.
10. J* = The analyte is qualified as estimated as a result of AMEC's data validation process.
11. µg/kg dwt = micrograms per kilogram dry weight.

Analyte	(MCC10-A)	(MCC10-B)	(MCC10-C)	(MCC10-D)	(MCC10-E)	(MCC10-F)	(MCC10-G)	(SARM10-LA3)	NOAA ERL	NOAA ERM
Aroclors										
Aroclor 1016	<13 [6]	<14	<15	<17	<20	<15	<13	<26	-- [7]	--
Aroclor 1221	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Aroclor 1232	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Aroclor 1242	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Aroclor 1248	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Aroclor 1254	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Aroclor 1260	<13	<14	<15	<17	12J [8]	5.5J	<13	<26	--	--
Aroclor 1262	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Total PCB Aroclors	<13	<14	<15	<17	12J	5.5J	<13	<26	22.7	180
Congeners										
PCB 8	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 18	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 28	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 37	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 44	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 49	<6.6	<7.1	1.3J	<8.4	2.2J	1.5J	<6.7	<13	--	--
PCB 52	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 66	<6.6	<7.1	0.86J	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 70	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 74	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 77	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 81	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 87	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 99	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 101	<6.6	<7.1	1.5J	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 105	<6.6	<7.1	1.3J	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 110	<6.6	<7.1	1.3J	1.3J	<9.8	<7.4	<6.7	<13	--	--
PCB 114	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 118	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 119	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 123	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 126	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 128	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 138/158	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 149	<6.6	<7.1	1.6J	1.3J	<9.8	<7.4	<6.7	<13	--	--
PCB 151	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 153	<6.6	<7.1	2.1J	1.7J	1.9J	<7.4	<6.7	<13	--	--
PCB 156	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 157	<6.6	<7.1	1.7J	1.6J	2.0J	1.7J	<6.7	<13	--	--
PCB 167	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 168	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 169	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 170	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 177	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 180	<6.6	<7.1	<7.4	1.3J	<9.8	<7.4	<6.7	<13	--	--
PCB 183	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 184	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 187	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 189	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 194	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 195	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 201	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 206	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
PCB 209	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
Total PCB Congeners	<6.6	<7.1	16	7.2J	6.1J	3.1J	<6.7	<13	22.7	180

Notes:

. PCB = polychlorinated biphenyl.
. µg/kg dwt = micrograms per kilogram dry weight.
. Sediment sample collected from the LA-3 Ocean Dredged Material Disposal reference site.
. NOAA ERL = National Oceanic and Atmospheric Administration Effect Ranges Low.
. NOAA ERM = National Oceanic and Atmospheric Administration Effect Ranges Medium.
. < = not detected at or above the laboratory reporting limit indicated.
. -- = NOAA ERL and ERM values are not available for individual PCB Aroclors or PCB congeners.
. J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

1-Methylnaphthalene	<13 [6]	<14	2.0J [7]	2.7J	3.7J	2.2J	1.5J	5.0J	-- [8]	--
1-Methylphenanthrene	<13	<14	<15	<17	<20	<15	<13	<26	--	--
1,6,7-Trimethylnaphthalene	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,6-Dimethylnaphthalene	2.3J	3.3J	4.5J	8.9J	11J	7.7J	5.6J	86	--	--
2-Methylnaphthalene	1.4J	2.7J	3.4J	3.9J	7.4J	4.2J	3.0J	5.3J	70	670
Acenaphthene	<13	<14	<15	<17	<20	<15	<13	<26	16	500
Acenaphthylene	<13	<14	<15	2.9J	2.9J	2.8J	<13	<26	44	640
Anthracene	<13	2.0J	1.9J	4.3J	2.9J	2.6J	<13	<26	85.3	1100
Benz[a]anthracene	2.7J	8.2J	9.4J	25	18J	14J, J* [9]	4.7J	9.9J	261	1600
Benzo[a]pyrene	5.2J	13J	18	57	40	29J*	5.6J	9.8J	430	1600
Benzo[b]fluoranthene	3.8J	9.6J	14J	43	28	21J*	5.1J	9.0J	--	--
Benzo[e]pyrene	4.4J	7.7J	11J	33	23	18	4.3J	7.9J	--	--
Benzo[g,h,i]perylene	6.7J	15	23	71	49	35J*	8.0J	12J	--	--
Benzo[k]fluoranthene	2.7J	7.5J	11J	35	20	16J*	3.8J	7.7J	--	--
Benzoic Acid	<130	<140	<150	<170	<200	<150	<130	<260	--	--
Biphenyl	<13	1.8J	1.7J	2.9J	2.7J	1.8J	<13	4.2J	--	--
Chrysene	3.7J	8.3J	10J	28	17J	16J*	3.8J	9.9J	384	2800
Dibenz[a,h]anthracene	<13	3.2J	2.9J	7.8J	5.5J	4.5J, J*	<13	<26	63.4	260
Dibenzothiophene	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Fluoranthene	4.8J	16	17	41	30	25	6.2J	12J	600	5100
Fluorene	<13	2.2J	2.1J	2.8J	2.5J	1.6J	<13	4.7J	19	540
Indeno[1,2,3-c,d]pyrene	4.3J	11J	15	47	33	24J*	5.0J	8.0J	--	--
Naphthalene	1.9J	3.6J	4.5J	7.3J	11J	6.2J	3.3J	7.8J, J*	160	2100
Perylene	6.6J	32	27	20	14J	13J	3.3J	15J	--	--
Phenanthrene	2.5J	8.8J	7.5J	16J	11J	8.4J	3.2J	8.2J	240	1500
Pyrene	6.9J	20	23	68	42	35	8.1J	13J	665	2600
LPAH[10]	5.9J	19	22	40	41	28	11J	31	552	3160
HPAH[11]	41J*	110J*	140J*	420J*	280J*	220J*	50J*	92	1700	9600
TPAH[12]	47J*	130J*	160J*	460J*	320J*	250J*	61J*	120	4022	44,792
Phenols										
2,3,4,6-Tetrachlorophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,4,5-Trichlorophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,4,6-Trichlorophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,4-Dichlorophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,6-Dichlorophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,4-Dimethylphenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2,4-Dinitrophenol	<660	<710	<740	<840	<980	<740	<670	<1300	--	--
2-Chlorophenol	<13	<14	<15	<17	<20	18J*	63J*	<26	--	--
2-Methyl-4,6-Dinitrophenol	<660	<710	<740	<840	<980	<740	<670	<1300	--	--
2-Methylphenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
2-Nitrophenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
3/4-Methylphenol	<13	9.8J	3.2J	3.3J	<20	3.5J	<13	<26	--	--
4-Chloro-3-Methylphenol	<13	<14	<15	<17	<20	<15	<13	<26	--	--
4-Nitrophenol	<660	<710	<740	<840	<980	<740	<670	<1300	--	--
Pentachlorophenol	<660	<710	<740	<840	<980	<740	<670	<1300	--	--
Phenol	<13	<14	17J*	<17	<20	<15	64J*	<26	--	--
Phthalates										
Bis (2-Ethylhexyl) Phthalate	13U* [13]	14U*	15U*	160	28	170	170	89	--	--
Butylbenzyl Phthalate	36	37	37	77	21	44	39	80	--	--
Diethyl Phthalate	13U*	14U*	15U*	17U*	6.6J	5.7J	4.5J	13J	--	--
Dimethyl Phthalate	<13	14U*	15U*	17U*	470	340	210	14J	--	--
Di-n-butyl Phthalate	95	20	15U*	26	13J	13J	8.2J	17J	--	--
Di-n-octyl Phthalate	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Pesticides										
2,4'-DDD	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
2,4'-DDE	<1.3	<1.4	1.1J	1.8	<2.0	<1.5	<1.3	<2.6	--	--
2,4'-DDT	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
4,4'-DDD	<1.3	<1.4	1.4J	**2.3**	<2.0	<1.5	<1.3	**2.4J, J***	2	20
4,4'-DDE	1.0J	1.4J	**5.2**	**10**	**3.5**	**2.3**	1.4	**18**	2.2	27
4,4'-DDT	<1.3	<1.4	<1.5	0.56J	<2.0	<1.5	<1.3	<2.6 UJ* [14]	1	7
Total DDTs	1.0J	1.4J	**7.7**	**15**	**3.5**	**2.3**	1.4	**21**	1.58	46.1
Aldrin	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Alpha-BHC	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Beta-BHC	0.54J, J*	0.59J, J*	0.83J, J*	1.6J, J*	<2.0	<1.5	0.46J	<2.6	--	--
Delta-BHC	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Gamma-BHC	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Chlordane	<13	<14	<15	<17	<20	<15	<13	<26	0.5	6
Alpha-Chlordane	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Gamma-Chlordane	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
cis-Nonachlor	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--

Heptachlor	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Heptachlor Epoxide	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Methoxychlor	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6UJ*	--	--
Mirex	<6.6	<7.1	<7.4	<8.4	<9.8	<7.4	<6.7	<13	--	--
Oxychlordane	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--
Perthane	<13	<14	<15	<17	<20	<15	<13	<26	--	--
Toxaphene	<27	<28	<30	<34	<39	<30	<27	<53	--	--
trans-Nonachlor	<1.3	<1.4	<1.5	<1.7	<2.0	<1.5	<1.3	<2.6	--	--

Notes:

1. µg/kg dwt = micrograms per kilogram dry weight
2. Sediment sample collected from the LA-3 Ocean Dredged Material Disposal reference site.
3. NOAA ERL = National Oceanic and Atmospheric Administration Effect Ranges Low. Concentrations that are equal to or exceed the screening level are shown in **BOLD**.
4. NOAA ERM = National Oceanic and Atmospheric Administration Effect Ranges Medium.
5. PAHs = polycyclic aromatic hydrocarbons.
6. < = not detected at or above the laboratory reporting limit indicated.
7. J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
8. -- = NOAA ERL and ERM values are not available for this analyte.
9. J* = The analyte is qualified as estimated as a result of AMEC's data validation process.
10. LPAH = Low-molecular-weight PAHs.
11. HPAH = High-molecular-weight PAHs.
12. TPAH = Total PAHs.
13. U* = The analyte was positively identified, but was not detected at a concentration greater than or equal to the laboratory reporting limit as a result of AMEC's data validation process.
14. UJ* = the analyte was not detected at a level greater than or equal to the reporting limit. The reporting limit is approximate and may be imprecise as a result of AMEC's data validation process.

TABLE 13

GRAIN SIZE DATA FROM SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

			Percent Passing														
			Gravel		Sand											Silt or Clay	
			Fine		Coarse		Medium				Fine						
			3/8" [1]	#4	#7	#10	#14	#18	#25	#35	#45	#60	#80	#120	#170	#200	#230
D	Sample ID	Date	9.50 mm [2]	4.75 mm	2.80 mm	2.00 mm	1.40 mm	1.00 mm	0.710 mm	0.500 mm	0.355 mm	0.250 mm	0.180 mm	0.125 mm	0.090 mm	0.075 mm	0.063 mm
01	SARM10-01-G1	1/24/2011	98.7	98.2	98.0	97.8	97.5	97.1	96.6	96.5	93.4	83.4	62.8	26.0	8.6	6.0	5.3
01	SARM10-01-G2	1/24/2011	100	100	100	100	99.96	99.91	99.85	99.8	99.6	99.2	98.3	96.9	95.4	94.3	93.3
01	SARM10-01-G3	1/24/2011	99.7	98.1	97.3	96.2	94.9	92.8	89.0	80.1	60.6	29.8	9.6	3.7	2.9	2.8	2.7
02	SARM10-02-G1	1/24/2011	100	100	100	99.97	99.89	99.8	99.7	99.6	99.1	97.7	94.2	81.8	58.9	47.6	40.4
02	SARM10-02-G2	1/24/2011	100	100	100	100	99.98	99.95	99.87	99.85	99.5	98.8	97.9	96.0	93.6	92.8	92.4
02	SARM10-02-G3	1/24/2011	99.7	99.6	99.4	99.1	98.6	97.6	95.4	95.3	87.7	78.0	67.8	45.0	19.3	13.6	12.3
02	SARM10-02-G4	1/24/2011	99.9	99.8	99.6	99.5	99.2	98.5	97.5	97.0	93.0	84.8	63.6	23.6	9.3	7.2	6.7
02	SARM10-02-G5	1/24/2011	100	99.97	99.97	99.92	99.8	99.4	98.7	97.0	92.7	80.4	49.7	16.8	8.0	7.0	6.8
SO [3]	SARM10-03-S0-G1	1/25/2011	100	100	100	100	100	100	100	100	99.9	99.2	95.2	76.2	28.2	6.7	3.8
03	SARM10-03-G2	1/25/2011	100	100	100	100	99.9	99.8	99.7	99.4	98.8	97.6	94.1	90.3	85.5	82.3	79.9
SO [3]	SARM10-04-SO-G1	1/25/2011	100	99.98	99.98	99.93	99.88	99.7	99.5	99.3	98.8	96.8	86.7	53.8	25.8	19.0	16.8
04	SARM10-04-G2	1/25/2011	98.7	98.1	97.8	97.6	97.3	96.2	92.9	76.2	37.4	8.9	3.3	2.2	1.9	1.8	1.8
05	SARM10-05-G1	1/24/2011	97.5	97.45	97.38	97.33	97.28	97.23	97.16	97.1	96.9	96.1	93.5	76.7	46.3	37.6	34.2
05	SARM10-05-G2	1/24/2011	100	100	100	99.98	99.96	99.91	99.78	99.76	99.0	97.5	95.4	90.1	82.9	80.2	78.9
05	SARM10-05-G3	1/24/2011	100	99.98	99.93	99.89	99.81	99.6	98.8	94.7	68.0	23.7	7.2	2.3	1.4	1.2	1.2
06	SARM10-06-G1	1/23/2011	98.2	98.0	97.93	97.91	97.84	97.81	97.75	97.73	97.2	94.5	84.2	42.6	17.8	13.7	13.1
06	SARM10-06-G2	1/23/2011	100	99.9	99.9	99.7	99.3	98.6	97.6	97.3	96.3	95.1	93.1	88.1	81.2	78.3	76.4
06	SARM10-06-G3	1/23/2011	100	99.95	99.7	99.5	98.9	97.6	95.0	94.1	83.5	68.5	56.8	42.6	31.9	29.3	28.1
06	SARM10-06-G4	1/23/2011	100	100	100	100	99.98	99.94	99.8	99.3	98.9	97.6	97.0	96.2	95.6	95.3	95.1
07	SARM10-07-G1	1/23/2011	94.4	93.9	93.7	93.5	93.2	92.7	91.3	89.5	79.3	61.3	46.1	33.1	23.2	20.6	19.6
07	SARM10-07-G2	1/23/2011	100	99.95	99.95	99.95	99.94	99.86	99.7	99.6	98.7	97.4	96.1	94.8	94.1	93.9	93.7
07	SARM10-07-G3	1/23/2011	98.5	98.0	97.4	96.7	94.9	89.7	80.1	65.9	43.2	22.0	14.7	12.0	11.2	11.0	10.9
08	SARM10-08-G1	1/23/2011	100	100	99.98	99.97	99.94	99.90	99.83	99.80	99.6	99.2	97.8	87.5	49.8	34.3	28.8
08	SARM10-08-G2	1/23/2011	95.93	95.93	95.93	95.92	95.9	95.9	95.7	95.7	95.1	94.1	93.1	90.5	81.9	76.1	72.8
08	SARM10-08-G3	1/23/2011	100	99.9	99.6	99.3	98.6	97.5	94.9	94.8	88.2	81.0	77.3	74.1	68.8	65.8	63.4
09	SARM10-09-G1	1/23/2011	99.0	98.9	98.78	98.75	98.69	98.61	98.39	98.36	96.9	93.4	86.7	67.1	44.7	38.6	36.2
09	SARM10-09-G2	1/23/2011	100	100	100	99.99	99.97	99.92	99.88	99.87	99.7	99.5	99.2	98.6	97.8	97.3	96.8
09	SARM10-09-G3	1/23/2011	100	100	100	100	100	99.99	99.97	99.93	99.8	99.6	99.3	99.0	98.4	98.1	97.8
10	SARM10-10-G1	1/23/2011	100	99.97	99.95	99.93	99.92	99.88	99.77	99.74	99.6	99.3	98.9	98.3	97.2	96.4	95.8
10	SARM10-10-G2	1/23/2011	100	100	100	100	99.94	99.86	99.74	99.68	99.3	98.6	97.8	96.8	95.5	94.8	94.0
10	SARM10-10-G3	1/23/2011	99.7	98.6	97.3	96.1	93.8	89.8	83.5	79.4	69.8	61.0	50.5	42.9	39.8	38.6	37.7

TABLE 13

GRAIN SIZE DATA FROM SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

			Percent Passing														
			Gravel		Sand											Silt or Clay	
			Fine		Coarse		Medium				Fine						
			3/8" [1]	#4	#7	#10	#14	#18	#25	#35	#45	#60	#80	#120	#170	#200	#230
D	Sample ID	Date	9.50 mm [2]	4.75 mm	2.80 mm	2.00 mm	1.40 mm	1.00 mm	0.710 mm	0.500 mm	0.355 mm	0.250 mm	0.180 mm	0.125 mm	0.090 mm	0.075 mm	0.063 mm
11	SARM10-11-G1	1/21/2011	100	100	99.96	99.96	99.94	99.88	99.7	99.6	99.1	98.6	98.1	97.5	96.8	96.4	96.1
12	SARM10-12-G1	1/21/2011	100	99.85	99.85	99.84	99.79	99.6	99.3	99.2	98.3	97.0	96.0	95.0	94.2	93.8	93.4
13	SARM10-13-G1	1/20/2011	100	99.86	99.86	99.83	99.81	99.7	99.5	99.0	98.1	94.6	90.3	84.9	79.0	75.8	74.0
14	SARM10-14-G1	1/20/2011	100	99.79	99.77	99.6	99.4	98.8	97.7	95.4	91.4	84.0	75.9	64.7	60.0	58.9	58.3
14	SARM10-14-G2	1/20/2011	99.8	99.2	98.6	97.7	96.1	93.9	90.3	82.9	70.7	51.2	30.4	15.7	8.5	7.1	6.7
15	SARM10-15-G1	1/20/2011	99.1	97.4	96.5	95.2	93.9	92.2	90.1	88.1	86.8	85.2	82.9	78.2	72.7	70.8	69.9
15	SARM10-15-G2	1/20/2011	60.0	54.0	49.4	45.2	39.5	33.2	27.3	23.5	21.7	20.6	19.6	18.4	17.4	17.0	16.8
15	SARM10-15-G3	1/20/2011	100	99.9	99.6	99.4	98.9	98.3	97.5	97.0	96.5	95.9	95.3	94.5	93.8	93.4	93.2
16	SARM10-16-G1	1/20/2011	90.1	89.5	88.7	88.0	87.2	86.1	84.7	82.8	79.9	75.2	70.0	62.3	56.4	52.2	52.0
16	SARM10-16-G2	1/20/2011	100	99.8	99.6	99.3	98.7	97.2	93.9	87.4	76.0	57.8	41.3	25.7	17.6	16.0	15.5
17	SARM10-17-G1	1/20/2011	100	99.8	99.7	99.6	99.5	99.2	98.7	97.6	95.3	89.4	79.9	68.6	62.3	61.1	60.5
17	SARM10-17-G2	1/20/2011	100	99.95	99.94	99.8	99.4	98.8	97.6	95.3	90.9	79.5	54.9	21.5	7.9	6.1	5.8
18	SARM10-18-G1	1/21/2011	99.7	99.54	99.48	99.4	99.3	99.1	98.7	98.6	97.2	94.7	90.6	75.3	48.8	40.1	36.5
18	SARM10-18-G2	1/21/2011	100	100	100	99.98	99.7	98.6	95.3	88.7	76.9	56.9	33.2	18.1	7.2	5.1	4.6
19	SARM10-19-G1	1/19/2011	99.77	99.75	99.71	99.65	99.5	99.2	98.7	97.3	94.0	87.2	76.7	64.8	57.8	56.0	54.5
19	SARM10-19-G2	1/19/2011	100	100	100	99.99	99.95	99.88	99.7	99.0	96.6	89.4	69.3	34.4	14.6	11.0	10.5
20	SARM10-20-G1	1/19/2011	98.83	98.83	98.78	98.77	98.74	98.71	98.6	98.2	95.5	84.1	62.7	36.8	24.6	23.1	22.9
20	SARM10-20-G2	1/19/2011	100	100	100	100	100	99.98	99.88	99.5	97.9	90.6	71.0	30.5	6.0	4.4	4.2
21	SARM10-21-G1	1/19/2011	100	100	100	99.96	99.92	99.86	99.7	99.3	98.5	96.4	92.2	81.1	58.5	52.2	51.4
21	SARM10-21-G2	1/19/2011	91.0	90.6	90.4	90.3	90.2	90.0	89.5	88.6	86.3	81.1	70.5	40.0	14.7	10.4	9.8
22	SARM10-22-G1	1/19/2011	99.8	99.2	98.8	98.5	98.2	97.6	96.5	94.8	91.4	84.5	70.0	47.9	31.3	25.6	24.6
A3	SARM10-LA3-G1	3/10/2011	100	100	99.97	99.97	99.97	99.95	99.84	99.75	99.2	98.2	97.1	94.8	91.5	89.4	87.5

specified in the Scope of Work.

by hand to obtain a longer sample in an area not accessible by the barge.
Disposal reference site.

TABLE 14

ATTERBERG LIMITS FOR SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Sample ID	Date	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
Area A	SARM10-01	SARM10-01-G2	01/24/11	48	29	19
	SARM10-02	SARM10-02-G2	01/24/11	48	24	24
Area B	SARM10-03-SO [1]	SARM10-03-S0-G1	01/25/11	NP [2]	NP	NP
	SARM10-03	SARM10-03-G2	01/25/11	39	22	17
	SARM10-04	SARM10-04-G2	01/25/11	NP	NP	NP
Area C	SARM10-05	SARM10-05-G2	01/24/11	36	18	18
	SARM10-06	SARM10-06-G2	01/23/11	53	25	28
	SARM10-06	SARM10-06-G3	01/23/11	23	21	2
	SARM10-06	SARM10-06-G4	01/23/11	69	30	39
	SARM10-07	SARM10-07-G2	01/23/11	56	22	34
Area D	SARM10-08	SARM10-08-G2	01/23/11	41	21	20
	SARM10-08	SARM10-08-G3	01/23/11	44	21	23
	SARM10-09	SARM10-09-G1	01/23/11	34	23	11
	SARM10-09	SARM10-09-G2	01/23/11	60	25	35
	SARM10-09	SARM10-09-G3	01/23/11	71	29	42
	SARM10-10	SARM10-10-G1	01/23/11	65	26	39
	SARM10-10	SARM10-10-G2	01/23/11	58	24	34
	SARM10-10	SARM10-10-G3	01/23/11	29	16	13
Area E	SARM10-11	SARM10-11-G1	01/21/11	76	27	49
	SARM10-12	SARM10-12-G1	01/21/11	81	29	52
Area F	SARM10-13	SARM10-13-G1	01/20/11	44	21	23
	SARM10-14	SARM10-14-G1	01/20/11	36	18	18
	SARM10-15	SARM10-15-G1	01/20/11	63	24	39
	SARM10-15	SARM10-15-G2	01/20/11	56	22	34
	SARM10-15	SARM10-15-G3	01/20/11	67	29	38
	SARM10-16	SARM10-16-G1	01/20/11	43	20	23
	SARM10-17	SARM10-17-G1	01/20/11	48	20	28
	SARM10-18	SARM10-18-G1	01/21/11	28	24	4

TABLE 14

ATTERBERG LIMITS FOR SEDIMENT SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Sediment Location ID	Sample ID	Date	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
Area G	SARM10-19	SARM10-19-G1	01/19/11	35	18	17
	SARM10-21	SARM10-21-G1	01/19/11	39	22	17
LA-3 Reference Site [3]	SARM10-LA3	SARM10-LA3-G1	03/10/11	66	30	36

Notes:
1. A step-out location was drove by hand to obtain a longer sample in an area not accessible by the barge.
2. NP = non-plastic
3. LA-3 Ocean Dredged Material Disposal reference site.

TABLE 15

GRAIN SIZE DATA FROM BEACH TRANSECT GRAB SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

			Percent Passing															
			Gravel		Sand											Silt or Clay		
		Approximate Elevations	Fine		Coarse		Medium				Fine							
			3/8" [2]	#4	#7	#10	#14	#18	#25	#35	#45	#60	#80	#120	#170	#200	#230	S
e ID	Date	(feet MLLW [1])	9.50 mm [3]	4.75 mm	2.80 mm	2.00 mm	1.40 mm	1.00 mm	0.710 mm	0.500 mm	0.355 mm	0.250 mm	0.180 mm	0.125 mm	0.090 mm	0.075 mm	0.063 mm	0.075 - (
10-1-1	1/27/2011	-29.7	100	100	100	100	100	100	100	100	99.9	99.8	99.4	97.5	90.1	72.9	40.0	6
10-1-2		-23.8	99.7	99.7	99.7	99.7	99.7	99.7	99.7	99.7	99.6	99.4	98.7	93.6	68.5	45.2	29.7	4
10-1-3		-17.8	100	99.9	99.7	99.7	99.5	99.2	98.7	97.0	92.7	85.0	74.9	52.5	18.9	8.7	5.2	6
10-1-4		-11.9	100	100	99.9	99.7	99.6	99.3	99.2	99.0	98.3	93.3	64.3	16.4	3.7	2.1	1.6	0
10-1-5	1/21/2011	-6	100	99.9	99.7	99.4	99.0	97.4	93.2	83.6	70.6	51.0	24.4	4.8	1.2	0.9	0.7	-
10-1-6		0	100	100	100	100	100	100	99.9	99.0	93.2	73.4	31.4	3.9	1.4	1.2	1.2	-
10-1-7		+6	100	100	100	99.9	99.9	99.4	98.0	89.1	60.1	19.3	3.4	0.5	0.1	0.0	0.0	-
10-1-8	2/8/2011	+12	100	99.8	99.7	99.7	99.6	99.4	97.8	96.8	73.2	34.3	13.9	8.0	6.9	6.65	6.61	-
10-2-1	1/27/2011	-29.9	100	100	100	100	100	100	100	100	100	99.8	99.1	96.0	88.3	72.3	40.6	6
10-2-2		-23.9	100	100	99.9	99.8	99.4	99.2	99.1	98.8	98.2	96.4	92.2	84.7	68.1	49.5	38.3	3
10-2-3		-17.9	100	99.8	99.6	99.5	99.4	99.2	98.9	98.4	97.2	95.1	91.7	77.6	33.4	16.8	10.0	1
10-2-4		-11.9	100	100	99.8	99.6	99.2	98.3	97.6	97.2	96.1	89.3	56.9	13.9	3.0	1.7	1.3	0
10-2-5	1/21/2011	-6	100	99.2	98.0	96.8	93.6	85.0	76.9	65.0	53.8	40.3	23.4	6.1	1.4	0.9	0.7	-
10-2-6		0	100	100	100	100	100	100	99.9	99.1	94.2	69.2	20.2	2.4	0.9	0.8	0.7	-
10-2-7		+6	100	99.5	99.0	98.6	97.8	93.6	83.5	63.4	41.1	16.9	4.4	0.9	0.3	0.2	0.2	-
10-2-8	2/8/2011	+12	100	99.95	99.94	99.94	99.92	99.86	99.4	99.1	77.1	33.3	12.2	6.3	4.9	4.7	4.7	-

w Water level.
es as specified in the Scope of Work.
ers.

TABLE 16

FINEST AND COARSEST RECEIVING BEACH GRADATIONS AND DREDGE AREA COMPOSITE GRADATIONS

Santa Ana River Marsh Investigation
Newport Beach, California

Location	Percent Passing														
	Gravel		Sand											Silt or Clay	
	Fine		Coarse		Medium				Fine						
	3/8" [1]	#4	#7	#10	#14	#18	#25	#35	#45	#60	#80	#120	#170	#200	#230
	9.50 mm [2]	4.75 mm	2.80 mm	2.00 mm	1.40 mm	1.00 mm	0.710 mm	0.500 mm	0.355 mm	0.250 mm	0.180 mm	0.125 mm	0.090 mm	0.075 mm	0.063 mm
Receiving Beach - Fine Limit	100	100	100	100	100	100	100	100	100	100	99	98	90	73	41
Receiving Beach - Coarse Limit	100	99	98	97	94	85	77	63	41	17	3	1	0	0	0
Area A Composite[3]	100	99	99	99	99	99	98	97	94	86	74	53	39	35	33
Area B Composite[3]	99	99	99	99	99	98	97	89	72	59	53	42	24	17	16
Area C Composite[3]	99	99	99	99	98	98	97	96	90	82	76	66	56	54	53
Area D Composite[3]	99	99	99	99	99	99	98	98	97	95	94	89	81	77	75
Area E Composite[3]	100	100	100	100	100	100	100	99	99	98	97	96	96	95	95
Area F Composite[3]	98	97	97	97	96	95	93	91	86	77	66	53	44	41	40
Area G Composite[3]	98	98	98	98	97	97	97	96	93	87	71	43	24	21	20

Notes:
1. U.S. Standard Sieve Sizes as specified in the Scope of Work.
2. Sieve opening in millimeters.
3. Composite gradations are weighted averages based on the depth interval of individual samples.

TABLE 17

SUMMARY OF SUSPENDED PARTICULATE-PHASE TOXICITY TEST RESULTS

Santa Ana River Marsh Investigation
Newport Beach, California

Samples	**Elutriate Concentration (Percent)**	***M. galloprovincialis*** **(Bivalve Embryos) Mean Percent Normal Alive** [1]	***A. bahia*** **(Mysids) Mean Percent Survival** [1]	***M. beryllina*** **(Inland Silverside Minnows) Mean Percent Survival** [1]
Lab Control [2]	0	91	96	98
Receiving Control	0	93	96	98
Salt Control	0	95	94	100
Area A	1	94	86	92
	10	96	86	96
	50	94	90	98
	100	91	95	98
Area C	1	98	90	90
	10	95	94	98
	50	96	88	92
	100	**0** [3]	90	90
Lab Control	0	91	98	100
Receiving Control	0	91	96	96
Salt Control	0	90	98	98
Area D	1	93	96	96
	10	96	92	98
	50	95	98	98
	100	**46**	92	96
Area E	1	97	98	98
	10	91	86	96
	50	92	96	94
	100	90	80	98
Lab Control	0	94	88	98
Receiving Control	0	90	90	96
Salt Control	0	97	94	96
Area F	1	95	92	98
	10	92	88	100
	50	88	96	100
	100	97	88	98

Notes:
1. Data are mean percent survival at 96 hours (mysid and fish tests) and mean percent normal development at 48 hours (bivalve test).
2. All Lab Controls reported here are for 30 ppt laboratory water.
3. Bold values are significantly reduced from the receiving water control.

TABLE 18

SUMMARY OF SOLID-PHASE TOXICITY TEST RESULTS

Santa Ana River Marsh Investigation
Newport Beach, California

Sediment Treatment	***Eohaustorius estuarius*** **(Marine Amphipod) Mean Survival (percent)**	***Neanthes arenaceodentata*** **(Marine Polychaete) Mean Survival (percent)**
Lab Control 1	100	100
Lab Control 2	95	NT [1]
Grain Size Control	84	100
LA 3 Reference	86	96
Area A	85	100
Area C	**70** [2]	100
Area D	**54**	96
Area E	**30**	96
Area F	**76**	100

Notes:
1. NT = not tested.
2. Bold values are significantly reduced from LA-3 reference sediment.

