DRAFT
ENVIRONMENTAL ASSESSMENT

FOR

SURFSIDE-SUNSET BEACH NOURISHMENT PROJECT
STAGE 13
Orange County, California

PREPARED BY

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

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DRAFT
FINDING OF NO SIGNIFICANT IMPACT
FOR THE
SURFSIDE-SUNSET BEACH NOURISHMENT PROJECT
STAGE 13
ORANGE COUNTY, CALIFORNIA

I have reviewed the attached Environmental Assessment (EA) prepared for the project in Orange County. The proposed project is the dredging of approximately 1.2 million cubic yards of sand from an offshore borrow area with placement on Surfside-Sunset Beach to nourish the beach and act as a feeder for downcoast beaches and backpassing approximately 100,000 cubic yards of sand within the city of Newport Beach.

The proposed project is required in order to renourish locally starved feeder beaches, which will allow natural sediment transport processes to move sand downcoast while providing adequate protection to shoreline facilities from storm damage. A Negative Determination will be submitted to the California Coastal Commission for project concurrence.

Project impacts on marine resources will be minor and short-term. No federally listed species will be adversely affected by project implementation. Conservation measures have been put in place to avoid affecting the federally threatened western snowy plover (*Charadrius alexandrinus nivosus*) following informal consultation with the U.S. Fish and Wildlife Service. Formal Section 7 consultation is not required pursuant to the Endangered Species Act of 1969, as amended.

The Los Angeles District has determined that the proposed project is consistent, to the maximum extent practicable with the Coastal Zone Management Act of 1972 and with enforceable policies of the California Coastal Management Plan. The Coastal Commission concurred with this Determination by issuing a Negative Determination on _____. The Los Angeles District requested a Section 401 Water Quality Certification for proposed operations. Section 401 requires certification that the permitted project complies with the State Water Quality Standards for actions within state waters. A Section 401 Water Quality Certification was issued by the Santa Ana Regional Water Quality Control Board on _____.

The implementing regulations for Section 106 of the National Historic Preservation Act (NHPA, 36 CFR 800) allow a federal agency to proceed with a project without further consultation if the project does not have the potential to cause effects on historic properties. Compliance with Section 106 of the NHPA is completed without input from the State Historic Preservation Officer (SHPO). The proposed project meets these criteria.

Other resources analyzed, including oceanography and water quality, air quality, noise, recreation uses, aesthetics, ground transportation, vessel transportation and safety, and aesthetics in this EA are not expected to result in significant adverse impacts.

Hence, I have considered the available information contained in this Environmental Assessment and determined that the impacts resulting from the implementation of the proposed project will not have a significant adverse impact upon the existing environment or the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

DATE

Aaron C. Barta, PMP
Colonel, US Army
Commander and District Engineer

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SECTION 1 - INTRODUCTION

1.1 PROPOSED PROJECT

1.1.1 Location. The overall project area is approximately 35 miles south of Los Angeles along the northern coastline of Orange County between the Anaheim Bay East Jetty and the Newport Pier (Figure 1). This coastal region is primarily sandy beaches, broken by low coastal cliffs in the Huntington Beach area.

1.1.2 Proposed Action. Sand will be dredged from the offshore borrow site and placed on Surfside-Sunset Beach to nourish the beach and act as a feeder for downcoast beaches(Figures 2 & 3). The proposed beach will be about 4,500 feet (ft) in length and between 350 and 900 ft in width (Figure 2). Approximately 1.2 million cubic yards (mcy) of material will be used for the beachfill. The proposed beach will be placed between 13 ft above and 13 ft below mean lower low water (MLLW). The contractor will be required to place sand using a method such as a diked, single-point discharge to minimize turbidity in the runoff water.

Approximately 100,000 cubic yards (cy) of sand will be backpassed from one area of Newport Beach to the groin field. The proposed borrow site is located adjacent the Santa Ana River and extends approximately 3,800 ft alongshore towards the east, from 71st Street to 56th Street (Figure 4). The proposed borrow site will be a 10 ft thick cut from existing top of slope (+12 ft MLLW) to approximately +2 ft MLLW. The beach area cut will include approximately 16 acres. The proposed fill site will be about 2,200 ft in length and be between the 32nd Street groin and the 44th Street groin. The fill will be 40 ft wide and match the existing top of slope (+12 ft MLLW) and extend to approximately 0 ft MLLW.

The contractor will establish a haul route along the seaward edge of the beach, maximizing the distance between the work and residences. The contractor will establish fencing to control public access to the work site. Access points through the work zone will be continuously manned by city of Newport Beach lifeguards.

Borrow Site Characteristics. The proposed borrow site is located approximately 7,000 ft offshore of Sunset Beach (Figure 3) in approximately 45 to 55 ft of water, and includes approximately 200 acres. Approximately 10 ft of material will be dredged off the ocean floor. The dredging depth limit will be -65.0 ft MLLW. The capacity of this site is approximately 2 mcy. A Sampling and Analysis Program was conducted in 2018, the material in the borrow area has been determined to be clean, beach-compatible sand. This determination was presented to the Southern California Dredged Material Management Team (SC-DMMT) on May 23, 2018, who concurred with the suitability determination.

1.1.3 Timing of Project. Construction is expected to start in fall/winter 2019. The equipment typically operates on a 24-hour basis; approximately 12,000 cy per day can be piped to the beach. Dredging for the Surfside-Sunset Beach nourishment portion is expected to take approximately four-five months. Construction of the sand backpass is expected to start in fall/winter 2019 and

is estimated to take approximately 30 days. The equipment typically operates on a 12-hour basis between 7am – 7pm. Approximately 5,000 cy per day can be moved.

1.1.4 Staging Area. Staging activities for beach nourishment activities will occur in the Seal Beach Naval Weapons Station W-8 area, which is approximately 1 acre in size. This site will be used for placement of construction materials, parking of support vehicles, and assembly of construction crews. Equipment will be stored (overnight) south of the Pacific Coast Highway Bridge and northwest of the Surfside colony. This site has been used for past USACE projects and is a currently vacant (disturbed) area. The staging area previously barricaded to prevent public access for earlier stages will again be utilized and is identified on Figure 2.

Staging activities for the sand backpass is a site owned by the City of Newport Beach adjacent the Santa Ana River shown in Figure 4. The site measures approximately 300 ft x 100 ft (0.7 acres), is suitably sized for the intended equipment utilization, and has suitable ingress and egress for the intended equipment. This site will be used for placement of construction materials, parking of support vehicles, and assembly of construction crews. The site will be fenced off and equipment will be stored overnight. This site has been used extensively for previous Federal and non-Federal construction projects.

1.1.5 Construction Equipment. Suitable material can be recovered just offshore Sunset Beach. Based on the proximity of this site, U.S. Army Corps of Engineers, Los Angeles District (USACE) engineers have determined the most feasible and economic way to transport material to the beach will be with use of a hydraulic dredge and pipeline. Use of a hopper dredge to perform the work will also be assessed.

It is anticipated that a cutterhead suction dredge will be used to excavate the sand. Then, the sand slurry will be pumped through a pipeline onto the receiver beach. It is expected that the pipeline will be partially floated on the surface and partially anchored on the seabed. Should the pipeline cross a navigational channel, the pipeline will be placed on the sea floor to allow continued use of the navigational channel during construction. Following pipeline transport, the sand will be uniformly spread over the beach using conventional earth moving equipment. A hopper dredge could also be used. Hopper dredges are self-propelled ships. A hopper dredge operates by pumping sand into its holds, and then moving to a placement site to pump sand onto a beach or into a near shore placement area or, it opens its hull (for split-hull designs commonly found on the west coast of the U.S.) to dump sand into near shore placement areas. The use of a hopper dredge is considered to be unlikely as it is inefficient for a project such as this where the dredged sands would be used to widen an existing beach. Hopper dredges on the west coast do not have a pump out capacity needed to place sands directly onto beaches. Additional construction equipment required to support cutterhead suction dredging activities will include three support boats: an anchor tender, a pipe tender, and a crew boat. The onshore work will utilize earth-moving equipment, including two bulldozers.

The sand backpass operation equipment will consist of conventional earthmoving equipment including bulldozers and scrapers.

1.2 ENVIRONMENTAL ASSESSMENT PROCESS

This Environmental Assessment (EA) shall address potential impacts associated with implementing its discretionary actions as they relate to USACE policies and those of other entities.

The USACE is the Lead Agency for this project. This EA is in compliance with the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, as amended. The NEPA requires Federal agencies to consider environmental effects of their actions. When those actions significantly affect the quality of the human environment, an agency must prepare environmental documentation that provides full and fair discussion of impacts.

The EA process follows a series of prescribed steps. The first, scoping, has been completed with purpose to solicit comments from other Federal and State agencies as well as the general public. The EA is the second step that is then sent out for a 30-day public review period, during which written and verbal comments on the adequacy of the EA will be received. The next step requires preparation of a Final EA (FEA) that incorporates and responds to comments received. The FEA will be furnished to all who commented on the Draft and be made available on request. The final step is preparing a FONSI; if it is determined the project will not have a significant impact upon the existing environment or the quality of the human environment. This is a concise summary of the decision made by the USACE from among the alternatives presented in the FEA. If it is determined the project will have a significant impact upon the existing environment or the quality of the human environment, an EIS will be required.

1.3 RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES, PLANS, AND OTHER REQUIREMENTS

The USACE is required to comply with all applicable federal policies; project compliance is summarized in Table 1.

Table 1
Summary of Environmental Compliance

Statute	Status of Compliance
National Environmental Policy Act (NEPA) of 1969, 42 U.S.C., as amended Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508) dated July 1986	The EA will be completed and submitted for public review. Upon review of the Final EA, the District Engineer will issue a FONSI or require preparation of an EIS and a ROD.
Clean Air Act, 42 U.S.C. 740B	A permit to construct will be obtained by contractor, if necessary.
Clean Water Act, 33 U.S.C. 1344 Rivers and Harbors Act of 1899, 33 U.S.C. 403	A section 404(b)(1) analysis has been conducted for the recommended plan and a Section 401 Water Quality Certification will be requested from the California Regional Water Quality Control Board, Santa Ana Region. Not Applicable.
National Oceanic and Atmospheric Administration Federal Consistency Regulation (15 CFR 930) Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq California Coastal Act of 1976	 A Negative Determination was prepared by the USACE and concurrence requested from the California Coastal Commission.
Joint Regulations (U.S. Fish and Wildlife Service and National Marine Fisheries Service) Endangered Species Committee Regulations, 50 CFR 402 Interagency Cooperation Endangered Species Act of 1973, 16 U.S.C. 1531, as amended Fish and Wildlife Coordination Act, 16 U.S.C. 661-666c Migratory Bird Treaty Act, 16 U.S.C. 703-711 Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1413 Marine Mammal Protection Act, 16 U.S.C. 1361 et seq	An analysis of potential effects has been conducted and coordination efforts with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service concluded. The Corps is conducting informal consultation with the USFWS for the western snowy plover. No other federally listed species will be adversely affected by project implementation. An analysis of potential effects has been conducted and coordination efforts are underway with the U. S. Fish and Wildlife Service. The USACE has determined that no species protected by the Migratory Bird Treaty Act will be impacted. Not applicable. The USACE has determined that no species of marine mammal will be impacted.
National Historic Preservation Act, 16 U.S.C. 470 and 36 CFR 800: Protection of Historic Properties Executive Order 11593: Protection and Enhancement of the Cultural Environment, May 13, 1971	Per 36 CFR 800.3(a)(1), the proposed project has no potential to cause effects, and therefore the agency official has no further obligations under Section 106 of the Act. A memorandum of record is included in Appendix C. Not applicable.

SECTION 2 – HISTORY AND PURPOSE

2.1 DESCRIPTION OF PROJECT AREA

The overall project area is approximately 35 miles south of Los Angeles along the northern coastline of Orange County between Anaheim Bay jetties and Newport Pier. This coastal region is primarily sandy beaches, broken by low coastal cliffs in the Huntington Beach area.

The specific project area for Surfside-Sunset starts at the beach area immediately downcoast of the Anaheim Bay East Jetty and extends for approximately 1 mile (5,400 ft).

Figure 2 depicts the overall project area and specific project boundaries.

2.2 PROJECT BACKGROUND INFORMATION

2.2.1 Project History

Prior to onshore structural development between the San Gabriel River outlet and Newport Bay, local beaches received sand from flood runoff of the Los Angeles, San Gabriel, and Santa Ana rivers.

Construction of the Los Angeles/Long Beach breakwater system and the Anaheim Bay jetties has altered the local sediment transport processes. Waves reflected off the Anaheim Bay East Jetty combine with incident waves, which cause strong, localized southward-flowing longshore currents near the jetty. These currents have induced downcoast erosion.

The installation of flood-control structures on the Los Angeles, San Gabriel, and Santa Ana rivers has reduced the total amount of sand that naturally passed through the system from river runoff.

Cumulatively, these activities have significantly affected the local natural shoreline and sediment transport processes. Local beaches have been continually eroding since the 1940's. Artificial activities (e.g. beach nourishments) have been conducted over time to mimic natural processes in an effort to sustain beach recreation opportunities and provide additional shoreline protection from coastal storm damage.

2.2.2 Project Authority

This project, as well as other periodic nourishment activities from Surfside to Newport Beach, California, were authorized by act of Congress, Public Law 87-874, 87th Congress, 2nd session, approved on October 23, 1962 and are in accordance with House Document 602, 87th Congress.

On September 13, 1963, the Chief of Engineers (CoE) modified the project to include: (1) relocating the proposed breakwater near the mouth of the Santa Ana River; (2) extending the south jetty at the Santa Ana River; (3) constructing groins and placing fills between the Santa

Ana River and Newport pier as required; and (4) increasing sand allotments at Surfside-Sunset from 3 to 4 mcy.

As a result, USACE, State of California, Orange County, and local cities established the Orange County Beach Erosion Control Project in 1964. This continuing effort has included periodic beach nourishment. Approximately 27.1 mcy of sand have been placed at Surfside-Sunset and Newport beaches to date. Table 2 summarizes previous nourishment activities under this project. Stage 12 also backpassed approximately 100,000 cy of sand into the Newport groin field, similar to the proposed Stage 13.

2.2.3 Project Purpose

Federal authority directs the Corps to nourish locally starved beaches between the Anaheim Bay jetties and the Newport pier. If discontinued, these local beaches will erode, reducing recreation opportunities and limiting protection from storm damage to existing shoreline facilities.

The western portion of Surfside-Sunset beach acts as a feeder for downcoast beaches; thus it is necessary to replenish the beach immediately downcoast of the Anaheim Bay jetties.

This project's purpose is to renourish locally starved feeder beaches, which will allow natural sediment transport processes to move sand downcoast while providing adequate protection to shoreline facilities from storm damage.

2.2.4 Future-Planned Projects

Future projects may include:

1. Stage 14 (approximately 2023)
    a. Renourish Surfside-Sunset Beach (1.75 mcy of sand)

Table 2
Summary of Previous Nourishment Activities

		Amount	Beach Replenishment		Construction	
Stage	**Year**	**(cubic yards)**	**Source**	**Disposal Area**	**Site**	**Type Construction**
	1935	3,700,000	Newport Harbor	Newport Beach		
	1935	1,900,000	Newport Harbor	Newport Beach		
	1945	202,000	Naval Weapons Station	Surfside Beach		
	1947	1,220,000	Naval Weapons Station	Surfside Beach		
	1956	874,000	Naval Weapons Station	Surfside Beach		
1	1964	4,000,000	Naval Weapons Station	Surfside Beach		
1	1964	1,315,000	Naval Weapons Station	Surfside Beach		
	1965	124,000	Newport (Balboa)	Newport (36-47 Sts)		
	1966	60,000	Newport (Balboa)	Newport (36-47 Sts)		
	1967	150,000	Newport (Balboa)	Newport (36-47 Sts)		
2	1968	494,000	Newport (Balboa)	Newport (36-47 Sts)	Newport Beach	Steel Groins (40, 44, 48 Sts)
2	1968	264,000	Newport (Santa Ana)	Newport (40-46 Sts)		
3	1969	750,000	Santa Ana River	Newport (40-46 Sts)	Newport Beach	Rock Groins (36, 48, 52, 56 Sts)
3	1970	124,000	Santa Ana River	Newport (31-46 Sts)		
4a	1971	2,260,000	Naval Weapons Station	Surfside Beach		
4b & 5	1973	350,000	Santa Ana River	Newport (28-48 Sts)	Newport Beach	Rock Groins (28, 32, 40, 48 Sts)
6	Deferred				Santa Ana River	Offshore Breakwater
7	1979	1,644,000	Offshore Borrow	Surfside Beach		
8	1983	250,000	Naval Weapons Station	Land-based Dikes		
	1983	250,000	Naval Weapons Station	Seal Beach		
	1983	500,000	Naval Weapons Station	Surfside Beach		
	1984	1,500,000	Offshore Borrow	Surfside Beach		
	1984	650,000	Naval Weapons Station	Surfside Beach		
9	1990	1,300,000	Offshore Borrow	Surfside Beach		
	1990	522,000	Offshore Borrow	Surfside Beach		
	1992	1,227,000	Santa Ana River	Newport (nearshore)		
10	1996-97	1,600,000	Offshore Borrow	Surfside Beach		
	1996-97	102,000	Offshore Borrow	Newport (nearshore)		
11	2001	1,750,000	Offshore Borrow	Surfside Beach		
12	2009	1,750,000	Offshore Borrow	Surfside Beach		

SECTION 3 - PROJECT ALTERNATIVES

3.1 PROJECT CRITERIA

The project goal is two-fold: to immediately stabilize and nourish locally starved beaches between the Anaheim Bay East Jetty and Newport pier to provide additional storm damage protection and increase current recreation opportunities. To accomplish these goals, USACE engineers and planners have established evaluation criteria. The criteria are: federal economic justification, technical feasibility and effectiveness for increasing shoreline stability/recreation opportunities, local and public acceptability, and potential environmental impacts.

3.2 MEASURES/ALTERNATIVES CONSIDERED

The USACE has proposed the following measures and alternatives to meet primary goals of this project:

3.2.1 Structural (Modification) Alternatives

Construct an Attached Breakwater
Construct Headland Parallel to Shore
Modify Seaward Side Slope near Anaheim Bay East Jetty

Structural alternatives were determined to be unacceptable. Although this approach may provide long-term shoreline stabilization, it will not alleviate immediate concerns. Therefore, the three structural alternatives were eliminated from further consideration as part of this project.

3.2.2 Beach Nourishment Alternatives

Beach nourishment alternatives will provide both adequate short-term, but not long-term, shoreline stabilization and nourishment to locally starved beaches and additional recreation opportunities from the construction of wider beaches. This alternative was determined the only feasible solution for meeting both project needs and criteria; thus, it is further developed below.

Historic and current profiles were used to determine beach areas requiring additional material. Studies determined the beach area immediately downcoast of the Anaheim Bay East Jetty are locally starved and require beachfill. Surfside-Sunset acts as a "feeder beach" i.e., sand placed in these areas will erode and distribute throughout the entire project area. Engineering studies recommend that approximately 1.75 mcy of material be placed on the beach immediately downcoast of the Anaheim Bay East Jetty. These studies also assessed potential borrow areas as a part of this project, which includes both offshore and onshore sites. Potential borrow sites and criteria are discussed below. Placement volume is generally limited to dredge and place 1.2 mcy this cycle; providing shoreline protection equivalent to past stages.

For a large beachfill, offshore sites are optimal so that beaches are not starved of their local sand source. The physical and chemical characteristics of the offshore source material must be compatible with the receiver beach. To minimize other impacts and costs, the preferred borrow

site must be close to the receiver beach. The preferred borrow site for the Surfside-Sunset nourishment is identified on Figure 2; this is the closest site that will provide suitable quantities of compatible material based on geotechnical investigations for beachfill requirements.

The above analyses are consistent with earlier environmental documents: 1972 EIS for Surfside-Sunset and Newport Beach; 1978 EA for Surfside-Sunset; 1982 EA for Surfside-Sunset; 1989 EA for Surfside-Sunset; 1995 EA for Surfside-Sunset/Newport Beach, 2001 EA for Surfside-Sunset Beach Nourishment Project, Stage 11, and a 2008 EA for Surfside-Sunset Beach Nourishment Project, Stage 12.

3.2.3 No Action Alternative

The No Action alternative will result in further sediment losses in the local littoral cell. Since no additional shoreline stabilization or nourishment activities will be provided under this option the beaches will continue to erode. Recreation opportunities will decrease with time, and long term effects include potential property damage, associated costs resulting from the damages, and safety concerns. Although this measure does not fulfill project needs, it will be carried forward in the analysis for comparative purposes, pursuant with NEPA.

SECTION 4 - ENVIRONMENTAL INVENTORY AND CONSEQUENCES

This section defines the project area by establishing an inventory of baseline resources, including physical, natural, and socioeconomic characteristics. The environmental consequences are presented for the Surfside-Sunset Beachfill Alternative as well as the No Action Alternative. The analyses for the East Beach nourishment are for dredging only. Impacts associated with sand placement will be assessed in the EA prepared to support an associated Corps Regulatory permit action. The analysis is based on significance criteria consistent with other NEPA documents. The No Action Alternative analyses are presented only if conditions are expected to change from existing conditions. If analyses indicate that significant impacts may occur, then mitigation is proposed to reduce the level to insignificance.

4.1 Oceanography and Water Quality

4.1.1 Affected Environment

The project area is south of Los Angeles along the northern coastline of Orange County extending approximately 12.5 miles between Anaheim Bay east jetty and Newport pier.

The beach placement site is shown on Figure 2. The borrow site, where all project dredging will occur, is shown on Figure 3.

4.1.1.1 Tides and Currents

The Pacific Coast has two high and two low tides of diurnal inequality. The mean tide average is 3.7 ft and the diurnal average is 5.3 ft. The tidal extremes range from a low of 1.8 ft to a high of 7.1 ft.

4.1.1.2 Waves

Waves are influenced by wind, currents, and ocean bathymetry and are responsible for maintaining coastal beaches. Seasonal changes in general waves have been observed along the coast. Winter waves commonly have shorter periods, greater heights, and a more oblique approach to the shore. The wave direction is generally perpendicular to the shoreline, with wave approach in the upcoast direction (except in the Seal Beach area). Summer waves, which frequently approach the shoreline in the downcoast direction, are classed as southern swells and tend to have long wave periods. Waves that break along the study area shoreline average in height from 2 to 4 ft. Large waves from 6 to 10 ft in height are common and may be expected at any season of the year and to continue for several days at a time.

4.1.1.3 Littoral Process

Littoral transport is the movement of sand along the shoreline. The rate of littoral transport is dependant upon the amount of material available, incoming wave energy, direction of wave approach, and nearshore/offshore topography. The net longshore current along southern

California is downcoast. The majority of sand movement by wave and longshore currents occurs between the beach berm and approximately 30 ft below MLLW. Although sediment is predominately transported downcoast; reversals occur along certain segments of the southern California coastline.

The USACE beach nourishment program at Surfside-Sunset is the only sediment source into the region, therefore, it is certain and expected that sand placed as part of the Stage 13 Surfside-Sunset Beach Nourishment Project will eventually migrate through the Bolsa Chica region and become impounded by the inlet. However, the Bolsa Chica inlet is now interfering with the historic longshore transport by preventing sand from reaching the downdrift beaches that were historically nourished by the feeder beach at Surfside-Sunset. This is demonstrated by aerial photos which show a gradient of sand buildup on the northwest (updrift, Bolsa Chica) side of the inlet compared to the southeast (downdrift, Huntington Cliffs) side of the inlet. Also, a recently identified problem is an erosional hotspot directly adjacent to the inlet (southeast) in the Huntington Cliffs area. The inlet design report (Moffatt & Nichol, 1999) specifically acknowledges that the inlet traps sediment by virtue of the recommendation for periodic maintenance dredging at 2-year intervals and placement of the sand onto the downdrift beaches. There are no transport/tracer studies to definitively measure the rate at which sand is transported downdrift from the Surfside-Sunset nourishment location through the Bolsa Chica inlet region. Analysis of aerial photos and professional judgment suggest an estimated time for sand to travel the 4-mile stretch of beach is 1-3 years.

The Bolsa Chica inlet design without-project condition includes the existence of the USACE Surfside-Sunset beach nourishment program. The inlet design report (Moffatt & Nichol, 1999) indicates that "…the shoreline (at the location of the inlet) responds significantly to the nourishment operations at Surfside/Sunset…". An average sediment transport rate of 340,000 cy per year was incorporated into the design during the numerical modeling efforts to represent the nourishment at Surfside-Sunset. This value identically matches the USACE design value of 350,000 cy per year used since the project inception. Additionally, decades of project experience and measurements from earlier Surfside-Sunset nourishments have shown that the longshore sediment transport direction in the area is from northwest to southeast. Since the sand place by the USACE at Surfside-Sunset is the only source of sand into the region, it is certain and expected that sand placed as part of the Stage 13 Surfside-Sunset project will eventually migrate through the Bolsa Chica region and become trapped by the inlet.

Limited dredging records of the Bolsa Chica inlet suggest a correlation between inlet shoaling and a nourishment event at Surfside-Sunset. The first inlet dredging operation in 2009, prior to the Stage 12 Surfside-Sunset nourishment, included removal of 235,500 cy. A second inlet dredging event in 2010-2011 resulted in the removal of 396,000 cy of sediment. The second dredging event most likely included material that was placed on Surfside-Sunset. Although dredging records do not indicate the full volume of fill material was impounded by the inlet, it suggests the increase following a nourishment event could be significant.

4.1.1.4 Water Quality

Water quality is typically characterized by salinity, pH, temperature, turbidity, and dissolved oxygen (DO). Table 3 characterizes the water quality parameters of the overall project area.

Table 3
Water Quality Characteristics for the Project Area

Parameter	Surfside-Sunset Beach
Salinity	30-32 ppt
Surface Temperature	14.4-17.7° C
pH	8.0
Turbidity	1.4-6.4 NTU
Dissolved Oxygen	6.6-10.7 mg/l

The primary source of pollutants in the project area is outflow from the adjacent Anaheim Bay. These pollutants consist of surface runoff from the Bolsa Chica Flood Control Channel (BCFCC), surface runoff from the areas located immediately adjacent to Anaheim Bay (including the Seal Beach Naval Weapons station), and from recreational vessels berthed at marinas and private residences located in Anaheim Bay. The BCFCC discharges storm runoff from about 37 square miles of urbanized land into Sunset Bay.

4.1.1.5 Sediment Suitability Criteria

Grain Size Compatibility: The USACE's guidelines for sediment compatibility for beach nourishment state percent fines in a composite sediment sample from the dredge site should not exceed the fines at the receiving beach by more than 10 percent.

Sediment Chemistry Compatibility: Sediments were assessed in accordance with the Inland Testing Manual (USEPA & USACE, 1998).

4.1.1.6 Sedimentary Analysis of the Project Area

In February 2018, sediment samples were collected from the proposed borrow areas. Beach profile samples were collected for the +12’ to –30’ MLLW stations. The materials were examined visually, and they were analyzed for grain size. Two representative samples from the borrow area were analyzed for bulk sediment chemistry (Appendix D).

The resulting engineering soil classification for the sediment in this area is a poorly graded sand (SP), with some poorly graded sand with silt (SP-SM). The range of grain sizes is from 0.065 to1.3 mm diameter. Physical grain size beach compatibility calculations based on both individual and composite weighted averages for depths less than 10 ft indicate that sediment from Sub Area “BB” (the proposed borrow site for Stage 13) is still a very sandy sediment. It is therefore very compatible and recommended as an idea borrow sub area for placement at Surfside Sunset beach.

4.1.1.6 Chemistry Analysis of the Project Area

Chemical analyses were performed on two composite samples made from individual cores from within the Borrow Site. All detectable metals concentrations were well below ER-L levels. Organic compounds (i.e. butyltins, DDT, other pesticides, PCBs, and PAHs) were all below detection levels with the exception of PAHs that were nearly two orders of magnitude below their ER-L value. Results are in Appendix D. Based on the physical and chemical characterization, the borrow site sediments are considered suitable for beach nourishment at the project site.

4.1.2 Environmental Consequences

4.1.2.1 Proposed Project

An impact to oceanography will be considered significant if: alteration of water quality results in deleterious effects on human, animal, or plant life; substantial impairment of beneficial recreational use of the beach and/or ocean; exceedances of water quality objectives from the California Ocean Plan; creation of pollution, contamination, or a nuisance as defined in Section 13050 of the California Water Code.

Although the local bathymetry will be altered at the borrow pit site, the magnitude and proportional resulting increase are so small that dredging will have negligible effects on water circulation, is not expected to alter waves caused by winds, and will have negligible effects on deep-water waves approaching the coast.

Dredging/placement activities will impact water quality by causing temporary, localized increases in turbidity, although required measures will considerably reduce this impact.

It is likely that a hydraulic cutterhead dredge will be used. These dredges generally do not cause extensive turbidity. As dredge materials are primarily sandy sediments, the sediment plume will be relatively localized to the area near the dredge. The duration of the plume is expected to be short; suspended solid concentrations will likely return to background levels within one hour after dredging stops.

The placing of dredge materials on local beaches will also result in localized turbidity impacts. Measures taken to protect endangered species (limiting beach placement to a diked, single-point placement site) will control turbidity impacts to levels not anticipated to be significantly greater than ambient suspended concentrations caused by natural surf zone levels.

When evaluating the effect of sand movement into the Bolsa Chica inlet from the proposed project and the responsibility of the proposed project for impacts resulting from that sand movement, the USACE evaluated the inlet design parameters as presented in the inlet design report prepared for the Bolsa Chica Lowlands Restoration Project (Moffatt & Nichol, 1999).

The Bolsa Chica inlet design without-project condition includes the existence of the USACE Surfside-Sunset beach nourishment program. The inlet design report (Moffatt & Nichol, 1999) indicates that "…the shoreline (at the location of the inlet) responds significantly to the nourishment operations at Surfside/Sunset…". Bolsa Chica maintenance should have and did take into account Surfside-Sunset Beach as an ongoing project into consideration for the design. Therefore, the maintenance volumes should not be adversely impacted by the ongoing Surfside-Sunset project.

During construction there may be minor inputs of contaminants from construction vessels; i.e. minor leaks and spills. Any such contaminants will be rapidly dispersed. Because no toxic materials will be used for dredging and placement operations, a large spill of a toxic substance is extremely unlikely. Impacts to water quality would be adverse but not significant. The only large spill that might occur would be a fuel tank rupture as a result of vessel collision. Mariners will be notified of the proposed activities and the project area will be appropriately marked with buoys. The chance of a collision between a vessel and a construction barge is minute; it is not reasonable to expect a significant impact to occur.

The sand distribution ranges between medium to fine grained sands. Metals and organic chemicals in the sediments can be released to the water during dredging and placement of the sediments. Most of these substances, however, have a very low solubility in water, are adsorbed to the fine sediments, and will not be released to the water. Sediment sampling in the dredge area has shown that the sediments do contain trace concentrations of organic chemicals and/or metals. Release of metals or organic chemicals from these sediments during dredging is not expected to have any significant impacts on water quality. Beach nourishment will beneficially change the oceanographic (physical) features by providing a sand source to locally starved beaches. Measures taken to protect endangered species (limiting beach placement to a diked, single-point placement site) will control turbidity impacts to levels not anticipated to be significantly greater than ambient suspended concentrations caused by natural surf zone levels.

The sand backpass operation is not expected to directly impact oceanography. Cut material will be taken above MSL and placed above MLLW. The placing of backpassed materials on Newport Beach will also result in localized turbidity impacts.

4.1.2.2 No Action Alternative

If dredging does not occur regularly, the natural beach areas will continue to erode. Continual erosion will eventually result in locally starved beaches that provide unacceptable levels of coastal storm protection to shoreline facilities, which will result in an increased potential for storm damage and loss of recreational opportunities.

Construction is not expected to cause short- or result in long-term significant adverse water quality impacts.

4.2 MARINE RESOURCES

4.2.1 Affected Environment

4.2.1.1 Vegetation & Wildlife

The affected environment includes Surfside-Sunset Beaches, which consists primarily of beach habitat, intertidal and subtidal rocky habitat, and marine waters.

The beaches are likely to support several species, including sand crabs and beach hoppers. The sandy beach is also expected to be used by a variety of shorebirds, including the black-bellied plover (*Pluvialis squatarola*), willet (*Catoptrophorus semipalmatus*), whimbrel (*Numenius phaeopus*), long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), sanderling (*Calidris alba*), and gulls (*Larus sp.*) for foraging or resting activities. Common sandy fishes typically found in shallow offshore environments include thornback rays (*Platyrhinoides triseriata*) lizard fish (*Synodus lucioceps*), speckled sanddab (*Citharichthys stigmaeus*), northern anchovy (*Engraulis mordax*), white croaker (*Genyonemus lineatus*), and walleye surfperch (*Hyperprosopon argenteum*).

Between March and September, grunion (*Leuresthes tenuis*) may also use the nearby beaches for spawning. These schooling fishes, which are members of the silversides family (Atherinidae), lay and bury their eggs on sandy beaches during nighttime spring tides with eggs hatching on the following spring tide. Peak grunion spawning activity occurs between April and June. Because grunion are vulnerable due to their unique spawning behavior, catch is regulated by CDFW.

The intertidal rocky habitat area of the jetty adjacent to the Surfside Sunset Beach nourishment site supports some feather boa kelp (*Egregia menziesii*) on the middle to low rocky areas and algae, including greens and reds on the high to middle areas. An assembly of bryozoans dominates the adjoining subtidal rocky habitat. Articulated coralline algae were present along with purple sea urchins (*Strongylocentrotus purpuratus*). The adjoining subtidal rocky habitat is also likely to support foraging opportunities for the following fishes: Garibaldi (*Hypsypops rubicundus*), sargo (*Anisotremus davidsonii*), opaleye (*Girella nigricans*), black perch (*Embiotoca jacksoni*), rock wrasse (*Halichoeres semicinctus*), senorita (*Oxyjulis californica*), halfmoon (*Medialuna californiensis*) and kelp bass (*Paralabrax clathratus*).

Planktonic organisms drift with the currents and include phytoplankton and zooplankton. Phytoplankton are the primary producers in the pelagic food web. Zooplankton are the animal component of the plankton (i.e., slightly mobile animals including small crustaceans, swimming mollusks, jellyfish, and free-swimming larvae of fishes and bottom animals). Many species, including many of the invertebrates and fishes important to commercial and recreational fisheries, spend the early stages of their life histories in the plankton. Planktonic communities are generally characterized by patchiness in distribution, composition, and abundance.

Several species of whales, dolphins, and porpoises are found offshore. These include the common dolphin (*Delphinus delphis*), Pacific white-sided dolphin (*Lagenorhynchus*

obliquidens), bottlenose dolphins (*Tursiops truncates*), and the gray whale (*Eschrichtius robustus*). The gray whale spends its summers in the Bering and Chukchi Seas and calves in the lagoons of Baja, California. The gray whale is occasionally observed outside the Channel Islands Harbor during its seasonal migrations. The whales travel south between November and February, and they travel north between the March and May. Gray whales have a low probability of occurring within the project area.

Two species of pinniped occur in the project area. These are the California sea lion (*Zalophus californianus*) and the harbor seal (*Phoca vitulina*). The harbor seal is an occasional visitor to the project site. The California sea lion are known to occasionally haul out on the east jetty rocks.

Loons (*Gaviidae sp.*), Bonaparte's gull (*Larus philadelphia*), western gull (*Larus occidentalis*), Brandt's (*Phalacrocorax penicillatus*), pelagic (*Phalacrocorax pelagicus*) and double-crested cormorant (*Phalacrocorax auritus*), grebes (*Podicipedidae sp.*), surf scoters (*Malanitta perspicillata*), and California brown pelicans (*Pelecanus occidentalis californicus*) are likely to use the project area for roosting and foraging opportunities.

4.2.1.2 Threatened and Endangered Species

Following is a review of potential federal and state-listed and candidate species that may occur near the project area.

California Least Tern. The Federally listed endangered California least tern (*Sternula antillarum browni*) is present in the project area in small numbers from April to August. The Seal Beach Wildlife Refuge, just inland from the nourishment site includes a nesting area for the California least tern. The least tern feeds primarily on surface fishes at dawn and dusk, such as topsmelt and anchovies, in nearshore waters and estuaries near the breeding colonies. Least terns have a medium to high probability of occurring within the project area between April and August.

Western Snowy Plover. Snowy plovers forage on invertebrates in the wet sand and cast-off kelp found in the intertidal zone, in dry sandy areas above high tide, on salt pans, and along the edges of salt marshes and salt ponds. This species nests in dune areas between March and September. Western snowy plover do use the area for overwintering, but do not use the area for breeding.

4.2.1.3 Essential Fish Habitat (EFH). In accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act, an assessment of Essential Fish Habitat (EFH) has been conducted for the proposed project. The project is located within an area designated as EFH for two Fishery Management Plans (FMPs): Coastal Pelagics Plan and Pacific Groundfish Management Plan. Many of the 86 species federally managed under these plans are known to occur in the area and could be affected by the proposed project.

4.2.2 Environmental Consequences

An impact to biological resources will be considered significant if there are: impacts to aquatic plants for ten years or longer directly or indirectly resulting in substantial changes in species composition or abundance beyond that of normal variability; impacts to attached or free-swimming animals for ten years or longer directly or indirectly resulting in substantial changes in species composition or abundance beyond that of normal variability; loss of any rare, endangered, or sensitive species or permanent degradation of the habitat of those species; or permanent deterioration or contamination of the aquatic habitat such that the aquatic ecosystem of the site is substantially disrupted.

4.2.2.1 Surfside-Sunset Beach Nourishment

The beach nourishment involves dredging sand from an offshore borrow site and placing it onto the proposed receiving beach between 13 ft above and 13 ft below MLLW. Dredging impacts include dredging within the borrow area for sand to be placed at the East Beach in Seal Beach. Activities at the dredge and placement sites will result in temporary beach and near shore impacts. These impacts are analyzed below.

Dredge Impacts

The most direct impact of dredging will be the elimination of benthic organisms from the immediate dredging areas. An indirect impact will be the redeposition of suspended sediments on adjacent areas. Due to the sandy nature of the sediments and the use of a suction dredge (where turbidity impacts are limited to the immediate area of the suction head) this redeposition is expected to be minimal and to be confined to the immediate area of dredging. Adjacent organisms will work their way up through the redeposited sediment.

Potential water column impacts at the dredge site include increased turbidity, increased oxygen demand, and slightly elevated levels of contaminants and nutrients. Because the dredge material is clean sand, oxygen depletion, eutrophication, and resuspension of contaminants are not likely to occur. Water column effects will be largely limited to turbidity in the immediate vicinity of the suction head. Cutterhead dredges in the past restrict increases in turbidity above background levels to within 200 to 500 ft of the dredge.

Turbidity can impact plankton populations by lowering the light available for phytoplankton photosynthesis and by clogging the filter feeding mechanisms of zooplankton. Some turbidity is expected from dredging, but most will be confined to the vicinity of the bottom and is not expected to impact surface waters. Because turbidity will be localized and short-term, and the marine plankton are transitory in nature, impacts of dredging on phytoplankton and zooplankton will not be significant.

