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STAFF REPORT: REGULAR CALENDAR

Consistency Determination No.: **CD-003-13**

Federal Agency: **U.S. Army Corps of Engineers**

Location: Encinitas and Solana Beach, San Diego County, specifically Segment 1 from the 700 block of Neptune Avenue south to the approximate end of West H Street in Encinitas; and Segment 2 from Tide Park south to the southern city limit at the western extent of Via de la Valle in Solana Beach (**Exhibits 1-4**)

Project Description: 50-Year Coastal Storm Damage Reduction and Beach Nourishment Project

Staff Recommendation: Conditional Concurrence

SUMMARY OF STAFF RECOMMENDATION

The U.S. Army Corps of Engineers (Corps) has submitted a consistency determination for the Encinitas-Solana Beach Coastal Storm Damage Reduction Project, a 50-year program to nourish two shoreline segments in the cities of Encinitas and Solana Beach (San Diego County) with sand dredged from offshore borrow sites. The purpose of the program is to reduce wave-induced erosion at the base of coastal bluffs in these two segments and reduce the need for additional armoring of the shoreline in these segments. At Encinitas, 680,000 cubic yards of sand would

be placed on a 7,800-foot-long section of shoreline to extend by approximately 100 feet the existing base year beach width of 110 feet at mean sea level. Renourishment with 280,000 cu.yds. of sand would occur every five years. At Solana Beach, 960,000 cubic yards of sand would be placed on a 7,200-foot-long section of shoreline to extend by approximately 200 feet the existing base year beach width of 70 feet at mean sea level. Renourishment with 420,000 cu.yds. of sand would occur every thirteen years. Implementation of the Encinitas and Solana Beach project would take approximately 103 and 139 days, respectively, and the Corps anticipates commencing project construction in late 2015.

The Commission finds the project is an allowable use as the offshore borrow sites and the beach disposal sites are not environmentally sensitive habitat areas, and the proposed dredged materials are suitable for beach nourishment. While the project holds the potential to adversely affect coastal resources, given the limited utility of the other alternatives, and the anticipated negative consequences of the no-project alternative (i.e., further armoring of the shoreline), the Commission finds that the proposed project represents the least environmentally damaging feasible method of addressing the inevitable need to reduce storm damage in the project area.

The project would create significant adverse effects on adjacent sensitive marine habitats and resources as sand placed on the beach moves into nearshore areas through the action of waves and currents. The project includes a preliminary monitoring and mitigation program but the extent of project impacts requiring mitigation will not be determined until two years after nourishment is completed. In addition, the 50-year time period of the consistency determination and the effects of sea level rise over that time period support the need for phased review by the Commission of future renourishment projects to ensure that project assumptions made today can be reexamined in light of future environmental conditions, monitoring results, and mitigation efficiency. The Commission has adopted conditions which provide in part for modifications to the project to ensure protection of sensitive habitat areas, adequate monitoring of project implementation and impacts, mitigation of project impacts, and phased review of future renourishment projects. If the Corps were to agree to implement these conditions, the proposed project could be found consistent with the marine resources, beach nourishment, and dredging and filling policies of the Coastal Act (Sections 30230, 30231, and 30233).

The project will adversely affect several unique surfing areas as a result of reefs being covered with sand as the widened beaches reach an equilibrium state. However, determining the degree of impact is complicated by uncertainty due to the dynamic nature of this segment of shoreline, changes in beach width and composition since the 1980s, future shoreline changes inherent with sea level rise, and the seasonal movement of sand within the littoral zone. The Commission has adopted conditions to assure that project impacts on surfing are minimized, adequately monitored, and if impacts occur, project modifications implemented. If the Corps were to agree to implement these conditions, the proposed project could be found consistent with the public access and recreation policies of the Coastal Act (Sections 30210, 30211, 30212, 30213, and 30220).

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I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

The U.S. Army Corps of Engineers has determined the project consistent to the maximum extent practicable with the California Coastal Management Program (CCMP).

II. MOTION AND RESOLUTION

Motion:

> *I move that the Commission **conditionally concur** with consistency determination CD-003-13 by concluding that the project would be fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the California Coastal Management Program (CCMP), provided the Corps agrees to modify the project consistent with the conditions specified below, as provided for in 15 CFR§930.4.*

Staff recommends a **YES** vote on the motion. Passage of this motion will result in a concurrence with the determination of consistency, provided the project is modified in accordance with the recommended conditions, and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

Resolution:

> *The Commission hereby **conditionally concurs** with consistency determination CD-003-13 by the U.S. Army Corps of Engineers on the grounds that the project would be fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP, provided the Corps agrees to modify the project consistent with the conditions specified below, as provided for in 15 CFR §930.4.*

Conditions:

1. Reduced Nourishment in Solana Beach Segment. Prior to the start of project construction, the Corps will submit revised construction plans to the Executive Director illustrating that beach nourishment in the Solana Beach segment will not extend north of Tide Beach Park, specifically the northern edge of the small cove located at the base of the stairway that connects the beach with the top of the bluff at the end of Solana Vista Drive.

2. Phased Review for Renourishment Projects. Prior to each renourishment project, the Corps will submit to the Commission a consistency determination (pursuant to 15 CFR § 930.36(d)) that includes: the results of all monitoring required since completion of the previous nourishment project (e.g., physical, biological, surfing), including copies of all required monitoring reports; an explanation of the status of completed and/or ongoing mitigation projects associated with previous nourishment projects; and the proposed sand volume, beach width, and borrow site location for the proposed renourishment.

3. Final Monitoring Plans. To continue to work cooperatively throughout the final project planning and construction phases, the Corps will provide, prior to commencement of construction of the initial dredging and nourishment project, a copy of the final Preconstruction Engineering and Design (PED) phase surveys and the monitoring plans to the Commission's Executive Director for review. The Corps will carefully consider all comments by the Commission's Executive Director and will make all reasonable efforts to ensure that the concerns expressed are resolved and any necessary revisions incorporated prior to the construction of this phase. Any significant disagreement between the Corps and the Executive Director will be brought before the Commission for a public hearing.

   The PED surveys and monitoring plans will include:

   (a) the final Biological (reef/surfgrass) Mitigation and Monitoring Plan (MMP), including all surveys conducted in preparation of that plan;

   (b) the Surfing Monitoring Plan;

   (c) the Turbidity Monitoring Plan;

   (d) the Stormwater Pollution Prevention Plan (SWPPP);

   (e) the Oil Spill Prevention and Response Plan (OSPRP); and

   (f) the Shoreline Monitoring Plan.

4. Biological Mitigation and Monitoring Plan Details. The final MMP (referenced in Condition 3) shall assure: (a) that biological monitoring of all offshore potential impact areas shall be for a minimum of 2 years pre-construction and 2 years post-construction; (b) that monitoring and analytical methods are adequate to identify and accurately measure all short- and long-term impacts from all aspects of the dredging and nourishment effort; (c) that appropriate mitigation sites are available to address potential impacts; and (d) that the success criteria and analytical methods used are adequate to demonstrate a difference between impact/mitigation site and control sites and shall include the following:

   (i) clear and specific identification of the potential impact areas that will be monitored before and after the beach nourishment efforts, including intertidal reef and nearshore reefs, and change criteria that will be used to establish thresholds of impacts for mitigation;

   (ii) schedule and frequency of monitoring efforts and monitoring reports;

   (iii) discussion of the monitoring and analytical methods that will be used to evaluate the sites based on the change criteria for both short- and long-term impacts;

(iv) delineation and characterization of the potential mitigation sites that will be used if short- or long-term impacts are identified that meet the threshold triggering the mitigation requirement;

(v) clear and specific criteria for identifying impacts and for evaluating the success of any necessary mitigation. If statistical tests are proposed, then the plan must specify biologically meaningful effect sizes (i.e., a difference between the control and the impact site, or between the control and the mitigation site) and specify alpha and beta, with alpha equal to beta. The field sampling plan must include sufficient replication to provide a statistical test with at least 80% statistical power (beta=0.2) to detect an effect of the stated size with alpha = 0.2. The proposed replication must be based on preliminary sampling data and a statistical power analysis. Smaller alpha and beta may be used. Alternatively, in the absence of a statistical analysis, project impacts will be measured as the change in the average metric of interest (e.g., area or density) at the potential impact site relative to the reference site. Prior to the start of construction, the Corps shall develop a quantitative sampling and analysis plan in cooperation with the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, Commission staff, and the Corps Engineering Research and Development Center (ERDC). This plan will include clear criteria to determine whether impacts to natural resources have occurred and whether any necessary mitigation has been successful. Such determinations will not be based simply on "best professional judgment."

(vi) Identification of the control or reference sites that will be used and the results of a preliminary field sample at both control and potential impact sites demonstrating that the control sites are appropriate.

To continue to work cooperatively throughout the final project planning and construction phases, the Corps will provide a copy of the final MMP to the Commission's Executive Director for review, prior to commencement of construction of the first phase of the dredging and nourishment project. The Corps will carefully consider all comments by the Executive Director and will make all reasonable efforts to ensure that the concerns expressed are resolved and any necessary revisions incorporated prior to each construction phase. Any significant disagreement between the Corps and the Executive Director will be brought before the Commission for a public hearing.

5. Surfing Monitoring Plan Details. The Corps will submit to the Executive Director a Surfing Monitoring Plan to include and implement the following features:

(a) adequate baseline data collection, including, if feasible, a full year of pre-construction monitoring to determine the baseline condition (conditions at the project area and, as appropriate, at control sites).

(b) identification of locations to be monitored, the length of the pre-project monitoring, and interest groups to be involved in establishing the monitoring effort to identify surfing or surf quality changes that might be attributable to the nourishment project, including

identifying criteria for a determination of what constitutes a significant alteration or impact. Another location within the region might also be chosen to act as a control site to help determine if there are changes within the region to surfing conditions that could be attributable to other factors other than project implementation.

(c) supplementing the "wave observation" component of the surf monitoring with observations about the surfing activities, including a usage scale of surfers in the water, both morning and mid-day, and describing the average and maximum ride lengths.

(d) given that video recordings are included, if observer counts are too difficult for one observer, video may be used to augment observer counts.

(e) when collecting user data, the analysis should be disaggregated into weekday and weekend data.

(f) for mid-day observations on days when surfers are kept out of the water by lifeguards, these should be recorded as restricted use days (not zero use days).

(g) establishing mechanisms for informing the local community about the project, and encouraging public comments on surfing quality (or other recreational concerns), including but not limited to: (i) a web site, (ii) pre-construction notifications to the public; and (iii) signs.

To continue to work cooperatively throughout the final project planning and construction phases, the Corps will provide a copy of the final Surfing Monitoring Plan to the Commission's Executive Director for review, prior to commencement of construction of the first phase of the dredging and nourishment project. The Corps will carefully consider all comments by the Executive Director and will make all reasonable efforts to ensure that the concerns expressed are resolved and any necessary revisions incorporated prior to each construction phase. Any significant disagreement between the Corps and the Executive Director will be brought before the Commission for a public hearing.

6. Staging Plan Details. The construction staging plans will assure that: (a) staging will avoid public beaches; (b) the minimum number of public parking spaces (on and off-street) that are required for the staging of equipment, machinery, and employee parking that are otherwise necessary to implement the project will be used; and (c) staging will avoid using to the maximum extent feasible public beach parking lots, but when the use of these lots is unavoidable to implement the project, only the minimum amount of space in these lots will be used.

7. Water Quality Plan Details. The SWPPP will assure that: (a) the contractor will not store any construction materials or waste where it will be or could potentially be subject to wave erosion and dispersion; (b) no machinery will be placed, stored or otherwise located in the intertidal zone at any time, except for the minimum necessary to implement the project; (c) construction equipment will not be washed on the beach; (d) where practicable, the contractor will use biodegradable (e.g., vegetable oil-based) lubricants and hydraulic fluids,

and/or electric or natural gas powered equipment; and (e) immediately upon completion of construction and/or when the staging site is no longer needed, the site shall be returned to its preconstruction state.

8. On-Going Monitoring Reports. The Corps will provide to the Executive Director copies of all the ongoing monitoring reports required under Condition 3, when they are published.

9. Out-of-Kind Mitigation. For any biological mitigation shown necessary by monitoring, the Corps will not proceed to implement out-of-kind mitigations (e.g., using kelp habitat to mitigate surfgrass impacts, or providing mid-water habitat to mitigate for shallow-water habitat impacts) without first showing that in-kind mitigation is infeasible. In addition, if the Corps concludes that in-kind mitigation is infeasible, it will create a proposal for out-of-kind mitigation and submit it for Commission review and approval as a subsequent phase of the subject Consistency Determination pursuant to 15 C.F.R. Section 930.36(d).

10. Dredging. All offshore dredging at Borrow Sites SO-5, SO-6, and MB-1 to obtain beach nourishment materials will occur below the depth of closure (i.e., outside the littoral drift zone and no shallower than -40 feet mean lower low water) at those locations, and only dredged materials physically compatible with receiver beaches will be placed at those locations.

11. Borrow Site Monitoring. Prior to the start of project construction, the Corps will submit a borrow site monitoring plan to the Commission's Executive Director for review. The plan will include measures to document the actual areas dredged during each nourishment project, the biological community affected, and the physical and biological temporal changes, including physical (multibeam sonar) and biological (benthic and infaunal sampling) monitoring of the borrow sites and nearby reference sites. The plan will include provisions for pre- and post-dredging surveys of all borrow areas used during nourishment projects. Prior to the start of construction of the first phase of the dredging and nourishment project, the plan will be reviewed by representatives from the California Department of Fish and Wildlife, National Marine Fisheries Service, and the Commission. The Corps will carefully consider all comments by the Executive Director and will make all reasonable efforts to ensure that the concerns expressed are resolved and any necessary revisions incorporated prior to each construction phase. Any significant disagreement between the Corps and the Executive Director will be brought before the Commission for a public hearing.

12. Monitoring between Encinitas and Solana Beach Segments. Prior to the start of the project monitoring required by Condition 3, the Corps will submit evidence that shoreline, biological, and surfing monitoring for the project will also occur in the geographical area between the Encinitas and Solana Beach segments of the project, in order to accurately document potential project impacts to this area from possible downcoast movement of sand placed in the Encinitas segment.

13. Timing. As the Corps develops the final construction calendar for the project, the Corps will make every practicable effort to schedule beach nourishment activities outside the peak summer recreation season in order to minimize project impacts on public access and

recreation. The Corps will submit the draft construction calendar to the Commission's Executive Director for review, will carefully consider the comments made by the Executive Director, and will make all reasonable efforts to ensure that the concerns expressed regarding construction scheduling and timing are resolved prior to construction. Any significant disagreement between the Corps and the Executive Director will be brought before the Commission for a public hearing.

III. APPLICABLE LEGAL AUTHORITIES

A. Standard of Review. The federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. § 1451-1464, requires that federal agency activities affecting coastal resources be "carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." Id. at § 1456(c)(1)(A). The implementing regulations for the CZMA ("federal consistency regulations"), at 15 C.F.R. § 930.32(a)(1), define the phrase "consistent to the maximum extent practicable" to mean:

> *… fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal agency.*

This standard allows a federal activity that is not fully consistent with California's Coastal Management Program ("CCMP") to proceed if full compliance with the CCMP would be "prohibited by existing law." The Corps, in its consistency determination, did not argue that full consistency is prohibited by existing law or provide any documentation to support a maximum extent practicable argument. Therefore, the standard before the Commission remains full consistency with the enforceable policies of the CCMP, which are the policies of Chapter 3 of the Coastal Act (Cal. Pub. Res. Code §§ 30200-30265.5).

B. Phased Review. The CZMA allows (and encourages) "phased federal consistency review" in cases where federal decisions to implement an activity are also made in phases. Section 930.36 (d) of the CZMA implementing regulations provides:

> *(d) Phased consistency determinations. … In cases where federal decisions related to a proposed development project or other activity will be made in phases based upon developing information that was not available at the time of the original consistency determination, with each subsequent phase subject to Federal agency discretion to implement alternative decisions based upon such information (e.g., planning, siting, and design decisions), a consistency determination will be required for each major decision. [15 CFR Section 930.36(d)]*

As noted in Section IV.A of this report, the Commission has determined that this is an appropriate mechanism to use to enable Commission review of future beach nourishment projects and out-of-kind mitigation plans to be carried out under the subject consistency determination as discussed in **Conditions 2 and 9**. Corps agreement with **Conditions 2 and 9** would provide for this mechanism.

C. Conditional Concurrences. The federal consistency regulations (15 CFR § 930.4) provide for conditional concurrences, as follows:

> *(a) Federal agencies, … should cooperate with State agencies to develop conditions that, if agreed to during the State agency's consistency review period and included in a Federal agency's final decision under Subpart C … would allow the State agency to concur with the federal action. If instead a State agency issues a conditional concurrence:*
>
> *(1) The State agency shall include in its concurrence letter the conditions which must be satisfied, an explanation of why the conditions are necessary to ensure consistency with specific enforceable policies of the management program, and an identification of the specific enforceable policies. The State agency's concurrence letter shall also inform the parties that if the requirements of paragraphs (a)(1) through (3) of the section are not met, then all parties shall treat the State agency's conditional concurrence letter as an objection pursuant to the applicable Subpart . . . ; and*
>
> *(2) The Federal agency (for Subpart C) … shall modify the applicable plan* [or] *project proposal, … pursuant to the State agency's conditions. The Federal agency … shall immediately notify the State agency if the State agency's conditions are not acceptable; and*
>
> *…*
>
> *(b) If the requirements of paragraphs (a)(1) through (3) of this section are not met, then all parties shall treat the State agency's conditional concurrence as an objection pursuant to the applicable Subpart.*

IV. FINDINGS AND DECLARATIONS

A. Study Area Background and Project Description.

The Corps of Engineers is proposing the Encinitas – Solana Beach Coastal Storm Damage Reduction Project, a 50-year program to nourish beaches in the cities of Encinitas and Solana Beach (San Diego County; **Exhibits 1-4**). The Corps states in the project *Feasibility Study and Environmental Impact Statement/Environmental Impact Report* (*Feasibility Study*) that erosion of the beaches and coastal bluffs in the San Diego region has occurred at an increasing rate over the past several decades for a number of reasons, and that erosion is projected to increase in the future based on the Coast of California Storm and Tidal Waves Study (CCSTWS) (USACE-LAD, 1991):

> *Shoreline erosion has narrowed the beaches and depleted them of sand, thus increasing the vulnerability of coastal bluffs to erosion from waves. In addition, water infiltration from rainfall and landscape irrigation has contributed to bluff top erosion, and has been a factor in bluff failures in localized areas. These events have resulted in the loss of human life and significant damages to public and private property . . . .*

Beaches are dynamic environments subject to seasonal movement of sand offshore (erosion) during the winter and onshore (accretion) during the summer. Sand moves within the littoral zone, which is bounded onshore by the beach and offshore by water depth, which typically is at -30 feet (ft) Mean Lower Low Water (MLLW) in the study area. Sand also is transported alongshore within the littoral zone during its offshore-onshore sedimentation cycle. Sand can be lost from the littoral zone by severe storms that carry sand offshore beyond the depths of littoral transport. Sand also becomes lost when transported north or south of the study area to the Carlsbad and La Jolla submarine canyons, respectively, which act as sediment sinks.

Historically, sand that was seasonally lost from the littoral zone was naturally replenished by river-borne sand carried to the coastal zone during high flow conditions, and to a lesser extent by sediment added to the shoreface by erosion of coastal bluffs. Over the last 50 years, urban development in San Diego County has hindered natural sediment conveyance to the coastal zone. Rivers and streams have been altered, and in some cases channelized, reducing the load of sand-sized material conveyed by the stream channels. Dams slow stream flow velocities and reduce the capacity of streams to convey sand to the coastal zone, and sand mining activities also alter stream hydrology and limit downstream movement of sand. As sediment loads have become trapped within the watershed, there have been significant reductions in coastal sediment supply and a trend of net depletion of San Diego beaches. In addition, severe storm events since the 1980s have exacerbated sand loss from the littoral system and have increased the effects of wave attack on bluffs.

Coastal structures have been constructed by cities, residents, and business owners to protect property, whose vulnerability has increased with increased beach erosion. A variety of methods and materials have been historically used to address shoreline erosion, ranging from sand tubes, bluff notch filling, rock riprap revetment, and seawalls. Approximately half of the coastline along the Cities of Encinitas and Solana Beach has been armored to some degree in response to bluff failures, wave damage, and coastal flooding over the last couple of decades.

The *Feasibility Study* examines the proposed project area and states that:

Nearly all of the shoreline in the study area (7.7 miles total), except the shoreline reach at Cardiff, consists of narrow sand and cobble beaches fronting nearshore bluffs.

To better analyze the coastal bluff and shoreline morphology as well as oceanographic conditions, the entire study area was divided into nine geographical areas called reaches. The distinction between reaches is based on differences in seacliff geology, topography, coastal development and beach conditions.

. . .

> [The] *Without-project analysis and plan formulation was performed on all reaches; however, through that process only portions of reaches 3-5 and 8-9 were identified for viable later alternatives analysis primarily because of susceptibility to future bluff failures, the existence of viable alternatives to address this problem, and sufficient economic value to justify those alternatives. Segment 1 is a portion of the beach within the City of Encinitas city limits that extends approximately 7,800 ft from the 700 block of Neptune Avenue south to West H Street. Segment 2 is the majority of the beach within the City of Solana Beach city limits, approximately 7,200 ft long extending from the southern city limits north to Tide Park, close to the northern city limits of Solana Beach.*
>
> . . .
>
> *Segment 1 includes 138 parcels and 112 structures which are mainly private residences located on the top of the bluff. There are some recreation amenities such as Moonlight Beach, a lifeguard building and restroom facilities located at the bottom of the bluff. Segment 2 includes 88 parcels and 81 structures located on the bluff top. This segment contains private residences and Fletcher Cove Beach Park (community building, recreational facilities, restrooms, lifeguard building and public parking).*

Given the existing conditions in the study area and after undertaking a project alternatives analysis (**Exhibit 5**), the Corps is proposing to nourish beaches only in Segment 1 in Encinitas and Segment 2 in Solana Beach over a 50-year period. The *Feasibility Study* states that the proposed project was formulated to "reduce erosion to the base/toe of the coastal bluffs exclusively" and that "residual sloughing at the bluff top edge . . . would not be prevented by a Federal-interest project." The Corps' proposed project is the alternative that maximizes National Economic Development (NED) benefits, primarily coastal storm damage reduction (**Exhibits 6 and 7**). The *Feasibility Study* states that:

> *Based on the coastal storm damage reduction benefits and associated costs, no alternative was economically justified on coastal storm damage reduction benefits only. Recreation benefits are limited to 50% of the total benefits required for justification to ensure recreation is incidental to plan formulation. Consequently, recreation benefits, not to exceed coastal storm damage reduction benefits, were included to determine the alternatives that are economically justified (net benefits greater than zero). All alternatives economically justified with limited recreation benefits are analyzed in a later step with full recreation benefits to determine the National Economic Development (NED) Plan.*
>
> *Among the beach fill alternatives evaluated at Segment 1* [Encinitas], *extending the beach 100 ft MSL and nourishing every 5 years maximizes NED net annual benefits. This result is consistent under low and high sea-level rise scenarios.*
>
> *Among the beach fill alternatives evaluated at Segment 2* [Solana Beach], *extending the beach 200 ft MSL and nourishing every 13 years maximizes NED net annual*

benefits. Under the high sea-level rise scenario, the alternative that maximizes NED net annual benefits is 300-ft added beach width nourished every 14 years.

At Encinitas, 680,000 cubic yards (cu.yds.) of sand would be placed on a 7,800-foot-long section of shoreline to extend by approximately 100 feet the existing base year beach width of 110 feet at mean sea level, thereby increasing the beach profile width to 210 feet under the low sea level rise scenario (**Exhibit 3**). The receiver beach extends from the 700 block of Neptune Avenue south to the approximate end of West H Street. The top of the sand berm would be constructed to an elevation of approximately +15 feet mean lower low water (MLLW). Upon completion of the initial nourishment project, the surface of the berm would be flat and approximately 210 feet wide with a slope of 10:1 towards the ocean; the toe of the slope would be located at approximately -10 feet MLLW. Implementation of this initial nourishment project is expected to last 103 days (including 82 days of dredging and disposal) and the Corps does not propose any timing restrictions to avoid the peak summer beach recreation season. Renourishment of this area with 280,000 cu.yds. of sand would occur every five years. At the end of the 50-year project period, the Corps estimates that approximately 3.20 million cu.yds. of sand would be placed along this segment under the low sea level rise scenario, and up to 4.03 million cu.yds. under the high sea level rise scenario.

At Solana Beach, 960,000 cu.yds of sand would be placed on a 7,200-foot-long section of shoreline to extend by approximately 200 feet the existing base year beach width of 70 feet at mean sea level, thereby increasing the beach profile width to 270 feet under the low sea level rise scenario (**Exhibit 4**). The receiver beach extends from Tide Park south to the southern city limit at the western extent of Via de la Valle. The top of the sand berm would be constructed to an elevation of approximately +15 feet mean lower low water (MLLW). Upon completion of the initial nourishment project, the surface of the berm would be flat and approximately 270 feet wide with a slope of 10:1 towards the ocean; the toe of the slope would be located at approximately -10 feet MLLW. Implementation of this initial nourishment project is expected to last 139 days (including 118 days of dredging and disposal) and the Corps does not propose any timing restrictions to avoid the peak summer beach recreation season. Renourishment of this area with 420,000 cu.yds. of sand would occur every thirteen years. At the end of the 50-year project period, the Corps estimates that approximately 2.21 million cu.yds. of sand would be placed along this segment under the low sea level rise scenario, and up to 4.04 million cu.yds. under the high sea level rise scenario.

For both the Encinitas and Solana Beach segments, future renourishment projects would be triggered by the need to maintain the equilibrium beach width that will be implemented (e.g., if a 100-foot beach width is proposed for the initial placement, renourishment volume will be based on maintaining a 100-foot beach width). The Corps expects to renourish Encinitas every five years and Solana Beach every 13 years.

The *Feasibility Study* states that sand used for beach nourishment would be dredged by either hopper or cutterhead dredges from three offshore borrow sites (SO-6 is 1,900 to 4,900 feet offshore of San Elijo Lagoon; SO-5 is 2,200 to 3,900 feet offshore of the San Dieguito River; and MB-1 is 4,500 to 7,700 feet offshore of Mission Bay) and placed directly on the receiver

shorelines (**Exhibit 8**). The *Feasibility Study* states that the borrow sites have been previously defined and mined for prior beach replenishment activities and that:

> *The amount of material to be dredged from these borrow sites varies, both for initial nourishment and for periodic renourishment activities, with each alternative. Borrow sites SO-5 and SO-6 are identified as the primary sites. Material from borrow site SO-5, would be used for Segment 2 (Solana Beach) and material from borrow site SO-6 would be used for Segment 1 (Encinitas) until exhausted at which time SO-5 would provide material for both Encinitas and Solana Beach receiver sites. The volumes necessary for an array of combinations of Segment 1 and Segment 2 alternatives, under the high sea level rise scenario, exceed the total combined volumes of material available at borrow sites SO-5 and SO-6. Borrow site MB-1 would then be used as a supplemental source to contribute to the required volume of sand for alternatives under the high sea level rise scenario.*

For both the hopper and cutterhead dredging methods, sand would be combined with seawater as part of the dredging process to produce a slurry, which would then be conveyed to the beach either via pipeline or a combination of hopper dredge and pipeline. Existing sand at each receiver site would be used to build a small, "L"-shaped berm to anchor the sand placement operations. The short side of the "L" is perpendicular to the shoreline and approximately the same width as the design beach for each receiver site. The long side is parallel to shore, at the seaward edge of the design beach footprint.

The slurry would be pumped onto the beach into the angle of the "L" between the berm and the bluff toe. This berm would reduce ocean water turbidity allowing all the sand to settle out inside the bermed area while the seawater is channeled just inside the long side of the berm until it reaches the open end where it would drain across the shore platform and into the ocean. As filling progresses the berm would be continuously extended to maintain its designed length. As the material is deposited behind the berm, the sand would be spread using two bulldozers and one front-end loader to direct the flow of the sand slurry and form a gradual slope to the existing beach elevation.

The Corps states that berm construction at each receiver site may be adjusted from the design requirements during fill placement depending on actual field conditions. The measurements indicated for the width of the berms for each nourishment event are the initial placement widths. The berms would be subject to the forces of the waves and weather once constructed, and would eventually settle down to a natural grade for the beach. The proposed nourishment project is designed to achieve a berm after two years of being reworked by ocean processes (waves, currents, and winds), also referred to as the 2-year equilibrium, as this is the actual project state that would provide the expected storm damage reduction.

Beach nourishment activities (sand dredging, placement, and dispersal) would occur on a 24-hour, 7-day a week (24/7) basis, by operating three shifts per day. Beach operations would only occur during the day (12 hours). Approximately two days would be required to set up the pipeline leading from the dredge or monobuoy to the shoreline. The contractor would typically assemble two sets of pipeline to avoid delays associated with moving and setting up the pipelines

as each section of sand placement is completed. Sand discharge would be continuous as long as the dredge is operating. The Corps expects to achieve a daily average production rate of approximately 10,000 cu.yds.

Regarding construction access and staging areas, the *Feasibility Study* states that:

> *Existing public beach access points would be used for the construction equipment and crew at Moonlight Beach in Encinitas. Beach access for the construction equipment and crew at Solana Beach would be provided at Fletcher Cove and potentially Cardiff State Beach parking lot north of the City of Solana Beach. Because the construction equipment would be used on a 24/7 basis, there would be only occasional need for a staging area. Should equipment need to be temporarily moved off the beach, it would be stored in parking lots at the access points. Any fueling or maintenance activities would occur at the staging areas, and the contractor would be required to provide and comply with a Spill Prevention, Control, and Containment (SPCC) plan for hazardous spill prevention and containment. Public parking areas are available for use by the construction crew. The dredge crew would park at the port of operations for the dredge.*

The Corps expects that all construction activities would be carried out such that the only impacts to public beach access would occur at the point of sand discharge. Between 150 to 325 feet of beach would be inaccessible to the public at the discharge pipeline and berms. In addition, there would be intermittent restrictions on public access for up to 540 feet on either side of the discharge zone. This space would be needed for maneuvering heavy equipment during construction of the temporary berms and for relocating discharge pipelines.

Construction of the proposed initial nourishment projects at Encinitas and Solana Beach is scheduled to commence in late 2015. As noted previously in Section III.B of this report, and as described in **Condition 2** in Section II of this report, the Commission has determined that a "phased consistency review" is the appropriate mechanism to use to evaluate the proposed 50-year coastal storm damage reduction and beach nourishment project at Encinitas and Solana Beach for consistency with the Coastal Act.

B. MARINE RESOURCES/BEACH NOURISHMENT/DREDGING AND FILLING. Sections 30230 and 30231 of the Coastal Act require the protection of marine resources and biological productivity. These sections provide:

> *Section 30230. Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*
>
> *Section 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine*

organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow,

Section 30233(a) of the Coastal Act applies to dredging and filling activities and provides in relevant part:

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following: …

(5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas. …

Section 30233(b) encourages beach replenishment, requires disposal to occur in a manner protecting sensitive habitat, and provides:

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.

Allowable Use. The Commission has historically found that beach nourishment using materials dredged from offshore borrow sites to be an allowable use under Section 30233(a)(5), which allows dredging and filling for mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas. Moreover, Section 30233(b) encourages beach nourishment whenever dredge material is suitable, and material being dredged for the sole purpose of replenishing beaches is inherently suitable for use (assuming, as is the case in this consistency determination, it tests free of contaminants and is predominantly sand sized material). The borrow sites offshore of Encinitas and Solana Beach are not environmentally sensitive areas, as there is no hard-bottom habitat or kelp forests within the borrow site footprint; the sandy bottom habitat in those areas do support important but common and widespread populations of benthic and invertebrate species. The beach disposal sites are also not environmentally sensitive areas, as they do not presently support Western snowy plover or California least tern nesting, due to the lack of suitable sandy areas for such activity, and there are no sensitive plant species that inhabit these shoreline reaches. The Commission therefore finds the dredging and nourishment project is an allowable use under Section 30233(a)(5).

Alternatives. Project alternatives considered by the Corps included the following:

1. No Action. No Federal project would occur, and the assumption is made that existing seawalls would be maintained; that public infrastructure and private property will continue to be threatened, and in response, public agencies and private homeowners will

continue to be granted permits to build new seawalls, as the Coastal Act requires; and most of the project area shoreline will be armored within 20 to 30 years in an inefficient uncoordinated process after significant loss of land.

2. Managed Retreat. The Corps states that it does not have the statutory authority to implement such a program; in addition, the high cost of real estate in the project area would make implementing this alternative impracticable and infeasible.
3. Beach Nourishment (proposed). Alternate widths were developed in 50-foot increments up to an increased width of 400 feet. The Corps states that this is the most economically and environmentally appropriate alternative.
4. Structural Measures. The Corps examined emergent breakwaters, submerged breakwaters/artificial reefs, groins, notchfills (filling toe notches and seacaves at the base of bluffs with engineered concrete), seawalls, and revetments, and concluded that these alternatives were not feasible due in large measure to Coastal Act concerns, local opposition, and adverse effects on coastal resources.
5. Hybrid – Beach Nourishment and Notch Fill. The Corps examined a combination of narrower nourishment and notch fill to prevent erosion during periods between nourishment events.

In terms of alternatives *within* the category of beach nourishment, the Corps considered a wide range of beach widths and nourishment cycles, and further analyzed the following viable alternatives:

Encinitas:

- EN-1A Beach Nourishment (100-ft beach renourished every 5 years)
- EN-1B Beach Nourishment (50-ft beach renourished every 5 years)
- EN-2A Hybrid (100-ft beach renourished every 10 years and notchfill)
- EN-2A Hybrid (50-ft beach renourished every 5 years and notchfill)
- EN-3 No Action

Solana Beach:

- SB-1A Beach Nourishment (200-ft/300-ft beach renourished every 13-14 years)
- SB-1B Beach Nourishment (150-ft/300-ft beach renourished every 10 years)
- SB-1C Beach Nourishment (100-ft/300-ft beach renourished every 10 years)
- SB-2A Hybrid (150-ft beach renourished every 10 years and notchfill)
- SB-2A Hybrid (100-ft beach renourished every 10 years and notchfill)
- SB-3 No Action

In addition, the project alternative selected for each location (EN-1A for Encinitas and SB-1A for Solana Beach) is described in the *Feasibility Study* under low sea-level rise and high sea-level rise prediction scenarios, which results in different predicted rates of erosion, fill volumes, and the design of each alternative. The *Feasibility Study* states that:

> *It is important to understand the potential consequences of the necessary design adaptation should either of the scenarios be realized. The current and historical*

> *trends for sea level rise that have been recorded, as described in Appendix B, align with the low sea level rise scenario predictions. Consequently it is the low sea level rise scenario design in each alternative that, at the time of writing this report, is the assumed 2015 'base scenario' for design. Should high sea level rise scenario predictions become evident during the course of the project, adaption of the design to the high sea level rise scenario would be implemented. To achieve that adaption the higher renourishment volumes would be implemented if, or when, any recalibration of sea level indicated the high sea level rise scenario was in evidence. The descriptions herein and the analysis in Section 5.0 of this Integrated Report provide comparable levels of information such that the consequences of the alternatives under either scenario can be effectively considered and compared. As with each of the other alternatives, should the switch to high sea level rise be necessary during the life of the project, renourishment would simply implement the volumes for the high sea level rise scenario from the time the switch is made.*

The Corps concluded in the *Feasibility Study* that the proposed 100-foot beach width nourishment at Encinitas and 200-foot beach width nourishment at Solana Beach provides the greatest net economic benefit consistent with protecting the environment (**Exhibits 6 and 7**). However, and as acknowledged by the Corps in the *Feasibility Study*, because these two areas have not been nourished in the past at the magnitude (in terms of volume, shoreline length, and beach width) approaching the proposed project, it is not particularly clear the extent to which sand might be mobilized and temporarily cover offshore sensitive habitats along the shoreline from Encinitas to Solana Beach. As a result, the proposed project includes preliminary monitoring measures to assess the littoral and habitat dynamics, and preliminary mitigation measures should the project result in adverse impacts to these resources. (These preliminary measures are discussed in more detail below.)