TABLE 19

MEAN PERCENT SURVIVAL IN BIOACCUMULATION TESTS

Santa Ana River Marsh Investigation
Newport Beach, California

Treatment	***Macoma nasuta*** **(Marine Clam)**	***Nereis virens*** **(Marine Polycheate)**
Laboratory Control	91	94
LA3 Reference	98	88
Area A	96	84
Area C	95	88
Area D	95	88
Area E	95	94
Area F	97	88

BIOACCUMULATION PHASE TOXICITY TEST
CONCENTRATIONS OF PERCENT LIPIDS, METALS, AND ORGANOTIN COMPOUNDS IN TISSUE SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

	FDA Action Level	Area A											
		Macoma nasuta (Marine Clam)							*Nereis virens* (Marine Polychaete)				
		17c	10c	19c	15c	33c	Mean	±1 SD	17w	10w	19w	15w	33w
	--	0.102J* [2]	0.141J*	0.078J*	0.316J*	0.200J*	0.2	0.1	0.500J*	0.652J*	0.522J*	0.378J*	0.458J*
[3]	86,000 [a]	3.05	2.00	3.38	3.25	2.23	2.8	0.6	2.63	2.47	1.97	2.16	1.86
	4000 [a]	0.148	0.118	0.205	0.130	<0.0500 [4]	0.1	0.1	0.053	<0.0500	<0.0500	<0.0500	<0.0500
	13,000 [a]	0.307J*	0.441J*	0.655J*	0.751J*	0.534J*	0.5	0.2	0.504	0.167	0.864	0.526	0.925
	-- [b]	1.51	1.18	2.38	2.77	2.26	2.0	0.7	1.18	1.06	1.05	1.02	0.835
	1700[a]	0.494	0.317	0.626	0.470	0.309	0.4	0.1	0.288	0.204	0.250	0.234	0.253
	1000 [c,d]	0.00765J-* [6]	<0.00479UJ* [7]	0.00720J-*	<0.00479UJ*	<0.00479UJ*	0.00417	NA	<0.00479UJ*	0.00910J-*	0.00820J-*	0.00500J-*	<0.00479UJ*
	80,000 [a]	0.569	0.534	0.810	0.975	0.649	0.7	0.2	0.381	0.225	0.557	0.466	0.573
	--	0.201	0.136	0.218	0.235	0.193	0.2	0.04	0.204	0.218	0.161	0.182	0.119
	--	0.0603	<0.0500	0.0714	<0.0500	<0.0500	0.04134	0.02271603	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
	--	16.3	11.8	20.7	16.7	11.6	15	3.8	9.42	22.7	21.0	29.6	7.65
[8]	--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
	--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
	--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
	--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2

BIOACCUMULATION PHASE TOXICITY TEST
CONCENTRATIONS OF PERCENT LIPIDS, METALS, AND ORGANOTIN COMPOUNDS IN TISSUE SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

FDA Action Level	Area C											
	Macoma nasuta (Marine Clam)							*Nereis virens* (Marine Polychaete)				
	1c	14c	9c	5c	21c	Mean	±1 SD	1w	14w	9w	5w	21w
--	0.373J*	0.224J*	0.333J*	0.216J*	0.150J*	0.3	0.1	0.508J*	0.418J*	0.590J*	0.490J*	0.492J*
86,000 [a]	1.63	1.89	2.21	1.96	1.93	1.9	0.2	1.84	1.50	1.83	1.67	2.21
4000 [a]	<0.0500	<0.0500	0.0574	<0.0500	<0.0500	0.031	NA	<0.0500	<0.0500	<0.0500	<0.0500	0.0502
13,000 [a]	0.268J*	0.500J*	0.660J*	0.451J*	0.454J*	0.5	0.1	0.336	0.112	0.115	0.297	0.629
-- [b]	2.19	1.82	2.63	2.12	1.91	2.1	0.3	0.743	0.633	0.858	0.701	0.818
1700[a]	0.230	0.364	0.483	0.410	0.298	0.4	0.1	0.276	0.183	0.285	0.230	0.243
1000 [c,d]	<0.00479UJ*	<0.00479UJ*	<0.00479UJ*	<0.00479UJ*	<0.00479UJ*	0.002	NA	<0.00479UJ*	<0.00479UJ*	0.00545J-*	<0.00479UJ*	<0.00479UJ*
80,000 [a]	0.482	0.613	0.799	0.628	0.616	0.6	0.1	0.331	0.172	0.192	0.280	0.420
--	0.166	0.171	0.224	0.169	0.174	0.2	0.02	0.158	0.104	0.136	0.123	0.157
--	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.025	NA	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
--	10.4	11.3	16.4	11.8	11.8	12	2.3	8.94	8.24	18.60	6.90	7.89
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	0.6	NA	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*

BIOACCUMULATION PHASE TOXICITY TEST
CONCENTRATIONS OF PERCENT LIPIDS, METALS, AND ORGANOTIN COMPOUNDS IN TISSUE SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

FDA Action Level	Area F											
	Macoma nasuta (Marine Clam)							*Nereis virens* (Marine Polychaete)				
	3c	12c	16c	4c	6c	Mean	±1 SD	3w	12w	16w	4w	6w
--	0.135J*	0.172J*	0.169J*	0.190J*	0.376J*	0.2	0.1	0.558J*	0.754J*	0.776	0.734J*	0.720J*
86,000 [a]	2.70	2.90	2.09	2.25	2.67	2.5	0.3	2.49	1.98	2.32	1.09	1.07
4000 [a]	0.132	0.178	0.0703	0.0693	0.160	0.1	0.1	<0.0500	<0.0500	0.0504	<0.0500	<0.0500
13,000 [a]	0.964J*	0.556J*	0.400J*	0.486J*	0.419	0.6	0.2	0.792	0.610	0.436	0.111	0.104
-- [b]	1.570	1.930	1.400	2.110	1.660	1.7	0.3	0.819	0.823	0.878	0.452	0.422
1700[a]	0.477	0.661	0.328	0.407	0.549	0.5	0.1	0.226	0.197	0.217	0.128	0.132
1000 [c,d]	0.00480J-*	0.00795J-*	<0.00479UJ*	<0.00479UJ*	<0.00479UJ*	0.0038	0.00264244	0.00482J-*	0.00725J-*	0.00550J-*	<0.00479UJ*	<0.00479UJ*
80,000 [a]	0.751	0.771	0.508	0.651	0.653	0.7	0.1	0.506	0.412	0.388	0.139	0.137
--	0.134	0.196	0.162	0.179	0.182	0.2	0.02	0.117	0.133	0.175	0.0815	0.0634
--	<0.0500	<0.0500	<0.0500	<0.0500	0.0562	0.0312	NA	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
--	11.3	21.2	11.4	14.7	15.7	15	4.0	16.4	35.6	9.43	22.2	4.10
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	0.6	NA	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*	<1.2UJ*

BIOACCUMULATION PHASE TOXICITY TEST
CONCENTRATIONS OF PERCENT LIPIDS, METALS, AND ORGANOTIN COMPOUNDS IN TISSUE SAMPLES

Santa Ana River Marsh Investigation
Newport Beach, California

FDA Action Level	LA-3 Reference Site [9]											
	Macoma nasuta (Marine Clam)							*Nereis virens* (Marine Polychaete)				
	2c	7c	25c	18c	11c	Mean	±1 SD	2w	7w	25w	18w	11w
--	0.200J*	0.181J*	0.201J*	0.240J*	0.141J*	0.2	0.04	0.400J*	0.418J*	0.775J*	0.797J*	0.461J*
86,000 [a]	1.57	2.21	3.43	3.50	2.54	2.7	0.8	1.44	2.26	2.47	2.20	2.27
4000 [a]	<0.0500	0.0701	0.194	0.156	0.147	0.1	0.1	<0.0500	0.0575	0.0619	<0.0500	0.0534
13,000 [a]	0.373J*	0.466J*	0.611J*	0.525J*	0.531J*	0.5	0.1	0.419	0.241	0.615	0.153	0.163
-- [b]	2.20	1.47	2.11	1.99	1.32	1.8	0.4	0.924	1.12	1.16	1.03	1.02
1700[a]	0.206	0.300	0.589	0.559	0.400	0.4	0.2	0.170	0.383	0.312	0.226	0.240
1000 [c,d]	<0.00479UJ*	0.00680J-*	0.00825J-*	0.00860J-*	0.00525J-*	0.0062	0.00268621	0.00755J-*	0.00660J-*	0.00545J-*	0.00675J-*	0.00755J-*
80,000 [a]	0.484	0.609	0.895	0.770	0.643	0.7	0.2	0.309	0.221	0.334	0.239	0.234
--	0.146	0.182	0.251	0.202	0.163	0.2	0.04	0.143	0.220	0.214	0.178	0.192
--	<0.0500	<0.0500	0.0910	0.0920	<0.0500	0.1	0.04	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
--	8.35	11.8	17.8	18.1	13.9	14	4.1	19.9	20.3	39.2	9.45	9.04
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2
--	<1.2	<1.2	<1.2	<1.2	<1.2	0.6	NA	<1.2	<1.2	<1.2	<1.2	<1.2

fied as estimated as a result of AMEC's data validation process.
kilogram wet weight.
bove the laboratory reporting limit indicated.
s were recorded as less then the reporting limit, therefore, the standard deviation = 0.
alified as estimated, but the result may be biased low as a result of AMEC's data validation process.
not detected at a level greater than or equal to the reporting limit. The reporting limit is approximate and may be imprecise as a result of AMEC's data validation process.
r kilogram wet weight.
cted from the LA-3 Ocean Dredged Material Disposal reference site.

nificantly greater values than the reference sample.
ninistration Action Levels for Molluscan Shellfish in ppm (wet limits).
Administration Action Levels not available.
ninistration Action Levels for All Fish in ppm (wet limits).
ninistration Action Levels for Methyl Mercury in ppm (wet limits).

Analyte	FDA Action Level	17c	10c	19c	15c	33c	Mean [3]	±1 SD [3]	17w	10w	19w	15w	33w	Mean	±1
ors															
clor 1016	1000 [a]	<10 [4]	<10	<10	<10	<10	5.0	NA [5]	<20	<20	<20	<20	<20	10.0	N
clor 1221	1000 [a]	<25	<25	<25	<25	<25	12.5	NA	<50	<50	<50	<50	<50	25.0	N
clor 1232	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	N
clor 1242	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	N
clor 1248	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	32J* [6]	32	35	<20	**23.8**	1
clor 1254	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	N
clor 1260	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	N
clor 1262	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	N
al PCB Aroclors [7]	-- [b]	<10	<10	<10	<10	<10	ND [8]	NA	<20	32J*	32	35	<20	33.0	1
eners															
3 8	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 18	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 28	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	1.6J [9]	<2.0	1.6J	<2.0	**1.2**	0
3 31	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 33	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 37	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 44	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	2.3	5.2	4.1	4.3	1.9J	**3.6**	1
3 49	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.9	2.4	2.4	<2.0	**1.9**	0
3 52	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	2.5	5.1	4.2	4.2	<2.0	**3.4**	1
3 56	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.2	<2.0	1.8J	<2.0	**1.4**	0
3 60	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	1.5J	<2.0	<2.0	<2.0	**1.1**	0
3 66	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	2.0	4.5	3.7	3.5	1.7J	**3.1**	1
3 70	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.1	<2.0	1.6J	<2.0	**1.3**	0
3 74	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.0	1.5J	1.7J	<2.0	**1.4**	0
3 77	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 81	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 87	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 95	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	1.9J	1.6J	1.5J	<2.0	**1.4**	0
3 97	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 99	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 101	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.6	2.2	2.2	<2.0	**1.8**	0
3 105	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	1.5J	<2.0	<2.0	<2.0	**1.1**	0
3 110	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.3	1.9J	1.9J	<2.0	**1.6**	0
3 114	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 118	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	2.0J	1.6J	1.5J	<2.0	**1.4**	0
3 119	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 123	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 126	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 128	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 132	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 138/158	--	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA	<4.0	<4.0	<4.0	<4.0	<4.0	2.0	N
3 141	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 149	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 151	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 153	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	1.4J	2.0	1.8J	1.4J	<2.0	**1.5**	0
3 156	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 157	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 167	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 168	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 169	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 170	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 174	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 177	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 180	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 183	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 184	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 187	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 189	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 194	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 195	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 201	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 203	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 206	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 209	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
al PCB Congeners [7,10]	--	<1.0	<1.0	<1.0	<1.0	<1.0	ND	NA	8.3J*	39J*	25J*	30J*	3.6J*	21.2	1

Analyte	Level	1c	14c	9c	5c	21c	Mean	±1 SD	1w	14w	9w	5w	21w	Mean	±1
ors															
clor 1016	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
clor 1221	1000 [a]	<25	<25	<25	<25	<25	12.5	NA	<50	<25	<50	<25	<25	17.5	N
clor 1232	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
clor 1242	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
clor 1248	1000[a]	<10	<10	<10	30J*	14J*	11.8	10.9	44J*	<10	<20	<10	28J*	**18.4**	1
clor 1254	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
clor 1260	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
clor 1262	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	N
al PCB Aroclors	-- [b]	<10	<10	<10	30J*	14J*	22	11	44J*	<10	<20	<10	28J*	36.0	
eners															
B 8	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 18	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 28	--	<1.0	<1.0	<1.0	1.0	<1.0	0.6	0.2	1.3J	<1.0	<2.0	<1.0	0.85J	**0.8**	0
B 31	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 33	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 37	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 44	--	<1.0	<1.0	<1.0	3.1	1.1	1.1	1.1	3.8	<1.0	2.4	<1.0	2.8	2.0	1
B 49	--	<1.0	<1.0	<1.0	1.5	<1.0	0.7	0.4	2.1	<1.0	<2.0	<1.0	1.7	**1.2**	0
B 52	--	<1.0	<1.0	<1.0	2.8	1.1	1.1	1.0	3.8	<1.0	2.5	<1.0	2.8	**2.0**	1
B 56	--	<1.0	<1.0	<1.0	1.4	<1.0	0.7	0.4	1.7J	<1.0	<2.0	<1.0	1.3	1.0	0
B 60	--	<1.0	<1.0	<1.0	0.90J	<1.0	0.6	0.2	<2.0	<1.0	<2.0	<1.0	0.89J	**0.8**	0
B 66	--	<1.0	<1.0	<1.0	2.6	0.99J	1.0	0.9	3.3	<1.0	2.2	<1.0	2.5	**1.8**	1
B 70	--	<1.0	<1.0	<1.0	1.2	<1.0	0.6	0.3	<2.0	<1.0	<2.0	<1.0	1.1	**0.8**	0
B 74	--	<1.0	<1.0	<1.0	1.2	<1.0	0.6	0.3	1.6J	<1.0	<2.0	<1.0	1.1	**0.9**	0
B 77	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 81	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 87	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 95	--	<1.0	<1.0	<1.0	1.1	<1.0	0.6	0.3	1.6J	<1.0	<2.0	<1.0	1.2	**1.0**	0
B 97	--	<1.0	<1.0	<1.0	0.69J	<1.0	0.5	0.1	<2.0	<1.0	<2.0	<1.0	0.68J	0.7	0
B 99	--	<1.0	<1.0	<1.0	0.76J	<1.0	0.6	0.1	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 101	--	<1.0	<1.0	<1.0	1.6	<1.0	0.7	0.5	2.0	<1.0	<2.0	<1.0	1.6	**1.1**	0
B 105	--	<1.0	<1.0	<1.0	0.79J	<1.0	0.6	0.1	<2.0	<1.0	<2.0	<1.0	0.79J	**0.8**	0
B 110	--	<1.0	<1.0	<1.0	1.4	<1.0	0.7	0.4	1.7J	<1.0	<2.0	<1.0	1.3	1.0	0
B 114	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 118	--	<1.0	<1.0	<1.0	1.3	<1.0	0.7	0.4	<2.0	<1.0	<2.0	<1.0	1.1	**0.8**	0
B 119	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 123	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 126	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 128	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 132	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 138/158	--	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA	<4.0	<2.0	<4.0	<2.0	<2.0	1.4	N
B 141	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 149	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 151	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 153	--	<1.0	<1.0	<1.0	0.64J	<1.0	0.5	0.1	1.6J	0.75J	<2.0	0.95J	1.0J	**1.1**	0
B 156	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 157	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 167	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 168	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 169	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 170	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 174	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 177	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 180	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 183	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 184	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 187	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 189	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 194	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 195	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 201	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 203	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 206	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
B 209	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	N
al PCB Congeners	--	<1.0	<1.0	<1.0	24	3.2	14	15	24J*	0.75J, J*	7.1J*	0.95J, J*	23J*	11	

Analyte	Level	3c	12c	16c	4c	6c	Mean	±1 SD	3w	12w	16w	4w	6w	Mean	±1
ors															
clor 1016	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
clor 1221	1000 [a]	<25	<25	<25	<25	<25	12.5	NA	<50	<50	<50	<25	<25	20.0	N
clor 1232	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
clor 1242	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
clor 1248	1000[a]	<10	22J*	37J*	<10	<10	14.8	14.4	35J*	<20	<20	<10	<10	13.0	N
clor 1254	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
clor 1260	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
clor 1262	1000 [a]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	N
al PCB Aroclors	-- [b]	<10	22J*	37J*	<10	<10	30	11	35J*	<20	<20	<10	<10	35	N
eners															
3 8	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 18	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 28	--	<1.0	0.77J	1.3	<1.0	<1.0	0.7	0.3	1.6J	<2.0	<2.0	<1.0	<1.0	**0.9**	0
3 31	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 33	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 37	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 44	--	<1.0	2.7	4.7	<1.0	<1.0	1.8	1.9	5.1	<2.0	<2.0	<1.0	<1.0	1.6	2
3 49	--	<1.0	1.6	2.2	<1.0	<1.0	1.1	0.8	2.8	<2.0	<2.0	<1.0	<1.0	1.2	1
3 52	--	<1.0	2.3	4.0	<1.0	<1.0	1.0	0.9	4.5	<2.0	<2.0	<1.0	<1.0	1.5	1
3 56	--	<1.0	1.1	2.0	<1.0	<1.0	0.9	0.7	2.2	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 60	--	<1.0	0.76J	1.3	<1.0	<1.0	0.7	0.3	1.6J	<2.0	<2.0	<1.0	<1.0	**0.9**	0
3 66	--	<1.0	2.1	3.7	<1.0	<1.0	1.5	1.4	4.2	<2.0	<2.0	<1.0	<1.0	1.4	1
3 70	--	<1.0	0.96J	1.6	<1.0	<1.0	0.8	0.5	1.8J	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 74	--	<1.0	0.94J	1.7	<1.0	<1.0	0.8	0.5	1.9J	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 77	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 81	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 87	--	<1.0	<1.0	0.82J	<1.0	<1.0	0.6	0.1	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 95	--	<1.0	0.89J	1.4	<1.0	<1.0	0.8	0.4	1.8J	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 97	--	<1.0	<1.0	0.94J	<1.0	<1.0	0.6	0.2	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 99	--	<1.0	<1.0	0.93J	<1.0	<1.0	0.6	0.2	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 101	--	<1.0	1.2	2.0	<1.0	<1.0	0.9	0.7	2.5	<2.0	<2.0	<1.0	<1.0	1.1	0
3 105	--	<1.0	0.72J	1.0	<1.0	<1.0	0.6	0.2	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 110	--	<1.0	1.1	1.8	<1.0	<1.0	0.9	0.6	2.1	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 114	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 118	--	<1.0	1.0J	1.5	<1.0	<1.0	0.8	0.4	1.8J	<2.0	<2.0	<1.0	<1.0	**1.0**	0
3 119	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 123	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 126	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 128	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 132	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 138/158	--	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA	<4.0	<4.0	<4.0	<2.0	<2.0	**1.6**	0
3 141	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 149	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 151	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 153	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	1.5J	<2.0	<2.0	<1.0	<1.0	0.9	0
3 156	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 157	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 167	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 168	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 169	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 170	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 174	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 177	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 180	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 183	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 184	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 187	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 189	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 194	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 195	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 201	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 203	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 206	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
3 209	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	N
al PCB Congeners	--	<1.0	18	33	<1.0	<1.0	26	11	35J*	<2.0 UJ* [11]	<2.0	<1.0UJ*	<1.0UJ*	35	N

Analyte	Level	2c	7c	25c	18c	11c	Mean	±1 SD	2w	7w	25w	18w	11w	Mean	±1
ors															
clor 1016	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1221	1000[a]	<25	<25	<25	<25	<25	12.5	NA	<25	<25	<25	<25	<25	12.5	N
clor 1232	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1242	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1248	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1254	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1260	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
clor 1262	1000[a]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	N
al PCB Aroclors	--[b]	<10	<10	<10	<10	<10	ND	NA	<10	<10	<10	<10	<10	ND	N
eners															
3 8	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 18	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 28	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 31	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 33	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 37	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 44	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 49	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 52	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 56	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 60	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 66	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 70	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 74	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 77	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 81	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 87	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 95	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 97	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 99	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 101	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 105	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 110	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 114	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 118	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 119	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 123	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 126	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 128	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 132	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 138/158	--	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	N
3 141	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 149	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 151	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 153	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	0.87J	<1.0	<1.0	0.96J	0.81J	0.7	0
3 156	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 157	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 167	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 168	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 169	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 170	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 174	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 177	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 180	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 183	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 184	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 187	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 189	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 194	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 195	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 201	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 203	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 206	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
3 209	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	N
al PCB Congeners	--	<1.0	<1.0	<1.0	<1.0	<1.0	ND	NA	0.87J, J*	<1.0UJ*	<1.0UJ*	0.96J, J*	0.81J, J*	0.88	0

s:
CB = polychlorinated biphenyl.
/kg = micrograms per kilogram wet weight.
ean and standard deviation (SD) for individual compounds among the 5 replicates were calculated using 1/2 of the method detection limit if result was < the method detection
nit, and the absolute value of results marked with "J" flags.
= not detected at or above the laboratory reporting limit indicated.
A = all reported values were recorded as less then the reporting limit, therefore, the standard deviation = 0.
= The analyte is qualified as estimated as a result of AMEC's data validation process.
alculated mean and SD for the totals include only detected values.
D = Not detected; numbers reported as less than the reporting limit are considered 0 and therefore calculated means are reported as ND if the summation of the values = 0.

Analyte	Level						Mean	2 SD						Mean	2 SD
Hs [3]															
1-Methylnaphthalene	-- [a]	<10 [4]	<10	<10	<10	<10	5.0	NA [5]	11J [6]	18J	14J	18J	8.3J	**13.9**	4.3
2-Methylnaphthalene	--	<10	<10	<10	<10	<10	5.0	NA	20J	33	28	32	16J	**25.8**	7.5
Acenaphthene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
Acenaphthylene	--	<10	<10	<10	<10	<10	5.0	NA	5.7J	14J	12J	14J	4.4J	**10.0**	4.6
Anthracene	--	<10	<10	<10	<10	<10	5.0	NA	9.9J	22	18J	17J	5.8J	**14.5**	6.5
Benz[a]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	12J	23	19J	19J	7.4J	**16.1**	6.3
Benzo[a]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	11J	22	19J	18J	6.0J	**15.2**	6.5
Benzo[b]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	6.7J	11J	10J	8.5J	<20	**9.2**	1.7
Benzo[g,h,i]perylene	--	<10	<10	<10	<10	<10	5.0	NA	<20	8.7J	7.3J	5.9J	<20	**8.4**	1.8
Benzo[k]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	6.3J	14J	11J	11J	<20	**10.5**	2.8
Chrysene	--	<10	<10	<10	<10	<10	5.0	NA	11J	24	20J	18J	6.1J	**15.8**	7.2
Dibenz[a,h]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
Fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	20	44	39	35	13J	**30.2**	13
Fluorene	--	<10	<10	<10	<10	<10	5.0	NA	15J	29	26	25	9.3J	**20.9**	8.3
Indeno[1,2,3-c,d]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	5.2J	8.0J	8.0J	6.6J	<20	**7.6**	1.8
Naphthalene	--	<10	11	12	14	11	11	3.4	26	47	38	47	22	**36.0**	12
Phenanthrene	--	<10	<10	<10	<10	<10	5.0	NA	51	110	96	89	33	**75.8**	32
Pyrene	--	<10	<10	<10	<10	<10	5.0	NA	32	72	63	55	19J	**48.2**	22
TPAH [7, 8]	--	<10UJ* [9]	11J*	12J*	14J*	11J*	12.0	1.4	240	500	430	420	150	**348**	147
enols															
2,3,4,6-Tetrachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2,4,5-Trichlorophenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
2,4,6-Trichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2,4-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2,6-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2,4-Dimethylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2,4-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2-Chlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2-Methyl-4,6-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
2-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
2-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
3+4-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
4-Chloro-3-Methylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
4-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
Pentachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
Phenol	--	<15UJ*	<15UJ*	<15UJ*	<15UJ*	<15UJ*	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
Total Phenol		<15UJ*	<15UJ*	<15UJ*	<15UJ*	<15UJ*	7.5	NA	<30	<30	<30	<30	<30	15.0	NA
thalates															
Bis (2-Ethylhexyl) Phthalate	--	430	410	280	310	390	364	65	150	140	170	220	20U* [10]	**149**	56
Butylbenzyl Phthalate	--	10	11	<10	12	10	9.6	2.7	20J	20	22	36	11J	**22**	9.0
Diethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	20U*	20U*	20U*	20U*	20U*	**16**	3.6
Dimethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	5.6J	6.8J	5.9J	17J	<20	**9.1**	4.8
Di-n-butyl Phthalate	--	12J*	<10UJ*	12J*	18J*	<10UJ*	10	5.5	35	32	38	26	20U*	29	8.7
Di-n-octyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	10.0	NA
sticides															
2,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
2,4'-DDE	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
2,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
4,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
4,4'-DDE	5000 [b]	<1.0	<1.0	<1.0	<1.0	1.6J*	0.7	0.5	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
4,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Total DDTs [7]	--	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	1.6J*	1.6	NA	<2.0	<2.0	<2.0	<2.0	<2.0	ND [11]	NA
Aldrin	300 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Alpha-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Beta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Delta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Gamma-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Chlordane	300 [b]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<20	<20	0.0	NA
Alpha-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Gamma-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
cis-Nonachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Dieldrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Endosulfan Sulfate	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Endosulfan-II	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Endosulfan-I	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Endrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Endrin Aldehyde	--	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	0.5	NA	<2.0UJ*	<2.0UJ*	<2.0UJ*	<2.0UJ*	<2.0UJ*	1.0	NA
Endrin Ketone	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA
Heptachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<2.0	<2.0	1.0	NA

Hs															
1-Methylnaphthalene	--	<10	<10	<10	12	<10	6.4	3.1	16J	<10	14J	<10	14	**11**	5.4
2-Methylnaphthalene	--	<10	<10	<10	21	13	9.8	7.2	29	<10	24	<10	24	**17**	12
Acenaphthene	--	<10	<10	<10	<10	<10	5.0	NA	4.6J	<10	4.3J	<10	<10	4.8	0.3
Acenaphthylene	--	<10	<10	<10	13	<10	6.6	3.6	12J	<10	9.6J	<10	14	**9.1**	4.1
Anthracene	--	<10	<10	<10	14	<10	6.8	4.0	14J	<10	10J	<10	15	**9.8**	4.8
Benz[a]anthracene	--	<10	<10	<10	16	<10	7.2	4.9	15J	<10	12J	<10	15	**10**	5.1
Benzo[a]pyrene	--	<10	<10	<10	14	<10	6.8	4.0	13J	<10	9.4J	<10	15	**9.5**	4.6
Benzo[b]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	7.5J	<10	5.9J	<10	<10	5.7	1.1
Benzo[g,h,i]perylene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
Benzo[k]fluoranthene	--	<10	<10	<10	11	<10	6.2	2.7	7.9J	<10	7.7J	<10	10	**7.1**	2.1
Chrysene	--	<10	<10	<10	16	<10	7.2	4.9	15J	<10	12J	<10	15	**10**	5.1
Dibenz[a,h]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
Fluoranthene	--	<10	<10	<10	33	<10	11	13	29	<10	24	<10	33	**19**	13
Fluorene	--	<10	<10	<10	22	<10	8.4	7.6	22	<10	20J	<10	24	**15**	9.4
Indeno[1,2,3-c,d]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
Naphthalene	--	<10	13	<10	25	19	13	8.8	43	<10	36	<10	31	**24**	18
Phenanthrene	--	<10	<10	<10	77	23	23	31	74	<10	59	<10	78	**44**	36
Pyrene	--	<10	<10	<10	54	15	17	21	44	<10	37	<10	44	**27**	20
TPAH	--	<10UJ*	13J*	<10UJ*	330J*	70J*	137	168	350	<10	290	<10	332	**324**	31
enols															
2,3,4,6-Tetrachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2,4,5-Trichlorophenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
2,4,6-Trichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2,4-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2,6-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2,4-Dimethylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2,4-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2-Chlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2-Methyl-4,6-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
2-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
2-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
3+4-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
4-Chloro-3-Methylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
4-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
Pentachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<15	<30	<15	<15	11	NA
Phenol	--	15J*	<15UJ*	<15UJ*	<15UJ*	<15UJ*	15.0	NA	<30	<15	<30	<15	<15	11	NA
Total Phenol		15J*	<15UJ*	<15UJ*	<15UJ*	<15UJ*	15.0	NA	<30	<15	<30	<15	<15	11	NA
thalates															
Bis (2-Ethylhexyl) Phthalate	--	480	910	1000	640	410	**688**	260	20U*	50	130	110	60	83	35
Butylbenzyl Phthalate	--	<10	<10	13	<10	11	7.8	3.9	20U*	<10	29	21	14	17	8.8
Diethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	20U*	<10	20U*	<10	<10	9.0	5.7
Dimethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	11J	<10	8.1J	<10	<10	6.8	2.7
Di-n-butyl Phthalate	--	<10UJ*	10J*	11J*	<10UJ*	<10UJ*	7.2	3.0	24	<10	21	15	14	16	7.3
Di-n-octyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
sticides															
2,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
2,4'-DDE	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
2,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
4,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
4,4'-DDE	5000 [b]	1.5J*	2.0J*	2.2J*	2.1J*	1.0J*	1.8	0.5	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
4,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Total DDTs	--	1.5J*	2.0J*	2.2J*	2.1J*	1.0J*	1.8	0.5	<2.0	<1.0	<2.0	<1.0	<1.0	ND	NA
Aldrin	300 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Alpha-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Beta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Delta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Gamma-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Chlordane	300 [b]	<10	<10	<10	<10	<10	5.0	NA	<20	<10	<20	<10	<10	7.0	NA
Alpha-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Gamma-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
cis-Nonachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Dieldrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Endosulfan Sulfate	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Endosulfan-II	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Endosulfan-I	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Endrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	1.6	<1.0	0.9	0.5
Endrin Aldehyde	--	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	0.5	NA	<2.0UJ*	<1.0UJ*	<2.0UJ*	<1.0UJ*	<1.0UJ*	0.7	NA
Endrin Ketone	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA
Heptachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<1.0	<2.0	<1.0	<1.0	0.7	NA