Impacts of dredging on fish populations will largely be limited to temporary avoidance of the dredge area and localized loss of some food resources. Adverse effects of suspended sediment on fishes are not anticipated. Tidal and current mixing, and flushing will likely dilute the

suspended sediment below lethal or even sublethal concentrations. Turbidity is expected to be localized in time and space, and fish will be able to avoid turbidity plumes. Turbidity impacts will not be significant.

Noise from operations may also impact marine life. The noise and activities of offshore operations may disturb fishes, seabirds, and marine mammals. Data on effects of noise on fishes are limited. The data suggest that fish will be more likely startled by sudden staccato noises than by the steady noise the construction barge will make. Moreover, the noise of the proposed operations will occur against a background area with large amounts of vessel traffic. There may also be localized disturbance to seabirds from the noise and activity of the construction barge. The dredge will not be operating in the immediate vicinity of any important seabird breeding areas. Marine mammals will also likely avoid noise-disturbed areas. Noise impacts are judged to be adverse, but not significant.

Dredging is scheduled to occur outside the California least tern nesting season, so this species will not be present. While dredging is expected to occur in the fall/winter time frame, dredging could occur at any time in the year. Dredging during the nesting season is not expected to affect California least tern because of the limited extent of foraging documented during previous foraging studies, and to the availability of other areas closer to the nest site for foraging that will not be affected by dredging activities. Additionally, dredging activities may not substantially alter California least tern foraging activity and seasonal restrictions on dredging near active California least tern nesting sites provide no protections to this species and are not warranted (Keane and Smith, 2016). The Corps has therefore determined that the project would not affect this species.

After dredging terminates, the affected bottom area will recolonize. Field studies of dredged areas have shown that full recolonization occurs within 2 to 3 years.

Placement Impacts

The slurry of sand will be pumped directly onto the higher portion of Surfside-Sunset Beach. It is expected that some sand will flow into the intertidal zone, which is a rigorous environment of constantly shifting sand.

Placement activities will have impacts on organisms that use the beach. Sandy beach invertebrates such as beach hoppers and sand crabs will be crushed and/or decimated. These species are well adapted to periodic disturbance. Recovery of the community will be expected to occur rapidly and within a year. Impacts on beach organisms will be adverse, but insignificant.

Most of the dredged sediments will consist of large grained sand particles, which will sink rapidly. Sediments may be expected to remain in suspension approximately 15 minutes or less. There may be some minor turbidity impacts from this discharge on planktonic organisms, benthic organisms, fishes and visually feeding seabirds. These impacts are expected to be adverse but insignificant because impacts will be localized within 3,000 ft or less from the receiver beach. Impacts on intertidal marine life will be adverse but not significant.

Due to existing beach scouring and a project schedule outside the grunion nesting season, grunion will not be using the project beach for spawning activities. The beach nourishment will provide suitable material and adequate beach sediment sizes for grunion spawning activities in the future.

Western Snowy Plover: Foraging western snowy plovers were monitored on the beach adjacent to the beach placement area during construction of Stage 12 in 2009. Western snowy plovers are not expected at any of the backpass operation sites. Following informal consultation with the USFWS, the USACE set up a monitoring program for this species during beach placement activities. Monitors were present during all beach placement activities, this only included the presence and activity of on-beach construction equipment. Monitors searched for the presence of western snowy plovers on the beach. Monitors carried marine radios or other equipment to communicate with the construction crews for purposes of coordination and safety. Monitors had the authority to halt all traffic on the beach and/or reroute traffic clear of any western snowy plovers observed by the monitor. Monitors ensured that roosting western snowy plovers were not harassed in any way. Roosting western snowy plovers were not frightened or startled by any means in an effort to get them to move. A post-construction report (Appendix E) reported that no instances of harassment were observed by work crews during any stage of construction. The report also included recommendations regarding future stages, which will be incorporated into the monitoring plan for Stage 13. Based on performance of the monitoring Plan, the USACE has determined that the project may affect, but is unlikely to adversely affect western snowy plover. Critical habitat is not present in the project area, so that the project would have no affect on designated critical habitat for this species.

A detailed monitoring plan will be prepared by the construction contractor, which will be provided to USFWS, CDFW, and CCC for review and comment prior to the initiation of construction. A qualified project biologist will be responsible for overseeing compliance with protective measures for the western snowy plover. The project biologist should be a trained ornithologist with at least 40 hours in the field observing plovers and documented experience locating and monitoring them. Building on the 2009 monitoring program, the monitoring plan will include three one-hour pre-construction surveys the week prior to mobilization to determine if western snowy plovers are present on project beaches, including backpass beaches. If western snowy plover are present, the pre-construction monitoring will attempt to determine the location of roosting locations. A map of the roosting locations would be used to determine which project activities may conflict with these sensitive areas and then create a plan for avoiding sensitive areas. This would include routing pipelines, storage areas, staging areas, vehicle transit routes, and other project activities that must occur on a daily basis around sensitive areas. Sensitive areas would be marked using symbolic fencing, so that crews and other beach goers avoid these areas. In cases where sensitive areas can be identified and protected prior to project activities commencing, biological monitoring would be reduced to visits twice weekly to ensure that protective measures are in place, that the western snowy plovers have not shifted roosting areas, and to check to ensure that the crews are following these directions. A qualified snowy plover monitor will walk ahead of all vehicle(s) and equipment on project beaches to ensure that all snowy plovers are out of harm's way before the vehicle(s) or equipment can proceed. Qualified

monitors will be those individuals who attend the on-site plover training that will be provided by the USACE. Weekly reports and a summary monitoring report would be prepared to document this effort that will be provided to the USFWS, CDFW, and CCC.

Sand Backpass

Excavation will take place above MSL and is not expected adversely impact marine resources. Excavation activities will take place outside nesting seasons for the California least tern and grunion and so will not adversely affect either of these species. Placement of backpassed material will have impacts similar to beach nourishment of dredged materials.

Essential Fish Habitat

The USACE has determined that the proposed project will not result in any substantial, adverse impacts to any species on the Fishery Management Plan or their habitat. Impacts, such as turbidity associated with dredging and placement of dredged materials would be temporary and insignificant.

4.2.2.2 No action alternative.

Construction impacts associated with the project would not occur. However, the project's beneficial effects to the ecosystem would be lost.

Construction is not expected to cause short- or result in long-term significant adverse marine resource impacts. No federally listed species will be affected nor will their continued existence be jeopardized by project implementation.

4.3 AIR QUALITY

4.3.1 Affected Environment

The overall project area is located on the Pacific Ocean roughly 35 miles south of Los Angeles (one of the nation's largest metropolitan areas) in northern Orange County, in the southwestern coastal area of the South Coast Air Basin (SCAB).

4.3.1.1 Climate and Meteorology

The climate of the SCAB is classified as Mediterranean, characterized by cool, dry summers and mild, wet winters. The mean daily air temperature is 63 degrees Fahrenheit (F) and ranges from a minimum of 34 degrees F to a maximum of 103 degrees F. The average relative humidity is 62 percent and the annual rainfall is 10.66 inches. The major influence on the regional climate is the Eastern Pacific High, a strong persistent counterclockwise circulation, with the moderating effects of the cool Pacific Ocean.

Large-scale circulation associated with the Eastern Pacific High produces an elevated temperature inversion along the West Coast. The base of this subsidence inversion is generally from 1,000 to 3,000 ft above mean sea level during the summer. Vertical mixing is often limited to the base of the inversion, which trap air pollutants in the lower atmosphere. The mountain ranges that rim the Los Angeles Basin constrain the horizontal movement of air and also inhibit the dispersion of air pollutants out of the region. These two factors are largely responsible for producing the high pollutant conditions experienced in the SCAB. During the summer, these two factors together with the long hours of sunlight result in formation of high concentrations of ozone. During the winter, the same two factors produce stagnant air that allows pockets of high concentrations of carbon monoxide to form.

High pollutant impacts can occur during these conditions 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 can produce high ozone concentrations in the SCAB during the warmer months of the year.

During the fall and winter months, the Eastern Pacific High can combine with high-pressure areas to produce light winds and extended inversion conditions in the region. These stagnant atmospheric conditions often result in adverse pollutant concentrations in the SCAB. Excessive build-up of high pressure in the Great Basin region can produce a "Santa Ana" condition, characterized by warm, dry, northeast winds in the SCAB and offshore regions. Santa Ana winds often ventilate the basin and prevent the build-up of air pollutants.

4.3.1.2 Baseline Air Quality

The existing levels of ambient air quality and historical trends of the project area are documented by the South Coast Air Quality Management District at the Costa Mesa air monitoring station. Monitored air pollutants include ozone, sulfur dioxide, total suspended particles, and sulfate. No first stage smog alerts have been noted at this station in the last five years. While the summer ozone levels are occasionally unhealthful for all receptor populations, they are lower than inland communities. Levels of primary automobile pollutants, such as CO, have not exceeded their standards in the last five years. Considerable improvement has occurred throughout the 1990s, however, desirable levels have not been attained for some pollutants.

4.3.2 Environmental Consequences

4.3.2.1 Criteria

The Clean Air Act (CAA) as amended specifies in Section 176(a) that no department, agency, or instrumentality of the federal government shall engage in, support in any way, 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(c) of the CAA as conformity to the State Implementation Plan’s purpose of eliminating or reducing the severity and number of violations of the National

Ambient Air Quality Standards and achieving expeditious attainment of such standards, and that the activity will not:

1. Cause or contribute to any new violation of a standard in any area;

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

3. Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Dredge impacts. Emissions associated with the proposed dredging activities will come mainly from the dredge motor drive. This operation will cause some minor air quality impacts. Because of the temporary nature of the emissions and the offshore location of the dredge operation, it is not expected to have a significant impact on air quality in the area.

Placement site. Emissions at the beach placement site will come from construction equipment used to grade the newly placed sand. The Contractor shall be required to properly maintain all construction equipment to further reduce air emissions and to comply with all SCAQMD regulations, including use of reformulated fuels. Because of the intermittent and short-term nature of expected emissions it is not expected to have a significant impact on air quality in the area. The placement of dredged material is primarily wet sand with small amounts of organic material that will not produce significant dust. Minor amounts of dust may be generated as equipment transits the dry beach. There may be some odor from the freshly dredged material, but it will be minor, short-term, and not affect air quality in the area.

Sand Backpass. Equipment will consist of conventional earthmoving equipment including bulldozers and scrapers. Because of the intermittent and short-term nature of expected emissions it is not expected to have a significant impact on air quality in the area. The placement of excavated material may produce minor amounts of dust.

The contractor will be required to obtain all necessary air quality permits and comply with the South Coast Air Quality Management District's (SCAQMD) Guidelines.

Air emissions calculations for this project are provided in Appendix F. Results are provided in Table 4.

Table 4. Construction Air Emissions for Project

	ROG	**CO**	**NOx**	**SOx**	**PM10**
Peak Daily Emissions	12.6	56.6	27.5	25.1	7.0
SCAQMD Daily Significance Thresholds	**75**	**550**	**100**	**150**	**150**
Mitigated total project emissions (tons)	0.8	1.9	1.8	1.1	0.5
DeMinimus Thresholds (tons/year)	**10**	**100**	**10**	**100**	**70**

GHG Emissions. On December 24, 2014, the Council on Environmental Quality (CEQ) released Revised Draft Guidance on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews (CEQ 2014). This guidance states that if a

proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO2 equivalent (MTCO2e) on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. It is important to note that CEQ does not propose this emissions reference point as an indicator of a threshold of significant effects. Pursuant to Executive Order 13783 Promoting Energy Independence and Economic Growth, signed on March 28, 2017, the CEQ guidance on greenhouse gas emissions and effects of climate change has been withdrawn (Executive Order 13783, 2017). The Council on Environmental Quality (CEQ) has withdrawn its Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews on April 5, 2017.

There are currently no Federal GHG emission thresholds, but the anticipated emissions will be disclosed for each alternative without expressing a judgment as to their significance.

GHG emissions were estimated for the project. GHG emissions are provided in Table 5. Calculations are shown in Appendix F.

Table 5. Total GHG Emissions	
	Total Equivalent CO2
Daily Emissions (lbs/day)	24.3
Total Project Emissions (tons)	1.0

Further review of GHG emissions from the project is not warranted.

4.3.2.2 No action alternative.

Construction emissions associated with the project would not occur. However, the project's beneficial effects to the ecosystem would be lost.

Significant adverse air impacts are not expected.

4.3.2.3 Measures to Reduce Air Emissions

Construction equipment will be properly maintained to reduce emissions. These reduction measures include:

- Maintain equipment in tune per manufacturer's specifications.
- Utilize catalytic converters on gasoline-powered equipment.
- Use reformulated, low-emissions diesel fuel.
- Equipment will not be left idling for prolonged periods.
- Curtail (cease or reduce) construction during periods of high ambient pollutant concentrations (e.g., State 1 smog alerts).
- Reduce the number of pieces of equipment involved, where feasible

The inclusion of these mitigation measures will reduce emissions to the maximum extent feasible.

4.4 NOISE

Noise is defined as unwanted sound. Noise disrupts normal activities and diminishes the quality of the environment. There are two types of noise sources: stationary sources which are typically related to specific land uses, and transient sources which move through the environment. A locale's total acoustical environment is the blend of the background or ambient acoustics with unwanted noise. Human response to noise is diverse and varies with the type of noise, the time of day, and the sensitivity of the receptor. The decibel (dB) is the accepted standard unit for measuring the level of noise, which is generally adjusted to the A scale (dBA) to correspond to the range of normal human hearing.

Slight changes in loudness are difficult to detect. A 3-dBA change is considered a just-perceivable difference. A change of at least 5 dBA is required before any noticeable change in community response would be expected. A 10-dBA change is subjectively heard as approximately a doubling in loudness. Exterior noise becomes increasingly noticeable at night and most people are very sensitive to nighttime noise intrusion.

4.4.1 Affected Environment

The dominant land uses in the project area include recreational beach, single- and multifamily residential, and limited industrial/commercial. In the Surfside-Sunset area, the closest residential units are approximately 100 ft from the beach area. Approximate sound levels were calculated using the assumption that sound levels decrease by 6 dBA for every doubling of distance.

Dominant noise sources include waves, beach recreation activities, and vehicle noise on adjacent roads. The sound of wave action will vary with factors including wave height, period, frequency, angle of attack, season, and wind conditions. One study performed by Chambers Group (1992) revealed average noise levels from wave action range between 56 to 70 dBA at a distance of about 165 ft from the water's edge at low tide. The noise included both wave and wind activity. These noise levels can vary considerably more depending on wave action and atmospheric conditions. Beach noise is expected to vary between 50 and 75 dBA. Noise levels in noisy urban areas are frequently as high as 70-80 dBA.

4.4.2 Environmental Consequences

4.4.2.1 Criteria

The City of Seal Beach Noise Ordinance (Ch. 13d-7f) exempts beach area dredging and related construction activities. Noise limits were not identified for the Surfside-Sunset areas.

Project noise impacts would be considered significant if noise resulting from the project results in an increase of 10 dBA above background during the day or a night-time increase of 5 dBA above background. This is a short-term project and a perceived daytime doubling of noise levels is considered to be significant. A lower threshold is used for nighttime noise to reflect the increased sensitivity of people to nighttime sources of noise.

4.4.2.2 Surfside-Sunset Beachfill

Heavy equipment, support vessels, and traffic along the access route will produce noise impacts.

Construction activities are assumed to require less than 10 workers, who will meet daily at the staging area. A rise of 3 dBA would require a doubling of existing traffic noise that is not projected. A cutterhead pipeline dredge will be used to recover material offshore for beach placement, which is expected to generate a noise level of 71.5 dBA at a distance of 50 ft. The dredge activity will occur approximately 5,000 ft offshore. The noise produced by the dredge will be negligible to an onshore receptor.

The intermediate pumping system can be electric- or diesel-powered. An electric pump will produce an insignificant amount of noise. If the power source is from a stationary generator or if the unit is diesel-powered, its projected noise level will be roughly equivalent to apiece of heavy equipment, or about 85 dBA at 50 ft. The unit will be located either on a floating dredge 1,500 ft from the shoreline or on Bolsa Chica beach about 500 ft from the residential area. Thus, noise impacts will be negligible to the local human population.

Onshore activities will involve sand spreading. It is assumed that up to two pieces of heavy equipment will be used at the receiver beach. Bulldozers typically generate approximately 85dBA at a distance of 50 feet. A distance of 100 feet represents the worst-case exposure to project noise at a sensitive receptor (i.e. the nearest residence). This results in a maximum noise of 79 dBA at the nearest residence. (Because the dredge will be operating offshore and in a different area than the receiver beach, its noise will not be discernable and is not expected to significantly increase the combined noise created from the earthmoving equipment.) Construction activity on the beach shall be restricted to the hours of 7:00 a.m. to 7:00 p.m., Monday thru Friday, and 8:00 a.m. to 6:00 p.m. on Saturdays. No beach grooming will be conducted on Sunday. This does not restrict dredging activities or pumping of sand onto the beach. These activities are not expected to significantly impact local residents.

Sand backpass impacts will be similar to sand spreading and will be limited to the same daily operations discussed above.

The following measures will be implemented to reduce noise as much as possible: all construction equipment shall be properly maintained and tuned to minimize noise emissions; and all equipment shall be fitted with properly operating mufflers, air intake silencers, and engine shrouds.

Although short-term adverse noise impacts may occur, these impacts will not be significant. Long-term impacts will not occur.

4.4.2.3 No Project Alternative

Noise impacts associated with the project would not occur. However, the project's beneficial effects to the ecosystem would be lost.

4.5 CULTURAL RESOURCES

4.5.1 Affected Environment.

Routine beach nourishment at Surfside-Sunset Beach has occurred sporadically beginning in 1935 (see Table 2). Dredged sites have been located in the same general area while placement sites have not changed. The current project involves placement of the sediments in the same locations as with Stage 12. All affected areas have been found to be negative for cultural resources.

4.5.2 Environmental Consequences

Criteria.

The project would have a significant effect on cultural resources if it will disturb, remove from original context, or introduce incompatible elements out of character with any property considered eligible for the National Register of Historic Places.

Overall.

No impacts to cultural resources are anticipated. Determination was made that the Stage 11 project would not involve National Register eligible or listed properties. The SHPO concurred that there were no historic properties present in the area of potential effects (APE) and that no historic properties would be affected. The Corps has determined that Stage 13 does not have the potential to cause effects to National Register eligible or listed properties. The current project will be in compliance with Section 106 of the National Historic Preservation Act pursuant to 36 CFR 800.

4.5.2.1 Dredge Impacts.

No impacts to cultural resources are anticipated. A records and literature search review indicates that there are no significant resources recorded within the APE. In addition, the area is not sensitive for presence of historic shipwrecks, and no underwater survey is therefore required.

4.5.2.2 Placement site.

There will be no change in the routinely used placement site. A determination was made that the Stage 11 project did not involve National Register eligible or listed properties. No impacts to cultural resources are anticipated.

4.5.2.3 No action alternative.

No historic properties are present in the APE. Therefore, no effects will result from continued erosion of beaches. However, the project's beneficial effects to the ecosystem would be lost.

4.6 RECREATION USES

4.6.1 Affected Environment

The coastal waters provide both recreational boating and fishing opportunities. The area supports a relatively large sport fishing industry. Common sport fish include grunion, rex sole, and kelpbass.

The nearshore waters provide opportunities for swimming, surfing, sport diving, and shore fishing. Local harbors are located at Huntington Harbor and Los Alamitos Bay, which support private, commercial, and public facilities.

The beaches provide sunbathing, fire pits, and volleyball. Neighboring areas support rollerskating, rollerblading, bicycling, eating facilities, and so forth.

The Surfside-Sunset project area land uses include the Seal Beach Naval Weapons Station (SBNWS), which harbors naval vessels and war combatants, and residential developments including Surfside Colony. The beachfront supports water recreational-services with tourism as one of the most important land use activities in the regional area.

4.6.2 Environmental Consequences

4.6.2.1 Criteria

Impacts will be considered significant if the project results in a permanent loss of existing recreational uses.

4.6.2.2 Surfside-Sunset Beachfill

Construction will occur in an area used year-round for recreation. The impact could extend beyond recreational concerns and could include a loss of revenues from local retail businesses. Construction will occur at the end of the summer season, thereby minimizing recreation impacts.

Project activities will not restrict public access to other land and water uses that abut the proposed staging and construction areas. The completed project will provide more protection for the shoreline and its facilities than current conditions.

Staging area impacts will not occur since the proposed area has been routinely used in the past for similar activities. Staging areas will be fenced for safety and security purposes.

The mobilization and demobilization of the discharge pipeline and associated equipment will cause temporary disruptions to recreational activities within the immediate area. The discharge pipe will be placed to minimize obstruction to navigating vessels. Buoys will bound the operation and other markers to alert recreational boat users.

In-water activities will occur in areas typically used for industrial and recreational purposes. Temporary impacts may occur; they are not expected to be significant.

Although temporary on-land use disruptions may occur, these will not result in any long-term incompatible uses. The project benefits will provide long-term beach stabilization for the project area and downcoast beaches. Stabilization will support more beach use opportunities. After the project, visitors will enjoy an increase of beach area as compared to the No Action Alternative.

Sand backpass operations will limit access to portions of the beach during construction. However, construction during the off-season will limit impacts to recreational beach users.

No significant adverse recreation use impacts are expected. Short-term impacts will be adverse; long term, beneficial.

4.6.2.3 No Action

This alternative assumes the proposed project will not occur, resulting in beaches being further starved and offering less protection to shoreline facilities. Property damage can result in a loss of both recreation opportunities and revenue to the local users as well as long-term land/beach use due to loss of beach. These impacts may be substantial.

4.7 GROUND TRANSPORTATION

4.7.1 Affected Environment

The Sunset Beach area is accessed by the public via Warner Street and Pacific Coast Highway from the south, Broadway Street and Anderson from the north. The Surfside (Colony) Beach area is a private community accessed only by key cards. A naval road accesses the staging area.

4.7.2 Environmental Consequences

4.7.2.1 Criteria

A significant impact would occur if the proposed project results in: 1) inadequate parking facilities, 2) an inadequate access or on-site circulation system, or 3) the creation of hazardous traffic conditions.

4.7.2.2 Surfside-Sunset Beachfill

Construction will require the use of heavy equipment, and manpower to operate it.

Traffic will be generated by crews associated with operations of dredge and support equipment. The equipment crew is anticipated at 10 people. This small staff will not significantly add to the local traffic levels. Because the tug and/or barge will be transferred over-water, delivery of the same will not add to the regional traffic.

Two miles of discharge pipeline will be required along with equipment necessary to pump sand. A small construction crew will lay the pipeline; this crew will not add significantly to daily traffic volume. If it is assumed that a haul truck can transport 20 pieces of pipe and each piece is 20 ft in length, then about 15 round trips will be necessary for pipe delivery. Assuming the delivery of pumping equipment as well as heavy equipment requires an additional seven loads, trucking is projected to generate 44 trips over the construction phase. If this is phased over a two-week period, an average of 3 trips per day will be generated. The total volume of construction traffic over this period is not projected to exceed 50 trips during the peak period.

A small crew will be used to spread sand and provide crowd control. The earthmoving equipment will be moved onsite and remain for the duration of the project. The equipment will not add to the average daily traffic volume. The construction crew to perform this work is expected at less than 5 workers and will not add significantly to daily traffic volume.

A flag person may be appointed to guide traffic in staging areas, and if needed, to direct vehicle maneuvering needs and to prevent safety concerns (i.e., visibility/impairment of local motorists). Traffic safety impacts from staging activities will not create significant impacts.

The sand backpass operation will use a haul route along the seaward edge of the beach, maximizing the distance between the work and residences. The sand backpass operation will, therefore, not impact ground transportation other than commutes for approximately five workers that is not expected to add significantly to daily traffic volume.

Additional vehicular traffic is not anticipated as result of completion of this project.

Significant adverse ground transportation impacts are not expected.

4.7.2.4 No Project Alternative

Additional traffic associated with the project would not occur. However, the project's beneficial effects to the ecosystem would be lost.

4.8 VESSEL TRANSPORTATION AND SAFETY

4.8.1 Affected Environment

4.8.1.1 Vessel Traffic

Currently, commercial boats, fishing vessels, and recreational vessels often traverse the overall project area. These vessels operate primarily out of Huntington Harbor and Los Alamitos Bay.

4.8.1.2 Safety Issues

Adequate wave and storm protection is not currently provided for shoreline facilities located on the proposed beaches. High wave energy has potential to cause considerable damage to existing facilities; these conditions may also place the general public at risk.

A cursory review of available literature on known hazardous, toxic, and radial waste (HTRW) sites and underground storage tanks has not identified any sites within or adjacent to the proposed construction limits.

4.8.2 Environmental Consequences

4.8.2.1 Criteria

Vessel safety impacts will be considered significant if construction activities create a navigation hazard, interfere with any emergency response or evacuation plans, or result in unsafe conditions for vessel traffic.

4.8.2.2 Surfside-Sunset Beachfill

Adequate protection is not currently provided to shoreline facilities from storm damage. Project implementation will result in adequate storm damage protection.

Project construction areas typically impose potential safety concerns. To minimize these concerns, notifications will be posted, and active areas will be properly marked and/or temporarily closed.

Vessel and safety impacts can occur since construction will require use of heavy equipment, primarily dredges and support vehicles. To minimize safety concerns, only work crews will be

permitted access to project areas. Construction will not restrict public access to water uses that abut the proposed working areas.

Water-related impacts may occur with vessel traffic in the project area and the near vicinity as a whole. Because various types of vessels will traverse the project area, there will be a slight potential for vessels to collide with edge or support vessels. Equipment will be properly marked and notifications will be posted to minimize potential concerns.

If a pipeline is used to transport material, additional vessels will be used to lay the pipe from the dredge site to the receiver beach. The pipeline will be appropriately marked. This increase of a few pieces of equipment is negligible as compared to the total local vessel traffic, and the limited distance of travel to set and remove the pipeline along with the limited nature to conduct the beachfill activities. Thus, the additional construction-related vessel traffic will be minimal.

Vessel traffic will not significantly increase over current conditions, and safety impacts are not expected. As a benefit, this alternative will result in adequate wave/storm protection for onshore shoreline facilities.

No significant adverse vessel safety impacts are expected.

4.8.2.4 No Action

No additional wave or storm protection will be provided under this scenario. Under high wave energy conditions, significant damages can occur, causing economic hardship to local residents; in a worst case, loss of life. Vessel traffic conflicts associated with the project would not occur. However, the project's beneficial effects to the ecosystem would be lost.

4.9 AESTHETICS

4.9.1 Affected Environment

The Surfside-Sunset area includes the SBNWS. The project area is located on the coast of the Los Angeles Basin, a relatively flat plain bordered by mountains and foothills on the north and east and by the ocean on the south and west. The overall aesthetic character of the area is a mix of public and commercial water-oriented facilities, dominated primarily by single-family housing. The immediate project vicinity is comprised of water vistas and sandy beaches. The natural resources provide a visually attractive setting and relaxing atmosphere for residents, vacationers, and tourists. The area is well maintained and projects an image that attracts the recreation user.

4.9.2 Environmental Consequences

4.9.2.1 Criteria

The project would significantly impact the aesthetics if a landscape were changed in a manner that permanently and significantly degrades an existing view shed or alters the character of a view shed by adding incompatible structures.

4.9.2.2 Surfside-Sunset Beachfill

Staging activities will occur in areas that have been previously used for staging. Visual impacts will be temporary and insignificant.

The presence of dredging will result in mixed impacts depending on the opinion of the viewer. Many viewers will consider the presence of the dredge to be an adverse impact, interrupting viewpoints from local land points and from boats. Many other viewers will consider the presence of the dredge to be a beneficial impact providing an interesting feature to the existing view. The dredge activity will occur approximately 5,000 ft offshore. Visual obstruction is expected to be minor and no effects from lighting of the dredge are expected due to the distance offshore. Given that the dredge will be present at the beginning of the tourist season there will be a short-term impact, aesthetic impacts will, however, be insignificant.

Dredged material discharge will also cause impacts to the beaches' aesthetic quality. Dredged material is usually darker in color and its discharge on the beach will cause temporary adverse impacts. Once the sand dries, it will lighten to match existing beach sands. Considering the timing of these operations, the magnitude of these impacts to the general public will be negligible.

Aesthetic impacts will result when the placement material is spread over the beach. Because equipment will use portions of the beach, the equipment will be dominant elements in the view shed of an adjacent beach. The view shed’s character will be altered by the introduction of these anomalous elements for the duration of the project. No residual aesthetic impacts will result.

Aesthetic impacts will be temporary and adverse, but not significant.

4.9.2.3 No Project Alternative

Beneficial impacts discussed above would be not be attained. Aesthetics of the area would degrade as the beaches continue to erode.

SECTION 5 - ENVIRONMENTAL COMPLIANCE AND COMMITMENTS

5.1 COMPLIANCE

5.1.1 National Environmental Compliance Act of 1969 (Public Law (PL) 91-190); 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.

The National Environmental Compliance Act includes the improvement and coordination of Federal plans to attain the widest range of beneficial uses of the environment and to achieve a balance between population and resource use permitting high standards of living and a wide sharing of life's amenities.

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. The proposed action and several alternatives are evaluated in relation to their environmental impacts, and a tentative selection of the most appropriate alternative is made.

This EA has been prepared to address impacts and develop mitigation (if warranted) 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 USACE 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 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.

5.1.2 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. The major section of the CWA that applies to the proposed project is Section 401, which requires certification that the permitted project complies with the State Water Quality Standards for actions within state waters, and Section 404(b)(1), which establishes guidelines for discharge of dredged or fill materials into an aquatic ecosystem. Although Sections 401 and 404(b)(1) of the CWA apply, by their own terms, only to applications for Federal permits, the USACE has made a policy decision to apply them to their own projects. This policy is set out in USACE regulations at 33 CFR Part 336. Section 336.1(a) of that regulation states, "Although the USACE does not process and issue permits for its own activities, the USACE authorizes its own discharges of dredge or fill material by applying all applicable substantive legal requirements, including public notice, opportunity for public hearing, and application of the Section 404(b)(1) guidelines." The USACE has applied for a

Section 401 Water Quality Waiver and prepared an approved Section 404(b)(1) Analysis for the authorized project. The Section 401 Water Quality Waiver or Certification will be obtained prior to the initiation of dredging activities.

5.1.3 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. 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.

Western snowy plover may occur on the placement site beach. A monitoring and avoidance plan will be prepared, in consultation with the USFWS, to ensure that wintering western snowy plovers are not harassed or injured. The Corps will be concluding informal consultation under Section 7 of the ESA following completion of the EA process.

The proposed project may affect but is unlikely to adversely affect western snowy plover and would not affect any other federally listed endangered or threatened species, or their critical habitat, and formal consultation under Section 7 of the ESA is not required.

5.1.4 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 USACE has prepared and requested concurrence from the California Coastal Commission for the necessary negative determination.

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

Air quality regulations were first promulgated with the Clean Air Act (CAA). The CAA is intended to protect the Nation's air quality by regulating emissions of air pollutants. Section 118 of the CAA requires that all Federal agencies engaged in activities that may result in the discharge of air pollutants comply with state and local air pollution control requirements. Section 176 of the CAA prohibits federal agencies from engaging in any activity that does not conform to an approved State Implementation Plan.

The CAA established the NAAQS and delegated enforcement of air pollution control to the states. In California, the Air Resources Board (ARB) has been designated as the state agency responsible for regulating air pollution sources at the state level. The ARB, in turn, has delegated the responsibility of regulating stationary emission sources to local air pollution control or management districts that, for the proposed project, is the South Coast Air Quality Management District (SCAQMD).

The CAA states that all applicable federal and state ambient air quality standards must be maintained during the operation of any emission source. The CAA also delegates to each state the authority to establish their own air quality rules and regulations. State adopted rules and regulations must be at least as stringent as the mandated federal requirements. In states where the NAAQS are exceeded, the CAA requires preparation of a State Implementation Plan (SIP) that identifies how the state will meet standards within timeframes mandated by the CAA.

The 1990 CAA established new nonattainment classifications, new emission control requirements, and new compliance dates for areas presently in nonattainment of the NAAQS, based on the design day value. The design day value is the fourth highest pollutant concentration recorded in a 3-year period. The requirements and compliance dates for reaching attainment are based on the nonattainment classification.

One of the requirements established by the 1990 CAA was an emission reduction amount, which is used to judge how progress toward attainment of the ozone standards is measured. The 1990 CAA requires areas in nonattainment of the NAAQS for ozone to reduce basin wide VOC emissions by 15 percent for the first 6 years and by an average 3 percent per year thereafter until attainment is reached. Control measures must be identified in the SIP, which facilitates reduction in emissions and show progress toward attainment of ozone standards.

The 1990 CAA states that a federal agency cannot support an activity in any way unless it determines the activity will conform to the most recent EPA-approved SIP. This means that Federally supported or funded activities will not: (1) cause or contribute to any new violation of any air quality standard; (2) increase the frequency or severity of any existing violation of any standard; or (3) delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area. In accordance with Section 176 of the 1990 CAA, the EPA promulgated the final conformity rule for general Federal actions in the November 30, 1993 *Federal Register*.

Project emissions are not expected to exceed “de minimis” levels established as a criteria for a finding of conformity. Therefore, the project is consistent with the SIP and meets the requirements of Section 176(c).

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

The purpose of the National Historic Preservation Act (NHPA) is to preserve and protect historic and prehistoric resources that may be damaged, destroyed, or made less available by a project. Under this Act, federal agencies are required to identify cultural or historical resources that may

be affected by a project and to consult with the State Historic Preservation Officer (SHPO) when a federal action may affect cultural resources.

Studies indicate that no cultural resources exist in the project area. All project coordination with respect to Section 106 of the NHPA (36 CFR 800) will be completed prior to construction.

If previously unknown cultural resources are identified during project implementation, all activity will cease until requirements of 36 CFR 800.13, *Discovery of Properties During Implementation of an Undertaking*, are met.

5.1.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires the USACE to consult with the U. S. Fish and Wildlife Service whenever the waters of any stream or other body of water are proposed to be impounded, diverted, or otherwise modified. Coordination efforts will continue in order to fulfill the requirements of the FWCA; at this time, we are in full compliance with its provisions.

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

This Draft 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 will be sent to the NMFS for their review and comment. The Final EA will include a written response to any comments and/or recommendations that may be received from the NMFS.

5.2 COMMITMENTS

Following is a summary of both general and resource commitments that have been developed to reduce the impact associated with construction of the proposed project. The USACE has committed responsibility for implementing each of the following measures.

1. Prior to construction, the USACE/contractor will provide a 14-day notification of planned activities to appropriate agencies and post information bulletins of scheduled work time and areas at appropriate offices. Project areas and equipment will be appropriately marked and lighted. Construction is scheduled to begin in fall/winter 2019 and last for approximately 4-5 months.

2. It is the Contractor's responsibility to obtain all applicable air permits and comply with federal, state, and local air and noise regulations.

3. If cultural resources are discovered prior to or during work and cannot be avoided, work will be suspended in that area until resources are evaluated for eligibility for listing in the National Register of Historic Places (NRHP) after consultation with the SHPO. If resources are deemed eligible for the NRHP, the effects of the project will be taken into consideration in

consultation with the SHPO. The Advisory Council on Historic Preservation (ACHP) will be provided an opportunity to comment in accordance with 36 CFR 800.13.

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

5. The Contractor shall implement a Water Quality Monitoring Plan at the dredge and beach placement sites.

6. All dredging and fill activities will remain within the boundaries specified in the plans. There will be no dumping of fill or material outside of the project area or within any adjacent aquatic community.

7. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife.

8. The contractor shall prepare a Western Snowy Plover Monitoring and Avoidance Plan that will be implemented following completion of informal consultation with USFWS prior to the start of construction.

9. The contractor shall mark the dredge and all associated equipment in accordance with U.S. Coast Guard regulations. The contractor must contact the U.S. Coast Guard two weeks prior to the commencement of dredging. The following information shall be provided: the size and type of equipment to be used; names and radio call signs for all working vessels; telephone number for on-site contact with the project engineer; the schedule for completing the project; and any hazards to navigation.

10. The contractor shall move equipment upon request by the U.S. Coast Guard and harbor patrol law enforcement and rescue vessels.

11. Beach placement will be limited to a diked, single-point placement site or similar methodology to minimize nearshore turbidity.

12. Construction activity on the beach shall be restricted to the hours of 7:00 a.m. to 7:00 p.m., Monday thru Friday, and 8:00 a.m. to 6:00 p.m. on Saturdays. No beach grooming will be conducted on Sunday. This does not restrict dredging activities or pumping of sand onto the beach.

13. The following measures will be implemented to reduce noise as much as possible: all construction equipment shall be properly maintained and tuned to minimize noise emissions; and all equipment shall be fitted with properly operating mufflers, air intake silencers, and engine shrouds.

14. Maintain equipment in tune per manufacturer’s specifications.

15. Utilize catalytic converters on gasoline-powered equipment.

16. Use reformulated, low-emissions diesel fuel.

17. Equipment will not be left idling for prolonged periods.

18. Curtail (cease or reduce) construction during periods of high ambient pollutant concentrations (e.g., State 1 smog alerts).

19. Reduce the number of pieces of equipment involved, where feasible

5.3 SUMMARY

The proposed Surfside-Sunset nourishment project has been designed to avoid, and minimize, probable effects on the environment. Where avoidance cannot be used and significant impacts may result, mitigation measures have been designed to minimize impact upon the resources. The above listed environmental commitments [Section 5.2] will be implemented by the USACE (or designee) during project implementation.

Through formal agency coordination and assessment of the proposed project impacts, it is determined the proposed project will not have a significant impact upon the existing environment or the quality of the human environment, as documented in this EA. As a result, preparation of an EIS is not required.

SECTION 6 - REFERENCES

California Environmental Quality Act (Council of Environmental Quality). 2014. Revised Draft NEPA guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions.

Chambers Group Inc.. 1992. Final noise Survey for the Construction and Operation of the International Wastewater Treatment Plant and Outfall Facilities at the Tijuana River, San Diego, California. Prepared for Department of the Army, Los Angeles District, Corps of Engineers.

Executive Order (EO) 13783. 2017. Promoting Energy Independence and Economic Growth.

Kathy Keane and Lawrence J. Smith. 2016. California Least Tern Foraging Ecology in Southern California, A Review of Foraging Behavior Relative to Proposed Dredging Locations. ERDC/EL CR-16-3. May 2016.

Moffatt & Nichol Engineers. 1999. Preliminary Engineering Inlet Studies for Balsa Chica Wetlands Restoration. Final Report & Appendices, December.

USEPA USACE. (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers). 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual, Inland Testing Manual. EPA 823-B-98. February 1998.