While the dredging and beach nourishment project holds the potential to adversely affect coastal resources, given the Commission's concurrence in the Corps' assessment of the limited utility of the other options, and the anticipated negative consequences of the no-project alternative, the Commission finds that the proposed project represents the least environmentally damaging feasible method of addressing the inevitable need to reduce storm damage at the two project locations. However, this finding is contingent on the Corps agreeing to **Conditions 1-13**, which provide in part for modifications to the project to ensure protection of sensitive habitat areas, adequate monitoring of project implementation and impacts, mitigation of project impacts, and phased review of future renourishment projects during the 50-year project time period.

Mitigation. Before the Commission can determine, as required by Coastal Act Section 30233(a), whether "feasible mitigation measures have been provided to minimize adverse environmental effects," it must first examine the primary habitats and species that are present in the project area, analyze the potential impacts on those habitats and species from the proposed offshore dredging and nourishment project, evaluate the proposed mitigation measures, and then consider whether additional measures are required to find the project consistent with the marine resource policies of the Coastal Act.

Habitats. The project area includes sandy beaches, beach areas with cobble coverage or exposed bedrock, sandy nearshore subtidal areas (broken down in the project area into the littoral zone to -30 feet mean lower low water (MLLW), an inner shelf zone to -80 feet MLLW, and a small portion of the middle shelf zone beyond -80 feet MLLW), and hard-bottom and vegetated habitats which include rocky intertidal shores and nearshore reefs supporting surfgrass beds and kelp forests, including nearshore reefs at Table Tops at the northern end of the Solana Beach segment (**Exhibits 9 and 10**). The *Feasibility Study* summarizes the marine resources in the project area as follows:

> *The 2002 SANDAG seafloor mapping provides the best available comprehensive data of nearshore habitat in the study area (Figure 4.5-1, Figure 4.5-2, and Figure 4.5-3). Similarly, the 2002 SANDAG vegetation map provides the best available quantitative estimates of the vegetative indicator species (Figure 4.5-1 and Figure 4.5-2). Those data include acreage estimates for various habitat types: surfgrass, giant kelp (kelp canopy), and understory algae. The understory category includes several species, including feather boa kelp and sea palm indicators. Indicator species were selected in coordination with resource agencies to be consistent with previous reef characterization surveys and monitoring conducted in the study area (US Navy 1997a, b; MEC 2000b, AMEC 2005). The indicators represent dominant species that are sensitive to varying degrees of sand scour and sedimentation, as follows:*
>
> - *Persistent indicator species considered relatively sensitive to sand scour and sedimentation (sea fans, giant kelp).*
> - *Persistent indicator species considered relatively tolerant of some sand influence (surfgrass, sea palm).*
> - *Opportunistic indicator species considered relatively sand tolerant (feather boa kelp).*

The federal- and state-listed endangered California least tern is known to nest at Batiquitos Lagoon (north of Encinitas) and San Elijo Lagoon (north of Solana Beach), although no nesting has occurred at the latter site since 2005. Least terns forage in nearshore waters as far as five miles away from their nesting sites. The federal-listed threatened Western snowy plover is known to nest at Batiquitos and San Elijo lagoons and forage along the shoreline north and south of the proposed receiver beaches at Encinitas and Solana Beach. Swami's State Marine Conservation Area was designated under the Marine Life Protection Act and is located in the offshore area from southern Encinitas to San Elijo Lagoon (**Exhibit 11**). Take of living marine resources in this area is prohibited except for recreational take by hook-and-line from shore; recreational take of pelagic fish by spearfishing; and take pursuant to beach nourishment and other sediment management activities, and operation and maintenance of artificial structures inside the conservation area pursuant to any required federal, state, and local permits, or as otherwise authorized by the state Department of Fish and Wildlife.

Impacts. The *Feasibility Study* examines potential direct and indirect project impacts on the offshore borrow sites, beach receiver sites, sensitive species, and essential fish habitat, and provides the following summary of those potential impacts:

> *Direct impacts from dredging at the borrow sites would include removal of sediment and associated organisms, while construction at the receiver sites would result in burial impacts to marine biota; however, these impacts are considered short-term and localized. Due to the relatively small area affected, and the widespread occurrence and relatively rapid recovery rates of marine invertebrates, direct impacts to marine invertebrates within the borrow and receiver sites are expected to be less than significant. Receiver site construction may also potentially impact grunion spawning; however habitat suitability surveys and construction monitoring would minimize impacts to the species. Restoration and maintenance of stable, wide beaches would be expected to enhance grunion spawning habitat as well as general sandy beach habitat.*
>
> *Indirect effects associated with removal on the forage base for other animals, and indirect effects associated with operation of the dredge equipment such as increased turbidity and noise are also considered short-term and localized and less than significant. However, there is the potential for sand introduced into the system to indirectly impact sensitive habitats and resources if sand deposits on those resources occur at sufficient depth and persistence to result in burial or degradation of those resources. Results from sediment transport modeling predict potential significant impacts to sensitive nearshore resources only at Solana Beach. Mitigation would be required to reduce the impact to less than significant.*

The *Feasibility Study* estimates that approximately eight acres nearshore reef habitat at Solana Beach would be adversely affected at the end of Year 2 after initial nourishment, and provides additional details on this significant, adverse project impact:

> *For Solana Beach, modeling estimates indicate a potentially significant impact to intertidal reef platform and reefs with other indicator species (Table 5.4-1) for all alternatives under consideration. No impacts to reefs supporting surfgrass were predicted. The need for renourishment would be based on the equilibrium beach width that would be implemented, thus no additional impacts are anticipated from renourishment. Any impact to nearshore resources would be expected during the initial beach fill as all subsequent nourishments would occur in the same footprint and would be a reduced volume relative to the initial fill. In addition, an adaptive monitoring program is proposed for the project to also account for potential cumulative effects associated with other beach nourishment activities (e.g., opportunistic programs, lagoon maintenance, and the SLERP* [San Elijo Lagoon Restoration Project]*). While the analysis relies on predicted impacts, actual impacts would be assessed by implementation of a construction monitoring program (see Appendix H). Mitigation would be triggered only if certain conditions occur during, and persist through, the two year post-construction monitoring period. If mitigation is implemented, mitigation monitoring would also be conducted.* ***The specifics of monitoring and mitigation would be determined in consultation with the resource and regulatory agencies.*** *However, based on model predicted estimates, impacts to nearshore resources at Solana Beach would be significant for all alternatives under consideration and mitigation would be required. Proposed mitigation measures are discussed below.* [Emphasis added.]

Proposed Mitigation Measures. Given the acknowledgement by the Corps that the proposed project would adversely impact marine biological resources, the *Feasibility Study* includes a proposed mitigation measure for this impact and a preliminary biological monitoring and mitigation plan (**Exhibit 12**):

> *Due to inherent uncertainties associated with estimating impacts based on model predictions, a monitoring program would be implemented to assess actual impacts two years following construction. Mitigation would be triggered only if certain conditions occur during, and persist through, the two year post-construction monitoring period. The two-year post-construction was established in consultation with the National Marine Fisheries Service and the California Department of Fish and Game* [now Wildlife] *to allow sand to equilibrate in the study area and to prevent mitigating for short-term impacts.* ***The final mitigation and monitoring plan will be prepared during the pre-construction engineering design phase of the project in consultation with resource and regulatory agencies.*** [Emphasis added.]
>
> *The general approach for assessing impacts would be similar to that used to identify potential project-related impacts to eelgrass as per the Southern California Eelgrass Mitigation Policy (SCEMP; NMFS 1991) and the monitoring protocol used for the RBSP* [Regional Beach Sand Project] *(Engle 2005). The project area and control site(s) will be surveyed prior to construction, and two years following construction. Given the relatively high natural variation, it is suggested that multiple control sites be sampled. Potential control areas, chosen for their similarity to potential impact sites, in the general project area include North Carlsbad (in the vicinity of Tamarack Boulevard) and South Carlsbad (north of Palomar Airport Road). Pre-construction (baseline) areal coverage will be compared to Year 2 (post-construction) areal coverage, taking into account any natural variation at control areas to identify potential project-related impacts.*
>
> *The expected monitoring schedule includes:*
>
> > *Pre-construction baseline monitoring (year prior to construction):*
> > *• Spring Survey*
> > *• Fall Survey*
> >
> > *Post-construction (two years following construction):*
> > *• Spring Survey*
> > *• Fall Survey*
>
> *If mitigation were required based on results of the post-construction monitoring, rocky reef and surfgrass mitigation shall each be conducted at a 2:1 functional equivalent as discussed in Appendix H. Because it will take at least two years to identify impacts, some temporal loss of habitat, if impacts were to occur, is unavoidable. Recovery of impacted habitats may also occur as sand is redistributed within the littoral cell; some observed burial of reef or surfgrass habitat would be temporary because sand would*

> *be expected to move out of the project area. Additionally, if impacts were to occur, future beach fills would be modified to avoid future impacts.*
>
> ***Mitigation would be implemented in the project area at sites to be determined in consultation with the resource and regulatory agencies**. Since potential impacts were identified under all alternatives for Solana Beach (except for the Alternative SB-3 - No Action), potential mitigation areas offshore of Solana Beach were identified (approximately 26 acres) and includes areas that consist primarily of sandy bottom habitat Figure 5.4-9* [**Exhibit 13**]. *No estimated impacts were predicted for Encinitas under all proposed alternatives, and therefore no potential mitigation areas were identified offshore of Encinitas.* [Emphasis added.]

The *Feasibility Study* next provides additional details on the proposed reef habitat mitigation program:

> *Reef habitat mitigation shall consist of shallow-water, mid-water, or deep-water reef at a 2:1 functional equivalent to the area of reef impacted. Shallow water reef would be for any surfgrass mitigation, mid-water reef would be located inshore of the existing kelp beds, and deep-water reef would be located offshore of the existing kelp beds. The mid-water reef would be the first priority as it is most like the reef being impacted and is thus closer to an in-kind mitigation. However, deep-water reef mitigation may be required.*
>
> *Separate mitigation requirements were established for each reef type. Each of the three reef types have differing locations and characteristics that result in different functional values. No impacts to surfgrass were identified from the project. Mitigation is proposed, however, should post-construction monitoring show unexpected impacts to surfgrass occurred.*
>
> *Shallow-water reef would be constructed inshore of the mid-depth mitigation sites shown on Figure 5.4-6 in water shallow enough to support surfgrass. The top of the constructed mitigation reef would be at a final top elevation of -10 to -14 ft MLLW and deep water reef would be constructed at approximately -40 ft MLLW along the outside edge of the existing reefs. Shallow-water reef shall be constructed with a final top elevation of -10 to -14 ft MLLW. Construction of a reef that is shallower than that is not proposed because construction methods would not be practical (e.g., a barge with the reef construction materials would not be able to operate in very shallow water). Although the surfgrass mitigation reef would be deeper than the impacted area, if surfgrass transplants are successful, the slightly deeper reef would replace the lost surfgrass resource.*
>
> *Although several studies currently are being conducted to determine how to successfully transplant surfgrass and may show potential for success, success rates to date have not been consistent (Reed and Holbrook 2003, Reed et al. 1999). Due to the absence of an established, successful method for mitigation of surfgrass loss, proposed mitigation currently is focused upon restoration of the rocky reef that*

surfgrass currently uses as habitat. However, as previously described, if it is determined that surfgrass has been affected by the project and a change is shown not to be due to natural variation, an experimental surfgrass transplant shall be implemented in addition to the construction of a shallow-water rocky reef.

. . .

Mitigation for shallow water reef was based on the functional equivalent to mitigate the actual impacts on a functional basis and relates to the uncertainty of transplanting surfgrass and difficulty of constructing a rocky reef in shallow water.

Mid-depth reef would be constructed at sites shown on Figure 5.4-9 at approximately -30 ft MLLW and is the preferred reef mitigation as it is closest to in-kind replacement. Mid- and deep- water reef shall be constructed similar to the SCE [Southern California Edison] *Wheeler North Reef constructed as mitigation for the impacts of the San Onofre Nuclear Generating Station.*

Mitigation for a mid-depth reef is proposed at a 2:1 functional equivalent owing to the similarity in habitat and the difficulty of constructing reef habitat.

Deep water reef would be constructed at approximately -40 ft MLLW along the outside edge of the existing reefs. Mitigation using a deep water reef is proposed at a 1.5:1 functional equivalent owing to the higher habitat value for deep water reefs and easier construction in deeper water that is closer to the SCE Wheeler North Reef. This reef would only be constructed if insufficient area of mid-depth reef were available to fully mitigate for observed losses to rocky reef habitat.

Questions were raised by state and federal resource agency staff regarding the adequacy of the above-referenced mitigation plan should monitoring document that the project has adversely affected nearshore reefs (**Exhibits 14-18**). The Corps confirmed to Commission staff that based on the functional equivalent methodology undertaken for the project, the acreage of rocky reef habitat that is determined adversely affected (based on the monitoring results at the end of the second year after completion of initial beach nourishment) would be mitigated by the construction of twice that acreage figure at a mid-depth mitigation area. If mitigation also occurs in shallow water or deep water areas, the acreage of that required mitigation would be adjusted.

Additional Mitigation Measures. The Corps has confirmed that the proposed beach nourishment holds the potential to create significant adverse effects on sensitive marine habitat and has proposed preliminary monitoring and mitigation programs. A challenge arises because the predicted level of impact on nearshore reef habitat is derived from modeling that the Corps acknowledges is subject to "inherent uncertainties" and from the results of previous beach nourishment projects in southern California. The predicted eight acres of impact to nearshore reefs and no impacts to surfgrass beds in the project area are only estimates, and the location of reef impacts cannot be identified other than they will occur within the offshore area out to the depth of closure. The extent of project impacts on this habitat will not be confirmed until after monitoring during the first two years after the completion of beach replenishment. It becomes

essential then that the monitoring program be designed to accurately record project impacts as this program will affect the development of the final mitigation plan.

The Corps has committed to preparing the final monitoring and mitigation plans in consultation with state and federal resource agencies, including Commission staff. However, this will be a challenging task given the disagreement to date between the state and federal resource agencies and the Corps regarding the current estimation of project impacts to the marine environment and the adequacy of proposed mitigation measures. The issues of concern include accuracy of the impact assessment methodology; accuracy of predicted impacts to rocky reef habitat and a finding that there would be no impacts to surfgrass; adequacy of reef and surfgrass mitigation strategies; and impacts to benthic invertebrates and the permanent alteration to seafloor topography at the borrow sites.

The Commission agrees with many of the resource agency concerns provided in **Exhibits 14-18.** The Commission staff has expressed similar concerns to the Corps regarding the potential adverse project effects on biologically sensitive nearshore reef habitat. The uncertainties associated with this project, due in large measure to the fact that marine resource impact analysis is based primarily on modeling, make it difficult to accurately predict project impacts. The 50-year time period of the subject consistency determination and the potential adverse impacts from sea level rise over that time period support the need for periodic review by the Commission of future renourishment projects to ensure that project assumptions made today can be reexamined in light of future environmental conditions, monitoring results, and mitigation efficiency. Furthermore, if the monitoring results after the first two years of nourishment (the date at which mitigation requirements for habitat impacts will be determined) indicate resource impacts occurring that were not anticipated in the *Feasibility Study*, the Commission could "re-open" the initial consistency determination (under federal consistency regulations 15 CFR §§ 930.45 and 930.46) to determine whether the project remains consistent with the Coastal Act. This action could take place prior to submittal of consistency determinations for renourishment projects as called for in **Condition 2**. This is even more crucial in the case of the Solana Beach segment, where renourishment is not planned until 13 years after the initial nourishment project.

In addition, when monitoring results from the SANDAG Regional Beach Sand Project II (RBSP II) are published (initial beach nourishment phases were completed in 2012), the Commission staff will review that information to determine whether the beach nourishment projects at three sites in Encinitas and one site in Solana Beach resulted in impacts to marine resources. If those RBSP II monitoring results indicate that the proposed Corps dredging and nourishment project could lead to habitat impacts not anticipated in the *Feasibility Report*, the Commission could invoke the aforementioned re-opener clause for the subject consistency determination to determine whether the Corps project remains consistent with the marine resource policies of the Coastal Act, including whether any further changes to the project are needed in light of those RBSP II monitoring results.

At the same time, the proposed project would benefit the general public and private property owners with the creation of wide sandy beaches within the Encinitas and Solana Beach project segments. Construction of a wide sandy beach where none currently exists would provide habitat for invertebrates, grunion, and bird species, and could reduce the demand for shoreline

armoring which in turn would lead to the protection of more natural coastal processes and habitat formation. However, notwithstanding these benefits and due to the aforementioned uncertainties, the Commission finds that the conditions found on pages 4-9 of this report are needed to assure the project's effects are minimized, adequately monitored, and if impacts occur, adequately mitigated before the project can be found consistent with the marine resource policies of the Coastal Act. The Commission has adopted 13 conditions regarding marine resource protection and which provide for the following:

- Limiting the northern extent of nourishment in the Solana Beach segment to avoid adverse impacts to nearshore reef habitat.

- Phased review through subsequent consistency determinations of future renourishment projects to ensure project consistency with the Coastal Act.

- Commission staff review of the final biological mitigation and monitoring plans, the turbidity monitoring plan, the stormwater pollution prevention plan, the oil spill prevention and response plan, and the shoreline monitoring plan, including Commission staff participation in plan development.

- Mitigation and monitoring plan details to ensure adequate identification of project impacts and development of adequate mitigation.

- Water quality plan details to ensure protection of water quality during construction.

- Submittal of all monitoring reports to the Commission staff.

- Review through subsequent consistency determinations of out-of-kind mitigation projects should in-kind mitigation be determined infeasible, to ensure that out-of-kind mitigation projects (none of which are analyzed in the *Feasibility Study* or the subject consistency determination) are reviewed for consistency with the Coastal Act.

- Dredging at the offshore borrow sites will occur in water no shallower than -40 feet mean lower low water in order to remain outside the depth of closure and avoid impacts to littoral systems.

- Commission staff review of the offshore borrow site monitoring plan to ensure adequate evaluation of project impacts on dredged areas throughout the life of the project.

- Shoreline and biological monitoring of the geographical area between the Encinitas and Solana Beach project segments in order to document potential project impacts in this location.

If the Corps were to agree to implement these conditions, the Commission finds that the proposed project could be found consistent with the marine resources, beach nourishment, and dredging and filling policies of the Coastal Act (Sections 30230, 30231, and 30233).

C. PUBLIC ACCESS AND RECREATION.
The Coastal Act provides:

> *Section 30210. In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*
>
> *Section 30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*
>
> *Section 30212*
>
> *(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where: (l) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby...*
>
> *Section 30213. Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred....*
>
> *Section 30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

Project Area Access and Recreation Resources. The *Feasibility Study* states that one of the purposes of the proposed project is to "restore beaches along the shorelines of the cities of Encinitas and Solana Beach." Ongoing beach erosion results in reduced recreational use of the shoreline and hazards to visitors due to wave attack at the base of the bluffs and the proximity of visitors to the bluffs on narrow beaches. One of the planning objectives used by the Corps to direct formulation of project alternatives is the need to:

> *Reduce coastal erosion and shoreline narrowing to improve recreational opportunities for beach users within the study area throughout the period of analysis.*

In addition, the planning constraints specific to the selection of a proposed project are:

- *No adverse impacts to the aesthetics along the shoreline.*
- *Maintain public access to the beach.*
- *Preserve the recreational opportunities within the study area.*
- *Preserve the environmental resources within the study area.*

The beaches in the project area are heavily used year-round, and the Corps reports that more than 2.8 million visits took place in 2012. Recreational opportunities are facilitated by a series of state, county, and local parks that provide public access to the shoreline and a variety of recreational opportunities, including beachgoing, sightseeing, surfing, body-boarding, snorkeling, tide-pooling, fishing, and skin and SCUBA diving. However, recreational use of the shoreline is currently limited by the narrow beaches, wave run-up that limits access during high tides, cobble and exposed sandstone rather than sandy beaches, and hazards from potential bluff collapse.

The *Feasibility Study* describes the recreational opportunities present in the proposed beach nourishment segments within both cities:

> *Recreational opportunities within Encinitas receiver site include Stone Steps, which is a popular spot for surfing and fishing. It can be accessed from a public stairway. It also includes Seaside Gardens County Park and Moonlight State Beach. This part of receiver site can be accessed from the north at the stairway at Stone Steps and from the south by the Moonlight State Beach parking area at C Street. Access along the beach is dependent upon tidal stage (SANDAG 2011a).*
>
> *Tide Beach Park and Fletcher Cove Park are located within Solana Beach receiver site. Tide Beach Park can be accessed by a public stairway down the bluffs. Reefs occur at the north end of the receiver site at Table Tops and to a lesser extent at Tide Beach Park. Table Tops is a popular tidepool, fishing, skin and SCUBA diving, and surfing spot. Access to these reefs and Tide Beach Park also is available from the parking area at the south end of Cardiff State Beach. They also can be accessed from the south starting at Fletcher Cove. Stairways to the beach are located at North Seascape Surf Beach Park, near the middle of the receiver site, and Del Mar Shores near the south end of the receiver site. Access along the beach is dependent upon tidal stage. Table 4.13-2 presents a list of the beaches in the project study area.*
>
> *Surfing is the recreational act of riding breaking waves and is an important part of the local culture. Within the project area, the surf site known as Swamis was made popular by The Beach Boys in their 1963 musical hit, "Surfin USA". Waves can be ridden using various equipment such as surfboards (e.g., longboards and shortboards), stand up paddle boards, body boards, boogie boards, wave skis, kayaks, sailboards, and kiteboards. In the project study area, surfing is most often defined as riding waves on longboards and shortboards (USACE 2012a). Table 4.13-3 lists the surf sites within Encinitas and Solana Beach.*

As described previously in Sections IV.A and IV.B of this report, the beaches in the project area have been severely eroding since the 1980s. While the primary purpose of the project is to reduce coastal storm damage from wave attack at the base of the bluffs and subsequent bluff failure, the sand nourishment of the two shoreline segments in Encinitas and Solana Beach will concurrently enhance and protect public access and recreation by expanding the width of the sandy beaches, allowing beachgoers to recreate further seaward of eroding bluff faces, and potentially reducing the need for additional armoring along these shoreline

segments. The Corps states that the additional sand placed on the two shoreline segments would not result in conditions that exceed the historic beach profile conditions and would thereafter become part of the natural variable littoral system.

However, these significant public access and recreation benefits are accompanied by potential adverse effects on public access and recreation, including sand nourishment occurring during the summer season, construction activities on the beach at the point of sand discharge, and short-term increases in turbidity in nearshore waters. Most significant, however, are possible changes to surfing sites due to the potential over time for sand placed on the beach to migrate and bury offshore reefs which provide unique surfing opportunities along this stretch of San Diego County shoreline.

Project Construction Impacts. The *Feasibility Study* examines potential construction-related project impacts in the Encinitas shoreline segment:

> *The construction activity at the Encinitas receiver site would continually progress down the beach. Recreational activities such as surfing and fishing, as well as other beach activities would be less accessible during the period of construction. Under both low and high sea level rise scenarios, approximately 150 to 325 ft of the receiver site would be inaccessible to the public around the discharge pipeline and berms. In addition, there would be intermittent restrictions on public access for approximately 540 ft for low sea level rise scenario and 350 ft for high sea level rise scenario on either side of this discharge zone. This space would be needed for maneuvering heavy equipment during construction of the temporary berms and for relocating discharge pipelines. The access restriction would result in a temporary redistribution of beach activities to the adjacent areas, or other portions of this receiver site. However, as the daily construction effort continues to travel down the beach, the public accessibility would also change and only result in temporary construction effects . . . The sections of the receiver site restricted would be relatively small and construction would be managed to accommodate planned activities. Long-term, a beneficial impact would result from the increased sand and wider span of beach area, increasing the amount of usable recreation area, as well as safeguarding the bluff face and stairway.*
>
> *Construction staging for equipment and crew is proposed at Moonlight Beach, which would result in intermittent placement of heavy equipment and crew parking. Moonlight Beach provides restrooms, showers, snack bar and picnic tables and is popular for surfing, fishing and other uses which would only be impacted during sand replenishment for that portion of the project. Otherwise, those amenities would remain open, even with staging activities. Access to portions of the receiving beaches would be restricted during construction, but this restriction would be short term and temporary, with access restored at completion of the project. The surf zone would not be closed during construction. Surfers would be able to access surfing sites entering the water from either end of the construction area.*

The *Feasibility Study* reports that the construction restrictions identified above for the Encinitas shoreline segment also apply to the Solana Beach segment; expected construction staging effects at Solana Beach are as follows:

> *Construction staging for equipment and crew is proposed at Fletcher Cove and South Cardiff. The Fletcher Cove amenities of restrooms, showers, picnic tables, basketball and volleyball may be closed periodically during sand nourishment. Access and activities impacted include Table Tops tidepool and Beach park. The existing narrow accessibility of the beach is dependent on tidal stage. Under both low and high sea level rise scenarios, nourishment activities would require daily closure of approximately 200 ft of receiver site. Construction and special events or activities schedules would be coordinated; and ample notice would be given to potentially affected groups. If the affected groups are not able to temporarily move the activities to an adjacent location, then construction would be required to be rescheduled around these special activities. The sections of the receiver site restricted would be relatively small and construction would be managed to accommodate planned activities. Therefore, implementation would not result in substantial loss or interference of recreational activities during construction.*

The *Feasibility Study* addresses potential impacts from turbidity increases during project construction:

> *Turbidity would be generated by the project, which could result in temporary impacts to water clarity as discussed in Section 5.3. Turbidity would be monitored during construction in accordance with the project's RWQCB permit. Short-term turbidity would very likely occur during construction but would primarily be a public perception issue and not a health problem. This condition would only last as long as project construction and would return to normal shortly after completion. Therefore, the implementation of Alternative EN-1A would not result in a substantial loss or interference with recreational uses during construction.*

The Corps reports that offshore dredging and sand placement would last approximately 82 days at Encinitas and 118 days at Solana Beach, and that these activities might occur partially within the summer recreation season. In response to a Commission staff inquiry in early 2012 regarding the project construction schedule, the Corps has stated that due to the length of time that the initial nourishment project will take, it is not feasible for the long-term project to work seasonally and avoid the summer months. However, the Commission believes that with adequate planning, and given that project implementation would not occur until late 2015 at the earliest, the Corps should be able to avoid summertime construction as much as possible in order to minimize adverse impacts to public access and recreation. In the most recent communication from the Corps on this matter, the agency stated that if it is possible to avoid the summer months, it would work to do so but that it is currently unable to predict when project funding would be made available in the fiscal year in which the construction contract would be awarded.

To address these potential project impacts on public access and recreation, the Commission finds that the **Conditions 3, 6, and 13** (addressing turbidity monitoring, staging plans, and construction timing) are needed to assure the project's effects are minimized before the project can be found consistent with the access and recreation policies of the Coastal Act. If the Corps were to agree to implement these conditions, the Commission could agree that the short-term temporary impacts to public access and recreation would be minor and would be offset by the expected long-term benefits to access and recreation from beach widening.

Surfing Impacts. However, as indicated above, the recreational activity that is most at risk from proposed beach nourishment, particularly in the Encinitas segment and the northern end of the Solana Beach segment, is surfing. In its reviews of beach nourishment projects in San Diego and Orange Counties over the past decade, the Commission has required detailed monitoring of potential adverse effects on surfing. The *Feasibility Study* reports that:

> *Beginning in 2012, as part of the SANDAG RBSP II project* [Regional Beach Sand Project]*, video monitoring of several surf spots will be initiated by SANDAG in conjunction with the Surfrider Foundation to establish a video-based Surf Monitoring Program.*
>
> *Utilizing technology provided by CoastalCOMS, a company which specializes in video-based coastal monitoring, this new Surfrider program will establish a baseline for surf quality at six San Diego County beaches where RBSP II beach fills are to occur, and will include daily observations of surf quality with the help of a newly-installed video monitoring system.*
>
> *Cameras monitoring the RBSP II project will create a long-term video archive, assess changes in beach width and shoreline position, and track potential changes in surf quality and "surfability." The beaches to be monitored in the project study area from south to north, are:*
>
> - *Fletcher Cove in Solana Beach;*
> - *Seaside Reef at the boundary of Solana Beach and Encinitas;*
> - *Cardiff Reef in Encinitas; and,*
> - *Moonlight Beach / D St. in Encinitas.*
>
> *Surf quality parameters will be measured from live video monitoring using analytics designed to detect breaking wave face heights, break zone activity level, and wave locations. Volunteers will also utilize CoastalCOMS software to review video archives for an assessment of conditions at each surf spot.*

In the Commission's concurrence with consistency determination CD-029-11 for the San Clemente Shoreline Protection Project, the Corps agreed to a condition that provided for monitoring of project impacts to surfing. The findings associated with that condition stated:

> *This monitoring would include direct surveys of the beach and seabed morphology to determine changes in beach and seabed morphology, define the sediment transport*

> *patterns at the shoreline, and ultimately identify the short term and long term beach erosion processes. The survey methods would consist of topographic measurements, bathymetric measurements, surf quality observations, and video stereo photogrammetric methods. Monitoring would begin one year before construction (for the surf quality observations) and continue for the 50- year period of the project. The monitoring would measure beach widths, topography, bathymetry, and surf quality (surfability).*

The *Feasibility Study* examines the surfing resources of the project area and the potential impacts from beach nourishment on surfing. Detailed descriptions of individual surfing sites are provided in Appendix B of the *Feasibility Study* and are classified geographically as located north of the Encinitas receiver site, within the Encinitas receiver site, between the Encinitas and Solana Beach receiver sites, within the Solana Beach receiver site, and south of the Solana Beach site (**Exhibits 19 and 20**). There are several well-known, iconic surf sites at (and between) the two beach receiver sites, including Stone Steps, Swami's, Cardiff Reef, Table Tops, and Pillbox. These are reef breaks (as contrasted with more frequent beach breaks) which are highly valued surf spots due to the unique waves that break over the underwater reefs at these locations. This section of the San Diego County coastline is internationally known for its surfing opportunities and this recreational activity contributes significantly to the regional economy. The Commission's analysis of potential project impacts on surfing includes (in addition to the surfing sites within the Encinitas and Solana Beach nourishment segments) surfing sites in that section of shoreline between the two project segments. This is due to the predominant downcoast littoral drift of sand in this region and the proposed beach nourishment, which in combination could adversely affect surfing locations up- or downcoast of the two beach disposal sites.

The *Feasibility Study* reports that:

> *Each reef break within the study area was analyzed with respect to Project induced changes in sedimentation. If a beach fill alternative fills in the low areas around a naturally high relief reef, this can change the way the wave breaks over the reef. A silted in reef can make a reef break behave more like a beach break, with lower breaking intensities, shorter ride lengths, lower peel angles, and more closed out conditions. For the beach nourishment options and sea level rise scenarios, changes are likely at some of the reefs.*

The *Feasibility Study* next reviewed the expected changes from the project to surf spots within and adjacent to the nourishment sites. Below are conclusions from the *Study* for several of the more iconic surf spots in the project area:

> <u>Stone Steps</u>
> *There are conflicting reports on whether Stone Steps is a reef or beach break. WannaSurf.com and Surf-Forecast.com state that it is beach break, but with specific break locations during large swells. It is likely that this is a typical reef-beach break with rights and lefts. From the bathymetric contours it seems that whatever reef does exist is low relief. The surf site is not as clearly defined as a classical reef break since*

it is generally low relief. Peaks are more shifty, similar to a beach break, but there may be some reef focusing effect from the subtle variation in bottom contours. Bottom contours are mostly straight and parallel. The nearest profile is SD-675.

The total profile volume is greater than the profile volume standard deviation, so measurable Project induced changes to surfing at this reef are likely. Thus, this surf site would be expected to behave more like a beach break under the alternatives analyzed. As reefs change to more like beach breaks, the reef effect is expected to be reduced as it becomes buried by sand. For beginning surfers, who generally go straight towards shore and do not take advantage of the peeling breakers along reefs, there would be very little change to their surfing experience at Stone Steps. For other surfers, the change would likely result in reduced peel angles, more closeouts, reduced section lengths, shorter rides, and reduced surfability.

Swamis and Boneyards

Swamis is the premier surf site within the project domain. The wave peels right over a bedrock reef for up to ¼ mile during large swell. The outside reef is known as Boneyards and only breaks during the largest west swells. During smaller days, a few lefts can be found. The breaking intensity is normally semi-hollow but can be mushy during south swells and during higher tides (Cleary and Stern, 1998). Since this is a well defined reef break, with waves breaking near the same location with regularity, it is possible to determine the peel angle and ride length. An analysis of four aerial photographs spanning 2003 through 2009 revealed peel angles ranging from 52 to 65 degrees with the median being 53 degrees and ride lengths from 170 to 980 feet. The peel line and wave crests for a long period west swell occurring on January 3, 2006. Surfers can be seen floating just to the south and west of the whitewash. Typical of shallow areas with broken waves, the LiDAR measured elevation contours reveal no data over the reef and in the surf zone, so detailed wave transformation is not possible here. The deep water wave energy polar spectral plot is provided by CDIP (2011) at the 100 Torrey Pines gage for the condition shown in the figure. The year two, Project induced net change in profile volume under all alternatives analyzed are less than the profile volume standard deviation, so Project induced changes to surfing at this reef are not likely.

Table Tops

Table Tops is a hollow right reef break and is best represented by profile SD-610. The total profile volume is greater than the profile volume standard deviation, so measurable reef changes are likely. If this surf site were measurably changed to more like a reef-beach break, it is expected that the reef exposure above the sandy bottom would become less pronounced and the break would become somewhat less hollow, with lower breaker intensities. This could be considered an improvement for intermediate surfers, but would likely be a detriment to more advanced surfers. If the sand thickness were further increased, the reef could become completely buried, changing the surf site to a beach break. If this were to occur, the rather unique albeit fickle nature of this surf site would be lost, changing it to yet another beach break. Since this is currently an advanced surf site and it is far from shore, beginning surfers

are not likely to attempt this surf site and would not experience any change to their surfing experience. For other surfers however this would likely result in more closeouts, shorter rides, and reduced surfability.