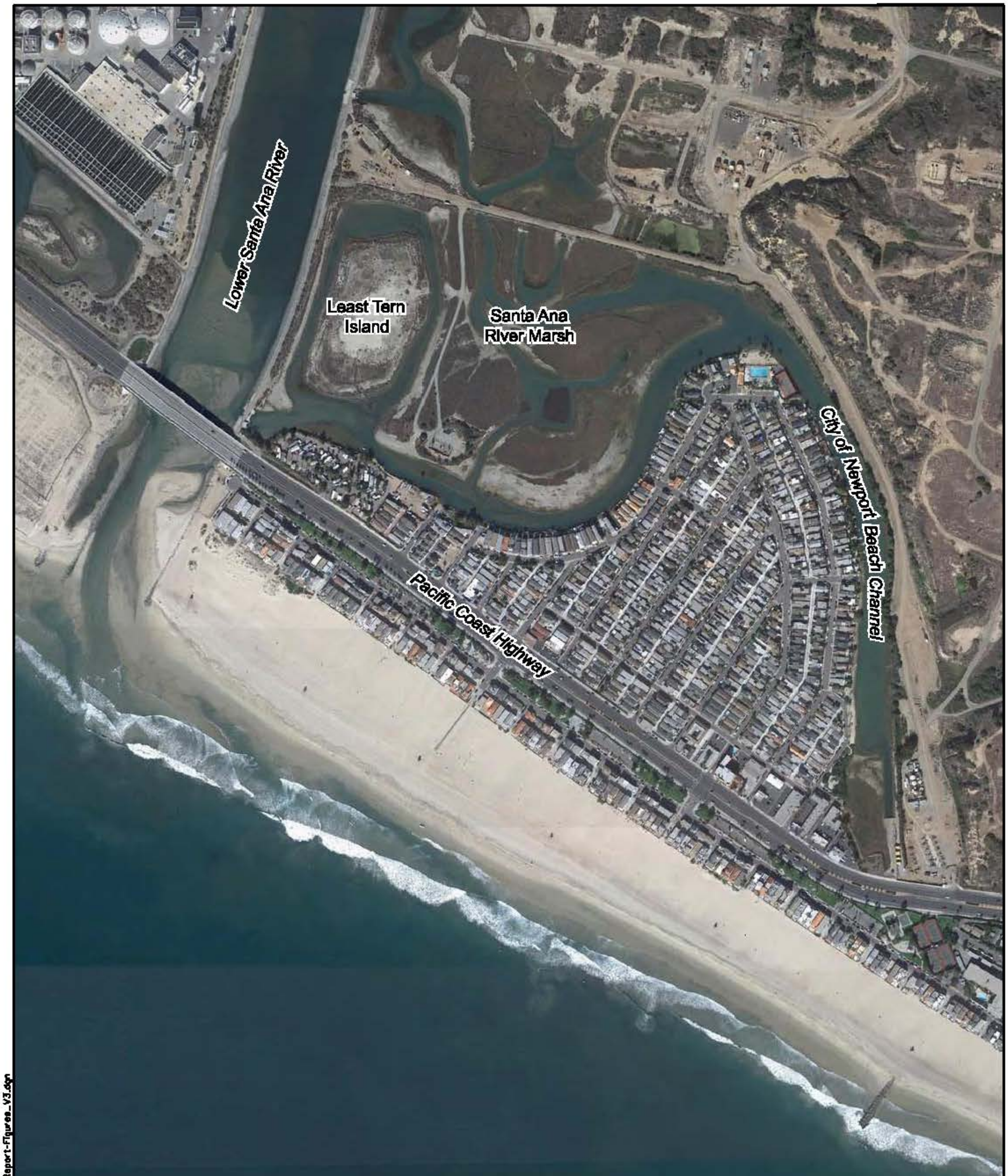
Hs																
1-Methylnaphthalene	--	<10	13	18	<10	<10	9.2	6.0	24	5.7J	3.9J	<10	<10	8.7	8.6
2-Methylnaphthalene	--	<10	21	32	<10	<10	14	12	41	11J	7.8J	<10	<10	**14**	15.3
Acenaphthene	--	<10	<10	<10	<10	<10	5.0	NA	6.7J	<20	<20	<10	<10	**7.3**	2.5
Acenaphthylene	--	<10	<10	19	<10	<10	7.8	6.3	20J	<20	<20	<10	<10	**10**	6.1
Anthracene	--	<10	<10	19	<10	<10	7.8	6.3	22	<20	<20	<10	<10	**10**	6.9
Benz[a]anthracene	--	<10	11	20	<10	<10	9.2	6.6	22	<20	<20	<10	<10	**10**	6.9
Benzo[a]pyrene	--	<10	11	21	<10	<10	9.4	7.0	20	<20	<20	<10	<10	**10**	6.1
Benzo[b]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	10J	<20	<20	<10	<10	**8.0**	2.7
Benzo[g,h,i]perylene	--	<10	<10	<10	<10	<10	5.0	NA	7.3J	<20	<20	<10	<10	**7.5**	2.5
Benzo[k]fluoranthene	--	<10	<10	14	<10	<10	6.8	4.0	15J	<20	<20	<10	<10	**9.0**	4.2
Chrysene	--	<10	11	21	<10	<10	9.4	7.0	22	<20	<20	<10	<10	**10**	6.9
Dibenz[a,h]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
Fluoranthene	--	<10	22	42	<10	<10	16	16	47	<20	<20	<10	<10	15	18
Fluorene	--	<10	17	29	<10	<10	12	11	36	5.0J	8.1J	<10	<10	12	14
Indeno[1,2,3-c,d]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	8.6J	<20	<20	<10	<10	**7.7**	2.5
Naphthalene	--	<10	29	42	<10	<10	17	17	58	14J	11J	<10	<10	19	22
Phenanthrene	--	<10	55	99	<10	<10	34	42	120	<20	4.4J	<10	<10	29	51
Pyrene	--	<10	38	69	<10	<10	24	29	74	<20	<20	<10	<10	21	30
TPAH	--	<10UJ*	230J*	450J*	<10UJ*	<10	337	153	550	36	35	<10	<10	**207**	297
enols															
2,3,4,6-Tetrachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2,4,5-Trichlorophenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
2,4,6-Trichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2,4-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2,6-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2,4-Dimethylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2,4-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2-Chlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2-Methyl-4,6-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
2-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
2-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
3+4-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
4-Chloro-3-Methylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
4-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
Pentachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
Phenol	--	<15UJ*	<15UJ*	<15UJ*	<15UJ*	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
Total Phenol		<15UJ*	<15UJ*	<15UJ*	<15UJ*	<15	7.5	NA	<30	<30	<30	<15	<15	12	NA
thalates															
Bis (2-Ethylhexyl) Phthalate	--	350	300	290	690	520	430	172	140	150	140	100	79	**122**	30.7
Butylbenzyl Phthalate	--	20	14	14	14	<10	13	5.4	29	45	42	20	21	**31.4**	11.6
Diethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	20U*	20U*	20U*	<10	<10	12.0	6.6
Dimethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	7.2J	8.4J	7.6J	<10	<10	**6.6**	1.6
Di-n-butyl Phthalate	--	11J*	<10UJ*	11J*	<10UJ*	<10	7.4	3.3	27	26	28	15	15	22.2	6.6
Di-n-octyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
sticides															
2,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
2,4'-DDE	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
2,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
4,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
4,4'-DDE	5000 [b]	<1.0	1.2J*	1.1J*	<1.0	<1.0	0.8	0.6	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
4,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Total DDTs	--	<1.0UJ*	1.2J*	1.1J*	<1.0UJ*	<1.0	1.2	0.1	<2.0	<2.0	<2.0	<1.0	<1.0	ND	NA
Aldrin	300 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Alpha-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Beta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Delta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Gamma-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Chlordane	300 [b]	<10	<10	<10	<10	<10	5.0	NA	<20	<20	<20	<10	<10	8.0	NA
Alpha-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	1.9	<1.0	**1.1**	0.5
Gamma-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
cis-Nonachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Dieldrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Endosulfan Sulfate	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Endosulfan-II	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Endosulfan-I	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Endrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Endrin Aldehyde	--	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	0.5	NA	<2.0UJ*	<2.0UJ*	<2.0UJ*	<1.0UJ*	<1.0UJ*	0.8	NA
Endrin Ketone	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA
Heptachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<2.0	<2.0	<2.0	<1.0	<1.0	0.8	NA

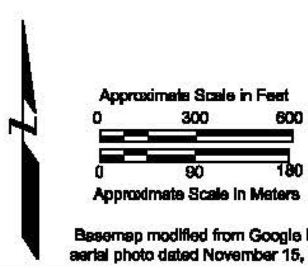
Analyte	Level						Mean							Mean	
AHs															
1-Methylnaphthalene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
2-Methylnaphthalene	--	11	<10	11	<10	<10	7.4	3.3	<10	<10	<10	<10	<10	5.0	NA
Acenaphthene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Acenaphthylene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Benz[a]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Benzo[a]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Benzo[b]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Benzo[g,h,i]perylene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Benzo[k]fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Chrysene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Dibenz[a,h]anthracene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Fluoranthene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Fluorene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Indeno[1,2,3-c,d]pyrene	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Naphthalene	--	12	<10	13	11	<10	9.2	3.9	<10	<10	11	<10	<10	6.2	2.7
Phenanthrene	--	11	<10	20	<10	<10	9.2	6.6	<10	<10	<10	<10	<10	5.0	NA
Pyrene	--	<10	<10	11	<10	<10	6.2	2.7	<10	<10	<10	<10	<10	5.0	NA
TPAH	--	34J*	<10UJ*	54J*	11J*	<10UJ*	33	22	<10	<10	11	<10	<10	11	NA
enols															
2,3,4,6-Tetrachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2,4,5-Trichlorophenol	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
2,4,6-Trichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2,4-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2,6-Dichlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2,4-Dimethylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2,4-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2-Chlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2-Methyl-4,6-Dinitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
2-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
2-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
3+4-Methylphenol	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
4-Chloro-3-Methylphenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
4-Nitrophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
Pentachlorophenol	--	<15	<15	<15	<15	<15	7.5	NA	<15	<15	<15	<15	<15	7.5	NA
Phenol	--	70J*	31J*	27J*	<15UJ*	<15UJ*	43	24	21	34	<15	<15	<15	16	12
Total Phenol		70J*	31J*	27J*	<15UJ*	<15UJ*	43	24	21	34	<15	<15	<15	28	9
thalates															
Bis (2-Ethylhexyl) Phthalate	--	400	400	130	340	280	310	112	50	120	77	84	75	81	25
Butylbenzyl Phthalate	--	20	13	14	36	15	20	9.6	14	13	12	<10	15	12	4.0
Diethyl Phthalate	--	11	13	<10	<10	11	9.0	3.7	<10	<10	<10	<10	10	6.0	2.2
Dimethyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Di-n-butyl Phthalate	--	30J*	32J*	31J*	10J*	15J*	24	10	36	32	20	14	22	25	9.0
Di-n-octyl Phthalate	--	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
sticides															
2,4'-DDD	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
2,4'-DDE	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
2,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	1.1	0.6	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
4,4'-DDD	--	<1.0	<1.0	<1.0	1.1J*	<1.0	0.6	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
4,4'-DDE	5000 [b]	3.7J*	2.9J*	1.3J*	2.8J*	1.5J*	2.4	1.0	<1.0	1.3J*	<1.0	<1.0	<1.0	0.7	0.4
4,4'-DDT	5000 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Total DDTs	--	3.7J*	2.9J*	1.3J*	3.9J*	2.5J*	2.9	1.0	<1.0	1.3J*	<1.0	<1.0	<1.0	1.3	NA
Aldrin	300 [b]	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	1.1J*	1.1J*	<1.0	<1.0	<1.0	0.7	0.3
Alpha-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Beta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Delta-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Gamma-BHC	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Chlordane	300 [b]	<10	<10	<10	<10	<10	5.0	NA	<10	<10	<10	<10	<10	5.0	NA
Alpha-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Gamma-Chlordane	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
cis-Nonachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Dieldrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Endosulfan Sulfate	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Endosulfan-II	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Endosulfan-I	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Endrin	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Endrin Aldehyde	--	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	0.5	NA	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	<1.0UJ*	0.5	NA
Endrin Ketone	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA
Heptachlor	--	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA	<1.0	<1.0	<1.0	<1.0	<1.0	0.5	NA

< = not detected at or above the laboratory reporting limit indicated.
NA = all reported values were recorded as less then the reporting limit, therefore, the standard deviation = 0.
J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
TPAH = Total PAHs.
Calculated mean and SD for the totals include only detected values.
UJ* = The analyte was not detected at a level greater than or equal to the reporting limit. The reporting limit is approximate and may be imprecise as a result of AMEC's dat
validation process.
U* = The analyte was positively identified, but was not detected at a concentration greater than or equal to the laboratory reporting limit as a result of AMEC's data validati
process.
ND = Not detected; numbers reported as less than the reporting limit are considered 0 and therefore calculated means are reported as ND if the summation of the values =
Sediment sample collected from the LA-3 Ocean Dredged Material Disposal reference site.

ld values represent significantly greater values than the reference sample.
= U.S. Food and Drug Administration Action Levels not available.
.S. Food and Drug Administration Action Levels for All Fish (wet limits).

FIGURES



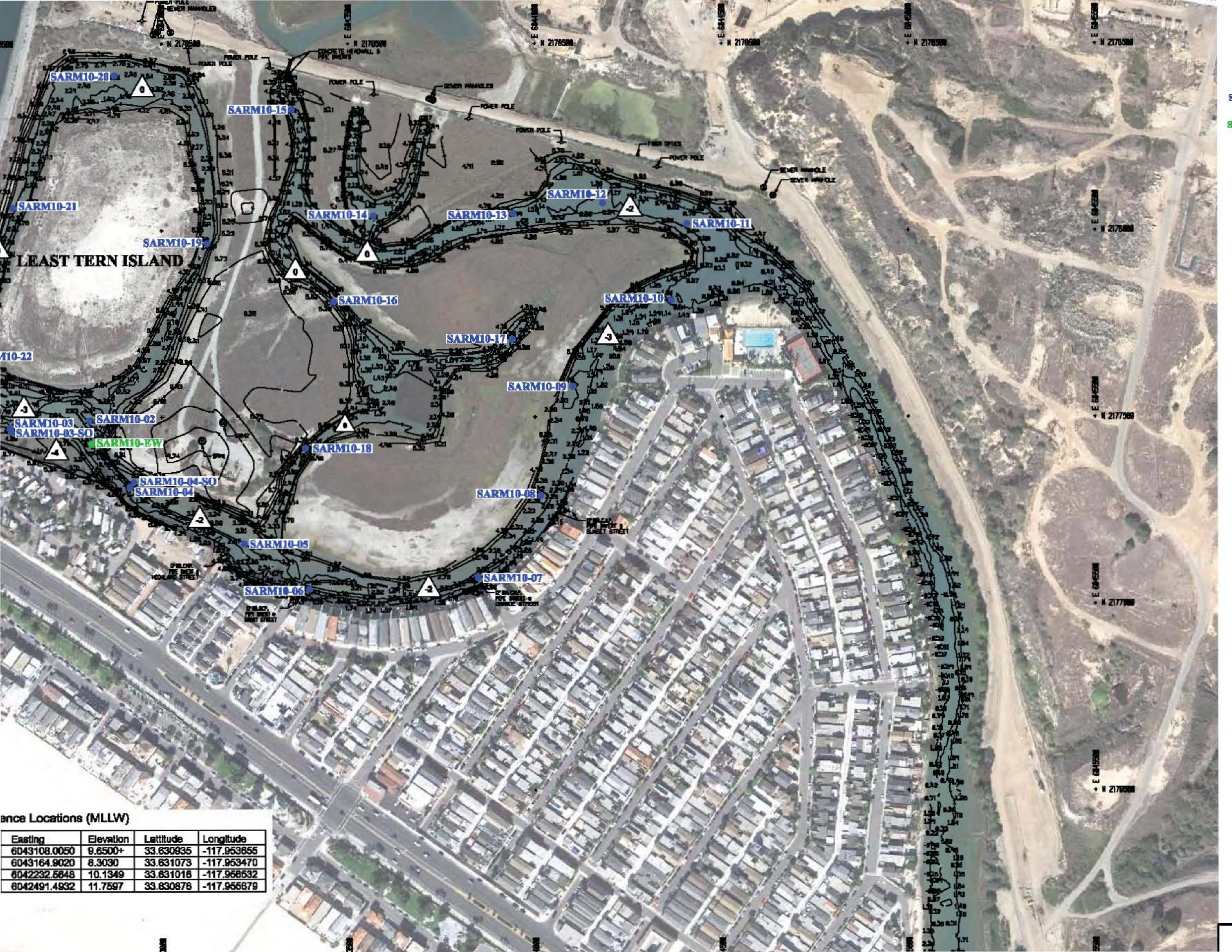


Basemap modified from Google Earth aerial photo dated November 15, 2009.

SITE LOCATION MAP
Santa Ana River Marsh Investigation
Newport Beach, California

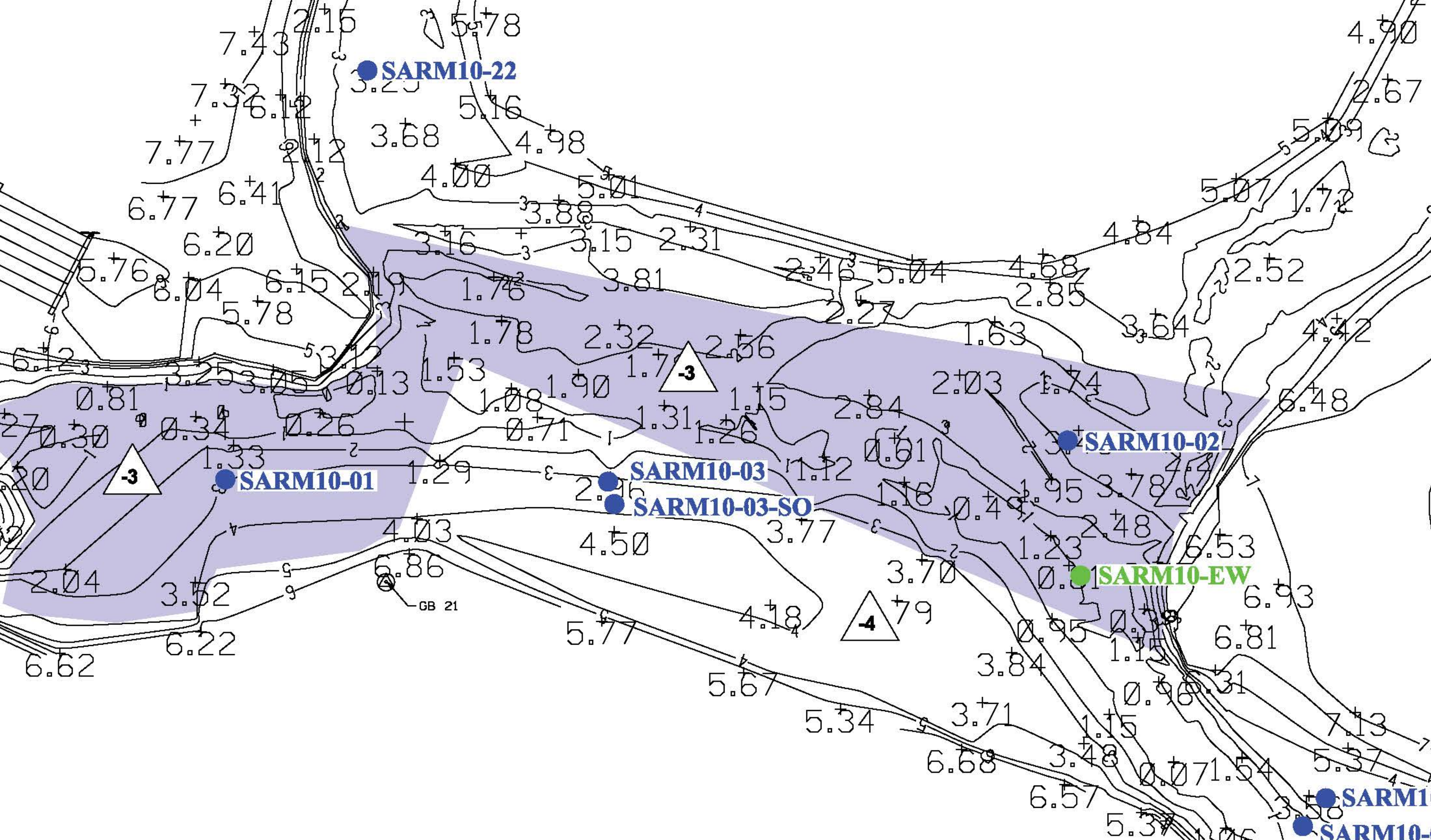
By: pah	Date: 07/12/11	Project No: 15029.004
AMEC Geomatrix		Figure 1

Y:\15029.004.0\DGN\SedimentAnalysisPlanReport-Figures_V3.dgn



ence Locations (MLLW)

Easting	Elevation	Lattitude	Longitude
6043108.0050	9.6500+	33.630935	-117.953655
6043164.9020	8.3030	33.631073	-117.953470
6042232.5648	10.1349	33.631016	-117.956532
6042491.4932	11.7597	33.630878	-117.955679



tion

ence location

y design depth in feet Mean Lower
r (MLLW)

ion

sample location

e location

te limit of Dredge Area A

Notes:

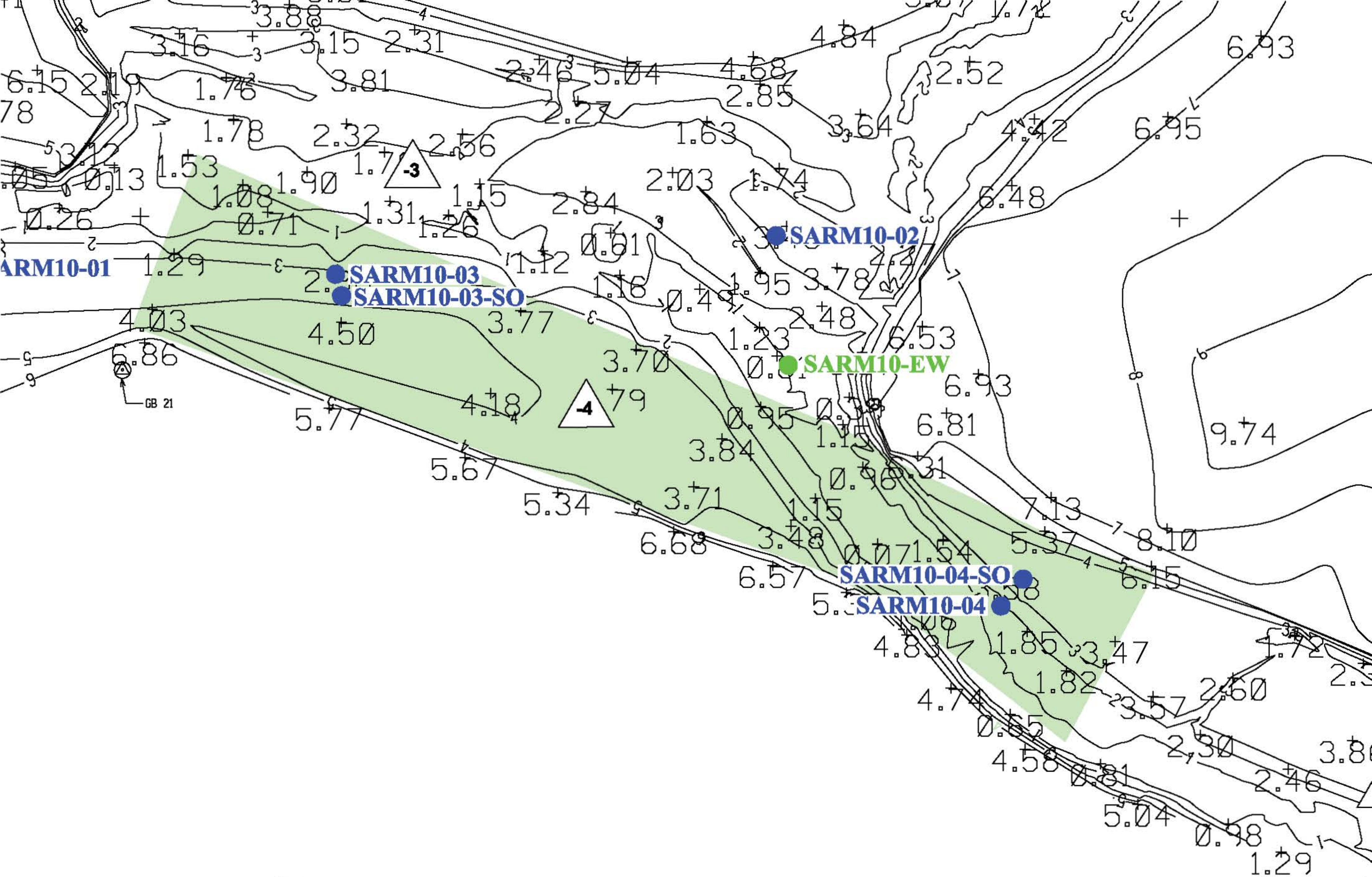
1. Soundings and elevations, in feet indicate the general conditions existing only at the time of survey - April/May 2010.

2. Contours are based on plotted survey data and may not accurately indicate conditions between ranges.

3. Coordinates are California Lambert Zone VI (NAD 83 Epoch 20090). Elevations are based on MLLW 83-01 Epoch (Newport Beach). Points were collected using the Leica RTK System.

0 30 60

SED



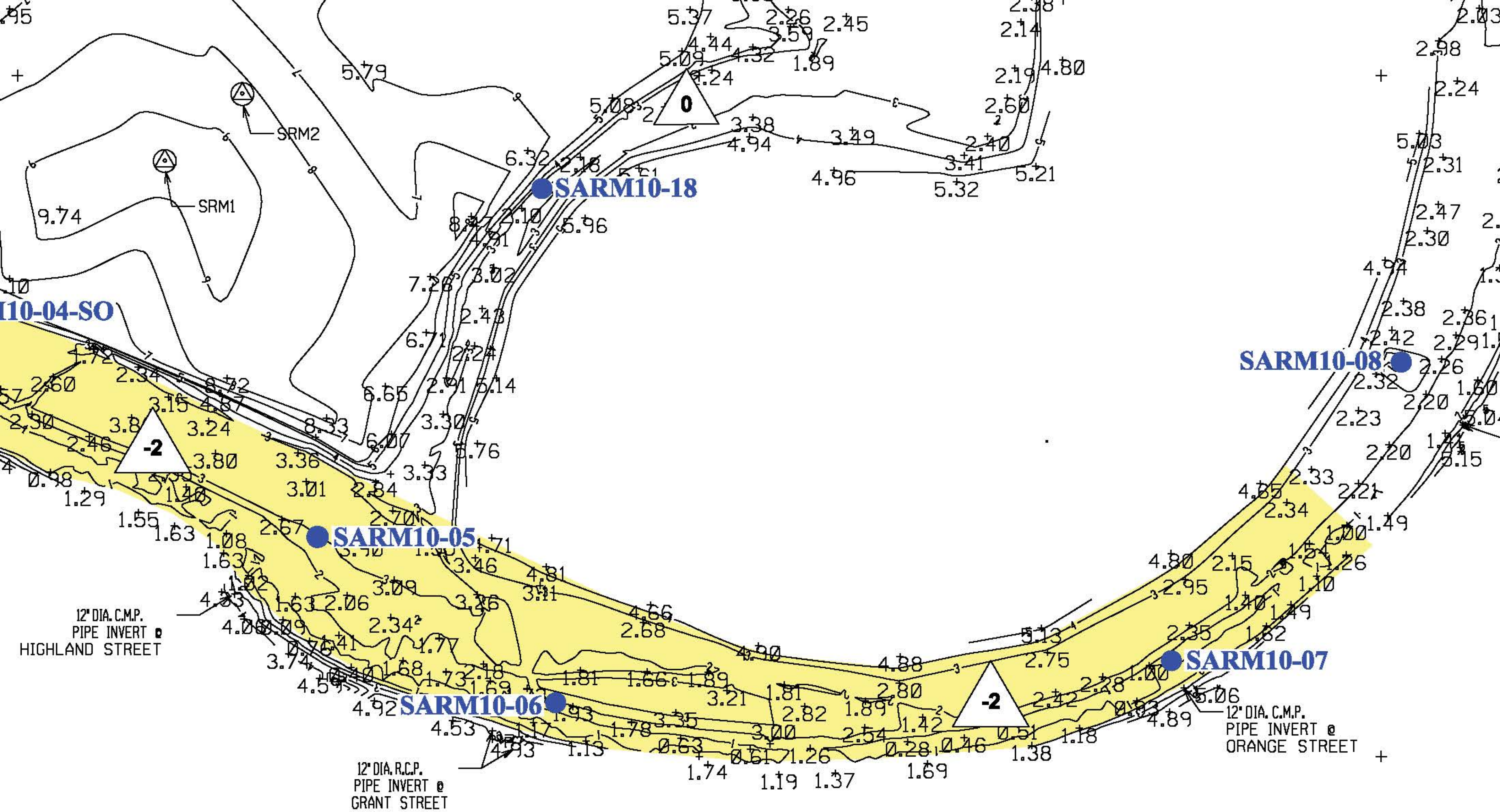
th in feet Mean Lower

tion

Notes:

1. Soundings and elevations, in feet indicate the general conditions existing only at the time of survey - April/May 2010.
2. Contours are based on plotted survey data and may not accurately indicate conditions between ranges.
3. Coordinates are California Lambert Zone VI (NAD 83 Epoch 20090). Elevations are based on MLLW 83-01 Epoch (Newport Beach). Points were collected using the Leica RTK System.

SED



ation

depth in feet Mean Lower Low

ocation

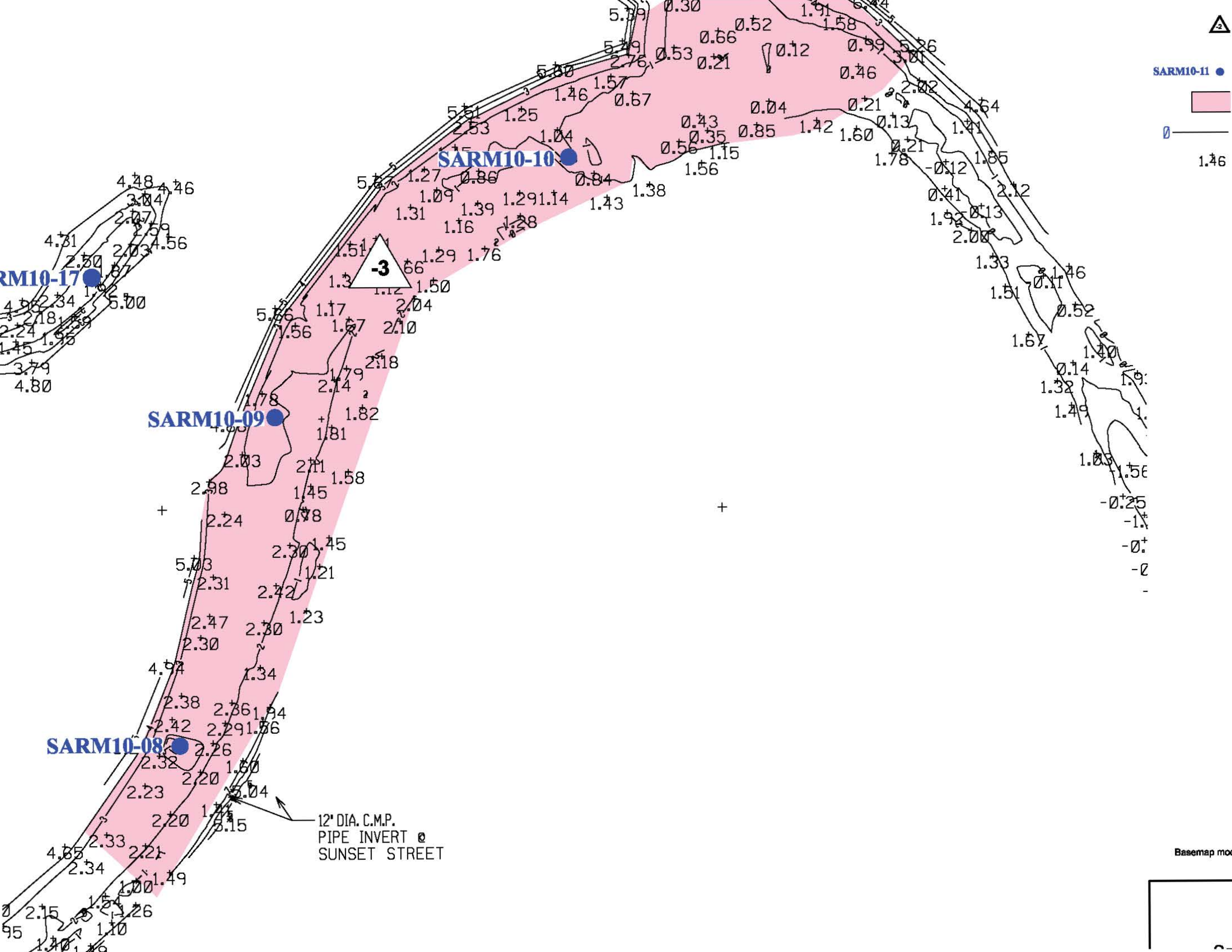
of Dredge Area C

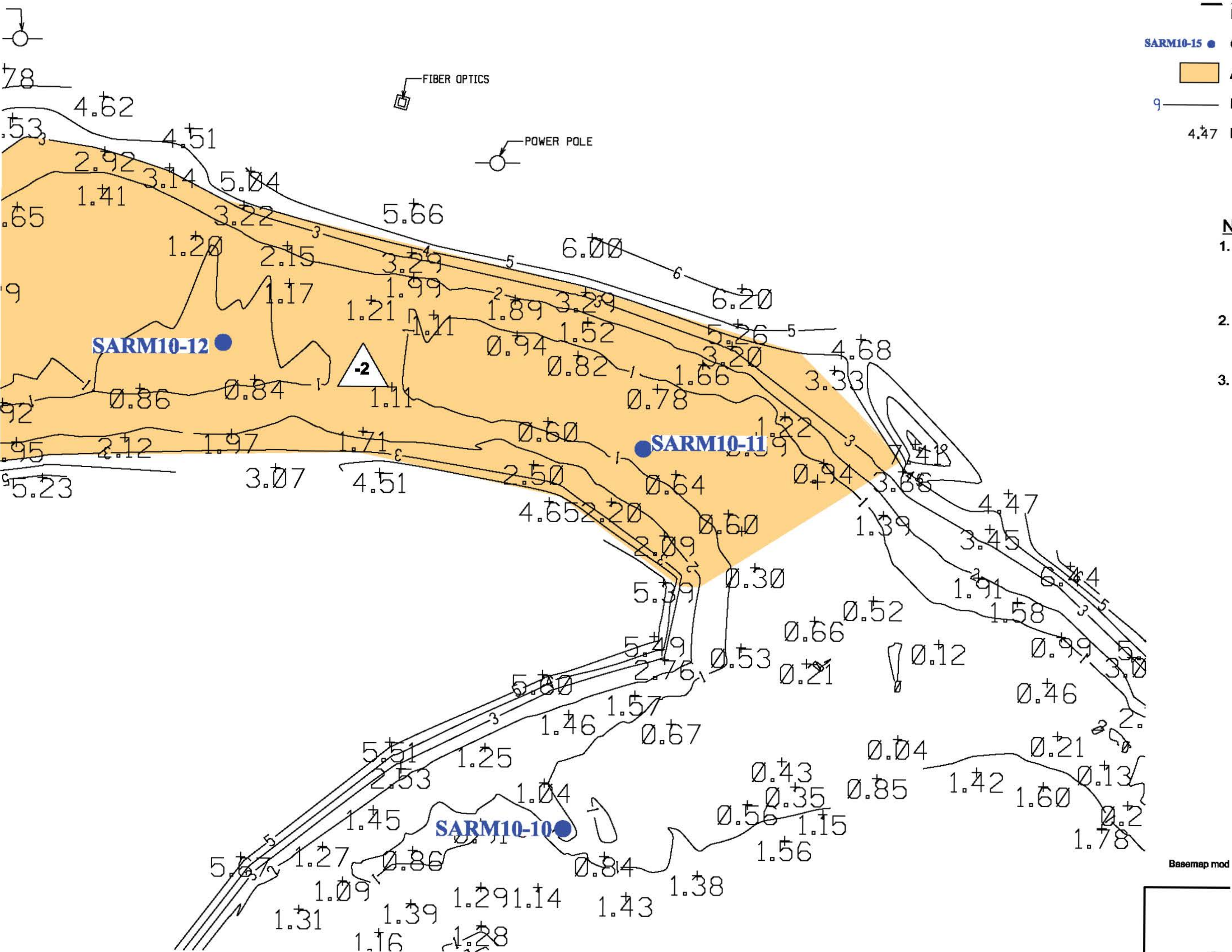
Notes:

1. Soundings and elevations, in feet indicate the general conditions existing only at the time of survey - April/May 2010.
2. Contours are based on plotted survey data and may not accurately indicate conditions between ranges.
3. Coordinates are California Lambert Zone VI (NAD 83 Epoch 20090). Elevations are based on MLLW 83-01 Epoch (Newport Beach). Points were collected using the Leica RTK System.