SECTION 7 - ACRONYMS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
ARB	Air Resources Board
BACT	Best Available Control Technology
BCFCC	Bolsa Chica Flood Control Channel
CAA	Clean Air Act
CEQ	Council on Environmental
CoE	Chief of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
cy	cubic yard
dB	decibel
dBA	decibel (A weighted scale)
DO	dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FEA	Final Environmental Assessment
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
Ft	feet
FWCA	Fish and Wildlife Coordination Act
HTRW	Hazardous, Toxic, & Radial Waste
USACE	U.S. Army Corps of Engineers, Los Angeles District
MLLW	mean lower low water
mcy	million cubic yards
NEPA	National Environmental Policy Agency
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
SBNWS	Seal Beach Naval Weapons Station
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
USFWS	U.S. Fish and Wildlife Service

SECTION 8 – DISTRIBUTION LIST

The Draft Environmental Assessment was distributed to the following agencies for review and comment:

Federal Agencies:	U.S. Environmental Protection Agency, Region IX U.S. Fish and Wildlife Service National Marine Fisheries Service U.S. Coast Guard Seal Beach Naval Weapons Station
State Agencies:	California Coastal Commission California Department of Fish and Wildlife Regional Water Quality Control Board, Santa Ana Region California State Clearinghouse California Division of Boating and Waterways California Natural Resources Agency South Coast Air Quality Management District
Local Agencies:	City of Seal Beach City of Newport Beach County of Orange Surfside Colony

SECTION 9 – PREPARERS/REVIEWERS

9.1 Preparers

Larry Smith	USACE, Ecologist, Environmental Policy Group

9.2 Reviewers

Chuck Mesa	USACE, Coastal Engineering
Susie Ming	USACE, Programs and Project Management
Jodi Clifford	USACE, Chief, Environmental Resources Branch
Erin Jones	USACE, Biologist, Ecosystems Planning Section

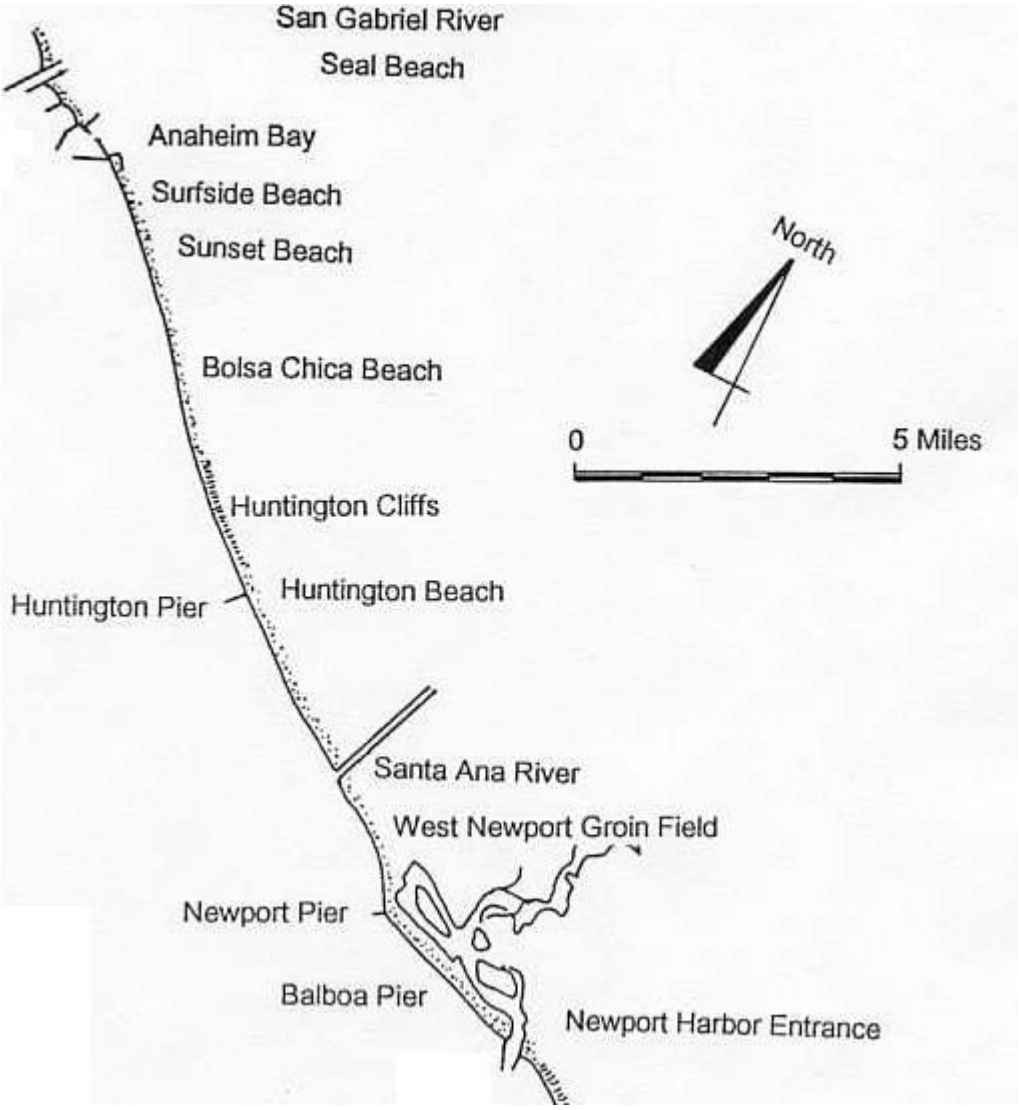


Figure 1. Vicinity Map

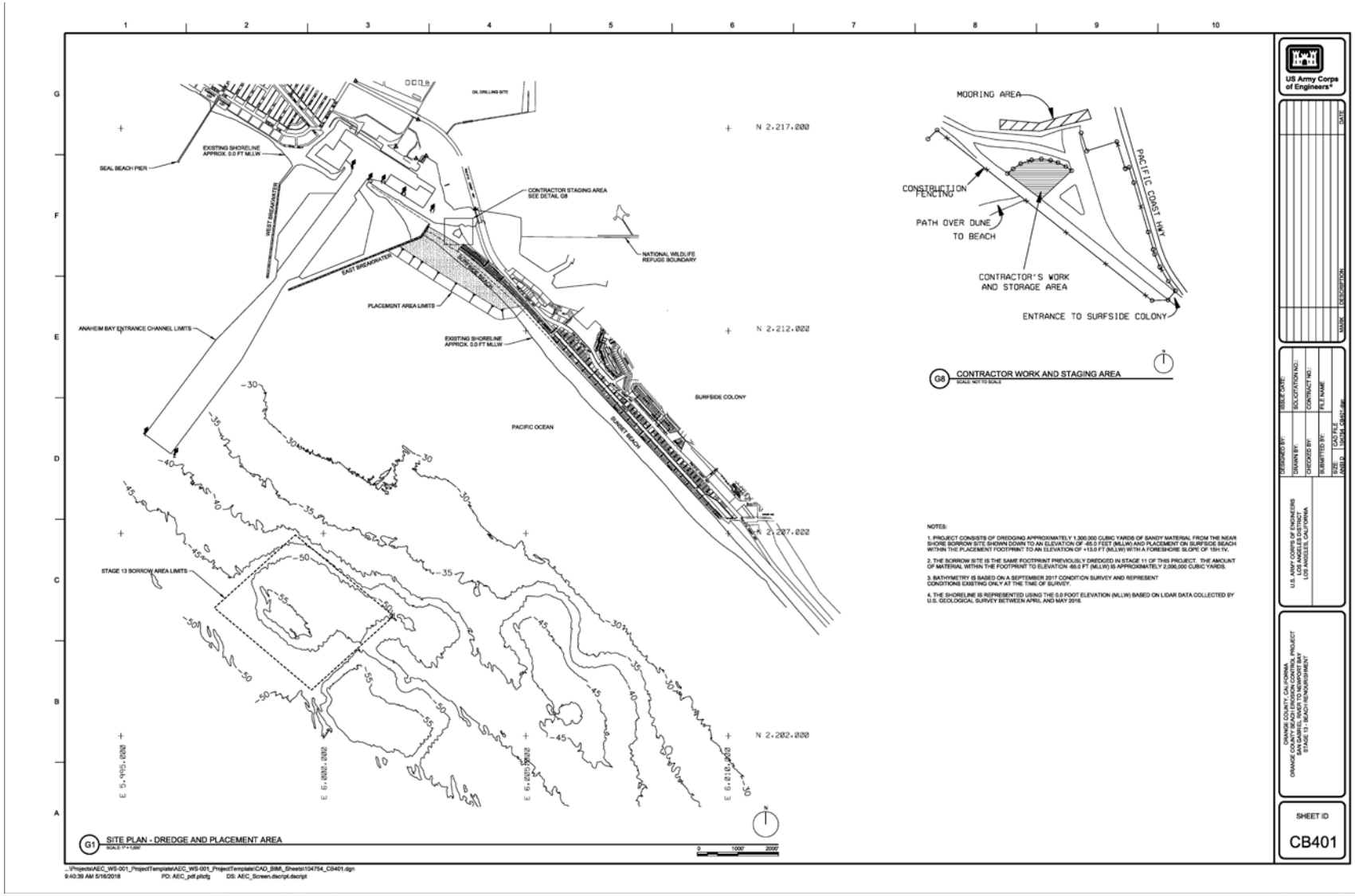
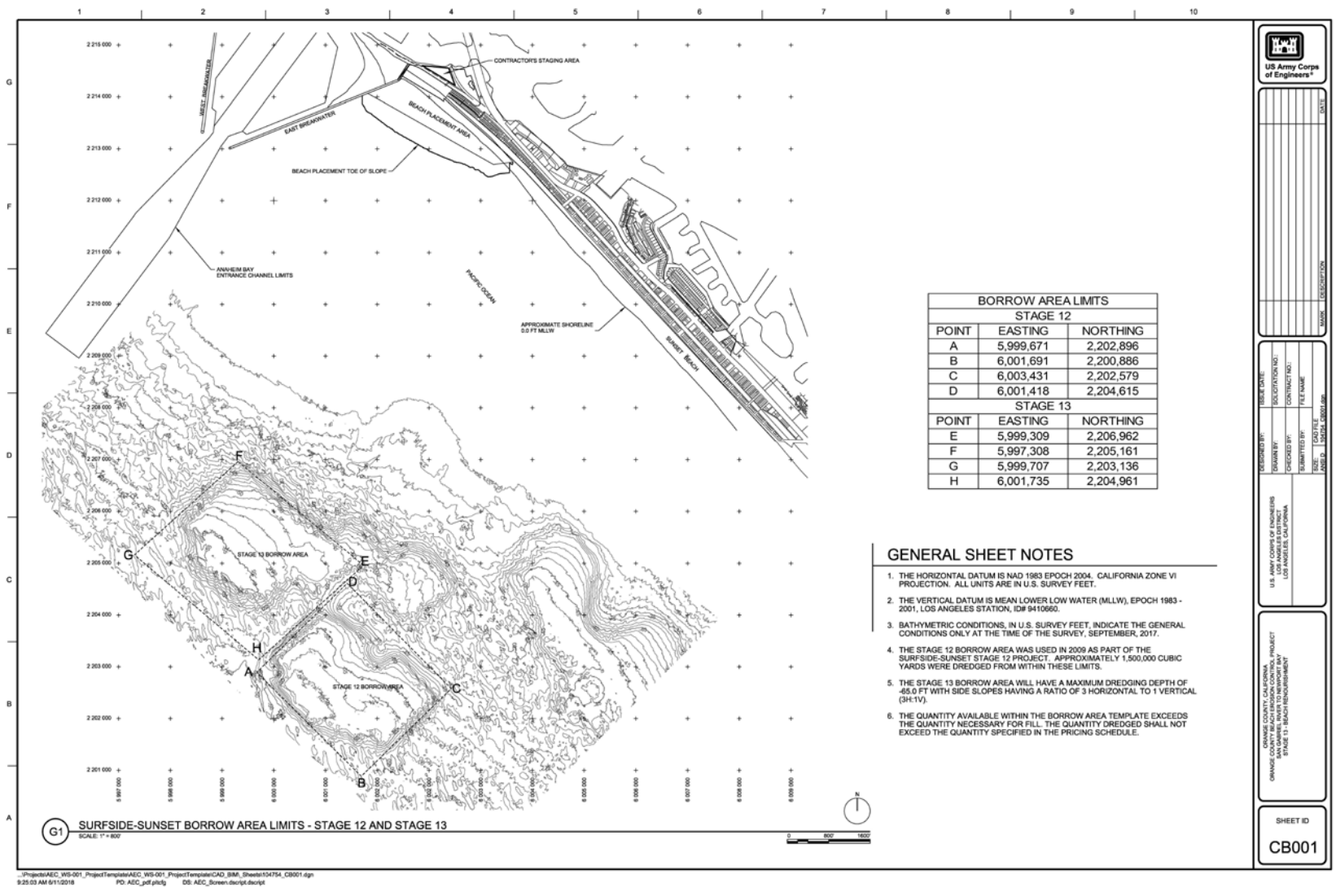


Figure 2. Project Map



BORROW AREA LIMITS		
STAGE 12		
POINT	EASTING	NORTHING
A	5,999,671	2,202,896
B	6,001,691	2,200,886
C	6,003,431	2,202,579
D	6,001,418	2,204,615
STAGE 13		
POINT	EASTING	NORTHING
E	5,999,309	2,206,962
F	5,997,308	2,205,161
G	5,999,707	2,203,136
H	6,001,735	2,204,961

GENERAL SHEET NOTES

1. THE HORIZONTAL DATUM IS NAD 1983 EPOCH 2004. CALIFORNIA ZONE VI PROJECTION. ALL UNITS ARE IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS MEAN LOWER LOW WATER (MLLW), EPOCH 1983 - 2001, LOS ANGELES STATION, ID# 9410660.
3. BATHYMETRIC CONDITIONS, IN U.S. SURVEY FEET, INDICATE THE GENERAL CONDITIONS ONLY AT THE TIME OF THE SURVEY, SEPTEMBER, 2017.
4. THE STAGE 12 BORROW AREA WAS USED IN 2009 AS PART OF THE SURFSIDE-SUNSET STAGE 12 PROJECT. APPROXIMATELY 1,500,000 CUBIC YARDS WERE DREDGED FROM WITHIN THESE LIMITS.
5. THE STAGE 13 BORROW AREA WILL HAVE A MAXIMUM DREDGING DEPTH OF -65.0 FT WITH SIDE SLOPES HAVING A RATIO OF 3 HORIZONTAL TO 1 VERTICAL (3H:1V).
6. THE QUANTITY AVAILABLE WITHIN THE BORROW AREA TEMPLATE EXCEEDS THE QUANTITY NECESSARY FOR FILL. THE QUANTITY DREDGED SHALL NOT EXCEED THE QUANTITY SPECIFIED IN THE PRICING SCHEDULE.

US Army Corps of Engineers

U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT LOS ANGELES, CALIFORNIA

ORANGE COUNTY, CALIFORNIA
ORANGE COUNTY BEACH EROSION CONTROL PROJECT
SURFSIDE-SUNSET BEACH
STAGE 13 - BEACH RENOURISHMENT

SHEET ID
CB001

Figure 3. Surfside-Sunset Beach Borrow Site

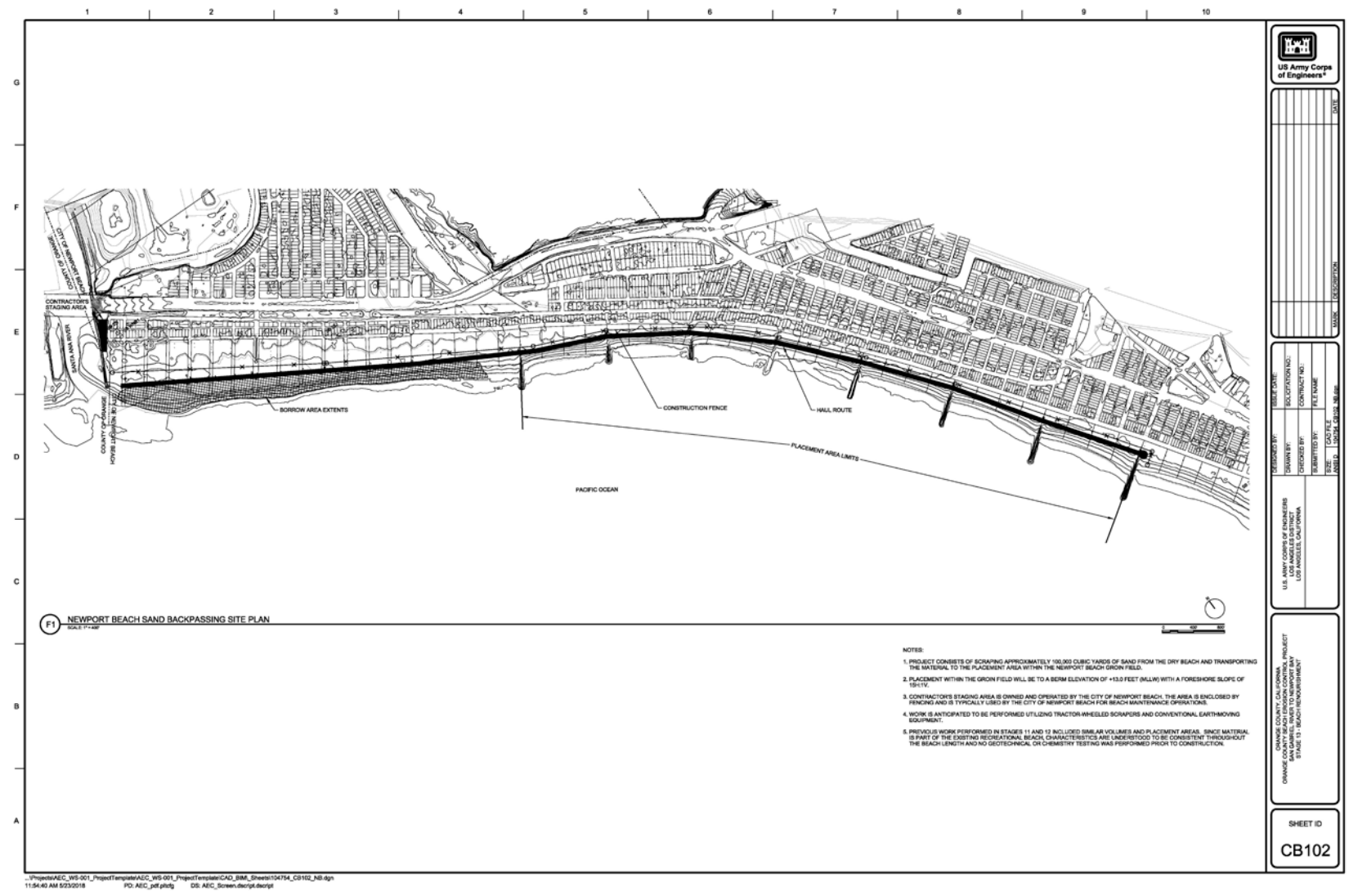


Figure 4. Newport Beach Sand Backpass

Appendix A
Mailing List

Dept. of Parks and Recreation
Division of Boating &
Waterways
ATTN: Casey Caldwell
One Capitol Mall, Suite 500
Sacramento, CA 95814

South Coast Air Quality
Management District
21865 Copley Dr
Diamond Bar, CA 91765

State of California Department
of Transportation, District 7
100 South Main Street
Los Angeles, CA 90012

Loni Adams
CA Dept of Fish & Wildlife
3883 Ruffin Road
San Diego, CA 92123

Jason Freshwater
Regional Water Quality Control
Board, Region 8
3737 Main Street, Suite 500
Riverside, CA 92501-3348

David Spitz
City of Seal Beach
211 8th Street
Seal Beach, California 90740

Catherine Caldwell
Policy & Program Development
Natural Resources Division
California State Parks
1416 9th St, Rm 923
Sacramento CA 95814

Dr. Reinhard Flick
Scripps Institution of
Oceanography
University of California, San
Diego
9500 Gilman Drive
La Jolla CA 92093

Kevin Pearsall, Superintendent
Department of Parks and
Recreation
Orange Coast District, North
Sector
21601 Pacific Coast Highway
Huntington Beach CA 92646

Ann Mesa
OC Public Works
2301 N Glassell St
Orange CA 92865

Joan Cardellino
California State Coastal
Conservancy
1515 Clay Street, 10th Floor
Oakland CA 94612-1401

Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

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

Commanding Officer
Naval Weapons Station
ATTN: Lisa Bosalet N45W
800 Seal Beach Boulevard
Seal Beach, CA 90740-5000

Jon Avery
U.S. Fish & Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Chris Yates
National Marine Fisheries
Service
ATTN: Bryant Chesney
501 W. Ocean Blvd., Suite 4200
Long Beach, CA 92802

Chris Potter
California Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Appendix B
404(b)(1) Evaluation

THE EVALUATION OF THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL INTO THE WATERS OF THE UNITED STATES IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT FOR THE SURFSIDE-SUNSET BEACH NOURISHMENT PROJECT STAGE 13 LOCATED IN 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. As such, it is not meant to stand-alone and relies heavily upon information provided in the environmental document to which it is attached. Citation in brackets [] refer to expanded discussion found in the Environmental Assessment (EA), to which the reader should refer for details.

II. PROJECT DESCRIPTION. [1.1]

a. Location. [1.1.1] The overall project area is approximately 35 miles south of Los Angeles along the northern coastline of Orange County between the Anaheim Bay East Jetty and the Newport Pier. This coastal region is primarily sandy beaches, broken by low coastal cliffs in the Huntington Beach area.

b. General Description. [1.1.2] Sand will be dredged from the offshore borrow site and placed on Surfside-Sunset Beach to nourish the beach and act as a feeder for downcoast beaches. The proposed beach will be about 4,500 ft in length and between 350 and 900 ft in width (Figure 2). Approximately 1.2 million cubic yards (mcy) of material will be used for the beachfill. The proposed beach will be placed between 13 ft above and 13 ft below mean lower low water (MLLW) (Figure 2). The contractor will be required to place sand using a method such as a diked, single-point discharge to minimize turbidity in the runoff water.

Approximately 100,000 cubic yards (cy) of sand will be backpassed from one area of Newport Beach to the groin field. The proposed borrow site is located adjacent to the Santa Ana River and extends approximately 3,800 ft alongshore towards the east, from 71st St to 56th St (Figures 4 & 5). The proposed borrow site will be a 10 ft thick cut from existing top of slope (+12 ft MLLW) to approximately +2 ft MLLW. The beach area cut will include approximately 16 acres. The proposed fill site will be about 2,200 ft in length and be between the 32nd St groin and the 44th St groin. The fill will be 200 ft wide and match the existing top of slope (+12 ft MLLW) and extend to approximately 0 ft MLLW.

The contractor will establish a haul route along the seaward edge of the beach, maximizing the distance between the work and residences. The contractor will establish fencing to control public

access to the work site. Access points through the work zone will be continuously manned by city lifeguards.

c. Authority and Purpose. [2.2] This evaluation has been prepared pursuant to Section 404(b)(1) of the Clean Water Act of 1977 (38 USC 1344) which applies to the discharge of dredged or fill materials into waters of the United States. This project's purpose is to renourish locally starved feeder beaches, which will allow natural sediment transport processes to move sand downcoast while providing adequate protection to shoreline facilities from storm damage.

d. General Description of Dredged or Fill Material. [4.1.1.6] The engineering soil classification for the sediment in this area is a poorly graded sand (SP), with some poorly graded sand with silt (SP-SM). The range of grain sizes is from 0.065 to1.3 mm diameter. Physical grain size beach compatibility calculations based on both individual and composite weighted averages for depths less than 10 ft indicate that sediment from Sub Area "BB" (the proposed borrow site for Stage 13) is still a very sandy sediment. It is therefore very compatible and recommended as an idea borrow sub area for placement at Surfside Sunset beach.

e. Description of the Proposed Discharge Site [1.1.1 & 4.1.1.6]: Dredged material will be placed of at Surfside-Sunset Beach. The following disposal method is available: onshore disposal via pipeline. The characteristic habitat type subject to impact by dredge material discharge is open-coast sandy beach and nearshore subtidal soft-bottom, sandy habitat.

f. Description of Dredging and Disposal Methods: [1.1.5] Material will be dredged and transported via a hydraulic pipeline or a hopper dredge with a pump-out capability.

g. Timing and duration of Discharge [1.1.3] Dredging and beach nourishment will take approximately 4-5 months. Construction is scheduled to occur in fall/winter 2019.

III. FACTUAL DETERMINATIONS.

a. Disposal Site Physical Substrate Determinations:

b. Substrate Elevation and Slope.

Impact: ____ N/A __X_ INSIGNIFICANT ____ SIGNIFICNT

The proposed project is not expected to result in significant substrate impacts.

c. Sediment type.

Impact: ____ N/A __X_ INSIGNIFICANT ____ SIGNIFICNT

Geotechnical studies indicate that the sediment consists primarily of poorly graded sands. Disposal sediments are expected to be compatible with existing beach materials.

d. Dredged/Fill Material Movement.

Impact: ____ N/A __X_ INSIGNIFICANT ____ SIGNIFICNT

Dredged material will be placed onshore at Surfside-Sunset Beach. Sands are expected to move downcoast nourishing those beaches as well mimicking the natural process that was interrupted by Anaheim Bay port development and flood control river channelization projects.

e. Physical Effects on Benthos (burial, changes in sediment type, composition, etc.).

Impact: ____ N/A __X_ INSIGNIFICANT ____ SIGNIFICNT

Temporary, short-term impacts will occur. However, no long-term, adverse significant impacts are expected.

f. Other Effects.

Impact: __X__ N/A ___ INSIGNIFICANT____ SIGNIFICNT

g. Actions Taken to Minimize Impacts.

Needed: __X__ YES ___ NO

If needed, Taken: __X__ YES ____ NO

h. Effect on Water Circulation, Fluctuation, and Salinity Determinations:

(1) Water. The following potential impacts were considered:

Salinity	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Water Chemistry	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Clarity	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Odor	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Taste	__X_N/A	____ INSIGNIFICANT	____ SIGNIFICANT
Dissolved gas levels	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Nutrients	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Eutrophication	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Others	__X_N/A	____ INSIGNIFICANT	____ SIGNIFICANT

The proposed project is not expected to significantly effect water circulation, fluctuation, and/or salinity.

(2) Current Patterns and Circulation. The potential of discharge on the following conditions were evaluated:

Current Pattern and Flow	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Velocity	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Stratification	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Hydrology Regime	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT

The proposed project is not expected to significantly effect current patterns or circulation.

(3) Normal Water Level Fluctuations. The potential of discharge on the following were evaluated:

Tide	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
River Stage	_X__N/A	___ INSIGNIFICANT	____ SIGNIFICANT

The proposed project is not expected to have a significant impact on normal water level fluctuations.

i. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site.

Impact: ____N/A __X_ INSIGNIFICANT ____ SIGNIFICANT

Impacts will be temporary and adverse, but not significant.

(2) Effects on Chemical and Physical Properties of the Water Column.

Light Penetration	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Dissolved Oxygen	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Toxic Metals & Organic	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Pathogen	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Aesthetics	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Others	__X_N/A	____ INSIGNIFICANT	____ SIGNIFICANT

Impacts will be temporary and adverse, but not significant.

(3) Effects of Turbidity on Biota.

Primary Productivity	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Suspension/Filter Feeders	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Sight feeders	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT

Impacts will be temporary and adverse, but not significant.

(4) Actions Taken to Minimize Impacts.

Needed: __X__ YES ___ NO

If needed, Taken: __X__ YES ____ NO

j. Contaminant Determination. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.

(1) Physical characteristics X

(2) Hydrography in relation to known or anticipated sources of contaminants..... X

(3) Results from previous testing of the material or similar material in the vicinity of the proposed project X

(4) Known, significant sources of contaminants (e.g. pesticides) from land runoff or percolation..... ___

(5) Spill records for petroleum products or designated (Section 311 of the CWA) hazardous substances ..... ___

(6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources ..... ___

(7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities..... ___

(8) Other sources (specify) ..... ___

An evaluation of the Geotechnical Report indicates that the proposed dredge material is not a carrier of contaminants and that levels of contaminants are substantively similar in the extraction and disposal sites and is not likely to be constraints.

YES __X_ NO ____
Impact: ____N/A __X_ INSIGNIFICANT ____ SIGNIFICANT

If the material does not meet the testing exclusion criteria above, describe what testing was performed and results: Seventy-two cores were taken from the borrow site and sixteen cores were taken from the disposal site. All cores were analyzed for geophysical parameters to determine suitability of the borrow site material for beach nourishment at the proposed sites. Two representative cores taken from the borrow site were analyzed for chemistry. The borrow sediments were determined to be suitable for beach nourishment meeting geophysical and chemistry guidelines. For details refer to Appendix D of the Environmental Assessment.

k. Effect on aquatic Ecosystem and Organism Determinations.

Plankton	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Benthos	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Nekton	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Food Web	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Sensitive Habitats			
Sanctuaries, refuges	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Wetlands	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Mudflats	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Eelgrass beds	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Riffle & pool complexes	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Threatened & endangered species	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT
Other wildlife	____N/A	__X_ INSIGNIFICANT	____ SIGNIFICANT

l. Actions Taken to Minimize Impacts.

Construction is not scheduled to take place during the nesting season of the three species listed below. Should construction be extended into the nesting season, the following actions will be taken to minimize/avoid impacts to those species. Currently, construction is scheduled to start in fall/winter 2019 and to take approximately four to five months.

Grunion. Restoration of the eroded beach will have beneficial affect on the California grunion by ensuring the presence of a beach on which to spawn. Eroded beaches, with little or no sand are not adequate sites for California grunion spawning. Alternative methods that will be used to minimize impacts to grunion should construction activities extend into the nesting season include a diked, single-point disposal site. Impacts will be avoided by observing the beach during the spawning time (night-time, high, spring tides) prior to proposed spreading operations to determine if grunion have spawned in the proposed disposal area. If grunion have spawned, no disposal activities will occur until the eggs are hatched at the following two spring-tide series.

m. Proposed Disposal Site Determinations. Is the mixing zone for each disposal site confined to the smallest practicable zone? __X_ YES ____ NO

n. Determination of Cumulative Effects of Disposal or Fill on the Aquatic Ecosystem.

Impacts: ____N/A __X_ INSIGNIFICANT ____ SIGNIFICANT

o. Determination of Indirect Effects of Disposal or Fill on the Aquatic Ecosystem.

Impacts: ____N/A __X_ INSIGNIFICANT ____ SIGNIFICANT

IV. **FINDING OF COMPLIANCE**

a. Adaptation of the Section 404 (b)(1) Guidelines to this Evaluation. No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. All practicable alternatives for dredging/disposal were evaluated. The proposed project is the most cost effective and least environmentally damaging.

c. Compliance with Applicable State Water Quality Standards: The proposed project will comply with State of California water quality standards.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act: No toxic materials/wastes are expected to be produced or introduced into the environment by this project.

e. Compliance with the Endangered Species Act of 1973: As discussed in the attached EA, the Corps has determined the proposed project will not have an effect upon the continued existence of any species Federally-listed as threatened or endangered. Formal consultation pursuant to Section 7(c) of this act is not required for this project.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972: No sanctuaries as designated by the Marine Protection, Research and Sanctuaries Act of 1972 will be affected by the proposed project. No sediments will be dispose of at designated ocean dredged material disposal sites.

g. Evaluation of Extent of Degradation of the Waters of the United States: No significant degradation of municipal or private water supplies, special aquatic sites, or plankton resources will occur. The project will have a short-term effect upon fish and invertebrates due to project-related turbidity and the burial of organisms.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem: Specific environmental commitments are outlined in the attached EA.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material is:

_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: Larry Smith _____ Date: 30 August 2018_____

Appendix C
Cultural Resources Documentation

CESPL-PD-RQ August 2018

MEMORANDUM FOR RECORD

SUBJECT: Environmental Assessment for the Surfside-Sunset Beach Nourishment Project, Stage 12, Orange County, California—No Potential to Cause Effects.

1. This memorandum for record (MFR) documents for the files the reasons why the proposed project does not have the potential to cause effects in accordance with Section 106 of the National Historic Preservation Act. This MFR addresses the issue as indicated in 36 CFR 800.3(a)(1). No cultural resources listed on, or eligible for the National Register of Historic Places (NRHP) are present.

2. The proposed project includes:

a. the dredging of approximately 1.2 mcy of sand from an offshore borrow area with placement on Surfside/Sunset /beach to nourish the beach and act as a feeder for downcoast beaches, and

b. backpassing approximately 0.1 mcy of sand within the city of Newport Beach.

3. A determination was made that the Stage 11 project would not involve National Register eligible or listed properties. The SHPO concurred that there were no historic properties present in the area of potential effects (APE) and that no historic properties would be affected. The footprint of the Stage 13 beach placement is the same as that for Stage 11. The footprint of the sand backpass is the same as that verified in Stage 9 & 12 as having no potential for eligible or listed properties.

4. In the unlikely event that cultural resources are uncovered during construction, work in that immediate area would be required to stop until the procedures outlined in 36 CFR 800.13 are complied with.

Appendix D

Sediment Sampling and Analysis Plan Report

SAMPLING AND ANALYSIS PLAN REPORT

SURFSIDE-SUNSET BEACH STAGE 13 BORROW AREA GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION PROJECT

USACE Contract No. W912PL-17-D-0003, Task Order No. 0005

AECOM Job No. 60555447

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
LOS ANGELES, CALIFORNIA

Prepared by:

AECOM Technical Services
999 TOWN AND COUNTRY ROAD
ORANGE, CA 92868

KINNETIC LABORATORIES INC.
10377 LOS ALAMITOS BLVD
LOS ALAMITOS, CA 90720

July 17, 2018

DISTRIBUTION LIST

Ms. Susie Ming, Project Manager U. S. Army Corps of Engineers, Los Angeles District Susan.M.Ming@usace.army.mil	Ms. Carol Roberts U.S. Fish and Wildlife Service carol_a_roberts@fws.gov
Mr. Jeffrey Devine, Technical Manager U. S. Army Corps of Engineers, Los Angeles District Jeffrey.D.Devine@usace.army.mil	Mr. Michael Smith AECOM Project Manager AECOM Technical Services Michael.g.smith@aecom.com
Mr. Jason Freshwater Santa Ana Regional Water Quality Control Board Jason.Freshwater@waterboards.ca.gov	Mr. Ken Kronschnabl KLI Project Manager Kinnetic Laboratories, Inc. kkronsch@kinneticlabs.com
Mr. Jun Zhu Los Angeles Regional Water Quality Control Board jun.zhu@waterboards.ca.gov	Mr. David Schug Senior Principal Geologist AECOM Technical Services david.schug@aecom.com
Ms. Melissa Scianni United States Environmental Protection Agency-Region 9 scianni.melissa@epa.gov	Mr. Spencer Johnson Field Operations Manager Kinnetic Laboratories, Inc. sjohnson@kinneticlabs.com
Mr. Allan Ota United States Environmental Protection Agency-Region 9 ota.allan@epa.gov	Ms. Amy Howk KLI QA/QC Management Kinnetic Laboratories, Inc. ahowk@kinneticlabs.net
Mr. Larry Simon Federal Consistency Coordinator Energy, Ocean Resources and Federal California Coastal Commission lsimon@coastal.ca.gov	Mr. Jon Toal Health and Safety Management Kinnetic Laboratories, Inc. jtoal@kinneticlabs.com
Mr. Larry Smith USACE Environmental Coordinator Los Angeles District lawrence.j.smith@usace.army.mil	Ms. Carla Hollowell Project Manager Eurofins Calscience CarlaHollowell@eurofinsUS.com

SAMPLING AND ANALYSIS PLAN REPORT
Surfside-Sunset Beach Stage 13 Borrow Area Geotechnical and Environmental Investigation Project

USACE Contract No. W912PL-17-D-0003, Task Order No. 0005
AECOM Job No. 60555447

July 17, 2018

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LIST OF ACRONYMS

ASTM	American Society for Testing and Materials	**NOAA**	National Oceanic and Atmospheric Administration
BLK	Method or Procedural Blank	**OEHHA**	Office of Environmental Health Hazard Assessment
Cal/EPA	California Environmental Protection Agency	**OTM**	Ocean Testing Manual
CD	Compact Disc	**PAH**	Polyaromatic Hydrocarbon
CDFW	California Department of Fish and Wildlife	**PCB**	Polychlorinated Biphenyl
CESPD	Corps of Engineers South Pacific Division	**PDS**	Post Digestion Spike
CHHSL	California Human Health screening Level	**PDSD**	Post Digestion Spike Duplicate
COC	Chain of Custody	**PPB**	Parts Per Billion
CSLC	California State Lands Commission	**PPM**	Parts Per Million
CWA	Clean Water Act	**PRG**	Preliminary Remediation Goals
cy	Cubic Yards	**PVC**	Polyvinyl Chloride
DDD	Dichlorodiphenyldichloroethane	**QA**	Quality Assurance
DDE	Dichlorodiphenyldichloroethylene	**QC**	Quality Control
DDT	Dichlorodiphenyltrichloroethane	**QUAL**	Qualifier
DGPS	Differential Global Positioning Satellite	**RBC**	Risk-Based Concentration
DUP	Laboratory Replicates	**RL**	Reporting Limit
EDD	Electronic data deliverable	**RPD**	Relative Percent Difference
ERL	NOAA Effects Range Low	**RSLs**	Regional Screening Levels for Cleanup of Superfund Sites
ERM	NOAA Effects Range Medium	**SAP**	Sampling and Analysis Plan
GPS	Global Positioning Satellite	**SAPR**	Sampling and Analysis Report
HDPE	High-density Polyethylene	**SARWQCB**	Santa Ana Regional Water Quality Control Board
HHMSSL	Human Health Medium – Specific Screening Levels	**SC-DMMT**	Southern California Dredge Material Management Team
ITM	Inland Testing Manual	**SOPs**	Standard Operating Procedures
KLI	Kinnetic Laboratories Inc.	**STLC**	Title 22 Soluble Threshold Limit Concentration
LARWQCB	Los Angeles Regional Water Quality Control Board	**SURR**	Surrogate Analysis
LCL	Lower Control Limit	**TOC**	Total Organic Carbon
LCS	Laboratory Control Spike	**TRPH**	Total Recoverable Hydrocarbons
LDPE	Low-density Polyethylene	**TTLC**	Title 22 Total Threshold Limit Concentration
MLLW	Mean Lower Low Water	**UCL**	Upper Control Limit
MS	Matrix Spike	**USACE**	U.S. Army Corps of Engineers
MSD	Matrix Spike Duplicate	**USCS**	Unified Soil Classification System
NAD	North American Datum	**USEPA**	U.S. Environmental Protection Agency
ND	Not Detected	**USFWS**	U.S. Fish and Wildlife Services
NMFS	National Marine Fisheries Services		

SAMPLING AND ANALYSIS PLAN REPORT

Surfside-Sunset Beach Stage 13 Borrow Area Geotechnical and Environmental Investigation Project

USACE Contract No. W912PL-17-D-0003, Task Order No. 0005

AECOM Job No. 60555447

July 17, 2018

1.0 INTRODUCTION

Since construction of the Anaheim Bay breakwater in 1944, the US Army Corps of Engineers (USACE) has been waging an ongoing battle to save a thirteen-mile stretch of beaches south of Anaheim Bay from continual erosion. Beach erosion not only depletes the beneficial uses of these beaches, it also threatens low elevation homes during winter storms. To mitigate the erosion and provide temporary protection on Surfside-Sunset Beach, USACE periodically dredges beach compatible sediments from borrow areas offshore of the beach and from the Santa Anna River Mouth for placement on the beach. Surfside-Sunset Beach then acts as a feeder beach for nourishing the down coast beaches. The location of Surfside-Sunset Beach is shown on Figure 1.