Pillbox & Southside
Pillbox is a right-peeling reef-beach break and the surf spot called Southside is a left-peeling reef-beach break. These surf sites are best represented by profile SD-600. The total profile volume is greater than the profile volume standard deviation, so measurable reef changes are likely. With the added sand these two surf sites would become more like beach breaks, reducing their reef tendencies. Beginning surfers would not likely experience any change to their surfing experience, but for other surfers this would result in more closeouts, shorter rides, and less surfability.

The *Feasibility Study* summarizes the overall expected impacts from beach nourishment on surfing in the project area:

- The locations of the break point of surfsites are expected to move seaward proportional to the amount of beach widening.
- Most waves at beach breaks that would have been surfable prior to project implementation would still likely be surfable after implementation.
- An overall reduction in backwash as a result of beach nourishment combined with sea level rise would likely result in an increase in the frequency in which a site would be surfable.
- Changing a surf site from a reef break to more of a beach break could reduce the surfing frequency.
- The overall frequency of surfable waves within the study area is not expected to change significantly.

However, the Commission would also add to this list the types of adverse effects listed in the above descriptions from the *Feasibility Study* of surfing at Stone Steps and Table Tops (e.g., reduced peel angles, more closeouts, reduced section lengths, shorter rides, reduced surfability, less hollow breaks, lower breaker intensities).

The *Feasibility Study* then concludes that the proposed project will affect reef break surfing but that these impacts will not be permanent or significant:

The project could add a relatively large sand volume to the system over a short time frame, thereby modifying existing sandbars and reefs by changing bottom conditions at the receiving beach sites as well as nearby beaches. Addition of sand to a beach break can steepen the nearshore beach profile, which can result in waves that closeout rather than peak on a more shallowly sloped nearshore bar. This impact could be adverse and significant if surfing is precluded by sand deposition causing waves to

closeout over a long period of time (months) or result in a perpetual shorebreak at the beach rather than a nearshore bar for waves to break over. Shorebreak or closeout conditions may exist over a temporary short-term period while the sand is naturally redistributed over the bottom. The slight difference in grain size of sand proposed for placement as part of this project and existing beaches is not anticipated to substantially change these processes.

Both placement sites are located in proximity to reefs that may be temporarily impacted by sand. Placement of sand at both receiving beaches could result in sand being transported to nearby reef breaks. Some sediment accumulation is anticipated in reef areas; however, natural transport processes continually move sediments through these reef areas under normal conditions. Additional sand placed as part of the proposed project would not substantially alter sand transport patterns in these areas. Some sand may accumulate in localized portions of existing reefs on a seasonal or short-term basis, which could temporarily affect confined portions of existing reef surf breaks. Appendix B9 of Appendix B presents details regarding the potential changes at surf spots in the vicinity of the receiver sites, summarized in Table 5.12-2 below. As described there may be short-term changes to the wave characteristics at individual surf breaks, these effects would be temporary as the sand is naturally distributed, and would not preclude the viability of the breaks.

The project may cause potentially beneficial impacts to surfing in some areas by contributing sand to the nearshore that would be deposited in bars throughout the receiving beach cities. More sand in the system provides material for enhanced sandbar formation and may result in larger or longer lasting bars, and improved surfing conditions. Informal qualitative observations regarding changes in surfing conditions after implementation of RBSP I have been offered by various beach users and city representatives. At Beacon's, surfers noted that the reef was temporarily overtopped, modifying surfing conditions for a period (Weldon 2011). Several other locations were noted to have shown improved surfing conditions due to sandbar formation offshore (Gonzalez 2009; Dedina 2010). Permanent impacts would not result from sand placement as bathymetric changes are short term and would ultimately revert to pre-project conditions after a relatively short period. Therefore, implementation of the Alternatives would not preclude the viability of existing or planned land or water activities (including surfing).

In a response to a May 2013 Commission staff inquiry regarding potential project impacts to surfing identified in the *Feasibility Study*, the Corps stated that:

The surfing analysis done for this feasibility study demonstrates a change in surfing quality along five key measures but does not conclude the overall impact is beneficial or detrimental. Given that this detailed analysis of surfing does not indicate an overall direction from surfing impacts (positive or negative) and given that surfing visits presently make up a relatively small share of total beach visitations to the study area estimated at less than 10% of total visits to the study area shoreline, the overall impact to recreation values from surfing is not expected to affect plan selection if

> *quantified. Further, surfing visits are not expected to increase as much as other recreation visits in the future due to the significant beach-based recreation that would be supported by the project. Consequently, surfing impacts have not been quantified to establish recreation benefits but have been analyzed to develop a qualitative understanding of how surfing could potentially be impacted to aid stakeholders. Surf breaks are expected to change in character in those areas where shallow reefs are covered in sand, but the number of surfing opportunities is not expected to change.*

The primary recreation issue before the Commission is whether the proposed nourishment of the two beach segments in Encinitas and Solana Beach to reduce coastal storm damage would adversely affect surfing such that the project could not be found consistent with the Coastal Act's recreation policies. As noted above and in the *Feasibility Study*, the project by its nature would create wide sandy beaches that in turn support a range of significant public access and recreation benefits. The *Feasibility Study* also makes clear that several iconic surf breaks in the project area will be covered in sand, at least temporarily and perhaps longer, and as a result the historic surfing experience at those locations will change. However, the Corps determined that the demonstrated change in surfing quality that will occur in the project area as a result of the beach nourishment is neither a beneficial or detrimental impact. The Corps concluded that because surfing visits are a relatively small proportion of total recreational visits in the study area and because it does not expect surfing visits to the project area to increase as much as other types of recreation visits, the impacts to surfing were not quantified and even if they were, the results would not have affected the selection of the project plan.

The Commission disagrees with the Corps' valuation and weighing of the resulting relative value of recreational activities. The loss of unique surfing breaks, whether during initial nourishment, during the estimated two-year period in which the new sand reaches an equilibrium profile along the nourished shoreline, or for a longer period of time, is an adverse effect on coastal recreation. The Commission acknowledges that uncertainty exists as to whether the proposed beach nourishment would create temporary and minor impacts on surfing or more significant and long-term changes in the reefs that generate the unique surf breaks in the project area. This uncertainty is documented in the *Feasibility Study* and in extensive comments submitted by the Surfrider Foundation (**Exhibit 21**). The Commission acknowledges that this uncertainty must inform its decision on the proposed project. However, the fact that surfing represents a small portion of overall recreational visits to the project area (and should therefore be less crucial to the decision-making process) is irrelevant. The value of many coastal recreational activities cannot be reduced to sheer numbers of participants. The fact that a relatively small percentage of visitors take advantage of coastal resources to engage in a particular activity does not make that activity, those resources, or those visitors any less important or less deserving of acknowledgement or protection under the Coastal Act. The Commission enjoys a long tradition of protecting coastal access and recreation opportunities and locations that may see only a handful of visitors in a week or month or year. The numbers of surfers are undoubtedly dwarfed by the numbers of sunbathers along the shoreline in the project area on an annual basis. However, protection of those locations that provide surfing opportunities for beginners through experts, particularly where surf breaks are unique, remains a bedrock principle under Coastal Act access and recreation policies.

Equally disconcerting was the decision by the Corps not to quantify surfing benefits and impacts in its assessment of the overall project recreational benefits and costs, particularly in light of the demonstrated economic benefits from surfing and related activities on local and regional economies (**Exhibits 22 and 23**). This Corps decision undervalues, both from economic and social perspectives, surfing and the unique and internationally known reef- and point-break surf spots located in the Encinitas-Solana Beach project area. And, despite the best efforts of many organizations over the last 20 years, including the Commission, there are no successful means to create new or replacement offshore surf breaks should those breaks be permanently lost to offshore or onshore development. Because there is no mitigation available for the alteration or loss of surf breaks, these areas, and the public recreation they provide and economic value they represent, should be fully incorporated into the decision process for all proposed development that holds the potential to adversely affect these areas. The Commission therefore believes that the Corps' *Feasibility Study* falls short in adequately valuing and protecting the surfing resources in Encinitas and Solana Beach.

The Corps states that the proposed project will adversely affect several surfing areas as a result of reefs being covered with sand as the widened beaches reach an equilibrium state, but that these effects will either be temporary as sand moves on and off these reefs within the nearshore zone, or that any effects will not be significant as surfing will not be eliminated but only modified. The Corps also acknowledges that there is a degree of uncertainty involved in determining and evaluating potential project effects on surfing. This is the challenge for the Commission as it weighs the numerous project benefits, including nourished and wider beaches made available to the public, and the potential project impacts on surfing. The dynamic nature of this segment of shoreline, and in particular the changes in beach width and composition since the 1980s, the future changes inherent with sea level rise, and the seasonal movement of sand within the littoral zone make it difficult at best for the Commission to predict with some degree of certainty how beach nourishment will affect surfing in the project area.

The prudent and precautionary decision would be one that would not lead to an irreversible loss of unique surf spots, and that would provide the Commission with the ability to propose and advocate project modifications as soon as it became clear that the project was adversely affecting surfing (through use of the reopener clause in the federal consistency regulations at 15 CFR §§ 930.45 and 930.46), and without waiting for the next renourishment project and its associated consistency determination. In addition, the results from the ongoing surfing monitoring program included in SANDAG's Regional Beach Sand Project II (RBSP II) and from the upcoming San Clemente beach nourishment project (both described earlier in this section of the report) might provide useful information on sand movement and nourishment effects on surfing in the project area. This information could reduce the level of uncertainty in evaluating the proposed project. In addition, if the RBSP II monitoring results indicate that the proposed Corps project could lead to surfing impacts not anticipated in the *Feasibility Report*, the Commission could invoke the aforementioned re-opener clause for the subject consistency determination (prior to the start of project construction) to determine whether the Corps project remains consistent with the access and recreation policies of the Coastal Act, including whether any further changes to the project are needed in light of those RBSP II monitoring results.

Therefore, the Commission finds that certain conditions found on pages 4-9 of this report are needed to assure the project's effects are minimized, adequately monitored, and if impacts occur, project modifications implemented before the proposed project can be found consistent with the public access and recreation policies of the Coastal Act. The Commission has adopted seven conditions regarding public access and recreation, which focus primarily on surfing, and which provide for the following:

Reduced nourishment in Solana Beach segment. Nourishment will not extend north of the northern edge of the small cove located at the base of the stairway that connects the beach with the top of the bluff at the end of Solana Vista Drive. This will keep sand placement further away from the unique Table Tops reef surfing area, located to the north of the cove, and reduce the potential for transported sand to bury the nearshore reef that supports Table Tops.

Phased review for renourishment projects. Prior to each renourishment project, the Corps will submit a consistency determination to the Commission which will include (in part) the results of shoreline and surfing monitoring reports required since completion of the previous nourishment project, and the proposed sand volume, beach width, and borrow site location for the proposed renourishment. This will provide the Commission information on whether the nourishment project has affected surfing in the project area, and if so, the significance of those effects. If it is demonstrated that beach nourishment has adversely affected surfing, the Commission may determine the need for further project conditions (e.g., reduced sand volumes, reduced beach widths, modifications to the lateral extent of the nourishment footprint, timing of nourishment, no additional nourishment) to avoid additional impacts to surfing.

Final monitoring plans. Prior to the start of project construction, the Executive Director will have the opportunity to review the final shoreline monitoring and surfing monitoring plans developed by the Corps.

Surfing monitoring plan details. The Corps will develop a surfing monitoring plan to assist in the evaluation of potential project impacts on surfing and which will include: (a) baseline pre-construction data within the project area and at control sites; (b) identification of surf areas to be monitored, user groups to be involved in the monitoring, and identification of criteria for determination of significant alterations or impacts; (c) supplement wave observations with observations of surfing activities; (d) use of video recordings to augment observer counts and observations; (e) user data disaggregated into weekday and weekend data; (f) tabulation of "restricted-use" days when surfing is not allowed; and (g) establishment of mechanisms to inform local communities about and encourage their participation in the monitoring project. The monitoring plan will be submitted to the Executive Director for review.

Ongoing monitoring reports. The Corps will provide the Executive Director all shoreline monitoring and surfing monitoring reports as they are published. Should these reports indicate that the project has resulted in surfing impacts not anticipated in the *Feasibility Study*, the Commission could invoke the reopener clause for the subject

consistency determination to determine whether the project remains consistent with the access and recreation policies of the Coastal Act, including whether any changes to the project are needed in light of the shoreline and surfing monitoring reports.

Monitoring between Encinitas and Solana Beach segments. The Corps will ensure that shoreline and surfing monitoring for the project will also occur in the geographical area between the Encinitas and Solana Beach nourishment segments, in order to accurately document potential project impacts on surfing in this area arising from possible downcoast movement of sand placed in the Encinitas segment.

Timing. The Corps will make every practicable effort to schedule beach nourishment activities outside the peak summer recreation season in order to minimize project impacts on public access and recreation, including surfing.

If the Corps were to agree to implement these conditions, the Commission finds that the project's effects on surfing would be minimized to the extent feasible and that the proposed project could be found consistent with the public access and recreation policies of the Coastal Act (Sections 30210, 30211, 30212, 30213, and 30220).

D. WATER QUALITY. The Coastal Act provides:

Section 30230. *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231. *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Water quality impacts can occur at either the offshore borrow site or at the beach replenishment site, due to fuel spill and contaminant releases, or excessive turbidity from dredging or disposal. The Corps proposes to minimize these effects through adherence to a Water Quality Monitoring Plan, Stormwater Pollution Prevention Plan (SWPPP), and an Oil Spill Prevention and Response Plan (OSPRP).

The Commission has generally considered open ocean turbidity from beach nourishment projects, with their predominantly large grain sizes, to be a minor impact. The *Feasibility Study* reports that:

> *Impacts to water and sediment quality from the project are expected to be similar to those for beach nourishment projects performed as part of the RBSP I and RBSP II, specifically, the borrow sites proposed for this project (SO-5 and SO-6). The potential and measured impacts to water and sediment quality, which are described in a series of reports (SANDAG 2011a, AMEC 2002b), are used to assist in assessing the potential impacts for this project, where appropriate.*

The *Feasibility Study* examined water and sediment quality at the offshore borrow sites (used previously in SANDAG's RBSP I and II projects) and proposed beach receiver sites, and summarizes potential water quality impacts from the proposed project:

> *Dredging of sands from the borrow sites and placement of material at the receiver sites would result in short-term elevated turbidity levels and suspended sediment concentrations, but no appreciable long-term changes in other water quality parameters, including dissolved oxygen, pH, nutrients, bacteria, or chemical contaminants. Factors considered in this assessment include the relatively localized nature of the expected turbidity plumes for the majority of the dredging period and rapid diluting capacity of the receiving environment. Water quality monitoring would be required as part of the overall project. If monitoring indicated that suspended particulate concentrations outside the zone of initial dilution exceeded permissible limits, dredge operations would be modified to reduce turbidity to permissible levels. Therefore, impacts to water quality from dredging at the borrow sites and placement of material at the receiver sites would not violate water quality objectives or compromise beneficial uses listed in the Basin Plan; therefore, the impact would be less than significant.*
>
> *Potential impacts to sediment quality at receiver sites could result from contaminants in dredged material or differences in physical characteristics of dredged material. SANDAG did not identify any significant impacts to sediment quality at receiver sites located within the project area based on the characterization of the SO-6 and SO-5 borrow sites. Sediment placed at Segments 1 and 2 would not exceed ER-L or ER-M guidelines (see Table 4.3-7), and both borrow and receiver sites have similar median grain size, proportions of sand, proportions of silt/clays, and TOC content. Thus, placing dredged material from SO-5 and SO-6 at the receiver sites would not affect sediment quality. Therefore, placement of sand would not alter sediment quality at the receiver sites that would be harmful to aquatic life or human health, and any impacts would be less than significant.*
>
> *There would be no significant impacts to water or sediment quality, and accordingly, no mitigation measures are necessary. However, turbidity monitoring will be undertaken during dredging and placement of fill to determine if measures are necessary to reduce impacts during construction.*

The *Feasibility Study* next describes the project water quality monitoring plan that will be implemented:

The Water Quality Monitoring Plan will include weekly monitoring at the dredge and beach receiver sites for salinity, pH, temperature, dissolved oxygen, and light transmissivity; monthly water samples will be taken and analyzed for total dissolved solids. Dredging will be controlled to keep water quality impacts to acceptable levels. Controls include modifying the dredging operation. Locations of the eight survey stations are described below:

A. 100 ft up current of the dredging operations, safety permitting.
B. 100 ft down current of the dredging operations, safety permitting.
C. 300 ft down current of the dredging operations.
D. 300 ft up current - Control site (area not affected by dredging operations).
E. 100 ft north of the beach placement just off of the beach at approximately the -20 ft isobath.
F. 100 ft south of the beach placement just off of the beach at approximately the -20 ft isobath.
G. 300 ft south of the beach placement just off of the beach at approximately the -20 ft isobath.
H. Control site 300 ft north of the beach placement site (area not affected by disposal operations) at approximately the -20 ft isobath.

If monitoring detects high levels of turbidity, best management practice (BMP) measures will be taken to reduce turbidity to within acceptable levels. Measures to reduce turbidity at the dredge include modifications to the dredging operation to reduce turbidity such as ensuring that the dredge remains on the bottom and doesn't bounce or that the dredge is shut off when raising or lowering the dredge cutterhead to the sea bottom. Measures to reduce turbidity at the beach site include discharging sand behind berms that channel runoff into a single point resulting in a longer path for water to run before entering the ocean allowing for more sand to settle and reducing turbidity.

To address fuel and other equipment spill concerns the Corps will prepare a Stormwater Pollution Prevention Plan and an Oil Spill Prevention and Response Plan. These plans shall specify measures that shall be taken during dredging and beach construction to avoid introducing contaminants to the ocean via leaks and spills. All measures shall be adhered to during project construction.

The Commission is adopting **Conditions 3, 7, and 8** to address the need for the water quality monitoring, stormwater pollution prevention, and oil spill prevention and response plans to be submitted for review by the Executive Director in order to assure the Commission meets its obligation for continued involvement to ensure that project water quality impacts will be minimized. Thus, if the Corps were to agree to implement these conditions, the Commission concludes that the project would be consistent with the water quality policy (Section 30231) of the Coastal Act.

E. RELATED COMMISSION ACTION.

Initially in 2000, and subsequently in 2011, the Commission has twice approved the countywide San Diego County beach nourishment program conducted by the San Diego Association of Governments (SANDAG Regional Beach Sand Project (RBSP) I and II - CDPs 6-00-038 (with several amendments) and 6-11-018). The permit conditions for both projects required, among other things, monitoring of recreational (including surfing) and biological impacts monitoring. Under the first of these permits, SANDAG placed approximately two million cu. yds. of sand on 12 San Diego County Beaches (RBSP I), completed in the Spring and Summer of 2001. The Commission's findings on RBSP II noted:

> *Extensive monitoring was completed in association with RBSP I and found no significant impacts to biological resources. The Commission also did not receive any adverse comments in regard to public access during or following construction of RBSP I.*

The second of these permits (RBSP II) involved placing 1.5 million cu. yds. on eight San Diego County Beaches between September and December 2012. During the Commission's review of this permit the paramount issue of concern appeared to be grunion protection and monitoring, and the Commission adopted an extensive set of conditions and criteria to monitor and protect grunions. The Commission also adopted conditions requiring beach sand monitoring, biological monitoring, surf break monitoring, Executive Director review and approval of the Final Monitoring Plan, and of final Staging Plans, Lagoon monitoring and mitigation, and applicant assumption of risk.

In consistency determination CD-029-11, the Corps of Engineers proposed and the Commission conditionally concurred with the San Clemente Shoreline Protection Project, a fifty-year beach nourishment program for San Clemente State Beach in northern San Diego County. This program consisted of initial nourishment of approximately 251,000 cubic yards of sand dredged from an offshore location and placed on a 50-foot-wide by 3,400-foot-long section of beach centered on the San Clemente Pier, with periodic renourishment every six years when the beach erodes to its base width of 35 feet. Dredging and placement would occur between late August and March to avoid the peak recreation, least tern breeding, and grunion spawning seasons. The Commission adopted nine conditions to assure the project's monitoring and mitigation measures are effective, adequate to protect, and, if impacts occur, mitigate the project's effects on marine resources, water quality, and public access and recreation. The Corps agreed to the conditions, although this project has yet to be implemented.

APPENDIX A

SUBSTANTIVE FILE DOCUMENTS

1. CD-003-13 (U.S. Army Corps of Engineers, Encinitas-Solana Beach Coastal Storm Damage Reduction Project).
2. Feasibility Study/EIS/EIR, Encinitas-Solana Beach Coastal Storm Damage Reduction Project, U.S. Army Corps of Engineers, December 2012.
3. CD-029-11 (U.S. Army Corps of Engineers, San Clemente Shoreline Protection Project).
4. Coastal Development Permits 6-11-018 and 6-00-038 (and Amendments A1 to A3), SANDAG Regional Beach Sand Projects I and II.
5. Appendix D to the SANDAG Regional Beach Sand Project EIR/EA, Evaluation of Impacts to Marine Resources and Water Quality from Dredging of Sands from Offshore Borrow Sites and Beach Replenishment at Oceanside, Carlsbad, Leucadia, Encinitas, Cardiff, Solana Beach, Del Mar, Torrey Pines, Mission Beach, and Imperial Beach, CA, March 2000.
6. Surfonomics 101, Paul Kvinta, CNN Money, June 5, 2013.
7. Surfonomics Quantifies the Worth of Waves, Gregory Thomas, The Washington Post, August 24, 2012.
8. February 26, 2013, comment letter from National Marine Fisheries Service to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
9. February 26, 2013, comment letter from U.S. Environmental Protection Agency to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
10. February 26, 2013, comment letter from California Department of Parks and Recreation to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
11. February 27, 2013, comment letter from California Department of Fish and Wildlife to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
12. March 5, 2013, comment letter from U.S. Fish and Wildlife Service to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
13. Undated comment letter from Surfrider Foundation to U.S. Army Corps of Engineers on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
14. May 8, 2013, letter from Surfrider Foundation to City of Solana Beach and City of Encinitas on Encinitas-Solana Beach Feasibility Study/EIS/EIR.
15. May 14, 2013, letter from Surfrider Foundation to California Coastal Commission on Encinitas-Solana Beach Feasibility Study/EIS/EIR.

EXHIBITS

long southernmost segment of the Encinitas shoreline is a low-lying barrier spit fronting the San Elijo tidal lagoon.

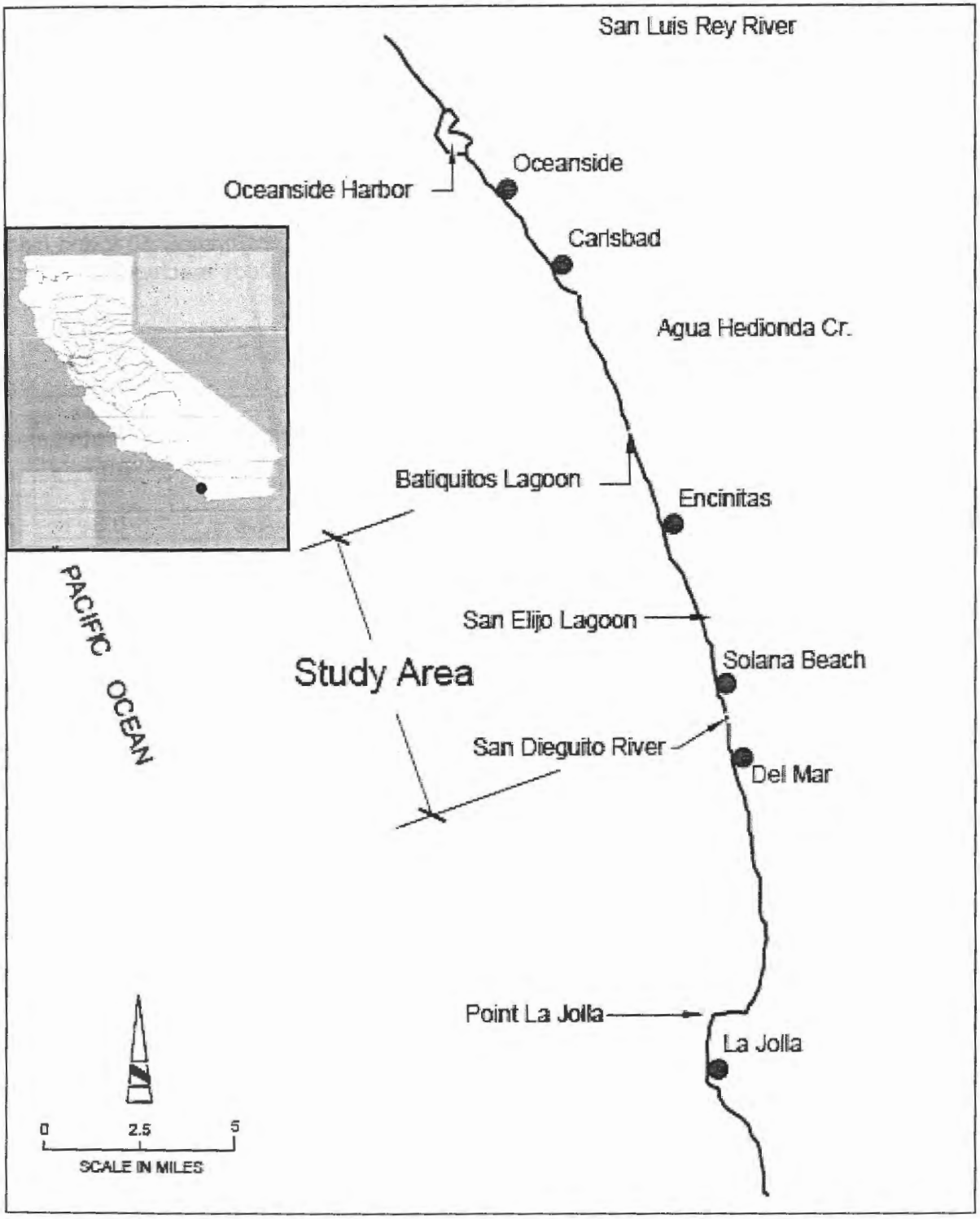

Figure 1.8-1 Location Map

EXHIBIT NO. 1
APPLICATION NO.
CD-003-13

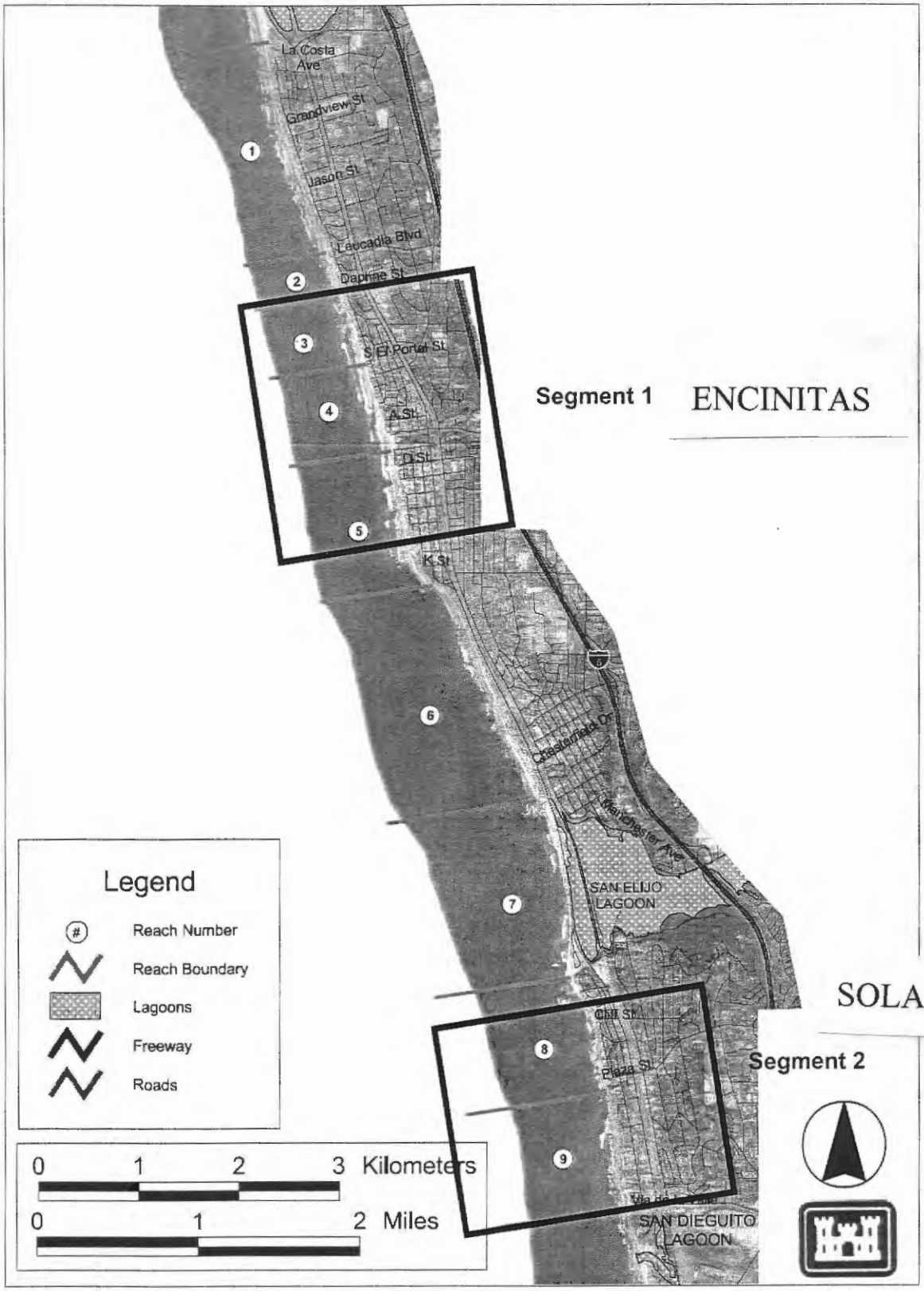

Figure ES-2 Segments 1 and 2

EXHIBIT NO. 2
APPLICATION NO.
CD-003-13

Figure 3.4-1 Alternative EN-1A - Encinitas

EXHIBIT NO. 3
APPLICATION NO.
CD-003-13

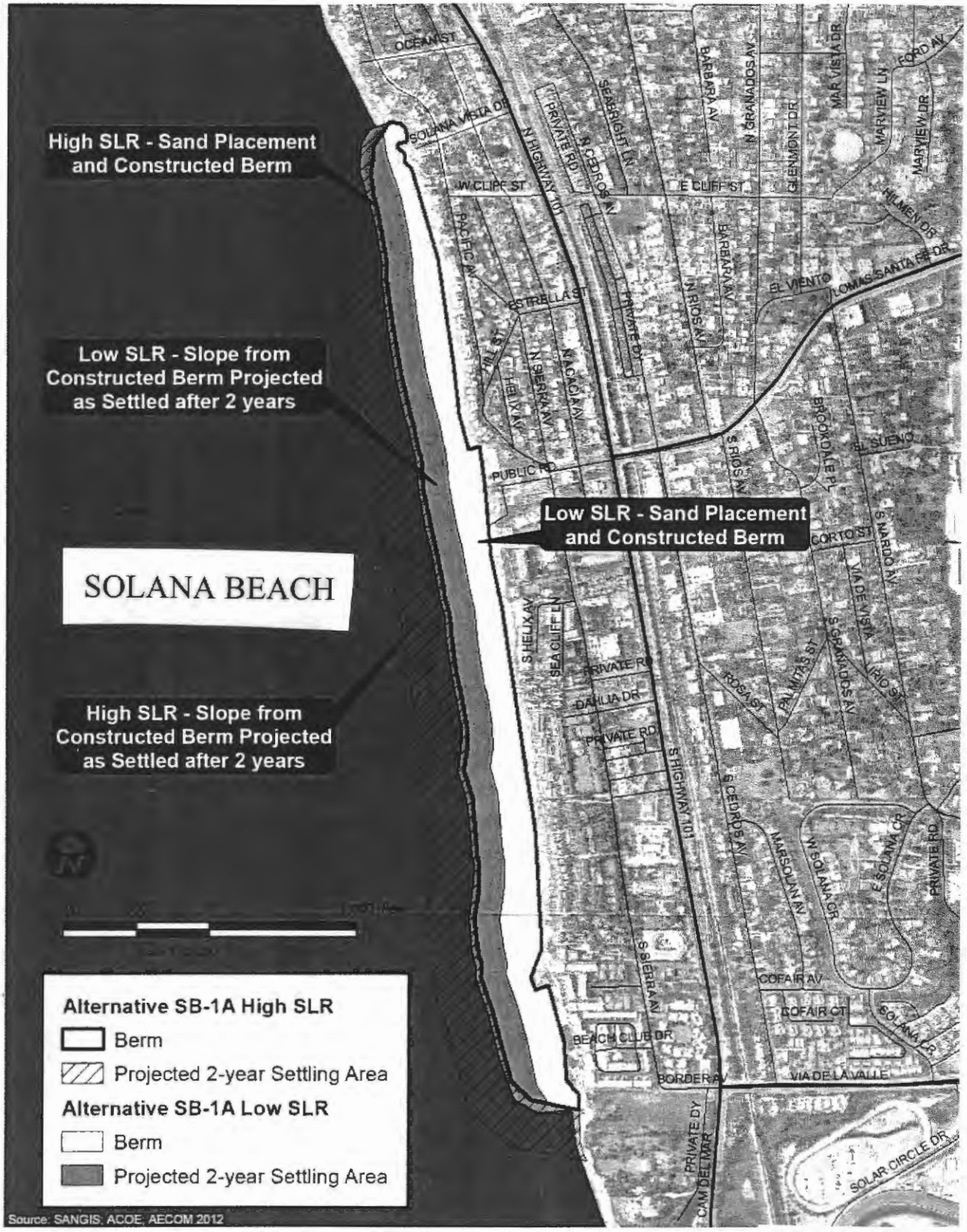

Figure 3.4-5 Alternative SB-1A – Solana Beach

EXHIBIT NO. 4
APPLICATION NO.
CD-003-13

1 **Table ES-1 Final Alternatives 1**

Encinitas (EN)		Alternative EN - 1A: Beach Nourishment (100 ft; 5-yr cycle)	Alternative EN - 1B: Beach Nourishment (50 ft; 5-yr cycle)		Alternative EN-2A: Hybrid (100 ft; 10-yr cycle)	Alternative EN-2B: Hybrid (50 ft; 5-yr cycle)	Alternative EN -3: No Action
Initial Placement Volume (cy)	High SLR	730,000	390,000		800,000	390,000	Assumes that the continued practice of emergency permitting for seawalls along the segment would continue.
	Low SLR	680,000	340,000		700,000	340,000	
Re-Nourishment Cycle	High SLR	5-yr	5-yr		10-yr	5-yr	
	Low SLR	5-yr	5-yr		10-yr	5-yr	
Added Beach MSL Width	High SLR	100 ft	50 ft		100 ft	50 ft	
	Low SLR	100 ft	50 ft		100 ft	50 ft	
Solana Beach (SB)		**Alternative SB - 1A: Beach Nourishment (200 ft; 13-yr cycle)**	**Alternative SB - 1B: Beach Nourishment (150 ft; 10-yr cycle)**	**Alternative SB-1C: Beach Nourishment (100 ft; 10-yr cycle)**	**Alternative SB-2A: Hybrid (150 ft; 10-yr cycle)**	**Alternative SB-2B: Hybrid (100 ft; 10-yr cycle)**	**Alternative SB-3: No Action**
Initial Placement Volume (cy)	High SLR	1,620,000	790,000	540,000	790,000	540,000	Assumes that the continued practice of emergency permitting for seawalls along the segment would continue.
	Low SLR	960,000	700,000	440,000	700,000	440,000	
Re-Nourishment Cycle	High SLR	14-yr	10-yr	10-yr	10-yr	10-yr	
	Low LSR	13-yr	10-yr	10-yr	10-yr	10-yr	
Added Beach MSL Width	High SLR	300 ft	150 ft	100 ft	150 ft	100 ft	
	Low SLR	200 ft	150 ft	100 ft	150 ft	100 ft	