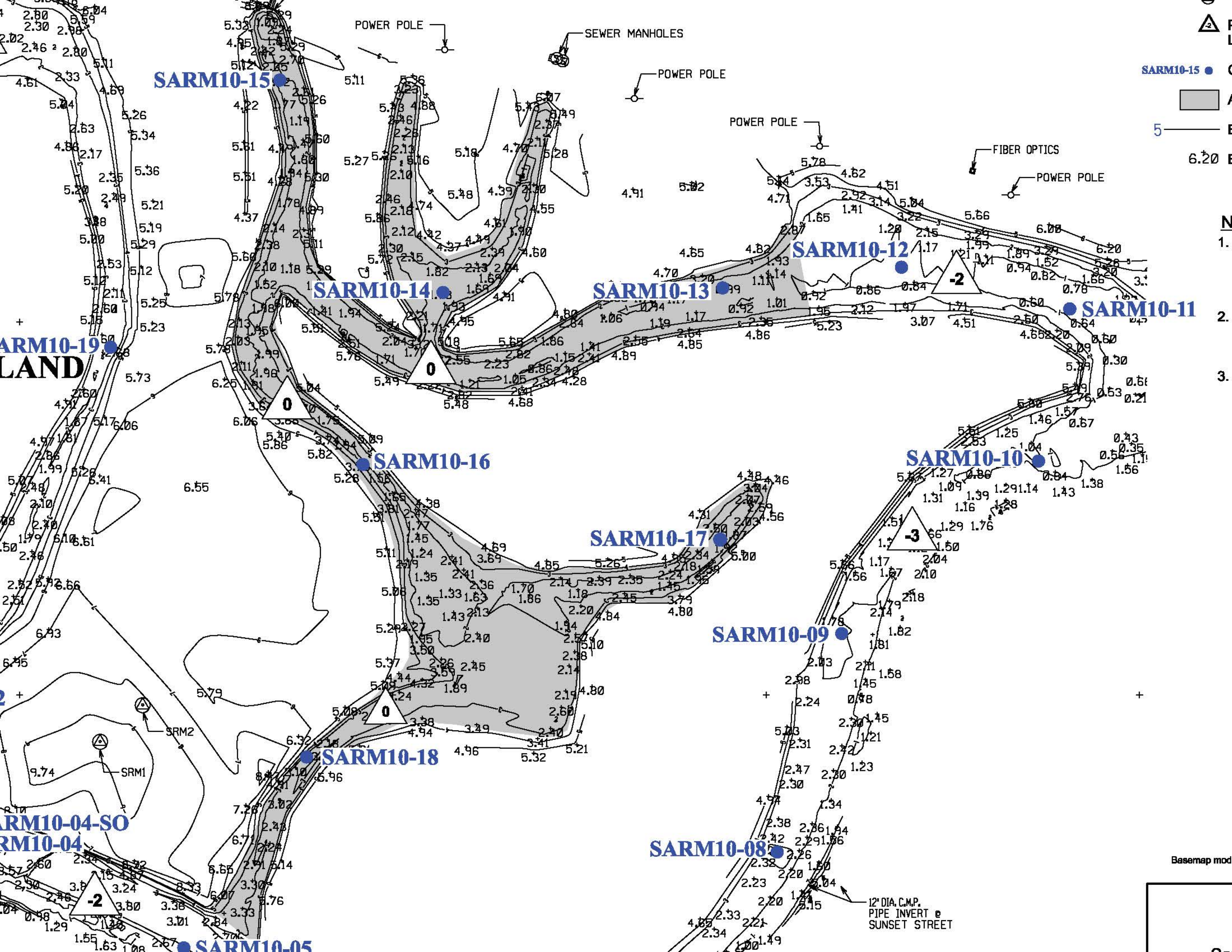
Basemap mod

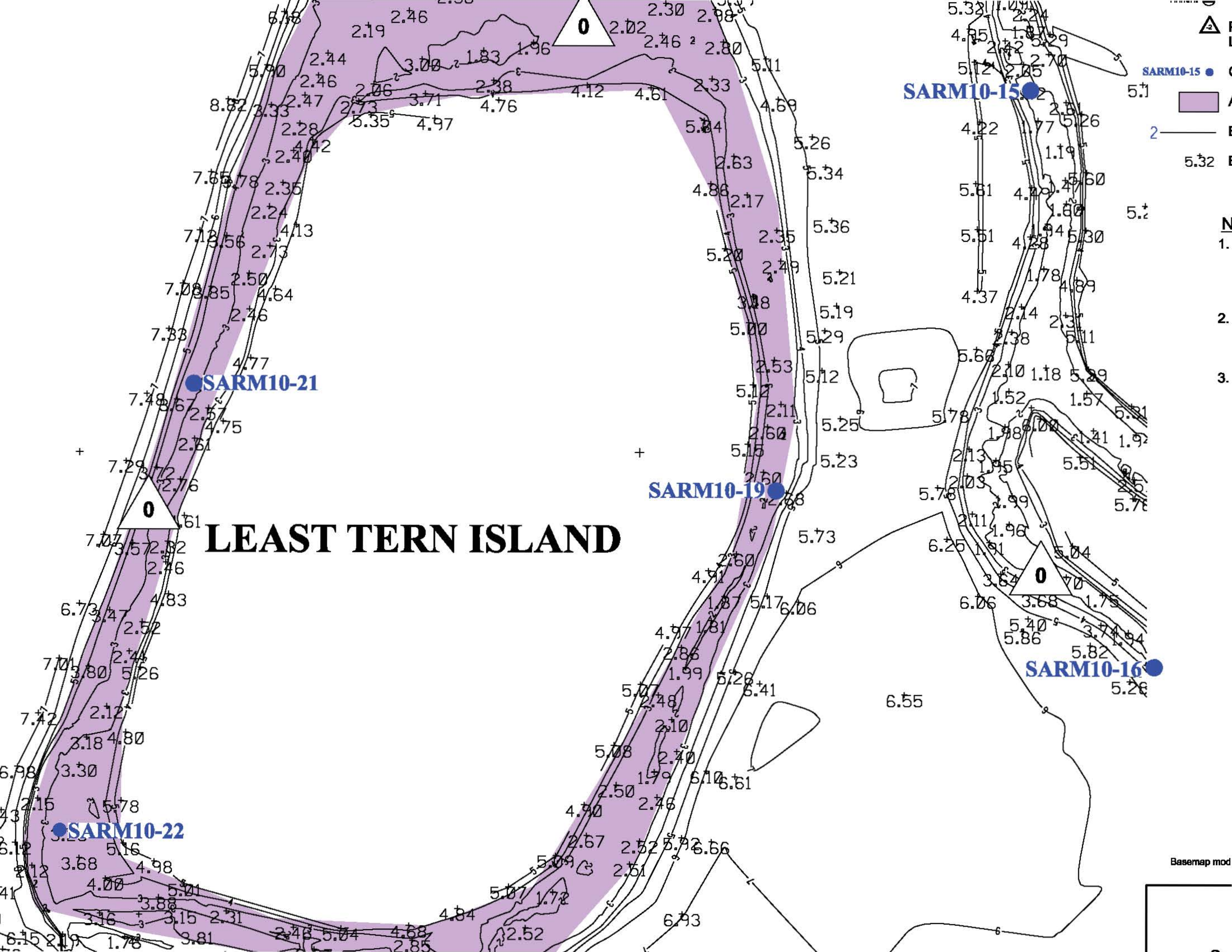
SED

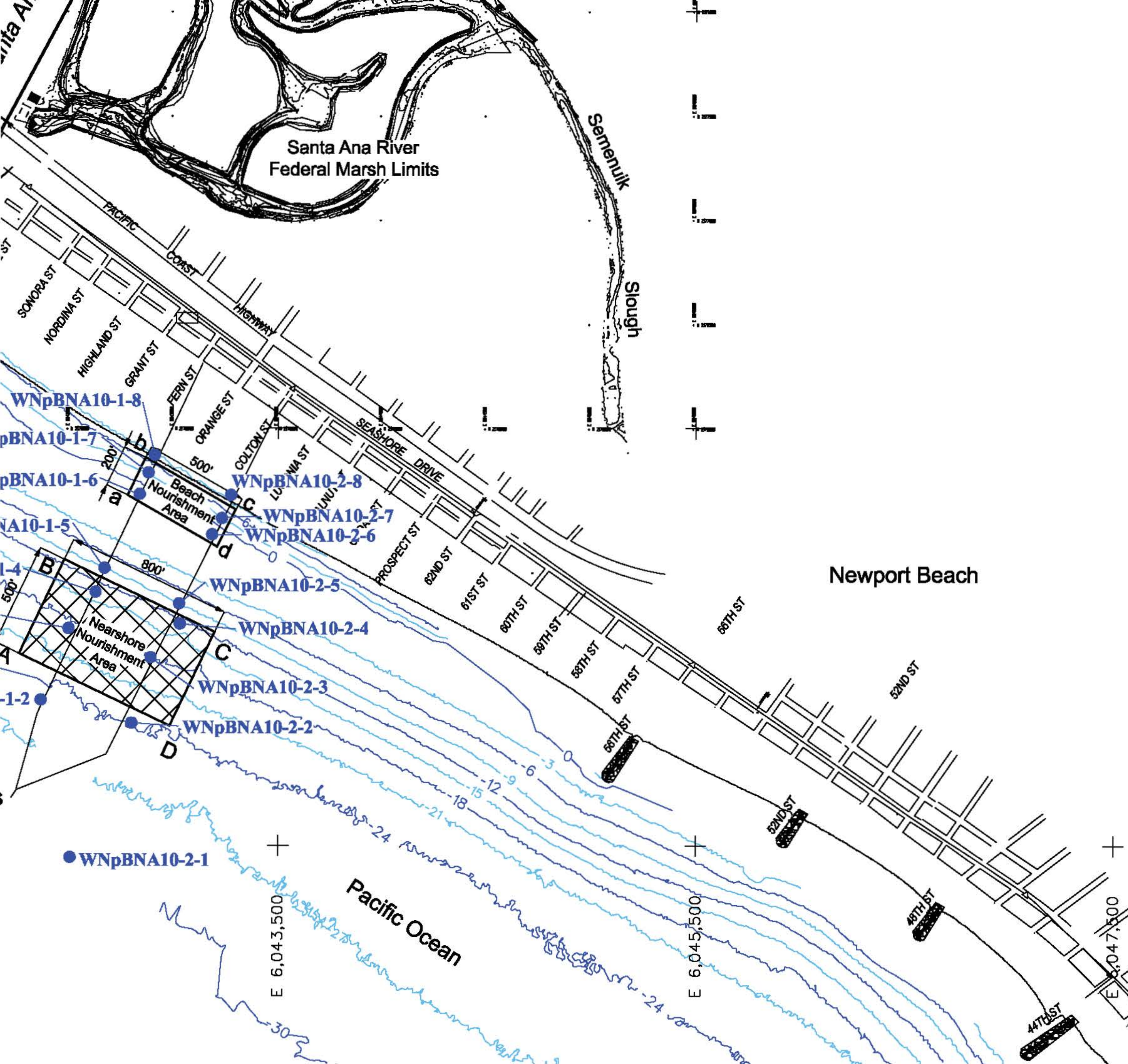

SARM10-11
SARM10-10
SARM10-09
SARM10-08
RM10-17
-3
12" DIA. C.M.P.
PIPE INVERT @
SUNSET STREET



FIBER OPTICS
POWER POLE
SARM10-12
SARM10-11
SARM10-10
-2
SARM10-15
4.47
Basemap mod


POWER POLE
SEWER MANHOLES
POWER POLE
POWER POLE
FIBER OPTICS
POWER POLE
SARM10-15
SARM10-14
SARM10-13
SARM10-12
SARM10-11
SARM10-19
LAND
SARM10-16
SARM10-10
SARM10-17
SARM10-09
SARM10-18
SRM2
SRM1
SARM10-04-SO
SARM10-04
SARM10-08
SARM10-05
12" DIA. C.M.P.
PIPE INVERT @
SUNSET STREET
Basemap mod


LEAST TERN ISLAND
SARM10-15
SARM10-16
SARM10-19
SARM10-21
SARM10-22
Basemap mod



C	2,174,963
D	2,174,512

BEACH NOURISHMENT AREA COOR		
NAD 1983 CALIFORNIA ZONE		
STA	NORTHING	EA
a	2,175,677	6,0
b	2,175,858	6,0
c	2,175,609	6,0
d	2,175,431	6,0

Expl

WNpBNA10-2-8 ● Core

-24 ——— Bathy

Note

1. Cor

2. Bea
Am

Basemap modi

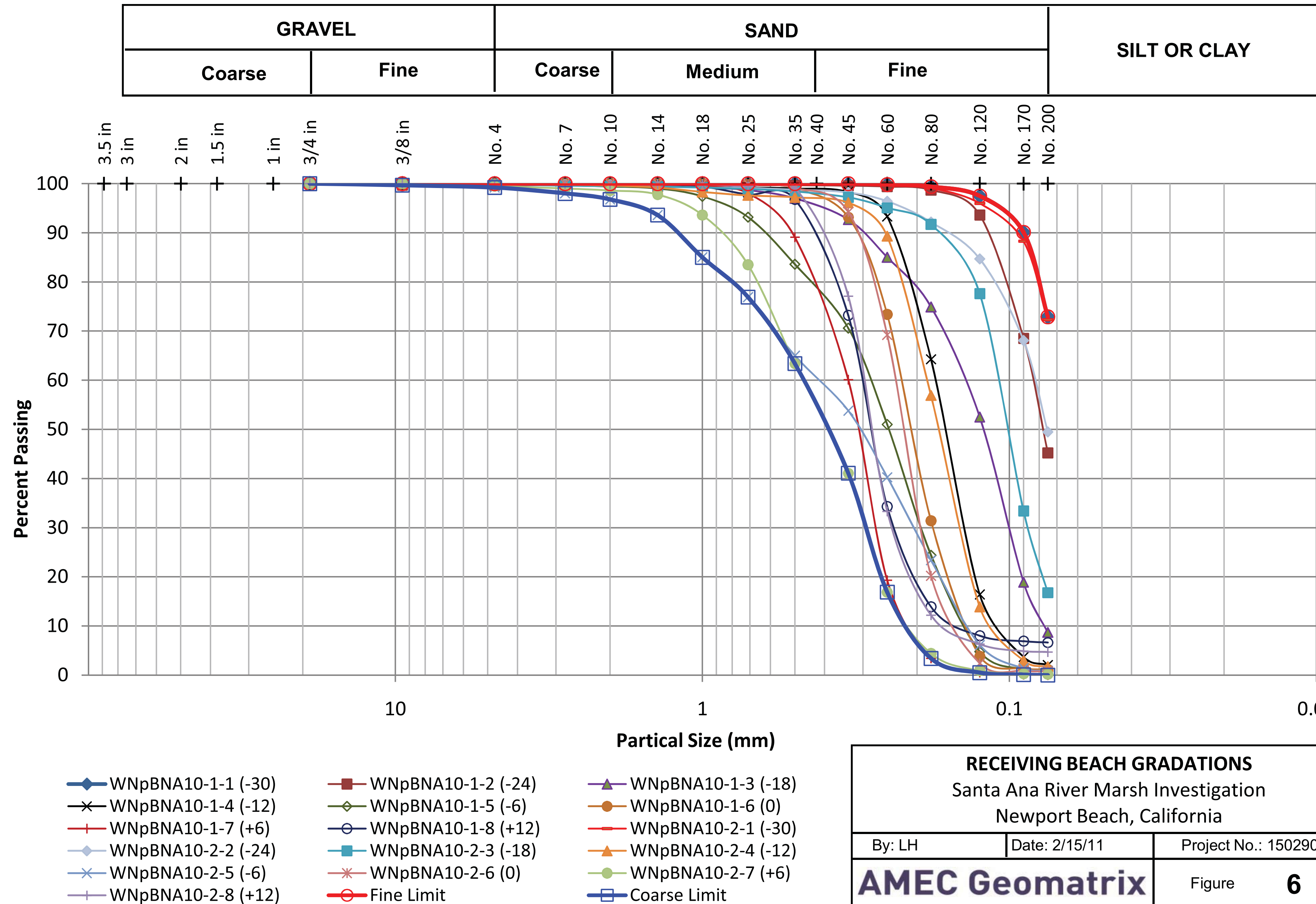
SAM

REPLE

Basemap modi

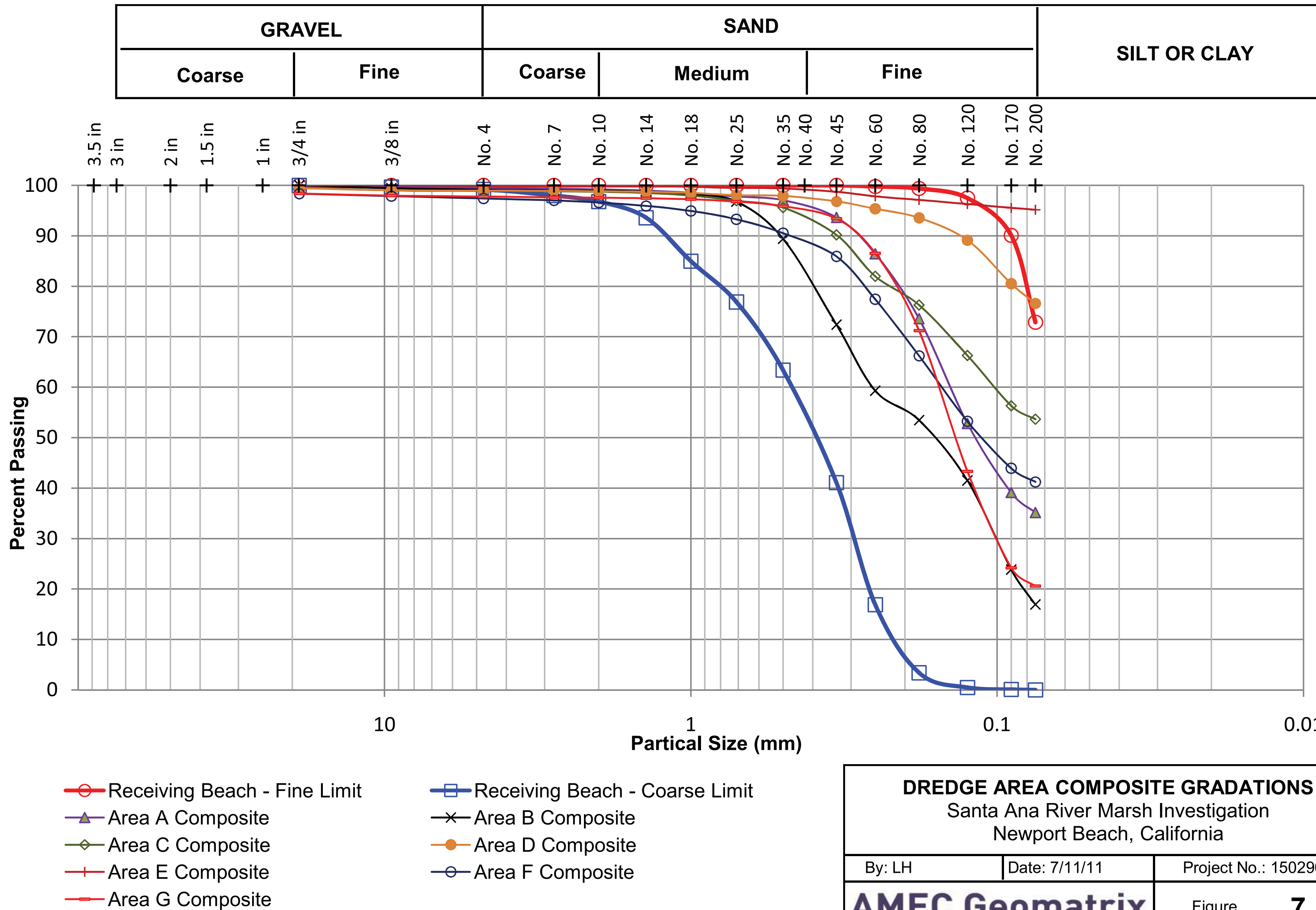
LA-3 REFERE

Santa



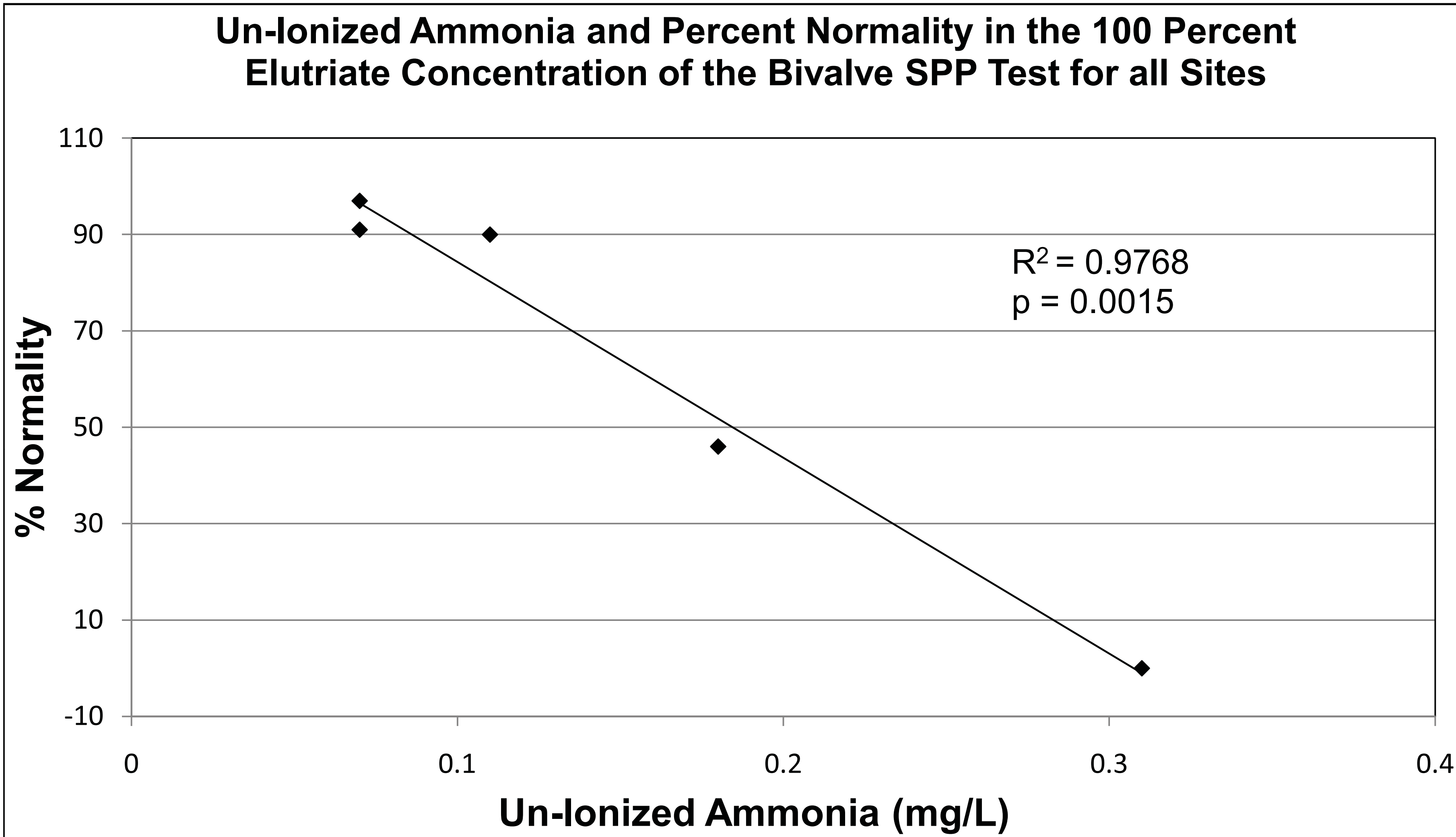
RECEIVING BEACH GRADATIONS
Santa Ana River Marsh Investigation
Newport Beach, California

By: LH	Date: 2/15/11	Project No.: 15029004
AMEC Geomatrix		Figure 6

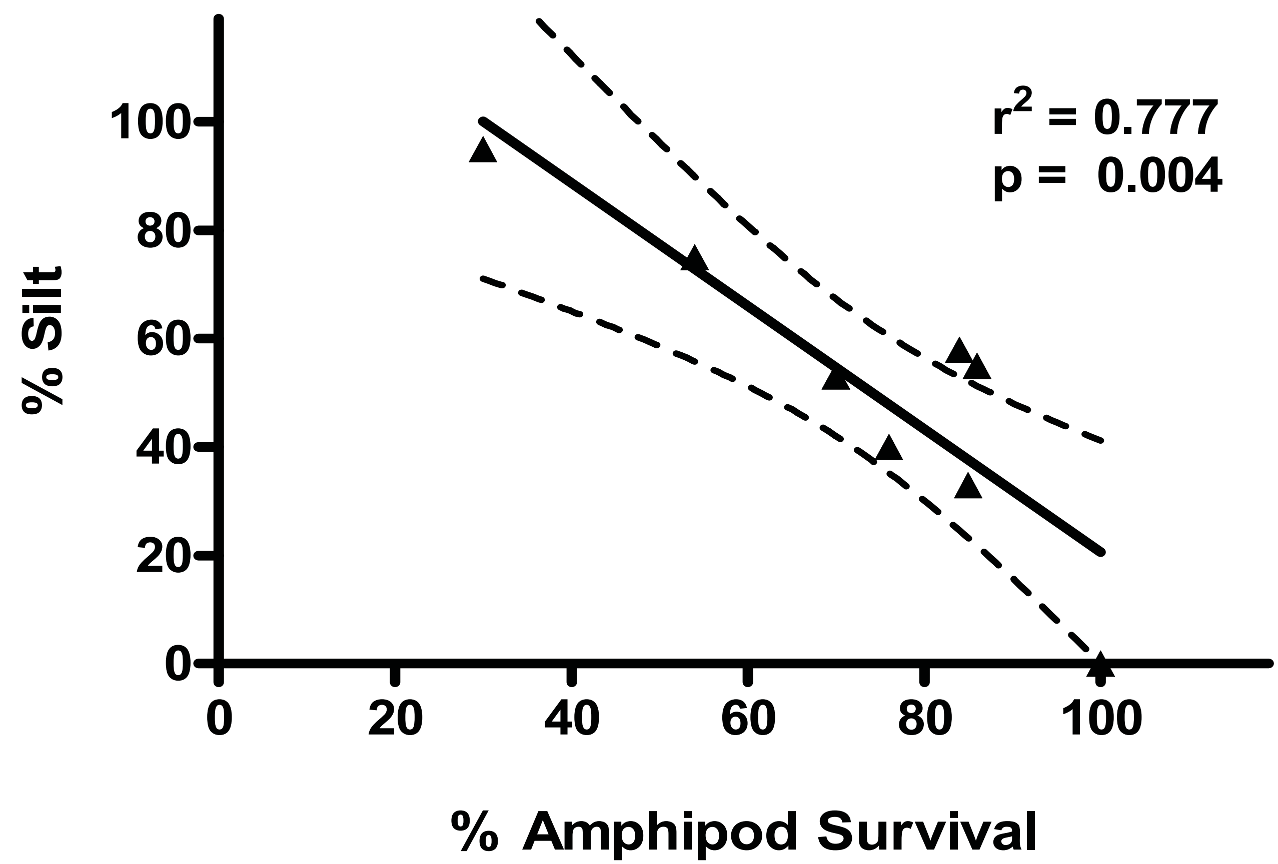


DREDGE AREA COMPOSITE GRADATIONS
Santa Ana River Marsh Investigation
Newport Beach, California

By: LH	Date: 7/11/11	Project No.: 15029004
AMEC Geomatrix		Figure **7**



UN-IONIZED AMMONIA AND PERCENT NORMALITY Santa Ana River Marsh Investigation Newport Beach, California		
By: EG	Date: 7/11/11	Project No.: 15029004
AMEC Geomatrix		Figure **8**



RELATIONSHIP OF PERCENT SILT AND AMPHIPOD SURVIVAL AMONG ALL TEST SEDIMENTS Santa Ana River Marsh Investigation Newport Beach, California		
By: EG	Date: 7/11/11	Project No.: 15029004
AMEC Geomatrix		Figure **9**

Appendix C: Record of Non-Applicability and Air Quality Emission Calculations

RECORD OF NON-APPLICABILITY (RONA)
FOR THE SANTA ANA RIVER MARSH DREDGING PROJECT
ORANGE COUNTY, CALIFORNIA

The proposed project is located in the City of Newport Beach, Orange County, California. The project area is within the 92-acre Santa Ana River Marsh, located between approximately 0.25 miles and 1.0 miles upstream of the mouth of the Santa Ana River.

The Clean Air Act (CAA) as amended in 1990, specifies in Section 176 that no department, agency, or instrumentality of the Federal Government shall engage in, support in anyway, or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated under Section 110 of this title. "Conformity" is defined in Section 176 of the CAA as conformity to the State Implementation Plan's (SIPs) purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of such standards, and that the activities will not:

1. Cause or contribute to any new violation of the NAAQS; or

2. Increase the frequency or severity of any existing violation;

3. Delay timely attainment of a standard, interim emission reductions, or milestones.

Air quality standards in the area of the City of Newport Beach are under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD acts as lead agency, responsible agency or a concerned agency with jurisdiction by law over the air resources within the South Coast Air Basin (SCAB) under the California Environmental Quality Act (CEQA). The 2007 Air Quality Management Plan is the most recently adopted clean air plan for the SCAB.

Estimation of air quality impacts was performed under the guidance of the SCAQMD using methods prescribed in the 1993 California Environmental Quality Act (CEQA) Air Quality Handbook published by the SCAQMD and the U.S. Environmental Protection Agency's (USEPA) AP-42 Appendix J. CEQA requires that short term impacts be discussed in the environmental document. These concerns are addressed in Section 5.5 of the Environmental Assessment.

Based on the air quality analysis described in the tables in Appendix C, the proposed project will not have a significant air quality effect on the environment. The total emissions of each criteria pollutant are below *de minimus* levels as prescribed in 40 CFR 93.153(b). This proposed project conforms with the Federal Clean Air Act as amended 1990. As a result, this Record of Non-Applicability is prepared instead of a conformity determination.

For further information, please contact Ms. Erin Jones, Environmental Manager, U.S. Army Corps of Engineers at (213) 300-9723, or Ms. Tiffany Bostwick, Environmental Manager, U.S. Army Corps of Engineers at (213) 452-3845.

19 JUL 2012
Date

R. Mark Toy, P.E.
Colonel, US Army
Commander and District Engineer

Total On-Site Emissions - Daily

	Pounds Per Day				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Dredging Equipment	12.48	26.10	58.49	6.05	6.56
Land Excavation Equipment	11.72	42.26	83.38	0.11	4.45
Total	24.20	68.36	141.87	6.17	11.01

* SCAQMD 2012. Website accessed March 27.