The purpose of this project was to sample and test sediments in borrow areas offshore of Surfside-Sunset Beach in order to determine the quality of available beach compatible material. In support of this purpose, this Sampling and Analysis Plan report (SAPR) has been prepared on behalf of the USACE, Los Angeles District to provide results of the sampling and testing of sediments necessary to fulfill the purpose.

This project and SAPR was designed to satisfy requirements of USACE's South Pacific Division Quality Management Plan (CESPD, 2000), the Inland Testing Manual (ITM) (USACE and USEPA, 1998), the Clean Water Act (CWA), and the Southern California Dredge Material Management Team (SC-DMMT) draft guidelines. This work is being performed under AECOM's USACE Contract No. W912PL-17-D-0003 and is authorized by Public Law 87-874 passed in 1962 by the 2nd session of the 87th Congress and the 49-year Public Agency Permit No. PRC 4551.9. Sampling and testing of this project was conducted according to the project Sampling and Analysis Plan (SAP) (AECOM and Kinnetic Laboratories, 2018).

1.1 Project Summary

This borrow area dredging episode and nourishment of Surfside-Sunset Beach is Stage 13 of the Orange County Beach Erosion Control Project, San Gabriel River to Newport Bay. Figure 2 (a and b) shows the primary borrow area (Borrow Area B) and areas outside of Borrow Area B that were investigated for beach compatible sediments. To assess this area, sediment cores up to 20 feet in length from multiple locations were sampled and tested. Figure 2 also shows sampling locations, and the most recent bathymetric data from September 2017. Sampling locations inside Borrow Area B was for the purpose of confirming the presence of beach quality sand and sampling locations outside of Borrow Area B was for the purpose of finding a new source of sand. Up to approximately 1,500,000 cy of beach compatible material will be dredged from the final borrow area as part of Stage 13 (USACE, Los Angeles District, 2014). In 2001, it was estimated that there was a total of 49,000,000 cy yards of beach compatible sediment in Borrow Area B. During Stage 11 (2002) and Stage 12 (2009), approximately 3,800,000 cy of material was removed from Borrow Area B for beach nourishment, leaving at least 45,200,000 cy available.

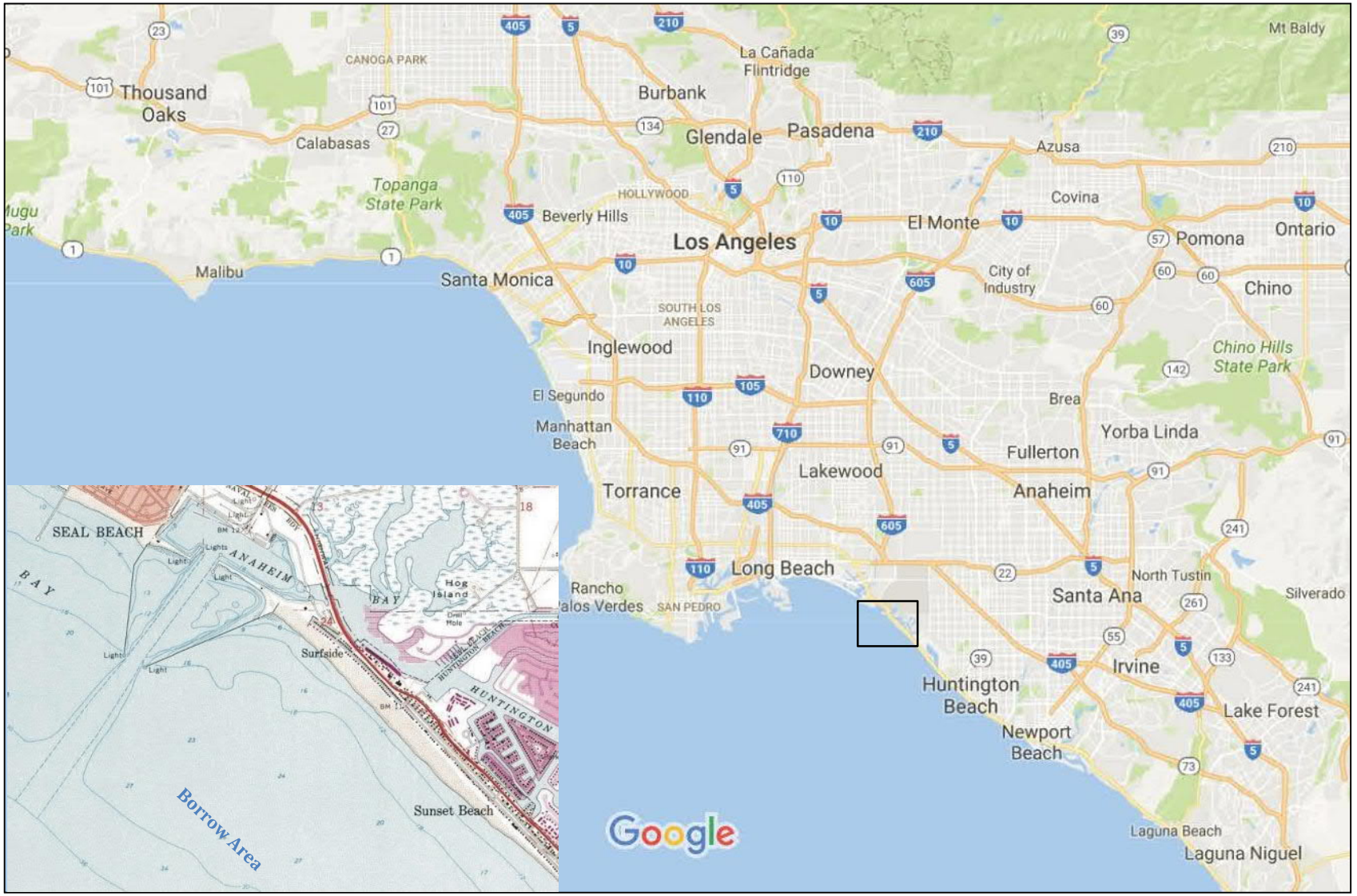


Figure 1. Location of the Surfside-Sunset Beach Project Area

SUBAREA "BB"		
POINT	NORTHING	EASTING
1	2,206,964	5,999,281
9	2,205,140	5,997,451
10	2,205,015	6,001,631
11	2,206,964	5,999,282

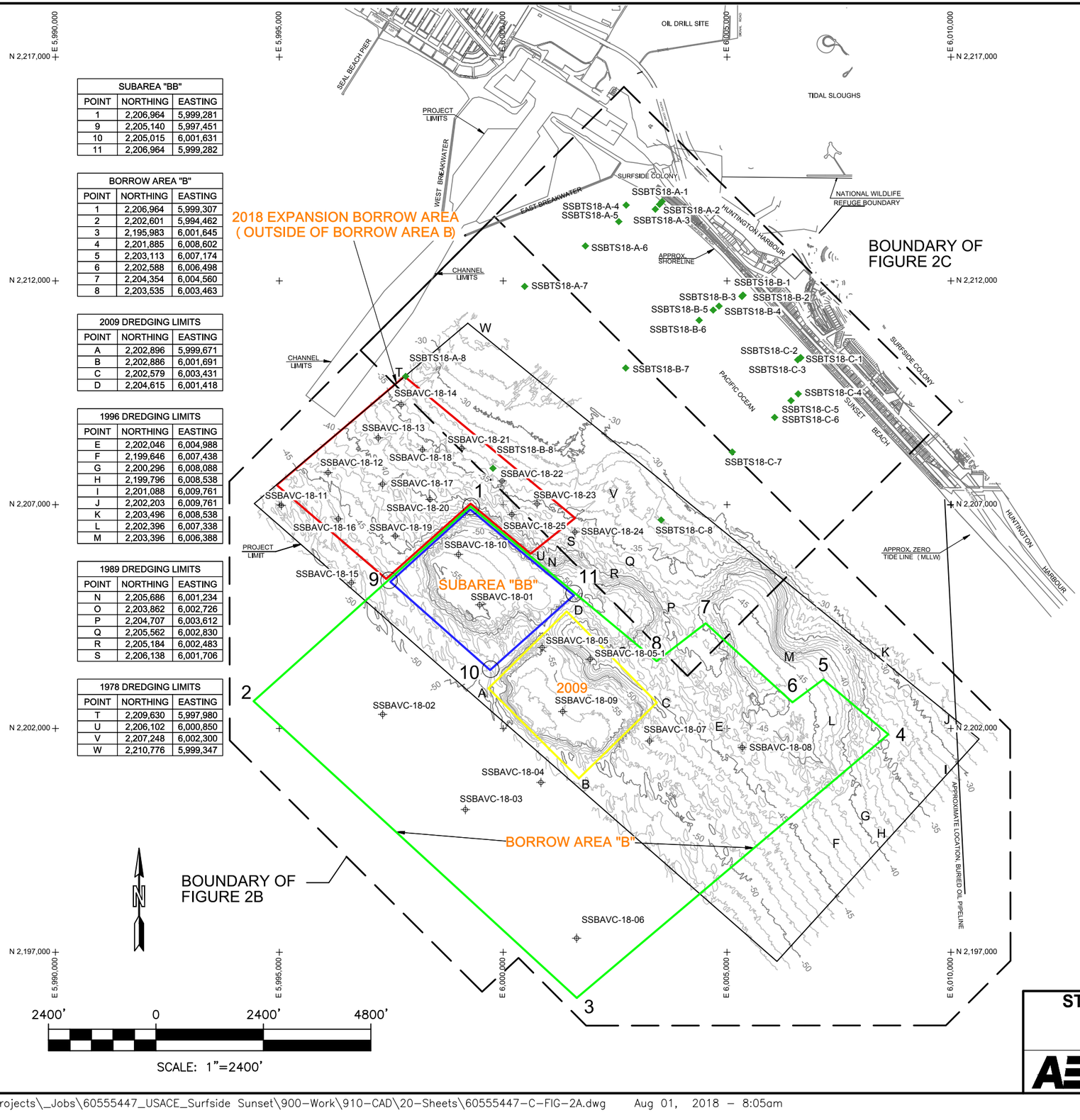
BORROW AREA "B"		
POINT	NORTHING	EASTING
1	2,206,964	5,999,307
2	2,202,601	5,994,462
3	2,195,983	6,001,645
4	2,201,885	6,008,602
5	2,203,113	6,007,174
6	2,202,588	6,006,498
7	2,204,354	6,004,560
8	2,203,535	6,003,463

2009 DREDGING LIMITS		
POINT	NORTHING	EASTING
A	2,202,896	5,999,671
B	2,202,886	6,001,691
C	2,202,579	6,003,431
D	2,204,615	6,001,418

1996 DREDGING LIMITS		
POINT	NORTHING	EASTING
E	2,202,046	6,004,988
F	2,199,646	6,007,438
G	2,200,296	6,008,088
H	2,199,796	6,008,538
I	2,201,088	6,009,761
J	2,202,203	6,009,761
K	2,203,496	6,008,538
L	2,202,396	6,007,338
M	2,203,396	6,006,388

1989 DREDGING LIMITS		
POINT	NORTHING	EASTING
N	2,205,686	6,001,234
O	2,203,862	6,002,726
P	2,204,707	6,003,612
Q	2,205,562	6,002,830
R	2,205,184	6,002,483
S	2,206,138	6,001,706

1978 DREDGING LIMITS		
POINT	NORTHING	EASTING
T	2,209,630	5,997,980
U	2,206,102	6,000,850
V	2,207,248	6,002,300
W	2,210,776	5,999,347



NOTES

1. SOUNDINGS AND ELEVATIONS, IN US SURVEY FEET, INDICATE THE GENERAL CONDITIONS EXISTING ONLY AT THE TIME OF SURVEY SEPTEMBER 6-15, 2017.
2. COORDINATES ARE CALIFORNIA LAMBERT ZONE VI, NAD 1983.
3. MEAN LOWER LOW WATER DATUM IS ESTABLISHED FROM LOS ANGELES, STATION ID 9410660.
4. ELEVATIONS, ESTABLISHED FROM MONUMENT F 978 RESET (PID DY0926) WITH ELEVATION OF 35.37 US FEET, MLLW, EPOCH 1983-2001.
5. CONTOURS ARE BASED ON SOUNDINGS NEAREST THE CENTER OF A 15ft GRID CELL. THE PLOTTED DEPTHS ARE FROM THE SOUNDINGS NEAREST THE CENTER OF A 100ft GRID CELL.
6. SOUNDINGS ARE SHOWN TO THE NEAREST 0.1ft AND IF THERE ARE ANY NON-WATER ELEVATIONS THEY ARE TO THE NEAREST 0.1ft.
7. SOUNDINGS LOCATED BY DIFFERENTIAL GPS SYSTEM (CG BEACON 302.0 - PT. LOMA) . DEPTHS MEASURED BY A MULTI-BEAM ECHO SOUNDER PROVIDING NEAR FULL BOTTOM COVERAGE.
8. SURVEY WAS PERFORMED USING THE 26' SURVEY BOAT "LA MAPPER".
9. ALL STRUCTURES AND PREVIOUS DREDGINGS SHOWN ARE APPROXIMATE.

LEGEND

- APPROXIMATE LIMITS OF BORROW AREA "B"
- APPROXIMATE LIMITS OF BORROW AREA "BB", STAGE 13 PROPOSED DREDGE FOOTPRINT LIMITS
- APPROXIMATE LIMITS OF 2018 EXPANSION INVESTIGATION
- APPROXIMATE LIMITS OF 2009 BORROW AREA
- SSBAVC-18-01 — SURFSIDE, FINAL VIBRACORE HOLE, YEAR AND NUMBER
- SSBTS18-A-1 — SURFSIDE, FINAL TRANSECT SAMPLES, YEAR SET AND NUMBER

ASBUILT VIBRACORE HOLE COORDINATES				
NAME	NORTHING (FEET)	EASTING (FEET)	LATITUDE NORTH	LONGITUDE WEST
SSBAVC-18-01	2,204,763	5,999,475	33° 42.2386'	118° 5.9140'
SSBAVC-18-02	2,202,315	5,997,307	33° 41.8286'	118° 6.3330'
SSBAVC-18-03	2,200,187	5,999,155	33° 41.4832'	118° 5.9611'
SSBAVC-18-04	2,200,795	6,000,842	33° 41.5884'	118° 5.6305'
SSBAVC-18-05	2,203,808	6,000,869	33° 42.0852'	118° 5.6358'
SSBAVC-18-05-1	2,203,546	6,001,942	33° 42.0451'	118° 5.4233'
SSBAVC-18-06	2,197,314	6,001,640	33° 41.0169'	118° 5.4611'
SSBAVC-18-07	2,201,720	6,003,268	33° 41.7480'	118° 5.1554'
SSBAVC-18-08	2,201,574	6,005,339	33° 41.7298'	118° 4.7463'
SSBAVC-18-09	2,202,378	6,001,330	33° 41.8508'	118° 5.5399'
SSBAVC-18-10	2,205,888	5,999,003	33° 42.4226'	118° 6.0111'
SSBAVC-18-11	2,206,985	5,995,045	33° 42.5918'	118° 6.7957'
SSBAVC-18-12	2,207,716	5,996,089	33° 42.7155'	118° 6.5923'
SSBAVC-18-13	2,208,492	5,997,208	33° 42.8466'	118° 6.3744'
SSBAVC-18-14	2,209,234	5,997,720	33° 42.9704'	118° 6.2759'
SSBAVC-18-15	2,205,255	5,996,606	33° 42.3113'	118° 6.4817'
SSBAVC-18-16	2,206,683	5,996,318	33° 42.5458'	118° 6.5436'
SSBAVC-18-17	2,207,459	5,997,306	33° 42.6766'	118° 6.3513'
SSBAVC-18-18	2,208,225	5,998,195	33° 42.8056'	118° 6.1786'
SSBAVC-18-19	2,206,299	5,997,590	33° 42.4863'	118° 6.2912'
SSBAVC-18-20	2,207,115	5,998,366	33° 42.6231'	118° 6.1411'
SSBAVC-18-21	2,208,259	5,999,076	33° 42.8138'	118° 6.0050'
SSBAVC-18-22	2,207,530	5,999,975	33° 42.6962'	118° 5.8250'
SSBAVC-18-23	2,207,018	6,000,756	33° 42.6140'	118° 5.6692'
SSBAVC-18-24	2,206,387	6,001,601	33° 42.5125'	118° 5.5004'
SSBAVC-18-25	2,206,780	6,000,194	33° 42.5731'	118° 5.7792'

STAGE 13 CORING LOCATIONS INSIDE AND OUTSIDE OF BORROW AREA B AND HISTORIC BORROW AREAS OFF SURFSIDE-SUNSET BEACH SURFSIDE, CALIFORNIA

AECOM

CHECKED BY: AA	DATE: 08/01/2018	FIGURE NO. 2A
PM: DS	PROJ. NO: 60555447	

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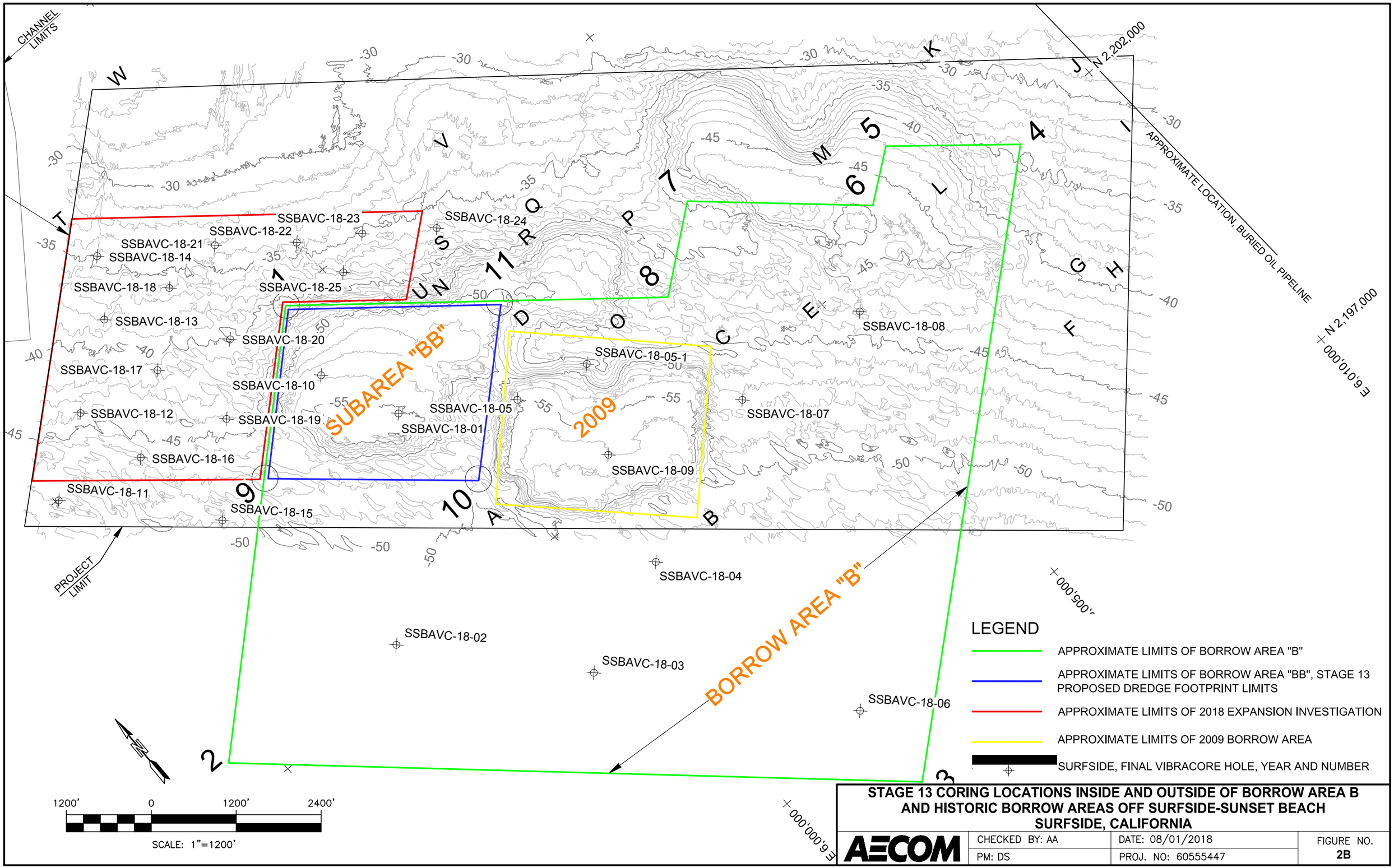

STAGE 13 CORING LOCATIONS INSIDE AND OUTSIDE OF BORROW AREA B AND HISTORIC BORROW AREAS OFF SURFSIDE-SUNSET BEACH SURFSIDE, CALIFORNIA

AECOM	CHECKED BY: AA	DATE: 08/01/2018	FIGURE NO. 2B
	PM: DS	PROJ. NO: 60555447	

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The offshore borrow areas for nourishment of Surfside Beach were previously dredged in previous Stages using a hydraulic cutterhead dredge, and this same method is expected for Stage 13. Dredged material is pumped directly to the beach and spread using conventional earthmoving equipment.

Subsequent to development of the SAP, it was decided by USACE that the final dredging area footprint for Stage 13 of this Borrow Project will be Area "BB" shown on Figure 2(a). Approximately 2.1 million cy will be dredge from this subarea. In addition, USACE will be back-passing clean sand along Newport Beach for beach nourishment. This component of the project consists of scraping approximately 100,000 cubic yards of sand from the dry beach at the northern end of Newport Beach near the mouth of the Santa Ana River and transporting the material approximately one mile to fill in the compartments of the groin field located north of the Newport Beach pier as shown on Figure 3. This work is a repeat of previous work completed as part of both the Stage 10 through Stage 12 projects. The removal and placement areas are shown on Figure 3. The borrow material is part of a net accretional area on Newport Beach with the primary material source being the mouth of the Santa Ana River. The material within the area is understood to have consistent characteristics with the remaining length of the beach extending to the pier. As the material was assumed to be consistent, no geotechnical or chemistry sampling was performed as part of the previous work. The entire length of the beach is a frequent area of recreational use and there have been no concerns with the existing material or with the previous back passing operations. Figure 4 are photos of the clean sand to be back passed from near the river mouth.

1.2 Site Location

The Surfside-Sunset Beach nearshore placement area is to the southeast of Anaheim Bay Harbor, just southeast of the east jetty. The approximate center of the beach placement area is adjacent to Anderson Street, which separates the communities of Surfside and Sunset (33° 43.4' N and 118° 04.8' W). The sand exploration areas are offshore of Surfside-Sunset Beach in approximately 30 to 70 feet of water. Coordinates of the corners of Borrow Area B and Subarea "BB" as well as the 2009 Stage 12 borrow area and the newly expanded area outside of Area B are given on Figure 2(a).

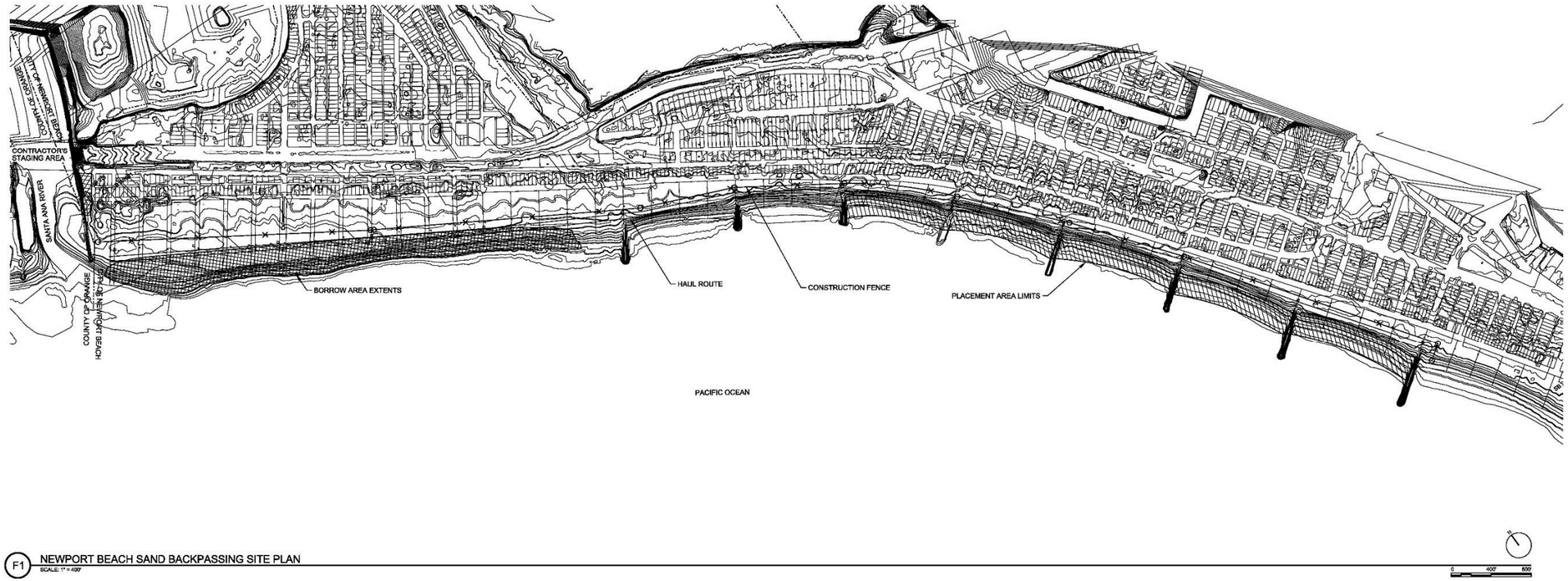


Figure 3. Plan for Back Passing Sediments from near the Santa Anna River Mouth

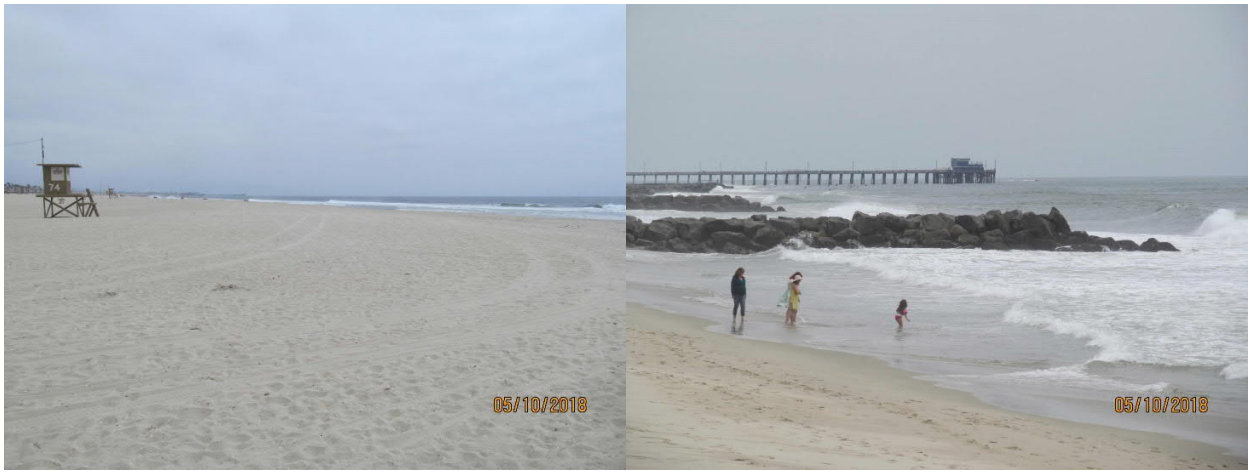


Figure 4. Photographs of Clean Sand to be Back-Passed Along Newport Beach (Left) and the Placement Area (Right).

1.3 Roles and Responsibilities

Project responsibilities and key contacts for this sediment characterization program are listed in Tables 1 and 2. Kinnetic Laboratories Inc. (KLI) provided sampling services. Core logging and geotechnical testing was provided by AECOM. Both AECOM and KLI were responsible for reporting. Analytical chemical testing of sediments for this project was carried out by Eurofins Calscience (Cal-ELAP No. 2944).

1.4 Data Users

The principal users of the data produced by this project are the following Southern California Dredge Material Management Team (SC-DMMT) regulating agencies:

1. Los Angeles District, U.S. Army Corps of Engineers (USACE);
2. Santa Ana Regional Water Quality Control Board (SARWQCB) - Region 8;
3. Los Angeles Regional Water Quality Board (LARWQCB) – Region 4;
3. U.S. Environmental Protection Agency (USEPA) - Region IX; and
4. California Coastal Commission (CCC).

Other users of the data may include the following agencies:

1. California Department of Fish and Wildlife (CDFW);
2. U.S. Fish and Wildlife Service (USFWS);
3. National Marine Fisheries Service (NMFS); and
4. California State Lands Commission (CSLC).

Table 1. Project Team and Responsibilities

Responsibility	Name	Affiliation
Project Planning and Coordination	Susie Ming Jeffrey Devine Larry Smith David Schug Ken Kronschnabl	USACE USACE USACE AECOM Kinnetic Laboratories
SAP Preparation	Ken Kronschnabl David Schug	Kinnetic Laboratories AECOM
Field Sample Collection and Transport	Spencer Johnson Dale Parent	Kinnetic Laboratories Kinnetic Laboratories
Geotechnical Investigation	David Schug Derek Rector Jeffrey Devine	AECOM AECOM USACE
Health and Safety Officer and Site Safety Plan	Derek Rector Jon Toal	AECOM Kinnetic Laboratories
Laboratory Chemical Analyses and Laboratory Coordination	Carla Hollowell Amy Howk	Eurofins Kinnetic Laboratories
QA/QC Management Analytical Laboratory QA/QC	Danielle Gonsman Amy Howk Carla Hollowell Amy Dahl	Kinnetic Laboratories Kinnetic Laboratories Eurofins AECOM
Technical Review	Pat Kinney Jeffrey Devine Chris Hayward	Kinnetic Laboratories USACE USACE
Final Report	Ken Kronschnabl David Schug Michael Smith	Kinnetic Laboratories AECOM AECOM
Agency Coordination	Jeffrey Devine Larry Smith	USACE USCAE

Table 2. Key Project Contacts

Susie Ming USACE Project Manager PPMD Navigation and Coastal Projects Branch U. S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, CA. 90017 Tel. (213) 452-3789 Susan.M.Ming@usace.army.mil	Jeffrey Devine USACE Project Technical Manager Geology and Investigations Section U. S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, CA. 90017 Tel. (213) 452-3579 Jeffrey.D.Devine@usace.army.mil
Larry Smith USACE Environmental Coordinator U.S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, CA 90017 Tel (213) 452-3846 lawrence.j.smith@usace.army.mil	Michael Smith, PE, GE, Principal Geotechnical Engineer AECOM 999 Town and Country Road Orange, CA 92868 D 1-714-567-2791 C 1-714-697-5239 michael.g.smith@aecom.com
David Schug, CEG, CHG Senior Principal Geologist, GeoEngineering AECOM 401 West A Street, Suite 1200 San Diego, CA 92101 Tel. (619) 610-7600 david.schug@aecom.com	Ken Kronschnabl Project Manager - Sampling/Testing Kinnetic Laboratories, Inc. (KLI) 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 kkronsch@kinneticlabs.net
Amy Howk KLI QA/QC Management Kinnetic Laboratories, Inc. 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 ahowk@kinneticlabs.net	Spencer Johnson Field Operations Mgr. Kinnetic Laboratories, Inc. (KLI) 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 sjohnson@kinneticlabs.net
Michele Castro Business Development Manager Eurofins Calscience, Inc. 7440 Lincoln Way Garden Grove, CA 92841-1427 Tel.: (949) 870-8766 MicheleCastro@eurofinsUS.com	

2.0 SITE HISTORY AND HISTORICAL DATA REVIEW

This section provides a brief history of the beach erosion control projects and former testing and sampling results.

2.1 Site Setting

Sunset-Surfside Beach is in Orange County, California. Surfside Beach is in front of the private gated community of Surfside Colony in the city of Seal Beach. Sunset Beach is adjacent to the community of Sunset Beach in the city of Huntington Beach. It borders Surfside to the north and extends to Warner Avenue to the south. Both beaches are located on the spit of land that separates the Pacific Ocean from Huntington Harbor.

2.2 Previous Borrow Area Dredging and Beach Nourishment Episodes

The first beach nourishment operations at Surfside-Sunset Beach were conducted between 1945 and 1956 when nearly 2.5 million cy of material dredged from the Seal Beach Naval Weapons Station was placed on the eroding Surfside-Sunset Beach (California Department of Boating and Waterways and State Coastal Conservancy, 2002). Subsequently, the Orange County Beach Erosion Control Project was initiated by the USACE and County of Orange in 1964 to mitigate the ongoing beach erosion. This project was designed to provide beach nourishment in stages. Stage 12 was completed in 2009. Most of the dredged material since 1964 was used to nourish Surfside-Sunset Beach but some material was placed on West Newport Beach from other borrow sources. History of the beach nourishment dredging episodes since 1964 is provided in Table 3. The various borrow areas offshore of the beach that have been used from year to year are shown on Figure 5. The total quantity of dredge material placed on Surfside-Sunset Beach from 1964 to 2009 exceeds 17,000,000 cy.

2.3 Previous Borrow Area Testing

The most recent study available for the Surfside-Sunset Beach borrow areas was for Stage 11 of the Orange County Beach Erosion Control Project sampled in 2000 (USACE, Los Angeles District, 2001). Testing was not conducted prior to Stage 12 as a Tier I evaluation was conducted and sediments were found to be suitable for beach nourishment in 2009. The 2000 study, provided in Appendix A, involved the collection of diver cores up to 10 feet long for physical and chemical testing from several borrow areas. Only one primary borrow area (Borrow Area B) was sampled offshore of Surfside-Sunset Beach. Seventy-three locations were sampled in this area in 2000. Two bulk sediment chemistry samples from a limited number of the diver cores were chemically analyzed. Locations of the exploratory boreholes from 2000 and previous years are shown on Figure 5.

The 2000 study concluded that the borrow area sediments were physically beach compatible and that the sediments were uncontaminated. Physical testing results for the borrow area indicated that sediments primarily consisted of fine to medium grained sand with less than 5% silt and clay and less than 5% fine gravels. There were only a few detected analytes in the two sediment

samples and concentrations of these were all below sediment quality objectives consisting of NOAA Effects Range Low (ERL) and Effects Range Median (ERM) values (Long et. al., 1995).

Table 3. Orange County Beach Erosion Control Project Dredging History

Dredge Year	Project Milestone	Vol. Removed *(cubic yards)*	Placement Site	Borrow Site
1964	Stage 1	4,000,000	Surfside-Sunset Beach	Anaheim Bay Harbor
1968	Stage 2	495,000	West Newport Beach	Sana Ana River
1970	Stage 3	874,000	West Newport Beach	Sana Ana River
1971	Stage 4A	2,300,000	Surfside-Sunset Beach	Anaheim Bay Harbor
1973	Stage 4B/Stage 5	358,000	West Newport Beach	Sana Ana River
1979	Stage 7[1]	1,644,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas
1983-1984	Stage 8	2,283,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas
1985	Stage 8	417,000	Surfside-Sunset Beach	Anaheim Bay Harbor
1989-1990	Stage 9	1,822,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas
1996-1997	Stage 10	1,600,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas
2001-2002	Stage 11	2,233,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas
2009	Stage 12	1,500,000	Surfside-Sunset Beach	Surfside-Sunset Beach Offshore Borrow Areas

Information from USACE, Los Angeles District and California Department of Boating and Waterways and State Coastal Conservancy (2002).
[1]Stage 6 was never conducted.

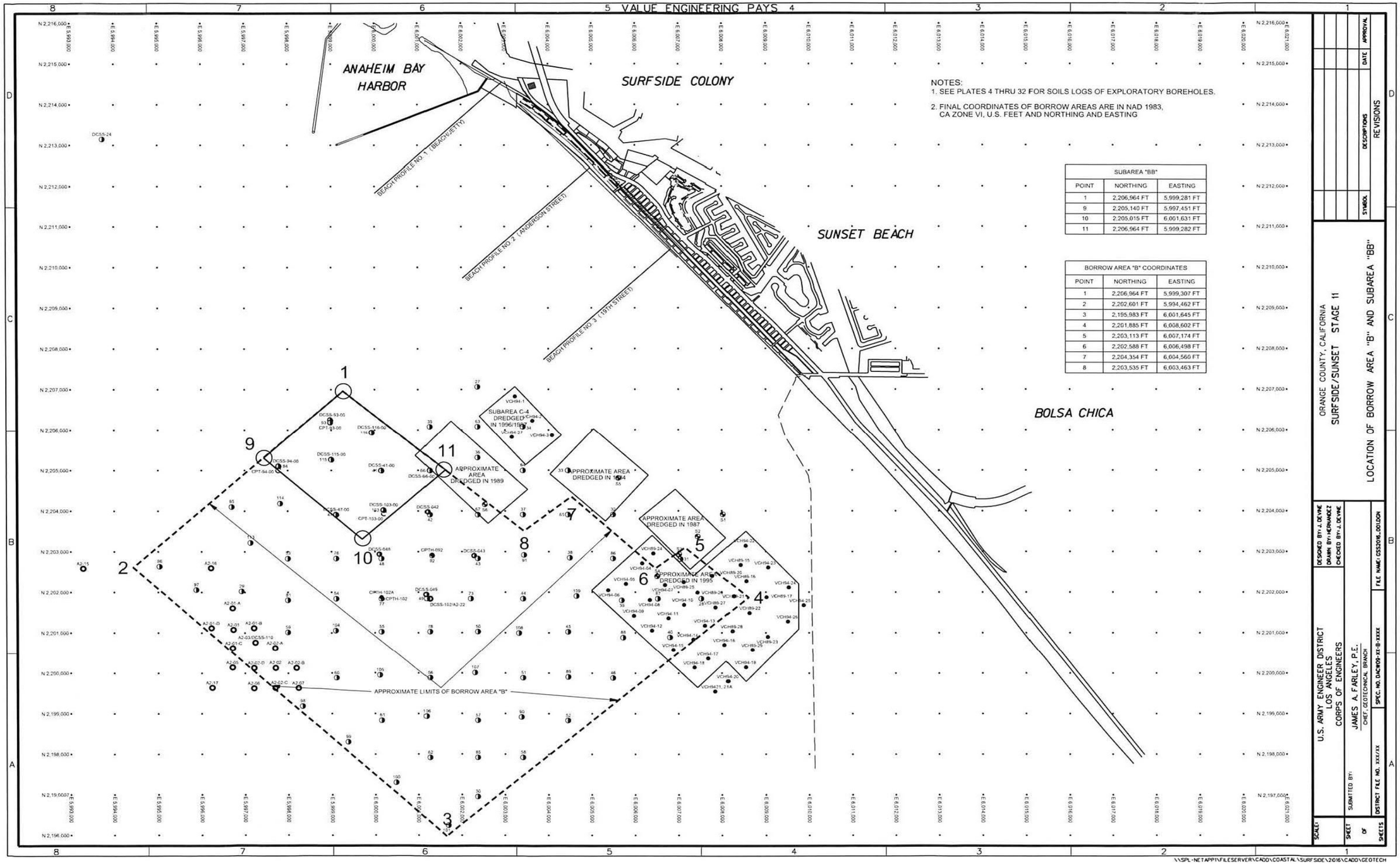


Figure 5. Locations of Previous Borrow Area Sampling and Surfside-Sunset Beach Reference Transects.