EXHIBIT NO. 5
APPLICATION NO. 6-03-13

ENCINITAS

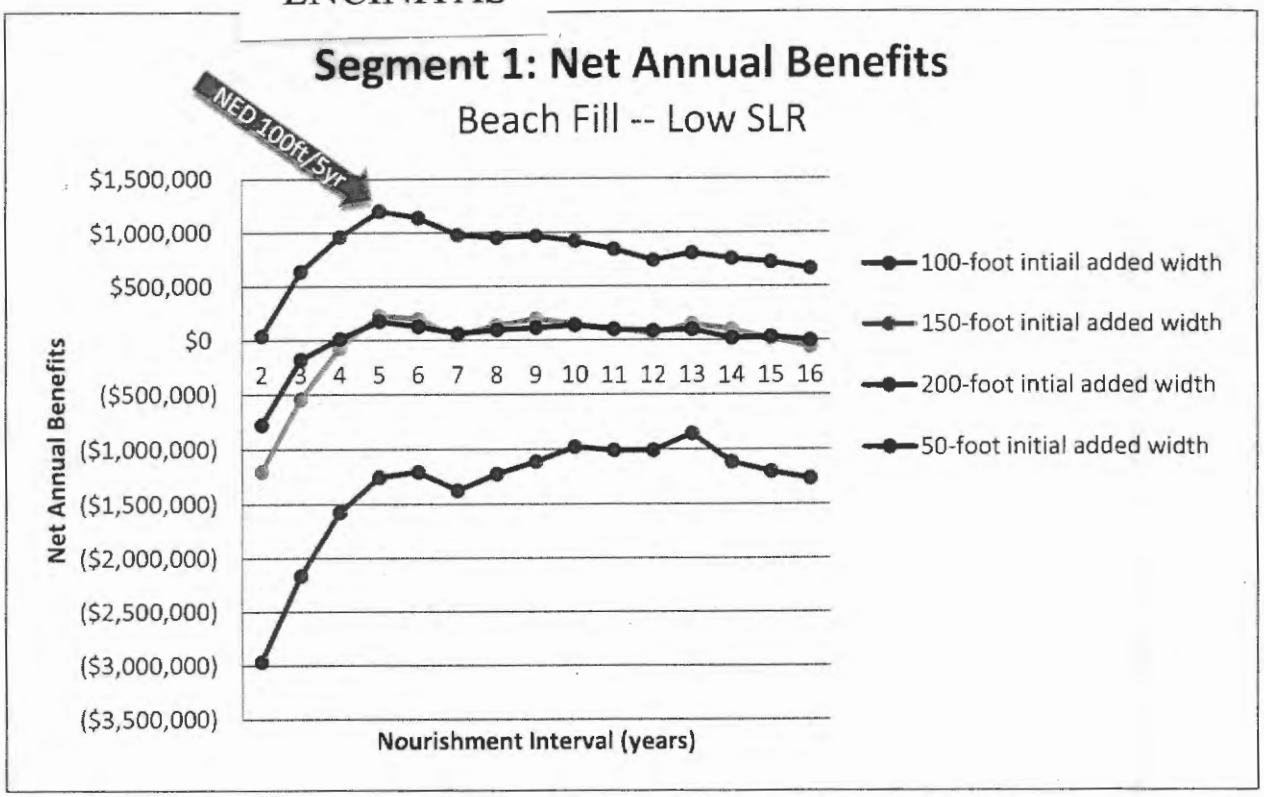

Figure 3.5-1 Net Annual Benefits for Segment 1 Beach Fill Alternatives with Limited Recreation Benefits (Low Sea-level Rise)

SOLANA BEACH

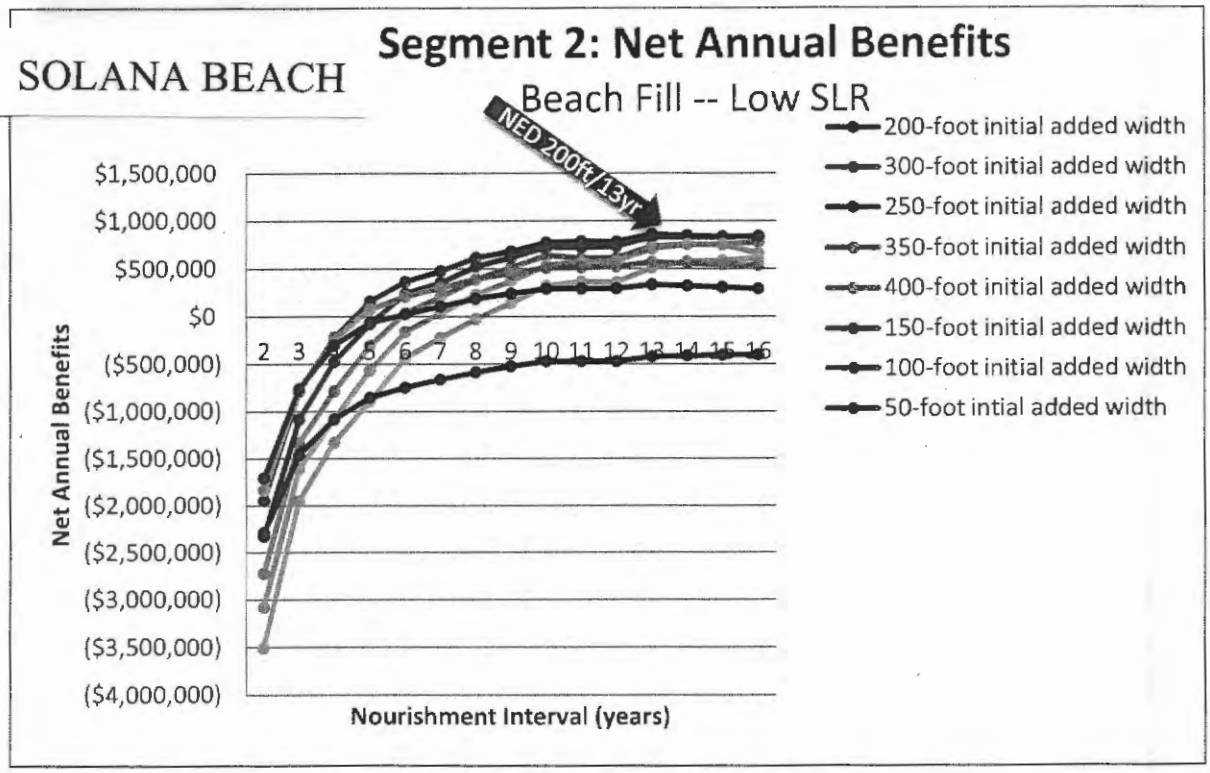

Figure 3.5-2 Net Annual Benefits for Segment 2 Beach Fill Alternatives with Limited Recreation Benefits (Low Sea-level Rise)

EXHIBIT NO. 6
APPLICATION NO.
CD-003-13

material (1-1.1 million cy under high SLR). Net annual benefits are expected to be $1.11 million annually ($1.67 million under high SLR).

Table 3.6-2 NED Plan Specifications ENCINITAS SOLANA BEACH

Low SLR	SEGMENT 1	SEGMENT 2
Type	Beach Fill	Beach Fill
Initial Added Width	100 ft	200 ft
Initial Volume Dredged	820,000 cyd	1,180,000 cyd
Nourishment Interval	5 yr	13 yr
Nourishment Volume Dredged	340,000 cyd	500,000 cyd
Net Annual Benefits		
Expected Value (full Recreation Benefits)	$1,435,000	$1,114,000
Expected Value (up to 50% Rec Benefits)	$1,201,000	$860,000
Expected Value (CSDR Benefits only)	-$234,000	-$345,000
BCR (incl full Recreation Benefits)	1.71	1.63
BCR (incl Rec Benefits up to 50% of CSDR Benefits)	1.53	1.43
BCR (CSDR Benefits only)	0.83	0.76
High SLR	**SEGMENT 1**	**SEGMENT 2**
Type	Beach Fill	Beach Fill
Initial Added Width	100 ft	300 ft
Initial Volume Dredged	880,000 cyd	1,970,000 cyd
Nourishment Interval	5 yr	14 yr
Nourishment Volume Dredged	400-480,000 cyd	900-1,020,000 cyd
Net Annual Benefits		
Expected Value (full Recreation Benefits)	$3,217,000	$1,665,000
Expected Value (up to 50% Rec Benefits)	$1,700,000	$1,196,000
Expected Value (CSDR Benefits only)	-$249,000	-$531,000
BCR (incl full Recreation Benefits)	2.32	1.52
BCR (incl Rec Benefits up to 50% of CSDR Benefits)	1.66	1.37
BCR (CSDR Benefits only)	0.83	0.75

EXHIBIT NO. 7
APPLICATION NO.
CD-003-13

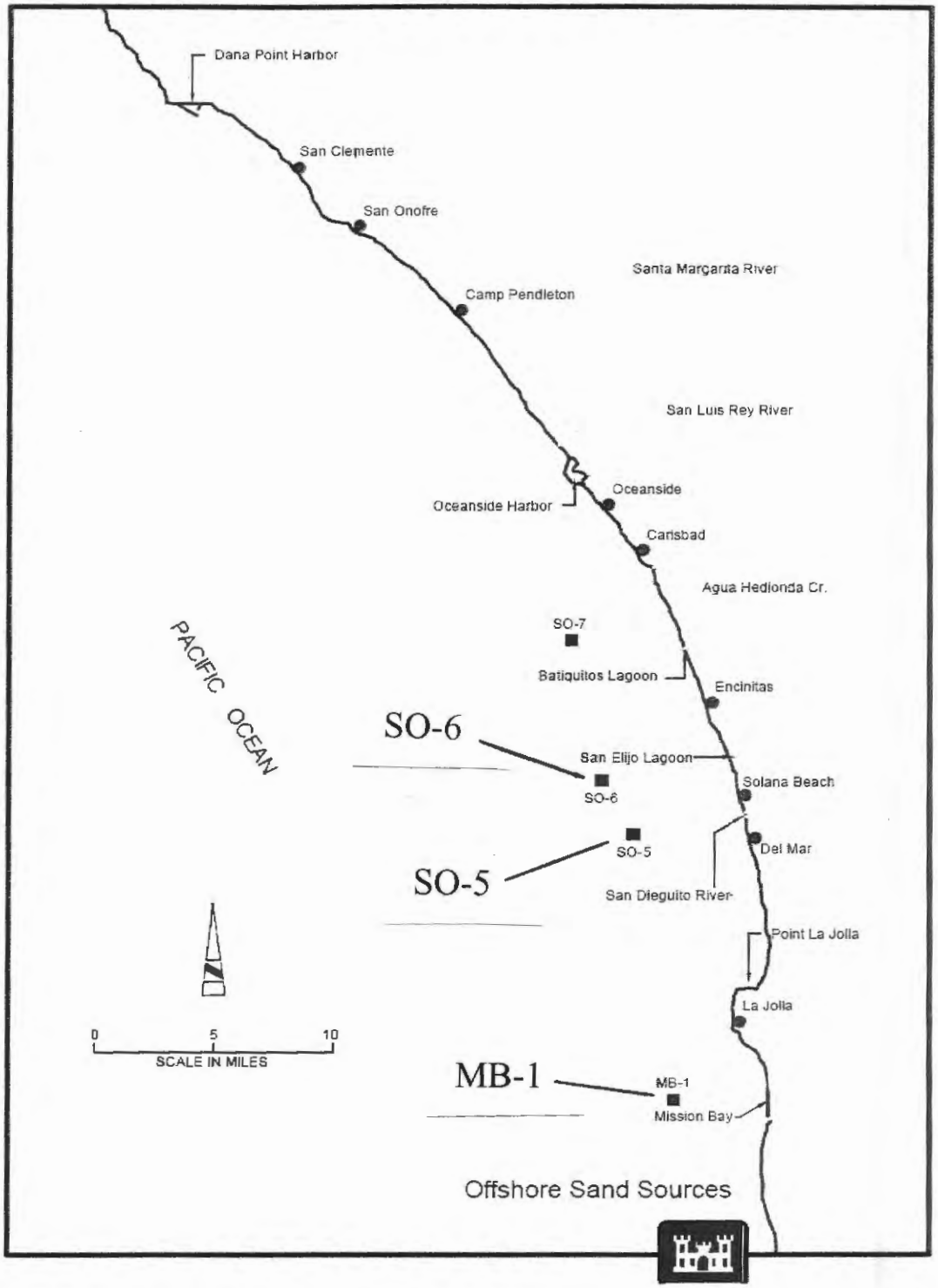

Figure 3.1-4 Regional Offshore Borrow Sites (not to scale)

EXHIBIT NO. 8
APPLICATION NO.
CD-003-13
1 of 4

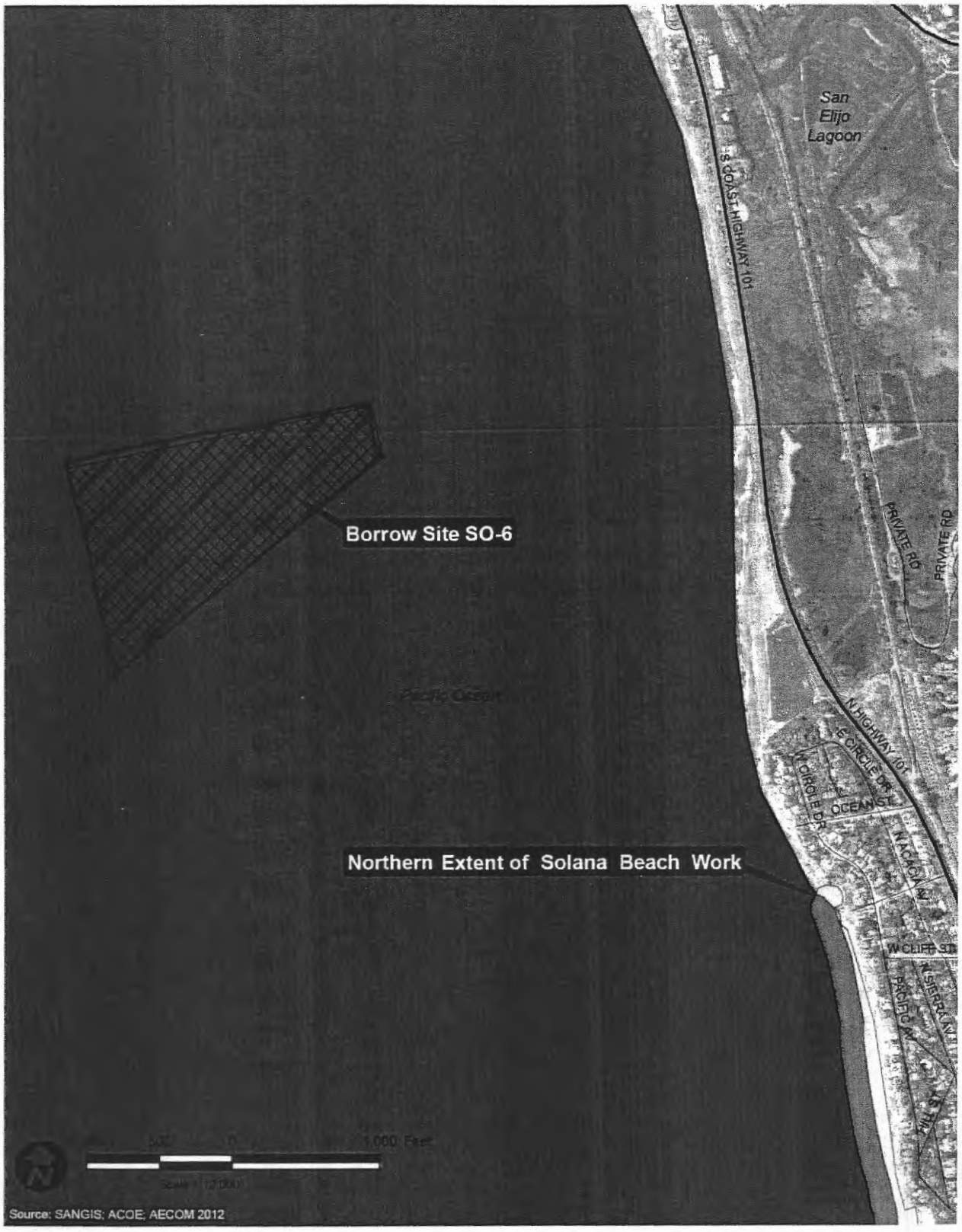

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Figure 3.3-1 SO-6 Borrow Site Footprint (SANDAG 2000a)

EXHIBIT NO. 8
APPLICATION NO.
CD-003-13
2 OF 4

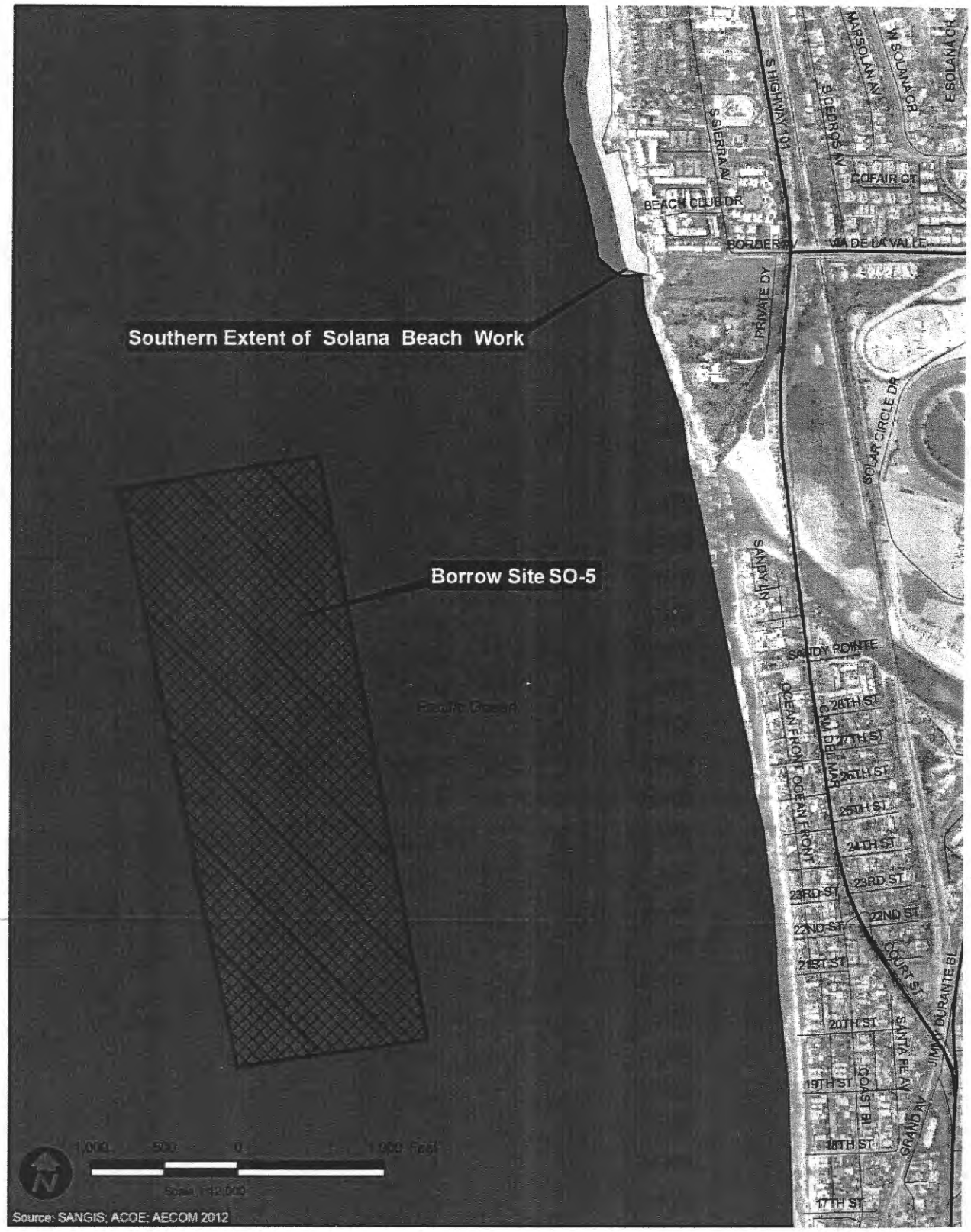

Figure 3.3-2 SO-5 Borrow Site Footprint (SANDAG 2000a)

EXHIBIT NO. 8
APPLICATION NO.
CD-003-13
3 OF 4

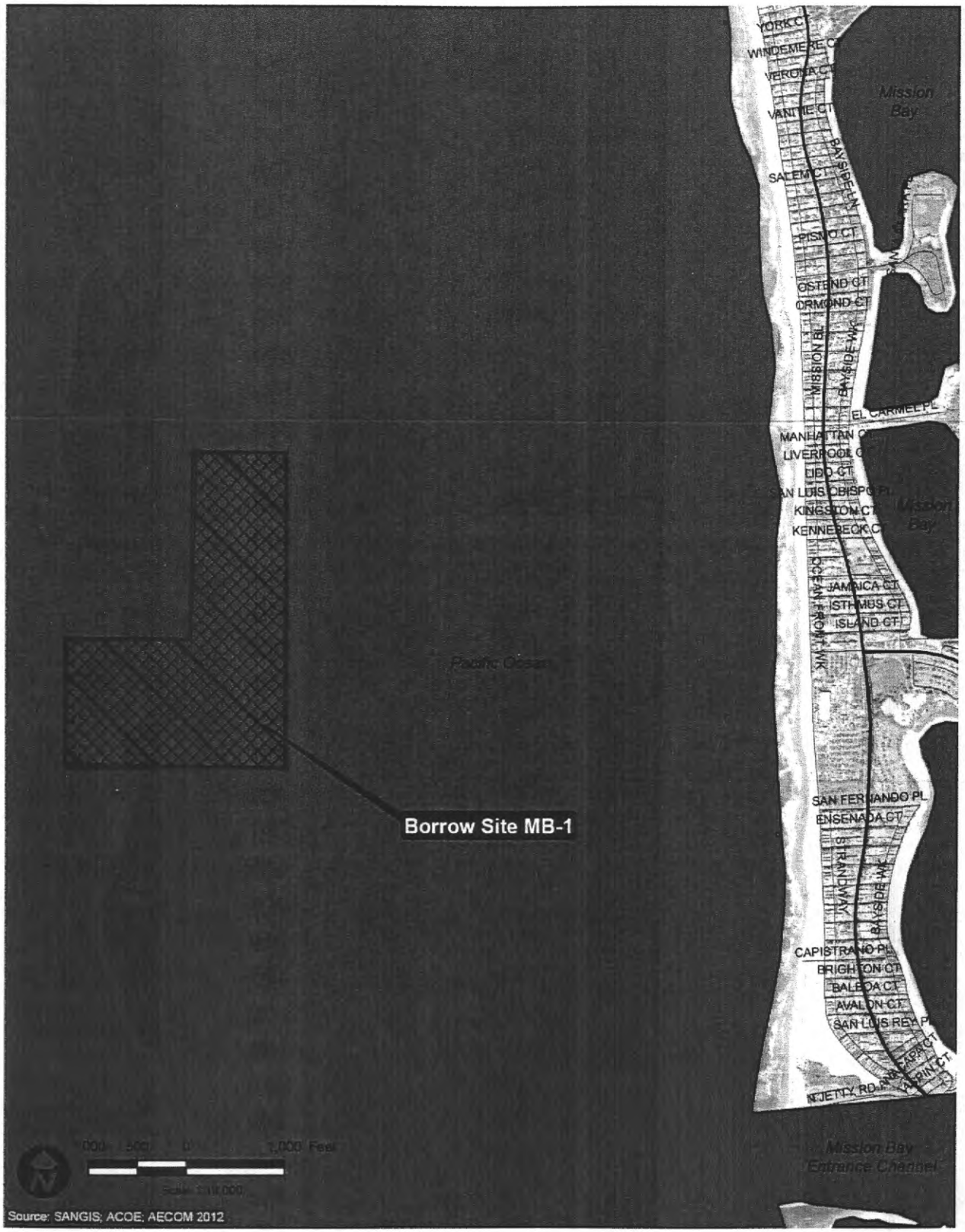

Figure 3.3-3 MB-1 Borrow Site Footprint (SANDAG 2000a)

EXHIBIT NO. 8
APPLICATION NO.
CD-003-13
4 of 4

Figure 5.4-3 Encinitas receiver site under Alternatives EN-1A and EN-2A

EXHIBIT NO. 9
APPLICATION NO.
CD-003-13

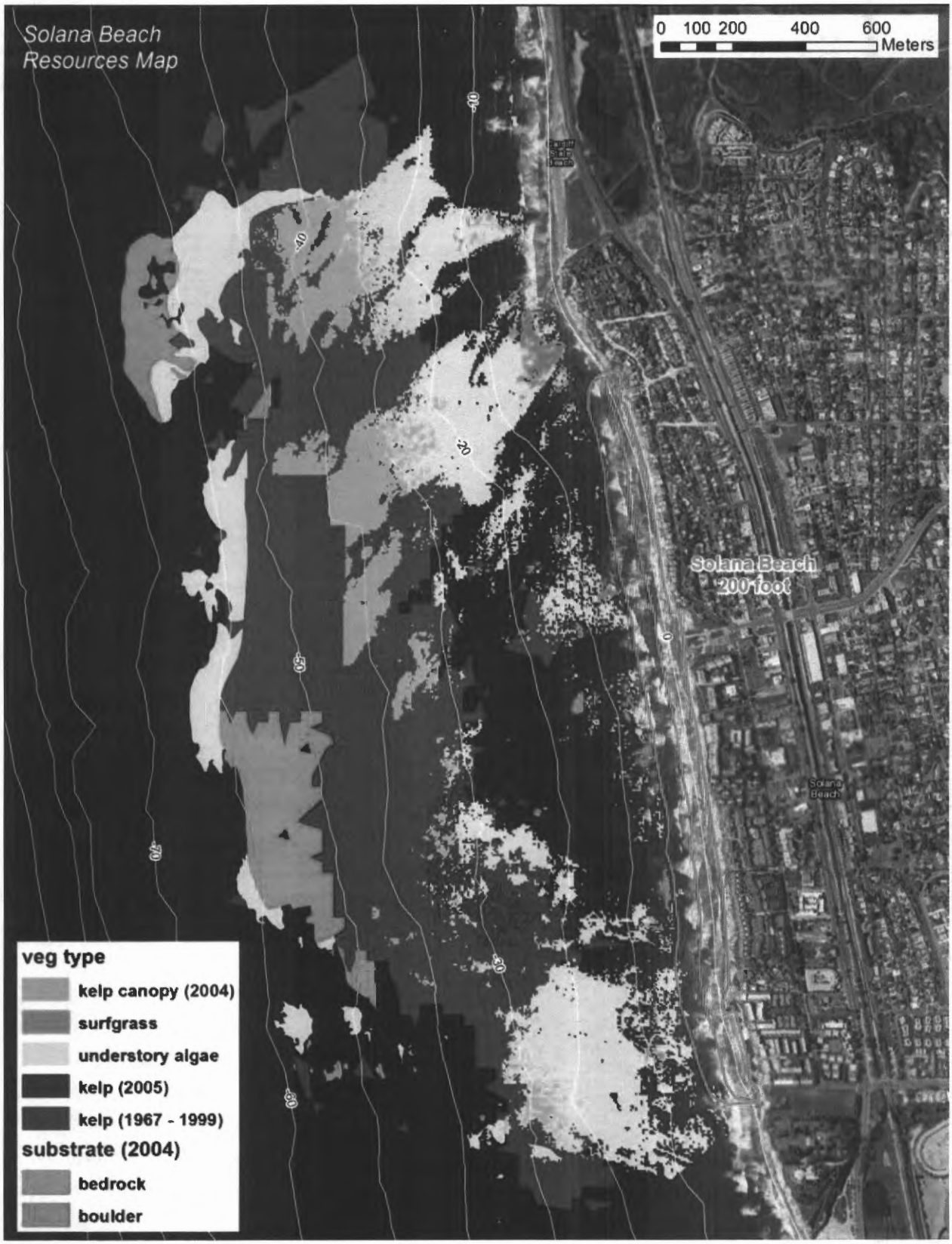

Figure 5.4-5 Solana Beach receiver site under Alternative SB-1A- low sea level rise

EXHIBIT NO. 10
APPLICATION NO.
CD-003-13

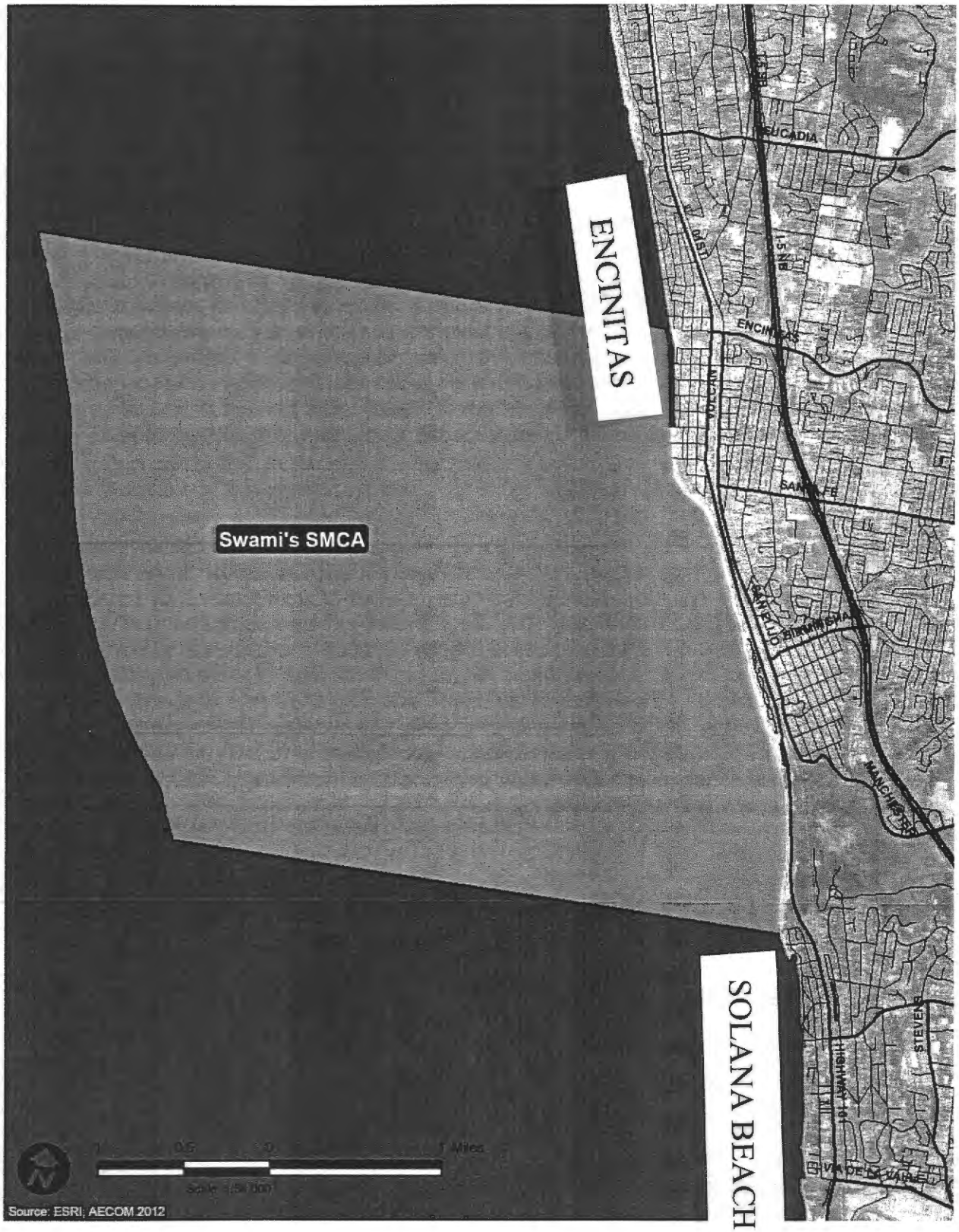

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Figure 4.2-2 Swami's State Marine Conservation Area (SMCA)

EXHIBIT NO. 11
APPLICATION NO.
CD-003-13

6 MITIGATION AND MONITORING

To assist in the cost-benefit analyses and in the selection of the NED Plan and other potential project alternatives, potential impacts to nearshore reefs and indicator species were assessed based on USACE model predictions for a variety of beach width options and sea level rise scenarios. To accommodate the need to conduct multiple model runs, a GIS-based approach was developed to utilize the existing spatial data available (e.g., LiDAR, multibeam bathymetry, and multi-spectral aerial imagery). To assess specifically potential project-related impacts, natural sediment variation was incorporated into the model based on 12 years of empirical coastal profile data.

The model predicted no project-related impact to nearshore reefs supporting surfgrass or other indicator species at Encinitas for both high and low sea level rise scenarios with beach widths of 100 ft or less; however, impacts to these resources were predicted for beach widths of 150 ft or greater. At Solana Beach, no project-related impacts to nearshore reefs supporting surfgrass were predicted for all beach width options and sea level rise scenarios. However, impacts to nearshore reefs supporting other indicator species (kelps) were predicted for beach widths greater than 50 ft for both low and high sea level rise scenarios. Costs to mitigate potential impacts and conduct monitoring were estimated based on recent similar mitigation projects (i.e., Wheeler North Kelp Reef). These costs were one metric used in the cost-benefit analysis to determine the NED Plan and other potential project alternatives.

Regarding potential impacts associated with renourishment, the need for renourishment was based on the equilibrium beach width that will be implemented (e.g., if a 100 ft beach width is proposed for the initial placement, renourishment volume will be based on maintaining a 100 ft beach width).