Total On-Site Emissions - Yearly

	Tons Per Year				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Dredging Equipment	0.25	0.56	1.69	0.17	0.17
Land Excavation Equipment	0.09	0.32	0.55	0.00	0.03
Total	0.34	0.88	2.24	0.18	0.20

* Total does not include tug boat emissions since it is assumed to be covered in existing SIP

Total Project Emissions - Daily

	Pounds Per Day				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
On-Site (Dredging/Excavation)	24.20	68.36	141.87	6.17	11.01
Off-Site (On-Road)	33.96	139.93	410.14	0.54	19.87
Total	58.17	208.30	552.01	6.71	30.88
SCAQMD Daily Significance Levels*	**75**	**550**	**100**	**150**	**150**

Total Project Emissions - Yearly

	Tons Per Year				
Project Emissions	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
On-Site (Dredging/Excavation)	0.34	0.88	2.24	0.18	0.20
Off-Site (On-Road)	0.54	2.36	6.18	0.01	0.30
Total	0.88	3.24	8.42	0.18	0.50
de minimis Thresholds	**10**	**100**	**100**	**100**	**70**

Total Project GHG Emissions - Yearly

	Tons Per Year
Project Emissions	**CO2**
On-Site (Dredging/Excavation)	571.6
Off-Site (On-Road)	885.5
Total	1457.0

Marsh Dredging

Emission Source Data for Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day	Total Work Days [1]	DailyTotal Hp-Hrs
Hydraulic Crane (100 Ton on work barge)	250	0.80	1	200	N/A	8	26	1,600
Hydraulic Dredge	275	0.80	1	220	N/A	12	96	2,640
Booster Station (8 in)	250	0.80	1	200	N/A	12	96	2,400
Log Skidder	175	0.80	1	140	N/A	4	19	560
Boat/Launch (13-ft)	50	0.80	1	40	N/A	10	34	400
Tender Boat (14-ft)	120	0.80	1	96	N/A	10	55	960
Tug boat	870	0.20	1	174	8.0	12	106	96

Emission Factors for Construction Dredging Equipment

Equipment Type	ROG	CO	NOx	SOx	PM10
Hydraulic Crane (lb/hr)	0.1103	0.3103	1.0712	0.0013	0.0388
Hydraulic Dredge (lb/hr)	0.2000	0.1000	0.5000	0.3000	0.2000
Booster Station (lb/hr)	0.1357	0.4345	1.7375	0.0023	0.0501
Log Skidder	0.1058	0.5866	0.8294	0.0011	0.0478
Boat/Launch (lb/hr)	0.0842	0.2740	0.2707	0.0004	0.0228
Tender Boat (lb/hr)	0.1104	0.5320	0.7540	0.0009	0.0633
Tugboat (lbs/1,000 Gal)	18.2	57.0	419.0	75.0	9.0

Daily Emissions from Construction Activities - Dredging Equipment

	Pounds per day				
Construction Activity/Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic Crane	0.8824	2.4822	8.5697	0.0101	0.3107
Hydraulic Dredge	2.4000	1.2000	6.0000	3.6000	2.4000
Booster Station	1.6284	5.2134	20.8503	0.0272	0.6008
Log Skidder	0.4232	2.3464	3.3176	0.0044	0.1912
Boat/Launch	0.8418	2.7399	2.7075	0.0036	0.2280
Tender Boat	1.1040	5.3200	7.5400	0.0090	0.6330
Tug boat	5.2000	6.8000	9.5000	2.4000	2.2000
Peak Daily Emissions	**12.4798**	**26.1019**	**58.4851**	**6.0543**	**6.5636**

Yearly Emissions from Construction Activities - Dredging Equipment

	Tons per Year				
Construction Activity/Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic Crane	0.0115	0.0323	0.1114	0.0001	0.0040
Hydraulic Dredge	0.1152	0.0576	0.2880	0.1728	0.1152
Booster Station	0.0782	0.2502	1.0008	0.0013	0.0288
Log Skidder	0.0040	0.0223	0.0315	0.0000	0.0018
Boat/Launch	0.0143	0.0466	0.0460	0.0001	0.0039
Tender Boat	0.0304	0.1463	0.2074	0.0002	0.0174
Peak Daily Emissions	**0.2535**	**0.5553**	**1.6851**	**0.1746**	**0.1712**

Assume total dredge volume of about 53,400 cubic yards (cy) including overdraft
Emissions factors for Maintenance Dredging for tugboat taken from the Port of Los Angeles Channel Deepening Project Final Supplemental Environmental Impact Statement/Environmental Impact Report, September 2000.
Assumes up to 23,100 cy of nearshore disposal; 30,300 cy at LA-3; and 23,400 at an upland site (landfill); nearshore and LA-3 at a rate of 50 cy per hour (hydraulic dredge).

GHG Emissions

Maintenance Dredging

Emission Source Data for Maintenance Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day	Total Work Days [1]	DailyTotal Hp-Hrs
Hydraulic Crane (100 Ton on work barge)	250	0.80	1	200	N/A	8	26	1,600
Hydraulic Dredge	275	0.80	1	220	N/A	12	96	2,640
Booster Station (8 in)	250	0.80	1	200	N/A	12	96	2,400
Log Skidder	175	0.80	1	140	N/A	4	19	560
Boat/Launch (13-ft)	50	0.80	1	40	N/A	10	34	400
Tender Boat (14-ft)	120	0.80	1	96	N/A	10	55	960
Tug boat	870	0.20	1	174	8.0	12	106	96

Emission Factors for Construction Equipment

	lbs/hr
Equipment Type	**CO2**
Hydraulic Crane (lb/hr)	112
Hydraulic Dredge (lb/hr)	509
Booster Station (lb/hr)	201
Log Skidder	101
Boat/Launch (lb/hr)	28
Tender Boat (lb/hr)	80.9
Tugboat (lbs/1,000 Gal)	93.9

Estimated Emissions from Construction Equipment

	CO2	
Equipment Type	**lbs/day**	**tons total**
Hydraulic Crane (lb/hr)	896.0	11.6
Hydraulic Dredge (lb/hr)	6,108.0	293.2
Booster Station (lb/hr)	2,412.0	115.8
Log Skidder	404.0	3.8
Boat/Launch (lb/hr)	280.0	4.8
Tender Boat (lb/hr)	809.0	22.2
Tugboat (lbs/1,000 Gal)	1,126.8	59.7
Total	12,035.8	511.2
Total Equivalent CO2	12,132.1	515.3

CO2 Equivalent = CO2*1.008

Excavation

Emission Source Data for Construction Land/Excavation Equipment

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day (1)	Total Work Days (2)	Daily Total Hp-Hrs
Hydraulic Crane (9 Ton)	50	0.80	1	40	N/A	10	18	400
Hydrauic Excavator (1 CY)	120	0.80	1	96	N/A	8	5	768
Marsh Excavator (1 CY)	120	0.80	1	96	N/A	10	20	960
Truck w/ Spreader	250	0.80	1	200	N/A	8	11	1,600
Dozer (Small)	175	0.80	1	140	N/A	8	27	1,120
Front-End Loader (2 CY)	175	0.80	1	140	N/A	8	6	1,120
Front-End Loader (3 CY)	175	0.80	1	140	N/A	10	30	1,400
Dump Trucks (10 CY)	250	0.80	2	400	N/A	8	4	3,200
Cargo Buggy/Dump Truck	250	0.80	1	200	N/A	8	17	1,600

Emission Factors for Construction Land/Excavation Equipment

	Pounds Per Hour				
Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic Crane (9 Ton)	0.1101	0.2979	0.2478	0.0003	0.0258
Hydrauic Excavator (1 CY)	0.1183	0.5220	0.7300	0.0009	0.0657
Marsh Excavator (lb/hr)	0.1183	0.5220	0.7300	0.0009	0.0657
Truck w/ Spreader	0.1469	0.3944	1.3513	0.0019	0.0461
Dozer (Small)	0.1195	0.3565	0.3179	0.0004	0.0302
Front-End Loader (2 CY)	0.1575	0.8008	1.2212	0.0016	0.0717
Front-End Loader (3 CY)	0.1575	0.8008	1.2212	0.0016	0.0717
Dump Trucks (10 CY)	0.1469	0.3944	1.3513	0.0019	0.0461
Cargo Buggy/Dump Truck (lb/hr)	0.1469	0.3944	1.3513	0.0019	0.0461

Daily Emissions from Construction Activities Land/Excavation Equipment

	Pounds per Day				
Construction Activity/Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic Crane (9 Ton)	1.1015	2.9790	2.4778	0.0030	0.2581
Hydrauic Excavator (1 CY)	0.9464	4.1760	5.8400	0.0072	0.5256
Marsh Excavator	1.1830	5.2200	7.3000	0.0090	0.6570
Truck w/ Spreader	1.1752	3.1552	10.8104	0.0152	0.3688
Dozer (Small)	0.9560	2.8520	2.5432	0.0032	0.2416
Front-End Loader (2 CY)	1.2600	6.4064	9.7696	0.0128	0.5736
Front-End Loader (3 CY)	1.5750	8.0080	12.2120	0.0160	0.7170
Dump Trucks (10 CY)	2.3502	6.3107	21.6212	0.0300	0.7368
Cargo Buggy/Dump Truck	1.1751	3.1553	10.8106	0.0150	0.3684
Peak Daily Emissions	**11.7224**	**42.2626**	**83.3848**	**0.1114**	**4.4469**

Yearly Emissions from Construction Activities Land/Excavation Equipment

	Tons per Day				
Construction Activity/Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic Crane (9 Ton)	0.0099	0.0268	0.0223	0.0000	0.0023
Hydrauic Excavator (1 CY)	0.0024	0.0104	0.0146	0.0000	0.0013
Marsh Excavator	0.0118	0.0522	0.0730	0.0001	0.0066
Truck w/ Spreader	0.0065	0.0174	0.0595	0.0001	0.0020
Dozer (Small)	0.0129	0.0385	0.0343	0.0000	0.0033
Front-End Loader (2 CY)	0.0038	0.0192	0.0293	0.0000	0.0017
Front-End Loader (3 CY)	0.0236	0.1201	0.1832	0.0002	0.0108
Dump Trucks (10 CY)	0.0047	0.0126	0.0432	0.0001	0.0015
Cargo Buggy/Dump Truck	0.0100	0.0268	0.0919	0.0001	0.0031
Peak Daily Emissions	**0.0856**	**0.3241**	**0.5513**	**0.0007**	**0.0326**

(1) Work hours per day assumes down time for crew shift changes and breaks
(2) Total duration could be up to 6 months (6 days/week), however, activities may be concurrent to each othe

Assume total excavation volume of about 23,600 cubic yards (cy) including overdraf
Emissions factors taken from SCAQMD (2012)

GHG Emissions
Land Excavation

Emission Source Data for Maintenance Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day	Total Work Days(3)	DailyTotal Hp-Hrs (1)
Hydraulic Crane (9 Ton)	50	0.80	1	40	N/A	10	18	400
Hydrauic Excavator (1 CY)	120	0.80	1	96	N/A	8	5	768
Marsh Excavator (1 CY)	120	0.80	1	96	N/A	10	20	960
Truck w/ Spreader	250	0.80	1	200	N/A	8	11	1,600
Dozer (Small)	175	0.80	1	140	N/A	8	27	1,120
Front-End Loader (2 CY)	175	0.80	1	140	N/A	8	6	1,120
Front-End Loader (3 CY)	175	0.80	1	140	N/A	10	30	1,400
Dump Trucks (10 CY)	250	0.80	2	400	N/A	8	4	3,200
Cargo Buggy/Dump Truck	250	0.80	1	200	N/A	8	17	1,600

Emission Factors for Construction Equipment

	lbs/hr
Equipment Type	**CO2**
Hydraulic Crane (9 Ton)	23.2
Hydrauic Excavator (1 CY)	73.6
Marsh Excavator (1 CY)	73.6
Truck w/ Spreader	167
Dozer (Small)	30.3
Front-End Loader (2 CY)	101
Front-End Loader (3 CY)	101
Dump Trucks (10 CY)	167
Cargo Buggy/Dump Truck	167

Estimated Emissions from Construction Equipmen

	CO2	
Equipment Type	**lbs/day**	**tons total**
Hydraulic Crane (9 Ton)	232.0	2.1
Hydrauic Excavator (1 CY)	588.8	1.5
Marsh Excavator (1 CY)	736.0	7.4
Truck w/ Spreader	1,336.0	7.3
Dozer (Small)	242.4	3.3
Front-End Loader (2 CY)	808.0	2.4
Front-End Loader (3 CY)	1,010.0	15.2
Dump Trucks (10 CY)	2,672.0	5.3
Cargo Buggy/Dump Truck	1,336.0	11.4
Total	8,961.2	55.8
Total Equivalent CO2	9,032.9	56.3

CO2 Equivalent = CO2*1.008

Assumptions

Onroad						
Phase	**Trip Type**	**Veh Type**	**Total Mi/Trip**	**Unpaved Mi/Trip**	**Worst case Daily Trips**	**Total Trips**
Dredging & Excavation	Employee	Passenger	40	0	15	2,700
	Pickup Truck	Passenger	1	0	4	264
	Sediment	Heavy-Duty	92	0	4	1,350

Estimating Fugitive emissions for Vehicle Miles Traveled (VMT) for construction laborers (SCAQMD CEQA Quality Handbook Table A9-9-A with updates through 2010

* On road sources include:

A) 15 personnel traveling to and from work site (15 vehicles used); personnel would commute from approximately 40 miles roundtrip on freeway.
B) Two pickup trucks (passenger) to travel within and around project site on local roads.
C) Transport of sediment in trucks (heavy-heavy-duty-trucks) to landfill approx. 92 miles roundtrip on freeway; assume an average of 18 trucks, 4 trips each per day.

V=W x (X/Y) x Z; where V=VMT, W=Distance x # of trips, X=number of vehicles, Y=1 hour, Z=estimated travel time

Passenger (Commuting): VMT = 40 miles/day x 1 trip x (15 vehicles/hr) x 1 hr = 600 miles per day
Passenger (Onsite Pickup Trucks): VMT = 1 miles/day x 4 trips x (2 vehicles/hr) x .25 hr = 1 miles per day
Heavy-Duty (Sediment Transport): VMT = 92 miles/day x 4 trips x (18 vehicles/hr) x 2 hr = 13248 miles per day

Estimating fugitive emissions from passenger (commuter) Vehicle Travel on Paved Roads (SCAQMD CEQA Air Quality Handbook Table A9-9-B with updates through 2010

E = V x G (with street cleaning and is dependent on type of road; where E=emissions for passenger vehicles; V=VMT; and G=0.00065 for freeways, 0.018 for local streets (SCAQMD CEQA Air Quality Handbook Table A9-9-B-1 with updates through 2010).
Passenger (Commuting): 600 miles/day x 0.00065 lbs/mile = 0.39 lbs/day
Passenger (Onsite Pickup Truck): 1 mile/day x 0.018 lbs/mile = 0.018 lb/day
Heavy-Duty (Sediment Transport): 13248 miles/day x 0.00065 lbs/mile = 8.6112

On-Road Fugitive Emissions Summary - Daily

Type of Vehicle	Number of Vehicles	VMT/DAY (On-Road)	VMT/DAY (Off-Road)	Emissions (On-Road) (lbs/day)	Emissions (Off-Road) (lbs/day)
Passenger (Commuter)	17	600	0	0.39	0
Passenger (Onsite Pickup Truck)	2	1	0	0.018	0
Heavy-Duty (Sediment Transport)	12	8832	0	8.6112	0
Total	31	9433	0	9.0192	0

Onroad Emissions (Construction-Offsite)

SCAQMD Emission Factors - 2012 (lbs/mile)

	ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	0.00079628	0.00765475	0.00077583	0.00001073	0.00008979	0.0000575	1.1015254
Delivery	0.00223776	0.01545741	0.01732423	0.00002667	0.00064975	0.00054954	2.76628414
Heavy-Heavy Duty	0.00252764	0.01021519	0.03092379	0.00004042	0.00149566	0.00129354	4.21590774

Dredging and Excavation

- Worst Case Daily Emissions

	VMT	Emissions lbs -2012						
Vehicle Type	Total	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	600	0.48	4.59	0.47	0.01	0.05	0.03	660.92
Passenger (Pickup Truck)	1	0.00	0.01	0.00	0.00	0.00	0.00	1.10
Heavy-Heavy Duty	13,248	33.49	135.33	409.68	0.54	19.81	17.14	55,852.35
	Totals	33.96	139.93	410.14	0.54	19.87	17.17	56,514.36

On-Road Emission (lb/day): 40 mph

Travel Emission Formula= (emission factors (Exhaust+Tire wear)) x (Distance traveled (VMT))

Dredging and Excavation

- Yearly Emissions

	VMT	Emissions tons -2012						
Vehicle Type	Total	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	86,400	0.03	0.33	0.03	0.00	0.00	0.00	47.59
Passenger (Pickup Truck)	144	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Heavy-Heavy Duty	397,440	0.50	2.03	6.15	0.01	0.30	0.26	837.79
	Totals	0.54	2.36	6.18	0.01	0.30	0.26	885.45

VMT 2012

	Miles/Day	Total Days	Total
Passenger (Commuting)	600	144	86400
Passenger (Onsite Pickup Trucks)	1	144	144
Heavy-Duty (Sediment Transport)	13248	30	397440

Appendix D: 404(b)(1) Analysis

THE EVALUATION OF THE EFFECTS
OF THE DISCHARGE OF DREDGED OR FILL MATERIAL
INTO THE WATERS OF THE UNITED STATES

Santa Ana River Marsh Dredging
Newport Beach, Orange County, California

I. INTRODUCTION. The following evaluation is provided in accordance with Section 404 (b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (Public Law 95-217). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the U. S, including incidental discharge during dredging. As such, it is not meant to stand alone and relies heavily upon information provided in the Draft Environmental Assessment (EA) to which it is attached.

II. PROJECT DESCRIPTION. (Referenced in the EA and described briefly as follows:)

A. Location: The project location is described in Section 1.1 of the attached draft EA.

Brief Summary: The project site is the Santa Ana River Marsh, located in Newport Beach, Orange County, California The proposed dredge footprint is approximately 16 acres within the 54-acre southern portion of the Marsh property. The proposed disposal site for nearshore compatible dredged material is located in the nearshore waters at Newport Beach, approximately 0.6 miles downcoast of the mouth of the Santa Ana River. The disposal site for material that is not physically compatible for nearshore waters (due to the amount of silt) is located at the Environmental Protection Agency's (EPA) open ocean disposal site, LA-3. Material that is neither physically nor chemically compatible with ocean disposal would be disposed of at an upland landfill in Orange County or Los Angeles County.

B. General Description: The project description is described in Section 3.4 of the attached draft EA.

Brief Summary: The following are the specific proposed actions for Marsh dredging and other project activities: (1) dredging and removal of sediment in the Marsh channels to restore design depths; (2) discharge of compatible dredged material in the nearshore at Newport Beach and at the LA-3 ODMDS; (3) disposal of non-compatible material at an upland landfill; (4) clearing and grubbing of the tern island; and (5) environmental monitoring.

C. Purpose and Need: The purpose and need is described in Section 2.0 of the attached draft EA.

Brief Summary: The proposed project would serve the following purposes: (1) restore the channels that have experienced shoaling to design depths; (2) restore tidal circulation and flushing within the marsh; (3) prevent water quality problems and stagnation; (4) prevent transition of Marsh habitats, which are used by endangered species; and (5) provide beach nourishment material for local beaches eroded by littoral processes. Removal of the accumulated sediments will increase tidal range and improve circulation of the tidal flow throughout the marsh, which will result in improved water quality and overall habitat quality for wildlife.

D. Authority and Purpose: The project authority and purpose is documented in Sections 1.4 of the attached draft EA.

Brief Summary: The Santa Ana Mainstem Project was federally authorized by the 74th Congress, on June 22, 1936. The Phase I GDM and Supplemental EIS were completed in 1980 by the Corps, and a supplement to Phase I was issued in 1985. The full authorization language is included in the 1980 Phase I GDM. Additional study was authorized by Congress under the Water Resources Development Act (WRDA) of 1986, Public Law 99-662. The Phase II GDM/SEIS was completed in 1988. Subsequent authorizations were included in the Energy and Water Appropriation Act of 1988 (which included the San Timoteo feature), WRDA 1990 (Santa Ana Trails), WRDA 1996 (Prado Dam, SR 71), and WRDA 2007 (Santa Ana River Interceptor Line protection/relocation).

E. General Description of Dredged or Fill Material: A description of dredge material is documented in Section 3.4.1 of the attached draft EA.

Brief Summary: To determine the suitability of the Marsh dredge materials for discharge in the nearshore at Newport Beach and at LA-3 ODMDS, an investigation was performed by AMEC Geomatrix, Inc. between January and March of 2011. Based on the project's dredge design, AMEC Geomatrix collected sediment from 22 sample locations within the seven dredge areas. AMEC Geomatrix also collected sediment samples from two beach transect locations at West Newport Beach and from the LA-3 reference site. The sediment samples collected were used to perform chemistry, geotechnical, and toxicity and bioaccumlation testing.

The chemical analysis results showed that the Marsh sediments from all areas tested would be potentially suitable for beach or nearshore placement and that the dredge sediments would have no or minimal toxicity impacts on benthic organisms at the Newport Beach nearshore disposal area. Based on grain size, only Areas B and G are considered compatible for nearshore placement due to the high fines content of the sediments in Areas A, C, D, E, and F. The SC-DMMT recommended that Area B and Area G be determined suitable for nearshore placement. No areas were found to be suitable for placement on the beach. The remaining Areas (A, C, D, E, and F) were then subject to toxicity and bioaccumulation testing to determine suitability for ocean disposal at the LA-3 ODMDS site.

While Areas D and E were compatible for ocean disposal based on chemistry and grain size analyses, toxicity test results showed that these areas were not suitable for placement at the LA-3 reference site. While these areas did not pass toxicity, it was not apparent from the test results what caused them to fail. Bioaccumulation testing results indicate that the Areas A, C, and F are suitable for ocean disposal at the LA-3 site.

Based on grain size, chemistry, toxicity and bioaccumulation testing results, the USACE and SC-DMMT determined that Areas B and G are suitable for nearshore placement; Areas A, C, and F are not suitable for nearshore but are suitable for placement at the LA-3 ODMDS site. Areas D and E are not suitable for nearshore or LA-3 placement, and instead require disposal at an upland landfill.

F. Description of the Proposed Nearshore Disposal Site: A description of the nearshore disposal site is documented in Section 3.4.3 of the attached draft EA.

Brief Summary: The nearshore disposal site is located approximately 3,000 feet southeast of the south jetty at the mouth of the Santa Ana River, offshore of the westernmost portion of the groin field. The rectangular disposal area is approximately 1,000 feet by 200 feet and 4.6 acres, and the center of the disposal area lies approximately 800 feet offshore. Dredged material will be placed in the nearshore environment in waters -16 to -22 feet Mean Lower Low Water (MLLW). This disposal site has been used for previous Corps dredging projects including Santa Ana River Dredging and Upper Newport Bay Dredging.

Approximately 24,000 cy of material would be disposed of in the nearshore during this dredging operation.

G. Description of Disposal Method: The disposal method is described in Section 3.4.3 of the attached draft EA.

Brief Summary: For nearshore disposal, the contractor may elect to transport the material using the offshore barge and scows, or use pipeline placed along the beach. For the barge/scow option, the pipeline would continue adjacent the South Jetty directly out to sea to the barge. The scow would then transport the material to the nearshore disposal site.

For the pipeline option, additional pipeline would be laid along the beach, parallel to the shoreline for approximately 0.6 mile, and then offshore approximately 1,000 feet to the nearshore disposal site. If pipeline is placed along the beach, ramps would be built over the pipeline to maintain pedestrian and vehicle crossing along the length of the pipeline. The pipeline along the beach would be removed after disposal in the nearshore is complete.

III. FACTUAL DETERMINATIONS.

A. Disposal Site Physical Substrate Determinations:

1. Substrate Elevation and Slope:

Impact: _____N/A __X__INSIGNIF. _____SIGNIF. __5.1__ EA Section

2. Sediment Type:

Impact: _____N/A __X__INSIGNIF. _____SIGNIF. __3.4.1__ EA Section

3. Dredged/Fill Material Movement:

Impact: _____N/A __X__INSIGNIF. _____SIGNIF. __5.1__ EA Section

Modifications to the existing bottom topography of the nearshore disposal area would be expected as a result of the proposed project. Local, but minor, changes to the bathymetry would result due to deposition of sediments in the nearshore.

The disposal site is at depths of -16 to -22 feet MLLW, the most desirable location for the purposes of beach nourishment. Sediments deposited in the nearshore would dissipate over time via wave action, eventually washing onto and replenishing the beach. The proposed discharge in nearshore waters would result in temporary beach accretion, resulting in probable increases in recreational use.

The San Pedro Littoral Cell is severely depleted of natural sediment inputs, and discharge of dredged materials in the nearshore waters would provide much needed sediment to the system.

4. Physical Effects on Benthos (burial, changes in sediment type, composition, etc.):

Impact: _____N/A __X__INSIGNIF. _____SIGNIF. __5.2__ EA Section

5. Actions taken to Minimize Impacts

Needed?: _X___YES _____NO

If Needed, Taken:

____N/A __X__YES _____NO

Benthic invertebrates shall be sampled in the month prior to and quarterly during the year after construction to survey for re-colonization. If the benthic invertebrate community has not recovered, the Corps would further coordinate with the resource agencies to evaluate causes of decline, and develop plans for additional monitoring and/or remediation as necessary.

B. Effect on Water Circulation, Fluctuation, and Salinity Determinations:

1. Effect on Water. The following potential impacts were considered:

a. Salinity __X_ N/A_____INSIGNIF._____SIGNIF.

b. Water Chemistry (pH, etc.) _____N/A__X__INSIGNIF._____SIGNIF.
c. Clarity _____N/A__X__INSIGNIF._____SIGNIF.
d. Color _____N/A__X__INSIGNIF._____SIGNIF.
e. Odor _____N/A__X__INSIGNIF._____SIGNIF.
f. Taste __X__N/A_____INSIGNIF._____SIGNIF.
g. Dissolved gas levels _____N/A__X__INSIGNIF._____SIGNIF.
h. Nutrients _____N/A__X__INSIGNIF._____SIGNIF.
i. Eutrophication_X__N/A____INSIGNIF._____SIGNIF.
j. Others __X__N/A_____INSIGNIF._____SIGNIF.

Temporary physical and chemical changes in water quality characteristics would result due to re-suspension of bottom sediments during dredging activities. However, since contaminant levels for all dredge areas were within acceptable limits, impacts to water quality due to contaminants during dredging activities are expected to be minimal and not significant.

Due to the fine sediments present in the Marsh, dredging activities would impact turbidity levels. Increases in turbidity would be localized and short term. Connections to the Marsh channels (via the tide gate and culverts) would be blocked during dredging to keep a consistent water level in the Marsh. This would prevent much of the turbidity from entering the Santa Ana River and northern Marsh. Water from the Marsh would only be released during extended periods of inactivity, during which time turbidity levels are expected to decrease as sediments settle. Dredging would occur for approximately four months, and would only occur Monday through Saturday during daytime hours. Turbidity levels would decrease during non-activity at nights and on Sundays.

Disposal activities likely contribute only a small percentage of the total turbidity found in the nearshore environment when compared with that created by natural erosion of the beach, storm run-off from terrestrial habitats, and resuspension of solids by waves, currents, and maritime traffic. High levels of turbidity resulting from the disposal operations are usually restricted to the immediate vicinity of the disposal area and tend to dissipate rapidly. Dredge sediments to be disposed of in the nearshore are coarser grained and are expected to settle out of the water column quickly. Sediments were also found to be free of chemical contaminants. Therefore, the proposed nearshore disposal is not expected to cause significant changes in water quality.

Dredging, disposal, and construction activities would adhere to the requirements and controls set forth by the California Regional Water Quality Control Board and the 401 Water Quality Certification. Water quality monitoring would be performed during dredging, disposal, and construction operations to minimize impacts due to the implementation of the proposed project. These activities shall include monitoring of turbidity, dissolved oxygen, and pH. Section 8.0 in the draft EA discusses environmental commitments related to water quality monitoring.

2. Effect on Current Patterns and Circulation. The potential of discharge or fill on the following conditions were evaluated:

a. Current Pattern and Flow
_____N/A__X___INSIGNIF._____SIGNIF.
b. Velocity
_____N/A__X___INSIGNIF._____SIGNIF.
c. Stratification
_____N/A__X___INSIGNIF._____SIGNIF.
d. Hydrology Regime
_____N/A__X___INSIGNIF._____SIGNIF.

Removal of the accumulated sediments will increase tidal range and improve circulation of the tidal flow throughout the marsh, which will result in improved water quality and overall habitat quality for wildlife.

3. Effect on Normal Water Level Fluctuations. The potential of discharge of fill on the following were evaluated:

a. Tide __X__N/A _____INSIGNIF. _____SIGNIF.
b. River Stage __X__N/A _____INSIGNIF. _____SIGNIF.

4. Action Taken to Minimize Effects:
Mitigation measures minimize impacts. See Section 8.0 for Environmental Commitments.

C. Suspended Particulate/Turbidity Determinations at the Disposal Site:

1. Expected Change in Suspended Particulate and Turbidity levels in Vicinity of Disposal Site:
Impact: _____N/A __X__INSIGNIF. _____SIGNIF. _4.4, 5.4_ EA Section

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column:

a. Light Penetration
_____N/A __X__INSIGNIF._____SIGNIF. _4.4, 5.4_ EA Section

b. Dissolved Oxygen
_____N/A __X__INSIGNIF._____SIGNIF. _4.4, 5.4_ EA Section

c. Toxic Metals & Organics
__X__N/A _____INSIGNIF._____SIGNIF.

d. Pathogen

__X__N/A _____INSIGNIF._____SIGNIF.

e. Esthetics
_____N/A __X__INSIGNIF._____SIGNIF. __4.4, 5.4__ EA Section

3. Effects of Turbidity on Biota: The following effects of turbidity on biota were evaluated:

a. Primary Productivity
_____N/A __X__INSIGNIF.___SIGNIF. __4.2, 4.4, 5.2, 5.4__ EA Section

b. Suspension/Filter Feeders
_____N/A __X__INSIGNIF.___SIGNIF. __4.2, 4.4, 5.2, 5.4__ EA Section

c. Sight feeders
___N/A _X_INSIGNIF.___SIGNIF. 4.2, 4.3, 4.4, 5.2, 5.3, 5.4 EA Section

4. Action Taken to Minimize Effects:
Mitigation measures minimize impacts. See Section 8.0 for Environmental Commitments.

D. Contaminant Determination:

The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material.

1. Physical characteristics of the sediment.

2. Chemical Analysis of sediment samples collected January to March 2011

3. Results from previous testing of the material or similar material in the vicinity of the project.

An evaluation of the appropriate information above indicates that the proposed dredge or fill material is not expected to be a carrier of contaminants.

The material meets the testing exclusion criteria.

YES__X__NO_____

Impact: _____N/A__X__INSIGNIF._____SIGNIF.

E. Effect on Aquatic Ecosystem and Organism Determinations: The Following ecosystem effects were evaluated:

1. On Plankton
_____N/A__X__INSIGNIF._____SIGNIF. __4.2, 5.2__ EA Section

2. On Benthos
_____N/A__X__INSIGNIF._____SIGNIF. __4.2, 5.2_ EA Section

3. On Nekton
_____N/A__X__INSIGNIF._____SIGNIF. __4.2, 5.2_ EA Section

4. Food Web
_____N/A__X_ INSIGNIF._____SIGNIF. __4.2, 5.2_ EA Section

5. Sensitive Habitats:
   a. Sanctuaries, refuges
      __X__N/A_____INSIGNIF._____SIGNIF.
   b. Wetlands
      __-__N/A__X___INSIGNIF._____SIGNIF.
   c. Mudflats
      __-__N/A__X___INSIGNIF._____SIGNIF.
   d. Eelgrass beds
      __-__N/A__X___INSIGNIF._____SIGNIF.
   e. Riffle and Pool Complexes
      __X__N/A_____INSIGNIF._____SIGNIF.

6. Threatened & Endangered Species
   _____N/A__X__INSIGNIF._____SIGNIF. __4.3, 5.3_ EA Section

7. Other Wildlife (grunion)
   _____N/A__X__INSIGNIF._____SIGNIF. __4.2, 5.2_ EA Section

F. Proposed Disposal Site Determinations: Is the mixing zone for each disposal site confined to the smallest practicable zone?

__X__YES _____NO

G. Determination of Cumulative Effects of Disposal or Fill on the Aquatic Ecosystem:

Impacts: _____N/A__X__INSIGNIF._____SIGNIF.

No significant cumulative adverse effects on the aquatic ecosystem are expected.

H. Determination of Indirect Effects of Disposal or Fill on the Aquatic Ecosystem:

Impacts: _____N/A___X__INSIGNIF._____SIGNIF.

IV. FINDING OF COMPLIANCE.

A. A review of the proposed project indicates that:

1. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose.