3.0 METHODS

This section describes the study design and field and analytical methods for this testing program.

3.1 Sampling and Testing Design

The sampling and testing design for this SAPR covers data collection tasks for the Surfside-Sunset Beach nourishment project. Sediment collection and testing for inside and outside of Borrow Area B as well as receiver beach sampling and testing are discussed. Evaluation guidelines are also discussed.

3.1.1 Sampling and Testing Approach

The main approach was to sample potential borrow area sediments to a depth of 20 feet below the existing mudline elevation and determine the physical properties of the sediments at different depths from 25 locations to search for sources of sand and to confirm that the sediments are physically suitable for placement on the beach. The approach also called for the formation of two area composite samples for chemical testing to determine if the borrow area sediments are environmentally suitable for beach nourishment. Testing followed requirements and procedures detailed in the ITM (USEPA/USACE, 1998) with further guidance from Los Angeles District USACE guidelines (CESPL, undated) and from SC-DMMT draft guidelines. Acceptability guidelines published in these documents were used to evaluate the suitability of the borrow area sediments for beach nourishment.

The entire Borrow Area B was investigated first, prior to performing additional sample collection outside of Borrow Area B. The vibracore sequence within the historical borrow area began with vibracores SSVC 18-01 continuing through SSVC 18-10. The initial vibracores were located inside bathymetric depressions (previously dredged footprints) to verify sediment consistency below the seabed and to determine the potential for dredging these areas deeper.

Previous sampling was limited to 10 feet in much of the Borrow Area B due to the limitations of the diver core method. CPT soundings were also performed previously in Borrow Area B to depths of 20 feet or more. Logs of the diver cores and CPTs are provided in Appendices A and B. The CPT data show sediment similar to the sediment found in the upper 10 feet by diver cores. The vibracores (planned to depths up to 20 feet) help physically verify previous CPT results (at depths below about 10 feet).

3.1.2 Sample Identification, Composite Formation, Sediment Collection and Testing

Vibracore sampling, as described in Section 3.2.2 (Vibracore Sampling Methods), was carried out to collect subsurface sediment data for 25 separate locations within the Surfside-Sunset Beach borrow area. The prefix for all vibracore locations is "SSBAVC-18-##." This is a deviation from the SAP, which stated a prefix ID of "SSBAVC-17-##." A 26th location was also sampled since one of the locations (SSBAVC-18-05) was originally sampled at the wrong coordinates. The correct location according to the SAP was given the location designation SSBAVC-18-05-1. Final sampling locations in relationship to the SAP sampling locations are

shown on Figure 2. Sample designations, target coordinates and approximate seafloor elevations for each sample location are listed in Table 4.

An attempt was made to advance all vibracore borings to 20 feet below the mudline. However, refusal was encountered at multiple locations. Actual core lengths recovered and elevations sampled are provided on Table 4. Sediments along the entire core interval (mudline to recovery depth) we sampled from each core collected.

Two sediment composite samples were created from the 26 sampling locations shown on Figure 2 and analyzed for bulk sediment chemistry. One composite sample represents the sediments inside of Borrow Area B, and the second composite sample represents the material from outside of Borrow Area B. All inside cores (from the mudline to the recovery depth) were combined together and homogenized and all outside cores were combined together and homogenized to form the composite samples. Composite sample designations are summarized in Table 4.

In addition to the composite samples, two archive bulk sediment chemistry samples were collected from each core location. One archive sample from each location represents the top six inches of sediment and the other represents the remainder of the core. Further archiving was performed if any other suspicious potential contaminated layer exists or if there is a significant change in the stratigraphy greater than two feet. All archive samples are being stored frozen for at least six months unless directed otherwise by the USACE Technical Manager.

Sediment samples retained for geotechnical laboratory testing were made up of six-inch-thick layers or greater. Layers less than 6 inches thick were combined with surrounding layers if the less than 6-inch-thick layer was found within a larger thickness layer. For the most part, many layers less than 6 inches in thickness (that are repeatable in one area of length of core) were combined as a separate geotechnical sample, based on judgement of the geologist during logging and sampling. The overall objective was to ensure that representative samples for grain size analyses (Section 3.1.4) were collected throughout the core and that they were representative of the entire length of the core and its corresponding stratigraphy.

Table 4. Sample Designations, Target Sampling Locations, Core Lengths, and 2017 Mudline Elevations, Surfside-Sunset Beach Borrow Area

Fed. Chan./ Area	Core Designation	Date Sampled	Time Sampled	California Lambert Zone 6 (NAD 83)		Geographic Coordinates (NAD 83)		Water Depth (feet)	Actual Mudline Elevation (ft., MLLW)	Core Recovery (ft.)	Core Interval Sampled (ft., MLLW)
				Northing (feet)	Easting (feet)	Latitude North	Longitude West				
Inside Borrow Area B	SSBAVC-18-01	4/4/2018	15:15	2204763	5999475	33° 42.2386'	118° 5.9140'	-57	-54.5	17	-54.5 to -71.5
	SSBAVC-18-02	4/5/2018	15:34	2202315	5997307	33° 41.8286'	118° 6.3330'	-56	-53	15.5	-53 to -68.5
	SSBAVC-18-03	4/5/2018	14:40	2200187	5999155	33° 41.4832'	118° 5.9611'	-56	-53	16.5	-53 to -69.5
	SSBAVC-18-04	4/5/2018	13:44	2200795	6000842	33° 41.5884'	118° 5.6305'	-54	-51	14.5	-51 to -65.5
	SSBAVC-18-05	4/4/2018	17:00	2203808	6000869	33° 42.0852'	118° 5.6358'	-57	-55	14	-55 to -69
	SSBAVC-18-05-1	4/5/2018	16:28	2203546	6001942	33° 42.0451'	118° 5.4233'	-47	-44.5	15.5	-44.5 to -60
	SSBAVC-18-06	4/5/2018	9:40	2197314	6001640	33° 41.0169'	118° 5.4611'	-55	-54	13	-54 to -67
	SSBAVC-18-07	4/5/2018	13:05	2201720	6003268	33° 41.7480'	118° 5.1554'	-50	-47	16	-47 to -63
	SSBAVC-18-08	4/5/2018	11:10	2201574	6005339	33° 41.7298'	118° 4.7463'	-46	-44	14.5	-44 to -58.5
	SSBAVC-18-09	4/4/2018	17:40	2202378	6001330	33° 41.8508'	118° 5.5399'	-58	-56	16.0	-56 to -72.0
	SSBAVC-18-10	4/4/2018	14:35	2205888	5999003	33° 42.4226'	118° 6.0111'	-56.5	-53.5	19	-53.5 to -72.5
Outside Borrow Area B	SSBAVC-18-11	4/7/2018	8:18	2206985	5995045	33° 42.5918'	118° 6.7957'	-49	-47.5	7	-47.5 to -54.5
	SSBAVC-18-12	4/7/2018	9:40	2207716	5996089	33° 42.7155'	118° 6.5923'	-45	-44	9	-44 to -53
	SSBAVC-18-13	4/7/2018	12:31	2208492	5997208	33° 42.8466'	118° 6.3744'	-39	-38	13	-38 to -51
	SSBAVC-18-14	4/7/2018	13:00	2209234	5997720	33° 42.9704'	118° 6.2759'	-36	-34.5	18	-34.5 to -52.5
	SSBAVC-18-15	4/6/2018	16:10	2205255	5996606	33° 42.3113'	118° 6.4817'	-53	-50	17	-50 to -67
	SSBAVC-18-16	4/6/2018	17:10	2206683	5996318	33° 42.5458'	118° 6.5436'	-49	-46	14.5	-46 to -60.5
	SSBAVC-18-17	4/7/2018	11:45	2207459	5997306	33° 42.6766'	118° 6.3513'	-42	-41	15	-41 to -56
	SSBAVC-18-18	4/6/2018	13:30	2208225	5998195	33° 42.8056'	118° 6.1786'	-38	-35.5	17.5	-35.5 to -53
	SSBAVC-18-19	4/6/2018	15:15	2206299	5997590	33° 42.4863'	118° 6.2912'	-47	-44	14.5	-44 to -58.5
	SSBAVC-18-20	4/6/2018	14:25	2207115	5998366	33° 42.6231'	118° 6.1411'	-45	-42	14.5	-42 to -56.5
	SSBAVC-18-21	4/6/2018	12:30	2208259	5999076	33° 42.8138'	118° 6.0050'	-35	-33	17.5	-33 to -50.5
	SSBAVC-18-22	4/6/2018	10:30	2207530	5999975	33° 42.6962'	118° 5.8250'	-36	-35	17.5	-35 to -52.5
	SSBAVC-18-23	4/6/2018	8:50	2207018	6000756	33° 42.6140'	118° 5.6692'	-37	-36	14	-36 to -50
	SSBAVC-18-24	4/6/2018	17:10	2206387	6001601	33° 42.5125'	118° 5.5004'	-40	-37.5	7	-37.5 to -44.5
	SSBAVC-18-25	4/6/2018	9:50	2206780	6000194	33° 42.5731'	118° 5.7792'	-38	-37	17.5	-37 to -54.5

3.1.3 Surfside-Sunset Beach Reference Samples

A series of surface grabs were collected along three transects perpendicular to the shore at the receiving beach. The beach transect sampling consisted of collecting surface grab samples at eight elevations (+12, +6, 0, -6, -12, -18, -24 and -30 feet MLLW) along the three transects. Beach transect locations are shown on Figure 6. Individual geotechnical grain size testing was performed on all grab samples collected along the beach transects. Table 5 provides a summary of sample designations for the beach reference samples.

Table 5. Surfside-Sunset Beach Reference Sample Designations

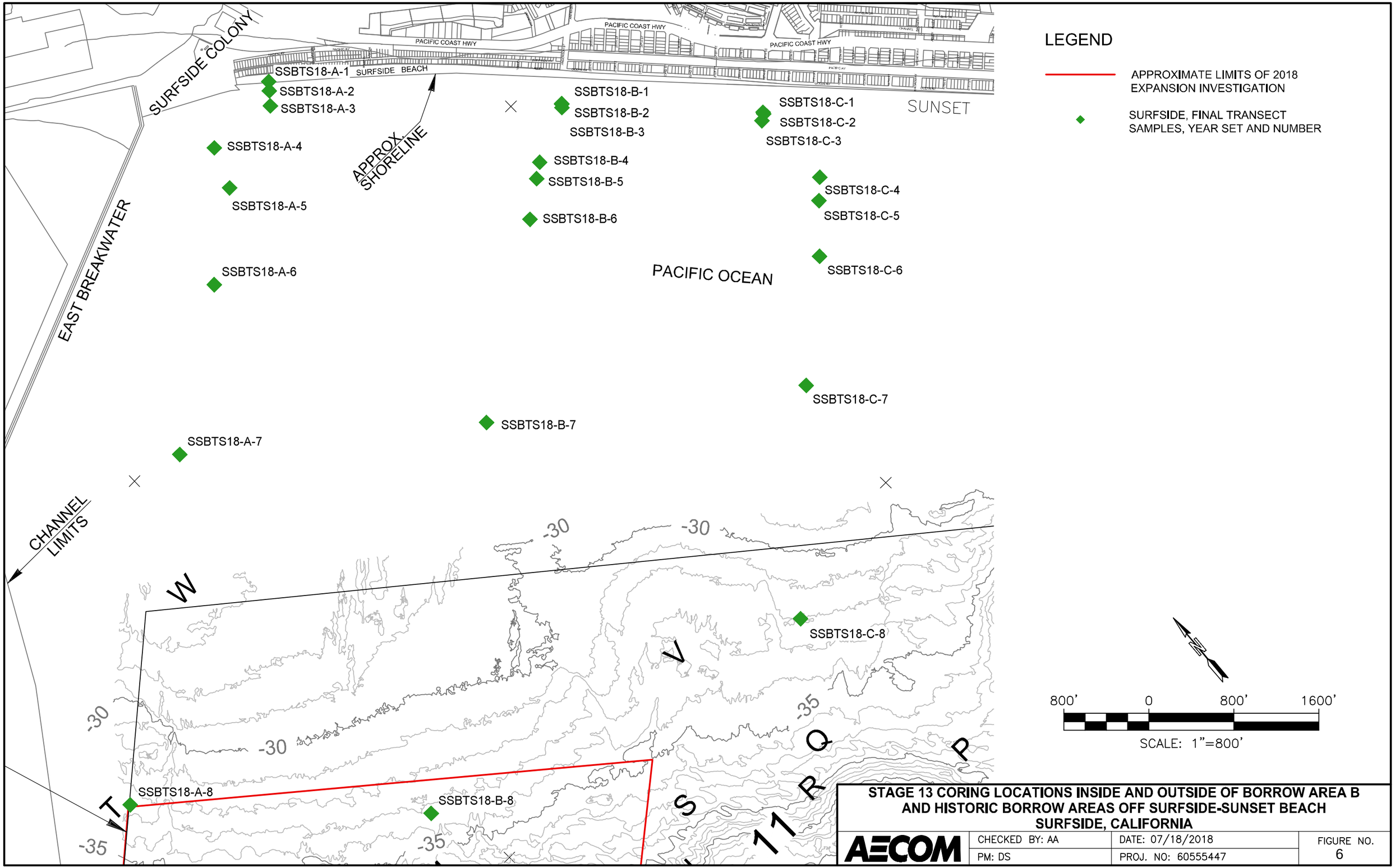
Area	Site Designations	Sampling Elevations	Testing Requirements
Transect A	SSBTS18-A-1,2,3,4,5,6,7,8	+12, +6, 0, -6, -12, -18, -24, -32 ft MLLW	Individual Grain Size
Transect B	SSBTS18-B-1,2,3,4,5,6,7,8	+12, +6, 0, -6, -12, -18, -24, -32 ft MLLW	Individual Grain Size
Transect C	SSBTS18-C-1,2,3,4,5,6,7,8	+12, +6, 0, -6, -12, -18, -24, -32 ft MLLW	Individual Grain Size

3.1.4 Geotechnical Samples and Testing

A sufficient quantity of sediment was collected from each location and from each core stratum so that a representative amount of sediment was included in each geotechnical sample. Several grain size samples were formed from each core, as described previously, and analyzed. Each sample represented layers six inches thick or greater of physically different material. Samples were also taken from layers less than six inches in length and archived. The field geologist coordinated with the USACE Technical Manager on the selection of samples and any samples to be archived. Grain size analyses were also run on each sampling location along the three Surfside-Sunset Beach transects.

All mechanical grain size tests were run according to ASTM D 422 (1963). In addition to the mechanical grain size samples, six hydrometer tests were run according to ASTM D 422 and five Atterberg Limits tests were run according to ASTM D 4318 (2005). The hydrometer and Atterberg tests were run on representative samples of fine grained material collected from the sediment cores.

All geotechnical data gathered was used to do physical beach compatibility analyses between the borrow sediments and the receiving beach. This task was accomplished by USACE, Los Angeles District and is reported separately as Appendix C to this report.



STAGE 13 CORING LOCATIONS INSIDE AND OUTSIDE OF BORROW AREA B AND HISTORIC BORROW AREAS OFF SURFSIDE-SUNSET BEACH SURFSIDE, CALIFORNIA

AECOM	CHECKED BY: AA	DATE: 07/18/2018	FIGURE NO. 6
	PM: DS	PROJ. NO: 60555447	

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3.1.5 Summary of Testing and Evaluation Sequence

The testing and evaluation sequence for the Surfside-Sunset Beach borrow area samples is described in detail in the next subsection and is outlined as follows:

1) Conduct bulk sediment chemical analyses on the two composite samples.
2) Grain size physical compatibility analyses were conducted by the Los Angeles District U.S. Army Corps of Engineers Geotechnical Branch.
3) Analytical results were evaluated using the sediment quality guidelines consisting of ERL and ERM values developed by Long, *et al*. (1995) that correlate concentrations of selected contaminants with likelihood of adverse biological effects. Please note that ERLs and ERMs have not been developed for all analytes.
4) Analytical results were also evaluated using the USEPA's RSL (Regional Screening Levels) (USEPA Region 9, updated 2017) and the State of California's CHHSL (California Human Health Screening Levels) for potential effects to humans (Cal/EPA, 2005 – updated 2010).

If grain size characteristics were compatible with the receiving beach and contaminant levels were low compared to lower effects based screening levels and human health screening levels, then the sediments are suitable for beach nourishment and no further testing is necessary. Individual cores were archived for potential additional chemical testing in case such testing should be requested by the SC-DMMT.

3.1.6 Evaluation Guidelines

As mentioned above, to aid in the evaluation of sediment test data, chemical concentrations of contaminants found within the sediments were compared to sediment quality guidelines (Long et. al., 1995) developed by NOAA. These guidelines were used to screen sediments for contaminant concentrations that might cause biological effects and to identify sediments for further toxicity testing. For any given contaminant, ERL guidelines represent the 10^{th} percentile concentration value in the NOAA database that might be expected to cause adverse biological effects and ERM guidelines reflect the 50^{th} percentile value in the database. Note that ERLs and ERMs were only used as a screening tool. They were not used to determine suitability.

As an additional measure of potential toxicity, the mean ERM quotient (ERMq) for the composite sample was calculated according to Long et al. (1998a) and Hyland et al. (1999). ERMq was calculated by dividing each contaminant concentration by its respective ERM value and then summing the results and dividing through by the number of contaminants as shown in the following equation:

$$ERMQuotien\ \ t = \frac{1}{24}\sum \frac{SampleConc\ entration}{ERM}$$

In cases where concentrations of measured contaminants were below the method detection limit (MDL), a value of ½ the MDL was used for the ERMq calculations. For a general overall indication of toxicity, a quotient less than 0.1 is indicative of a low probability (<12%) of a

highly toxic response to marine amphipods (Long and MacDonald, 1998b). If there were no ERL exceedances in a sample, there is less than a 10% probability of a highly toxic response to marine amphipods. The probability of a highly toxic response increases to 71% for quotients greater than 1.0.

The dredge material was also assessed to whether or not it is suitable for human contact. To do so, the chemical results were compared to “Regional Screening Levels for Chemical Contaminants at Superfund Sites" (USEPA Region 9, updated 2018), formerly known as Preliminary Remediation Goals (PRGs). These screening levels (RSLs) were developed for Superfund/RCRA programs and was a consortium of USEPA Region 9 Preliminary Remediation Goals (PRGs), USEPA Region 3 Risked-Based Concentrations (RBCs) and EPA Region 6 Human Health Medium Specific Screening Levels (HHMSSLs). RSLs are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. RSLs that were uses were based on a target hazard quotient of 0.1.

RSLs are considered by the USEPA to be protective for humans (including sensitive groups) over a lifetime. However, RSLs are not always applicable to a particular site and do not address non-human health endpoints, such as ecological impacts. The RSLs were calculated without site-specific information. They are used for site "screening." RSLs are not cleanup standards and were not applied as such. The RSL's primary role in site "screening" was to help identify areas, constituents, and conditions that require further federal attention at a particular site, and was also useful in determining risks to human exposure at non-superfund sites. RSLs may be lower than the California Title 22 Total Threshold Limit Concentration (TTLC) values, but often are much higher.

Human health risks to the sediments were also evaluated using California Human Health Screening Levels (CHHSLs). CHHSLs (Cal/EPA, updated 2010) are concentrations of 54 hazardous chemicals in soil or soil gas that are considered to be protective of human health. The CHHSLs were developed by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of California Environmental Protection Agency (Cal/EPA). CHHSLs were developed using standard exposure assumptions and chemical toxicity values published by the USEPA and Cal/EPA. CHHSLs used were developed separately for industrial/commercial settings and for residential settings.

3.2 Field Sampling Protocols

Vibracore sampling, grab sampling, decontamination, sample processing and documentation procedures are discussed in this section. Vibracore sampling took place from April 4 through April 7, 2018. Beach transect sampling took place on April 11, 2018.

3.2.1 Positioning and Depth Measurements

Positioning at sampling locations was accomplished using a Hemisphere Vector 104 differential GPS (DGPS) navigation system (Si-Tex GPS). The purpose of differential GPS (DGPS) is to remove the effects of selective availability (SA), atmospheric errors, timing errors, and satellite orbit errors, while enhancing system integrity. Autonomous position capabilities of the Vector 104 will result in position accuracies of 3 meters 95% of the time. In order to improve position

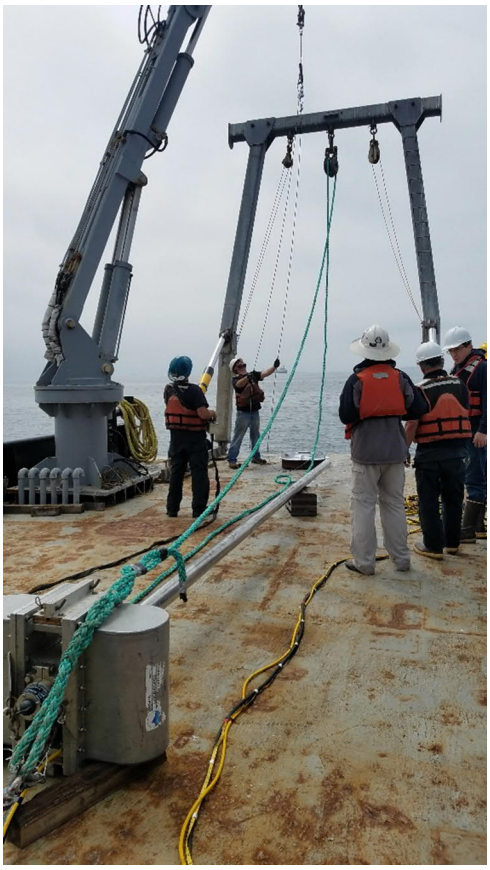
quality to better than 1.0 meter 95% of the time, the Vector 104 is able to use differential corrections received through the internal SBAS demodulator or externally-supplied RTCM corrections.

Final sampling locations were recorded in Geographic coordinates (NAD 83) and converted to State Plane Coordinates (CA Zone VI, NAD 83). All sampling sites were located within 15 to 30 feet of target coordinates.

Water depths were measured with an onboard fathometer and verified with graduated lead line. A two foot offset was required for all depth readings. Depths were later adjusted to mean lower low water (MLLW) using NOAA predicted tide tables for Los Angeles Outer Harbor (Station #9410660).

3.2.2 Vibracore Sampling Methods

All sediment samples were collected using an electric vibracore that can penetrate and obtain samples to the project sample elevations. The cores were advanced to target sampling elevations (20 feet below the mudline) or to refusal. The depth of refusal was defined as the depth at which the average rate of penetration is less than 0.1 feet/minute for a two-minute period. At sites where the depth of refusal was reached prior to the sample depth, additional attempts were made to reach the sample depth if the core was not accepted by the USACE representative. If the sample depth could not be reached after the additional attempts, the longer of the cores was retained for sampling. At the conclusion of a successful vibracore, the core liner was removed and split open for inspection and sampling. Extrusion of the core was not allowed. Processing took place onboard the sampling vessel.



Vibracore sampling was conducted from the 101-foot ***M/V Surveyor*** owned and operated by Maritime Logistics. This vessel has a stern A-frame for deploying and retrieving the vibracore. This vessel was also fully equipped with all necessary navigation, safety, and lifesaving devices per U.S. Coast Guard requirements.

Kinnetic Laboratories' vibracore consists of a 4-inch diameter aluminum coring tube, a stainless steel cutting tip, and a stainless-steel core catcher. Inserted into the core tubes were food-grade clean polyethylene liners. The vibrating unit contains two counter-rotating motors encased in a waterproof aluminum housing. The motors are powered by a three-phase, 240-volt generator. The vibracore head and tube were lowered overboard with a boom. The unit was then vibrated until it reached target sampling elevation or until the depth of refusal was reached.

When penetration of the vibracore was complete, power was shut off to the vibra-head, and the vibracore was brought aboard the vessel. A check valve located on top of the core tube reduced or prevented sediment loss during pull-out. The length of sediment recovered was noted by measuring down the interior of the core tube to the top of the sediment. The core tube was then detached from the vibra-head, and the core cutting tip and catcher were removed. Afterwards, the core liners were removed and sealed on both ends until processed. Processing was conducted directly onboard the sampling vessel.

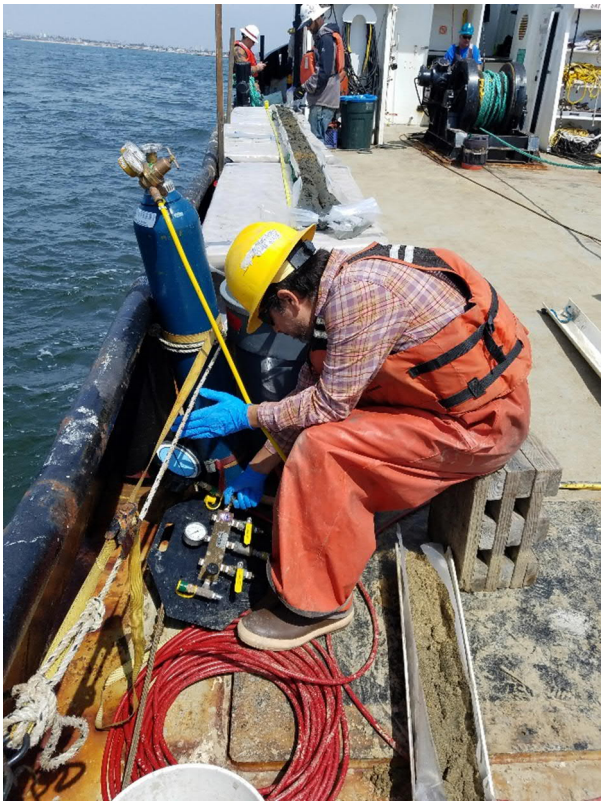
A float package was used to support the vibracore since waters are unprotected from wave action. Use of a float package allowed for no anchoring through dynamic positioning to be utilized. The float package also prevented the coring apparatus from being pulled up from waves while trying to penetrate, thus alleviating multiple penetrations of the same material. A bubbler depth gauge was attached to the vibracore head in order to determine the rate and depth of penetration.

3.2.3 Vibracore Decontamination

All sample contact surfaces were stainless steel and polyethylene. Compositing tools were stainless steel or Teflon® coated stainless steel. Except for the core liners, all contact surfaces of the sampling devices and the coring tubes were cleaned for each sampling area. The cleaning protocol consisted of a site water rinse, a Micro-90® soap wash, and then finished with deionized water rinses. The polyethylene core liners were new and of food grade quality. All rinseate was collected in containers and disposed of properly.

3.2.4 Core Processing

Whole cores were processed on top of tables on deck of the ***M/V Surveyor***. The tables had a plastic covering that was freshly changed for every core. Cores were placed in PVC core racks that were cleaned between cores. After placement in the core racks, core liners were split lengthwise to expose the recovered sediment. Once exposed, sediment that came in contact with the core liner was removed by scraping with a pre-cleaned stainless steel spoon. Each core was photographed, measured, and lithologically logged in accordance with the Unified Soil Classification System (USCS) as outlined in ASTM Standards D-2488 (2006) and D-2487 (2006). Additional sediment characteristics and other observations was also recorded. A geologist from AECOM conducted the lithologic logging along with collection of sample splits for geotechnical testing.



Photographs were taken of each core (each photograph covered a maximum two-foot interval). These pictures are provided with the field logs in Appendix D.

Following logging, vertical composite subsamples were then formed from each core and samples for grain size analyses were formed. The primary vertical composite subsamples were from the mudline to six inches below and from six inches to the bottom of the core. An archived sample was formed from each primary vertical composite subsample. If distinct geologic stratification greater than two (2) feet was observed, then separate vertical composite subsamples of each core stratum were archived for chemistry.

Vertical composite subsamples were formed by combining and homogenizing a representative sample from each sampling interval, as described in Section 3.2.3, in a pre-cleaned stainless steel or Teflon®-coated tray. A 0.5-liter portion of each vertical composite subsample was placed in a pre-cleaned and certified glass jar with a Teflon®-lined lid for archived material. Then a representative portion of each vertical composite subsample within each sampling interval identified was placed in a large pre-cleaned mixing bowl for horizontal compositing. The composited sediment was placed in two one-liter pre-cleaned and certified glass jars with Teflon®-lined lids for each composite sample. All samples for grain size analyses were transferred to pre-labeled sample containers (sealed plastic bags) and stored appropriately until they were ultimately transferred to the laboratory for analysis.

Except for chemistry archival material, containers were completely filled to minimize air bubbles being trapped in the sample container. A small amount of headspace was allowed for archived chemistry samples to prevent container breakage during freezing. For the preservation of all sediment composite chemistry samples, filled containers were refrigerated or placed on ice immediately following sampling and maintained at 2 to 4°C until analyzed. Archived samples for chemistry were placed on ice initially and then frozen as soon as possible. The sample containers, jars and bags, were sealed to prevent any moisture loss and possible contamination. Samples showing external contamination due to handling or incorrect sampling procedures were re-sampled.

3.2.5 Beach Transect and Nearshore Area Grab Samples

The three Surfside-Sunset Beach transects were approximately perpendicular to the existing shoreline and offshore bathymetry as shown on Figure 2(c). Positioning at all transect and nearshore area sampling locations was accomplished using a DGPS navigation system. Water depths at intertidal and subtidal locations were measured with a graduated lead line and corrected to MLLW. Onshore locations were determined with a level transit and stadia rod.

The top six inches of sand or sediment was collected at all beach transect and nearshore area sampling locations. The three highest locations along each beach transect were hand collected on land with a scoop. All offshore stations were sampled from a 17-foot Boston Whaler using a petite Ponar grab. The grab sampler was deployed at each offshore location, and upon retrieval, the grab was visually inspected to ensure the sample was acceptable according to SOPs. A plastic scoop was used to transfer sediment.

All samples for grain size analyses were transferred to pre-labeled sample containers (sealed plastic bags) and stored appropriately until they were ultimately transferred to the geotechnical laboratory for analysis.

3.2.6 Detailed Soils Log

A detailed soils log was prepared for each sampling location, including beach transect locations. As a minimum, this log included the project name, hole or transect number or designation, date, time, location, water depth, estimated tide, mudline elevation, type and size of sampling device used, depth of penetration, length of recovery, name of person(s) taking samples, depths below mudline of samples, and a description and condition of the sediment. Descriptions of the sediment were conducted in accordance with ASTM D 2488 (2006), and included as a minimum: grain size, color, maximum particle size, estimation of density (sand) or consistency (silts and clays), odor (if present), and description of amount and types of organics and trash present. In cohesive soils, a pocket penetrometer and miniature vane shear device (torvane) was used to collect estimated strength/consistency data.

3.2.7 Documentation and Sample Custody

All samples had their containers physically marked as to sample location, date, time and analyses. All samples were handled under Chain of Custody (COC) protocols beginning at the time of collection. Redundant sampling data was also recorded on field data log sheets. Copies of the field data logs are included in Appendix D.

Samples were considered to be “in custody” if they were (1) in the custodian’s possession or view, (2) in a secured place (locked) with restricted access, or (3) in a secure container. Standard COC procedures were used for all samples collected, transferred, and analyzed as part of this project. COC forms were used to identify the samples, custodians, and dates of transfer. Except for the shipping company, each person who had custody of the samples signed the COC form and ensured samples were stored properly and not left unattended unless properly secured.

Standard information on Chain of Custody forms includes:

- Sample Identification
- Sample Collection Date and Time
- Sample Matrices (e.g., marine sediment)
- Analyses to be Performed
- Container Types
- Preservation Method
- Sampler Identification
- Dates of Transfer
- Names of Persons with Custody

The completed COC forms were placed in a sealable plastic bag and taped to the inside lid of one or more coolers. COC records are included with the laboratory reports in Appendix E.

A daily field activity log was maintained listing the beginning and ending time for every and all phases of operation, the names and responsibilities of all field personnel present, description and length of any delays, and weather and sea conditions. This log also included DGPS and water depth calibration/verification notes.

As described in Sections 3.2.6, detailed soil logs were prepared from each sampling location, including beach transect locations. These soil logs are included as Appendix F.

3.3 Laboratory Testing Methods

Testing of sediments for this project used USEPA and USACE approved methodologies.

3.3.1 Geotechnical Testing

Sieve analyses and hydrometer testing were performed according to ASTM D 422 (1963), and Atterberg Limits were determined according to ASTM D 4318 (2005). Required U.S. standard sieve sizes included No. 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230 sieves. All sediment samples were classified in accordance with the Unified Soil Classification System (ASTM D 2487-06 and ASTM D 2488-06). Grain size compatibility of the proposed dredge material with the reuse areas was evaluated by the Los Angeles District USACE.

3.3.2 Bulk Sediment Chemical Analyses

The two sediment composite samples collected from within the borrow area were analyzed for the parameters and quantification limits specified in Table 6. The results are reported in dry weight unless noted otherwise. All analyses were conducted in a manner consistent with guidelines for dredge material testing methods in the USEPA/USACE ITM. Samples were extracted and analyzed within specified USEPA holding times, and all analyses were accomplished with appropriate quality control (QC) measures. Discrete chemistry samples from each location have been archived frozen. If required, additional direction will be provided for analysis.

Table 6. Sediment Analytical Methods Achieved and Target Quantitation Limits.

Analyte	Method	Method Detection Limits (Dry Weight)	Laboratory Reporting Limits (Dry Weight)	SAP Reporting Limits (Wet Weight)
CONVENTIONALS (mg/kg except where noted)				
Ammonia	SM 4500-NH3 B/C (M)	0.17 - 0.18	0.31 - 0.33	0.2
Percent Solids (%)	SM 2540 B	0.1	0.1	0.1
Total Organic Carbon (%)	EPA 9060A	0.017-0.029	0.050 - 0.083	0.05
Total Volatile Solids (%)	EPA 160.4M	0.10	0.10	0.1
Oil & Grease	EPA 1664A (M) HEM	12 - 13	16 - 17	10
TRPH	EPA 1664A (M) HEM-SGT	13	16 - 17	10
METALS (mg/kg)				
Arsenic	EPA 6020	0.136 - 0.145	0.156 - 0.166	0.1
Cadmium	EPA 6020	0.0891 - 0.0949	0.156 - 0.166	0.1
Chromium	EPA 6020	0.0967 - 0.103	0.156 - 0.166	0.1
Copper	EPA 6020	0.0653 - 0.0695	0.156 - 0.166	0.1
Lead	EPA 6020	0.103 - 0.109	0.156 - 0.166	0.1
Mercury	EPA 7471A	0.00942 - 0.00946	0.0321 - 0.0322	0.02
Nickel	EPA 6020	0.0789 - 0.0840	0.156 - 0.166	0.1
Selenium	EPA 6020	0.114 - 0.121	0.156 - 0.166	0.1
Silver	EPA 6020	0.0488 - 0.0519	0.156 - 0.166	0.1
Zinc	EPA 6020	1.24 - 1.32	1.56 – 1.66	1.0
ORGANICS-CHLORINATED PESTICIDES (µg/kg)				
2,4' DDD	EPA 8270C PEST-SIM	0.12	0.30 - 0.33	0.2
2,4' DDE	EPA 8270C PEST-SIM	0.053 - 0.057	0.30 - 0.33	0.2
2,4' DDT	EPA 8270C PEST-SIM	0.094 - 0.10	0.30 - 0.33	0.2
4,4' DDD	EPA 8270C PEST-SIM	0.061 - 0.065	0.30 - 0.33	0.2
4,4' DDE	EPA 8270C PEST-SIM	0.062 - 0.066	0.30 - 0.33	0.2
4,4' DDT	EPA 8270C PEST-SIM	0.080 - 0.086	0.30 - 0.33	0.2
Total DDT	EPA 8270C PEST-SIM	--	0.30 - 0.33	0.2
Aldrin	EPA 8270C PEST-SIM	0.058 - 0.062	0.30 - 0.33	0.2
BHC-alpha	EPA 8270C PEST-SIM	0.087 - 0.093	0.30 - 0.33	0.2
BHC-beta	EPA 8270C PEST-SIM	0.10 - 0.11	0.30 - 0.33	0.2
BHC-delta	EPA 8270C PEST-SIM	0.14 - 0.15	0.30 - 0.33	0.2
BHC-gamma (Lindane)	EPA 8270C PEST-SIM	0.052 - 0.056	0.30 - 0.33	0.2
Chlordane (Technical)	EPA 8081A	8.0 - 8.7	15 - 17	10
Chlordane-alpha	EPA 8270C PEST-SIM	0.10 - 0.11	0.30 - 0.33	0.2
Chlordane-gamma	EPA 8270C PEST-SIM	0.081 - 0.087	0.30 - 0.33	0.2
Cis-nonachlor	EPA 8270C PEST-SIM	0.077 - 0.083	0.30 - 0.33	0.2
Oxychlordane	EPA 8270C PEST-SIM	0.11 - 0.12	0.30 - 0.33	0.2
Total Chlordane	EPA 8270C PEST-SIM	--	0.30 - 0.33	0.2
Dieldrin	EPA 8270C PEST-SIM	0.16 - 0.17	0.30 - 0.33	0.2
Endosulfan sulfate	EPA 8270C PEST-SIM	0.16 - 0.17	0.30 - 0.33	0.2
Endosulfan I	EPA 8270C PEST-SIM	0.088 - 0.094	0.30 - 0.33	0.2
Endosulfan II	EPA 8270C PEST-SIM	0.14 - 0.15	0.30 - 0.33	0.2
Endrin	EPA 8270C PEST-SIM	0.086 - 0.092	0.30 - 0.33	0.2
Endrin aldehyde	EPA 8270C PEST-SIM	0.15 - 0.16	0.30 - 0.33	0.2
Endrin ketone	EPA 8270C PEST-SIM	0.084 - 0.090	0.30 - 0.33	0.2
Heptachlor	EPA 8270C PEST-SIM	0.078 - 0.084	0.30 - 0.33	0.2
Heptachlor epoxide	EPA 8270C PEST-SIM	0.067 - 0.072	0.30 - 0.33	0.2
Methoxychlor	EPA 8270C PEST-SIM	0.010 - 0.011	0.30 - 0.33	0.2
Mirex	EPA 8270C PEST-SIM	0.060 - 0.064	0.30 - 0.33	0.2
Toxaphene	EPA 8081A	14 - 15	30 - 33	10
trans-Nonachlor	EPA 8270C PEST-SIM	0.065 - 0.070	0.30 - 0.33	0.2

Table 6 (Continued). Sediment Analytical Methods Achieved and Target Quantitation Limits.