Therefore, no additional impacts are anticipated from renourishment, as any impact to nearshore resources would be expected during the initial beach fill. Renourishment events require substantially less sand to maintain beach widths than the initial fill volume. Impacts from those reduced volumes are expected to be less than those from the initial fill. Impacts from the initial fill will be mitigated as needed by the construction reef habitat features. Any impacts associated with renourishment would have been mitigated for following the initial fill. In addition, an adaptive monitoring program is proposed for the project to also account for potential cumulative impacts associated other beach nourishment activities (e.g., opportunistic programs, lagoon maintenance).

Due to inherent uncertainties associated with estimating impacts based on model predictions, a monitoring program would be implemented to assess actual impacts during the two years following construction. Delaying the identification of mitigation requirements for two years allows sand to migrate and to reach steady state conditions. Waiting for two years allows time for temporary impacts to end thus preventing the project from mitigating for short-term impacts that do not warrant mitigation. Reef features are naturally exposed to periodic burial, so that short-term burial resulting from the project is not a loss. Monitoring of the near shore resources will begin prior to construction to establish baseline conditions and resume immediately following construction. Mitigation would be triggered only if certain conditions occur during, and persist through, the two year post-construction monitoring period. Temporal loss for impacted resources due to the two-year waiting period are considered when establishing the mitigation functional equivalent described in **Appendix M**. The impact assessment methodology discussed in this appendix, the mitigation functional equivalent discussed in **Appendix M**, and

the two-year waiting period to measure long-term impacts were established in conjunction with federal and state resource agencies, including the NMFS, CDFG, Coastal Commission, and USFWS. If mitigation is implemented, mitigation monitoring would also be conducted. This section provides information regarding mitigation and monitoring for nearshore biological resources regardless of which project alternative is selected, and includes:

1. A pre- and post-construction monitoring program for rocky reef/surfgrass habitat in the project area to determine if project mitigation would be necessary;

2. A preliminary mitigation implementation plan, if mitigation is determined to be necessary; and

3. A preliminary mitigation monitoring plan, if mitigation is determined to be necessary.

The final mitigation and monitoring plans will be prepared during the pre-construction engineering design (PED) phase of the project. The details of these plans will be finalized in consultation with knowledgeable, experienced, and qualified marine ecologists, with monitoring performed by knowledgeable, experienced, and qualified marine biologists. These knowledgeable, experienced, and qualified marine ecologists may come from a variety of agencies, organizations, institutions, or community centers of practice and expertise, such as – the University of California, USACE Engineer Research and Development Center (ERDC), NOAA National Marine Fisheries Service (NMFS) Southwest Fisheries Sciences Center, U.S. Geological Survey (USGS) Western Ecological Research Center, other Federal and state agencies, as well as, consulting marine ecologists. California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), and NMFS staff will also be involved with the review process.

6.1 Pre- and Post-Construction Monitoring Program

The project has been designed to avoid or minimize impacts to sensitive biological resources to the maximum extent practicable. This was done by selecting fill alternatives that limit fill volume while achieving project objectives. Encinitas, for example, was able to select a beach width that avoids losses of rocky and surf grass habitats while still achieving shoreline protection objectives. Solana Beach selected an alternative that resulted in no impacts to surf grass resources while impacting minimal reef resources. Fill footprints for both cities avoid any direct impacts to sensitive resources; all estimated impacts are the result of indirect burial. However, for several alternatives, potential project impacts have been identified using a conservative coastal engineering model. Prior to the implementation of construction of the project, the extent of reef habitat and vegetation throughout and adjacent to the entire predicted equilibrium footprint will be mapped using remote sensing techniques such as multi-spectral aerial photography and/or interferometric side scan sonar. Multi-spectral aerial photography utilizes an airplane to capture multispectral reflectance characteristics that allow the identification and separation of various bottom substrates and vegetation, while interferometric side scan sonar is a type of technology used to interpret seabed features, material, and textures from acoustic backscatter response intensity, as well as, bathymetry. When the techniques are combined, data sets include bathymetry, bottom substrate type, and vegetation type information. Results from similar methodologies were used for this study to provide the baseline data (i.e., SANDAG 2002), and the proposed mapping provides the most cost-effective approach for surveying the large study area. This pre-construction monitoring is to establish baseline conditions to compare post-construction conditions against. All data would be geo-rectified, and habitat types digitized as a theme over an aerial image to calculate the coverage of various habitat types and

show its distribution. Diver surveys would also be conducted to ground truth or verify remote sensing data. The diver surveys would be at a level appropriate to effectively ensure that data were representative (e.g., 20 random locations for each substrate or habitat type). The proposed mapping would be repeated during years one and two post-construction to determine what long-term impacts result from the project that require mitigation. Based on the data collected, a decision will be made as to whether, and to what extent, mitigation is necessary.

The general approach for assessing impacts would be similar to that used to identify potential project-related impacts to eelgrass as per the Southern California Eelgrass Mitigation Policy (SCEMP; NMFS 1991). The project area and control site(s) will be surveyed prior to construction, and annually for two years following construction.

Seasonal monitoring may be required for grunion (if suitable habitat is identified in any of the sand placement areas). The season for grunion is identified as March 15 to September 1. A cultural resource survey of the mitigation sites would be needed prior to mitigation construction. A cultural resource survey of the borrow site would also be performed prior to construction. Water quality monitoring will be performed during construction on a weekly basis. Pre- and post-construction monitoring of the nearshore environmental will be conducted to allow for identification of project-related impacts for purposes of delineating mitigation requirements.

Given the relatively high natural variation of sediment transport that occurs in the nearshore zone, multiple control sites be mapped to provide a level of natural variability. Potential control areas, chosen for their similarity to potential impact sites, in the general project area include North Carlsbad (in the vicinity of Tamarack Boulevard) and South Carlsbad (north of Palomar Airport Road). By sampling control sites, changes in the sediment cover would be put into a regional perspective and natural variation taken into account. If this was not measured, any increase in sedirnent cover in the project area would be considered project related. This is similar to the eelgrass mapping/impact assessments, whereby changes at the project site are compared with reference areas. This is necessary if there is a reduction in eelgrass at the project site, that may be the result of a natural decline measured relative to the reference area. Pre-construction (baseline) areal coverage will be compared to Year 2 (post-construction) areal coverage, taking into account any natural variation at control areas to identify potential project-related impacts.

The City of Encinitas and the City of Solana Beach have been performing annual fall and spring beach profile surveys to monitor shoreline changes. The survey included transects historically monitored by the Cities. Data would be obtained from the back beach seaward, offshore of the presumed depth of closure. Beach profile data would be acquired to wading depth along transects located within or adjacent to the nourishment site.

The expected monitoring schedule includes:

Pre-construction baseline monitoring (year prior to construction):

- Spring Survey
- Fall Survey

Post-construction (annually for two years following construction):

- Spring Survey
- Fall Survey

6.2 Mitigation

If mitigation were required based on results of the second annual post-construction monitoring, rocky reef and surfgrass mitigation shall each be conducted at an equivalent functional value to the impacted area. Because it will take at least two years to identify impacts, some temporal loss of habitat, if impacts were to occur, is unavoidable. Delaying the identification of mitigation requirements for two years allows sand to migrate and to reach steady state conditions. Waiting for two years allows time for temporary impacts to end thus preventing the project from mitigating for short-term impacts that do not warrant mitigation. Recovery of impacted habitats may also occur as sand is redistributed within the littoral cell; some observed burial of reef or surfgrass habitat would be temporary because sand would be expected to move out of the project area. Additionally, if impacts are substantially different than predicted were to occur, future beach fills would be modified as part of the adaptive management plan for this project. The decision point for determination of mitigation is after the second annual post-construction monitoring. Any loss of nearshore habitat (greater than 1 foot over historical sedimentation) relative to the reference sites would require mitigation. Temporal loss of habitat are mitigated by using a mitigation functional equivalent that includes this temporal loss as one of the factors used in the calculation (see **Appendix M**). A functional equivalent of 2:1 is proposed for rocky reef resources.

Mitigation would be implemented in the project area at sites to be determined by the USACE and the two cities in consultation with the various resource and regulatory agencies noted previously (NMFS, USFWS, Coastal Commission, CDFG). Since potential impacts were identified for Solana Beach for the project alternatives carried forward, potential mitigation areas offshore of Solana Beach were identified (approximately 26 acres) and includes areas that consist primarily of sandy bottom habitat (**Figure 6.2-1**). No estimated project-related impacts were predicted for Encinitas under the alternatives that were carried forward, and therefore no potential mitigation areas were identified offshore of Encinitas. However, it should be noted that if mitigation is required for impacts that occur at Encinitas, there are options including the nearshore resources and the Swami's State Marine Conservation Area.

Reef habitat mitigation shall consist of shallow-water, mid-water, or deep-water reef at a 2:1 functional equivalent to the area of reef impacted. Shallow-water reef would be the type of reef replanted for any surfgrass mitigation, mid-water reef would be located inshore of the existing kelp beds, and deep-water reef would be located offshore of the existing kelp beds. The mid-water reef would be the first priority chosen for use for mitigation as it is most like the reef being impacted and is thus closer to an in-kind mitigation. However, deep-water reef mitigation may be required if insufficient area in the mid-water depth is available for all required mitigation.

Mid-water reef would be constructed on the offshore/outer edge of the existing reef; mid-water reef would be constructed at approximately -30 ft Mean Lower Low Water (MLLW); and deep water reef would be constructed at approximately -40 ft MLLW along the outside edge of the existing reefs. Shallow-water reef shall be constructed with a final top elevation of -10 to -14 ft MLLW. Construction of a reef that is shallower than -10 to -14 ft MLLW is not proposed because construction methods would not be practical (e.g., a barge with the reef construction materials would not be able to operate in this shallow of water). Although the surfgrass mitigation reef would be deeper than the impacted area, if surfgrass transplants are successful, the slightly deeper reef would replace the lost surfgrass resource. If surf grass transplants are not successful, the shallow-water reefs will be vegetated with kelp to serve as out of kind mitigation for surf grass losses, if any. No surf grass losses are predicted for either city.

Mid-water reef is the preferred reef mitigation as it is closest to in-kind replacement in terms of water depth and expected habitat. Mid-water reef also has some sand-retention value for adjacent beaches, similar to natural reefs. Mid- and deep-water reef shall be constructed in a fashion similar to the SCE Wheeler North Reef, which was constructed as mitigation for the impacts of the San Onofre Nuclear Generating Station. For example, if the monitoring shows 1 acre of reef impact and 1 acre of surfgrass impact, 2 acres of shallow-water reef would be constructed and 2 acres of mid- or deep-water reef would be constructed.

Although several studies currently are being conducted to determine how to successfully transplant surfgrass, and may show success, success rates to date have not been consistent (Reed and Holbrook 2003, Reed et al. 1999). Due to the absence of an established, successful method for mitigation of surfgrass loss, proposed mitigation currently is focused upon restoration of the rocky reef that surfgrass currently uses as habitat and an experimental transplant that allows for one attempt to transplant surf grass followed by out of kind kelp transplant, which does have a history of success. However, if it is determined that surfgrass has been affected by the project, and not due to natural variation, an experimental surfgrass transplant shall be implemented in addition to the construction of a shallow-water rocky reef.

Currently, surfgrass transplant success is much higher for subtidal than for intertidal conditions and, therefore, surfgrass mitigation efforts for this project will focus on subtidal transplants only. The methodology for the surfgrass transplant shall be the transplant of sprigs from a donor bed to the new reef using the method developed by Bull et al. (2004). To harvest sprigs, an unbranched terminal end of an actively growing rhizome is carefully removed from the perimeter of a bed with a knife. The rhizome of each sprig should contain several lateral shoots and a terminal shoot. Sprigs are then transplanted by attaching the cut end of the rhizome to the reef using marine epoxy. An alternative transplant method could be proposed, if evidence can be presented that the alternative method has as great or greater chance of success as the sprig transplant method. To avoid harvesting effects to the subject surfgrass bed, donor material will be taken from a larger area of surfgrass in the vicinity of the study area.

A portion of the shallow-water reef shall be test planted with surfgrass. The transplant will be conducted in the late summer/early fall, the time of year when most surfgrass seeds are released and germinate in southern California. A test area equal to approximately 25 percent of the surfgrass impact area (not to exceed 0.1 acre) will be test planted. Success of the transplant shall be determined after six months based on survivorship, percentage change in the number of leaves and the amount of areal coverage. The experimental transplant will be considered successful if the sprigs survive and there is a net increase in number of leaves and areal coverage. If the transplants survive, surfgrass grows. If the test transplant is successful, the remainder of the surfgrass impact area will be planted on the shallow-water reef with surfgrass. If the surfgrass transplant is not successful, two acres of shallow-water kelp (e.g., *Egregia menziesii* and *Eisenia arborea*) will be transplanted on the two acres of shallow-water reef built during the project mitigation.

6.2.1 Surfgrass Mitigation Monitoring Plan

Surf grass mitigation will be monitored for five years after the transplant is completed. This would be a part of the post-construction monitoring program to be performed for the project. Permanent transects shall be established on the mitigation reef containing the surfgrass bed (if the experimental surfgrass transplant is successful) and at a reference site (control area) of similar depth. The same number of transects would be established in the control area as in the

mitigation area, and transects will be at similar depths. Transects should be monitored at the following intervals, if successful:

Post-mitigation implementation*:

Year One

- within one month after completion
- 3 months after completion
- 6 months after completion
- 1 year after completion

Years Two through Five

- Spring survey
- Fall survey

*This time line follows full mitigation, which occurs only if the experimental transplant is successful. This is not after the experimental transplant, which is only monitored once, six months after transplant.

Success Criteria

The mitigation functional equivalent established in Appendix M results in the creation of mitigation reefs that are functionally equivalent to the rocky reef habitats permanently lost. This includes temporal loss of habitat value during the two-year monitoring period and design and construction time for the mitigation features. Success criteria would include determining if measured parameters are significantly different than the control transects. Success criteria for the mitigation reef itself would include no complete permanent burial of the reef. Because of the predominantly sandy bottom environment in the project area, placement of the deep water rocky reef would be considered successful if a characteristic invertebrate and fish community were to become established. On each surfgrass transect, the following parameters will be monitored at a minimum: 1) surfgrass density (i.e., number of shoots per square meter), 2) percent cover of surfgrass, sand, and rock, 3) sand depth, and 4) identification and quantity of flora and fauna. The line intercept method is recommended for measuring percent cover and sand depth. With this method, a tape measure is deployed and at pre-determined or random numbers, data are collected, Specific success criteria will be developed during the PED phase. General success criteria will consist of the following:

1. Approximately 50% - 60% of the fish, invertebrates, and algae species found at the reference site occur at the mitigation site two years post-mitigation.

2. Approximately 50% - 60% of surfgrass survival at the mitigation site two years post-mitigation implementation.

An estimated cost to implement the mitigation and mitigation monitoring is provided in Table 6.2-1through Table 6.2-4and is dependent on the estimated level of impact. Key assumptions are also provided Section 4.4.

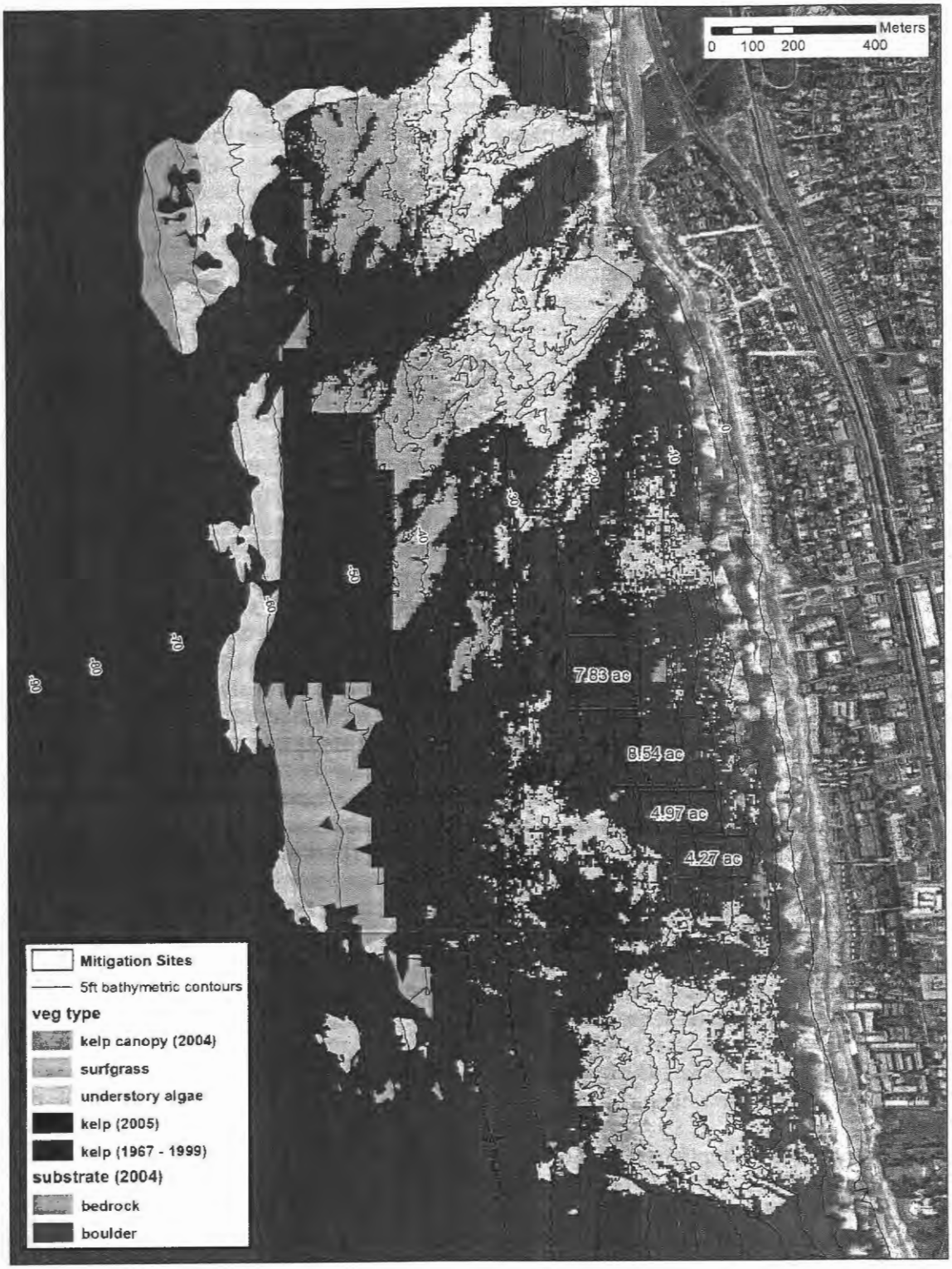

Figure 6.2-1 Potential mitigation areas off Solana Beach.

Table 6.2-1 Mitigation estimate for Encinitas for the low sea level rise scenario.

Beach Width Option (ft)	Resource	Project-Related Impact (Acres)	Mitigation Required?	Estimated Construction Monitoring Cost*	Surfgrass Transplanting Cost*	Reef Mitigation*	Estimated Kelp Transplanting Cost*	Estimated Mitigation Monitoring Cost*	Sub-Total Mitigation Cost*	Total Mitigation Cost**
50	Reefs with Surfgrass	(-1.7)	No	$75,000	N/A	N/A	N/A	N/A	N/A	$150,000
	Reefs with Other Indicators	(-7.2)	No		N/A	N/A	N/A	N/A	N/A	
100	Reefs with Surfgrass	(-0.3)	No	$75,000	N/A	N/A	N/A	N/A	N/A	$150,000
	Reefs with Other Indicators	(-1.5)	No		N/A	N/A	N/A	N/A	N/A	
150	Reefs with Surfgrass	**2.0**	**Yes**	$75,000	$500,000	$4,000,000	N/A	$75,000	$4,500,000	$18,870,000
	Reefs with Other Indicators	**9.5**	**Yes**		N/A	4,750,000	$35,000		$4,785,000	
200	Reefs with Surfgrass	**3.4**	**Yes**	$75,000	$850,000	$6,800,000	N/A	$75,000	$7,650,000	$38,190,000
	Reefs with Other Indicators	**22.5**	**Yes**		N/A	$11,250,000	$45,000		$11,295,000	

*Assumes 1:1 mitigation functional equivalent (used for cost-estimation purposes)
**Assumes 2:1 mitigation functional equivalent

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Table 6.2-2 Mitigation estimate for Encinitas for the high sea level rise scenario.

Beach Width Option (ft)	Resource	Project-Related Impact (Acres)	Mitigation Required ?	Estimated Construction Monitoring Cost*	Surfgrass Transplanting Cost*	Reef Mitigation*	Estimated Kelp Transplanting Cost*	Estimated Mitigation Monitoring Cost*	Sub-Total Mitigation Cost*	Total Mitigation Cost**
50	Reefs with Surfgrass	(-1.7)	No	$75,000	N/A	N/A	N/A	N/A	N/A	$150,000
	Reefs with Other Indicators	(-7.1)	No		N/A	N/A	N/A	N/A	N/A	
100	Reefs with Surfgrass	(-0.2)	No	$75,000	N/A	N/A	N/A	N/A	N/A	$150,000
	Reefs with Other Indicators	(-0.8)	No		N/A	N/A	N/A	N/A	N/A	
150	Reefs with Surfgrass	**2.1**	**Yes**	$75,000	$525,000	$4,200,000	N/A	$75,000	$4,725,000	$20,430,000
	Reefs with Other Indicators	**10.6**	**Yes**		N/A	$5,300,000	$40,000		$5,340,000	
200	Reefs with Surfgrass	**4.6**	**Yes**	$75,000	$1,150,000	$9,200,000	N/A	$75,000	$10,350,000	$44,300,000
	Reefs with Other Indicators	**23.2**	**Yes**		N/A	$11,600,000	$50,000		$11,650,000	

*Assumes 1:1 mitigation functional equivalent (used for cost-estimation purposes)

**Assumes 2:1 mitigation functional equivalent

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Table 6.2-3 Mitigation estimate for Solana Beach for the low sea level rise scenario.

Beach Width Option (ft)	Resource	Project-Related Impact (Acres)	Mitigation Required?	Estimated Construction Monitoring Cost**	Reef Mitigation**	Estimated Kelp Transplanting Cost**	Estimated Mitigation Monitoring Cost**	Total Mitigation Cost***
50	Intertidal Reef Platform	0.0	No	$75,000	N/A	N/A	N/A	$150,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A	N/A	
	Reefs with Other Indicators	-3.3	No		N/A	N/A	N/A	
100	Intertidal Reef Platform	**0.1**	**Yes**	$75,000	$50,000*	N/A	$75,000	$1,920,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**1.5**	**Yes**		$750,000	$10,000		
150	Intertidal Reef Platform	**0.3**	**Yes**	$75,000	$150,000*	N/A	$75,000	$7,270,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**6.5**	**Yes**		$3,300,000	$35,000		
200	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$8,800,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**8.0**	**Yes**		$4,000,000	$50,000		
250	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$11,630,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**10.6**	**Yes**		$5,400,000	$65,000		
300	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$13,650,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**12.8**	**Yes**		$6,400,000	$75,000		

*Based on out-of-kind mitigation cost

**Assumes 1:1 mitigation functional equivalent (used for cost-estimation purposes)

***Assumes 2:1 mitigation functional equivalent

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Table 6.2-4 Mitigation estimate for Solana Beach for the high sea level rise scenario.

Beach Width Option (ft)	Resource	Project-Related Impact (Acres)	Mitigation Required?	Estimated Construction Monitoring Cost**	Reef Mitigation**	Estimated Kelp Transplanting Cost**	Estimated Mitigation Monitoring Cost**	Total Mitigation Cost***
50	Intertidal Reef Platform	0.0	No	$75,000	N/A	N/A	N/A	$150,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A	N/A	
	Reefs with Other Indicators	(-3.2)	No		N/A	N/A	N/A	
100	Intertidal Reef Platform	**0.1**	**Yes**	$75,000	$50,000*	N/A	$75,000	$2,320,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**1.9**	**Yes**		$950,000	$10,000		
150	Intertidal Reef Platform	**0.3**	**Yes**	$75,000	$150,000*	N/A	$75,000	$7,670,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**6.9**	**Yes**		$3,500,000	$35,000		
200	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$9,810,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**9.0**	**Yes**		$4,500,000	$55,000		
250	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$11,630,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**10.8**	**Yes**		$5,400,000	$65,000		
300	Intertidal Reef Platform	**0.4**	**Yes**	$75,000	$200,000*	N/A	$75,000	$13,860,000
	Reefs with Surfgrass	(-0.4)	No		N/A	N/A		
	Reefs with Other Indicators	**13.0**	**Yes**		$6,500,000	$80,000		

*Based on out-of-kind mitigation cost

**Assumes 1:1 mitigation functional equivalent (used for cost-estimation purposes)

***Assumes 2:1 mitigation functional equivalent

6.2.2 Compensatory, Mid-Water, or Deep-Water Reef Mitigation Monitoring Plan

Similar to the Surfgrass Mitigation Monitoring Plan, permanent transects shall be established in the rocky reef area containing the kelp on the mitigation reef and at a reference site (control area) of similar depth. The same number of transects would be established in the control area as in the mitigation areas and transects would be at similar depths. On each kelp transect, the following parameters would be monitored at a minimum: 1) kelp density (number of kelp plants per square meter) of each age class, 2) holdfast diameter of each adult kelp plant on the transect, 3) number of stipes of each adult kelp plant on the transect, and 4) identification and quantity of associated flora and fauna. Transects should be monitored at the following intervals:

Post-compensatory mitigation implementation:

Year One

- within one month after completion
- 3 months after completion
- 6 months after completion
- 1 year after completion

Years Two through Five

- Spring survey
- Fall survey

Success Criteria

Success criteria of kelp would include determining if the measured parameters are significantly different than the reference transects. Success criteria for the mitigation reef itself (if it is not planted with kelp) would include no complete permanent burial of the reef. Because of the predominantly sandy bottom environment in the project area, placement of the deep water rocky reef would be considered successful if a characteristic invertebrate and fish community were to become established. On each kelp transect, the following parameters should be monitored and evaluated at a minimum: 1) kelp density (number of kelp plants per square meter) of each age class, 2) holdfast diameter of each adult kelp plant on the transect, 3) number of stipes of each adult kelp plant on the transect, and 4) identification and quantity of associated flora and fauna. Specific success criteria will be developed during the PED phase. General success criteria will consist of the following:

1. Approximately 50% - 60% of the fish, invertebrates, and algae found at the reference site occur at the mitigation site two years post-mitigation.

2. Approximately 50% - 60% of kelp survival at the mitigation site two years post-mitigation implementation.

Key assumptions are also provided Section 4.4.

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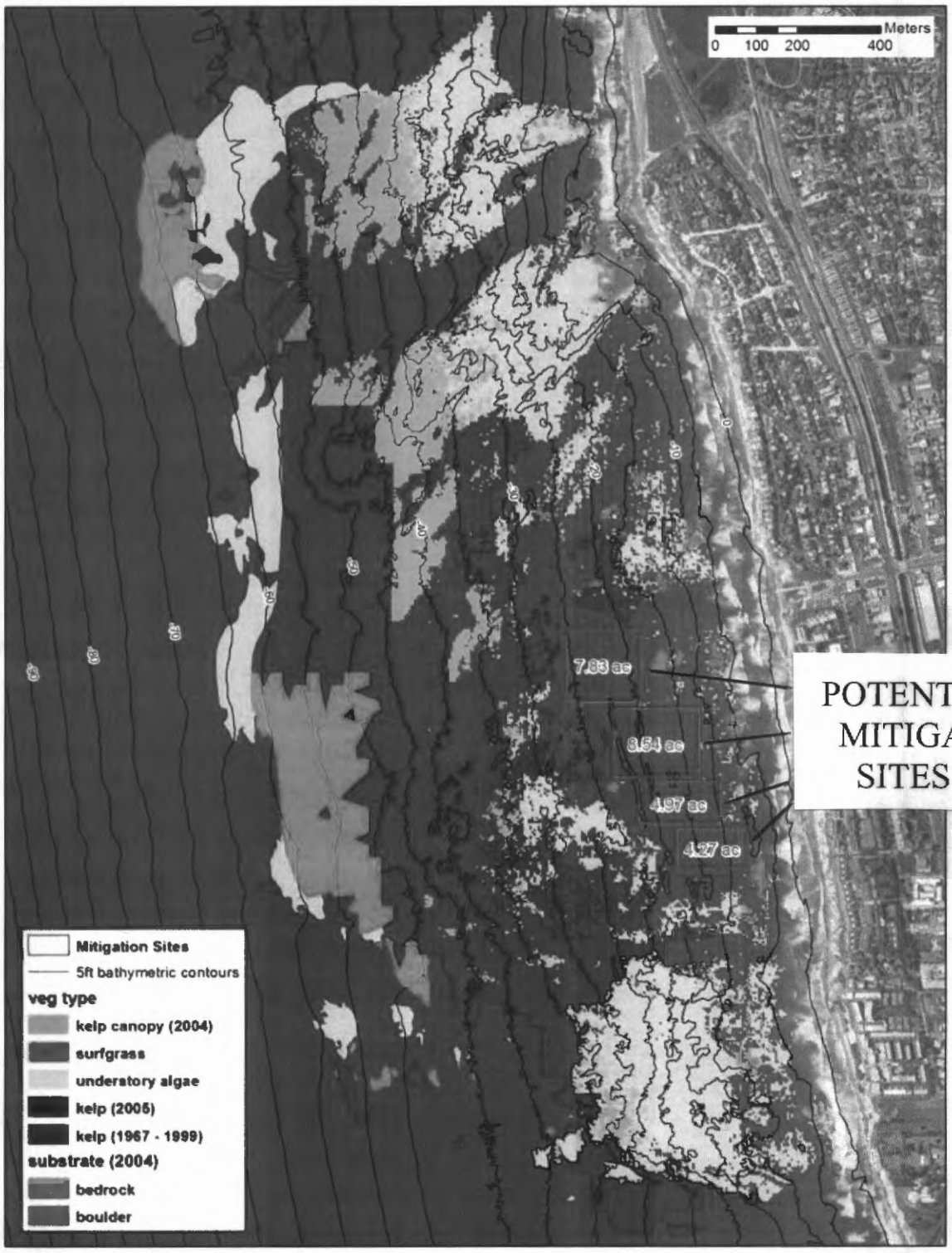

Figure 5.4-10 Potential mitigation areas off Solana Beach

EXHIBIT NO. 13
APPLICATION NO.
CD-003-13

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

February 26, 2013

Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
ATTN: Mr. Larry Smith (CESPL-PD-RN)
Los Angeles, California 90053-2325

Dear Dr. Axt:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the U.S. Army Corps of Engineers (Corps) integrated feasibility report and Environmental Impact Statement/Environmental Impact Report (Integrated Report) for the Encinitas-Solana Beach Coastal Storm Damage Reduction Project (Project). The purpose of the Project is to effectively reduce risks to public safety and economic damages associated with bluff erosion and to restore beaches along the shorelines of the cities of Encinitas and Solana Beach in San Diego County, California. NMFS has some concerns regarding the proposed project and the Integrated Report. The Encinitas-Solana Beach Project sets a precedent for how Corps may plan and implement large shoreline protection and beach nourishment projects for which sensitive nearshore habitats may be impacted. NMFS offers the following comments pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), and the Marine Mammal Protection Act (MMPA).

Proposed Action

The tentatively recommended plan is comprised of beach nourishment of a 100 foot (ft) wide beach for the City of Encinitas with re-nourishment cycles every 5 years and a 200 ft wide beach for the City of Solana Beach with re-nourishment cycles every 13 years. The Corps proposes an initial placement volume of 680,000 cubic yards (cy) at the Encinitas site and a total placement volume between 3,200,000 and 4,030,000 cy over 50 years. At Solana Beach, 960,000 cy is proposed for initial placement with a total placement volume between 2,210,000 and 4,040,000 cy of sediment.

The study area extends from the southern limits of the City of Solana Beach to the northern limits of the City of Encinitas. Two segments within this study area were identified for protection from bluff erosion. Segment 1 is a portion of the beach within Encinitas that extends approximately 7,800 ft from the 700 block of Neptune Ave south to West H Street. Segment 2 is approximately 7,200 ft long extending from the southern city limits of Solana Beach north to Tide Park, close to the northern city limits of Solana Beach.

Sand would be dredged from offshore using borrow sites designated as MB-1, SO-5, and SO-6. Table 3.3-1 summarizes the three offshore borrow sites considered for the project. Borrow sites SO-5 and SO-6 are identified as the primary sites. Material from borrow site SO-5 would be used for Segment 2 (Solana Beach). Material from borrow site SO-6 would be used for Segment 1 (Encinitas) until exhausted; at which time SO-5 would provide material for both Encinitas and Solana Beach alternatives. Borrow site MB-1 would be used as a supplemental source to contribute to required sand volumes under a high sea level rise scenario.

	MB-1	SO-5	SO-6
Volume Available (approximate)	5,800,000 cy	7,800,000 cy	1,300,000 cy
Surface Area	107 acres	124 acres	44 acres
Depth of the Dredge Cut (ft)	20	20	20
Depth of Borrow Site (MLLW)	-60 to -74 ft	-34 to -95 ft	-42 to -56 ft

The total cost of the tentatively recommended plan is $177,121,000.

Magnuson-Stevens Fishery Conservation and Management Comments

NMFS and the Corps established a finding, or agreement, that specified essential fish habitat (EFH) consultation procedures. Based upon this finding, National Environmental Policy Act documents prepared by the Corps should contain sufficient information to satisfy the requirements in Section 600.920(g) for EFH Assessments. As set forth in the regulations, EFH Assessments must include (1) a description of the proposed action; (2) an analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage; (3) the federal agency's views regarding the effects of the action on EFH; and (4) proposed mitigation, if applicable. If appropriate, the assessment should also include: the results of an on-site inspection; the views of recognized experts on the habitat or species affects; a literature review; an analysis of alternatives to the proposed action; and any other relevant information. The information must be easily found, and should include both an identification of affected EFH and an assessment of impacts. The level of detail in an EFH Assessment should be commensurate with the complexity and magnitude of the potential adverse effects of the action, 50 CFR 600.920 (e)(2).

The spatial and temporal scale and the associated environmental effects of this Project may have substantial adverse impacts to EFH. Dredging would affect 275 acres of subtidal habitat on the inner shelf. Disposal will directly impact 156 acres of beach habitat and indirectly affect a significant area of shallow subtidal habitat containing a number of sensitive resources and Habitat Areas of Particular Concern (HAPC). The exact acreage of affected HAPCs is difficult to quantify and is based upon a modeling effort described in the Integrated Report. Assuming all modeling assumptions are fully justified, the Integrated Report indicates 8.4 acres of rocky reef habitat would be impacted. Considering the potential additive impacts of increased sand in association with natural variation, the Project may impact 21 acres of rocky reef habitat. Given the potential for substantial adverse impacts to EFH, the Integrated Report should contain more detail regarding the effects of the action, alternatives analysis, and recommended mitigation measures. NMFS believes the Integrated Report provides insufficient information to fully

inform an analysis of the adverse effects on EFH. Below are specific points the Corps should address for analyzing effects of the action on EFH. Upon receipt of a revised analysis, NMFS will review and submit appropriate EFH Conservation Recommendations consistent with our finding.