__X__YES _____NO

2. The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and 3) violate requirements of any Federally designated marine sanctuary.

__X__YES _____NO

3. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values.

__X__YES _____NO

4. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

__X__YES _____NO

B. On the Basis of the Guidelines, the Proposed Disposal Sites for the Discharge of Dredged or Fill Material is (select one):

___X___ (1) Specified as complying with the requirements of these guidelines; or,

_______ (2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem;or,

_______ (3) Specified as failing to comply with the requirements of these guidelines.

Prepared by: Erin Jones
Name

Environmental Coordinator/Biologist
Position

Date: July 16, 2012

Appendix E: Response to Comments

Comments from National Marine Fisheries Service
May 18, 2012

1) Vegetated marsh habitat, mudflats, and shallow subtidal soft bottom habitat will be impacted by the proposed project. In order to improve the quantity and quality of fish habitat, NMFS frequently supports projects that increase tidal circulation and subtidal habitat. However, due to the context of this project, NMFS believes a more sensitive maintenance approach is warranted. Water quality within the marsh has not yet been impacted by existing sedimentation levels. The restoration site has matured 20 years, provides a number of wetland functions, provides avian habitat, and, to a lesser extent, fishery habitat. Although dredging would increase the subtidal area available for estuarine dependent fish species, it would be at the expense of mudflat and vegetated marsh habitat. Some dredging may be appropriate, but, given the existing values provided by the marsh, disturbance should be minimized. NMFS believes the benefits of reducing the dredging footprint outweigh the benefits of returning marsh to its original design. Therefore, NMFS recommends that the Corps consult with NMFS, USFWS, and other relevant stakeholders on an alternative dredging approach that would minimize impacts to existing resources.

   Response: The Corps has coordinated with USFWS and has agreed to pull back the dredge footprint three feet from vegetated banks in order to minimize impacts to vegetated marsh and mudflat habitats. This will also allow for some preservation of the invertebrate community in this area, which supports foraging for a variety of birds including the light-footed clapper rail.

2) A basic monitoring program is described in the EA, but it lacks sufficient detail to determine whether it will be capable of accurately characterizing functional change and/or recovery. Therefore, NMFS recommends that the Corps consult with NMFS, USFWS, and other relevant stakeholders on an appropriate monitoring plan.

   Response: The Corps will continue to coordinate with USFWS and NMFS to outline the details of monitoring in the Marsh.

Comments from U.S. Fish and Wildlife Service
May 17, 2012

1) Light-Footed Clapper Rail: Although the water quality within the marsh has not been impacted by the existing sedimentation levels (Draft EA, page 31), the proposed project will benefit the clapper rail by increasing tidal exchange before sedimentation occurs to an extent that water quality is compromised. While acknowledging the benefits of reestablishing tidal flow to maintain water quality in the Santa Ana River marsh, we are concerned that the proposed project also has the potential to adversely affect clapper rail.

   [See attached letter for additional text]

Response: Based on continued coordination with the USFWS, the Corps has revised the determination to reflect that the proposed project may affect, but is not likely to adversely affect the light-footed clapper rail. Cordgrass habitat would be removed in Marsh channels in the southern portion of the Marsh, however all work would be performed outside the breeding season and known occupied cordgrass habitat would be avoided. To further minimize impacts the Corps agrees to modify the dredge footprint and pull back 3 feet from vegetated banks, based on observations in the field and coordination with USFWS.

2) California Least Tern: The Draft EA concludes that the project will have no effect on least terns, in part because the nest site in the marsh is currently overgrown with vegetation and is not supporting least tern nesting (page 47). Actually, the project may have a beneficial effect on least terns because the proposed clearing and grubbing of the nest site will provide additional nesting habitat and may attract least terns to the site. To avoid potential adverse effects on least terns, we recommend the proposed project also include repair of the fencing around the nest site. The Santa Ana River marsh is located immediately adjacent to residences. Consequently, there is an abundance of potential predators on least terns in the immediate vicinity (e.g., dogs, cats, opossums, raccoons).

   Currently, the fencing around the nest site has large holes at the bottom that provide easy access for predators. Preparing the site for nesting without also ensuring that predators cannot enter the nest site has the potential to result in harm to least terns by attracting individuals to a nesting site with heavy predation pressure. Provided that fencing repair is included as part of the project, we will concur with a Corps determination that the project may affect, but is not likely to adversely affect least tern.

   Response: Although the original marsh and island construction, and a subsequent island maintenance project did not require formal or informal consultation, the Corps has agreed to revise the determination to reflect that the proposed project may affect, but is not likely to adversely affect the California least tern. The proposed project would beneficially affect the tern via the removal of vegetation on the top of the 7-acre sand capped least tern island, which would improve nesting habitat. The Corps has also agreed to repair holes in the fencing surrounding the island to further benefit the tern.

3) Contaminated Sediment: Based on the results of sediment testing (Draft EA, Appendix B), the project includes disposal of approximately 25,000 cubic yards of contaminated sediment at an upland landfill. The Corps proposes to dike the contaminated areas, pump the water from the areas and then use a drying agent (e.g., fly ash, quicklime, or cement) to remove adequate water from the material to meet the moisture content requirements for landfill disposal. We are concerned that *in situ* application of drying agents could result in lasting impacts to benthic invertebrates within the marsh should drying agent be missed during excavation and/or leach into adjacent marsh habitat during application. Although the project includes one year of post-project monitoring (PH and invertebrate re-colonization) and remediation of the project area, as necessary, remediation will likely require additional disturbance to sensitive marsh habitats. The *in situ* use of drying agents will introduce caustic and toxic material into an area where the sediment appears to have

only low concentrations of contaminants. To avoid introduction of additional contaminants into the marsh, we recommend materials are transported to a designated contained area prior to mixing with the proposed drying agents.

Response: The Final EA will be revised to specify that a drying additive "may" be needed, and if so, it would be mixed with excavated sediments at an on-site material handling site. The site consists of 0.8 acres between the Marsh channel and the existing access road, and would be used for excavated material handling, storage, and staging. If the contractor elects to use a drying additive, the contractor will be required to mix the dredge sediments with the drying additive within the material handling site. The drying additive will be mixed in slurry form to reduce airborne dust. The drying additive will then be removed with the dredge sediments. Additionally, the material handling site will be required to contain all dredge sediments so that no drying additive will leach into the surrounding environment.

Comments from Regional Water Quality Control Board, Santa Ana Region
<u>May 10, May 17, 2012</u>

1) [See attached e-mails for text of comments]

   Response: We concur and have continued to coordinate with the RWQCB on specific measures to address their comments, as documented in the Draft 401 Water Quality Certification.

Comments from Native American Heritage Commission
<u>May 11, 2012</u>

1) [See attached letter for text of comments]

Response: Thank you for your comments. The Corps is in compliance with Section 106 of the National Historic Preservation Act of 1966 and the project areas have been previously disturbed, in the Marsh area during its creation in 1992 and in the nearshore area during previous dredge disposal activities in the recent past.

Jones, Erin L SPL

From: Adam Obaza [adam.obaza@noaa.gov]
Sent: Friday, May 18, 2012 11:11 AM
To: Jones, Erin L SPL
Cc: Christine_Medak@fws.gov
Subject: Santa Ana River Marsh Dredging Project

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Erin,

NOAA's National Marine Fisheries Service (NMFS) has reviewed the U.S. Army Corps of Engineers (Corps) draft Environmental Assessment (EA) for dredging activities in the Santa Ana marsh and disposal in the nearshore area of Newport Beach, California. NMFS offers the following comments pursuant to our Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) responsibilities.

Vegetated marsh habitat, mudflats, and shallow subtidal soft bottom habitat will be impacted by the proposed project. In order to improve the quantity and quality of fish habitat, NMFS frequently supports projects that increase tidal circulation and subtidal habitat. However, due to the context of this project, NMFS believes a more sensitive maintenance approach is warranted. Water quality within the marsh has not yet been impacted by existing sedimentation levels. The restoration site has matured 20 years, provides a number of wetland functions, provides avian habitat, and, to a lesser extent, fishery habitat. Although dredging would increase the subtidal area available for estuarine dependent fish species, it would be at the expense of mudflat and vegetated marsh habitat. Some dredging may be appropriate, but, given the existing values provided by the marsh, disturbance should be minimized. NMFS believes the benefits of reducing the dredging footprint outweigh the benefits of returning marsh to its original design. Therefore, NMFS recommends that the Corps consult with NMFS, USFWS, and other relevant stakeholders on an alternative dredging approach that would minimize impacts to existing resources.

A basic monitoring program is described in the EA, but it lacks sufficient detail to determine whether it will be capable of accurately characterizing functional change and/or recovery. Therefore, NMFS recommends that the Corps consult with NMFS, USFWS, and other relevant stakeholders on an appropriate monitoring plan.

Please feel free to contact me at (562)980-4044, or via email if you have any questions concerning this EFH consultation or require additional information. Thank you for consulting with NMFS.

--
Adam Obaza
Habitat Conservation Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-OR-12B0198-12TA0338

MAY 17 2012

Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
Los Angeles, California 90053-2325

Attention: Ms. Erin Jones, Project Environmental Coordinator

Subject: Draft Environmental Assessment for the Santa Ana River Marsh Dredging Project, City of Newport Beach, Orange County, California

Dear Dr. Axt:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (EA) for the above-referenced project received April 20, 2012. The proposed project includes dredging of approximately 77,000 cubic yards of sediment and improving a nest site for the federally endangered California least tern (*Sternula antillarum browni*, least tern) in the Santa Ana River Marsh. The project area is located within a 92-acre restoration site, completed by the Corps in 1992 as part of the Santa Ana River Project. The restoration project was designed to improve the quality of habitat in the existing marsh by increasing tidal exchange, providing additional shallow water foraging habitat for least terns and increasing the likelihood that the area would support resident populations of the federally endangered light-footed clapper rail (*Rallus longirostris levipes*, clapper rail) and state endangered Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) (Corps 1988, page SEIS-V-68). The proposed project would restore tidal exchange to as-built conditions within approximately 16 acres of the southern portion of the restoration site.

We offer the following comments and recommendations regarding project-associated biological impacts based on our review of the draft EA. These comments are provided pursuant to our responsibilities under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

1. <u>Light-Footed Clapper Rail:</u> Although the water quality within the marsh has not been impacted by the existing sedimentation levels (Draft EA, page 31), the proposed project

will benefit the clapper rail by increasing tidal exchange before sedimentation occurs to an extent that water quality is compromised. While acknowledging the benefits of reestablishing tidal flow to maintain water quality in the Santa Ana River marsh, we are concerned that the proposed project also has the potential to adversely affect clapper rail. The Draft EA (page 47) concludes the proposed project will have no effects on clapper rail because it will be conducted outside of the clapper rail breeding season and will avoid known occupied habitat. We disagree with the Corps determination that the project will have no effect on clapper rails and recommend that the Corps initiate formal consultation with the Service pursuant to section 7 of the Endangered Species Act if adverse effects to clapper rail cannot be avoided or initiate informal consultation with the Service if adverse effects can be avoided.

The project area was occupied by a pair of clapper rails in 2011, and the project will impact clapper rail habitat. Six pairs of clapper rails were observed in the Santa Ana River marsh in 2011, including 5 pairs in the northern marsh and 1 pair in the southern marsh, where the proposed project will occur. Increased noise and human activity levels in southern marsh may degrade the quality of occupied habitat by impairing the ability of clapper rails to communicate with each other and to forage in the open. The Draft EA concludes that the northern marsh will provide adequate foraging habitat for the 6 pairs of clapper rails during the project; however, we are concerned that the manipulation of water levels in the marsh during dredging may affect the availability of foraging habitat in the northern marsh. In the Final EA, we request that the Corps clarify the expected availability of foraging habitat for clapper rails in the northern marsh during project construction.

The proposed project is anticipated to impact 0.33 acre of cordgrass (*Spartina foliosa*) and an unspecified amount of pickleweed (*Salicornia virginica*), but will avoid vegetation within an area identified as occupied clapper rail habitat in the southern marsh (i.e., Draft EA, Figure 13 "Southern Marsh Occupied Habitat"). Clapper rails primarily nest in dense, tall cordgrass and occasionally in pickleweed (Massey *et al.* 1984); however, they also require shallow water and mudflats for foraging (Zeiner *et al.* 1990). Clapper rails in Upper Newport Bay have been documented to have territory sizes ranging from 0.89-4.10 acres (Zembal *et al.* 1989). The area proposed for avoidance is less than half the size of the smallest territory documented in Upper Newport Bay, indicating that the clapper rail pair likely occupies a larger area than is defined in the Draft EA. The proposed project does not avoid the shallow water and mudflat foraging habitat required by this pair. We expect foraging to occur in all parts of the salt marsh, with efforts concentrated at lower elevations when the tide is out, and higher elevations as the tide advances (Service 2009, page 8). Cordgrass throughout the marsh likely provides cover during foraging excursions.

Clapper rails were first documented in the Santa Ana River marsh in 2006 (Draft EA, page 27), 14 years after completion of the restoration project. The relatively recent occupation of the species within the project area indicates that habitat has become gradually more suitable for clapper rails as dense cordgrass, and shallow water/mudflat foraging habitat has established. Although the Corps anticipates that cordgrass will re-establish in the marsh over time, it is not clear how long re-establishment is expected to take or whether adequate elevations for cordgrass establishment will be available in the dredge footprint following completion of the project. Excavation of the channel will steepen its banks and lower its depth, which will decrease the potential for cordgrass establishment. In addition, channel excavation will decrease the amount of mudflat habitat within the channel that is exposed for foraging at low tides. Alteration of the channel's morphology may result in a change in prey availability and will result in a loss of foraging habitat for the clapper rail.

To avoid adverse effects to the clapper rails from removal of their habitat, we recommend the Corps reduce the dredging footprint of the proposed project. Confining the dredging footprint to a minimum of 3 to 4 feet from the vegetated banks would reduce impacts to cordgrass, pickleweed and shallow water/mudflat foraging habitat. Because Belding's savannah sparrows nest in pickleweed, they would also benefit from a reduction in impacts to their nesting habitat. Benthic invertebrates that are left in sediment outside the dredge footprint would be available to rapidly re-colonize the impact area following completion of the project. Water quality within the marsh has not been compromised by the existing sedimentation levels (Draft EA, page 31); therefore, we believe the benefits of reducing the dredging footprint for the clapper rail and other marsh species outweigh the benefits of returning the marsh to its original design dimensions. We are available to assist in the development of a dredging footprint that will avoid adverse effects to clapper rail.

2. <u>California Least Tern:</u> The Draft EA concludes that the project will have no effect on least terns, in part because the nest site in the marsh is currently overgrown with vegetation and is not supporting least tern nesting (page 47). Actually, the project may have a beneficial effect on least terns because the proposed clearing and grubbing of the nest site will provide additional nesting habitat and may attract least terns to the site. To avoid potential adverse effects on least terns, we recommend the proposed project also include repair of the fencing around the nest site. The Santa Ana River marsh is located immediately adjacent to residences. Consequently, there is an abundance of potential predators on least terns in the immediate vicinity (e.g., dogs, cats, opossums, raccoons). Currently, the fencing around the nest site has large holes at the bottom that provide easy access for predators. Preparing the site for nesting without also ensuring that predators cannot enter the nest site has the potential to result in harm to least terns by attracting individuals to a nesting site with heavy predation pressure. Provided that fencing repair

is included as part of the project, we will concur with a Corps determination that the project may affect, but is not likely to adversely affect least tern.

3. Contaminated Sediment: Based on the results of sediment testing (Draft EA, Appendix B), the project includes disposal of approximately 25,000 cubic yards of contaminated sediment at an upland landfill. The Corps proposes to dike the contaminated areas, pump the water from the areas and then use a drying agent (e.g., fly ash, quicklime, or cement) to remove adequate water from the material to meet the moisture content requirements for landfill disposal. We are concerned that *in situ* application of drying agents could result in lasting impacts to benthic invertebrates within the marsh should drying agent be missed during excavation and/or leach into adjacent marsh habitat during application. Although the project includes one year of post-project monitoring (pH and invertebrate re-colonization) and remediation of the project area, as necessary, remediation will likely require additional disturbance to sensitive marsh habitats. The *in situ* use of drying agents will introduce caustic and toxic material into an area where the sediment appears to have only low concentrations of contaminants. To avoid introduction of additional contaminants into the marsh, we recommend materials are transported to a designated contained area prior to mixing with the proposed drying agents.

We appreciate the opportunity to comment on the Draft Environmental Assessment for the Santa Ana River Marsh Dredging Project. Should you have any questions pertaining to these comments, please contact Christine Medak of my staff at (760) 431-9440, extension 298.

Sincerely,

Jonathan Snyder

for Karen A. Goebel
Assistant Field Supervisor

cc:
Adam Obaza, National Marine Fisheries Service
Loni Adams, California Department of Fish and Game
Larry Simon, California Coastal Commission
Michael Lyons, Regional Water Quality Control Board

Literature Cited

Corps (U.S. Army Corps of Engineers). 1988. Santa Ana River Design Memorandum No. 1 Phase II GDM on the Santa Ana River Maintstem including Santiago Creek. Main Report & Supplemental Environmental Impact Statement. August 1988.

Massey, B.W., R. Zembal, and P.D. Jorgensen. 1984. Nesting habitat of the light-footed clapper rail in southern California. Journal of Field Ornithology 55:67-80.

Service (U. S. Fish and Wildlife Service). 2009. Light-footed clapper rail (*Rallus longirostris levipes*) 5-Year Review: Summary and Evaluation. Prepared by the Carlsbad Fish and Wildlife Office, Carlsbad, California. August 10, 2009.

Zeiner, D.C., W.F. Laudenslayer, K.E. Mayer, and M. White, eds. 1990. California's Wildlife: Volume II - Birds. California Department of Fish and Game, Sacramento, California.

Zembal, R., B.W. Massey, and J.M. Fancher. 1989. Movements and activity patterns of the light-footed clapper rail. Journal of Wildlife Management 53:39-42.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-OR-12B0198-12I0472

JUL 19 2012

Ms. Hayley Lovan
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
Los Angeles, California 90053-2325

Subject: Informal Section 7 Consultation for the Santa Ana River Marsh Dredging Project in Orange County, California

Dear Ms. Lovan:

On July 9 and July 16, 2012, we received e-mails from the U.S. Army Corps of Engineers (Corps) requesting initiation of informal consultation on the proposed Santa Ana River Marsh dredging project, in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.). The Corps' e-mails requested our concurrence that the proposed project is not likely to adversely affect the federally endangered light-footed clapper rail (*Rallus longirostris levipes*, "clapper rail") and California least tern (*Sternula antillarum browni*, "least tern") and the federally threatened western snowy plover (*Charadrius alexandrinus nivosus*, "snowy plover").

DESCRIPTION OF THE PROPOSED ACTION

The proposed project includes dredging of approximately 77,000 cubic yards of sediment and improving a nest site for the least tern in the Santa Ana River Marsh through removal of vegetation that has grown over the site. The project area is located within a 92-acre restoration site, completed by the Corps in 1992 as part of the Santa Ana River Project. The proposed project is designed to improve the quality of habitat in the existing marsh by increasing tidal exchange, providing additional shallow water foraging habitat for least terns, and increasing the likelihood that the area would support resident populations of the clapper rail and State endangered Belding's savannah sparrow (*Passerculus sandwichensis beldingi*). The proposed project would restore tidal exchange to as-built conditions within approximately 16 acres of the southern portion of the restoration site.

Avoidance and minimization measures are included in the Draft Environmental Assessment for the proposed project and in e-mails from the Corps to the U.S. Fish and Wildlife Service dated July 9 and July 16, 2012. These measures include, but are not limited to, the following:

- Conducting construction activities outside the breeding season for clapper rail and least tern (i.e., outside the period from March 15 through September 15);

- Monitoring of construction activities by a qualified biologist to ensure that there are no unanticipated impacts to federally listed species;
- Weeding of temporarily impacted habitat and restoration with appropriate native vegetation if temporarily impacted areas do not recover within a year;
- Conducting pre and post-dredge surveys to document acreage and location of cordgrass impacted by construction activities;
- Monitoring re-establishment of cordgrass following construction. If cordgrass does not re-establish, planting may be performed in areas of suitable channel depth;
- Monitoring of benthic invertebrates and water quality before, during, and after project construction;
- Repairing holes in fencing surrounding the tern nesting site;
- Creating and avoiding a 3-foot buffer between the vegetated banks and the dredge footprint to minimize potential impacts to clapper rail habitat along the banks;
- Moving contaminated sediment to a designated site outside the channel before applying drying agents and transporting the sediment to a landfill; the handling site will contain all dredge sediment so that no drying agents or contaminants will leach into the surrounding environment;
- Training equipment operators to drive slowly and avoid birds, including snowy plovers, that are foraging and roosting on the beach.

EFFECTS OF THE ACTION

Least tern

The proposed project will have a beneficial effect on least tern habitat by maintaining tidal flows in the Santa Ana River Marsh, removing vegetation on the island that was designed as a least tern nesting site, and repairing the fencing surrounding the nesting site. These actions are anticipated to maintain fish populations in the marsh, improve the attractiveness of the nesting site for least terns, and minimize the potential for predation and the risk that least tern chicks will become entangled in broken fencing. Construction will be conducted outside the least tern nesting season, so no disturbance of least tern breeding activities is anticipated.

Clapper rail

The proposed project will help maintain the tidal flow within the marsh that is necessary to support cordgrass, the preferred habitat for clapper rails, but it will result in short-term minor impacts to individuals and their habitat. Construction will be conducted outside the clapper rail breeding season, so there will be no disturbance of clapper rail breeding as a result of noise and construction activity. Construction activity is likely to disturb clapper rails during the non-breeding season, but clapper rails are anticipated to continue to shelter and forage in remaining habitat in the Santa Ana River Marsh, although they may shift their use area to locations that are not immediately adjacent to dredging activities.

Dredging will remove a small amount (0.33 acre) of cordgrass that may occasionally be used as foraging or sheltering habitat by clapper rails. However, the primary use area for clapper rails in the southern portion of the marsh appears to be centered around a larger patch of cordgrass that will not be impacted by the project. In addition, the project could result in minor degradation of upland habitat adjacent to channels where the dredging occurs. However, the Corps will establish and avoid a 3-foot buffer between the vegetated banks and the dredge footprint to minimize potential impacts to clapper rail habitat along the banks. With the incorporation of measures to minimize potential impacts to clapper rail habitat, we anticipate that the project will result in only short-term minor impacts to clapper rail habitat and that sufficient resources will remain for essential breeding, feeding, and sheltering behaviors.

Snowy plovers

Snowy plovers loaf and forage on the beaches in the project site during winter months when the project will take place. However, equipment operators will be trained to watch for and avoid foraging and loafing plovers to minimize the potential for individuals to be killed or injured. In addition, there is ample loafing and foraging habitat in the Santa Ana River Marsh to the north and at the mouth of the Santa Ana River to the south. Therefore, snowy plovers are anticipated to shift their use area to avoid construction activity, but this is not anticipated to substantially impact their essential feeding and sheltering behaviors. The project may also temporarily impact some of the sandy deposits that the snowy plovers use for foraging and loafing, but many of the sandy deposits are anticipated to remain following project implementation, and snowy plovers will continue to forage and loaf in habitat to the north and at the mouth of the Santa Ana River.

Based on the preceding analysis, we concur with your determination that the proposed action is not likely to adversely affect clapper rails or least terns. With our concurrence, the interagency consultation requirements of section 7 of the Act have been satisfied. Although this ends informal consultation, obligations under section 7 of the Act shall be reconsidered if (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (2) this action is subsequently modified in a manner that was not considered in this assessment, or (3) a new species is listed or critical habitat designated that may be affected by the action.

We thank you for your coordination on this project and your efforts to avoid and minimize potential effects to federally listed species. If you have any questions regarding this consultation, please contact Fish and Wildlife Biologist Christine Medak at 760-431-9440, extension 298.

Sincerely,

Jonathan Snyder

for Karen A. Goebel
Assistant Field Supervisor

Jones, Erin L SPL

From: Glenn Robertson [grobertson@waterboards.ca.gov]
Sent: Thursday, May 10, 2012 3:38 PM
To: Jones, Erin L SPL
Cc: Doug Shibberu; Mark Adelson; Marc Brown; Wanda Cross
Subject: Comment on Santa Ana River Marsh Dredging Project, SCH# 2012044004
Attachments: Robertson, Glenn.vcf

Follow Up Flag: Follow up
Flag Status: Flagged

To Erin Jones, U.S. Army Corps of Engineers:

Regional Board staff have reviewed the proposed Santa Ana River Marsh Dredging Project Draft Environmental Assessment (DEA), Newport Beach (SCH# 2012044004, received April 20, 2012, deadline for comments May 18, 2012), and have received the Corps' application for the Project's required Clean Water Act Section 401 Certification (Certification). The following comments on the EA may be entered into the public record for subsequent response:

1. Regional Board staff cannot issue the Certification until we have received the Final Environmental Assessment (FEA) and the Final Finding of No Significant Impact (FONSI), and then have had an opportunity to review these documents. We understand that your office has required our acknowledgment of the Certification application's completeness by early June, and issuance of the Certification itself by early July, or the Corps will determine a prerogative to proceed without the Certification. However, we view it as a breach of procedure if the EA is not finalized and submitted as the last portion of the Certification application.

2. Discussion of the small floating hydraulic dredge and cutterhead (p.11) does not include discussion of any applicable, attachable silt curtain around all or a portion of the dredge apparatus, in order to limit turbidity. Basin Plan turbidity limits have traditionally been part of dredging permits and Certifications issued by the Regional Board.

Pending review of the Final EA, we have no further comments at this time. We ask if you will accept the above comments in electronic form; please advise if we should reiterate the above in letter form and we will do so.

Thank you very much Erin. Glenn Robertson

Glenn Robertson, Engineering Geologist
CEQA Coordinator
California Regional Water Quality Control Board, Santa Ana Region (8)
3737 Main Street, Suite 500
Riverside, CA 92501-3348
(951) 782-3259
Fax (951) 781-6288
Email grobertson@waterboards.ca.gov
Website: www.waterboards.ca.gov/santaana

Jones, Erin L SPL

From: Glenn Robertson [grobertson@waterboards.ca.gov]
Sent: Thursday, May 17, 2012 2:08 PM
To: Jones, Erin L SPL
Cc: Lovan, Hayley J SPL; Doug Shibberu; Mark Adelson; Marc Brown; Wanda Cross
Subject: RE: Comment on Santa Ana River Marsh Dredging Project, SCH# 2012044004

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Erin, as before thank you for soliciting any additional comments. Regional Board staff do have some more considerations that I have compiled and which you may wish to include/ address in the Final EA/FONSI:

1. Discoloration, floating pollutants. We may include a condition in the Certification that applies and quantifies the Ocean Plan's narrative, qualitative requirements with regard to any dewatering of sediments at the offshore barge, which we understand could occur and then, could occur nearshore. Of course, some beach deposition out of the littoral/surf zones is part of the proposed operation and the discoloration topic needs to be worked into your planning....

.....We are aware that you are working on this subject through your 404(b)(1) and coastal zone management consistency guidelines. It is possible that we may quantify a distance from the barge in which any discoloration (from floating particulates, grease, oil) must not be visible and at any rate does not reach the surfzone. Further, "natural light shall not be significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste" and "the rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded."

2. BacT. We may condition that the Ocean Plan bacteria standards be monitored for, given potential beach impacts by the Project, either by Corps staff or through coordination with the Orange County Environmental Health Care Agency ongoing program. There may be pathogen indicator bacteria (PIB) monitoring triggered by the deposition of spoils as beach replenishment. This will be certain if elevated PIB was found in portions of the marsh sediments.

I wanted to provide this so that you have no surprises, and details can be worked out with your office in the coming weeks/months. Thank you.

>>> "Jones, Erin L SPL" <Erin.L.Jones@usace.army.mil> 5/14/2012 10:36 AM
>>> >>>
Hi Glenn,

Thank you for your e-mail. We understand that RWQCB cannot complete the application processing until the EA is finalized, however we would appreciate your review of the draft EA and application to ensure everything is included before we get too far along in the process. This would greatly expedite the WQC timeline and ensure that we can start and end the project outside the nesting season for sensitive species.

We will incorporate your comment regarding silt curtains in the project description for the Final EA, and update the environmental commitments to include this measure. Please let me know if you have any additional comments on the Drat EA and application to allow us to speed up the application review process.

We gladly accept comments in electronic form. Please feel free to submit any further comments electronically as well.

Thanks again for your timely response.

Sincerely,

Erin L. Jones
Staff Biologist, Ecosystem Planning Section US Army Corps of Engineers Los Angeles District
CESPL-PD-RN
(213) 300-9723 (cell)
erin.l.jones@usace.army.mil
P Please consider the environment before printing this email.

-----Original Message-----
From: Glenn Robertson [mailto:grobertson@waterboards.ca.gov]
Sent: Thursday, May 10, 2012 3:38 PM
To: Jones, Erin L SPL
Cc: Doug Shibberu; Mark Adelson; Marc Brown; Wanda Cross
Subject: Comment on Santa Ana River Marsh Dredging Project, SCH# 2012044004

To Erin Jones, U.S. Army Corps of Engineers:

Regional Board staff have reviewed the proposed Santa Ana River Marsh Dredging Project Draft Environmental Assessment (DEA), Newport Beach (SCH# 2012044004, received April 20, 2012, deadline for comments May 18, 2012), and have received the Corps' application for the Project's required Clean Water Act Section 401 Certification (Certification). The following comments on the EA may be entered into the public record for subsequent response:

1. Regional Board staff cannot issue the Certification until we have received the Final Environmental Assessment (FEA) and the Final Finding of No Significant Impact (FONSI), and then have had an opportunity to review these documents. We understand that your office has required our acknowledgment of the Certification application's completeness by early June, and issuance of the Certification itself by early July, or the Corps will determine a prerogative to proceed without the Certification. However, we view it as a breach of procedure if the EA is not finalized and submitted as the last portion of the Certification application.

2. Discussion of the small floating hydraulic dredge and cutterhead (p.11) does not include discussion of any applicable, attachable silt curtain around all or a portion of the dredge apparatus, in order to limit turbidity. Basin Plan turbidity limits have traditionally been part of dredging permits and Certifications issued by the Regional Board.

Pending review of the Final EA, we have no further comments at this time. We ask if you will accept the above comments in electronic form; please advise if we should reiterate the above in letter form and we will do so.

Thank you very much Erin. Glenn Robertson

Glenn Robertson, Engineering Geologist
CEQA Coordinator
California Regional Water Quality Control Board, Santa Ana Region (8)
3737 Main Street, Suite 500

Riverside, CA   92501-3348
(951) 782-3259
Fax (951) 781-6288
Email grobertson@waterboards.ca.gov
Website: www.waterboards.ca.gov/santaana

July 17, 2012

Erin Jones
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, CA 90053

***REVISED DRAFT* CLEAN WATER ACT SECTION 401 WATER QUALITY STANDARDS CERTIFICATION FOR SANTA ANA RIVER MARSH DREDGING PROJECT, COUNTY OF ORANGE, CALIFORNIA (SARWQCB PROJECT NO. 302012-19)**

Dear Ms. Jones:

On May 7, 2012, we received an application for Clean Water Act Section 401 Water Quality Standards Certification ("Certification") from the U.S. Army Corps of Engineers (Corps) for the Santa Ana River Marsh Dredging Project. The Corps requested a reply by June 30, 2012, but later extended the deadline to July 31, 2012.

The purpose of the project is to remove accumulated sediment from tidal channels within the Santa Ana River Marsh. The Santa River Marsh is a 92-acre coastal salt marsh located adjacent to the mouth of the Santa Ana River, within the City of Newport Beach. The marsh was restored in 1992 as mitigation for impacts caused by the Corps' Santa Ana River Mainstem Project (a flood control project). The marsh's tidal channels have not been dredged since the site was first restored in 1992. Sediment accumulation over the past twenty years has reduced tidal flushing, leading to reduced water quality. Sedimentation also threatens habitat diversity by converting open water and intertidal habitat to marsh and upland habitat.

This letter responds to your request for certification that the proposed project, described in your application and summarized below, will comply with State water quality standards outlined in the Water Quality Control Plan for the Santa Ana River Basin (1995) (Basin Plan) and subsequent Basin Plan amendments:

Project Description: The project consists of the removal of approximately 77,000 cubic yards of accumulated sediment from Santa Ana River Marsh using a hydraulic dredge and an excavator. Approximately 23,000 cubic yards of dredged sediment will be placed in the nearshore zone off Newport Beach. Another 30,000 cubic yards will be disposed of at the U. S. Environmental Protection Agency's (U.S. EPA) LA-3 Ocean Dredged

Material Disposal Site. The remaining 24,000 cubic yards will be disposed of at an upland landfill. The project will take place largely within the city of Newport Beach, California (33°37'53.82"N/ 117°57'11.40"W).