Analyte	Method	Method Detection Limits (Dry Weight)	Laboratory Reporting Limits (Dry Weight)	SAP Reporting Limits (Wet Weight)
ORGANICS-Pyrethroid Pesticides (µg/kg)				
Allethrin (Bioallethrin)	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Bifenthrin	EPA 8270D (M)/TQ/EI	0.46 - 0.49	0.76 - 0.81	0.5
Cyfluthrin-beta (Baythroid)	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Cyhalothrin-Lamba	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Cypermethrin	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Deltamethrin / Tralomethrin	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Esfenvalerate / Fenvalerate	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Fenpropathrin (Danitol)	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Fluvalinate	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Permethrin (cis and trans)	EPA 8270D (M)/TQ/EI	0.76 - 0.81	1.5 - 1.6	1.0
Resmethrin/Bioresmethrin	EPA 8270D (M)/TQ/EI	0.65 - 0.69	0.76 - 0.81	0.5
Sumithrin (Phenothrin)	EPA 8270D (M)/TQ/EI	0.38 - 0.41	0.76 - 0.81	0.5
Tetramethrin	EPA 8270D (M)/TQ/EI	0.46 - 0.49	0.76 - 0.81	0.5
ORGANICS-BUTYLTINS (µg/kg)				
Monbutyltin	Krone et al., 1989	2.1 - 2.3	4.6 - 5.0	3.0
Dibutyltin	Krone et al., 1989	1.1 - 1.2	4.6 - 5.0	3.0
Tributyltin	Krone et al., 1989	2.3 - 2.5	4.6 - 5.0	3.0
Tetrabutyltin	Krone et al., 1989	1.1 - 1.2	4.6 - 5.0	3.0
ORGANICS-PHTHALATES (µg/kg)				
bis(2-ethylhexyl) phthalate	EPA 8270C (SIM)	2.3 - 2.5	76 - 81	10
Butyl benzyl phthalate	EPA 8270C (SIM)	3.0 - 3.2	76 - 81	10
Diethyl Phthalate	EPA 8270C (SIM)	2.5 - 2.6	76 - 81	10
Dimethyl Phthalate	EPA 8270C (SIM)	3.1 - 3.2	76 - 81	10
Di-n-butyl Phthalate	EPA 8270C (SIM)	2.9 - 3.1	76 - 81	500
Di-n-octyl Phthalate	EPA 8270C (SIM)	2.9 - 3.1	76 - 81	10
ORGANICS-PHENOLS (µg/kg)				
2,3,4,6-Tetrachlorophenol	EPA 8270C (SIM)	6.0 - 6.3	15 - 16	10
2,4,5-Trichlorophenol	EPA 8270C (SIM)	1.9 - 2.0	15 - 16	10
2,4,6-Trichlorophenol	EPA 8270C (SIM)	2.0 - 2.1	15 - 16	10
2,4-Dichlorophenol	EPA 8270C (SIM)	2.6 - 2.8	15 - 16	10
2,4-Dimethylphenol	EPA 8270C (SIM)	4.0 - 4.2	760 - 810	500
2,4-Dinitrophenol	EPA 8270C (SIM)	92 - 97	760 - 810	500
2,6-Dichlorophenol	EPA 8270C (SIM)	3.3 - 3.5	15 - 16	10
2-Chlorophenol	EPA 8270C (SIM)	2.8 - 3.0	15 - 16	10
2-Methyl-4,6-dinitrophenol	EPA 8270C (SIM)	100 - 110	760 - 810	500
2-Methylphenol	EPA 8270C (SIM)	3.0 - 3.2	15 - 16	10
2-Nitrophenol	EPA 8270C (SIM)	2.6 - 2.7	760 - 810	500
3+4-Methylphenol	EPA 8270C (SIM)	5.5 - 5.9	15 - 16	10
4-Chloro-3-methylphenol	EPA 8270C (SIM)	3.1 - 3.3	15 - 16	10
4-Nitrophenol	EPA 8270C (SIM)	120 - 130	760 - 810	500
Bisphenol A	EPA 8270C (SIM)	3.2 - 3.4	15 - 16	10
Pentachlorophenol	EPA 8270C (SIM)	2.0 - 2.1	760 - 810	500
Phenol	EPA 8270C (SIM)	3.5 - 3.7	15 - 16	10

Table 6 (Continued). Sediment Analytical Methods Achieved and Target Quantitation Limits.

Analyte	Method	Method Detection Limits (Dry Weight)	Laboratory Reporting Limits (Dry Weight)	SAP Reporting Limits (Wet Weight)
ORGANICS-PCBs (µg/kg) PCB congeners of: 018, 028, 037, 044, 049, 052, 066, 070, 074, 077, 081, 087, 099, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138/158, 149, 151, 153, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.	EPA 8270C (SIM)	0.052 - 0.58	0.31 - 0.66	0.5
Total PCBs as sum of all individual PCB congeners.	EPA 8270C (SIM)	--	0.31 - 0.66	0.5
ORGANICS-PAHs (µg/kg dry)				
1-Methylnaphthalene	EPA 8270C (SIM)	1.6 - 1.7	15 - 16	10
1-Methylphenanthrene	EPA 8270C (SIM)	3.0 - 3.2	15 - 16	10
1,6,7-Trimethylnaphthalene	EPA 8270C (SIM)	2.7 - 2.8	15 - 16	10
2,6-Dimethylnaphthalene	EPA 8270C (SIM)	3.2 - 3.4	15 - 16	10
2-Methylnaphthalene	EPA 8270C (SIM)	2.5 - 2.7	15 - 16	10
Acenaphthene	EPA 8270C (SIM)	2.3 - 2.5	15 - 16	10
Acenaphthylene	EPA 8270C (SIM)	2.6 - 2.7	15 - 16	10
Anthracene	EPA 8270C (SIM)	3.0 - 3.1	15 - 16	10
Benzo[a]anthracene	EPA 8270C (SIM)	2.2 - 2.3	15 - 16	10
Benzo[a]pyrene	EPA 8270C (SIM)	2.1 - 2.2	15 - 16	10
Benzo[b]fluoranthene	EPA 8270C (SIM)	2.2 - 2.3	15 - 16	10
Benzo[e]pyrene	EPA 8270C (SIM)	2.6 - 2.7	15 - 16	10
Benzo[g,h,i]perylene	EPA 8270C (SIM)	2.3 - 2.5	15 - 16	10
Benzo[k]fluoranthene	EPA 8270C (SIM)	2.3 - 2.5	15 - 16	10
Biphenyl	EPA 8270C (SIM)	2.9 - 3.1	15 - 16	10
Chrysene	EPA 8270C (SIM)	2.1 - 2.2	15 - 16	10
Dibenzo[a,h]anthracene	EPA 8270C (SIM)	2.2 - 2.3	15 - 16	10
Dibenzothiophene	EPA 8270C (SIM)	2.1 - 2.2	15 - 16	10
Fluoranthene	EPA 8270C (SIM)	2.7 - 2.9	15 - 16	10
Fluorene	EPA 8270C (SIM)	2.5 - 2.6	15 - 16	10
Indeno[1,2,3-c,d]pyrene	EPA 8270C (SIM)	2.0 - 2.1	15 - 16	10
Naphthalene	EPA 8270C (SIM)	2.4 - 2.5	15 - 16	10
Perylene	EPA 8270C (SIM)	1.8 - 1.9	15 - 16	10
Phenanthrene	EPA 8270C (SIM)	2.6 - 2.8	15 - 16	10
Pyrene	EPA 8270C (SIM)	2.5 - 2.6	15 - 16	10
Total Low Weight PAHs	EPA 8270C (SIM)	--	15 - 16	10
Total High Weight PAHs	EPA 8270C (SIM)	--	15 - 16	10
Total Detectable PAHs	EPA 8270C (SIM)	--	15 - 16	10

4.0 RESULTS

Physical and chemical results for the Surfside-Sunset Beach Borrow Areas and beach transect sediments are summarized in Tables 7 through 10 below. Tables do not include analytical quality assurance/quality control (QA/QC) data. Complete analytical results including all associated QA/QC data are provided in Appendix E. A complete set of physical results with grain size distribution curves are included in Appendix G.

4.1 Sediment Physical Results

Grain Size analyses were performed on multiple layers from each of the 26 cores collected. Data for each core and each individual layer are provided in Tables 7 and 8. Sieve analysis data for the beach transect area samples are provided in Table 9. Individual grain size distribution curves for each individual grain size sample are provided in Appendix G along with plasticity index plots and hydrometer data for a select number of samples.

4.2 Sediment Chemistry Results

A summary of the sediment chemical testing results for the Surfside-Sunset composite samples are provided in Table 10. Included in Table 10 are screening values consisting of NOAA ERL and ERM values and human health objectives for residential and industrial settings consisting of RSLs and CHHSLs (see Section 3.1.6). Any testing values that exceed any of these screening values are highlighted. Table cells shaded in green are for data that exceed one or more screening values for human health in commercial/industrial settings. Estimated values between the method detection limits and reporting limits were considered real values for the purpose of these comparisons.

Data contained in Table 10 are often coded. Values that were not detected above the method detection limit (MDL) were assigned the MDL with a "<" prefix symbol. Values estimated between the MDL and RL were tagged with a "J". A "J" code may also indicate an estimated value due to QC data for that value being outside of certain QC objectives. Definitions of all other symbols are described in the QA/QC report in Appendix H and in table footnotes.

Table 7. Surfside-Sunset Inside Borrow Area B Sieve Analysis Data.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Atterberg Limits		Classification
			Sieve No. / Sieve Size / % Passing																		
			1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	LL	PI	
			12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm			
SSBAVC-18-01	0.00	0.50	100	100	100	100	100	100	100	100	100	99	97	92	69	35	25	20			SILTY SAND (SM)
SSBAVC-18-01	0.50	3.00	100	100	100	100	100	100	100	100	100	100	99	97	83	58	48	43			SILTY SAND (SM)
SSBAVC-18-01	3.00	5.50	100	100	100	100	100	100	100	100	100	99	99	97	88	69	61	56			SANDY SILT (ML)
SSBAVC-18-01	5.50	9.75	100	100	100	100	100	100	100	100	99	98	95	86	51	17	9	6			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-01	9.75	12.75	100	100	99	98	97	93	88	79	68	57	42	31	19	9	5	4			POORLY GRADED SAND (SP)
SSBAVC-18-01	12.75	17.00	100	100	100	100	100	100	100	100	100	100	100	99	96	83	69	60			SANDY SILT (ML)
SSBAVC-18-01	Weighted Avg.		100	100	100	100	99	99	98	96	94	92	88	83	67	46	37	32			
SSBAVC-18-02	0.00	3.00	100	100	100	100	99	96	92	82	66	45	23	10	3	2	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-02	3.00	11.00	100	100	100	99	98	98	97	96	95	93	89	81	38	9	4	2			POORLY GRADED SAND (SP)
SSBAVC-18-02	11.00	13.50	100	100	98	97	96	95	95	94	94	94	92	89	75	29	15	9			SILTY SAND (SM)
SSBAVC-18-02	13.50	14.50	100	100	100	100	100	100	100	100	100	100	100	100	99	98	97	97	55	30	FAT CLAY (CH)
SSBAVC-18-02	14.50	15.50	100	100	100	100	100	100	100	100	100	100	100	99	97	90	79	66			SILT WITH SAND (ML)
SSBAVC-18-02	Weighted Avg.		100	100	100	99	98	97	96	94	90	85	78	71	45	22	16	13			
SSBAVC-18-03	0.00	0.50	100	100	100	100	99	98	95	90	83	72	49	29	15	6	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-03	0.50	7.00	100	98	97	96	94	90	85	76	64	49	28	14	6	3	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-03	7.00	16.00	100	100	100	100	100	99	99	98	97	96	92	84	57	22	13	11			SILTY SAND (SM)
SSBAVC-18-03	16.00	16.50	100	97	94	90	87	85	83	83	83	82	82	81	78	65	54	49			SANDY SILT (ML)
SSBAVC-18-03	Weighted Avg.		100	99	99	98	97	95	93	88	83	76	65	54	36	15	10	8			
SSBAVC-18-04	0.00	1.50	100	100	100	100	98	94	86	80	70	53	30	16	8	3	2	1			POORLY GRADED SAND (SP)
SSBAVC-18-04	1.50	8.00	100	100	99	99	98	97	96	95	93	91	86	76	38	12	6	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-04	8.00	14.50	100	98	98	97	96	96	95	95	95	94	93	90	77	30	15	10			SILTY SAND (SM)
SSBAVC-18-04	Weighted Avg.		100	99	99	98	97	96	94	93	91	89	83	76	53	19	10	6			
SSBAVC-18-05-1	0.00	3.00	100	100	100	98	93	83	73	64	53	40	29	20	9	3	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-05-1	3.00	12.75	100	100	100	100	100	99	99	98	97	96	91	79	38	11	6	4			POORLY GRADED SAND / SILT (SP-SM)
SSBAVC-18-05-1	12.75	15.50	100	100	100	100	100	100	100	100	100	99	96	90	74	36	23	16			SILTY SAND (SM)
SSBAVC-18-05-1	Weighted Avg.		100	100	100	99	98	96	94	92	89	85	80	69	38	14	8	5			
SSBAVC-18-05	0.00	0.50	100	100	100	100	100	100	100	100	100	100	99	96	70	30	19	14			SILTY SAND (SM)
SSBAVC-18-05	0.50	4.50	100	100	100	100	100	100	100	100	99	98	97	92	64	29	20	16			SILTY SAND (SM)
SSBAVC-18-05	4.50	9.50	100	100	100	99	98	96	94	92	90	88	86	80	46	14	7	4			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-05	9.50	14.00	100	100	100	100	100	100	100	100	100	100	99	99	93	68	49	38			SILTY SAND (SM)
SSBAVC-18-05	Weighted Avg.		100	100	100	100	99	99	98	97	96	95	94	90	67	36	25	19			
SSBAVC-18-06	0.00	0.50	100	100	100	97	93	88	83	75	57	34	15	7	2	2	2	1			POORLY GRADED SAND (SP)
SSBAVC-18-06	0.50	2.25	100	97	90	77	64	54	48	42	30	16	7	4	2	2	2	1			POORLY GRADED SAND (SP)
SSBAVC-18-06	2.25	11.00	100	99	99	98	97	97	96	96	96	96	95	91	59	15	6	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-06	11.00	11.75	100	89	81	73	68	63	60	60	59	59	57	55	50	34	23	18			SILTY SAND (SM)
SSBAVC-18-06	11.75	13.00	100	100	100	99	98	98	98	97	97	97	96	95	93	84	72	62			SILT WITH SAND (ML)
SSBAVC-18-06	Weighted Avg.		100	98	96	93	91	89	87	86	84	81	78	75	52	20	12	10			

Table 7 (Continued). Surfside-Sunset Inside Borrow Area B Sieve Analysis Data.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Atterberg Limits		Classification
			Sieve No. / Sieve Size / % Passing																		
			1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	LL	PI	
			12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm			
SSBAVC-18-07	0.00	0.50	100	100	100	100	99	99	98	96	92	85	68	51	25	6	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-07	0.50	4.25	100	100	100	99	98	96	93	89	82	69	44	27	12	4	2	1			POORLY GRADED SAND (SP)
SSBAVC-18-07	4.25	14.00	100	100	100	100	100	100	100	100	99	99	97	91	50	11	5	3			POORLY GRADED SAND (SP)
SSBAVC-18-07	14.00	16.00	100	100	100	100	100	100	100	100	100	100	100	99	90	64	48	38			SILTY SAND (SM)
SSBAVC-18-07	Weighted Avg.		100	100	100	100	99	99	98	97	95	92	84	75	45	16	9	7			
SSBAVC-18-08	0.00	0.50	100	100	100	100	100	99	98	96	91	81	61	41	17	6	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-08	0.50	10.25	100	99	98	97	94	90	86	79	68	54	37	24	11	4	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-08	10.25	14.50	100	100	100	100	100	100	100	100	100	100	100	99	94	69	54	46			SANDY SILT (ML)
SSBAVC-18-08	Weighted Avg.		100	100	99	98	96	93	90	85	78	69	56	47	35	23	17	15			
SSBAVC-18-09	0.00	0.50	100	100	100	100	100	100	100	100	100	99	95	87	60	29	20	15			SILTY SAND (SM)
SSBAVC-18-09	0.50	3.50	100	100	100	100	100	100	100	100	100	99	95	90	71	46	36	30			SILTY SAND (SM)
SSBAVC-18-09	3.50	7.25	100	100	100	99	98	97	96	95	91	83	68	50	26	11	6	4			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-09	7.25	8.25	100	100	100	100	100	100	100	100	100	99	99	98	97	95	91	89			SILT (ML)
SSBAVC-18-09	8.25	13.75	100	100	100	100	100	100	100	100	100	100	100	99	95	72	48	34			SILTY SAND (SM)
SSBAVC-18-09	13.75	15.50	100	100	100	100	100	100	100	100	100	100	99	99	98	96	89	82			SILT (ML)
SSBAVC-18-09	Weighted Avg.		100	100	100	100	100	99	99	99	98	95	91	85	73	55	42	34			
SSBAVC-18-10	0.00	0.50	100	100	100	100	100	100	100	100	100	99	92	76	47	24	15	12			SILTY SAND (SM)
SSBAVC-18-10	0.50	9.50	100	100	100	100	100	100	100	99	97	91	74	53	30	16	12	9			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-10	9.50	12.50	100	100	99	98	96	95	93	91	89	86	79	68	48	29	22	18			SILTY SAND (SM)
SSBAVC-18-10	12.50	15.25	100	100	99	98	97	96	95	94	91	84	68	49	25	9	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-10	15.25	16.50	100	100	100	100	100	100	100	100	99	99	98	95	75	38	24	18			SILTY SAND (SM)
SSBAVC-18-10	16.50	19.00	100	100	100	100	100	100	100	100	100	100	100	99	97	91	85	81			SILT (ML)
SSBAVC-18-10	Weighted Avg.		100	100	100	99	99	99	98	97	96	91	79	64	44	29	23	20			
Composite Weighted Average (107 feet)			100	100	99	99	98	97	95	93	91	86	80	72	50	27	19	16			

Table 8. Surfside-Sunset Outside Borrow Area B Sieve Analysis Data.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Atterberg Limits		Classification
			Sieve No. / Sieve Size / % Passing																		
			1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	LL	PI	
			12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm			
SSBAVC-18-11	0.00	2.00	100	100	99	99	99	98	96	92	82	63	33	13	3	2	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-11	2.00	3.00	100	100	99	99	97	93	86	76	64	49	26	14	9	7	7	7			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-11	3.00	6.00	100	100	100	100	99	98	96	91	85	77	69	62	55	50	48	46			CLAYEY SAND (SC)
SSBAVC-18-11	6.00	7.00	100	100	100	100	99	99	97	93	86	79	69	63	57	53	51	50			SANDY CLAY (CL)
SSBAVC-18-11	Weighted Avg.		100	100	100	99	99	97	95	90	81	70	53	41	34	31	29	28			
SSBAVC-18-12	0.00	3.00	100	100	100	99	99	96	91	81	64	45	23	12	7	6	5	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-12	3.00	4.00	100	100	100	100	100	99	97	93	84	76	68	64	60	56	53	51			SANDY CLAY (CL)
SSBAVC-18-12	4.00	9.00	100	100	100	99	97	94	88	77	61	39	20	13	9	7	7	6			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-12	Weighted Avg.		100	100	100	99	98	95	90	80	65	45	27	18	14	12	11	11			
SSBAVC-18-13	0.00	3.00	100	100	99	97	96	94	91	85	74	55	27	16	10	6	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-13	3.00	10.00	100	100	99	98	96	93	89	82	70	50	24	14	8	5	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-13	10.00	13.00	100	100	100	100	99	98	95	88	77	55	20	8	4	3	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-13	Weighted Avg.		100	100	99	98	97	94	91	84	72	52	24	13	8	5	3	3			
SSBAVC-18-14	0.00	1.00	100	100	100	100	100	100	100	99	97	89	75	58	38	27	21	17			SILTY SAND (SM)
SSBAVC-18-14	1.00	6.75	100	100	100	100	99	98	96	91	81	63	42	30	20	15	12	11			SILTY SAND (SM)
SSBAVC-18-14	6.75	11.00	100	100	100	100	100	99	96	90	79	66	54	48	42	39	37	36	26	8	CLAYEY SAND (SC)
SSBAVC-18-14	11.00	17.00	100	100	99	98	97	94	87	72	49	27	11	5	2	1	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-14	17.00	18.00	100	100	99	98	97	95	91	87	82	78	75	74	72	70	69	69			FAT CLAY (CH)
SSBAVC-18-14	Weighted Avg.		100	100	100	99	98	97	93	85	71	54	38	30	23	20	18	17			
SSBAVC-18-15	0.00	2.50	100	100	100	100	99	98	96	93	86	77	61	46	21	6	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-15	2.50	5.00	100	99	98	95	93	88	82	73	59	42	20	9	4	2	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-15	5.00	11.50	100	100	100	100	99	99	98	98	97	95	90	72	30	7	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-15	11.50	17.00	100	100	100	99	98	97	97	97	96	96	95	94	87	62	47	40			SILTY SAND (SM)
SSBAVC-18-15	Weighted Avg.		100	100	100	99	98	97	95	93	90	85	77	66	43	24	17	14			
SSBAVC-18-16	0.00	1.00	100	100	100	100	99	96	91	81	62	38	18	11	9	8	8	7			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-16	1.00	7.00	100	100	99	98	97	93	88	78	60	40	21	14	11	10	9	9			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-16	7.00	13.50	100	100	100	100	100	96	91	83	72	60	47	38	24	15	13	12	***NP***	***NP***	SILTY SAND (SM)
SSBAVC-18-16	13.50	14.50	100	100	100	100	99	99	98	97	97	95	94	93	90	83	78	75			SANDY CLAY (CL)
SSBAVC-18-16	Weighted Avg.		100	100	100	99	98	95	90	82	68	52	38	30	22	17	15	15			
SSBAVC-18-17	0.00	3.00	100	100	99	99	99	98	96	91	83	72	58	44	25	15	11	9			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-17	3.00	11.50	100	100	100	100	100	100	99	99	97	95	89	77	47	27	19	14			SILTY SAND (SM)
SSBAVC-18-17	11.50	15.00	100	100	100	99	97	95	92	87	77	64	45	30	15	9	6	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-17	Weighted Avg.		100	100	100	99	99	98	97	94	90	83	73	59	35	20	14	11			
SSBAVC-18-18	0.00	5.50	100	100	100	100	100	100	99	97	89	73	50	31	19	14	11	10			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-18	5.50	6.50	100	100	100	100	99	99	98	98	97	97	95	95	94	93	92	91			LEAN CLAY (CL)
SSBAVC-18-18	6.50	15.50	100	100	100	100	100	100	99	98	90	74	47	26	13	9	7	7			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-18	15.50	16.25	100	100	99	95	92	83	69	46	25	13	7	5	4	4	3	3			POORLY GRADED SAND (SP)
SSBAVC-18-18	16.25	17.50	100	100	100	99	99	96	91	79	65	56	50	48	47	46	46	46			CLAYEY SAND (SC)
SSBAVC-18-18	Weighted Avg.		100	100	100	98	96	92	88	84	79	73	58	42	21	11	9	7			

Table 8 (Continued). Surfside-Sunset Outside Borrow Area B Sieve Analysis Data.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Atterberg Limits		Classification
			Sieve No. / Sieve Size / % Passing																		
			1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	LL	PI	
			12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm			
SSBAVC-18-19	0.00	1.00	100	100	100	100	100	100	100	99	97	91	74	50	18	6	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-19	1.00	8.00	100	100	100	99	98	95	92	87	82	75	57	38	14	5	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-19	8.00	13.50	100	100	99	95	91	85	79	74	68	62	49	35	16	6	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-19	13.50	14.50	100	100	100	100	100	100	100	100	100	100	100	99	96	92	84	78	27	1	SILT WITH SAND (ML)
SSBAVC-18-19	Weighted Avg.		100	100	100	99	98	95	92	86	78	66	49	30	10	4	2	2			
SSBAVC-18-20	0.00	0.50	100	100	100	100	100	100	99	97	93	87	74	52	19	8	5	4			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-20	0.50	10.00	100	100	100	100	99	98	96	91	82	69	51	32	11	4	3	2			POORLY GRADED SAND (SP)
SSBAVC-18-20	10.00	11.00	100	100	99	97	92	83	72	57	40	28	17	10	3	2	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-20	11.00	14.50	100	100	99	97	94	91	87	80	74	66	49	29	10	3	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-20	Weighted Avg.		100	100	99	99	98	96	91	83	72	60	46	39	32	26	20	17			
SSBAVC-18-21	0.00	1.00	100	100	100	100	100	100	100	100	99	96	86	76	63	45	30	23			SILTY SAND (SM)
SSBAVC-18-21	1.00	8.25	100	100	100	100	100	99	98	95	88	75	56	45	36	26	18	13			SILTY SAND (SM)
SSBAVC-18-21	8.25	9.50	100	100	100	100	99	99	99	98	97	97	96	95	93	90	87	85			LEAN CLAY (CL)
SSBAVC-18-21	9.50	13.00	100	100	100	100	100	99	87	71	52	37	24	18	14	10	8	7			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-21	13.00	14.00	100	100	100	100	99	98	97	95	92	90	85	80	70	60	53	49			SANDY SILT (ML)
SSBAVC-18-21	14.00	17.50	100	100	97	94	91	85	75	58	37	20	8	5	3	2	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-21	Weighted Avg.		100	100	99	99	98	96	91	83	72	60	46	39	32	26	20	17			
SSBAVC-18-22	0.00	2.00	100	100	100	100	100	100	99	97	89	64	42	38	36	27	13	7			SILTY SAND (SM)
SSBAVC-18-22	2.00	11.25	100	100	100	100	100	99	97	93	83	55	31	27	26	18	10	6			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-22	11.25	14.00	100	100	100	99	98	96	93	88	79	59	43	38	35	30	25	22			SILTY SAND (SM)
SSBAVC-18-22	14.00	15.50	100	100	100	100	100	100	100	100	100	99	97	93	84	68	51	44			SANDY SILT (ML)
SSBAVC-18-22	15.50	17.50	100	100	100	100	100	100	100	99	97	89	67	46	29	19	10	6			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-22	Weighted Avg.		100	100	100	100	99	99	97	94	86	64	44	38	34	25	16	12			
SSBAVC-18-23	0.00	0.50	100	100	100	100	100	100	100	99	95	81	48	28	19	14	8	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-23	0.50	7.00	100	100	100	100	100	99	98	95	86	66	32	15	8	5	4	3			POORLY GRADED SAND (SP)
SSBAVC-18-23	7.00	13.50	100	100	100	100	100	99	98	96	88	68	33	15	7	4	3	3			POORLY GRADED SAND (SP)
SSBAVC-18-23	13.50	14.00	100	100	100	100	100	100	100	100	99	96	89	83	78	76	76	76	38	17	LEAN CLAY WITH SAND (CL)
SSBAVC-18-23	Weighted Avg.		100	100	100	100	100	99	98	95	88	68	35	18	10	8	6	6			
SSBAVC-18-24	0.00	5.00	100	99	99	98	98	97	95	91	84	72	49	35	25	17	10	6			POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-24	5.00	7.00	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	75	44	FAT CLAY (CH)
SSBAVC-18-24	Weighted Avg.		100	99	99	99	99	98	96	94	88	80	64	53	46	41	36	33			
SSBAVC-18-25	0.00	3.00	100	100	100	100	100	99	98	95	88	72	32	11	3	2	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-25	3.00	13.00	100	100	100	100	99	97	93	88	81	65	32	11	4	2	2	2			POORLY GRADED SAND (SP)
SSBAVC-18-25	13.00	17.00	100	100	100	98	96	91	86	77	64	50	29	14	4	2	1	1			POORLY GRADED SAND (SP)
SSBAVC-18-25	17.00	17.50	100	100	100	100	100	100	100	99	99	99	95	90	83	73	64	56			SANDY SILT (ML)
SSBAVC-18-25	Weighted Avg.		100	100	100	99	98	96	93	87	79	64	33	14	6	4	3	3			
Composite Weighted Average (213.5 ft)			100	100	100	99	98	97	94	88	80	66	47	35	24	17	13	12			

Table 9. Surfside-Sunset Beach Transect Sieve Analysis Data

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Atterberg Limits		Classification
			Sieve No. / Sieve Size / % Passing																		
			1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	LL	PI	
			12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm			
Transect A																					
SSBTS18-A-1	1	+12	100	100	100	99	97	93	88	80	69	55	34	20	10	5	3	3			POORLY GRADED SAND (SP)
SSBTS18-A-2	2	+6	100	99	99	99	99	99	98	98	96	90	64	27	7	2	1	0			POORLY GRADED SAND (SP)
SSBTS18-A-3	3	0	100	100	100	100	100	100	100	100	100	100	98	93	37	10	3	2			POORLY GRADED SAND (SP)
SSBTS18-A-4	4	-6	100	100	100	100	99	99	99	99	98	96	93	90	41	13	6	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-A-5	5	-12	100	100	99	98	98	98	98	97	95	92	90	87	49	14	6	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-A-6	6	-18	100	100	100	100	100	99	99	98	95	90	86	80	68	20	9	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-A-7	7	-24	100	100	100	100	100	100	100	100	99	98	97	96	86	38	23	16			SILTY SAND (SM)
SSBTS18-A-8	8	-32	100	100	100	100	100	100	100	100	100	98	94	90	83	28	15	9			SILTY SAND (SM)
Average			100	100	100	99	99	98	98	96	94	90	82	73	48	16	8	5			
Transect B																					
SSBTS18-B-1	1	+12	100	100	100	100	100	99	99	96	86	63	30	13	1	0	0	0			POORLY GRADED SAND (SP)
SSBTS18-B-2	2	+6	100	100	100	100	99	98	96	90	75	44	11	3	1	1	1	1			POORLY GRADED SAND (SP)
SSBTS18-B-3	3	0	100	100	98	94	90	87	83	79	73	60	31	15	5	2	1	1			POORLY GRADED SAND (SP)
SSBTS18-B-4	4	-6	100	100	100	100	100	100	99	99	99	99	98	94	57	15	5	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-B-5	5	-12	100	100	100	100	100	100	100	100	99	98	95	89	62	18	8	4			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-B-6	6	-18	100	100	100	100	100	100	100	100	99	98	96	94	68	19	9	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-B-7	7	-24	100	100	100	100	100	100	100	100	100	99	99	98	93	35	19	11			SILTY SAND (SM)
SSBTS18-B-8	8	-32	100	100	100	100	100	100	100	100	100	99	97	96	95	41	21	12			SILTY SAND (SM)
Average			100	100	100	99	99	98	97	95	91	83	70	63	48	16	8	5			
Transect C																					
SSBTS18-C-1	1	+12	100	100	100	100	99	99	96	88	69	41	16	8	1	0	0	0			POORLY GRADED SAND (SP)
SSBTS18-C-2	2	+6	100	100	100	100	99	97	95	88	75	52	22	7	1	1	0	0			POORLY GRADED SAND (SP)
SSBTS18-C-3	3	0	100	100	100	100	99	99	99	99	98	95	74	40	13	4	2	1			POORLY GRADED SAND (SP)
SSBTS18-C-4	4	-6	100	100	99	99	99	99	99	99	98	97	91	71	32	10	4	2			POORLY GRADED SAND (SP)
SSBTS18-C-5	5	-12	100	100	100	100	100	100	100	99	99	98	91	73	37	13	5	3			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-C-6	6	-18	100	100	100	100	100	100	100	100	100	99	97	95	76	22	11	5			POORLY GRADED SAND W/ SILT (SP-SM)
SSBTS18-C-7	7	-24	100	100	100	100	100	100	99	99	99	98	96	92	85	33	16	10			SILTY SAND (SM)
SSBTS18-C-8	8	-32	100	100	100	100	100	100	100	99	97	92	74	60	50	29	15	7			SILTY SAND (SM)
Average			100	100	100	100	99	99	98	97	92	84	70	56	37	14	7	4			

Table 10. 2018 Surfside-Sunset Beach Composite Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Surfside-Sunset Composite Samples		NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		IB	OB	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
SEDIMENT CONVENTIONALS									
Percent Solids	%	64.2	60.3						
Total Volatile Solids	%	0.16	0.17						
Total Organic Carbon	%	<0.027	<0.029						
Oil and Grease	mg/kg dry	21	77						
TRPH	mg/kg dry	<13	44						
Total Ammonia	mg/kg dry	0.87	0.93						
METALS									
Arsenic	mg/kg dry	2.46	2.38	8.2	70	0.68	3	0.07	0.24
Cadmium	mg/kg dry	0.0969J	0.113J	1.2	9.6	7.1	98	1.7	7.5
Chromium	mg/kg dry	14.6	11.0	81	370			100,000	100,000
Copper	mg/kg dry	8.98	7.56	34	270	310	4,700	3,000	38,000
Lead	mg/kg dry	6.45	3.41	46.7	218	400	800	80	320
Mercury	mg/kg dry	0.0251J	0.0211J	0.15	0.71	1.1	4.6	18	180
Nickel	mg/kg dry	10.3	8.60	20.9	51.6	150	220	1,600	16,000
Selenium	mg/kg dry	<0.114	<0.121			39	580	380	4,800
Silver	mg/kg dry	<0.0488	<0.0519	1	3.7	39	580	380	4,800
Zinc	mg/kg dry	46.9	34.5	150	410	2,300	35,000	23,000	100,000
BUTYLTINS									
Monobutyltin	ug/kg dry	<2.1	<2.3						
Dibutyltin	ug/kg dry	<1.1	<1.2			1,900	25,000		
Tributyltin	ug/kg dry	<2.3	<2.5			1,900	25,000		
Tetrabutyltin	ug/kg dry	<1.1	<1.2						
PAH's									
1-Methylnaphthalene	ug/kg dry	<1.6	<1.7			18,000	73,000		
1-Methylphenanthrene	ug/kg dry	<3.0	<3.2						
2,3,5-Trimethylnaphthalene	ug/kg dry	<2.7	<2.8						
2,6-Dimethylnaphthalene	ug/kg dry	<3.2	<3.4						
2-Methylnaphthalene	ug/kg dry	<2.5	<2.7	70	670	24,000	300,000		
Acenaphthene	ug/kg dry	<2.3	<2.5	16	500	360,000	4,500,000		
Acenaphthylene	ug/kg dry	<2.6	<2.7	44	640				
Anthracene	ug/kg dry	<3.0	<3.1	85.3	1100	1,800,000	23,000,000		
Benzo (a) Anthracene	ug/kg dry	<2.2	<2.3	261	1600	1,100	21,000		
Benzo (a) Pyrene	ug/kg dry	<2.1	<2.2	430	1600	110	2,100	38	130

Table 10 (Continued). 2018 Surfside-Sunset Beach Composite Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Surfside-Sunset Composite Samples		Surfside-Sunset Composite Samples		Human RSLs[2]		Human CHHSLs[3]	
		IB	OB	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Benzo (b) Fluoranthene	ug/kg dry	<2.2	<2.3			1,100	21,000		
Benzo (e) Pyrene	ug/kg dry	<2.6	<2.7						
Benzo (g,h,i) Perylene	ug/kg dry	<2.3	<2.5						
Benzo (k) Fluoranthene	ug/kg dry	<2.3	<2.4			11,000	210,000		
Biphenyl	ug/kg dry	<2.9	<3.1						
Chrysene	ug/kg dry	<2.1	<2.2	384	2800	110,000	2,100,000		
Dibenz (a,h) Anthracene	ug/kg dry	<2.2	<2.3	63.4	260	110	2,100		
Dibenzothiophene	ug/kg dry	<2.1	<2.2			78,000	1,200,000		
Fluoranthene	ug/kg dry	<2.7	<2.9	600	5100	240,000	3,000,000		
Fluorene	ug/kg dry	<2.5	<2.7	19	540	240,000	3,000,000		
Indeno (1,2,3-c,d) Pyrene	ug/kg dry	<2.0	<2.1			1,100	21,000		
Naphthalene	ug/kg dry	<2.4	<2.5	160	2100	3,800	17,000		
Perylene	ug/kg dry	<1.8	<1.9						
Phenanthrene	ug/kg dry	<2.6	<2.8	240	1500				
Pyrene	ug/kg dry	<2.5	<2.6	665	2600	180,000	2,300,000		
Total Low Weight PAHs	ug/kg dry	ND	ND	552	3160				
Total High Weight PAHs	ug/kg dry	ND	ND	1700	9600				
Total PAHs	ug/kg dry	ND	ND	4022	44792				
PHTHALATES									
Benzyl Butyl Phthalate	ug/kg dry	17J	18J			290,000	1,200,000		
bis-(2-Ethylhexyl) Phthalate	ug/kg dry	12J	11J			39,000	160,000		
Diethyl Phthalate	ug/kg dry	2.7J	2.7J			5,100,000	66,000,000		
Dimethyl Phthalate	ug/kg dry	<3.1	<3.2			780,000	12,000,000		
Di-n-Butyl Phthalate	ug/kg dry	76U	81U			630,000	8,200,000		
Di-n-Octyl Phthalate	ug/kg dry	<2.9	<3.1			63,000	820,000		
PHENOLS									
2,3,4,6-Tetrachlorophenol	ug/kg dry	<6.0	<6.3			190,000	2,500,000		
2,4,5-Trichlorophenol	ug/kg dry	<1.9	<2.0			630,000	8,200,000		
2,4,6-Trichlorophenol	ug/kg dry	<2.0	<2.1			6,300	82,000		
2,4-Dichlorophenol	ug/kg dry	<2.6	<2.8			19,000	250,000		
2,4-Dimethylphenol	ug/kg dry	<4.0	<4.2			130,000	1,600,000		
2,4-Dinitrophenol	ug/kg dry	<92	<97			13,000	160,000		
2,6-Dichlorophenol	ug/kg dry	<3.3	<3.5						
2-Chlorophenol	ug/kg dry	<2.8	<3.0			39,000	580,000		
2-Methylphenol	ug/kg dry	<3.0	<3.2			320,000	4,100,000		
2-Nitrophenol	ug/kg dry	<2.6	<2.7						