Level of detail in EFH analysis

Although the EFH section within the Integrated Report indicates that EFH for species within the Pacific Groundfish and Coastal Pelagic Species Fishery Management Plans would be adversely impacted, it does not provide a list of managed species by life stage that may be affected by the Project. In addition, it does not include EFH for the Highly Migratory Species FMP. Lastly, it does not provide a detailed analysis of the effects commensurate with the scope of the Project.

Given the significant cost of the Project and the potential for substantial adverse impacts to EFH, NMFS believes that the views of recognized experts should be presented in the analysis. Experts could include university, agency, or private industry personnel with extensive knowledge about the habitat, managed species, or types of effects relevant to the proposed action. In addition, biostastical expertise may assist understanding of the confidence and risks associated with previous monitoring and the modeling assumptions used in the analysis. NMFS is aware that the Corps is conducting an Independent External Peer Review of the Project. Inclusion of the results from this review may benefit the EFH analysis.

NMFS encourages further review of the literature to ensure the conclusions made are adequately justified by the best scientific information available. Specific information regarding federally managed species may be found on our website:
http://swr.nmfs.noaa.gov/hcd/HCD_webContent/EFH/index_EFH.htm.
Additional references are cited in this comment letter. Below are some additional points that the Corps should consider for analyzing effects of the action on EFH.

Effects of dredging

The adverse effects of dredging on EFH may include: 1) direct removal/burial of organisms; 2) turbidity/siltation effects, including light attenuation from turbidity; 3) contaminant release and uptake, including nutrients, metals and organics; 4) release of oxygen consuming substances; 5) entrainment; 6) noise disturbances; and 7) alteration to hydrodynamic regimes and physical habitat. The dredging impacts of most concern to NMFS are impacts to the benthic invertebrate community and the permanent alteration to the topography of the seafloor at the borrow sites.

Many fishery species forage on infaunal and bottom-dwelling organisms, such as polychaete worms, crustacean, and other prey types. Dredging may adversely affect these prey species at the site by directly removing or burying these organisms. Recolonization studies suggest that recovery (generally meaning the later phase of benthic community development after disturbance when species that inhabited the area prior to disturbance begin to re-establish) may not be straightforward, and can be regulated by physical factors including particle size distribution, currents, and compaction/stabilization processes following disturbance. Rates of recovery listed in the literature range from several months to several years for estuarine muds to up to 2 to 3

years for sands and gravels. Recolonization can also take up to 1 to 3 years in areas of strong current but up to 5 to 10 years in areas of low current.

Boyd *et al.* (2005) examined the benthic community at an aggregrate dredge site that experienced extraction of >100,000 tons of substrate/year for 21 years. They concluded that the alteration in sediment characteristics from persistent dredging prevented the climax community from returning. Newell *et al.* (2004) found a decrease in species richness, population density, and biomass at an aggregrate dredging site compared to control areas. Early successional, opportunistic species comprise benthic communities at long-term dredge sites (Robinson *et al.* 2005). Thus, forage resources for fish that feed on the benthos may be substantially reduced until recovery is achieved. The Corps should further analyze the effects of a reduced foraging base and the implications of precluding the development of a benthic invertebrate climax community.

The Integrated Report indicates that benthic recovery would be expected to be similar to Regional Beach Sand Project I and concludes that the impact would be less than significant on a regional level. It is anticipated that the impact would also be less than significant on a local level given that no long-term alteration of the benthic community was found 9 years after implementation of RBSP I. However, NMFS notes that the benthic community impact analysis conducted for the borrow sites at RBSP I was not comprehensive and may not adequately assess environmental impacts associated with dredging at the borrow sites. According to SANDAG (2011), the sampling effort associated with the borrow sites was limited given the reconnaissance level of the survey. NMFS believes additional analysis is warranted given the spatial (combined area of borrow sites are 275 acres) and temporal scale (50 year project with repeated dredging) of the Project.

Effects of sand placement

The disposal of dredged material on the beach may adversely affect EFH by 1) impacting or destroying benthic communities; 2) impacting adjacent sensitive habitats; 3) creating turbidity plumes and introducing contaminants and/or nutrients. Of primary concern to NMFS are the potential impacts associated with the sediment disposal to sensitive nearshore resources (e.g. seagrass and reef habitat) and beach habitat.

Reef habitat

The Integrated Report indicates that reef features are naturally exposed to periodic burial, so that short-term burial resulting from the project is not a loss. However, short term burial at depths of 0.8 feet exhibited a statistically significant decline in surfgrass shoot count within a laboratory setting (Craig *et al.* 2008). Thus, surfgrass habitat is likely to be impacted by beach nourishment and shoreline protection projects that place sand either directly or indirectly onto surfgrass beds (Craig *et al.* 2008). Surfgrasses exhibit late successional traits, recover very slowly from disturbance, require facilitation from algae before settling, and are strong competitors (Turner 1985). Additive impacts and repeated beach nourishment efforts likely will increase this rate of disturbance to these systems. Slow recovery times suggest that disturbances to these communities may be ecologically significant. Given that algal turf community facilitates

surfgrass settlement, consideration should also be given to reefs containing turf algae. They do not appear to be accounted for in the nearshore impact analysis.

Removal of surfgrass from a rocky reef community has profound impacts to community structure (Turner 1985). Galst and Anderson (2008) have suggested that surfgrass is important for nearshore fish communities and reductions in surfgrass could negatively affect recruitment patterns. Specifically, experimental reductions in coverage of seagrass (ranging from 7 to 180 square meters) resulted in significant decreases in the density of newly recruited fish species. Similarly, NMFS expects reductions in coverage and/or density may reduce other ecological services provided by surfgrass, such as shelter, foraging, primary productivity, substrate for epibiota, and wave energy dissipation.

Beach habitat

Under the tentatively recommended alternative, a maximum of 93 acres of beach habitat would be disturbed by construction at Encinitas and 63 acres at Solana Beach. The Integrated Report concludes that recovery of the invertebrate prey base would be complete in less than 1 year. Due to the relatively small area affected, and the widespread occurrence and relatively rapid recovery rates of sandy beach invertebrates, the Integrated Report concludes that direct impacts to marine invertebrates within the receiver site footprints are expected to be less than significant. However, the Integrated Report provides little scientific rationale for this conclusion.

Although beach nourishment has the potential to restore ecosystem functions of sandy beach communities, persistent disturbances may preclude natural recovery Revell *et al.* (2011). Following a major El-Nino on nearby beaches, recovery of wrack abundance and shorebirds to pre-El Nino levels took 3 years. Reductions in biomass and mean size of invertebrates were still detected 2 years after the event. The loss of larger and older cohorts of intertidal invertebrates (e.g., sand crabs, E. analoga, and pismo clams, T. stultorum) may take 1 to 10 years for recovery.

The benefit of sandy beach habitat to fishery resources is often overlooked because of frequent disturbance, low primary productivity and minimal habitat heterogeneity (Dexter 1992). Energy input is primarily from allocthonous organic material (e.g. macrophytes, phytoplankton) and plankton that supports high densities of filter-feeding, benthic macroinvertebrates (Polis and Hurd 1996, Dugan *et al.* 2003, Crawley *et al.* 2006). These invertebrates are a valuable link to upper level predators such as fishes and shorebirds (Leber 1982).

Beach maintenance activities such as nourishment and bulldozing cause high rates of mortality in benthic macroinvertebrates (Speybroeck *et al.* 2006). For example, the impact to sand crabs (*Emerita* spp.) and clams from beach maintenance activities has been well documented (Peterson *et al.* 2000, Peterson *et al.* 2006). Recovery of these macroinvertebrates can take up to two years if no additional disturbances occur (Dolan and Stewart 2006). For some species, such as Pismo clams, recovery may take even longer (Revell *et al.* 2011).

Losses of benthic invertebrates cascade through the food web by decreasing the abundance of prey items available to recreationally and commercially important fishes. Recreationally important species such as barred surfperch and California corbina (Efford 1965, Barry *et al.*

1996) consume these macroinvertebrates, as well as many other fishes trophically linked to recreationally and commercially important fishes. Other recreational fishes include barred surfperch, white seabass, queenfish, spotfin croaker, California halibut, jacksmelt and California grunion utilize this habitat for foraging (Allen and Pondella 2006). In addition, leopard shark (*Triakus semifasicata)*, managed under the Pacific Groundfish FMP, utilize shallow coastal waters as pupping and feeding/rearing grounds. Neonate pups occur in and just beyond the surf zone in areas of southern California. Therefore, repeated disturbances are likely to have cumulative impacts to prey availability. Changes in the availability of prey resources reduce the quality of habitat and may adversely affect the overall fitness of fishery species in the area.

Adequacy of nearshore impact analysis

Sediment transport modeling was used to predict the influence of the project on sand elevations in the vicinity of the receiver sites. A 2004 LiDAR dataset was used as base bathymetry to examine changes in sand thickness. Substrate and vegetation data from 2002 was added as a layer to indicate areal coverage of the resources. Modeled sedimentation results were then overlaid on these data sets. In addition, a sand layer was created from empirical data provided from the 1996 to 2008 coastal profile dataset and was used to estimate sedimentation and potential impacts to resources based on natural variation. The potential project-related impact was determined by subtracting the most probable impact from natural variation. Encinitas modeling indicates no project-related impact to nearshore resources. Solana Beach modeling estimates indicate a permanent impact to approximately 8.4 acres of rocky reef. However, no impacts to reefs supporting surfgrass were predicted.

The Integrated Report indicates this methodology was developed in coordination with CDFG, NMFS, and USFWS. However, NMFS staff expressed concerns with the approach at an October 2011 interagency meeting and requested that various assumptions be more fully described and justified. Examples of issues suggested to be more clearly explained were 1) how natural variation was defined and incorporated into the modeling and analysis, 2) a rationale for assuming the average condition as the most probable impact, and 3) a description of how maximum and minimum impacts were described. However, the methodology provided in the Integrated Report is not substantively different than that provided by the Corps in 2011. NMFS maintains staff's previous recommendation that the methodology provide additional justification for the assumptions used in the analysis. Below is some additional discussion regarding the three points mentioned above.

Based upon the methodology description, the Integrated Report calculates natural variation by using coastal beach profile datasets. Profile data may provide some indication of changes in sand depth, but are not reflective of variation in biological resources associated with reef habitat. There are limitations to this approach that have previously been described. NMFS notes the following conclusions in the RBSP Year 4 Post-Construction Monitoring Report:

> *Beach profile data are primarily bathymetric (i.e., water depth) data along a narrow corridor, and differences can be perceived as changes in sand cover. However, transect data cannot provide sand cover over a large area, but only along the transect line. Beach profile data are very good for observing general patterns; however, the primary*

limitation, especially in areas where there are reefs, is the inability to address changes in reef area. To document reef area and seasonal changes in reef area, remote sensing surveys, similar to what was conducted for SANDAG's Nearshore Inventory Program would need to be conducted.

Moreover, simple subtraction of the natural variation in sand depth from the predicted sand burial depth expected from the project does not seem to be a justified approach for evaluation of reef impacts. This approach does not seem consistent with the impact evaluation procedure for RBSP I and II. The estimated project-related impacts were calculated by subtracting the standard deviation of empirical coastal profile data from the most probable impact of beach nourishment (Table 5.2-4). However, subtracting one standard deviation from the mean only represents 34.1% of possible impact values. Typically, confidence intervals encompassing 90% to 95% of possible values are reported (Douglass *et al.* 1999; Stockdon *et al.* 2002). In addition, solely subtracting the standard deviation assumes sedimentation will only decrease as a result of natural variation. It is inherent in the definition of 'natural variation' that values may increase or decrease. If the analysis subtracted the standard deviation only to show natural variation was greater than the probable project impact, the analysis then ignored the potential synergistic effects of project impacts and natural variation. Therefore, NMFS believes this method may be statistically inadequate to model potential project impacts. The additive effects of sand placement may exceed the ability of biological indicator species to withstand naturally occurring sand movements. The most probable impact, as presented in Appendix H, may provide a better indication of the potential for additive impacts associated with sand placement. Under the tentatively recommended plan scenario, 1.8 acres of reef with surfgrass and 6.7 acres of reef with other biological indicators may be impacted at Encinitas and 0.4 acre impact to intertidal reef platform and 12.1 acres of reef with other biological indicators may be impacted at Solana Beach.

The theoretical sand surfaces appear to be based upon average values of sand movement. Denny and Gaines (1990) demonstrated the inadequacy of means and variances as sole descriptors for considering the impact of wave forces on the population dynamics and evolution of marine species. Gaines and Denny (1993) suggest that many other ecological and evolutionary problems are also better expressed in terms of extreme values than in terms of means and variances. They suggested that physical stresses that kill or physiologically impair are clear examples where maxima or minima are often more critical than means for predicting community structure. Given that sediment burial and scour are significant physical stressors in the affected area, NMFS would expect that the maximum values of sand movement may be more appropriate for determining potential impacts to reef habitat. The Corps should further justify the application of average values for their impact determination and present the range of impacts that may occur using the minimum and maximum values associated with sand movement.

NMFS further questions the conclusions that no surfgrass impacts will occur based upon results from RBSP I. NMFS notes the following from the RBSP Year 4 Post-Construction Monitoring Report:

Sand cover at SB SS-2 [a transect at the Solana Beach site] *increased to levels beyond what was observed prior to the RBSP and remained at those levels. At SB-SS-2, the only*

> *apparent source of sediment was the RBSP suggesting that the RBSP may have potential impacts on this nearshore reef. The increased sedimentation did not appear to affect surfgrass cover; however, shoot density declined as a possible response to the increased sedimentation. If sedimentation persists it is likely that declines in indicator species would occur.*

and

> *Based on the volume of material that was placed at the receiver sites for the RBSP, no environmental impacts were observed; however, the placement of large quantities (exceeding that of the RBSP) in close proximity to nearshore sensitive resources may result in significant impacts to these resources.*

Based upon figures provided by the Corps during an October 2011 interagency meeting, the two receiver sites overlap previous beach nourishment sites from RBSP I. Specifically, 146,000 cy were placed at Solana Beach and 105,000 cy were placed at Encinitas. Initial placement volumes for the Project are more than six times that placed at RBSP I. Thus, in light of the conclusions from RBSP I above, significant impacts to nearshore sensitive resources at both project sites may occur.

Lagoon impacts and mitigation measures

San Elijo Lagoon and San Dieguito Lagoons occur in close proximity to the nourishment sites. San Elijo Lagoon lies between the two nourishment sites and may have the greatest potential for adverse impacts associated with increased lagoon sedimentation. San Dieguito Lagoon lies to the south of the Solana Beach nourishment site. According to Appendix B-2, as gross transport increases with increasing beach nourishment, lagoon sedimentation is expected to increase. An increase in lagoon sedimentation is a negative project impact, and the estimated costs of removing the sedimentation by dredging provide a valuation of this impact. However, this impact is not described in Section 5.4 Biological Resources nor are mitigation measures identified to address the increased sedimentation. In addition, no environmental commitments are identified in Section 10.2. This impact may also warrant discussion in Section 5.1 Geology and Topography and/or Section 5.2 Oceanographic and Coastal Processes.

Analysis of previous monitoring

During the environmental review of a similar, but smaller project (San Clemente Beach Nourishment project), NMFS conveyed concerns regarding the adequacy of analysis and conclusions drawn from previous studies. Peterson and Bishop (2005) reviewed 46 beach monitoring studies and showed that: 1) only 11 percent of the studies controlled for both natural spatial and temporal variation in their analyses; 2) 56 percent reached conclusions that were not adequately supported; and 3) 49 percent failed to meet publication standards for citation and synthesis of related work. They opined that regulatory and resource agency practices are in urgent need of reform as the risk of cumulative impacts grows in the face of sea level rise, climate change, and increased coastal development. NMFS notes that, with the exception of one project from the 1970s, all the studies that were reviewed were on the Atlantic or Gulf coastlines.

Thus, their results may not be directly applicable to projects implemented in Southern California. However, NMFS shares the concerns expressed by the authors that the presumption that nourishment projects are ecologically benign may be based upon an incomplete and flawed body of science. If previous monitoring results in Southern California are to be used as support for conclusions that impacts to biological resources are minor and/or insignificant, NMFS believes a more rigorous examination of their sampling design, statistical analyses, and conclusions are necessary.

Erosion sources and effect on alternative analysis

The Integrated Report is supposed to describe existing and future without-project conditions of the study area and identify problems and opportunities to reduce storm damages, improve public safety, increase recreation opportunities, and protect the environment. The Monte Carlo Simulation used to model bluff failure appears to focus on bluff toe erosion from waves. Bluff erosion also occurs from groundwater, rainfall, and failures at the bluff top. According to Young *et al.* (2009), nine seacliff sections in southern California showed maximum seacliff erosion in the the most rainy time period when wave energies were not particularly elevated. Although the Corps' authority may focus on bluff toe protection, the analysis should still address other other sources of erosion. At a 2011 interagency meeting, NMFS and FWS staff requested that the analysis account for other sources of bluff erosion. Since erosive forces other than just wave energy may occur at the bluff top and on the bluff face, they need to be more clearly accounted for in the alternative formulation and analysis. Groundwater and rainfall may require armoring and/or retreat to reduce risks to public safety and economic damages.

Economic analysis

Significant expenditure of public dollars requires thorough analysis of the alternatives. NMFS recognizes the importance of infrastructure protection, recreation benefits, and public safety that may be derived from the beach nourishment approach proposed in the Integrated Report. Project alternatives were formulated to exclusively reduce erosion to the base/toe of the bluff. The Integrated Report compares the bluff erosion damages that are prevented by the Project to the damages associated with residual sloughing at the bluff top edge that would not be prevented by a Federal-interest project. This comparison provides an indication of the level of economic risk expressed as a percentage of the residual damages as a share of the preventable damages. The "Level of Risk" for the tentatively recommended plan is 32% at Encinitas and 45% at Solana Beach.

A similar level of risk factor should account for the environmental risks. Environmental costs should be fully considered in the economic evaluation of the project. The proposed Project involves six times the amount of material used during previous beach nourishment projects and may have significant environmental impacts. The Corps has acknowledged the potential need to mitigate 8.4 acres of rocky reef impact, but NMFS has concerns that this may be an underestimate. Furthermore, there is uncertainty whether the proposed mitigation would offset impacts to rocky reef habitat. Lastly, the environmental costs associated with repeated disturbance to soft bottom communities are not incorporated into the analysis. The Corps maintains that there are adequate contingency measures in place to account for uncertainty

regarding environmental impacts. NMFS has previously questioned the Corps reliance on their contingency measures during the project planning phases and expressed concerns about the modeling assumptions. An informed decision as to whether the project achieves a positive benefit cost ratio (BCR) is compromised if accurate costs are not provided for monitoring and mitigation. The Corps should provide a more explicit accounting for the range of potential impacts to marine resources and provide a justified worse-case scenario in the economics analysis.

Managed retreat alternative analysis

The Integrated Report indicates there are no quantitative economic benefits that would enable a managed retreat alternative to qualify for a Federal interest since the benefit to cost ratio would be less than one and the Cities of Encinitas and Solana Beach do not support a Managed Retreat Alternative. However, the analysis of this alternative within the Integrated Report is based upon a very limited cost-benefit analysis and does not consider alternatives evaluated in detail elsewhere in the State (e.g., ESA PWA (2012)). Given the cost of the proposed Project ($177 million), the economic "Level of Risk", the uncertainty of environmental impacts, and the likely need to continue similar actions after the life of the Project, managed retreat warrants additional analysis.

Conclusion and Preliminary Recommendations

NMFS believes the Integrated Report provides insufficient information to fully inform an analysis of the adverse effects on EFH. We have identified specific issues above that would improve the overall analysis. Upon receipt of a revised analysis, NMFS will review and submit appropriate EFH Conservation Recommendations consistent with our finding. In the interim, NMFS offers the following recommendations to consider in your decision-making process.

1. According to Table 3.1-2 which summaries the preliminary screening of alternatives, all of the beach nourishment alternatives with various beach width increments would meet the fundamental objectives of the Project. The primary difference amongst these alternatives is the extent to which the economic analysis justifies a Federal interest in the Project. If the basic objectives of the Project may be met via a reduced beach nourishment volume, NMFS recommends the alternative(s) with the minimum beach width to avoid and/or minimize impacts to EFH.

2. A scientifically defensible monitoring plan should be developed prior to a record of decision on the proposed project. The purpose of the monitoring plan is to detect environmental impacts associated with the proposed project and serve as the basis for determining whether compensatory mitigation is appropriate. Results from the monitoring plan will inform the development of a final mitigation plan, which will be based upon the approach described in the contingency mitigation plan. The monitoring plan should be described in greater detail than the program currently described in Section 6.1 of Appendix H. The sampling design and statistical analyses should be clearly described and should be based upon fundamental principles of statistical inference. This monitoring plan should be reviewed and approved by the Corps, NMFS, and other interested resource agencies prior to a record of decision. In addition, to

ensure adequate scientific rigor, consideration should be given to involving an independent review by recognized, biostatistical experts.

3. According to Appendix B Coastal Engineering Appendix, the Project will result in increased sedimentation to nearby coastal lagoons. Maintenance of lagoon mouths is necessary to ensure adequate tidal circulation to support the ecological functions provided by these sensitive lagoon habitats. The Corps should provide funding to the appropriate entities responsible for lagoon mouth maintenance to offset any increases in lagoon sedimentation at lagoon systems adversely affected by the Project.

4. As described in the Integrated Report and expressed in our comments above, there is great uncertainty regarding the extent of impacts to nearshore reef habitat. NMFS questions some of the assumptions used in the nearshore habitat impact analysis. The Corps should explicitly address each of the identified concerns, provide detailed justification for the assumptions, and provide a range of potential mitigation alternatives that may be necessary to offset the adverse impacts to nearshore reefs and EFH.

Endangered Species Act Comments

As a Federal agency and pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et. seq.), the Corps shall, in consultation with and with the assistance of NMFS, insure that any action it authorizes, funds, or carries out, does not jeopardize the continued existence of any species listed as threatened or endangered, or result in the destruction or adverse modification of designated critical habitat designated. In order to comply with the ESA, the Corps should determine whether any ESA-listed species or designated critical habitat may be adversely affected by the Project. NMFS recommends that the Corps engage in consultation with the NMFS Protected Resources Division in Long Beach, California, for assistance with ESA compliance. Upon request, NMFS staff may be able to help in determination of which ESA-listed species or designated critical habitat, if any, may be present in the Project area and how these ESA-listed species or designated critical habitats may be directly or indirectly affected by the Project. NMFS staff may also be able to assist in development of protective measures that can help minimize the potential for adverse effects to ESA-listed species or designated critical habitat.

Marine Mammal Protection Act Comments

Marine mammals are protected under the Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1361 et. seq.). Under the MMPA, it is generally illegal to "take" a marine mammal without prior authorization from NMFS. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. Except with respect to military readiness activities and certain scientific research conducted by, or on behalf of, the Federal Government, "harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

NMFS recommends that the Corps assess the potential for harassment or injury to marine mammals as a result of the Project, and implement any measures that may be necessary prevent the take of any marine mammals, as defined under the MMPA. If the incidental take of marine mammals is expected to occur as a result of the Project, the Corps should apply for an Incidental Harassment Authorization (IHA) or Letter of Authorization (LOA) from NMFS well in advance of the Project. NMFS staff is available to assist with this assessment and compliance with the MMPA, including any IHA or LOA applications, upon request from the Corps. If it becomes apparent that impacts to marine mammals in the form of "take" may be occurring as a result of the Project that has not been authorized, the Corps should cease operations and contact NMFS immediately to discuss appropriate steps going forward.

Thank you for considering our comments. Please contact Mr. Bryant Chesney at (562)980-4037, or via email at Bryant.Chesney@noaa.gov if you have any questions concerning our EFH comments or require additional information. If you have any questions pursuant to ESA or MMPA issues, please contact Dan Lawson at (562) 980-3209 or Dan.Lawson@noaa.gov, or Monica DeAngelis at (562) 980-3232 or Monica.DeAngelis@noaa.gov, respectively.

Sincerely,

For

Rodney R. McInnis
Regional Administrator

cc: Administrative File: 150316SWR2005HC_N183

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To:	Smith, Lawrence J SPL
Cc:	Carol Roberts; David Zoutendyk (David_Zoutendyk@fws.gov); Munson.james@Epa.gov; Clifford, Jodi L SPL; Ming, Susan M SPL; Ota.Allan@epamail.epa.gov
Subject:	Encinitas and Solana Beach Storm Damage Reduction Draft Environmental Impact Statement/Environmental Impact Report/Feasibility Study
Date:	Tuesday, March 05, 2013 12:54:19 PM

Larry,

Thanks for your note below. Please note that I remain the USFWS main point of contact on the proposed project. Please send related correspondence, such as your email below, to me.

Per your email below, we have limited further comments and recommendations on the subject draft EIS/EIR beyond those stated in our draft Coordination Act Report that we sent you on 9 November 2012. The general recommendations from our draft CAR are repeated below.

Our one additional comment is that we disagree with the Corps' determination that the proposed action would have "no effect" on the California least tern or snowy plover. Pursuant to the Endangered Species Act we suggest that consultation on snowy plover and California least tern is appropriate and warranted for the proposed action.

Thanks,

Jon

From:
USFWS Draft Coordination Act Report, November 2012
Encinitas and Solana Beach Shoreline Protection Project

RECOMMENDATIONS
The FWCA states that" ... wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation ... " In accordance with the FWCA, we make the following recommendations to avoid and minimize
negative effects to fish and wildlife resources.

1. Considering the RBSP pre-project modeling, the subsequent reduction in sand replenishment quantities of the RBSP based on this modeling, and post-project monitoring that determined no significant long-term impacts to biological occurred, the Corps should use the same (or smaller) sand replenishment quantities as those used in the RBSP. If the Corps decides to proceed with larger sand replenishment quantities than the RBSP, the Corps should use the GENESIS model and/or a similar equivalent model to predict sand movement over the life of the Project. This model should take into account (as model baselines for initial and recurrent proposed replenishment volumes) the recent and likely future sand replenishment efforts by others in the Study Area over the life of the Project (e.g., 2012 RSBP) and predict what: a) biological resources may be affected (e.g., reefs, surfgrass beds, or kelp beds buried) by Project-associated sand movement in the littoral system; and b) effects may occur to the coastal lagoons in the area (i.e., Batiquitos, San Elijo, and San Dieguito). The Corps should identify the spatial and temporal extent of Project-related sand that would likely bury sensitive resources. The Corps should also predict the magnitude of sand predicted to enter the lagoons or reduce the present fluvial exchange regimes oflagoon mouths, and the associated removal costs of any additional sand. The proposed Project beach replenishment quantities, footprints, and or timing should then be modified to avoid any significant long-term impacts to biological resources or from sand migration into the lagoons. Any predicted remaining biological impacts from replenishment sand should be mitigated as directed by a

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biological working group consisting of representatives from the California Department of Fish and Game, Corps, National Marine Fisheries Service, and the Service.

2. If the Corps decides to proceed with larger sand replenishment quantities than the RBSP, the Corps should implement the monitoring protocol used for the RBSP (Engle 2005), and/or a similar equivalent protocol, to determine if the Project causes any significant long-term impacts to biological resources and/or lagoons.
Implementation of a monitoring program should be overseen by the above-noted biological working group. The biological working group would also review monitoring reports and make recommendations for the future replenishment activities during the 50-year life of the proposed Project.

3. The Corps should perform surveys for least terns, snowy plovers, and grunion in the Study Area during the environmental review process and before each replenishment event, to determine current nearshore use for foraging by breeding least terns, and beach use by grunion and wintering or breeding snowy plovers. If Project activities must occur during the breeding seasons of these species (or wintering season for snowy plovers) and they are present in the Project area, measures developed by the biological working group should be implemented to avoid, minimize, and offset potential impacts.

4. As was done for the RBSP, the Corps should place funds in an interest bearing account of sufficient quantity to guarantee a means to mitigate any significant long-term adverse impacts documented by the monitoring program. Such mitigation could include creation of artificial reefs and the clearing of lagoon inlets, as determined to be appropriate by the biological working group.

5. The Corps should monitor the extent of turbidity plumes at the dredge and beach replenishment sites throughout the duration of dredging and sand placement activities. Each turbidity plume should not exceed 2.5 ac (1.0 ha) at any given time. If a plume is documented to be greater 2.5 ac (1.0 ha), Project operations should cease until the plume has receded to less than 2.5 ac (1.0 ha). Surface turbidity plumes should be avoided during the most sensitive periods for California least terns, from early May to late July. For the purpose of monitoring, surface turbidity is defined as a change in ambient conditions in the water column visible to the naked eye and where a secchi disc reading is less than 3.3 ft (1 m). Turbidity plumes with a secchi disc reading greater than 3.3 ft (1 m) would not require monitoring per these recommendations.

6. If a hopper dredge is used, a morning glory spillway or similar type spillway that conveys overflow water below the bottom of the hull for discharge should be used.

7. If a cutterhead dredge is used, it should back flush a minimum of 16 ft (5 m) below the surface and not at the surface. Turbidity monitoring would not be necessary if this method and back flush technique are implemented.

8. Sand placed in the nearshore with the intent to replenish beaches should be placed directly within the littoral zone, in depths as shallow as practicable, to reduce in-water impacts and provide the most nourishment to beaches. Any Project replenishment sand not deposited onshore should be deposited directly into the littoral zone, at depths of-19 ft (-6 m) MLL W or less, wherever practicable (SANDAG and CSMG 2006). No sand intended for beach replenishment should be deposited at depths greater than-30ft (-9 m) MLLW (SANDAG and CSMG 2006, EPA 2012).

9. To help avoid and/or minimize potential impacts due to operation of equipment offshore of the beach replenishment sites, the Corps should develop a plan based on diver surveys that includes details of the proposed locations of all pipelines, cables, anchors, and any other equipment to be used. If submerged pump lines are used to place dredged material onto the beach, they should be outfitted with tractor tires or equivalent bumpers to minimize abrasion of the ocean floor or reefs. Construction monitoring should include monitoring of equipment and activities offshore of the beach replenishment sites. Pumpout of fluids from offshore equipment (such as holds or ballast tanks) should be avoided. If problems are detected, operations should cease until the any problems observed during monitoring are remedied. Pre- and post-construction surveys should be performed to document any adverse biological impacts. Any impacts should be mitigated as directed by the biological working group.

10. The Corps should maintain and operate all Project-related equipment in such a manner as to prevent contaminants (e.g., fuel, oil, grease, coolant, hydraulic fluid, hold and tank pump-outs, etc.) from entering the ocean, local streams/storm drains, or beach areas directly or indirectly).

11. The Corps and Cities should work with the California Department of Transportation, Caltrans, San Diego Association of Governments, North County Transit District, the 22nd District Agricultural Association, the cities of Oceanside, Carlsbad, and Del Mar, resource agencies, and others, to develop and implement hydrological/fluvial solutions to the sediment capturing effects of the artificial fill (e.g., road and railroad berms) and bridge-related structures associated with the freeway, railroad, and road crossing of the lagoons and stream/rivers in north San Diego County. For example, the Corps and Cities should investigate the benefits and costs of partially restoring storm flow sediment delivery capacity of Escondido Creek/San Elijo Lagoon to the ocean, through substantially expanding the water-flow openings of the road and railroad crossings (two bridges and a trestle) over the lagoon. The potential benefits of this would be to: a) restore more natural levels of sediment delivery to the ocean and beaches; b) reduce the anthropocentric trapping of sediments in, and concomitant degradation of, local lagoons; and c) increase the effective longevity, and reduce the needs, costs, and impacts of, beach replenishment and lagoon restoration efforts in north San Diego County.

---------- Forwarded message ----------
From: Smith, Lawrence J SPL <Lawrence.J.Smith@usace.army.mil>

Date: Thu, Feb 28, 2013 at 4:42 PM
Subject: RE: Notice of Availability Encinitas/Solana Beach (UNCLASSIFIED)
To: "David Zoutendyk (David_Zoutendyk@fws.gov)" <David_Zoutendyk@fws.gov>, "Munson.james@Epa.gov" <Munson.james@epa.gov>
Cc: "Clifford, Jodi L SPL" <Jodi.L.Clifford@usace.army.mil>, "Ming, Susan M SPL" <susan.m.ming@usace.army.mil>, "Ota.Allan@epamail.epa.gov" <Ota.Allan@epamail.epa.gov>

Classification: UNCLASSIFIED
Caveats: NONE

Gentlemen,

We have not received comments from either the USFWS nor the USEPA. The comment period for the project has closed, as of February 26, 2013. Please let us know as soon as possible if you plan to submit comments and when we can expect to receive them. We will accept late comments, provided they are submitted within a week from today. We are on a tight schedule and cannot delay any further than that. If we do not hear from you, we will have to assume that your agency does not choose to comment on the proposed project. If you mailed comments, please scan the comment letter and email to me, in case your letter got lost in the mail.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
www.dfg.ca.gov
Marine Region
4665 Lampson Avenue, Suite C
Los Alamitos, CA 90720
(562) 342-7210

EDMUND G. BROWN, Jr., Governor
CHARLTON H. BONHAM, Director

February 27, 2013

Ms. Josephine R. Axt, Ph.D
US Army Corp of Engineers
P.O. Box 532711
Los Angeles District
ATTN: Mr. Larry Smith (CESPL-PD-RN)
Los Angeles, California 90053-2325

Subject: Encinitas and Solana Beach Storm Damage Reduction Draft Environmental Impact Statement/Environmental Impact Report/Feasibility Study (SCH # 2012041051)

Dear Ms. Axt:

The Department of Fish and Wildlife (Department) has reviewed the Encinitas and Solana Beach Storm Damage Reduction Draft Environmental Impact Statement/Environmental Impact Report (draft EIS/EIR) and Feasibility Study. This report was prepared by the US Army Corp of Engineers (USACE). The proposed Project is described as follows:

- Segment 1: The City of Encinitas will have a portion of their beach area replenished with sand extending laterally 7,800 feet from the 700 block of Neptune Ave. and Daphne south to West H St. The southern portion of this segment is located in the northern most portion of Swami's State Marine Conservation Area (SMCA). The beach sand replacement alternatives include pumping between 340,000 and 800,000 cubic yards of sand onto the beach from an offshore borrow site. Each alternative includes a bluff notch fill in order to repair the undercut bluff areas. This alternative includes 5 or 10 year sand replenishment cycles.

- Segment 2: The City of Solana Beach portion of the Project will encompass the city limits and extend laterally 7,200 feet from approximately Tide Park south to the southern city limit. The beach sand replacement alternatives include pumping from 440,000 to 1.62 million cubic yards of sand onto the beach from an offshore borrow site. Each alternative includes a bluff notch fill in order to repair the undercut bluff areas. This alternative includes 10 or 13 year sand replenishment cycle.