Dredged sediment destined for disposal at LA-3 will be pumped from the hydraulic dredge to a staging site in the ocean just outside the surf zone, where the sediment will be transferred to scows for transport to the LA-3 site. Dredged sediment for nearshore placement will be delivered by pipeline or by a combination of pipeline and scows.

Receiving water: 1. Santa Ana River Marsh
2. Pacific Ocean
(a) 4.6-acre disposal zone centered 800 feet offshore, located 3,000 feet southeast of Santa Ana River mouth south jetty
(b) LA-3 Ocean Dredged Material Disposal Site administered by U.S. EPA

Fill area: 16 acres of temporary impact to wetland habitat (10,200 linear feet)
4.6 acres of temporary impact to ocean

Dredge/Fill volume: 77,000 cubic yards (Dredge)

Federal permit: Not applicable for U.S. Army Corps projects

You have proposed to mitigate water quality impacts as described in your Certification application. The proposed mitigation is summarized below:

Onsite Water Quality Standards Mitigation Proposed:

- Corps will implement measures recommended by USFWS to mitigate impacts to the light-footed clapper rail and the California least tern
- Temporarily affected vegetation, habitat, & staging areas will be monitored to ensure complete recovery
- Standard water quality related best management practices (BMPs) will be employed during construction activities.

Offsite Water Quality Standards Mitigation Proposed:

- Benefits produced by the project (wetland restoration) will mitigate temporary impacts. Compensatory mitigation is not required.

<u>Threatened and/or Endangered Species</u>: Five threatened or endangered species (federal or state listed) occur in the vicinity of the project site. The Corps is coordinating with the U.S. Fish and Wildlife Service and the California Department of Fish and Game

to implement measures to address potential negative impacts to these species.

Regulatory Compliance: The Corps released a draft Environmental Assessment (DEA) for public review on April 18, 2012 pursuant to its obligations under the National Environmental Policy Act (NEPA). The Corps expects to finalize the DEA prior to July 31, 2012. A Clean Water Act Section 404 permit is not required as the Corps is implementing this project itself.

The California Environmental Quality Act (CEQA) categorical exemption under 14 CCR § 15304(g) applies to maintenance dredging where the dredged material is deposited in an area authorized by all applicable state and federal regulatory agencies. The Southern California Dredged Material Management Team reviewed the project and approved disposal at LA-3 and in the nearshore zone for specified portions of the sediment. Sediment unsuitable for nearshore or LA-3 disposal will be disposed of at an upland landfill. The project, implemented with the conditions specified below, qualifies for exemption under 14 CCR § 15304(g).

Other Potentially Applicable Permits:

- Construction de-watering discharges, including temporary stream diversions necessary for project construction are regulated under Regional Board Order No. R8-2009-0003, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality. This project includes the diversion of tidal flow around areas of the marsh being dredged in order to maintain tidal flow into Semeniuk Slough. Based on the information in the project application and the DEA, we do not expect that enrollment in Order No. R8-2009-003 will be required. For more information, please review Order No. R8-2009-0003 at www.waterboards.ca.gov/santaana/

- Construction activities associated with this project may result in land disturbance equal to or greater than one acre. The Corps must substantially comply with the terms of the Statewide General Construction permit if land clearance for staging and sediment drying exceeds one acre. For more information please review Order No. 2009-0009-DWQ at http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

This 401 Certification is contingent upon the execution of the following conditions:

1) Use of Best Management Practices (BMPs): The Corps shall utilize BMPs to minimize the controllable discharges of sediment and other wastes to waters of the state and of the United States. These BMPS shall include:

a. Isolation of areas being dredged from adjacent waters, (such as Semeniuk Slough) using temporary diversion structures or gates and silt curtains if warranted
b. Isolation of Areas D and E from the remainder of the marsh during the dewatering and drying operation
c. Operational factors (e.g. equipment operating speed, coordination with favorable tides) to limit the turbidity plume associated with the components of the project that involve nearshore activity
d. Removal of floating material or material that will become floatable from dredged sediment

2) Receiving Water Limitations and Specifications: The Corps must comply with the following applicable narrative and/or numeric objectives:

a. Bacteria, Santa Ana River Marsh (including Semeniuk Slough) – The Santa Ana River Marsh is listed in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) as having the water contact recreation beneficial use (REC-1). The Corps shall ensure that its project does not cause an exceedance of the Basin Plan objectives specified in Table 1 for this beneficial use.

Table 1: Bacteria Receiving Water Limitations for the Santa Ana River Marsh and Semeniuk Slough

Parameter	30-day Logarithmic Mean (5 or more samples)	10% of samples in any 30-day period
Fecal coliform	< 200 per 100 ml	< 400 per 100 ml

b. Bacteria, Nearshore Zone – For recreational standards purposes, the nearshore zone is defined in the California Ocean Plan as a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour whichever is further from shoreline. The Corps project includes a nearshore sediment disposal and a nearshore sediment dewatering operation (hopper overflow) that will take place within this zone. The Corps shall ensure that its activities do not cause an exceedance of the Ocean Plan standards summarized in Table 2.

Table 2: Bacteria Receiving Water Limitations for the Nearshore Zone

Parameter	30-day Geometric Mean (5 most recent samples)	Single Sample Maximum
Total coliform	< 1,000 per 100 ml	< 10,000 per 100 ml
		<1,000 per 100 ml when fecal coliform/total coliform ratio > 0.1
Fecal coliform	< 200 per 100 ml	< 400 per 100 ml
Enterococcus	< 35 per 100 ml	< 104 per 100 ml

c. Physical Characteristics, Ocean Discharge –
   i. Floating particulates and grease and oil shall not be visible
   ii. The discharge of sediment and water shall not cause aesthetically undesirable discoloration of the ocean surface

d. Chemical Characteristics – The Corps must comply with the receiving water limitations specified in Table 3. The turbidity and transmittance limitations are based on recent data collected in Lower Newport Bay. The Corps may substitute site-specific data relating these parameters to total suspended solids (TSS) if available. The Corps must obtain prior approval from the Regional Board for proposed changes to the limitations specified in Table 3.

Table 3: Physical/Chemical Numeric Receiving Water Limitations

Parameter	Santa Ana River Marsh and Semeniuk Slough	Ocean - Nearshore Zone
Turbidity	45 NTU	45 NTU
Transmittance	15%	15%
TSS	100 mg/L	100 mg/L
pH	7 < pH < 8.6; < 0.2 unit change from ambient	< 0.2 unit change from naturally occurring pH
Dissolved Oxygen	> 5 mg/L	> 5 mg/L
Total Recoverable Petroleum Hydrocarbons (TRPH)	0.1 mg/L	0.1 mg/L

3) <u>Monitoring</u>: The Corps must implement a monitoring program to ensure compliance with the receiving water limitations specified above in Conditions 2a through 2d. Minimum requirements of the monitoring plan are listed in Table 4. The Corps may satisfy some of the monitoring requirements in Table 4 by coordinating its monitoring with the Orange County Health Care Agency (OCHCA) and the Orange County Sanitation District (OCSD).

a. General Monitoring Provisions:

1. All sampling, sample preservation, and analytical procedures shall be in accordance with the current approved edition of "*Standard Methods for the Examination of Water and Wastewater*" (American Public Health Association) and/or 40 CFR Part 136 approved methods unless otherwise specified by the Executive Officer of the Regional Board.

2. In accordance with the provision of Water Code section 13176, chemical, bacteriological, and bioassay analyses shall be conducted at a laboratory certified for such analyses by the California Department of Public Health or at laboratories approved by the Regional Board's Executive Officer.

3. The Corps shall have and implement an acceptable written quality assurance (QA) plan for laboratory analyses. Duplicate chemical analyses must be conducted on a minimum of ten percent (10%) of the samples, or at least one sample per month, whichever is greater. A similar frequency shall be maintained for analyzing spiked samples.

4. All monitoring instruments and devices used by the Corps to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. In the event that continuous monitoring equipment is out of service for greater than a 24-hour period, the Corps shall obtain a representative grab sample each day the equipment is out of service. The Corps shall correct the cause(s) of failure of the continuous monitoring equipment as soon as practicable. In its monitoring report, the Corps shall specify the period(s) during which the equipment was out of service and if the problem has not been corrected, shall identify the steps which the Corps is taking or proposes to take to bring the equipment back into service and the schedule for these actions.

5. Monitoring and reporting shall be in accordance with the following:
   i. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
   ii. Monitoring and reporting shall be done more frequently as necessary to maintain compliance with this certification and or as specified in this certification.
   iii. Whenever the Corps monitors any pollutant more frequently than is required by this certification, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the discharge monitoring report specified by the Executive Officer.
   iv. Daily samples shall be collected on each day of the week.
   v. Weekly samples shall be collected on any representative day of each week.
   vi. Monthly samples shall be collected on any representative day of each month.

b. Nutrient monitoring shall consist of Nitrate/Nitrite-Nitrogen, Total Kjeldahl Nitrogen (TKN), and Total Phosphorus. Bacteria monitoring shall include total coliform, fecal coliform, and enterococcus.

c. Samples shall be collected down-current of the project activity being monitored. The Corps should obtain current directions in the nearshore zone from the OCSD and the Southern California Coastal Ocean Observing System: http://www.sccoos.org/projects/ocsd-diversion/.

Table 4: Minimum Monitoring Program

Project Component	Locations	Monitored Analytes	Frequency
Hydraulic Dredging (Areas A, B, C, F, G) and Sediment Excavation (Areas D and E)	SAR Marsh: two locations 300 feet from dredge (generally upcurrent and downcurrent)	Turbidity Transmittance Dissolved Oxygen pH	Daily during first week, weekly thereafter
	Semeniuk Slough: One location within 300 feet of boundary with SAR Marsh	Turbidity Transmittance Dissolved Oxygen pH	Daily during first week, weekly thereafter
		TSS TRPH Nutrients Bacteria	Weekly
Nearshore Hopper Sediment Dewatering	Bacteria: Four locations in the surfzone spaced 500 feet apart along the beach, centered at the location of the hopper Other Parameters: Mid-column, 100 and 300 feet from discharge site	Turbidity Transmittance Dissolved Oxygen pH	Daily during first week, weekly thereafter
		TSS TRPH Nutrients Bacteria	Weekly
Nearshore Placement	Bacteria: Four locations in the surfzone spaced 500 feet apart along the beach, centered at the midpoint of the rectangular placement zone Other Parameters: Mid-column, 100 and 300 feet from discharge site	Turbidity Transmittance Dissolved Oxygen pH	Daily during first week, weekly thereafter
		TSS TRPH Nutrients Bacteria	Weekly
In-situ Sediment Dewatering and Excavation **(*if included in project)**	Residual surface sediment (Areas D and E)	pH TRPH Metals	Once after dredging. Quarterly thereafter for one year
		Benthic community Bioassessment	Once prior to dredging and quarterly thereafter until benthic community has recovered

4) Reporting:

a. All analytical data shall be reported with method detection limit[1] (MDLs) and with identification of either reporting level or limits of quantitation (LOQs). To the maximum extent practicable, all MDLs shall be sufficiently low enough to compare analytical results for water and sediment samples to the values listed above under Condition #2: "Receiving Water Limitations and Specifications."

b. Laboratory data must quantify each constituent down to the approved reporting levels for specific constituents. Any internal quality control data associated with the sample must be reported when requested by the Executive Officer. The Regional Board will reject the quantified laboratory data if quality control data are unavailable or unacceptable.

c. Monitoring data shall be submitted in a format acceptable by the Regional Board. Specific reporting format may include preprinted forms and/or electronic media. The results of all monitoring required by this certification shall be reported to the Regional Board, and shall be submitted in such a format as to allow direct comparison with the limitations and requirements of this certification.

d. The Corps shall tabulate the monitoring data to clearly illustrate compliance and/or noncompliance with the requirements of the certification.

e. For every item of monitoring data where the requirements are not met, the monitoring report shall include a statement discussing the reasons for noncompliance, the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and an estimate of the date when the Corps will be in compliance. The Corps shall notify the Regional Board by letter when compliance with the time schedule has been achieved.

f. The Corps shall assure that records of all monitoring information are maintained and accessible for a period of at least five years from the date of the sample, report, or application. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or by the request of the Regional Board at any time.

g. All reports and/or information submitted to the Regional Board shall be signed by a responsible officer or duly authorized representative of the Corps and shall be submitted under penalty of perjury.

---

[1] The standardized test procedure to be used to determine the method detection limit (MDL) is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit" of 40 CFR 136.

h. The Corps shall submit monthly reports via e-mail to the assigned Regional Board staff identified in this certification by the 7th day of each month. The monthly reports shall include a copy of the laboratory reports for samples collected during the previous month, as well as a brief description of project activities conducted during the previous month. Monthly reports are not required for recovery monitoring conducted after completion of dredging and disposal activities (Table 4, Areas D and E).

i. A final water quality monitoring report summarizing the project data and correcting any errors and/or omissions in the monthly reports shall be submitted to the Regional Board no later than six months after completion of the dredging and disposal activities.

j. A final report summarizing the post-dredging recovery monitoring, if required (Table 4, Areas D and E), shall be submitted to the Regional Board no later than six months after completion of the recovery monitoring.

5) Caulerpa: The Corps must conduct at least one visual survey for the invasive algae *Caulerpa taxifolia* at low tide prior to initiating dredging. If *Caulerpa taxifolia* is discovered, the Corps must cease dredging at that location and notify Regional Board staff, the California Department of Fish and Game (CDFG) (William Paznokas: 858-467-4218,(wpaznokas@dfg.ca.gov) and/or the National Marine Fisheries Service (NMFS) (Eric Chavez: 562-980-4064, Eric.Chavez@noaa.gov) within 24-hours of discovery. The Corps may resume dredging after implementing management measures specified by the CDFG and/or NMFS.

6) Eelgrass: Although the DEA indicated that eelgrass is currently not present in the marsh, eelgrass may have recolonized areas within the marsh subsequent to the Corps' last monitoring activities in 1999-2000. The Corps must conduct at least one visual survey for eelgrass at low tide prior to initiating dredging. If eelgrass is discovered within the planned dredge footprint, the impact must be mitigated according to the latest version of the Southern California Eelgrass Mitigation Policy.

7) Threatened and Endangered Species: The Corps must reach agreement with the USFWS regarding implementation of recommendations provided to the Corps by the USFWS for avoidance of adverse effects to the light-footed Clapper Rail and the California least tern.

8) Construction Wastes: Substances resulting from project-related activities that could be harmful to aquatic life, including, but not limited to, petroleum lubricants and fuels, cured and uncured cements, epoxies, paints and other protective coating materials, portland cement concrete or asphalt concrete,

and washings and cuttings thereof, shall not be discharged to soils or waters of the state. All waste concrete shall be removed.

9) Construction Equipment: Motorized equipment shall not be maintained or parked within or near any stream crossing, channel or lake margin in such a manner that petroleum products or other pollutants from the equipment may enter these areas under any flow conditions. Vehicles shall not be driven or equipment operated in waters of the state on-site, except as necessary to complete the proposed project. No equipment (other than machinery directly related to the dredging operation and associated monitoring) shall be operated in areas of flowing water.

10) The Corps shall ensure that all facilities (outlet structures, grade control structures, and eroded soil-cement access ramps etc.) will be restored to their original design and grade, and that vegetation within the project area will be maintained in perpetuity.

11) This Water Quality Certification is subject to the acquisition of all local, regional, state, and federal permits and approvals as required by law. Failure to meet any conditions contained herein or any the conditions contained in any other permit or approval issued by the State of California or any subdivision thereof may result in the revocation of this Certification and civil or criminal liability.

12) A copy of this Certification and any subsequent amendments must be maintained on site for the duration of.

13) Applicant shall ensure that all fees associated with this project shall be paid to each respective agency prior to conducting any on-site construction activities.

Under California Water Code, Section 1058, and Pursuant to 23 CCR §3860, the following shall be included as conditions of all water quality certification actions:

(a) Every certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section §13330 of the Water Code and Article 6 (commencing with Section 3867) of this Chapter.

(b) Certification is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a FERC license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to Subsection §3855(b) of this Chapter and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

(c) Certification is conditioned upon total payment of any fee required under this Chapter and owed by the applicant.

If the above stated conditions are changed, any of the criteria or conditions as previously described are not met, or new information becomes available that indicates a water quality problem, the Regional Board may require the applicant to submit a report of waste discharge and obtain Waste Discharge Requirements.

In the event of any violation or threatened violation of the conditions of this certification, the holder of any permit or license subject to this certification shall be subject to any remedies, penalties, process or sanctions as provided for under state law. For purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification. Violations of the conditions of this certification may subject the applicant to civil liability pursuant to Water Code section 13350 and/or 13385.

This letter constitutes a Water Quality Standards Certification issued pursuant to Clean Water Act Section 401. I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law.

This discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ (Order No. 2003-0017-DWQ), "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received Water Quality Certification" which requires compliance with all conditions of this Water Quality Standards Certification. Order No. 2003-0017-DWQ is available at: www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo 2003-0017.pdf

Should there be any questions, please contact Marc Brown at (951) 321-4584, or Mark Adelson at (951) 782-3234.

Sincerely,

Kurt V. Berchtold
Executive Officer
Santa Ana Regional Water Quality Control Board

cc (via electronic mail):
U.S. Army Corps of Engineers – Biologist, Planning Division – Erin Jones

U.S. Army Corps of Engineers, Los Angeles Office – Josephine Axt
State Water Resources Control Board, OCC - David Rice
U.S. Fish and Wildlife Service – Christine Medak,
California Department of Fish and Game – Loni Adams
State Water Resources Control Board, DWQ-Water Quality Certification Unit - Bill Orme

w:\mbrown\401\draft certs with comments\302012-19_santa_ana_river_marsh_dredge_acoe_draft_30jun12.docx

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

5/18/12
clear
e

RECEIVED
MAY 15 2012
STATE CLEARING HOUSE

May 11, 2012

Ms. Erin Jones
U.S. Army Corps of Engineers – Los Angeles District
915 Wilshire Boulevard
Los Angeles, CA 90017

Re: SCH#2012044004; NEPA Notice of Completion; draft Environmental Assessment (EA) & Finding of No Significant Impact ((FONSI) for the **"Santa Ana River Marsh Dredging Project;"** located in the Newport Beach area; Orange County, California.

Dear Ms. Jones:

The Native American Heritage Commission (NAHC), the State of California 'Trustee Agency' for the protection and preservation of Native American cultural resources pursuant to California Public Resources Code §21070 and affirmed by the Third Appellate Court in the case of EPIC v. Johnson (1985: 170 Cal App. 3rd 604).

This letter includes state and federal statutes relating to Native American historic properties of religious and cultural significance to American Indian tribes and interested Native American individuals as 'consulting parties' under both state and federal law. State law also addresses the freedom of Native American Religious Expression in Public Resources Code §5097.9.

The California Environmental Quality Act (CEQA – CA Public Resources Code 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ...objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. The NAHC did conduct a Sacred Lands File (SLF) search within the 'area of potential effect (APE) with the following results: Native American cultural resources were found within the APE.

The NAHC "Sacred Sites,' as defined by the Native American Heritage Commission and the California Legislature in California Public Resources Code §§5097.94(a) and 5097.96. Items in the NAHC Sacred Lands Inventory are confidential and exempt from the Public Records Act pursuant to California Government Code §6254 (r).

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries of cultural resources or burial sites once a project is underway. Culturally affiliated tribes and individuals may have knowledge of the religious and cultural significance of the historic properties in the project area (e.g. APE). We strongly urge that you make contact with the list of Native American Contacts on the attached list of Native American contacts, to see if your proposed project might impact Native American cultural resources and to obtain their recommendations concerning the proposed project. Pursuant to CA Public Resources Code § 5097.95, the NAHC requests cooperation from other public agencies in order that the Native American consulting parties be provided pertinent project information. Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). Pursuant to CA Public Resources Code §5097.95, the NAHC requests that pertinent project information be provided consulting tribal parties. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and Section 2183.2 that requires documentation, data recovery of cultural resources.

Furthermore, the NAHC if the proposed project is under the jurisdiction of the statutes and regulations of the National Environmental Policy Act (e.g. NEPA; 42 U.S.C. 4321-43351). Consultation with tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA and Section 106 and 4(f) of federal NHPA (16 U.S.C. 470 *et seq*), 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Confidentiality of "historic properties of religious and cultural significance" should also be considered as protected by California Government Code §6254(r) and may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APEs and possibility threatened by proposed project activity.

Furthermore, Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for inadvertent discovery of human remains mandate the processes to be followed in the event of a discovery of human remains in a project location other than a 'dedicated cemetery'.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. Regarding tribal consultation, a relationship built around regular meetings and informal involvement with local tribes will lead to more qualitative consultation tribal input on specific projects.

Finally, when Native American cultural sites and/or Native American burial sites are prevalent within the project site, the NAHC recommends 'avoidance' of the site as referenced by CEQA Guidelines Section 15370(a).

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton
Program Analyst

Cc: State Clearinghouse

Attachment: Native American Contact List

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY EDMUND G. BROWN, *GOVERNOR*

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400
TDD (415) 597-5885

May 25, 2012

Josephine R. Axt, Ph.D.
Chief, Planning Division
Los Angeles District
U.S. Army Corps of Engineers
ATTN: Erin Jones
P.O. Box 532711
Los Angeles, CA 90053-2325

Re: **ND-023-12**, Army Corps Negative Determination, Santa Ana River Marsh Dredging Project, Newport Beach, Orange Co.

Dear Dr. Axt:

The Coastal Commission staff has reviewed the above-referenced negative determination submitted by the U.S. Army Corps of Engineers (Corps) for the dredging of approximately 80,000 cu. yds. of material from channels in the Santa Ana River Marsh (Marsh) in Newport Beach. The project purpose is to restore the Marsh to its original habitat design and function, and the project would:

(1) restore the channels that have experienced shoaling to design depths;
(2) restore tidal circulation and flushing within the Marsh;
(3) prevent water quality problems and stagnation;
(4) prevent transition of Marsh habitats, which are used by endangered species;
(5) provide beach nourishment material for local beaches eroded by littoral processes; and
(6) include the clearing and grubbing of the California least tern island (tern island) to remove weedy vegetation and restore nesting habitat.

Disposal would be in three ways: beach-compatible material would be disposed of in the nearshore at Newport Beach, open ocean-compatible would be disposed of at LA-3 (the Ocean Dredged Material Disposal Site offshore Orange Co.), and material not compatible for ocean disposal would be excavated under dry conditions and disposed of at an upland landfill. All sediment has been tested in accordance with applicable regulations and determined compatible with the designated disposal areas.

Construction would occur between September 2012 and March 2013 (to avoid impacts to sensitive species). Additional environmental commitments are attached.

This project is similar to projects previously authorized by the Commission. In 1988 the Commission originally authorized the marsh restoration as part of a flood control/restoration project (the Lower Santa Ana River Mainstem Project (CD-29-88)).

In 2000 the Commission staff authorized maintenance dredging of 500,000 cu. yds. to restore the river channels to design depths, including disposal in the marsh of 20-40,000 cu. yds. of sand to build up a least tern nesting island, and with disposal of the remainder for beach/nearshore replenishment (ND-111-00).

In 2002 the Commission staff authorized removal of vegetation and excavation of approximately 40,000 cubic yards of sediment, to again restore channels to design depth, with beach/nearshore disposal within the Newport Beach groin field (ND-026-02). In 2005 the Commission staff authorized moving the nearshore disposal site (that had been identified in ND-111-00) approximately one-half mile upcoast (ND-034-05).

Under the federal consistency regulations (Section 15 CFR 930.35(a)), a negative determination can be submitted for an activity "which is the same or similar to activities for which consistency determinations have been prepared in the past." The proposed project would benefit environmentally sensitive habitat and, with the attached commitments, is similar to the above-mentioned consistency and negative determinations with which we concurred. We therefore **concur** with your negative determination made pursuant to 15 CFR Section 930.35 of the NOAA implementing regulations. Please contact Mark Delaplaine at (415) 904-5289 if you have any questions regarding this matter.

Sincerely,

Mark D (for)

CHARLES LESTER
Executive Director

Attachment – Environmental Commitments

cc: Long Beach District Office

Environmental Commitments

General

1. Prior to construction, the Corps will provide a 14-day notification of planned activities to appropriate agencies and the surrounding community, and post information bulletins containing work schedules and work areas at appropriate offices. Project areas and equipment will be appropriately marked and lighted.

2. All dredging, disposal, and construction activities will remain within the boundaries specified in the plans. There will be no disposal of dredge material outside of the project area or within any adjacent aquatic community.

Physical Environment

PE-1. Dredging would only occur in areas with sediments compatible for the nearshore and LA-3, as determined by sediment sampling completed in February 2011 and approved by the EPA. Non-compatible material would be excavated and disposed of at an upland landfill.

Biological Resources

BR-1. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with and disturbance to fish and wildlife.

BR-2. Construction shall occur between September 15 and March 15, outside the breeding season for birds.

BR-3. Benthic invertebrates shall be sampled in the month prior to and quarterly during the year after construction to survey for re-colonization and any potential impacts from the use of drying agents in the excavation areas. If the benthic invertebrate community has not recovered, the Corps would further coordinate with the resource agencies to evaluate causes of decline, and develop plans for additional monitoring and/or remediation as necessary.

BR-4. All staging areas would be restored with appropriate native vegetation after construction is complete. The staging areas would be monitored and weeded for one year after construction to evaluate the re-establishment of vegetation in those areas, specifically pickleweed. If vegetation is not properly re-establishing, re-planting would be performed.

BR-5. Visual pre- and post-dredge eelgrass surveys would be performed at low tide in the Marsh to document presence or absence of eelgrass. If eelgrass is found in the Marsh, the Corps would coordinate further with NMFS on eelgrass mitigation and monitoring.

BR-6. Equipment and vehicles operating on the beach would drive slowly to allow birds ample time to move away from oncoming equipment. Equipment operators would be trained to avoid birds foraging and roosting on the beach.

Threatened and Endangered Species

TE-1. Pre- and post-dredge vegetation surveys would be performed to document acreage of cordgrass and pickleweed habitat impacted by construction activities.

TE-2. The Marsh channels would be monitored for one year after construction to evaluate the re-establishment of cordgrass. If cordgrass does not re-establish, planting may be performed in appropriate areas based on availability of suitable channel depths.

TE-3. Cordgrass habitat that is known to have been occupied by light-footed clapper rail in the southern Marsh would be left in place.

TE-4. Staging areas, dominant with pickleweed, would be restored after construction is complete as described in BR-4. The large patch of occupied pickleweed habitat in the southern Marsh, east of the least tern island, would remain undisturbed.

TE-5. As in BR-6, equipment and vehicles operating on the beach would drive slowly to allow plovers ample time to move away from oncoming equipment. Equipment operators would be trained to avoid plovers foraging and roosting on the beach.

Water Quality

WQ-1. The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface and ground waters.

WQ-2. The Contractor shall implement Water Quality Monitoring, including turbidity (light transmittance), dissolved oxygen, pH, salinity, temperature, and total suspended solids at the dredge and nearshore disposal sites for the duration of the dredging activities. Water quality samples shall be taken from designated areas repeatedly throughout dredging.

WQ-3. pH shall be sampled in the month prior to and quarterly during the year after construction to survey for any potential impacts from the use of drying agents in the excavation areas. If the pH has not recovered to normal levels, the Corps would further coordinate with the resource agencies to evaluate causes of decline, and develop plans for additional monitoring and/or remediation as necessary.

WQ-4. If needed based on water quality monitoring, the Contractor would use turbidity curtains around the dredge to minimize impacts from turbidity to sensitive resources in the Marsh and the Santa Ana River (i.e. eelgrass, benthic invertebrates, fish).

WQ-5. Exchange with the Seminuk Slough would be maintained during excavation activities to ensure the water there does not become stagnant while cut off from the Marsh. Water quality monitoring would be performed in the Slough during dredging and excavation activities to ensure impacts are minimized in that area.

WQ-6. For clearing activities on the least tern island, the crossing would be temporarily improved using gravel or steel plates, which would minimize the equipments' direct contact with the water in the Marsh channel.

WQ-7. Dredging and construction activities would adhere to the requirements and controls set forth by the California RWQCB and the 401 Water Quality Certification.

Air Quality

AQ-1. The Contractor shall obtain and observe all applicable SCAQMD or State Air Resources Board (ARB) permits.

Noise

NO-1. Construction would only occur during daytime hours per the City of Newport Beach's Municipal Code (Section 10.28.040). Construction may occur Monday through Friday between the hours of 7 a.m. and 6:30 p.m. and on Saturday between the hours of 8 a.m. and 6 p.m.

NO-2. Residents would be notified as to when construction would be likely to occur adjacent to their residence.

Land Use and Recreation

LR-1. In the event of any temporary levee bike path or other trail closure, the public would be notified of the closure, and appropriate signs would be posted to ensure safe access and, or, bypass/detour of the affected segment.

LR-2. The Corps shall coordinate with the appropriate agencies/land owners for access and use of the access road to minimize disturbance of routine operations.

Aesthetics

AE-1. The Corps shall replace and restore screening vegetation that is removed along the excavation area. Where possible, in coordination with road property owners, the Corps would restore with native vegetation that would reach equal height, density, and quality for screening purposes.

Cultural

CR-1. Pursuant to 36 C.F.R. § 800.13, in the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property the Contractor shall immediately suspend all work in any area(s) where potential cultural resources are discovered. The Contractor shall not resume construction in the area surrounding, i.e., immediately adjacent to, the potential cultural resources until the Corps of Engineers has complied with 36 CFR 800.13.

Traffic

TR-1. The Contractor shall prepare and implement a traffic control plan, per City of Newport requirements, that specifies appropriate traffic control measures for project construction activities, as applicable. The Contractor shall be responsible for obtaining all applicable permits for transporting of material to the upland landfill site.

TR-2. All marine-based equipment shall be properly marked. Appropriate notifications of the proposed work and duration will be made and posted to the U.S. Coast Guard, and other appropriate agencies.

Comments from Mr. Patrick Alford, City of Newport Beach
May 17, 2012

1) 4.2 Biological Environment: The West Newport Beaches contain dune habitats. The proposed 8-inch pipeline should be sited to avoid disrupting these areas.

   Response: Thank you for your concern and comment. The pipeline would be buried along the beach and would avoid dune habitats, which are located closer to the residences along the northwestern portion of the beach. An environmental commitment would be added to the Final EA to outline that dune habitat should be avoided.

2) 5.10 Local and Marine Traffic: The project provides for a haul route through the Newport Shores residential community. The EA does not provide any details as to type and size of vehicles involved or the number of estimated trips. The EA provides no information on the impacts to on-street parking in this community. On street parking is heavily utilized by Newport Shores residents and guests. The EA needs to determine if the proposed haul route will result in the temporary loss of on-street parking and address any potential impacts to the Newport Shores community. The EA should also determine if an alternative haul route is available that would avoid the Newport Shores community.

   Response: The Final EA will be revised to provide additional details on the haul trucks and impacts to the local community. The Contractor requires access at Sunset Street to install and later remove a small dike to support the excavation portion of the project. Sunset Street is an ideal location to enter and exit the Marsh while still minimizing impacts to sensitive habitat in the Marsh area.

   Temporary loss of street parking may occur at Sunset Street due to presence of construction equipment during daytime hours. The project was developed to minimize the loss of parking and minimize impacts to the Newport Shores community by limiting the time the contractor may use the end of Sunset Street. During project construction, the Contractor is limited to using Sunset Street for a total of 10 days (discontinuous). The Contractor would use 10 cubic yard dump trucks for the dike placement. Residents of the community would be notified prior to the use of Sunset Street as a construction haul route.

3) 8.0 Environmental Commitments: The 14-day notification should include the following community associations:

   - Far West Newport Residents Association
   - Lido Sands Community Association
   - Newport Shores Community Association
   - West Newport Beach Association

   Current address and contact information can be found at: http://gis.newportbeachca.gov/gispub/HOA reportl.

Response: Thank you for this information. The Corps will provide the notification to the community associations prior to dredging. The Corps also held a public meeting with the City and several members of the community in April 2012 to discuss the project and ensure they are aware of the proposed construction in their area.

4) To reduce noise and air quality impacts, it is recommended that trucks and heavy truck idling be limited to no more than thirty (30) minutes.

   Response: The Corps will include in the Final EA an environmental commitment limiting truck idling to less than 30 minutes.

5) The booster pump for the 8-inch pipeline should be located as far from residential areas as possible.

   Response: The Corps understands the need to minimize impacts of the project to local residents. The contract specifications state the booster shall be located as far from the residences as possible.

Comments from Mr. Philip Bettencourt
<u>May 18, 2012</u>

1) What are the official design channel depths you are seeking to restore?

   Response: Design depths vary throughout the project area, ranging from 0 feet mean lower low water (MLLW) to -2.5 feet (MLLW). MLLW refers to the average of the lower low water height of each tidal day, observed over the National Tidal Datum Epoch.