Table 10 (Continued). 2018 Surfside-Sunset Beach Composite Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Surfside-Sunset Composite Samples		Surfside-Sunset Composite Samples		Human RSLs[2]		Human CHHSLs[3]	
		IB	OB	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
3/4-Methylphenol	ug/kg dry	<5.5	<5.9						
4,6-Dinitro-2-Methylphenol	ug/kg dry	<100	<110						
4-Chloro-3-Methylphenol	ug/kg dry	<3.1	<3.3						
4-Nitrophenol	ug/kg dry	<120	<130						
Bisphenol A	ug/kg dry	<3.2	<3.4			320,000	4,100,000		
Pentachlorophenol	ug/kg dry	7.6J	<2.1			1,000	4,000	4,400	13,000
Phenol	ug/kg dry	<3.5	<3.7			1,900,000	25,000,000		
CHLORINATED PESTICIDES									
2,4'-DDD	ug/kg dry	<0.12	<0.12						
2,4'-DDE	ug/kg dry	<0.053	<0.057						
2,4'-DDT	ug/kg dry	<0.094	<0.10						
4,4'-DDD	ug/kg dry	<0.061	<0.065	2	20	190	2,500	2,300	9,000
4,4'-DDE	ug/kg dry	0.92	<0.066	2.2	27	2,000	9,300	1,600	6,300
4,4'-DDT	ug/kg dry	<0.080	<0.086	1	7	1,900	8,500	1,600	6,300
Total DDT	ug/kg dry	0.92	ND	1.58	46.1				
Aldrin	ug/kg dry	<0.058	<0.062			39	180	33	130
BHC-alpha	ug/kg dry	<0.087	<0.093			86	360		
BHC-beta	ug/kg dry	<0.10	<0.11			300	1,300		
BHC-delta	ug/kg dry	<0.14	<0.15						
BHC-gamma	ug/kg dry	<0.052	<0.056			570	2,500		
Chlordane-alpha	ug/kg dry	<0.10	<0.11						
Chlordane-gamma	ug/kg dry	<0.081	<0.087						
Chlordane (Technical)	ug/kg dry	<8.0	<8.7			1,700	7,700	430	1,700
Cis-Nonachlor	ug/kg dry	<0.077	<0.083						
Dieldrin	ug/kg dry	<0.16	<0.17	0.02	8	34	140	35	130
Endosulfan Sulfate	ug/kg dry	<0.16	<0.17						
Endosulfan I	ug/kg dry	<0.088	<0.094			47,000	700,000		
Endosulfan II	ug/kg dry	<0.14	<0.15						
Endrin	ug/kg dry	<0.086	<0.092		45	1,900	25,000	21,000	230,000
Endrin Aldehyde	ug/kg dry	<0.15	<0.16						
Endrin Ketone	ug/kg dry	<0.084	<0.090						
Heptachlor	ug/kg dry	<0.078	<0.084			130	630	130	520
Heptachlor Epoxide	ug/kg dry	<0.067	<0.072			70	330		
Methoxychlor	ug/kg dry	<0.10	<0.11			32,000	410,000	340,000	3,800,000
Mirex	ug/kg dry	<0.060	<0.064			36	170	31	120
Oxychlordane	ug/kg dry	<0.11	<0.12						

Table 10 (Continued). 2018 Surfside-Sunset Beach Composite Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Surfside-Sunset Composite Samples		Surfside-Sunset Composite Samples		Human RSLs[2]		Human CHHSLs[3]	
		IB	OB	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Toxaphene	ug/kg dry	<14	<15			490	2,100	460	1,800
Trans-nonachlor	ug/kg dry	<0.065	<0.070						
Total Chlordane	ug/kg dry	ND	ND	0.5	6	1,700	7,700	430	1,700
PCB CONGENERS									
PCB018	ug/kg dry	<0.10	<0.11						
PCB028	ug/kg dry	<0.11	<0.11						
PCB037	ug/kg dry	<0.093	<0.10						
PCB044	ug/kg dry	<0.23	<0.25						
PCB049	ug/kg dry	<0.076	<0.081						
PCB052	ug/kg dry	<0.29	<0.31						
PCB066	ug/kg dry	<0.19	<0.20						
PCB070	ug/kg dry	<0.11	<0.12						
PCB074	ug/kg dry	<0.14	<0.15						
PCB077	ug/kg dry	<0.18	<0.19			38	160		
PCB081	ug/kg dry	<0.14	<0.15			12	48		
PCB087	ug/kg dry	<0.17	<0.18						
PCB099	ug/kg dry	<0.073	<0.078						
PCB101	ug/kg dry	<0.068	<0.073						
PCB105	ug/kg dry	<0.082	<0.088			120	490		
PCB110	ug/kg dry	<0.052	<0.056						
PCB114	ug/kg dry	<0.11	<0.12			120	500		
PCB118	ug/kg dry	<0.053	<0.057			120	490		
PCB119	ug/kg dry	<0.096	<0.10						
PCB123	ug/kg dry	<0.11	<0.12			120	490		
PCB126	ug/kg dry	<0.084	<0.090			0.036	0.15		
PCB128	ug/kg dry	<0.18	<0.20						
PCB132/153	ug/kg dry	<0.25	<0.27						
PCB138/158	ug/kg dry	<0.54	<0.58						
PCB149	ug/kg dry	<0.18	<0.19						
PCB151	ug/kg dry	<0.13	<0.14						
PCB156	ug/kg dry	<0.12	<0.13			120	500		
PCB157	ug/kg dry	<0.13	<0.14			120	500		
PCB167	ug/kg dry	<0.20	<0.22			120	510		
PCB168	ug/kg dry	<0.22	<0.23						
PCB169	ug/kg dry	<0.10	<0.11			0.12	0.51		
PCB170	ug/kg dry	<0.17	<0.18						

Table 10 (Continued). 2018 Surfside-Sunset Beach Composite Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Surfside-Sunset Composite Samples		Surfside-Sunset Composite Samples		Human RSLs[2]		Human CHHSLs[3]	
		IB	OB	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
PCB177	ug/kg dry	<0.18	<0.19						
PCB180	ug/kg dry	<0.14	<0.15						
PCB183	ug/kg dry	<0.14	<0.15						
PCB187	ug/kg dry	<0.16	<0.17						
PCB189	ug/kg dry	<0.098	<0.11			130	520		
PCB194	ug/kg dry	<0.11	<0.12						
PCB201	ug/kg dry	<0.052	<0.056						
PCB206	ug/kg dry	<0.18	<0.19						
Total PCB Congeners	ug/kg dry	ND	ND	22.7	180	230	940	89	300
PYRETHROIDS									
Allethrin	ug/kg dry	<0.38	<0.41						
Bifenthrin	ug/kg dry	<0.46	<0.49			95,000	1,200,000		
cis-/trans-Permethrin	ug/kg dry	<0.76	<0.81			160,000	2,100,000		
Cyfluthrin	ug/kg dry	<0.38	<0.41			6,300	82,000		
Cypermethrin	ug/kg dry	<0.38	<0.41			380,000	4,900,000		
Deltamethrin:Tralomethrin	ug/kg dry	<0.38	<0.41			47,000	620,000		
Esfenvalerate:Fenvalerate	ug/kg dry	<0.38	<0.41			160,000	2,100,000		
Fenpropathrin	ug/kg dry	<0.38	<0.41			160,000	2,100,000		
Fluvalinate	ug/kg dry	<0.38	<0.41			63,000	820,000		
lambda-Cyhalothrin	ug/kg dry	<0.38	<0.41						
Phenothrin (Sumithrin)	ug/kg dry	<0.38	<0.41			320,000	4,100,000		
Resmethrin:Bioresmethrin	ug/kg dry	<0.65	<0.69			190,000	2,500,000		
Tetramethrin	ug/kg dry	<0.46	<0.49						
ERM Quotient		0.015	0.011						

1. Effects Range Low (ERL) and Effects Range Median (ERM) sediment quality objectives from Buchman (2008) and Long *et al.* (1995).
2. Regional Screening Levels for Chemical Contaminants at Superfund Sites" (USEPA Region 9, updated 2018).
3. California Human Health Screening Levels for Soil (Cal/EPA, 2005).

Green shaded values exceed one or more of the corresponding human health values.
ND = Not Detected NF= Not found as a Tentatively Identifiable Compound.
< = Not detected at the corresponding Method Detection Limit. J = Estimated between the Reporting Limit and the Method Detection Limit.

5.0 DISCUSSION

Subsections that follow describe the physical and chemical testing results, as summarized in Tables 7 through 10 in terms of objectives for beach nourishment.

5.1 Sediment Observations

According to sediment logs (Appendix F), sediment stratigraphy in most borings showed varying degrees of heterogeneity and complexity. Most borings were described as poorly graded sand (SP), poorly graded sand with silt (SP-SM), or silty sand (SM) in the upper portions of the borings. A couple of borings outside of Borrow Area B did have one to two foot layers of lean (low plasticity) clay (CL) in the middle or upper portions of the borings. In the lower portions of the borings, sediment descriptions varied widely. They were described as being anywhere from fat (high plasticity) clay (CH) to poorly graded sand (SP). In comparison, the Surfside-Sunset Beach transect samples were described as poorly graded sand (SP) down to 0.0 feet MLLW. It then transitioned into poorly graded sand with silt (SP-SM) down to the -18 feet MLLW elevation. Below that elevation, the sediments were described as silty sand (SM).

Usually the borrow area sediments were described as loose throughout the length of the borings. However, numerous cores were described as being either dense (sand) of stiff (silt and clay) near or at the bottom of the borings.

No odors or organic material were noted for any of the borings. Varying amounts of shell fragments or shell hash were noted for most borings.

5.2 Sediment Grain Size

The weighted average composite grain size gradation was calculated for the 10 borings within Borrow Area B and separately for the 15 borings outside Borrow Area B (Table 7). The composite weighted average sand content was 81% inside of Borrow Area B and 87% outside Borrow Area B. In comparison, the average sand content along the Surfside-Sunset Beach transects was 92% for the A and B transects and 93% for the C transect. However, the fines content (passing through the #200 sieve) of the beach transect samples ranged from 0% to 23%. According to USACE, Los Angeles District and the Sand Compatibility and Opportunistic Use Program (SCOUP) (Moffatt & Nichol, 2006) guidelines, individual core weighted average fines limit cannot be more than 10% finer than the finest beach transect sample. In this case, that limit is 33% fines.

Results of the physical compatibility analysis are provided in Appendix C as a separate report prepared by the Los Angeles District USACE. Based on this report, USACE expanded the limits of Borrow Area B for a future source of beach compatible material. The limits of this expanded area are shown in red on Figure 2.

According to USACE's physical compatibility report, the individual weighted average grain size curves for eight of the ten 2018 vibracore samples within the original Borrow Area B limits fits well within the overall grain size envelope for the Surfside-Sunset beach placement site.

Sediments from locations SSBVAC-18-01 and 09 do not fit within the beach compatibility envelope because their fines content is too high (greater than 33 percent). Calculated on an individual weighted average basis, the fines content from these locations were 37% and 42%, respectively. However, if the depth of sediment cut is limited to an elevation of -65 feet MLLW, then the weighted average fines content for locations SSBVAC-18-01 and 09 is much improved at 26% and 28%, respectively (Table 11). Sediments from the remaining vibracores had a weighted average fines content along their entire length that ranged from 8% to 23% or a sand content of 77% to 92%.

Table 11. Sand Content for Locations SSBVAC-18-01 and 09 down to an Elevation of -65 feet MLLW.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Top of Sample (feet MLLW)	Bottom of Sample (feet MLLW)	% Passing through #200 Sieve	% Sand
SSBAVC-18-01	0.00	0.50	-54.5	-55	25	75
SSBAVC-18-01	0.50	3.00	-55	-57.5	48	52
SSBAVC-18-01	3.00	5.50	-57.5	-60	61	39
SSBAVC-18-01	5.50	9.75	-60	-64.25	9	91
SSBAVC-18-01	9.75	12.75	-64.25	-65	5	95
				Weighted Average	26	74
SSBAVC-18-09	0	0.5	-56	-56.5	20	80
SSBAVC-18-09	0.5	3.5	-56.5	-59.5	36	64
SSBAVC-18-09	3.5	7.25	-59.5	-63.25	6	94
SSBAVC-18-09	7.25	8.25	-63.25	-64.75	91	9
SSBAVC-18-09	8.25	8.5	-64.75	-65	48	52
				Weighted Average	28	72

Twelve of fifteen 2018 vibracore samples collected outside of the original Borrow Area B are located within the limits of the newly expanded area for Borrow Area B. Sediments from all twelve of these cores plus the sediments from Vibracore Location SSVC18-15 fit well within the overall grain size compatibility envelope for the Surfside-Sunset Beach placement site. Vibracore Location SSVC18-11 is compatible based on individual weighted average but was not included in the newly drawn boundaries because it contained a thick layer of clay and silt below 3 feet depth. Vibracore Location SSVC18-24 was excluded because it contained approximately 36% fines and does not fit within the compatibility envelope for Surfside-Sunset Beach. Although the sediments from Vibracore Location SSVC18-15 had a weighted average sand content of 82% and fit well with in the beach compatibility envelope, it was also left out of the newly expanded area for Borrow Area B. This is because the sediment area between locations SSVC18-11 and SSVC18-15 was not sampled further during this investigation. With the lack of data, the true character of sediment between the two locations could not be discerned. The decision was therefore made to exclude SSVC18-15 from the newly drawn boundary.

5.3 Bulk Sediment Chemistry

Analyte concentrations in the Borrow Area composite samples, as summarized in Table 9, were below detection limits or low compared to effects based screening values. Of the detected analytes, which were limited to a few metals and phthalate compounds, all concentrations were below NOAA ERL values. As one would expect, the mean ERM quotient among all analytes with ERM values in a composite sample were very low (0.015 inside Borrow Area B and 0.011 outside Borrow Area B).

Except for arsenic, all analytes detected in the composite samples were well below RSLs and CHHSLs developed for human protection. Elevated arsenic concentrations occur commonly from natural as well as from anthropogenic sources in offshore California sediments and soils, and the concentrations of arsenic in the Borrow Area composite samples were below levels previously observed that have never been a concern for beach nourishment activities in Southern California.

5.4 Conclusions and Recommendations

There was no evidence of any environmental contamination that would preclude the Borrow Area sediments for use at Surfside-Sunset Beach. Therefore, beach compatibility focuses on the physical characteristics of the sediments.

The future disposition of dredged sediment from Borrow Area B is proposed to occur during years 2018 or 2019 at the Stage 11 Subarea "BB" (area bordered by dark blue on Figure 2). Dredging will be limited to less than 10 feet or to -65 feet MLLW in elevation. This area was last dredged in 2001 as part of the Stage 11 beach nourishment project. During that event, approximately 2.2 million cubic yards of very sandy sediment was dredged from this area and was successfully placed on Surfside-Sunset Beach. Recent 2018 vibracore investigation data and observations and physical grain size beach compatibility calculations based on both individual and composite weighted averages for depths less than 10 feet indicate that sediment from Subarea "BB" is still a very sandy sediment. The sediments in this subarea are represented by core locations SSBAVC-18-1 and SSBAVC-18-10. The weighted average composite sand content for these two locations down to -65 feet MLLW is 79% (Table 12). It is therefore recommended as an ideal borrow subarea to replenish Surfside-Sunset Beach.

This same 2018 dataset indicates that the 2009 Stage 12 Subarea sediments (bordered by light blue on Figure 2) and all of the previous designated Borrow Area B sediments outside of Subarea "BB" along with the sediments from the newly expanded area outside of Borrow Area B contain a homogenous thick layer of sandy sediment that could also be used in the future for replenishing Surfside-Sunset Beach.

Table 12. Surfside-Sunset Borrow Subarea BB Sand Content down to an Elevation of -65 feet MLLW.

Core Designation	Top of Sample (feet)	Bottom of Sample (feet)	Top of Sample (feet MLLW)	Bottom of Sample (feet MLLW)	% Passing through #200 Sieve	% Sand	Classification
SSBAVC-18-01	0.00	0.50	-54.5	-55	25	75	SILTY SAND (SM)
SSBAVC-18-01	0.50	3.00	-55	-57.5	48	52	SILTY SAND (SM)
SSBAVC-18-01	3.00	5.50	-57.5	-60	61	39	SANDY SILT (ML)
SSBAVC-18-01	5.50	9.75	-60	-64.25	9	91	POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-01	9.75	12.75	-64.25	-65	5	95	POORLY GRADED SAND (SP)
SSBAVC-18-10	0.00	0.50	-53.5	-54	15	85	SILTY SAND (SM)
SSBAVC-18-10	0.50	9.50	-54	-63	12	88	POORLY GRADED SAND W/ SILT (SP-SM)
SSBAVC-18-10	9.50	12.50	-63	-65	22	78	SILTY SAND (SM)
				Weighted Average	21	79	

6.0 QUALITY CONTROL REQUIREMENTS

Formal QA/QC procedures were followed for this project. The objectives of the QA/QC Program were to fully document the field and laboratory data collected, to maintain data integrity from the time of field collection through storage and archiving, and to produce the highest quality data possible. Quality assurance involves all of the planned and systematic actions necessary to provide confidence that work performed by the project team conforms to contract requirements, laboratory methodologies, state and federal regulation requirements, and corporate Standard Operating Procedures (SOPs). The program is designed to allow the data to be assessed by the following parameters: Precision, Accuracy, Comparability, Representativeness, and Completeness. These parameters are controlled by adhering to documented methods and procedures (SOPs), and by the analysis of quality control (QC) samples on a routine basis.

6.1 Field Sampling Quality Management

Field quality control procedures were followed and included adherence to SOPs, field documentation, formal sample documentation and tracking, use of certified clean laboratory containers, protocol cleaning, and sample preservation. There were no field issues to report that could have affected the quality of data collected.

6.2 Analytical Chemistry QA/QC

Analytical chemistry QC is formalized by EPA and State Certification agencies, and involves internal quality control checks for precision and accuracy. Any issues associated with the analytical laboratory quality control checks are summarized in Appendix H.

QA/QC findings presented are based on the validation of the data according to the quality assurance objectives detailed in the project SAP (AECOM and Kinnetic Laboratories) and in Appendix H, and using guidance from EPA National Functional Guidelines for inorganic and organic data review (USEPA, 2017b and 2017a).

As the first step in the validation process, all results were carefully reviewed to check that the laboratories met project reporting limits and that chemical analyses were completed within holding times. Except for five phthalate compounds and toxaphene, all wet weight detection limits and reporting limits for this project, as specified in the project SAP and SC-DMMT SAP guidance document, were met. A wet weight RL of 50 µg/kg was achieved for the five phthalate compounds. The project SAP specified an RL of 10 µg/kg and the SC-DMMT guidance document specified an RL of 20 µg/kg for these compounds. Note though that method detection limits for these compounds were 1.5 - 2.0 µg/kg wet weight. Toxaphene achieved a wet weight RL of 20 µg/kg exceeding the target limit of 10 µg/kg. However, toxaphene did achieve the limit of 9.0 µg/kg for the MDL. All analyses were completed within EPA specified holding times.

QA/QC records (496 total) for the sediment and tissue analyses included method blanks (BLK), laboratory duplicates (DUP), laboratory control samples and their duplicates (LCS/LCSDs), matrix spikes and matrix spike duplicates (MS/MSDs), post digestion spikes (PDS) and

surrogates (SURR). Total numbers of QC records by type are summarized in Table 11. Two sediment sample results (all phthalate compounds and 0.7% of the total sediment results) were qualified as a result of the QC review and are summarized in Table 12. All of these qualifications were a result of method blank detections. The reasoning behind these qualifications is explained in Appendix I. Despite these minor QC issues, overall evaluation of the analytical QA/QC data indicates that the chemical data are for the most part within established performance criteria and can be used for characterization of sediments in the Surfside Sunset Beach project area.

Table 13. Counts of QC records per Chemical Category.

Analyte Group	BLK	DUP	LCS / LCSD	MS / MSD	PDS	SURR	Total
Sediment							
Conventionals							
Percent Solids	1	1					2
Ammonia	1		2	2			5
Total Organic Carbon	1		2	2			5
Total Volatile Solids	1	1					2
O&G	1		2	2			5
TRPH	1		2	2			5
Total Metals including Hg	10		20	20	9		59
PAH's, Phthalates & Phenols	48		17	34		18	117
Chlorinated Pesticides	29		22	44		12	107
PCB Congeners	40		30	30		6	106
Butyltins	4		4	4		3	15
Pyrethroids	13		26	26		3	68
Sediment Totals	150	2	127	166	9	42	496

Table 14. Final QC Qualification Applied to Sample Results.

Analyte	# Samples Qualified	Final Qualifier	BLK	DUP	LCS	MS	PDS	SURR
Phthalates – Sediment								
Di-n-Butyl Phthalate	2	U	U					
Total number of affected samples	2							
Percentage of all samples	0.7%							

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Appendices available upon request

Appendix E

Surfside Beach Sand Replenishment Project Western Snowy Plover Monitoring Final Report

SURFSIDE BEACH SAND REPLENISHMENT PROJECT
WESTERN SNOWY PLOVER MONITORING
FINAL REPORT

Prepared by:

Thomas Ryan
Ryan Ecological Consulting
135 N. Meridith Ave.
Pasadena, CA 91106
tryanbio@gmail.com

Robert Hamilton
Hamilton Biological, Inc.
316 Monrovia Avenue
Long Beach, CA 90803
robb@hamiltonbiological.com

Prepared for

Manson Construction
772 Tuna Street
San Pedro CA 90731
Contact: Max Oviedo, P.E.

November 10, 2009

INTRODUCTION

Ryan Ecological Consulting (REC) and Hamilton Biological, Inc. (HB) were contracted by Manson Construction Company (Manson Construction) to monitor work activities at the Surfside sand replenishment project at Surfside, California to ensure that Western Snowy Plover (*Charadrius alexandrinus nivosus*) were not harmed or harassed by their actions. The Pacific Coast Population of the Western Snowy Plover is a Federally Threatened species (USFWS 1993). As such, it is protected under Section 9 of the Endangered Species Act of 1973. As amended, this section prohibits any person subject to the jurisdiction of the United States from taking (i.e., harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting) listed wildlife species. "Harm" is a significant habitat modification or degradation that results in the killing or injury of wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. To "Harass," is the intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding, or sheltering. The Western Snowy Plover is also considered a Bird Species of Special Concern by the State of California and is protected by the California Code of Regulations, Title 14, Ch.1, Section 251.1 (CA Code T14. C1. S251.1). … no person shall harass, herd or drive any game or nongame bird or mammal or furbearing mammal. For the purposes of this section, harass is defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering.

The Western Snowy Plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, in interior areas of the western United States, and coastal areas of extreme southern Texas and northeastern Mexico (American Ornithologists' Union 1957). Snowy Plovers tend to be site-faithful, and thus the Pacific coast population of the Western Snowy Plover is largely distinct from those plovers breeding within the interior (USFWS, 1993a; Warriner et al. 1986). The Pacific coast population consists of approximately 4,000 breeding Snowy Plovers, most occurring from southern San Francisco Bay to southern Baja California (Page et al. 1995, Page and Stenzel 1981, Palacios et al. 1994).

Western Snowy Plovers overwinter at roost sites throughout the California coast, including coastal Orange County. Records exist for a roosting population at Surfside Beach from 2006-2009 of approximately 10-17 Snowy Plovers from winter 2005-06 to winter 2008-09 (USFWS Unpublished Data, P. Knapp pers. comm.). Their preferred habitats include sand spits, dune-backed beaches, beaches at creek and river mouths, and salt pans at lagoons and estuaries (Stenzel et al. 1981). Driftwood, kelp, and dune plants support invertebrates, an important food source (Page et al. 1995). Kelp is especially important because Snowy Plovers forage on flies, isopods, beetles and their larvae that specialize on decomposing the kelp. Snowy Plovers are known to inhabit winter roosts, where they tend to sit within footprints, vehicle tracks, and shallow roost scrapes that they create. Most roosts are within 100 m of the beach slope and the birds tend to inhabit an area approximately 320 m long by 75 m wide (Ryan et al. In Prep).

In August 2009, a Snowy Plover roost was reported within the work area of the Surfside sand replenishment project at Surfside, California. The U.S. Fish and Wildlife Service (USFWS), Army Corps of Engineers (Corps), and Manson Construction took actions to protect the Snowy Plovers that roosted and foraged on the beach. The Corps directed Manson Construction that "*Monitors shall be present during any beach disposal activities, this only includes the presence and activity of on-beach construction equipment. Simple pumping of sediments does not qualify. Monitors shall observe for the presence of Western Snowy Plovers on the beach. Monitors shall carry marine radios or other equipment for purposes of communication with the construction Crews for purposes of coordination and safety. Monitors shall have the authority to halt all traffic on the beach and/or reroute traffic clear of any Western Snowy Plovers observed by the monitor. Monitors shall ensure that roosting Snowy Plovers are*

not harassed in any way. Roosting plovers shall not be frightened or startled by any means in an effort to get them to move. A post-construction report will be required giving numbers and locations of birds and any actions taken to avoid impacts (L. Smith, Corps, Letter September 25, 2009.)" The goal of this report is to summarize work activities near the plovers and actions to prevent harassment and to make recommendations for future sand replenishment operations near Snowy Plover roosts

METHODS

Mr. Thomas Ryan of Ryan Ecological Consulting and Robert Hamilton of Hamilton Biological (Monitors) monitored the Manson Construction work crews (Crews) from September 26 to October 28, 2009 (Table 1). The project took place on an approximately 1-km reach of sandy beach at the northern portion of Surfside Beach, Surfside, California (33°43'48.15"N; 118° 5'19.25"W) to (33°43'26.44"N, 118° 4'50.46"W). The site is immediately south of the entrance to Anaheim Bay and approximately 2.2 km north of Bolsa Chica State Beach/Ecological Reserve.

The Monitors typically arrived at the beach approximately 30 minutes prior to work activities, inspected the beach where work activities were scheduled to occur, conferred with Manson Construction Supervisor Larry Hall on the location of any roosting plovers, and recommended ways to avoid them. They then monitored work activities until work ended for the day. Their goal was to ensure that Manson's ongoing work at Surfside Beach did not harm or harass any Snowy Plovers, roosting or foraging, that may occur in this area. They carefully monitored all vehicular traffic and other potential disturbances in and around the areas where Snowy Plovers were detected during the morning survey and areas where they were known to roost and forage (Figure 1). They verified that Manson Construction employees did not engage in any actions that might have potentially disturbed any Snowy Plovers.

Surveys were conducted by walking the beach and scanning with binoculars (10x) and spotting scopes (32x). Monitoring was accomplished by occupying a position with a view of the entire work area and adjacent beach and watching with binoculars and spotting scopes for any Snowy Plovers in or near the work area. The Monitors had cell phones, which they could use to contact the Crews and Mr. Hall. When Snowy Plovers were detected within the work area prior to the start of work, they were avoided. When Snowy Plovers entered the work area, Crews were notified to avoid plover-occupied areas.

Figure 1. Project Location Map.

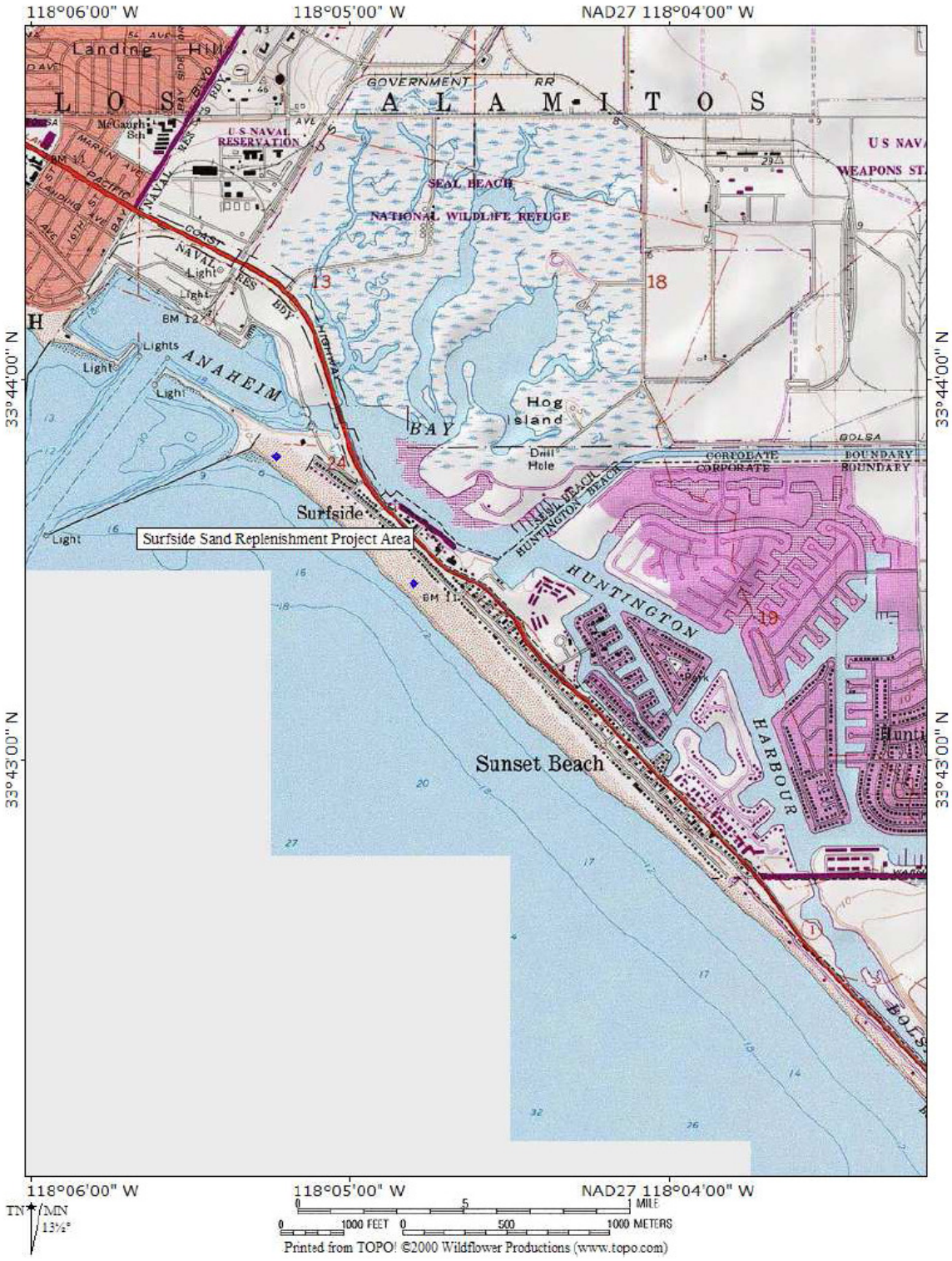

Figure 2. Map depicting the Locations of Project Activities and Snowy Plover Roosting and Foraging Locations. Blue areas are staging and storage areas, orange is the access road, grey is the pipeline, red are Snowy Plover roosting areas and green are Snowy Plover foraging areas.

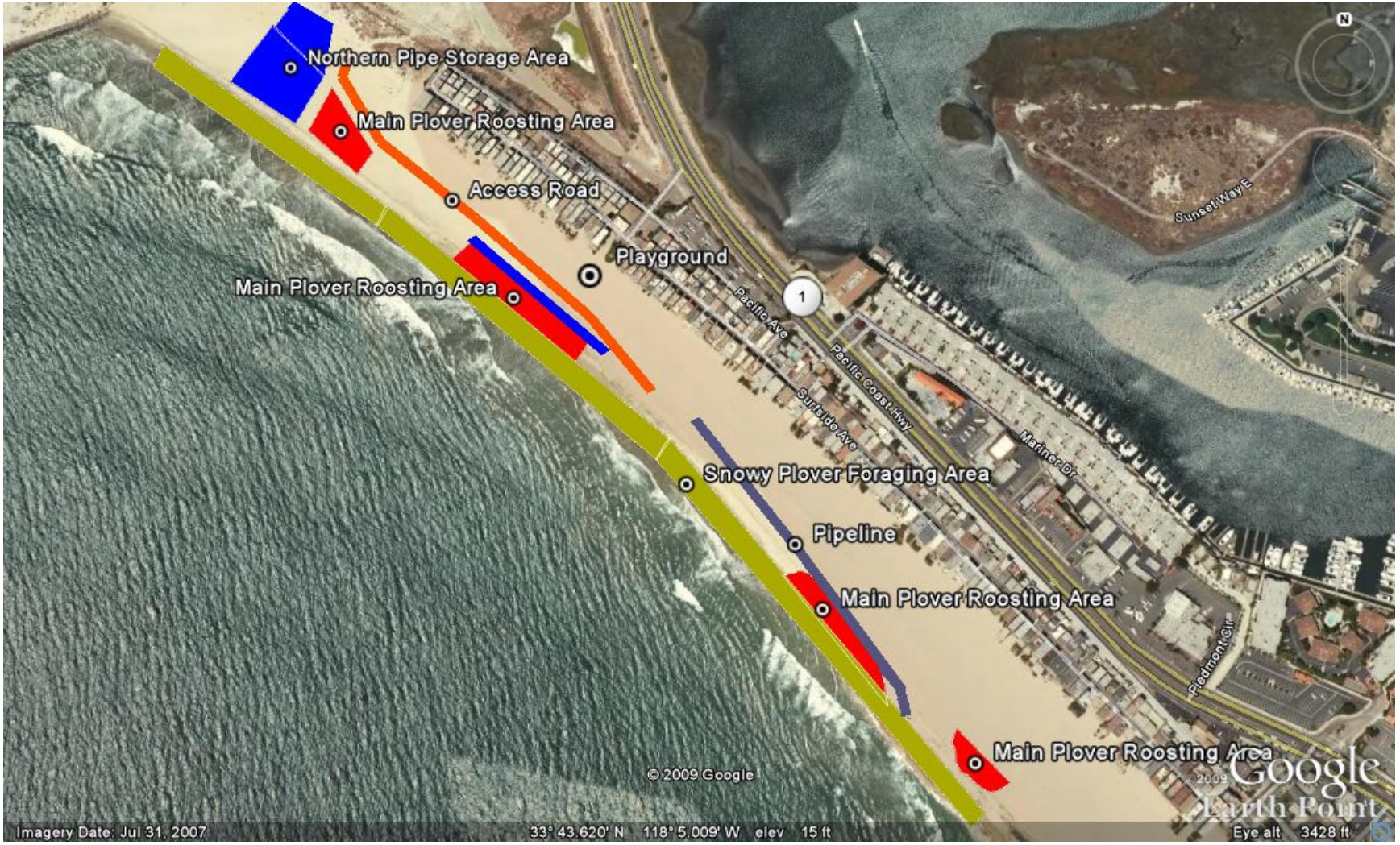

Table 1. Dates, Times, and Conditions at Surfside Beach, 2009.

Date	Observer	Start Time	End Time	Wind	Cloud Cover	Temp Start	Temp End
9/27/2009	RH	6:30	14:30	light	no data	65	75
9/28/2009	RH	6:30	12:15	light	no data	65	75
9/29/2009	TR	6:54	16:05	0 to 10	100	62	72
9/30/2009	TR	6:30	14:55	8 to 10	0	65	76
10/1/2009	RH	6:55	15:00	light	high overcast	59	80
10/2/2009	RH	6:50	13:50	no data	0	62	81
10/3/2009	TR	6:40	14:40	2 to 10	0	56	73
10/4/2009	TR	6:40	12:00	5 to 15	pt cldy	53	65
10/5/2009	RH	7:00	15:00	moderate breeze	sunny	66	75
10/6/2009	RH	6:55	15:00	moderate breeze	sunny	58	74
10/7/2009	TR	6:40	15:00	0-8	pt cldy	59	70
10/8/2009	TR	6:40	15:00	0-10	pt cldy	56	70
10/9/2009	RH	6:55	15:00	moderate breeze	70-100%	61	70
10/10/2009	RH	6:55	15:00	moderate breeze	70-100%	61	70
10/11/2009	TR	6:50	12:00	5 to 8	100	59	62
10/12/2009	TR	6:50	16:00	5 to 8	100	59	65
10/13/2009	RH	6:50	15:00	no data	90-100, light showers	58	65
10/14/2009	RH	6:55	14:25	7 to 10	100, light showers	63	68
10/15/2009	TR	6:50	14:40	0-6	100-0	67	73
10/16/2009	RH	6:55	14:40	light	0	62	74
10/17/2009	RH	6:55	14:10	light	100	67	73
10/18/2009	RH	8:45	16:20	light	100	65	71
10/19/2009	TR	12:45	18:40	4 to 10	0	71	67
10/20/2009	TR	11:30	18:40	6 to 10	0	74	70
10/21/2009	TR	6:55	16:50	6 to 10	0	59	74
10/22/2009	RH	6:50	14:50	light	overcast	58	74
10/23/2009	RH	6:55	15:30	2 to 10	foggy - clear	59	74
10/24/2009	TR	6:32	12:00	2 to 4	100	59	64
10/25/2009	No Work	-	-	-	-	-	-
10/26/2009	RH	6:55	14:25	light	0	52	83
10/27/2009	No Work	-	-	-	-	-	-
10/28/2009	TR	6:40	12:40	5 to 15	0	61	72
10/29/2009	RH	7:00	11:30	light	0	50	72

RESULTS & DISCUSSION

Snowy Plover Populations and Distribution.

We detected Snowy Plovers within the project area during all of the days we monitored the project (Table 2). On most days, there were between 15 and 20 Snowy Plovers present, the average was 17.3 (Std. Dev. = 4.6, N = 31) (Table 2). When fewer birds were recorded this was typically because monitors focused on a limited work area and did not survey the project area in its entirety. The maximum number of Snowy Plovers observed was 27 on October 15, 2009. One reason for these fluctuations may be individuals departing to and arriving from both the Bolsa Chica and Anaheim Bay Estuaries that are both nearby. We have evidence of this, as one color-banded bird was observed at both Surfside Beach and Bolsa Chica on the same day (P. Knapp pers. comm.). Another possibility is that the Snowy Plovers moved either north or south of the survey area and out of the monitor's survey range. We suspect that most Snowy Plovers observed were spending the winter months roosting on this beach, rather than waves of migrants passing through. This is supported by repeated observations of three color-banded birds throughout the survey period.

On the morning of October 21, 2009, a pedestrian discovered a nearly-dead Snowy Plover in the surf and transported it to Wildlife Rescue in Huntington Beach, where it died. The cause of death is currently under investigation. No sick birds were noted by the monitors on either October 20 or 21. No birds were observed struck by vehicles, captured by dogs, or otherwise harmed. No unusual die-offs of other seabirds or shorebirds were noted by the Monitors. The Monitors have no reason to believe that this death was a direct result of heavy machinery flushing Snowy Plovers from roosting or foraging areas.

We detected three color-banded Snowy Plovers during the monitoring operations. One was originally banded in Saltair, Utah, 585 miles from Sunset Beach (Table 2, Photograph 1; photos and figures at end of report). Other birds from this banding location have been re-sighted in San Diego (E. Copper pers. comm.), but this is the first sighting of a bird banded from Utah in Orange County. The second was captured by a dog at Surfside Beach and brought to a wildlife rehabilitation center, where it was subsequently banded and released (Table 2, Photograph 2). It survived through the study period. The third was originally banded at Camp Pendleton, northern San Diego County (Table 2, Photograph 3). A summary of color-band re-sightings from nearby Los Angeles County indicates that most Snowy Plovers that overwinter there originate from the central California coast (Ryan and Vigallon In Prep). We suspect that the Utah bird is unusual, and that most individuals are of the Pacific Coast Population of the Western Snowy Plovers that nest elsewhere in California.