- Both segments propose replacing sand on extensively eroded beach areas for public safety, recreation, infrastructure and private property protection. The

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project alternatives in the draft EIS/EIR include: no project, replacement of beach sand, and bluff notch filling for the two non-contiguous segments of beach.

As a trustee for the State fish and wildlife resources, the Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants and habitat necessary for biologically sustainable populations (California Fish and Game Code §1802). In this capacity, the Department administers the Marine Life Protection Act (MLPA) and other provisions of the California Fish and Game Code and California Code of Regulations (CCR), Title 14 that afford protection to the fish and wildlife of the State. The Department is a Trustee Agency for purposes of CEQA [CCR, Title 14, §15386(a)]. Under the MLPA, the Department is responsible for marine biodiversity protection in coastal marine waters of California. Pursuant to our statutory authority, the Department submits the following concerns, comments, and recommendations regarding the Project.

Impacts to Marine Fish and Wildlife

The draft EIS/EIR indicates that Project activities may directly impact and permanently bury or scour existing intertidal reefs with surf-grass and algae, as well as abalone and other invertebrates. Other sensitive habitats observed by Department staff within or adjacent to the two project segments include: large intertidal boulders, tide-pools, and sub-tidal reef pedestals. The draft EIR/EIS has not adequately identified these resources and potential impacts to these habitats from Project activities, or provided adequate avoidance, minimization and mitigation measures. Many species rely on these habitats for attachment, shelter, roosting, foraging and reproduction.

The Department also has concerns regarding the potential for direct loss and degradation to marine plants and animals from Project activities. Both of the Project segments are located in high energy wave areas. Once algae or surf-grass mats are removed, it is difficult for them to re-establish on reefs naturally or by transplantation, due to harsh wave conditions. Additionally, indirect adverse impacts including scour and/or burial may occur due to storms and cross-shore or long-shore sediment transport. The draft EIR/EIS should adequately identify these potential impacts from Project activities, and provide adequate avoidance, minimization and mitigation measures.

Impacts from Project activities may permanently change the community structure of existing sandy beach habitats within or adjacent to the Project segments. These habitats are critical to the preservation and maintenance of the vast array of fish and wildlife resources that utilize these areas. For example, the intertidal sandy beach is important foraging and spawning habitat for the California species of special concern and federally threatened Western snowy plover (*Charadrius alexandrinus nivosus*) and the California grunion (*Leuresthes tenuis*). Coastal strand habitat is an important and diminishing California natural resource and supports a unique ecological community (Dugan and Hubbard 2009). The draft EIS/EIR does not adequately discuss the

impacts to sandy beach and coastal strand species and habitats, nor how it should be conserved during initial and subsequent beach construction.

Impacts to Marine Protected Areas

Marine Protected Areas (MPAs) in southern California went into effect in January 2012. Three of these MPAs are located near the Project area, and one, Swami's SMCA, is located within the Project footprint. According to the Marine Managed Areas Improvement Act, in an SMCA it is unlawful to "injure, damage, take, or possess any living, geological, or cultural marine resource for commercial or recreational purposes, or a combination of commercial and recreational purposes, that the designating entity or managing agency determines would compromise protection of the species of interest, natural community, habitat, or geological features" (Public Resources Code §36710(c)). Swami's SMCA includes offshore reef habitat and nearshore bedrock benches. These areas are important nearshore areas that include a wide range of species including surf-grass, algae, abalone and lobster. While Swami's SMCA does allow the take of living marine resources pursuant to sediment management activities, it does not allow the conversion (e.g. changing nearshore rocky areas from hard to soft substrates via burial), degradation, or destruction of habitats within the MPA.

In addition to Swami's SMCA, there are three additional MPAs near the Project area. These include: Batiquitos Lagoon SMCA, San Elijo Lagoon SMCA and San Dieguito Lagoon SMCA. It is likely that Project activities will also impact these MPAs due to the movement of sediment. As required in the Marine Life Protection Act (MLPA), MPAs were carefully sited in order to capture specific habitats and to meet size and spacing requirements in order to create a network effect along the California coastline. The removal, destruction, or degradation of any habitats within an MPA is likely to jeopardize the effectiveness of the MPA network as a whole. Due to the regulations outlined in the MLPA, the MMAIA, and CCR Title 14, significant impacts to habitats within MPAs shall be avoided and loss of habitat in an MPA cannot be mitigated outside the MPA.

Reef Mitigation Strategy

The draft EIS/EIR describes the main impacts being the burial and/or scouring of reefs with indicator species located immediately offshore of segment 2 in the City of Solana Beach. These impacts were described as adverse and unavoidable, and that mitigation will be required. Table ES-2 (page S-9) of the draft EIS/EIR predicts a total area of natural reef loss between a minimum of 1.6 acres under the Alternatives 1C and 2B and a maximum of 8.4 acres under Alternative 1A. Compensation for these losses will be provided by constructing shallow, mid and deep water artificial reefs.

Federal regulations require a functional assessment be conducted whenever mitigation for a federal project is deemed necessary. In order to determine appropriate mitigation for these impacts, the USACE convened a panel to assist in the development of an acceptable mitigation plan. The panel consisted of staff from the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service, California Coastal

Commission, USACE, the Department and Keith Merkel with Merkel and Associates. During a conference call on March 1, 2012, the panel agreed to use the NMFS Wetland Mitigation Ratio Calculator to determine acceptable mitigation ratios for reef impacts. (Appendix M of the draft EIS/EIR entitled "Mitigation Strategy" describes the process that was used to calculate mitigation ratios). The ratio calculator includes seven parameters. The panel agreed on the appropriate values for the parameters that includes a range of low, average and high values. The panel recommended ratios for shallow, mid-water, and deep water reefs as follows; 1.35:1 for the low values, 2.18:1 for the average values and 5.58:1 for the high values. The USACE did not use these recommendations. They instead used 2.5:1 for shallow water reefs, 2.0:1 for mid-depth reefs and 1.5:1 for deep water reefs. The ratios proposed are not sufficient to adequately mitigate for reef impacts and the USACE proposed ratios should be revised using the panel recommendations.

Impacts to California Least Tern and other Seabirds

Impacts to offshore areas of the Encinitas and the Solana Beach segments will increase ocean turbidity and may prevent sight dependent seabirds such as the California least tern (*Sterna antillarum browni*), a State fully protected and endangered species, from seeing and obtaining its prey during the breeding season. Nesting activity disturbances during construction may also occur in the lagoon nesting sites nearby.

Recommendations

The following items should be fully addressed in the final EIS/EIR:

1. The Department supports Project alternatives having a beach width and volume of sand that reduces the risk such that the initial or subsequent adverse impacts to biological resources are avoided. In addition, it is recommended the beach sand have a replacement cycle that is adaptive in nature rather than static cycles of 5 to 13 years. A longer sand replacement cycle may be needed (based on the impact monitoring results) to further avoid or minimize impacts to marine resources. The USACE should consult with the resources agencies prior to subsequent sand replacement projects.

2. The Department recommends the final EIS/EIR include specific language in the summary section as well as Appendix M that clearly identifies that the USACE will utilize the ratio calculation process recommended by the panel. Also, actual impacts determined through the implementation of a comprehensive monitoring plan developed in consultation with the resource agencies should also be included. This monitoring plan should include a pre-construction survey for marine resources and rocky reef habitats, a component for adaptive management monitoring during construction, and a complete post construction survey.

3. In order to protect marine resources within Swami's SMCA, and to comply with the specific laws and regulations pertinent to Swami's SMCA, the preferred projects chosen should identify strategies to avoid permanent and minimize temporary loss or degradation of reefs and other habitats. A Swami's SMCA biological impacts monitoring, avoidance and minimization plan should be developed in consultation with the Department to sufficiently protect fish, wildlife and habitats of this area. These plans should be included in the final EIS/EIR.

4. Baseline biological surveys should be conducted for Swami's SMCA as well as reference sites, borrow sites and along the pipeline route. Quantitative surveys should include, but are not limited to: fish, all reefs, boulders, marine plants, all abalone species, locally unique habitats and vulnerable species (e.g. California grunion), sandy beach habitat, benthic and epi-benthic invertebrates, listed or fully protected species, seabirds and shorebirds. Draft baseline survey plans should be reviewed and approved by the Department.

5. The MLPA laws and regulations do not include provisions for the construction of artificial reefs as mitigation for impacts to habitats located within an MPA [California Fish and Game Code §2857(c)]. The Department recommends that the draft EIR/EIS be amended to reflect that adverse impacts to reefs and the construction of an artificial reef for mitigation will not be allowed in the Swami's SMCA.

6. Monitoring during construction for direct impacts to shallow reef and surf-grass may assist with adaptive management as well as to facilitate research and development for new impact reducing strategies.

7. Impacts to the San Dieguito Lagoon SMCA, San Elijo Lagoon SMCA, and Batiquitos Lagoon SMCA should be assessed. Mitigation and monitoring plans to minimize and avoid impacts should be developed in consultation with the Department and included in the final EIS/EIR.

8. A sandy beach and coastal strand habitat avoidance and minimization plan should be developed in consultation with the Department. For example, the beaches should be built such that the resulting beach has the same or similar sand type and slope as the existing beach. Additionally, areas of the built beach should leave gaps at intervals in order for the invertebrates to easily re-colonize the built beach on each side facilitating faster sandy beach invertebrate recovery times.

9. The bird breeding season between May 1st and August 31st should be avoided for the Western snowy plover and California least tern. If avoiding the bird breeding season is not feasible, then appropriate surveys and impact assessments should be conducted. Protection plans should be developed to

avoid foraging and nesting impacts if necessary. Surveys and impact assessments of over-wintering Western snowy plovers is also recommended. All reports should be reviewed and approved by the Department and other agencies.

10. If surveys indicate that Western snowy plover, California least tern, California grunion and abalone protection plans are necessary, they should be developed in consultation with the resources agencies.

11. Finally, a comprehensive mitigation and monitoring plan is required to address all adverse impacts (including unexpected impacts) to marine resources. After impact monitoring is completed, mitigation and monitoring plans should be developed in consultation with the Department and the other resources agencies.

Thank you for the opportunity to review and comment on the draft EIS/EIR. As always, Department personnel are available to discuss our concerns, comments, and recommendations. Please contact Ms. Loni Adams, Environmental Scientist, at (858) 627-3985 or ladams@dfg.ca.gov if you have any questions.

Sincerely,

Paul Hamdorf

Paul Hamdorf
Acting Regional Manager
Marine Region

cc: Department of Fish and Wildlife
Becky Ota- Belmont Office
Vicki Frey- Eureka Office
Loni Adams- San Diego Office

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Mr. Mark Delaplaine
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Mr. James M. Munson
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Munson.James@epamail.epa.gov

CITATIONS

Dugan, J. E. and D. M. Hubbard. 2010. Loss of Coastal Strand Habitat in Southern California: The Role of Beach Grooming. Estuaries and Coasts. 33:1-11.

State of California • Natural Resources Agency
Edmund G. Brown Jr., *Governor*

DEPARTMENT OF PARKS AND RECREATION
Major General Anthony L. Jackson, USMC (Ret), *Director*
San Diego Coast District
4477 Pacific Highway
San Diego, CA 92110

February 26, 2013

US Army Corps of Engineers, Los Angeles District
Planning Division
Lawrence Smith, CESPL-PD
915 Wilshire Blvd.
Los Angeles, CA 90017

RE: **Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Feasibility Study and EIS/EIR**

Dear Mr. Smith,

Thank you for the opportunity to comment on the *Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Feasibility Study and EIS/EIR, San Diego County, California,* USACE, Dec. 2012. The California Department of Parks and Recreation (State Parks) is a Trustee Agency and is mandated by law to protect the natural, cultural and recreational resources found within the State Park system. Therefore, we submit the following comments to assist you in developing a project design that avoids or minimizes impacts to lands held in public trust. In general we support the goal of this project, to protect public access and recreational opportunities, without extensive hardening of the coastline. Our department is also concerned about the project's compliance with the American's with Disabilities Act (ADA). Given the extensive public use of this area, please make certain that all aspects (both during construction and upon completion) of the project comply with ADA.

State Parks remains concerned about several aspects of the project and requires further clarification and assurances that the project will not result in significant impacts to cultural and environmental resources on State Public Trust Lands. The first question is about archaeological findings at Moonlight State Beach, and the second is the necessity of staging at Cardiff State Beach.

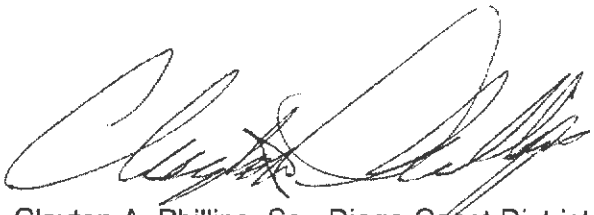
1) Impacts to archaeological site at Moonlight State Beach
Within the last six months, federally-listed archaeological site CA-SDI-17402 (also listed as P37026506/SDM-S-83) has been located on the beach itself. Recorded prior to WWII by Malcolm Rogers of the San Diego Museum of Man, it should have shown up in your South Coastal Information Center search. The City of Encinitas has contracted with Dr. Mark Becker, ASM Affiliates, Inc. of Carlsbad, who is doing the site assessment at this time (mbecker@asmaffiliates.com, 760-804-5757), and would be able to consult with you. Section 4.8.3 statement (p. 264, line 20) that no onshore cultural materials were located needs to be changed. It is the shallow nature and unknown western boundary of this site (C14 dated so far from 3800 bp to 1800 bp) that would be affected by the use of existing sand to create an "L"-shaped berm to anchor sand placement (Section 3.3.4, p. 122, lines 37-40). Advanced testing of this western edge is essential in designing the berm construction and sand placement strategy. This is not just a monitoring situation at the time of construction, but something that could conceivably change the sand replacement strategy. Please consult with District Archaeologist Therese Muranaka (Therese.Muranaka@parks.ca.gov, 619-778-2553).

2A) Impacts to Cardiff State Beach from staging and transportation to receptor sites
State Parks would prefer that staging and access to Segment 2 (Solana Beach) occur at Fletcher Cove; if this is not feasible, then project staging and access must be designed to avoid impacts to State Park operations, public access, and the rocky substrate that supports archaeological and paleontological resources. Federally-registered archaeological site CA-SDI-13754 (San Diego Museum of Man site SDM-W-312), a well-known Archaic stone bowl site, rests just underwater at low tide in the shell formation. Staging (p. 123, lines 28-38), even only at beginning and ending phases of the project, or for fueling and maintenance purposes, poses a problem for these cultural resources. Underwater survey prior to site selection would be required. Paleontological comment regarding Cardiff 'reef' should be gathered from Dr. Tom Demere of the San Diego Natural History Museum (tdemere@sdnhm.org, 619-255-0232) as to the stability of the shell formation, which in turn supports the archaeological site. It is of note that Fig. 8.3-2 does not match Fig. 1.8-2 and Fig. 3.1-2, as it shows a more northern reach for sand replenishment, impacting the Cardiff 'reef' for more than just staging. Furthermore, to avoid impacts to park operations and public access, work schedules and staging locations would have to be agreed upon by the North Sector Superintendent Robin Greene (Robin.Greene@parks.ca.gov) and formalized with a Right of Entry (ROE) agreement.

2B) Impacts to rocky intertidal reef at Cardiff State Beach (Seaside Reef)
Although the project seeks to avoid placing sand on rocky intertidal habitat, State Parks is concerned that changes in sand drift patterns may negatively affect the habitat. The rocky intertidal habitat in the vicinity of Seaside Reef is the best and most accessible in the Encinitas/Solana Beach Area. It is critical that this location remains healthy and intact. The EIS/EIR proposes post-project monitoring to assess potential impacts and then prescribes a vague mitigation strategy for impacts in the event that they may occur. With a mitigation strategy that is as vague as the one proposed State Parks shall require that all efforts are made to avoid impacts to the rocky intertidal habitat at Seaside. A site-specific monitoring plan must be implemented to measure the effects of sand replenishment on the habitat quality of the nearby rocky intertidal habitat. This plan should be designed to be complementary with ongoing monitoring conducted by the Multi-Agency Rocky Intertidal Network (MARINe).

State Parks requests that project proponent meet with staff when 50% plans are available for review. State Parks will initiate internal project review; and negotiate terms and conditions of Right of Entry Permit for access to State Park Lands. To initiate this process please contact our CEQA coordinator Cindy Krimmel (Cindy.Krimmel@parks.ca.gov, 619-278-3771).

Sincerely,



Clayton A. Phillips, San Diego Coast District Superintendent

Cc Darren Smith, Acting District Services Manager
Robin Greene, North Sector Superintendent
Therese Muranaka, Archaeologist
Reading File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

February 26, 2013

Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
ATTN: Mr. Larry Smith (CESPL-PD-RN)
Los Angeles, California 90053-2325

Subject: Draft Environmental Impact Statement for the Encinitas-Solana Beach Coastal Storm Damage Reduction Project, San Diego County, CA (CEQ# 20120400).

Dear Ms. Axt:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for Encinitas-Solana Beach Coastal Storm Damage Reduction Project (Project), San Diego County, California. Our review is provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act. Our comments were also prepared in accordance with the provisions of the Federal Guidelines promulgated at 40 CFR 230 under Section 404(b)(1) of the Clean Water Act (CWA).

EPA recognizes the need to minimize threats to public safety from collapsed bluffs, and we support this goal. Based on our review of all of the project action alternative scenarios, we have rated the DEIS as *Environmental Concerns – Insufficient Information* (EC-2) (see enclosed "*Summary of Rating Definitions*"), due to our concerns regarding climate change and sea level rise, and impacts to water quality. We also have concerns regarding the source and quality of beach nourishment materials; biological quality surveys and monitoring; endangered species; floodplain management; cumulative impacts and air quality.

EPA recommends that the FEIS give greater consideration to the project's potential impacts and mitigation needs under high sea level scenarios and that further consideration be given to the need for monitoring and mitigation plans to address environmental impacts from the proposed fill activities, such as loss of surf grass, loss of hard bottom habitat, and water quality. We also encourage the U.S. Army Corps of Engineers to include, in the Final Environmental Impact Statement (FEIS), the results of a comprehensive biological survey of the Encinitas-Solana Beach shoreline. Without such a survey, it is difficult to accurately evaluate the potential environmental impacts of the various alternatives described in the proposed action.

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EPA appreciates the communication between our offices and the opportunity to review this DEIS. When the FEIS is released, please send one hard copy and three CD's to the address above (mail code: CED-2). If you have any questions, please contact me at (415) 972-3521, or have your staff contact James Munson, the lead reviewer for this project. James can be reached at (415) 972-3852 or munson.james@epa.gov.

Please note that, as of October 1, 2012, EPA Headquarters no longer accepts paper copies or CDs of EISs for official filing purposes. Submissions must be made through the EPA's new electronic EIS submittal tool: e-NEPA. To begin using e-NEPA, you must first register with the EPA's electronic reporting site - https://cdx.epa.gov/epa_home.asp. Electronic submission does not change requirements for distribution of EISs for public review and comment, and lead agencies should still provide one hard copy and three CD's of each Draft and Final EIS released for public circulation to the EPA Region 9 office in San Francisco (Mail Code: CED-2).

Sincerely,

Kathleen Martyn Goforth, Manager
Environmental Review Office
Communities and Ecosystems Division

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

EPA'S DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE ENCINITAS-SOLANA BEACH COASTAL STORM DAMAGE REDUCTION PROJECT, SAN DIEGO COUNTY, CA, (CEQ# 20120400)

Alternatives Analysis/Climate Change

The DEIS includes no-action alternatives and multiple action alternatives for each beach, and each alternative has a high sea level rise scenario and a low sea level rise scenario. The document identifies a tentatively recommended plan with two alternatives that call for beach nourishment on two project areas but with different beach widths, (EN-1A Encinitas Beach 100 feet and SB-1A Solana Beach 200 feet). The tentatively recommended plan assumes a low sea level rise scenario, but does not provide a sufficient rationale for why this was chosen. Page 115 of the DEIS states, "Should high sea level rise scenario predictions become evident during the course of the project, adaption of the design to the high sea level rise scenario would be implemented. To achieve that adaption the higher re-nourishment volumes would be implemented." EPA is concerned that the impacts analysis and mitigation is primarily calibrated using the low sea level rise scenario; hence, there is insufficient data to fully analyze the impacts and mitigation needs should the high sea level rise scenario become the federal action.

Page 47 of the DEIS states: "The low sea level rise is represented by a trendline analysis of yearly MSL data recorded at La Jolla in San Diego County from 1924 to 2006. This indicates an upward trend of approximately 0.0068 ft per year, as described in the Coastal Engineering Appendix." Page 46 indicates that this number is formulated using a "Curve I from the National Research Council (1987)." Using a low sea level rise from a curve created in 1987 that reflects data calculating changes from 1924 to 2006 may not fully capture probable sea level rise levels over the next 50 years. At 0.0068 feet per year, this amounts to an increase of 0.34 feet over the 50 year life of the project; however, Table 1.8-4 on page 48 of the DEIS shows conflicting data from the "'Projections from year 2000 baseline' Source: California Ocean Protection Council, 2011." Those data project an average rise of approximately 1.17 feet or "14 inches" by 2050, which is less than $^4/_5$ of the project's 50 year action period -- a difference of approximately 0.84 feet over the life of the project.

As written, the DEIS' alternatives and economic sections are insufficient to demonstrate why the Corps chose the "tentative recommended plan" or why this plan was chosen over the "Environmentally Superior Plans (EN-1B & SB-1C)". We also note that the artificial reef alternative was dismissed, but the "tentative recommended plan" includes 16 acres of artificial reef; detailed description of the artificial reef alternative that was discarded is not available for comparison. Furthermore, although a CWA Section 404 permit is not needed for the proposed action, this Civil Works project should meet the intent of the CWA Section 404(b)(1) Guidelines. The DEIS alternatives analysis does not demonstrate the project's consistency with the nature of the Clean Water Act Section 404(b)(1) Guidelines and selection of the Least Environmentally Damaging Practicable Alternative (LEDPA).

Recommendations:

The FEIS should include a full detailed description of the tentatively recommended plan, including high sea level scenarios, using up-to-date data, and looking forward through at least the life of the project.

The FEIS should include a description of how each alternative would meet the needs of the project while reducing adverse impacts to species of concern, coral reefs, and surf grass.

The FEIS alternatives analysis should include a reasonable range of practicable alternatives that meet the project purpose and demonstrate the project's consistency with the CWA Section 404(b)(1) Guidelines and selection of the LEDPA.

Water Quality

While the project will have impacts to high value marine habitats, including special aquatic sites (defined at 40 CFR 230.3(q-1)), the Section 404(b)(1) Analysis (Appendix D) concludes that all impacts are localized and temporary and, therefore, insignificant. There is little discussion of the basis for this conclusion.

As a result of the large volumes of sand being placed on receiver beaches, (1.64 million cy), the Tentatively Recommended Plan described on page 501 could lead to significant and unavoidable adverse impacts on surface water quality, benthic habitat, and fisheries from increased turbidity and fill in special aquatic sites. Page 333 of the DEIS states that, "turbidity is limited to the bottom and is rarely visible at the surface"; however, little information is provided in the document to support this statement. Other short and long term threats to water quality include construction-related contaminants such as oil and hydraulic fluid and increased turbidity that would occur during future maintenance activities for the proposed project.

Recommendations:

The FEIS should include the results of a comprehensive biological survey of the Encinitas-Solana Beach shoreline.

The FEIS should address the potential of the project to contribute to elevated turbidity levels. The Corps should consider marine design modifications regarding factors such as location and size to minimize these environmental impacts.

Additional minimization measures for impacts to the aquatic environment should be discussed in the FEIS, such as measures related to timing and rate of fill placement.

The FEIS should commit to: 1) placement in fall or winter to better mimic natural shoreline turbidity processes and reduce impacts during high recreational use times, and 2) development of debris management plans to ensure that the borrow site materials do not deposit trash or other debris that may be harmful to the ocean environment.

Source & Quality of Beach Nourishment Materials

The DEIS briefly considers sources of sand such as onshore and offshore borrow sites (DEIS p. 100); however, in regards to possible onshore borrow, the document states, "Some potential for beach replenishment material exists within the quarry and the surrounding area, although the cost would be much higher than offshore sources due to the costs associated with transport."

Recommendation:

The Corps should evaluate and discuss, in the FEIS, any opportunities to further minimize impacts to the aquatic environment by coordinating with other Corps permitted dredging projects that may produce suitable material for beach nourishment purposes, or using sources from which the dredging might provide enhancement of environmental, navigational, or recreational conditions. The ROD should include a commitment to consideration of opportunistic sources of beach nourishment material prior to each nourishment cycle.

We note that the chemical testing of the sediments in the proposed Oceanside borrow pit occurred several years ago. Due to this lapse of time, additional testing may be necessary. Page 203 of DEIS describes an initial general sampling scheme, with an unspecified number of cores taken at depths of 2 feet and approximately 20 feet; however, it is unclear how many of those cores were taken from borrow sites planned for the Tentative Recommended Plan. EPA is also concerned that the document fails to include plans to take core testing down to the anticipated dredging depth.

Recommendation:

The discussion of the chemical testing of the proposed Oceanside borrow site should be expanded in the FEIS to describe what was done in greater detail, including why further up-to-date testing is not needed down to the anticipated dredging depth.

Biological Quality Surveys and Monitoring

As discussed in the DEIS, surveys and monitoring have typically been incorporated into beach nourishment projects. We acknowledge the Corps' commitment to a 50 year monitoring period (over the life of the project); however, the document does not sufficiently discuss a biological monitoring plan.

Recommendation:

The FEIS should include a clear detailed description of a survey and monitoring program for the biological impacts of the preferred alternative, and commit to its incorporation as a required project element. This information should be included for both nearshore and borrow areas in order to evaluate the effectiveness of the proposed action in protecting biological diversity and quality. The monitoring plan should include pre- and post-project

dive surveys and benthic community sampling of the borrow site and the receiver site to ensure that each benthic community returns to its pre-project density and structure. We recommend that the monitoring program have a clear adaptive management strategy to ensure that the aquatic environment is protected.

Endangered Species

The DEIS insufficiently evaluates the potential impacts to on shore species of concern such as snowy plover, least tern and their habitat. The document states that the species are found in the area, but does not sufficiently disclose the results of site specific surveys.

Recommendation:

The FEIS should include the results of a comprehensive biological survey of the entire project area as well as the borrow site, including a complete review of species outside the immediate project area that may be affected by the project.

The results of consultation with the United States Fish and Wildlife Service and National Oceanic and Atmospheric Administration, if appropriate, regarding threatened or endangered species or critical habitat should be included in the FEIS.

The FEIS should commit to having beach nourishment activities avoid the nesting seasons for listed species, such as the least tern and snowy plover.

Executive Order 11988: Floodplain Management

Per Flood Insurance Rate Maps (FIRM), portions of the project footprint are in a Zone VE Coastal Flood Zone with velocity hazard and established base flood elevation (BFE). See FIRM#: 06073C1045G San Diego Co Unincorporated & Incorporated Areas 05/16/2012. Executive Order 11988 Floodplain Management requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains.

Recommendation:

The FEIS should discuss any impacts that the Proposed Project may have on the potential for flooding.

Cumulative Impacts

The DEIS does not include a sufficient description of other projects in the area that are under construction or planned within the 50 year time frame and could have cumulative impacts , such as adjacent beach re-nourishment projects and or the ecosystem restoration at the San Elijo Lagoon, which is located between the Encinitas Beach and Solana Beach.

Recommendation:

Given that the Project will take place over the next 50 years, the FEIS should include a comprehensive discussion of reasonably foreseeable projects that may take place in the area during the construction period, such as the San Elijo Lagoon Restoration project, San Clemente Shoreline Feasibility Study and others, and analyze the potential cumulative impacts on affected resources.

Air Quality

Construction Mitigation Measures

EPA recognizes the incorporation of mitigation best management strategies for the project on page S-10 to reduce or minimize air pollutant emissions. More stringent emission controls are available that could further reduce emissions.

Recommendations:
We recommend that all applicable requirements under the South Coast Air Quality Management District (SCAQMD) Rules and the following additional measures be incorporated into the Construction Emissions Mitigation Plan.

Fugitive Dust Source Controls:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
- Install wind fencing, and phase grading operations, where appropriate, and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage, and limit speeds to 15 miles per hour (mph). Limit speed of earth-moving equipment to 10 mph.

Mobile and Stationary Source Controls:

- Reduce use, trips, and unnecessary idling from heavy equipment.
- Maintain and tune engines per manufacturer's specifications to perform at California Air Resources Board (CARB) and/or EPA certification, where applicable, levels and to perform at verified standards applicable to retrofit technologies. Employ periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications. CARB has a number of mobile source anti-idling requirements. See their website at: http://www.arb.ca.gov/msprog/truck-idling/truck-idling.htm
- Prohibit any tampering with engines and require continuing adherence to manufacturer's recommendations

- If practicable, lease new, clean equipment meeting the most stringent of applicable Federal or State Standards. In general, only Tier 2 or newer engines should be employed in the construction phase.
- Utilize EPA-registered particulate traps and other appropriate controls where suitable, to reduce emissions of diesel particulate matter and other pollutants at the construction site.

Administrative controls:

- Identify all commitments to reduce construction emissions and incorporate these reductions into the air quality analysis to reflect additional air quality improvements that would result from adopting specific air quality measures.
- Identify where implementation of mitigation measures is rejected based on economic infeasibility.
- Prepare an inventory of all equipment prior to construction, and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking. (Suitability of control devices is based on: whether there is reduced normal availability of the construction equipment due to increased downtime and/or power output, whether there may be significant damage caused to the construction equipment engine, or whether there may be a significant risk to nearby workers or the public.) Meet CARB diesel fuel requirement for off-road and on-highway (i.e., 15 ppm), and where appropriate use alternative fuels such as natural gas and electric.
- Develop construction traffic and parking management plan that minimizes traffic interference and maintains traffic flow.
- Identify sensitive receptors in the project area, such as children, elderly, and infirm, and specify the means by which you will minimize impacts to these populations. For example, locate construction equipment and staging zones away from sensitive receptors and fresh air intakes to buildings and air conditioners.

Air Quality Impacts Associated with Transporting Fill Material

EPA is concerned that the air quality analysis in the DEIS does not adequately address mitigation of emissions associated with the multiple collection barge trips needed to remove and transport fill from the Project site, nor does the DEIS appear to include estimates of the number of necessary collection barge trips, distance traveled, and corresponding air emissions.

Recommendations:

The FEIS should include a revised air quality analysis and updated emissions comparison to SCAQMD significance thresholds to account for the emissions from the equipment required to transport fill. The FEIS should also commit to additional minimization measures for emissions from barges, tugboats, dredge equipment and equipment used to place the sand on the beach.

OBJECTID	Label
1	Grandview
2	Avocados
3	White Fence
4	Log Cabins
5	North Beacon
6	Bamboos
7	South Beacon
8	Rosestas
9	North El Porta
10	Stone Steps
11	Swamis
12	Pipes
13	Traps
14	Turtles
15	Suck Outs
16	Campgrounds
17	Tippers
18	85/60s
19	Cardiff Reef
20	Evans
21	Georges
22	Parking Lots
23	Seaside Reef
24	Pallies
25	Table Tops
26	Pillbox
27	Fletcher Cove
28	Southside

Figure 4.13-1 Popular Surfing Spots

EXHIBIT NO. 19
APPLICATION NO.
CD-003-13

Table 4.13-3 Surf Sites in the Study Area

Name	Location
Ponto, Batiquitos	North of Encinitas Receiver Site
Grandview	North of Encinitas Receiver Site
Avocados	North of Encinitas Receiver Site
White Fence	North of Encinitas Receiver Site
Log Cabins	North of Encinitas Receiver Site
North Beacons	North of Encinitas Receiver Site
Bamboos	North of Encinitas Receiver Site
South Beacons	North of Encinitas Receiver Site
North El Portal	Within Encinitas Receiver Site
Stone Steps	Within Encinitas Receiver Site
Rosetas	Within Encinitas Receiver Site
Moonlight	Within Encinitas Receiver Site
D Street	Within Encinitas Receiver Site
Trees	Between Encinitas and Solana Beach Receiver Sites
Boneyards, outside Swamis	Between Encinitas and Solana Beach Receiver Sites
Swamis	Between Encinitas and Solana Beach Receiver Sites
Dabbers	Between Encinitas and Solana Beach Receiver Sites
Brown House	Between Encinitas and Solana Beach Receiver Sites
Pipes	Between Encinitas and Solana Beach Receiver Sites
Traps	Between Encinitas and Solana Beach Receiver Sites
Turtles	Between Encinitas and Solana Beach Receiver Sites
Barneys	Between Encinitas and Solana Beach Receiver Sites
85/60s	Between Encinitas and Solana Beach Receiver Sites
Tippers	Between Encinitas and Solana Beach Receiver Sites
Campgrounds	Between Encinitas and Solana Beach Receiver Sites
Suckouts, Lagoon Mouth	Between Encinitas and Solana Beach Receiver Sites
Cardiff Reef, South Peak	Between Encinitas and Solana Beach Receiver Sites
Evans	Between Encinitas and Solana Beach Receiver Sites
Georges, Cardiff Beach	Between Encinitas and Solana Beach Receiver Sites
Parking Lots	Between Encinitas and Solana Beach Receiver Sites
Seaside Reef	Between Encinitas and Solana Beach Receiver Sites
Pallies	Between Encinitas and Solana Beach Receiver Sites
Table Tops, Tide Beach Park	Within Solana Beach Receiver Site
Pillbox, Fletcher Cove	Within Solana Beach Receiver Site
South Side, Fletcher Cove	Within Solana Beach Receiver Site
Cherry Hill, Seascape Surf Beach	Within Solana Beach Receiver Site
Del Mar, 17th – 20th Street	South of Solana Beach Receiver Site
15th Street	South of Solana Beach Receiver Site

Source: Detailed in Appendix B Table 11.3-1

Detailed descriptions of individual sites are provided in Appendix B9 of the Encinitas & Solana Beach Shoreline Study (USACE 2012).. Beginning in 2012, as part of the SANDAG RBSP II project, video monitoring of several surf spots will be initiated by SANDAG in conjunction with the Surfrider Foundation to establish a video-based Surf Monitoring Program.

Utilizing technology provided by CoastalCOMS, a company which specializes in video-based coastal monitoring, this new Surfrider program will establish a baseline for surf quality at six San Diego County beaches where RBSP II beach fills are to occur, and will include daily observations of surf quality with the help of a newly-installed video monitoring system.

Simon, Larry@Coastal

From:	Mark Rauscher <mrauscher@surfrider.org>
Sent:	Tuesday, May 14, 2013 10:39 AM
To:	Ewing, Lesley@Coastal; Simon, Larry@Coastal
Cc:	Roger Kube; Julia Chunn
Subject:	Fwd: Coastal Storm Damage Reduction Project Concerns
Attachments:	Surfrider ACOE comments 5 8 2013.pdf; SB Public Comments - ACOE.pdf; ACOE Solana Beach Encinitas NOP comments final.pdf; ACOE Surf Reef Pages CombinedACOEEIR.pdf

Lesley and Larry-
I'm sharing a letter sent to the Encinitas and Solana Beach City Councils in relation to their recent vote supporting the Corps' beach project, as well as the San Diego Chapter Chair's spoken comments at the meeting. Also, our letter in response to the Corps' NOP is included for your reference of our initial concerns, and which were not fully satisfied. You already have our comments to the Draft EIR/EIS. Also, note the information below regarding surfing economics. I think it should prove useful in this and other projects that may have impacts on surfing resources.