2) Are the design depths the same for the portion of the channel within the City of Newport Beach jurisdiction?

   Response: This question would be better answered by City staff as the Corps is unfamiliar with design depths for the City managed Slough. The Corps has contacted the City and will respond to the commenter as soon as possible.

3) Is the dredging and excavation fully funded so that you can proceed within the September 2012-March 2013 time frame?

   Response: Yes, funding is currently available for the construction project. The construction contract must be awarded and funds obligated prior to September 30, 2012, which is the end of the Corps' 2012 fiscal year. This contract will cover activities for the entire project, until completion of construction by March 2013.

4) Is a Coastal Development Permit from the California Coastal Commission already in hand (or required)?

Response: The Corps has coordinated with the California Coastal Commission (CCC) in compliance with the Coastal Zone Management Act. The Corps submitted a Negative Determination (ND) to the CCC during the Draft EA public review period and received concurrence from the CCC in a letter dated May 25, 2012 (Appendix E).

As a federal agency, the Corps is not required to obtain a Coastal Development Permit.

5) Is your schedule at all dependent on what the City of Newport Beach may or may not do at this time with their portion of the marsh?

   Response: Due to availability of funding, the Corps must proceed with the construction project regardless of the City's ability to perform maintenance in the Semeniuk Slough. Although the two projects are adjacent to one another, they are completely independent. While the City may have experienced some savings in shared mobilization/ demobilization costs if the work occurred simultaneously, neither project is dependent on the other for successful implementation. The Corps project has been designed to consider water quality in the Slough and environmental commitments have been incorporated to minimize impacts.

6) Is the material deemed to be not compatible for ocean disposal subject to upland drying and bioremediation rather than being placed in an offsite fill?

   Response: Opportunities for upland drying were investigated, however no land was available near the Marsh to perform such an operation. Furthermore, locating land, transporting material there, and performing bioremediation would be cost prohibitive for the project.

   Bioremediation of dredged material is a very expensive option. Due to the relatively small quantity of dredged material not suitable for ocean disposal, it is more cost efficient to consider upland disposal in lieu of bioremediation.

7) Will the completed project remain within the stewardship of ACOE or are other possible arrangements being considered?

   Response: After project completion the Corps will retain ownership of the Marsh property and management responsibilities. The Corps is currently drafting a Habitat Management Plan (HMP) that would allow management responsibilities to be turned over to a local, interested entity. The intent is that the HMP would guide management activities at the Marsh and dictate how the local entity would maintain the site. However the Corps would continue to retain ownership of the Marsh property.

Comments from Mr. Jim Mosher
<u>May 1, 2012 via e-mail</u>

1) Mr. Mosher requested a copy of the referenced 1988 Phase II GDM/SEIS "Phase II General Design Memorandum/Supplemental Environmental Impact Statement (GDM/SEIS) on the Santa Ana River Mainstem, including Santiago Creek (August 1988); U.S. Army Corps of Engineers".

   Response: The Phase II GDM/SEIS and the Marsh Restoration Plan were provided to Mr. Mosher on May 10, 2012.

2) (Regarding the Phase II GDM/SEIS) In particular, I would be interested in the parts hinted at in the EA that presumably describe:
   a. How many active and abandoned oil wells were present at the time of acquisition by USACE?

      Response: Within the Marsh boundary, seven oil wells were abandoned in preparation of March construction. Additionally, four previously abandoned (prior to Marsh construction) oil wells were lowered to accommodate site grading. Outside the Marsh boundary, four oil wells were abandoned.

   b. How were the wells and contamination remediated, transforming the area into a viable wetland?

      Response: The Corps will research this information and respond to the commenter as soon as possible.

3) I am also wondering if anyone recalls the approximate cost of the initial remediation/ creation of the 92 acre wetland 20 years ago?

   Response: Costs documented in the Marsh Restoration Plan (1987) for Marsh construction and planting were estimated at approximately $3.8 million. This included (but is not limited to) grading, relocation of utility lines, installation of tide gates, abandoning oil wells, and planting.

4) And also what the estimated cost of the 20 year maintenance described last night will be?

   Response: The current dredging and excavation project in the Marsh is expected to cost approximately $4.5 million. Based on the time it has taken since the initial marsh restoration for shoaling to reach current levels, subsequent dredging may not be required for another 15 to 20 years.

5) Mr. Mosher also provided the following editorial comments on the Draft EA:
   a. page 18: in the last paragraph there is a citation to "(USACE 1989)" but there is no publication of that date in the references.

b. page 57 (third paragraph from end): "Sediment is would dissipate over time" <--- extra "is"

c. page 60 (last paragraph): "tugboat is expected to me minimal" <-- "me" for "be"

Response: The above typos were corrected in the Final EA.

<u>May 17, 2012 via e-mail</u>

Mr. Mosher later provided the below comments

1) I think it would be useful to define the term "grubbing." I believe it means removing both the vegetation AND its roots, but am not sure -- and in any event it is not a term familiar to those not in the trade.

   Response: You are correct. Grubbing refers to the removal of vegetation and root mass below the surface. This is typically done by clearing the vegetation and discing the soil to disturb the root system. The Final EA was edited to clarify the term "grubbing".

2) I think some thought might be given to alternatives that might make the current project effective for more than the 20 years, since a project that needs less frequent maintenance might possibly have less cumulative impact. As example, could something be done with the tide gate design that would enhance natural flushing of silt from the marsh? That is, perhaps something could be done to enhance the velocity of outflow and reduce that of inflow?

   Response: In addition to supplying water to the Marsh, the tide gate also serves to provide flood damage protection to Newport Shores. During higher tides and flood flows in the Santa Ana River, when the water level exceeds a prescribed elevation, the tide gate automatically closes to prevent excess water entering the Marsh and resultant flooding of Newport Shores. Under natural conditions, during these high water conditions water would flow into and then out of the Marsh at higher velocities, performing the self-cleaning that is referred to. However, due to the need to protect Newport Shores from flooding, this no longer occurs in the Marsh. The result is that the Marsh will experience some accumulation of sediment that would not otherwise occur under natural conditions.

3) one very minor typo -- I think the spelling of "Semeniuk Slough" (pages 6, 19, 54, 66, 73 and 90 of the 216 page PDF) is incorrect.

   The City of Newport Beach uses many variations, but the spelling in its most recent General Plan (see Chapter 10 - Natural Resources Element) is "Semeniuk":
   http://www.newportbeachca.gov/index.aspx?page=173

   "Semeniuk" seems to be a Ukrainian family name:
   http://www.surnamedb.com/Surname/Semeniuk

and although exactly which person the slough is named after has been lost in the mists of time, that is a MUCH more common spelling than any other.

Response: Thank you for bringing to our attention the correct spelling of the Slough. The occurrences of “Seminuk” were corrected to “Semeniuk” in the Final EA.

Comments from Mr. Sean Pence

May 6, 2012

1) During the period of the dry excavation, I am concerned that the native plants on the islands will not be properly watered and may die. This is concerning since these plants and shrubs provide homes, nests and protection to much of the wildlife in the area, not to mention the beauty it provides to those of us that live on the wetlands. Is there anything that can be done to water the area affected by the dry excavation?

   Response: While there may be some loss of vegetation due to drying near the excavation area, the plants are expected to rebound quickly once water is reintroduced to the area. Excavation is expected to take approximately 30 days and the majority of the dense vegetation in the area (pickleweed) is located in the upland areas, which do not require inundation to survive. All construction will take place outside the breeding season for birds and substantial loss of vegetation is not expected, such that nesting would not be impacted.

   Since the area must remain dewatered and as dry as possible to support excavation, watering the vegetation in the area may introduce more water into the channels and disrupt the operation. However, vegetation would be surveyed prior to and after construction to document losses. Per the environmental commitments, pre- and post-dredge vegetation surveys would be performed to document acreage of cordgrass and pickleweed habitat impacted by construction activities. Furthermore, all staging areas would be restored with appropriate native vegetation after construction is complete. The staging areas would be monitored and weeded for one year after construction to evaluate the re-establishment of vegetation in those areas, specifically pickleweed. If vegetation is not properly re-establishing, re-planting would be performed.

2) The staging areas will likely destroy many of the plants / trees in the affected area. I am particularly concerned about the large trees / shrubs that provide a screen to the oil drilling facility to the North of the wetlands. I would like extra care to be taken in this area to preserve as much of the current shrubs / trees as possible, and if any of such trees or shrubs are destroyed, then the same size trees / shrubs should be replaced at the conclusion of the project.

   Response: The Corps has committed to preserve the boxed trees lining the road that provide a screen to the oil fields. These trees would be moved during construction to avoid damaging the vegetation, and replaced after construction is complete. The staging areas would be restored with native vegetation and monitored to ensure that it re-establishes properly.

Per environmental commitments, the Corps shall replace and restore screening vegetation that is removed along the excavation area. Where possible, in coordination with road property owners, the Corps would restore with native vegetation that would reach equal height, density, and quality for screening purposes.

3) The depths of the wetlands at low tide appear to be very shallow. I'm sure this is part of the original plan, and there is probably a very good reason for this. However, would it make sense to take out more material so that the wetlands will be deeper at low tide? This would (i) remove more of the 'sludge' that is present today, (ii) provide a longer period of time before dredging will be required again, and (iii) likely create more opportunity for larger fish to live in the wetlands (which brings more birds and other wildlife).

   Response: The goal of Marsh restoration is to mimic what would occur under natural conditions. The marsh design depths were determined by a comprehensive environmental evaluation considering the type of marsh that would naturally exist at this location and the tidal prism (total volume of water available). A marsh artificially deeper than what would otherwise occur in a natural environment is more susceptible to rapid infilling of sediment.

Comments from Mr. William Seitz
<u>May 18, 2012</u>

1) I would welcome it if you could forward me a link where I could get access to the plans, specifications and estimates for this project.

   Response: The plans and specifications will be publically available at the Federal Business Opportunities website https://www.fbo.gov. The cost estimate will be publically available after bid opening by request from the Los Angeles District.

2) I have seen my share of projects where landscaping does not have its own line item and gets lumped into "mobilization/ demobilization". In some cases, as quantities and scope expand, restoration of landscaping becomes the "go to" source to bridge the funding gap. Many causes for concern are allayed when there is a well worded description for the landscape restoration line item for measurement and payment.

   One concern with this project is to ensure that the contract requires that the existing landscaping opposite the clubhouse will be protected in place or restored in a manner that is consistent with its current state. A recent Orange County Sanitation District sewer project removed a significant amount of vegetation. A restoration effort is currently in process and a row of boxed trees have been placed to screen oil operations until the newly re-landscaped areas have matured.

The regulatory agencies may restrict the types of plants that will be allowed to be replanted. The Environmental Assessment (EA) notes that existing non-natives will be removed and restored with native plants. A drought tolerant planting may be more appropriate rather than restricting the selection to only native plants.

Response: All restoration work would be performed under a separate contract through the Corps Environmental Branch. In this way, restoration would not be lumped into the construction contract and would be managed by a qualified native restoration biologist and the contract would be overseen by the Corps biologist.

The Corps has committed to preserve the boxed trees lining the road that provide a screen from the oil fields. These trees would be moved during construction to avoid damaging the vegetation, and replaced after construction is complete. The staging areas would be restored with native vegetation and monitored to ensure that it re-establishes properly.

Per environmental commitments, the Corps shall replace and restore screening vegetation that is removed along the excavation area. Where possible, in coordination with road property owners, the Corps would restore with native vegetation that would reach equal height, density, and quality for screening purposes.

The Corps would not remove non-native screening vegetation unless required to create staging areas. Any non-native vegetation currently screening views of the oil fields that do not require removal for staging would be left in place. However, when staging areas are restored, it is preferred that natives be used to enhance the Marsh ecosystem.

3) Newport Shores is an active residential neighborhood with a lot of pedestrian, bicycle and automotive traffic. I am obliged that this was considered when the decision was made to limit truck traffic to the Santa Ana River access road for egress.

   Response: Thank you for your comment. The Corps understands the importance of minimizing impacts to local residents and will continue to consider ways to reduce impacts throughout the construction project.

Comments from Ms. Suzanne Skov
<u>May 18, 2012</u>

1) Residents along the Semeniuk Slough use the waterway to access the Pacific Ocean via the Santa Ana River and the Semeniuk Slough provides habitat for endangered and threatened species. Thus, all the waterways within the Marsh are inter-connected.

   Response: To clarify, while the residents along Semeniuk Slough may access the waterways of the Slough and the Corps' Marsh, there is no access to the Santa Ana River or Pacific Ocean via these waterways. A tide gate exists between the Marsh waterways and the Santa Ana River, such that human access from the Marsh channels to the River is not available. Furthermore, the purpose of the Corps' Marsh and its waterways is ecosystem restoration and mitigation, not to support recreation for adjacent residents.

While the Marsh supports threatened and endangered species within the coastal salt marsh habitat (i.e., pickleweed, cordgrass), there is no such habitat existing within the Slough. Species may use any existing mudflats for foraging; however, nesting habitat for these species or their presence in the Slough has not been documented.

2) The Semeniuk Slough will eventually require dredging in order to maintain the water quality and habitat protection that the Project would provide the remaining portion of the Marsh. (Environmental Assessment, p. 62.) However, despite acknowledging that simultaneous construction could reduce the cumulative environmental impacts of the Project (Environmental Assessment, p. 62), the Army Corps did not consider including the Semeniuk Slough as a part of the Project, nor did the Army Corps consider including the Semeniuk Slough as a Project alternative.

The dredging of the Semeniuk Slough will have roughly the same temporary construction impacts to water quality, biological resources, air quality, traffic, and noise as the Project construction activities will have. In order to fulfill the purpose and need of this regional Project to restore the channels to design depths and restore tidal circulation and flushing within the Marsh, the Army Corps should avoid the need for future duplicative construction impacts to this environmentally sensitive area and include the Semeniuk Slough within its Project footprint.

Response: The Slough is not part of the federal project. The Corps does not have authorization or funding for expanding maintenance activities outside of federally owned property within the restored marsh. Furthermore, dredging of the Slough is not required to protect habitat or maintain water quality within the marsh. The federal project was designed to be fully functional, irrespective of activities that may or may not occur in the Slough or other surrounding land areas.

As stated in Section 2 of the EA, the purpose and need of the project is specifically related to the Marsh area and its habitats. The proposed project will meet the Corps' objectives whether or not the Slough is dredged. The "regional project" referred to in Section 1.3 of the EA is related to the Santa Ana River Mainstem Project as a whole, which is comprised of a multitude of project features in three counties constructed over 25 years, and is not specific to the Marsh construction as a stand-alone project.

The Corps did coordinate with the City regarding the possibility of including the Slough as part of the Corps project. The City would have been required to provide funding for that element, complete the required studies and environmental reports, and obtain permits. The extent of Corps involvement would have been limited to the use of a shared contractor whereby costs of mobilization/ demobilization could be shared. As the City was not able to complete their studies and documentation and identify funding within the Corps' timeframe, dredging of the Slough could not be included in the Corps' contract.

While a simultaneous effort may have minimized cumulative impacts, these impacts would be temporary and minor, and would not significantly affect sensitive resources. Since it currently appears that construction of the two projects may not overlap at all, the potential for cumulative impacts would be further reduced. Eventual dredging of the Slough by the City at a future date should be able to occur without directly affecting sensitive habitat in the Marsh.

3) Further, the Army Corps has not analyzed the long term impacts to the Marsh and the Semeniuk Slough if the Semeniuk Slough is not ultimately dredged. The Army Corps must assess whether there will be biological and water quality impacts, including, but not limited to, water flow and stagnation, so that the Army Corps can mitigate for any such impacts that may occur in order to satisfy the purpose and need of the Project. In addition, the Army Corps must analyze whether the Project purpose and need is fulfilled and the regional water quality goals met if the Semeniuk Slough is not ultimately dredged.

Response: The Corps has considered impacts of the proposed project to the Slough and has included environmental commitments to ensure impacts to water quality and stagnation are minimized. Per the environmental commitments, exchange with the Semeniuk Slough would be maintained during excavation activities to ensure the water there does not become stagnant while cut off from the Marsh. Water quality monitoring would be performed in the Slough during dredging and excavation activities to ensure impacts are minimized in that area.

Due to the extremely shallow design depths of the Slough and Marsh, and the dampened tidal flows in the back portion of the Marsh and the Slough, the water quality and sedimentation in the Marsh would not be substantially impacted if the Slough were not dredged. Furthermore, the Corps is not authorized to dredge the Slough. The Corps will include additional information in the Final EA regarding the lack of substantial impacts to the Marsh if the slough is not dredged.

4) The Army Corps should consider including the dredging of the Semeniuk Slough as a part of the Project to avoid the need for additional future construction impacts and to ensure that the purpose and need of the Project is met. If it is determined that it is not feasible to dredge the Semeniuk Slough as part of the Project, the Environmental Assessment should study the potential impacts resulting to the Semeniuk Slough and the rest of the Marsh, and mitigate for any such impacts.

Response: The Corps is not authorized to maintain the Slough and the purpose and need of the project is related to the Marsh and its channels. While the Slough is physically connected to the Marsh, its maintenance (or lack thereof) does not substantially influence the functioning of the Marsh ecosystem. The Environmental Assessment has considered impacts to the Semeniuk Slough and has included environmental commitments to minimize impacts to environmental resources.

CITY OF NEWPORT BEACH

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

May 17, 2012

Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
ATTN: Ms. Erin Jones
P.O. Box 532711
Los Angeles, CA 90053-2325

RE: Draft Environmental Assessment for the Santa Ana River Marsh Dredging Project

Dear Dr. Axt,

Thank you for the opportunity to comment on the Draft Environmental Assessment (EA) for the Santa Ana River Marsh Dredging Project. The Community Development Department, Planning Division recommends that the following comments be addressed in the EA:

4.2 Biological Environment

The West Newport Beaches contain dune habitats. The proposed 8-inch pipeline should be sited to avoid disrupting these areas.

5.10 Local and Marine Traffic

The project provides for a haul route through the Newport Shores residential community. The EA does not provide any details as to type and size of vehicles involved or the number of estimated trips. The EA provides no information on the impacts to on-street parking in this community. On-street parking is heavily utilized by Newport Shores residents and guests. The EA needs to determine if the proposed haul route will result in the temporary loss of on-street parking and address any potential impacts to the Newport Shores community. The EA should also determine if an alternative haul route is available that would avoid the Newport Shores community.

8.0 Environmental Commitments

The 14-day notification should include the following community associations:

- Far West Newport Residents Association
- Lido Sands Community Association
- Newport Shores Community Association
- West Newport Beach Association

Current address and contact information can be found at:
http://gis.newportbeachca.gov/gispub/HOA_report/.

3300 Newport Boulevard · Post Office Box 1768 · Newport Beach, California 92658-8915
Telephone: (949) 644-3200 · Fax: (949) 644-3229 · www.newportbeachca.gov/planning

To reduce noise and air quality impacts, it is recommended that trucks and heavy truck idling be limited to no more than thirty (30) minutes.

The booster pump for the 8-inch pipeline should be located as far from residential areas as possible.

Please feel free to contact me at (949) 644-3232 or PAlford@newportbeachca.gov if you have any questions.

Sincerely,

Patrick J. Alford
Planning Manager

Cc: Brenda Wisneski, Deputy Community Development Director

Jones, Erin L SPL

From: Philip Bettencourt [philip@bettencourtplans.com]
Sent: Friday, May 18, 2012 10:19 AM
To: Jones, Erin L SPL
Cc: P. Bettencourt
Subject: Draft Environmental Assessment (EA) for Santa Ana River Marsh Dredging Project.

Follow Up Flag: Follow up
Flag Status: Flagged

To: Josephine R. Axt and/or Erin Jones

I am writing as a private citizen concerning the subject study and the request for comments on the EA for the subject project.

I would respectfully request to be included on the official email list of interested community parties concerning this important project.

In the final administrative record could you please address?

* What are the official design channel depths you are seeking to restore?
* Are the design depths the same for the portion of the channel within the City of Newport Beach jurisdiction?
* Is the dredging and excavation fully funded so that you can proceed within the September 2012-March 2013 time frame?
* Is a Coastal Development Permit from the California Coastal Commission already in hand (or required)?
* Is your schedule at all dependent on what the City of Newport Beach may or may not do at this time with their portion of the marsh?
* Is the material deemed to be not compatible for ocean disposal subject to upland drying and bioremediation rather than being placed in an offsite fill?
* Will the completed project remain within the stewardship of ACOE or are other possible arrangements being considered?

Thank you so much for your attention and for your consideration.

Philip Bettencourt
Real Estate Development Planning
110 Newport Center Dr., S. 200
Newport Beach, Ca. 92660
949-720-0970
philip@bettencourtplans.com

Jones, Erin L SPL

From: Jim Mosher [jimmosher@yahoo.com]
Sent: Tuesday, May 01, 2012 7:32 AM
To: Jones, Erin L SPL
Cc: Suzanne Forster; Terry Welsh; Steve Ray
Subject: Availability of earlier USACE Santa Ana Marsh restoration documents?

Follow Up Flag: Follow up
Flag Status: Flagged

Erin,

My sincere thanks to you and your colleagues for taking the time to prepare the informative presentation about the Corp's planned Santa Ana River Marsh Dredging Project at the Newport Beach Council Chambers last night.

I am the the one who asked about the availability of the earlier Corps reports cited in the Draft Environmental Assessment, particularly regarding the earlier restoration effort.

On page 5, with reference to the 92 acres, it says:

"At the time of purchase there were both active and abandoned oil wells on the site, which required extensive cleanup of oil contamination (USACE 1988)."

and on page 18:

"The restoration plan was approved in 1989 and a 92- acre parcel was acquired by USACE from West Newport Oil (USACE 1988). At the time of purchase there were both active and abandoned oil wells on the site, which required extensive cleanup of oil contamination (USACE 1988). Restoration was completed by USACE in 1992."

As explained on pages 4 and 74 the cited reference is:

"Phase II General Design Memorandum/Supplemental Environmental Impact Statement (GDM/SEIS) on the Santa Ana River Mainstem, including Santiago Creek (August 1988); U.S. Army Corps of Engineers"

which I gather from last night's comments is a multi-volume report dealing with the entire Santa Ana River project from the Prado Dam to the ocean.

Is it possible to access just the part of the document cited in the present EA?

In particular, I would be interested in the parts hinted at in the EA that presumably describe: How many active and abandoned oil wells were present at the time of acquisition by USACE? How were the wells and contamination remediated, transforming the area into a viable wetland?

I am also wondering if anyone recalls the approximate cost of the initial remediation/creation of the 92 acre wetland 20 years ago? And also what the estimated cost of the 20 year maintenance described last night will be?

Thank you,

Jim Mosher

P.S.: In reviewing the EA prior to last night's meeting I noticed a few typos on the pages I looked at --

page 18: in the last paragraph there is a citation to "(USACE 1989)" but there is no publication of that date in the references.

page 57 (third paragraph from end): "Sediment is would dissipate over time" <--- extra "is"

page 60 (last paragraph): "tugboat is expected to me minimal" <-- "me" for "be"

If I have any substantive comments I will send them separately.

Thanks again.

Jones, Erin L SPL

From: Jim Mosher [jimmosher@yahoo.com]
Sent: Thursday, May 17, 2012 1:33 PM
To: Jones, Erin L SPL
Subject: Comments on Santa Ana River Marsh draft EA

Follow Up Flag: Follow up
Flag Status: Flagged

Erin,

Thanks again for your presentation on April 30th in Newport Beach, and for providing access to the previous design and environmental documentation referenced in the craft Environmental Assessment at:

http://www.spl.usace.army.mil/Portals/17/docs/publicnotices/SPL-2012-001-ELJ.pdf

With regard to that document I would like to offer two comments:

1. I think it would be useful to define the term "grubbing." I believe it means removing both the vegetation AND its roots, but am not sure -- and in any event it is not a term familiar to those not in the trade.

2. I think some thought might be given to alternatives that might make the current project effective for more than the 20 years, since a project that needs less frequent maintenance might possibly have less cumulative impact. As example, could something be done with the tide gate design that would enhance natural flushing of silt from the marsh? That is, perhaps something could be done to enhance the velocity of outflow and reduce that of inflow?

Aside from that, I think it is an excellent report.

Yours sincerely,

Jim Mosher

P.S.: one very minor typo -- I think the spelling of "Seminuk Slough" (pages 6, 19, 54, 66, 73 and 90 of the 216 page PDF) is incorrect.

The City of Newport Beach uses many variations, but the spelling in its most recent General Plan (see Chapter 10 - Natural Resources Element) is "Semeniuk" :

http://www.newportbeachca.gov/index.aspx?page=173

"Semeniuk" seems to be a Ukrainian family name:

http://www.surnamedb.com/Surname/Semeniuk

and although exactly which person the slough is named after has been lost in the mists of time, that is a MUCH more common spelling than any other.

Jones, Erin L SPL

From: Sean Pence [Sean.Pence@quiksilver.com]
Sent: Sunday, May 06, 2012 12:29 AM
To: Jones, Erin L SPL
Cc: Sean Pence

Subject: Santa Ana River Marsh Dredging Project

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Erin,

Thank you for your presentation and the Q&A session at the Newport Beach City Council Chambers last week. Everyone is very excited to commence and complete the project on the schedule you outlined. I raised a few concerns during the meeting, and I'd like to record those concerns with you via this email. In particular, I am concerned with the following:

* During the period of the dry excavation, I am concerned that the native plants on the islands will not be properly watered and may die. This is concerning since these plants and shrubs provide homes, nests and protection to much of the wildlife in the area, not to mention the beauty it provides to those of us that live on the wetlands. Is there anything that can be done to water the area affected by the dry excavation?

* The staging areas will likely destroy many of the plants / trees in the affected area. I am particularly concerned about the large trees / shrubs that provide a screen to the oil drilling facility to the North of the wetlands. I would like extra care to be taken in this area to preserve as much of the current shrubs / trees as possible, and if any of such trees or shrubs are destroyed, then the same size trees / shrubs should be replaced at the conclusion of the project.

* The depths of the wetlands at low tide appear to be very shallow. I'm sure this is part of the original plan, and there is probably a very good reason for this. However, would it make sense to take out more material so that the wetlands will be deeper at low tide? This would (i) remove more of the 'sludge' that is present today, (ii) provide a longer period of time before dredging will be required again, and (iii) likely create more opportunity for larger fish to live in the wetlands (which brings more birds and other wildlife).

Thank you very much for your consideration.
Best regards,
Sean Pence

18 May 2012

William Seitz
318 62nd Street
Newport Beach, CA 92663
zbillys@gmail.com

Erin L. Jones
Staff Biologist, Ecosystem Planning Section
US Army Corps of Engineers
Los Angeles District
CESPL-PD-RN
(213) 300-9723 (cell)
erin.l.jones@usace.army.mil

Sent via US Mail and E-mail

Re: ***Santa Ana River Marsh Dredging Project, Newport Beach, Orange County, CA April 2012***

Hello Ms. Jones,

I am a resident of Newport Beach and a member of the Newport Shores Community Association (NSCA). NSCA represents over 450 homes that are directly adjacent to your proposed project: - which we support. I am a program manager and a licensed Civil Engineer.

I would welcome it if you could forward me a link where I could get access to the plans, specifications and estimates for this project.

I can well appreciate that this is a complicated project that has taken a long time to fund and implement and thank you for your efforts.

I have seen my share of projects where landscaping does not have its own line item and gets lumped into “mobilization/ demobilization”. In some cases, as quantities and scope expand, restoration of landscaping becomes the "go to" source to bridge the funding gap. Many causes for concern are allayed when there is a well worded description for the landscape restoration line item for measurement and payment.

One concern with this project is to ensure that the contract requires that the existing landscaping opposite the clubhouse will be protected in place or restored in a manner that is consistent with its current state. A recent Orange County Sanitation District sewer project removed a significant amount of vegetation. A restoration effort is currently in process and a row of boxed trees have been placed to screen oil operations until the newly re-landscaped areas have matured.

The regulatory agencies may restrict the types of plants that will be allowed to be replanted. The Environmental Assessment (EA) notes that existing non-natives will be removed and restored with native plants. A drought tolerant planting may be more appropriate rather than restricting the selection to only native plants.

Newport Shores is an active residential neighborhood with a lot of pedestrian, bicycle and automotive traffic. I am obliged that this was considered when the decision was made to limit truck traffic to the Santa Ana River access road for egress.

I thank you for your time and look forward to hearing from you.

William Seitz
949.300.9132

Allen Matkins

Allen Matkins Leck Gamble Mallory & Natsis LLP
Attorneys at Law
1900 Main Street, 5th Floor | Irvine, CA 92614-7321
Telephone: 949.553.1313 | Facsimile: 949.553.8354
www.allenmatkins.com

Suzanne E. Skov
E-mail: sskov@allenmatkins.com
Direct Dial: 949.851.5418 File Number: 371348-00001/OC955327.01

Via Electronic Mail

May 18, 2012

Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
ATTN: Ms. Erin Jones
erin.l.jones@usace.army.mil

Re: Public Comments: April 2012 Draft Environmental Assessment for the Santa Ana River Marsh Dredging Project, Newport Beach, Orange County, California ("Project")

Dear Dr. Axt:

We appreciate the opportunity to provide comments on the Project and request that these comments be made a part of the administrative record for the Project. The U.S. Army Corps of Engineers ("Army Corps") is the Project proponent. A Draft Finding of No Significant Impact ("FONSI") has been prepared and is included with the Environmental Assessment. Thus, it appears the Army Corps has determined that an Environment Impact Statement is not required for the Project.

According to the Environmental Assessment, the Project includes the dredging of sediment from channels within the southern portion of the Santa Ana River Marsh ("Marsh") located in the City of Newport Beach to restore habitat and Marsh function. The dredged material will be disposed near the shore waters of Newport Beach and at an upland infill. The Project is a "regional approach to provide flood control solutions for the Santa Ana River and its tributaries within San Bernardino, Riverside and Orange Counties." (Environmental Assessment, p. 4.) The stated purpose and need for the Project is to (1) restore the channels that have experienced shoaling to design depths; (2) restore tidal circulation and flushing within the Marsh; (3) prevent water quality problems and stagnation; (4) prevent transition of Marsh habitats; and (5) provide beach nourishment material for local beaches eroded by the littoral processes. (Environmental Assessment, p. 6.)

The 92-acre Marsh was initially restored by the Army Corps in 1992. The site now provides restored coastal salt marsh for habitat for a variety of native plants and wildlife, including federally and/or state listed endangered species. (Environmental Assessment, p. 5.) Increased sediment within the waterways of the Marsh have created water quality and biological concerns. The Project would provide dredging of all of the waterways within and adjacent to the Marsh with the exception of the Seminuk Slough. (Environmental Assessment, p. 62 and Figures 2 and 8.) Residents along the Seminuk Slough use the waterway to access the Pacific Ocean via the Santa Ana River and the Seminuk Slough provides habitat for endangered and threatened species. Thus, all the waterways within the Marsh are inter-connected.

The Seminuk Slough will eventually require dredging in order to maintain the water quality and habitat protection that the Project would provide the remaining portion of the Marsh. (Environmental Assessment, p. 62.) However, despite acknowledging that simultaneous construction could reduce the cumulative environmental impacts of the Project (Environmental Assessment, p. 62), the Army Corps did not consider including the Seminuk Slough as a part of the Project, nor did the Army Corps consider including the Seminuk Slough as a Project alternative.

The dredging of the Seminuk Slough will have roughly the same temporary construction impacts to water quality, biological resources, air quality, traffic, and noise as the Project construction activities will have. In order to fulfill the purpose and need of this regional Project to restore the channels to design depths and restore tidal circulation and flushing within the Marsh, the Army Corps should avoid the need for future duplicative construction impacts to this environmentally sensitive area and include the Seminuk Slough within its Project footprint.

Further, the Army Corps has not analyzed the long term impacts to the Marsh and the Seminuk Slough if the Seminuk Slough is not ultimately dredged. The Army Corps must assess whether there will be biological and water quality impacts, including, but not limited to, water flow and stagnation, so that the Army Corps can mitigate for any such impacts that may occur in order to satisfy the purpose and need of the Project. In addition, the Army Corps must analyze whether the Project purpose and need is fulfilled and the regional water quality goals met if the Seminuk Slough is not ultimately dredged.

The Army Corps should consider including the dredging of the Seminuk Slough as a part of the Project to avoid the need for additional future construction impacts and to ensure that the purpose and need of the Project is met. If it is determined that it is not feasible to dredge the Seminuk Slough as a part of the Project, the Environmental Assessment should study the potential impacts resulting to the Seminuk Slough and the rest of the Marsh, and mitigate for any such impacts.

Very truly yours,

Suzanne E. Skov

SES

cc: Honorable Nancy Gardner, Mayor, City of Newport Beach (via e-mail)