The Snowy Plovers mostly occurred in roosts on the upper beach, and occasionally on the lower beach on raised areas (Figure 2, Photographs 4 and 5). They were frequently observed at the southwestern edge of the main shorebird roosting flocks, which alternated locations between an area just south of the northern staging area and in front of the playground (Figure 2). They foraged along the wrack/high-tide line and in the wet sand along most of the beach within the project area (Figure 2).

Overall, we suggest that there was little or no impact of the project on the Snowy Plovers, as evidenced by a stable population present throughout the span project. During the first seven working days of the project there were an average of 16.1 Snowy Plovers observed each day (Std. Dev = 4.4 , N = 7); and during the last seven working days of the project there were an average of 16.1 Snowy Plover observed each day (Std. Dev = 5.8, N = 7). These numbers are similar to the range of Snowy Plovers detected during surveys in previous winters, which was 10–17 Snowy Plovers present 2005-2009 (USFWS Unpublished Data).

Project Activities and Snowy Plovers

Snowy Plovers were present within the overall project area on all days. On 10 of the 31 working days, activities occurred in areas where Snowy Plovers were not present, thus had no potential to harass Snowy Plovers (Table 3). During the remaining 21 days, work activities occurred near roosting or foraging Snowy Plovers. The Biological Monitors worked closely with Manson Construction Supervisor Larry Hall and the Crew to avoid any activities that would flush or otherwise harass these plovers. Mostly, this consisted of first finding where the Snowy Plovers were roosting, then discussing the planned work activity with the Manson Construction Supervisor and Crew to determine how their activities might affect the plovers. The Monitors and Manson Construction Staff then created a plan to avoid the Snowy Plovers to the extent possible. The monitors then supervised the activity to ensure that Snowy Plovers were not disturbed and to signal the crew if they were, so that activities could be halted. Additionally, work vehicles were generally restricted to a marked route (Figure 2). Heavy equipment moving on this route was escorted and vehicles that needed to move off the route were also escorted.

In most instances, the monitors and the crew were able to avoid flushing Snowy Plovers. Examples of this include September 30 when an equipment operator built a sand berm, but angled the bulldozer's passes to the south to avoid a group of roosting plovers. When moving plastic pipes from the center of the beach, just inland from the main shorebird roost on October 3 and 21, Crews approached from the inland side and pulled the pipes around the flock. When working in the northern pipe staging area, the Crews routed equipment and vehicles between the pipes and avoided flocks just south of the pipes. On October 7, the crew worked with the monitor and avoided disturbing a small group of roosting Snowy Plovers by approaching the flock tangentially (instead of directly) and minimizing their time near the flock. In each case no Snowy Plovers were flushed by the work activities.

On several occasions, Snowy Plovers were in areas where the crew needed to work. On these occasions, monitors watched the flock until they were flushed by pedestrians, dogs or other beach maintenance/patrol vehicles. They then called the crew so that they could occupy the area before the plovers returned.

Overall, the Manson Construction Supervisor and Crews were very cooperative with requests from the monitors. This led to a close working relationship between the Monitors and Crews and over the course of 31 working days; the monitors did not observe Snowy Plovers being disturbed by Manson Construction project activities.

Other Disturbances.

On most days, Monitors observed that Snowy Plovers were repeatedly flushed from roosting and foraging areas by off-leash dogs (Photograph 7), pedestrians, and vehicles not associated with the project (Photographs 6 and 8); see Table 3. The most frequent source of flushing was off-leash dogs. These dogs not only flushed the Snowy Plovers, but flushed all other types of birds that foraged and roosted on the beach, as well. This occurred almost every day that the flock was under observation, and often occurred multiple times within an hour, especially on weekends. Disturbance of Snowy Plovers was sustained for up to 14 minutes by one dog on October 7 (Table 3). Prior to the monitors being present, an off-leash dog captured a Snowy Plover, which was brought to a wildlife rehabilitation center (P. Knapp pers. comm.). Dogs are prohibited on this beach, but on several occasions, the Monitors observed the Orange County Sheriff patrol vehicle drive by people with off-leash dogs without enforcing this code.

Other sources of flushing were pedestrians, presumably unaware of the presence of the Snowy Plovers, walking through the roosting areas (Table 3). Additionally, both the Orange County Sheriff and the

Surfside Maintenance vehicle (a green, six-wheeled Gator; see Photograph 6) drove through and flushed the flock (Table 3). A tractor dragging a metal grate also flushed the flock (Table 3). Other potential predators of Snowy Plovers observed during the project were domestic cats and a Peregrine Falcon (*Falco peregrinus*).

It should be noted that the Manson Construction Crew on numerous occasions expressed their frustration at the fact that they were being restricted in their actions and doing their best to obey regulations, while these regulations were being ignored by other agencies and beach goers that use the beach everyday. The Monitors agree that the level of disturbance by other agencies and beach goers is excessive and likely constitutes harassment of the Snowy Plovers.

Other Wildlife Species Present.

The site supported several other wildlife species. Among the most notable were large numbers of Brown Pelicans (*Pelecanus occidentalis*), and Western Gulls (*Larus occidentalis*) that were drawn to the pipe outlet at the replenishment (Photograph 9). Hundreds would often sit in the outflow and feed on crabs, bivalves, and fish that came through the pipe. Several color-banded individuals were observed and reported (e.g., Photograph 10). Both of these species are potential opportunistic predators of adult Snowy Plovers. Because of this, and because of differences in preferred foraging techniques, it was highly unlikely that a Snowy Plover would be present at the outflow/replenishment site.

There was also a large shorebird flock that regularly roosted at Surfside Beach (Photographs 11 and 12). The numbers tended to be highest at high tide, when the mudflats at Anaheim Bay and Bolsa Chica and the lower beach were flooded. The flock mostly consisted of 300-350 Semipalmated Plovers (*Charadrius semipalmatus*), 300-600 Western Sandpipers (*Calidris mauri*), and small numbers of Least Sandpiper (*Calidris minutilla*), Dunlins (*Calidris alpina*), Sanderlings (*Calidris alba*), and Black-bellied Plovers (*Pluvialis squatarola*). This flock was typically located immediately south of the northern staging area or in front of the playground (Figure 2). Snowy Plovers often joined this flock, but generally remained on the seaward fringe. When flushed, the Snowy Plovers were often the last to flush, appearing to remain still and use their camouflage to protect them. The flock was most frequently flushed by off-leash dogs, pedestrians, and vehicles not involved in the project (Photograph 6).

We noted several shorebirds foraging along the shoreline, including Greater Yellowlegs (*Tringa melanoleuca*), Willet (*Catoptrophorus semipalmatus*), Whimbrel (*Numenius phaeopus*), Marbled Godwit (*Limosa fedoa*), Ruddy Turnstone (*Arenaria interpres*), Red Knot (*Calidris canutus*), and Sanderling. Sanderlings were the most numerous, including a one-day influx of 500 birds that appeared on the beach at mid-morning on October 6. Snowy Plovers were often observed foraging among and near groups of Sanderlings. All of these species were regularly flushed by off-leash dogs (Photograph 7).

Table 2. Numbers of Snowy Plovers observed each day and daily logs of banded plovers.

		Banded Plovers		
Date	**Max Present**	**RB:KW (Utah)**	**RR:YT (rehab)**	**KV:S (Pend)**
9/27/2009	9	√		
9/28/2009	19	√		
9/29/2009	19	√		
9/30/2009	19			
10/1/2009	20	√	√	
10/2/2009	11			
10/3/2009	16			
10/4/2009	9			
10/5/2009	20	√	√	√
10/6/2009	21	√	√	
10/7/2009	22	√		
10/8/2009	12	√		
10/9/2009	15	√		
10/10/2009	19			
10/11/2009	21	√		
10/12/2009	17			
10/13/2009	14		√	
10/14/2009	16		√	√
10/15/2009	27	√		
10/16/2009	18	√		√
10/17/2009	18		√	√
10/18/2009	24			
10/19/2009	20			
10/20/2009	16			
10/21/2009	16			
10/22/2009	18	√	√	√
10/23/2009	18	√	√	
10/24/2009	19	√	√	
10/25/2009	no work			
10/26/2009	21	√	√	√
10/27/2009	no work			
10/28/2009	17			
10/29/2009	4	√		

Table 3. Summary of daily work activities and other beach disturbances and their impacts on Snowy Plovers. It should be noted that categories for "Plovers Present" and "Plovers Disturbed" refer to Snowy Plovers in the immediate vicinity of work activities that had the potential to be disturbed and do not include those elsewhere on the beach away from work activities.

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
9/27/2009	RH	The Crews worked moving sand near pipe outlet.	No	No	Off-leash dog flushed Snowy Plover, cat on the beach
9/28/2009	RH	The Crews worked moving sand near pipe outlet. The crew pulled two 400-foot-long pipes from the main staging area. Avoided Plover.	1	No	
9/29/2009	TR	The crew worked on capping pipes the main staging area, this required the placement and removal of a large metal equipment box and compressor on the beach using a Caterpillar 966G, then work using an impact wrench with the compressor running and movement of pipes using the Caterpillar 966G. They then worked on dredging, moving sand near pipe outlet. Plovers were monitored and not disturbed by work activities.	2	No	
9/30/2009	TR	The Crews worked building up a sand berm approximately ½ way down the pipeline where the crew plans to begin replenishing a new section tomorrow. This work involved one Caterpillar D8R moving sand from the lower beach to the upper beach. Crews limited their work area and altered direction from which they pushed sand to avoid plovers. Crews worked at replenishment site and installed two 100 ft extensions.	10	No	Roosts flushed by joggers twice, by dog 10:38
10/1/2009	RH	The Crews mobilized to a new sand replenishment site a few hundred feet south of the previous site. Crews worked within approximately 150 feet of roosting plovers without disturbing the birds.	No	No	Peregrine falcon stooped on shorebirds
10/2/2009	RH	The crew rebuilt the temporary dike at the sand deposition site, and they also spread and smoothed the sand was deposited from the dredge last week, just north of the current deposition site.	No	No	

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/3/2009	TR	The crew moved 400 ft sections of plastic pipe from the pipe staging area to a new pipe staging area. Crews then worked moving sand near the replenishment site. Crews were requested not to drive south of pipe and plovers were not disturbed.	6	No	09:53, pedestrians flushed the main flock and two Snowy Plovers departed with them.
10/4/2009	TR	The crew worked leveling sand immediately north of the replenishment site adjacent to the new pipe staging area.	No	No	Pedestrians and both off-leash and on-leash dogs flushed or chased both the Snowy Plovers and the large shorebird flock five times during the morning (7:15-12)
10/5/2009	RH	The crew finished smoothing out the sand that had been deposited last week, north of the current sand deposition site, and rebuilt the temporary dike at the current sand deposition site.	No	No	
10/6/2009	RH	The crew smoothed out the sand deposited at the northern end of the beach, adjacent to the northern roost. Plovers were not disturbed.	5	No	
10/7/2009	TR	The crew leveled sand near the northern pipe staging area immediately adjacent to the roost, we requested they move tangentially to the roost and minimize their time near the roost. They did this and no plovers were disturbed. Crews then worked moving sand at the replenishment site and repositioned the trailer.	14	No	Snowy Plovers chased repeatedly by off-leash dog 07:25-07:39. 8:55 two surfers walked thru roost flushing the roost.
10/8/2009	TR	The crew moved the replenishment site, which involved building up a berm (07:30 to 8:35), moving the pipe and removing the end segments, storing those segments, attaching the outflow, reinitiating flow, moving the trailer and leveling sand (09:00 to 11:30). In the afternoon, they worked at the replenishment site and leveled sand near the previous replenishment site (13:30 to 15:00). Crews were informed of their presence and avoided the plovers.	12	No	Snowy Plovers flushed by a dog at 07:14

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/9/2009	RH	The crew graded the sand that had been deposited last week, north of the current sand deposition site, and rebuilt the temporary dike at the current sand deposition site. Plovers were not disturbed by work and Crews avoided the roost.	9	No	
10/10/2009	RH	The crew continued to grade sand and work on the temporary dike at the sand deposition site. Plovers were not disturbed by work and Crews avoided the roost.	9	No	
10/11/2009	TR	The crew moved pipe and removed the end segments, stored those segments, moved the trailer, and graded sand at the final replenishment site. Snowy Plovers were present near the work area near the final replenishment site. Plovers near the replenishment site, but not disturbed by work activities.	21	No	Snowy Plovers flushed by fishermen 7:44. Flushed by a dog at 08:19. 21 Snowy Plover near replenishment site repeatedly flushed by off-leash dogs. Found a dead Western Sandpiper (possible dog kill).
10/12/2009	TR	The Crews capped the pipes in the southernmost pipe storage area and moved them to the northernmost pipe storage area. They pumped water out of the pipe on the southern end of the beach and covered this pipe end with sand. The Crews brought the pipe segments from the ocean onto the northernmost pipe staging area. Crews briefly worked near roosting and foraging plovers while flushing the water from the southern pipe. The plovers were observed and did not appear disturbed. While Crews were bringing the pipes on-shore, five Snowy Plovers were roosting among the shorebird flock. Crews worked within 150 yards of this flock without disturbing them. Crews were requested not to drive south of the pipe and the birds were not disturbed.	17	No	08:12 Snowy Plovers flushed by maintenance person in green cart. 08:32, 08:37, 08:57, 09:20-09:05, 10:01, 14:22 they were flushed by a dog.

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/13/2009	RH	Crews continued to remove equipment from the beach. At 9:30 a.m. Crews moved a rack of pipe covers out of an area located near a group of roosting plovers that included a Snowy Plover. The operator followed a route that would not disturb the plovers and the plovers did not flush as a result of this action.	11	No	
10/14/2009	RH	Activities were limited to working on the pipes stored at the north end of the beach.	No	No	
10/15/2009	TR	The Crews worked on removing weights from pipes in the northernmost pipe storage area. All work was completed among the pipes.	No	No	10:21 the main shorebird roost including Snowy Plovers was flushed by a dog
10/16/2009	RH	Activities were limited to working on the pipes stored at the north end of the beach, five plovers were roosting within 120 ft of work, but were not disturbed.	5	No	
10/17/2009	RH	A crew of two equipment operators spent the day excavating around the large pipe that is buried at the southeastern end of the project site.	No	No	Surfers flushed Snowy Plovers
10/18/2009	RH	Up to three equipment operators spent much of the day excavating the large pipe that is buried at the southeastern end of the project site	No	No	Numerous off-leash dogs were on the beach today, frequently chasing shorebirds including some Snowy Plovers. A Sheriff's patrol came down the beach at approximately 13:00, but the officers did not get out of their vehicle or otherwise address the owners of two dogs that were off leash and chasing birds in the intratidal zone at the time.

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/19/2009	TR	The Crews worked on removing weights from pipes in the northernmost pipe storage area, TR discussed remaining north of the pipes to avoid disturbing the roosting plovers. The crew worked exposing the remaining pipe at the southern end of the project site. Heavy equipment worked in the mudflat and area surrounding the pipe until approximately 18:00. TR monitored plovers foraging nearby and they did not appear affected by work activities.	20	No	Snowy Plovers flushed by dog 14:07.
10/20/2009	TR	The Crews worked on removing weights from pipes in the northernmost pipe storage area from throughout the day. Crews worked at the final pipe outlet most of the day. They first removed and floated the last remaining section of pipe and then filled in the depression that digging it out had created. I spent most of the day monitoring this crew as there were four plovers foraging immediately adjacent to the work area. They were not disturbed by project activities	4	No	
10/21/2009	TR	The Crews completed moving sand at the final pipe outlet in the morning. Initially, there were Snowy Plovers foraging on the wet sand, but a dog flushed them about 200 yards up the beach and they did not return. Work activities did not interfere with these birds. The Crews then moved the pipes at the southern pipe storage area to the northern pipe storage area. I inspected the route and monitored the flock during the movement. The flock did flush once during this activity, but it was not possible to tell if it was the work activities or pedestrians passing nearby. The flock did not flush during the movement of the other four pipes and they immediately returned to the roosting area, so the disturbance was minimal. The Crews then worked in the northern pipe storage area the rest of the afternoon.	16	No	07:32 surfers flushed the Snowy Plovers, Dog flushed plovers 07:35.

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/22/2009	RH	The crew worked within the northern pipe storage area.	No	No	Several off-leash dogs were again on the beach today, and one of them flushed three Snowy Plovers that were foraging in the wet sand. A jogger also flushed two birds that were roosting at the main (northern) roost site. a beachgoer found a Snowy Plover floundering in the surf yesterday morning (21 October) and took the bird to a rehabilitator in Huntington Beach.
10/23/2009	RH	RH drove slowly ahead of Larry Hall while he smooth out the sand by rolling a section of pipe over it, they stopped work mid-way through because of Snowy Plovers roosting at their typical mid-beach location. The plovers were avoided.	18	No	
10/24/2009	TR	One crew smoothed the sand by pushing a pipe in front of a Caterpillar D8T. Because the Snowy Plovers were roosting in front of the park/playground equipment at mid-beach, the crew began working at the southernmost end of the beach at 7:30 am. As they moved north, TR marked the roosting area at the lower beach and Crews avoided it (approximately 100 ft at the boundary between the upper and lower beach). TR then marked the roosting areas in front of the park/playground at mid-beach (35 m x 75 m). Crews avoided this area and no Snowy Plovers were disturbed. TR then monitored the roost until they were flushed at 11:17 by a low-flying helicopter. I then called the crew and they were able to complete the smoothing.	19	No	Low-flying helicopter flushed Snowy Plovers
10/25/2009	No Work				

Date	Observer	Activity	Plovers Present	Plovers Disturbed	Notes
10/26/2009	RH	Manson continued demobilizing operations today, using a barge to offload half of the pipes out of the northern storage area.	21	No	All of these Snowy Plovers were flushed at approximately 10:15, when a person not associated with the dredging operation drove a John Deere tractor through the roosting area as part of a beach manicuring operation unrelated to the Army Corps project
10/27/2009	No Work				
10/28/2009	TR	Crews worked among the pipes in the northern pipe staging area. They used two loaders to move four pipes so that all pipes were together. No Snowy Plovers were observed within 500 ft of work activities. At approximately 11:30 am, a bulldozer was used to smooth the sand where these pipes were and to smooth out sand along the beach slope. I monitored this activity and detected the five Snowy Plovers along the lower beach in front of the playground. TR notified the operator, and the bulldozer remained 150 ft north of the closest Snowy Plover and they were not disturbed.	4	No	
10/29/2009	RH	A barge was used to offload the remaining plastic pipes from the northern storage area, loaders were used to remove the last of the metal pipes from the beach to the yard, and the construction trailer was also moved to the yard. Manson also finished smoothing the sand in these last work areas by pushing a pipe with a loader.	4	No	

CONCLUSIONS & RECOMMENDATIONS

In conclusion, between September 27 and October 29, 2009, the Monitors did not observe any actions by Manson Construction that harassed or harmed Western Snowy Plovers on Surfside Beach, Surfside, California. While between 15 and 20 Snowy Plovers were present on each day, Manson Construction Crews either worked elsewhere, or were able to avoid roosting Snowy Plovers with the assistance of the Monitors. When Snowy Plovers were in areas where they needed to work, Monitors assisted them in waiting until the Snowy Plovers had left the area before they began work. In addition, observations of the same number of Snowy Plovers at the beginning and end of monitored operations suggest that the birds were not disturbed by project activities during the monitoring period. We conclude that the combination of the presence of Monitors determining the location of roosting plovers and advising the crew, and the crew cooperatively working with the Monitors, avoided harassing the plovers.

In future beach replenishment operations, we recommend the following improvements to better inform project staff and reduce costs for monitoring operations.

1. **Pre-project Identification and Protections of Snowy Plover Nesting, Roosting and Foraging Areas.** Qualified biologists should contact the Coordinator of the local Snowy Plover Recovery Unit and obtain contact information on the local Snowy Plover monitor. They should contact this person to determine where annual Snowy Plovers roosts and nesting areas occur on a particular beach. If possible, they should then survey the proposed work area several times during the prior nesting season and wintering season to determine up-to-date locations of plovers. This should include mapping the extent of the beach used by the Snowy Plovers on each visit. They should then visit the site on 3–5 days prior to work activities to determine the location of roosting locations. For projects with less lead time, or emergency situations, they should try to do just the latter, or, at minimum, visit the project site the day or morning before work begins.

   They should prepare a map of the roosting/nesting areas that the project staff can then use to determine which project activities may conflict with these sensitive areas. The project staff and the biologist should then create a plan for avoiding sensitive areas. This should include routing pipelines, storage areas, staging areas, vehicle transit routes, and other project activities that must occur on a daily basis around sensitive areas. Sensitive areas should then be marked using symbolic fencing, wood drift fencing, or silt fencing so that crews and other beach goers avoid these areas.

   All staff that will be working on the beach should then be briefed on the identification and habits of the Snowy Plover. They should be instructed to maintain a speed limit of no more than 10 mph while on the beach, including transit routes, and to remain vigilant, especially when driving in existing vehicle tracks. If a Snowy Plover is found in a work area, the biological monitor should be contacted and cones or other markers placed in that area to prevent harassment of the Snowy Plover(s) until the bird(s) depart or the biological monitor can recommend other protective measures.

2. **Protections during Project Activities.** In cases where sensitive areas can be identified and protected prior to project activities commencing, biological monitoring can be reduced to visits every few days to ensure that protective measures are in place, that the Snowy Plovers have not shifted roosting areas, and to check the ensure that the crews are following these directions. Biological monitors would not need to be present at all times if crews were not working within sensitive areas.

On days when crews need to work in sensitive areas, biological monitors should be present. They should arrive a half-hour prior to the beginning of planned work activities, if this is prior to sunrise, then work activities should be delayed to allow the monitors time to accomplish their tasks. The monitors should survey the proposed work area, and then discuss the planned activities with the supervisor and crews. They should create a plan for accomplishing the work without harassing the plovers. Monitors should then be present during work activities to ensure that the Snowy Plovers are not harassed. In cases where Snowy Plovers are in work areas, and all other options have been exhausted, the biological monitors should be allowed to slowly approach the roost and herd the Snowy Plovers out of the proposed work area. We propose that, given the amount of harassment that occurs daily on most beaches by dogs, pedestrians, and vehicles, a single flushing by a person on foot would not create any significant added level of harassment. Further, the actions taken to protect the roost would have already significantly reduced the daily level of harassment, offsetting the few occasions that the monitor may need to herd them.

Other Disturbances.

In regards to the other observed disturbances, we recommend that wildlife agencies work to educate the local homeowners, who are the majority of beach users at Surfside Beach, about the plovers and existing dog regulations. They should also contact the homeowners' association to educate the beach maintenance staff about the presence of Snowy Plovers. If this is unsuccessful in reducing the daily harassment of the Snowy Plovers on Surfside Beach, we recommend that law enforcement begin enforcing dog regulations and establishment of educational signage together with barriers or symbolic fencing around the plovers' main roosting areas.

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APPENDIX A: LIST OF WILDLIFE OBSERVED AT SURFSIDE BEACH, SEPTEMBER – OCTOBER 2009

Common Name	Scientific Name
Common Loon	*Gavia immer*
Eared Grebe	*Podiceps nigricollis*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*
Brown Pelican	*Pelecanus occidentalis*
Brandt's Cormorant	*Phalacrocorax penicillatus*
Double-crested Cormorant	*Phalacrocorax auritus*
Great Blue Heron	*Ardea herodias*
Snowy Egret	*Egretta thula*
Turkey Vulture	*Cathartes aura*
American Wigeon	*Anas americana*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Surf Scoter	*Melanitta perspicillata*
Osprey	*Pandion haleatus*
Red-tailed Hawk	*Buteo jamaicensis*
Peregrine Falcon	*Falco peregrinus*
Black-bellied Plover	*Pluvialis squatarola*
Snowy Plover	*Charadrius alexandrinus*
Semipalmated Plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
American Avocet	*Recurvirostra americana*
Greater Yellowlegs	*Tringa melanoleuca*
Willet	*Catoptrophorus semipalmatus*
Whimbrel	*Numenius phaeopus*
Marbled Godwit	*Limosa fedoa*
Ruddy Turnstone	*Arenaria interpres*
Red Knot	*Calidris canutus*
Sanderling	*Calidris alba*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Heermann's Gull	*Larus heermanni*
Ring-billed Gull	*Larus delawarensis*
California Gull	*Larus californicus*

Common Name	Scientific Name
Herring Gull	*Larus argentatus*
Western Gull	*Larus occidentalis*
Glaucous-winged Gull	*Larus glaucescens*
Caspian Tern	*Sterna caspia*
Royal Tern	*Sterna maxima*
Elegant Tern	*Sterna elegans*
Forster's Tern	*Sterna forsteri*
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
Vaux's Swift	*Chaetura vauxi*
Belted Kingfisher	*Ceryle alcyon*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Cassin's Kingbird	*Tyrannus vociferans*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
No. Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
European Starling	*Sturnus vulgaris*
American Pipit	*Anthus rubescens*
Yellow-rumped Warbler	*Dendroica coronata*
Savannah Sparrow (Large-billed)	*Passerculus sandwichensis rostratus*
Lincoln’s Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
Western Meadowlark	*Sturnella neglecta*
Brewer's Blackbird	*Euphagus cyanocephalus*
House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*
Domestic Dog	*Canis familiaris*
Raccoon	*Procyon lotor*
House Cat	*Felis domesticus*
California Sea Lion	*Zalophus californicus*
Bottlenose Dolphin	*Tursiops truncatus*

APPENDIX B: PHOTOGRAPHS TAKEN AT SURFSIDE BEACH, SEPTEMBER – OCTOBER 2009

Photograph 1. Color-banded Snowy Plover Bk:W/RW. Origin: Saltair, Utah.

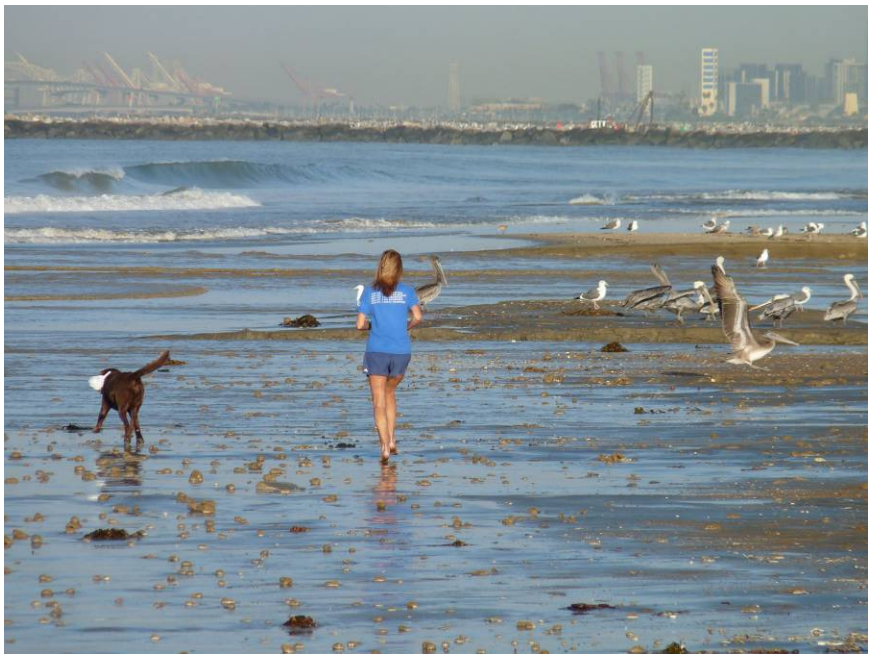
Photograph 2. Color-banded Snowy Plover R:R/Y:N. Origin: Surfside Beach, CA via the Wildlife Rehabilitation Center in Huntington Beach.

Photograph 3. Color-banded Snowy Plover Bk:V/M. Origin: Camp Pendleton, CA.

Photograph 4. Snowy Plovers roosting at Surfside Beach.

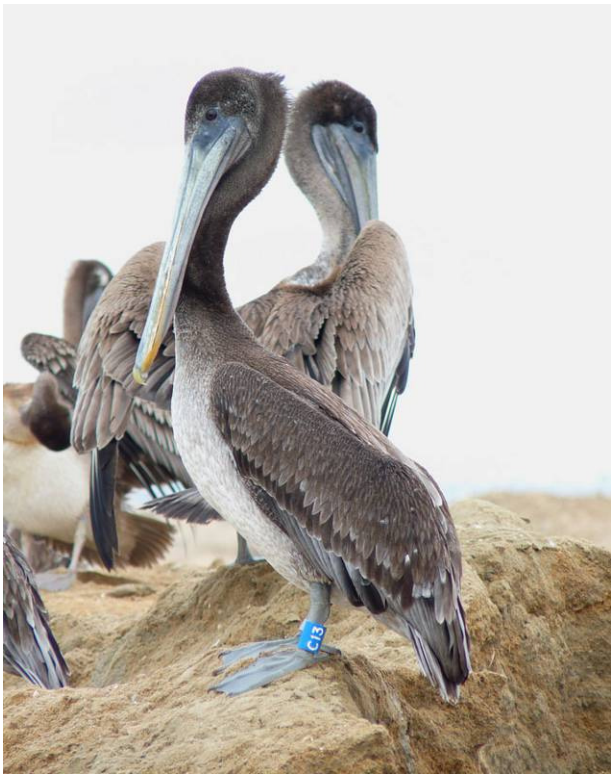
Photograph 5. Snowy Plovers roosting near northern pipe storage area while work is occurring at Surfside Beach.

Photograph 6. Surfside HOA maintenance staff flushing shorebird flock, including Snowy Plovers.



Photograph 7. Off-leash dog flushing birds on Surfside Beach.

Photograph 8. This tractor operator, not a part of the Army Corps project, smoothed out the sand on 26 October 2009, by dragging a metal grate up and down the beach. The group of small shorebirds in the midground of this photo includes some of the 21 Snowy Plovers that have been routinely roosting on this part of the beach. Approximately 15 minutes after this photo was taken, this action caused the mixed flock of plovers and sandpipers to flush from the roosting site.



Photograph 9. Color-banded Brown Pelicans near the outflow at Surfside Beach.

Photograph 10. Brown Pelicans and Western Gulls near the outflow at Surfside Beach.

Photograph 11. Semipalmated Plovers and Western Sandpipers roosting on piping at the northern Staging area on Surfside Beach.

Photograph 12. Semipalmated Plovers and Western Sandpipers roosting in front of the playground area on Surfside Beach (main shorebird roost).

Appendix F
Air Emissions Calculations

Emission Factors for Dredges

Source	CO	NOx	VOC/ROG[7]	PM_{10}/ SOx [6]
Traditional AP-42 Large-Bore Diesel Emission Factors				
Uncontrolled diesel emission factors (Lb/hp-hr)[1]	0.0055	0.024	0.0006	0.0007/ .00809
Controlled diesel emission factors (Lb/hp-hr)[2]	0.0055	0.013	0.0006	0.0007/ 0.00809
Caterpillar 3516B Emission Factors[3]				
Lb/hp-hr	0.0008	0.18	0.0003	0.0002/ 0.0004
H.R. Morris Emission Factors				
Lb/hp-hr	0.0001	0.0004	0.0002[4]	0.0002[3]/ 0.0002
Traditional AP-42 Emissions for a 2,600 Horsepower Diesel[5]				
Uncontrolled diesel emission factors (Lb/hr)	7.2	31.2	0.8	0.9/ 10.5
Controlled diesel emission factors (Lb/hr)[2]	7.2	16.9	0.8	0.9/ 10.5
Caterpillar 3516B Emissions for a 2,600 Horsepower Diesel[5]				
Lb/hr	1.0	23.8	0.4	0.2/ 0.5
H.R. Morris Emission Factors[5]				
Lb/hr	0.1	0.5	0.2	0.2/ 0.3

[1] Based on Table 3.4-1 of USEPA AP-42, A Compilation of Air Pollutant Emission Factors.

[2] NOx controlled by injection timing retard.

[3] Based on data provided by Caterpillar for this engine.

[4] Assumes 50 percent control efficiency for use of selective catalytic reduction (SCR).

[5] A 50 percent load factor used for this engine per discussion with Caterpillar Diesel.

[6] SOx values are separate emission factors from PM10.

[7] VOC and ROG are used interchangeably.

Ancillary Equipment Operations and Horsepower Ratings			
Emission Source	**Number**	**Horsepower**	**Total Hours per Day**
Tugboat	1	1,600	2
Crew Boats	2	50	4

Tug Boat Fuel Data	
Fuel Type	Diesel
Fuel Density, lb/gal	7.12
Specific Fuel Consumption, lb/hp/hr	0.40
Idle Load Factor	0.20
Maneuver Load Factor	0.50
Cruise Load Factor	0.80

Estimating Fugitive emissions for Vehicle Miles Traveled (VMT) for construction laborers (SCAQMD CEQA Quality Handbook Table A9-9-A with updates through 2010). It is assumed that 18 personnel would work and 18 Vehicles used. Personnel would commute from approximately 6.25 miles one-way on-road. Note: No off-road work.

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

VMT= 12.5 miles/day x (18 vehicles/hr) x 0.5 hr = 112.5 miles per day

Estimating fugitive emissions from passenger (commuter) Vehicle Travel on Paved Roads (SCAQMD CEQA 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 **(SCAQMD CEQA Quality Handbook Table A9-9-B-1 with updates through 2010).**

E = 112.5 miles/day x 0.00065 lbs/mile = 0.08 lbs/day
Note: No off-road work = no off-road fugitive emissions/day.

Total Fugitive Emissions (Vehicles) = 0.15 lb/day

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)	18	112.5	0	0.08	0
Total on-road fugitive emissions	Na	na	Na	0.08	na

"na" means "Not Applicable"

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

Travel emission formula= [(emission factors (Exhaust+Tire wear)) x (Distance traveled(VMT))]/(454 grams/lbs)

PM10 = [0.195 grams/mile x 112.5 miles/day]/454 grams/lb = [21.94 grams/day]/454 grams/lb = 0.05 lbs/day PM10

CO = [4.72 grams/mile x 112.5 miles/day]/454 grams/lb = [531 grams/day]/454 grams/lb = 1.17 lbs/day CO

ROC = [0.55 grams/mile x 112.5 miles/day]/454 grams/lb = [61.88 grams/day]/454 grams/lb = 0..14 lbs/day ROC

NOx = [3.73 grams/mile x 112.5 miles/day]/454 grams/lb = [419.63 grams/day]/454 grams/lb = 0.92 lbs/day NOx

SOx = [0.29 grams/mile x 112.5 miles/day]/454 grams/lb = [32.63 grams/day]/454 grams/lb = 0.07 lbs/day SOx

Surfside Sunset Stage 13

Emission Source Data for Maintenance Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day (1)	Total Work Days (2)	DailyTotal Hp-Hrs (1)
Tug boat-clamshell dredge	800	0.20	1	160	8.0	22		176
Hydraulic dredge	2,600	N/A	N/A	N/A	N/A	22		N/A
Bulldozer-D8 (3)	335	0.50	2	335	18.8	8		2,680

Emission Factors for Construction Equipment

Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Clamshell dredge (lb/hr)	1.1	0.3	1.1	1.0	0.7
Tugboat (lbs/1,000 Gal)	18.2	57.0	419.0	75.0	9.0
Hydraulic dredge (lb/hr)	0.2	0.1	0.5	0.3	0.2
Bulldozer (grms/HP-HR)	0.1	2.6	0.3	0.9	0.015

Daily Emissions from Construction Activities Hydraulic Dredge

	Pounds per day				
Construction Activity/Equipment Type	**ROG**	**CO**	**NOx**	**SOx**	**PM10**
Hydraulic dredge	4.4	2.2	11.0	6.6	4.4
Tug boat-hydraulic dredge	5.2	6.8	9.5	2.4	2.2
Crew boat (4)	0.4	0.3	0.8	0.1	0.1
Worker Vehicles (4)	0.1	1.2	0.9	0.1	0.1
Bulldozer-D8(3)	0.8	15.4	1.8	5.3	0.1
Peak Daily Dredging/Beach Placement Emissions	**11.0**	**25.8**	**24.0**	**14.5**	**6.8**
Backpass Operations	**1.7**	**30.7**	**3.5**	**10.6**	**0.2**
Peak Daily Emissions	**12.6**	**56.6**	**27.5**	**25.1**	**7.0**
SCAQMD Daily Significance Thresholds	**75**	**550**	**100**	**150**	**150**

(1) Assumes 2-hour down time per day for shift change, maintenance, fueling. Three shifts per day.
(2) Assumes average duration of 5 months for hydraulic dredging with beach placement.
(2) Assumes average duration of 30 days for sand backpass operation; equipment equivalent of two D-8 Bulldozers.
(3) Bulldozer would operate 10 hours per day for beach placement and 12 hours per day for backpass operations., Tier 4 engine.
(4) See following pages for source date, emissions factors, and emissions calculations.

Assume dredge volume of 1.2 mcy
Emissions factors for Maintenance Dredging for tugboat and bulldozer taken from the Port of Los Angeles Channel Deepening Project Final Supplemental Environmental Impact Statement/Environmental Impact Report, September 2000.
Emissions factors for Maintenance Dredging for the Clamshell Dredge provided by Justice and Associates for a Manson clamshell dredge.
Emission factors for hopper dredge taken from AP-42 for diesel engines.
Tug emissions are not included in total projects emissions estimates as those emissions are already included in the SIP and do not apply to de minimus calculations for conformity.

Total Project Construction Emissions

	Tons				
	ROG	**CO**	**NOx**	**SOx**	**PM10**
Dredge/.Sand Placement					
Hydraulic dredge	0.8	1.9	1.8	1.1	0.5

Backpass Operations	0.0	0.5	0.1	0.2	0.0
Total	0.8	2.4	1.9	1.2	0.5
De Minimus Levels	**10.0**	**100.0**	**10.0**	**100.0**	**70.0**

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(3)	DailyTotal Hp-Hrs (1)
Hydraulic dredge	2,600	NA	1	NA	NA	22		NA
Crew boat	50	NA	1	NA	NA	4		NA
Tug boat-hydraulic dredge	1,600	NA	1	NA	NA	2		NA
Worker vehicles	NA	NA	18	NA	NA	12.5		NA
Hopper dredge	2,000					22		22,000
Bulldozer-D8	335	0.50	2	335	18.8	8	2	2,680

Emission Factors for Construction Equipment

	Grams per HP-HR
Equipment Type	**CO2**
Tugboat	509
Hydraulic dredge	183
Crew boat	75
Tug boat-hydraulic dredge	93.9
Worker vehicles	1.1
Bulldozer	390

Estimated Emissions from Construction Equipment

	CO2	
	lbs/day	**tons total**
Equipment Type		**Trench**
Hydraulic dredge	8.9	0.1
Crew boat	0.7	0.0
Tug boat-hydraulic dredge	0.4	0.0
Worker vehicles	0.5	0.0
Bulldozer[(3)]	6.9	0.0
Operation Type		
Hydraulic dredge	10.5	0.8
Backpass Operations	13.8	0.2
Total	24.3	1.0
Total Equivalent CO2		
Total		1.0

CO2 Equivalent = CO2*1.008