While we would like to be able to support a beach fill project in this region (as we have in other instances) that takes efforts to reduce and minimize impacts to natural and recreational (surfing) resources, this project being put forward by the Corps of Engineers simply does not do that, and so we cannot support it.

I'm sure you are aware that of the San Clemente beach fill project that recently went through a similar feasibility study with the Corps of Engineers for a project. Much like Solana Beach and Encinitas, San Clemente is known for gorgeous beaches and great surf spots. San Clemente is a destination for surfers who value its high-quality reef and point breaks, bringing millions to the local economy every year. I spent many hours working directly with the City Staff and engineers at the Corps as they developed their beach sand project.

At one point, long before feasibility completion, it became clear that the direction they were heading would have serious negative impacts on the surfability of one of the city's most treasured reefs at T-Street. At that point the project was very intentionally altered to reduce those projected impacts that were brought to light during the feasibility study, impacts almost identical to what is being projected here at Table Tops, Pillbox and Stone Steps. In that instance the Corps of Engineers was able to design a cost effective beach project that should not have major impacts to surf in San Clemente, but for some reason the same engineers are now telling us that they cannot make any alterations to reduce impacts and that we are all simply going to have to live with the loss of our high-quality surf spots.

It appears to me that the sand volumes and beach width being proposed here in Solana Beach have been artificially inflated to help justify the Corps' cost to benefit requirements. The arcane economic models that the Corps uses do not take into account the inherent and perceived values of surfable waves and other natural resources. They have somehow justified the destruction of high-quality waves by saying that the resulting low-quality waves will be as much of a draw to surfers, only it will be beginner surfers rather than those that are more experienced.

Well, there are plenty of low-quality waves for beginners all over San Diego, and none of them are destinations. Unfortunately there is only a limited number of high-quality surf spots that people go out of their way to get to, and they are about to bury a few of them.

This notion that it will all be alright because we have an adaptive management clause in the plan is nonsense. Adaptive management only works if you have done your best to minimize impacts at the outset and something unexpected happens that would require adjustment. If this project goes forward in its current form we fully expect to lose these great resources that the community has come to rely on.

We request and encourage you to recommend DENIAL of the federal consistency determination for this project.

Thank you and please let me know if there is anything I can do to help or clarify.

-Mark

Mark Rauscher | Coastal Preservation Manager | Surfrider Foundation
mrauscher@surfrider.org | 949.412.9733 c | skype: markrsfn
beachapedia.org | your coastal knowledge resource

Begin forwarded message:

From: Julia Chunn <julia@surfridersd.org>
Subject: Re: Coastal Storm Damage Reduction Project Concerns
Date: May 8, 2013 10:58:28 AM PDT
To: <council@encinitasca.gov>
Cc: Kristin Brinner <kristin.brinner@gmail.com>, tom cook <tom.m.cook@gmail.com>, Jim Jaffee <jimjaffee@gmail.com>, Katherine Weldon <KWeldon@encinitasca.gov>, Roger Kube <roger@surfridersd.org>, Mark Rauscher <mrauscher@surfrider.org>, Rick Wilson <rwilson@surfrider.org>

Dear Encinitas City Council Members,

Please find a comment letter from Surfrider San Diego County Chapter regarding the proposed Coastal Storm Damage Reduction Project attached here. Please add this comment letter and the associated attachments summarizing the letters received from 270 Surfrider supporters to the administrative record for this project.

We look forward to continuing the dialogue about this project at the City Council meeting this evening.

Thank you in advance for your time and consideration.

Sincerely,

--
Julia Chunn-Heer
Campaign Coordinator
Surfrider Foundation, San Diego Chapter
julia@surfridersd.org

On Mon, May 6, 2013 at 12:22 PM, Julia Chunn <julia@surfridersd.org> wrote:

Dear Encinitas City Council Members,

Surfrider San Diego would like to reiterate our willingness to meet with you individually prior to the May 8th City Council meeting to explain our perspective and concerns regarding the Coastal Storm Damage Reduction Project. We believe a discussion prior to the May 8th City Council meeting will be most beneficial for all parties.

We have included some information below regarding the economic benefits associated with surfing resources. Unfortunately, this economic driver was left out of the project analysis and alternative selection.

Please review this recent article in the Washington Post regarding "Surfonomics". We found the following quotes particularly interesting:
"Scorse, the marine policy advocate, is in the final stages of a study that he said proves that surfing contributes potentially hundreds of millions of dollars — not in tourism, but in property tax revenue. He said his research, which he expects to complete this year, shows that houses within walking distance of surf spots in Santa Cruz, Calif., are worth far more than coastal homes farther from great wave breaks."
"Mavericks, an epicenter of big-wave surfing in Half Moon Bay, Calif., is worth $23.9 million annually in a report produced in 2010. A wave at Mundaka, off the coast of southern Spain, brings in about $4.5 million to the local economy each year, according to a 2007 study."

For your reference, we have attached the following documents:

- A 5-page summary document detailing the anticipated impacts to surfing resources from the draft EIR/EIS
- Surfrider's comment letter dated May 22, 2012 regarding the Notice of Preparation for this project
- Surfrider's comment letter dated March 5, 2013 regarding the draft EIR/EIS

For more information about the economic benefits of surfing, please visit the links below:
http://www.surfrider.org/coastal-blog/entry/surfonomics-above-the-fold
http://www.surfrider.org/coastal-blog/entry/the-economics-of-surfing

Sincerely,
--
Julia Chunn-Heer
Campaign Coordinator
Surfrider Foundation, San Diego Chapter
julia@surfridersd.org
619-246-8881

SURFRIDER FOUNDATION
SAN DIEGO COUNTY CHAPTER

Surfrider Foundation San Diego County Chapter
9883 Pacific Heights Blvd, Suite D
San Diego, CA 92121
Phone: (858) 622-9661 Fax: (858) 622-9961

May 8th, 2013

Delivered via email

Honorable Mayor and City Council Members of Solana Beach
City of Solana Beach
635 South Highway 101
Solana Beach, CA 92075

Honorable Mayor and City Council Members of Encinitas
City of Encinitas
505 S. Vulcan Ave.
Encinitas, CA 92024

RE: Concerns regarding Army Corp of Engineers Coastal Storm Damage Reduction Project

Dear Honorable Mayors and City Council Members of Encinitas and Solana Beach,

The Surfrider Foundation is a non-profit, environmental organization dedicated to the protection and enjoyment of the world's oceans, waves and beaches for all people, through a powerful activist network. The Surfrider Foundation has over 250,000 members, activists and supporters and 83 chapters in the United States. Please consider these comments on behalf of the San Diego County Chapter of the Surfrider Foundation.

As avid users of our coastline, the Surfrider Foundation is keenly interested in this proposed project, and has spent numerous hours submitting technical comments on the Notice of Preparation, the draft EIR/EIS and meeting with city staff from both Solana Beach and Encinitas. We are discouraged by the recent change in pace which is leading to a "take it or leave it" attitude, and forcing a decision even before a response to comments has been provided. This does little to encourage or protect the public process.

We understand the history, the amount of money the cities have spent on studies and the need for Federal support for our coastline. What we don't understand is the urgency to bring an incomplete project before WRDA. We feel you are being rushed to meet a deadline that is beyond the scope of this project and will sacrifice the importance of public input that has been so integral to local projects managing the Solana Beach and Encinitas coastline.

We understand you are faced with a difficult decision of moving forward immediately with the National Economic Development Plan (NED) or "no project" according to the Army Corp of Engineers. However, we would remind you, you are the project sponsors, you are the "clients". This project is being pursued to fulfill the city's needs. So the real question is, do you want to move forward with the

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most aggressive alternative (NED) to improve towel space and protect private property at the expense of surfing resources? In our opinion, the towel space will be much less valuable if the surfing resources are destroyed. Furthermore, the protection of private property needs to be balanced with the need to preserve recreation and access to coastal resources.

Despite our continued input, the draft EIR/EIS fails to consider the economic benefits associated with surfing, and only analyzes the economic benefits of increased towel space. Furthermore, the draft EIR/EIS anticipates the conversion of precious reef breaks such as Table Tops, Pill box and Stone Steps into beach breaks with close-outs at the two-year mark, which constitutes long term impacts. As we have stated previously, these anticipated impacts are intolerable from our perspective. The surfing resources in Encinitas and Solana Beach are a vital part of our community, and must be preserved. We would encourage the Council to find a way to pursue a "locally preferred alternative," a reduced amount of sand from the NED, that does not trigger the "likely" impacts to surfing resources. If that is not possible at this juncture, we would urge you to support the no project alternative.

Like you, we don't want to be faced with a "take it or leave it" scenario. Some sand is better than no sand at all, but anticipating likely destruction of precious surfing resources, with no efforts to reduce or mitigate those impacts is unacceptable. Adaptive management may be touted as the response to these impacts; however, according to the draft EIR/EIS the adaptive management clause is only triggered if the impacts are substantially different than predicted. We are saying the anticipated impacts are unacceptable! Our cities need an alternative that suits the priorities of our coastal towns, which undoubtedly includes surfing.

Please include these comments and the documents attached here as part of the administrative record. We have included a spreadsheet detailing the name and addresses of the 270 residents who sent the attached letter or something similar to the project leads in March 2013. Please also consider this 4-minute video, which captures comments from local surfers and members of the surf industry regarding this proposed project.

Please allow for meaningful public participation in this long-term project, and do not move forward with an alternative that is not right for our beach communities. Thank you for your time and consideration.

Sincerely,

Julia Chunn-Heer
Campaign Coordinator

The Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's oceans, waves and beaches through a powerful activist network. Founded in 1984 by a handful of visionary surfers in Malibu, California, the Surfrider Foundation now maintains over 250,000 supporters, activists and members worldwide. For an overview of the Surfrider Foundation San Diego Chapter's current campaigns, programs and initiatives go to www.surfridersd.org or contact us at info@surfridersd.org or (858) 622-9661.

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Josephine R. Axt, Ph.D.
Chief, Planning Division
U.S. Army Corps of Engineers
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Mr Smith:
Thanks for the opportunity to contribute to the planning process of the Draft Encinitas-Solana Beach Coastal Storm Damage Reduction Project Integrated Feasibility Study & Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR). As stakeholders in this project, our staff and volunteers have dedicated hours of time meeting with the local cities and consultants as well as reviewing the over 1500 pages of the draft EIR/EIS and its 14 appendices. We thank you for the additional week you gave us to prepare our comments.

Surfrider Foundation is an organization representing 250,000 surfers and beach-goers worldwide that value the protection and enjoyment of oceans, waves and beaches. For the past decade, San Diego chapter of the Surfrider Foundation has reviewed and commented on coastal construction projects and policy in San Diego County. We take a project of this size and expense very seriously.

We feel your draft provides a fair look at the coastal processes that are affecting San Diego County. However, we feel the beach fill amounts associated with this project are too large and will negatively impact surfing conditions at surf spots within the project area. Surfing is an economic driver for San Diego County, and the project area contains iconic surf spots such as Swamis and Cardiff Reef, which are known worldwide for their unique and enjoyable waves. Surfrider is a member-driven organization that is dedicated to the preservation of surfing resources. Any impacts to surfing and surf spots are not acceptable to us, our membership, or the public at large. Given that the severe impacts to surfing identified in this study are not part of the monitoring or mitigation of this project, it is not possible for us to support any of the project alternatives. Our specific comments to the document follow.

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IMPACTS TO SURFING NOT CONSIDERED IN ALTERNATIVES

Section 5.12.2 - Surfing Change Analysis
Impacts to surfing that are identified in Section 5.12.2 need to be considered in project alternatives.

The surfing analysis is a welcome change to beach nourishment project EIRs. It was well done and provides an accurate description of the core resource Surfrider is concerned with preserving. Given that, it makes it much harder to understand why the negative impacts to surfing in the project alternatives are not discussed in project design and the determination of fill amounts. According to your analysis (Appendix B Table 11.4.7), the amount of sand used in this project will impact Stone Steps, Table Tops, and Pillbox in ways detrimental to surfing with the likely transformation of these surf spots from reef break to beach break. We strongly object to the statement that follows this table, "the overall frequency of surfable waves within the study area are not expected to change significantly as a result of the Project alternatives." We believe the quality and frequency of the surfing experience will be severely altered by degrading prized reef breaks within the study area. Table Tops will be altered in a way that would cause a traditional reef break to transform into a beach break. Table Tops has an important distinction as a surf spot in San Diego County, as it is one of a few that is rideable when the larger, longer period swells of winter hit. It is unlikely that as a beach break Table Tops will continue to break in the same manner. The many surfers that surf there during larger swells will have to travel to other breaks out of the area, thereby reducing the recreational activity at the beach. Please view this 4-minute video (http://vimeo.com/61054486) which captures the reactions and comments of local surfers and members of the surf industry.

Additionally, the reef at Table Tops provides an interesting and unique nearshore environment of sea grass, birds, mammals, fish and invertebrates for families to explore. It is hard to imagine how this will look under a carpeting of sand.

UNCERTAINTY WITH MEDIAN GRAIN SIZE OF FILL MATERIAL

We request clarification regarding the grain size of the fill material. Please provide the median grain size to be used in the beach fill.

In the Surfing change analysis, there is language that suggests some unknowns about the median grain size of the fill material (d_{50}). For example, "However, if an increase in d_{50} is expected..." and "If the nourishments result in no change to d_{50}...". In "Impacts of coastal engineering projects on the surfability of sandy beaches" L. Benedet, T. Pierro, M. Henriquez, Shore & Beach, Vol. 75, No. 4, Fall 2007, p3, the authors note that beach fill can *"... affect surfing over the long-term if the fill sediments have a mean grain size and a sediment distribution that significantly differs from the sediments that are currently on the beach."*

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SURF SPOT/SURFABILITY MONITORING NEEDS TO BE A COMPONENT OF PROJECT MONITORING

Section 4.13.6 - Surfing

Include mitigation for loss of surfing resources, which should allow adaptation of the fill amounts and frequency. Surfrider monitoring program will end before this project starts, but Surfability monitoring should be implemented at least one year before first beach fill.

Given the predicted impact to surfing within the project area, it is imperative that Surf Spot/Surfability monitoring be required as part of this project. As mentioned in section 4.13.6, Surfrider Foundation San Diego Chapter has designed and implemented a surf spot monitoring program in response to SANDAG's RBSP II, which seeks to provide understanding of the immediate and short term effects of beach fill on surf spot quality. Unfortunately, Surfrider's Surf Monitoring Study program will end in December 2013, and will not be able to provide the type of monitoring that this project requires. However, there is precedent for US Army Corps of Engineers (US ACOE) projects to include Surfability monitoring. The recently completed San Clemente Shoreline Feasibility study includes Surfability monitoring designed by Chuck Mesa (US ACOE SPL). We feel this methodology is sufficient for monitoring impacts to surfing resources. However, monitoring must be implemented for a year or more prior to any beach fill to provide an adequate baseline of surfing conditions at surf spots within the project area.

Mitigation of any observed impacts to surfing should be included in Section 5.12.

If surf spots will be impacted by this project, a reasonable mitigation plan should consist of an adaptive strategy to adjust subsequent fill amounts and frequency. If impacts are shown through the surf spot monitoring, then fill amounts should be reduced.

FILL AMOUNTS ARE TOO LARGE

Section 3.2 - Final Array of Alternatives

Decrease the beach width and fill amounts for all alternatives. Proposed beach fill volumes exceed traditional/historical beach widths for the region. There is very little understanding how this extreme amount of sediment will behave in project area.

It is clearly understood that the major goal of this project is protection of private property. To this end, the project has been designed to maximize the protective nature of beaches by building the widest beach possible, given an acceptable cost to benefit ratio. However, the beach widths that are considered as alternatives in this project are extreme and well beyond what typically occurs at beaches in front of bluffs. Additionally, it is unclear what the justification for such a large difference in the proposed beach widths and intervals for Solana Beach (200 feet every 13 years) and Encinitas (100 feet every 5 years). Please provide clarification on this disparity.

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It is well known that erosion of coastal bluffs provide sediment to the beach in front of them. In "Sea Cliffs, Beaches, and Coastal Valleys of San Diego County" (1984) by Kuhn and Shepard, they write of bluff-fronted beaches: "*Prior to 1978 the beaches in this area varied in width from 40 to 60 feet, with few sandbars offshore. This changed in 1978, however, when stormy weather caused extensive erosion of the bluffs and canyons, which in turn provided sediment that widened the beach by at least 40 feet and caused sandbars to form offshore.*" In the current environment of armored bluffs, seawalls have trapped the bluff sand and prevent the beaches from building. However, even after large amounts of bluff erosion, area beach widths are not as wide as the 150-200ft beach widths proposed as alternatives for this project. In particular, the 200 feet width seems extreme and will likely cause temporary impacts (steepened beach, surfing impact) to last longer.

There is no explanation for using such large beach widths. The potential negative impacts to the nearshore environment, seagrass and surfing are an unknown that is difficult to forecast using state of the art computer modeling. Appendix H Section 1 states: "*...the influences of nearshore reefs on local sand movement are also poorly understood and likely complex because of reef geometry and orientation (e.g., channels between reefs may facilitate sand movement [AMEC 2005] and reef structure may retain sand [SAIC 2007]).*"

We suggest, rather than depend on computer modeling, that the US ACOE follows the results from SANDAG's RBSP II project as they are being compiled. The Imperial Beach portion of RBSP II placed close to 4 times the amount of sand as compared to RSBP I. Significant unintended consequences have followed at Imperial Beach, including extensive flooding and damage to private property, the formation of dangerous beach profiles, significant sand migration within close proximity to federally protected resources, and significant reduction of surfing resources. The US ACOE needs to work closely with SANDAG to understand how those unintended consequences impacts came about. We strongly urge that this project reduce the amounts of sand as part of a "Locally preferred alternative" to avoid such negative intended consequences of placing such large amounts of sand.

SEDIMENT MONITORING NEEDS TO TAKE PLACE MORE THAN TWICE A YEAR

Provide a sediment monitoring program that utilizes state of the art science and high frequency profiling similar to that which has been implemented by local scientists from Scripps Institution of Oceanography.

The only way to understand the impacts and behavior of the larger beach fills proposed for this project is through intensive monitoring. The Draft EIR/EIS does not outline a very substantive monitoring program. Measuring profiles in Fall and Spring only, does not provide any information on how the fill is dispersed in the weeks and months after placement. Two profiles a year will only provide some seasonal dynamics, and will not provide adequate evidence to understand the impacts of the beach fill on surrounding nearshore environment and surf spot quality as they are happening. Please strengthen your monitoring program, and involve local

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experts at Scripps Institution of Oceanography who have implemented this high frequency monitoring during RBSP I and II as part of the Southern California Beach Processes Study (http://cdip.ucsd.edu/SCBPS/).

It is also unclear what the minimum beach width is that would trigger the next round of sand placement. In other words, if erosion rates are higher than expected and the beach narrows, is there a point when additional fill will be placed? These uncertainties could change both costs and severity/duration of impacts. Please clarify the mechanism to identify what conditions would call for more fill to be placed.

ECONOMIC ANALYSIS DOES NOT INCLUDE SURFING
Section 3.5.2 needs to include recreational benefits and losses due to surfing quality.

In order for this project to be authorized, the cost benefit ratio needs to include contributions to recreation. The cost of this project is too expensive for the US ACOE (and US tax payers) if only the protection of private property is the motivation. The study relies on a simple correlation of "towel space" to income generated by the linear extent of the beach. In the EIR, surfing and the quality of surf breaks are not considered recreation. Nor are the family and friends that travel with a surfer to another break. These are significant economic drivers and must be considered. Please re-examine the cost benefit ratio taking these benefits into consideration, and provide clear language as to how those benefits and impacts have been accounted for.

SURF SPOT AND BEACH DEGRADATION ECONOMIC ANALYSIS UNDER THE ALTERNATIVES ARE AN OMISSION AND ERROR IN THE STUDY
Economic analysis for the impact of increased backwash from the no project alternative is not studied. This is an error and omission. Backwash from seawalls will lead to diminished beach visits and decreases the value of of surrounding property that derives part of its value from walking to the beach. In addition, all recreational visits are impacted with this alternative.

In the Planned Retreat Alternative where seawalls are incrementally removed, there will be an anticipated decrease in backwash, increase in beach width, and increase in beach visits and surfing. This predicted increase in backwash if the seawalls are left intact should be used to determine the decrease in backwash if the seawalls are removed as part of a managed retreat strategy. Additionally, preserving the surfing and beach resources in a state that more closely resembles the present conditions would preserve property values of non-beachfront property in the project area as well as increasing the beach and surfing visits to the project area.

As discussed in Appendix B Section 11.4.1, "Eventually, for the without Project condition, with sea level rise, reflection and backwash are expected to increase significantly. A good example of what to expect can be found at the nearby Sunset Cliffs, as shown in Figure 11.4-3, where there is typically no beach and waves reflect off the cliffs regularly during high tide. As stated by one of the locals on Wannasurf.com, "Getting in and out at a low tide is not hard. Higher tide, big day? Better not surf here unless you are a really strong swimmer. Getting

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out of the water is challenging." Clearly, with a properly designed Managed Retreat Alternative, the natural bluff line would be allowed to retreat and this impact would be reduced or eliminated. Again, the analysis fails to include economic impacts of various alternatives as a result of surf break degradation or beach visit decreases.

MANAGED RETREAT PROPOSED DOES NOT MEET GUIDELINES OF A PROPER ALTERNATIVE
Section 3.1.4 needs to properly propose a Managed Retreat Alternative.

The total expected cost for the 50-year life of the project is nearly $177 million for a total project length of about 3.4 miles or $52 million per mile. The cost and time authorization for this project requires an exhaustive review of alternatives. Judging from the brevity and lack of explanation of a managed retreat plan, it is clear that this alternative was not taken seriously. The analysis does not provide any quantitative examination to provide a realistic comparison of costs for project vs. retreat. The breakdown of costs associated with Managed Retreat in Appendix E, is unfortunate in that the Cities have indicated they still intend to armor the cliffs when roads and infrastructure are threatened. This topic will take leadership and discussion that is absent from the EIR. Furthermore, a reason given for screening of retreat is that coastal cities don't want to support this. This is unfair to coastal cities, as their budgets obviously don't allow for buying out all of the bluff top houses. The "retreat scenario" that was modeled only relies on property owner action, not pro-active action by the cities or US ACOE. If the Federal taxpayers are asked to support the $177 million to authorize this project, at least a serious analysis needs to be done. Managed retreat is now being pursued as a preferred alternative for dealing with the aftermath of Super Storm Sandy, and will become more important in a period of sea level rise.

There are several errors in this analysis as appears in Section 3.1.4 and Appendix E Section 4. First, the US ACOE fails to propose any funding as part of the project alternative. As specifically quoted in the EIR/EIS, Surfrider proposed that, "The funding for property acquisition would come from a combination of Land Lease Fees for use and encroachment on Public Land with seawalls, Army Corps Shore Protection Funding and other Funding Mechanisms as outlined in the LUP Policy 4.36. Acquisition of blufftop property meets the US ACOE goals of Shoreline Protection in that the value of threatened structures will be preserved by buying blufftop property and removing structures at fair market value." The funding from US ACOE was completely ignored in the alternative analysis. Additionally, the analysis in Section 3.1.4 falsely concludes that the fees for Land Lease are $1000. This is not a fee. This is a deposit for a yet to be determined fee. From the LUP, "The City is collecting a $1,000 per linear foot fee deposit to be applied towards a future Public Recreation/Land Lease Fee. Therefore, until such time as a final Public Recreation / Land Lease Fee is adopted by the City following Coastal Commission approval of such a payment and certification of an LUP amendment adding the fee program to the City's LCP, the City will continue to impose an interim fee deposit in the amount of $1,000 per linear foot to be applied as a credit toward the Public Recreation/Land Lease Fee. The City shall complete its Public Recreation/Land Lease fee study within18 months of effective certification of the LUP."

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Additionally, the alternative improperly includes replacement of private stairways as a cost (Appendix E Section 4.4.4). Such replacement of stairways is inconsistent with the LUP as adopted by the Solana Beach City Council as well as with guidance on amendments from the Coastal Commission. Private beach stairways are non-conforming uses that must eventually be abated or converted to public use.

The analysis also assumes that threatened public infrastructure would automatically lead to applications for armoring by the city. The cities actually claim that if the first row of houses were lost they would attempt to armor the entire stretch in order to protect their shore-parallel roads and utilities. This scenario (Section 4.5 of Appendix E) was calculated simply as a way to show possible expenses if the Corps does not undertake any project, and does not represent the potential costs of a managed retreat project. This analysis does not appear to account for the fact that much of the coast is already armored, and instead uses a natural bluff erosion rate. Clearly along stretches that currently have seawalls or revetments the true bluff retreat rate would be much slower, even without the nourishment project. This would allow time for relocation of infrastructure as it naturally deteriorates irrespective of marine erosion thus alleviating the City's fear of infrastructure damage and the process outlined in Section 4.3. In fact the GSL line for 75 years of erosion in the City of Solana Beach indicates that the setback line is approximately Pacific Ave. An additional source of revenue for acquisition of Blufftop Properties would be from acquisition and rental prior to removal. The economic justification of the entire project relies on this worst-case scenario whereby the entire first row of homes, their contents and the land they sit on will eventually be lost to catastrophic bluff failures if the Corps project is not built.

Further confusing to the description of Retreat is this statement in Section 4.3, "Structure loss, structure demolition & removal, and land loss valued at non bluff-top price levels are additional damage categories present in the Retreat Scenario but not present in the Armoring Scenario because the Retreat Scenario models parcel owners that do not or cannot react in time to secure the necessary seawall construction permits, financing, and construction experts prior to structure failure brought about by episodic erosion events. The Retreat Scenario also distinguishes between bluff-top and non bluff-top land value to account for land loss that occurs between the bluff edge and structure as well as land loss that occurs after the structure has failed." If the Retreat alternative were truly analyzed assuming acquisition, this statement should not be a part of describing the option.

In the same section, the No Project Alternative with seawalls omits, and in error fails to include an analysis of the impact on adjacent properties through loss of beach and recreation including surfing. Recreation is solely analyzed based on the value of towel space. This is unacceptable, and must be rectified.

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THE ENGINEERING ANALYSIS FAILS TO PROPERLY CHARACTERIZE THE IMPACTS OF SEA LEVEL RISE ON EROSION PROCESSES

Appendix C carefully analyzes the effect of sea level rise on the erosion over the past 6000 years. Appendix C Section 5 states,

> "Before anthropogenic changes in the 20th Century, the coastal bluffs retreated in accordance with long-term sea level rise since the last glacial maximum. By approximately 6,000 years ago, sea level had rapidly risen to within 12 to 16 ft of the present level. The rate then slowed by an order of magnitude to approximately 0.002 foot per year from an earlier rate of 0.028 foot per year. The configuration of the bluffs was similar to the pre-anthropogenic configuration throughout the more recent period of slow sea level rise, consisting of a transient sandy beach, sea cliffs and upper bluffs. Using this history of sea level rise, the geologic retreat rate before anthropogenic changes can be estimated by finding the distance on the shore platform between the sea level or the sea cliff and the 12- and 16-foot depth contours. Where the base of sea cliff is below sea level, an assumption is made that the same condition existed previously and the depth below sea level is used to adjust the 12-foot or 16-foot depth downward. Anthropogenic influences typically consist of flood protection and intensive urbanized and or modern agricultural development that has occurred within the last ±125 years along the coastal areas in the vicinity of the project. This type of influence has gradually reduced the available load of sediment that was naturally present in larger amounts as beach nourishment fill during pre-anthropogenic times.
>
> For the Encinitas/Solana Beach coast, eleven profiles of nearshore bathymetry are available in Appendix B. Evaluation of these profiles using the 12-foot depth indicates the geologic rate of coastal bluff retreat is 0.11 foot per year, with about 640 ft of retreat occurring gradually in the last 6,000 years (Table 4.1-1)."

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32 **Table 4.1-1 Geologic (Pre-Anthropengic) Rate of Coastal-Bluff Retreat**

Transect	Location	Reach No.	Source	R_{total} (ft)	R/yr (ft/yr)	0 to -12' Shore Platform Slope
SD710	Parliament Road	1	COE	509	0.085	0.024
SD700	Grandview Street	1	COE	639	0.107	0.019
SD695	Jupiter Street	1	COE	658	0.110	0.018
SD690	Jason Street	1	COE	654	0.109	0.018
SD680	Beacons Beach	2	COE	695	0.116	0.017
SD675	Stone Steps	3 / 4	COE	651	0.109	0.018
SD670	Moonlight Beach	4 / 5	COE	640	0.107	0.019
SD660	Swami's	6	COE	580	0.097	0.021
SD650	San Elijo Park	6	COE	635	0.106	0.019
SD620	Seaside	7 / 8	COE	670	0.112	0.018
SD600	Fletcher Cove	8	COE	696	0.116	0.017
Average Using 12-foot depth Using 16-foot depth				639 852	0.107 0.142	0.019

The implication is that the 6000-year sea level rise trend corresponds to an approximate erosion rate of 0.1 to 0.14 ft/yr with a sea level rise trend of 0.002 ft/yr.

In Appendix B, it is reported that over the last century, sea level rise has accelerated to between 0.003 to 0.008 ft/yr. Specifically in La Jolla, the rate is reported as 0.0068 ft/yr. This is a rate 3 times higher than the 6000-year trend. This may imply that the erosion rate would be correspondingly higher, yet all of the erosion loss appears to be attributed to loss of sand in the study and project discussion. This would predict an erosion rate of 0.3 to 0.42 ft/yr, which corresponds to observed rates in the project area. The omission of this conclusion is a gross distortion of the presumed need for the project.

From Appendix B,

"3.2.3 Sea Level Rise

Long-term changes in the elevation of sea level relative to the land can be engendered by two independent factors: (1) global changes in sea level, which might result from influences such as global warming, and (2) local changes in the elevation of the land, which might result from subsidence or uplift. The ocean level has never remained constant over geologic time, but has risen and fallen relative to the land surface. A trendline analysis of yearly Mean Sea Level (MSL) data recorded at La Jolla in San Diego County 1924 to 2006 indicates that the MSL upward trend is approximately 0.0068 feet per year, as shown in Figure 3.2-1.

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According to the Intergovernmental Panel on Climate Change (IPCC), global average sea levels have risen approximately 0.3 feet to 0.8 feet over the last century and are predicted to continue to rise between 0.6 ft and 2.0 ft over the next century (IPCC, 2007). In a 2009 study performed by the Pacific Institute on behalf of the California State Coastal Conservancy (SCC) scientific data gathered from 1980 to 1999 suggests that global sea level rise has outpaced the IPCC predictions (Rahmstorf, 2007). To the contrary, an analysis of U.S. Tide Gauge records spanning from 1930 to 2010 found the rate of sea level rise for this period to be decelerating (Houston and Dean, 2011). Potential effects from an acceleration of sea level rise on coastal environments, such as erosion, net loss of shorefront, increased wetland inundation, and storm surge have the potential to displace coastal populations, threaten infrastructure, intensify coastal flooding, and ultimately lead to loss of recreation areas, public access to beaches, and private property."

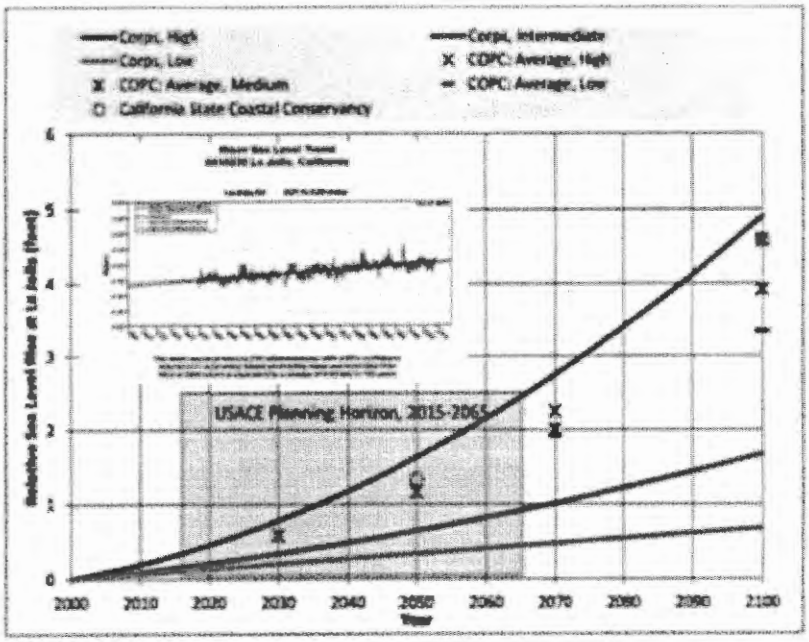

Figure 3.2-2 Relative Sea Level Rise Estimates

Further discussed in Appendix B above is that predicted Sea Level Rise would make the rate annually 0.006 ft/yr to 0.02 ft/yr. This would keep the same erosion rate as has occurred in the last century to a rate about 3 times higher or 1.2 ft/yr. Even at this high end estimate of 1.2ft/yr, about 60 ft of erosion would occur in the project area over the 50 year project life likely irrespective of sand input.

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In conclusion, we recognize that projects like the one proposed are part of our future. We appreciate the balancing act that coastal managers must perform in order to protect coastal property while protecting coastal resources. Generally, we prefer beach fill projects to hard structures. However, the volume of sand proposed for this project will cause negative impacts to the coastal resources our membership is most concerned about. We hope you will take our comments seriously and we look forward to further discussions with you regarding this project.

Sincerely,

Tom Cook
Expert Advisor and Beach Preservation Co-Chair
San Diego Chapter
Surfrider Foundation

Jim Jaffee
Expert Advisor and Beach Preservation Co-Chair (Solana Beach Resident)
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Kristin Brinner
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The Washington Post

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Surfonomics quantifies the worth of waves

By Gregory Thomas, Published: August 24, 2012

In 2002, a surfer named Chad Nelsen enlisted an economist at Duke University to help put a price tag on a popular surfing spot on Puerto Rico's northwest coast. Nelsen's idea was novel: to prove that the waves breaking on the beach constituted a multimillion-dollar asset and persuade the local town to take pains to preserve it.

Real estate developers were after another multimillion-dollar asset: the views from the beach, which would be the selling point for three high-rise condominiums they planned to build.

Surfers and environmentalists feared that the construction at Rincon, the village in Puerto Rico, would change the flow of sediment around the beach and bury a reef that created the surf break. Nelsen sought to show that without the reef, there would be no waves, no surfers and, ultimately, a big drop in tourism dollars.

"We found that people were buying second houses there just for the surfing," said Linwood Pendleton, the Duke economist who assisted Nelsen and is a chief economist for the National Oceanic and Atmospheric Administration. "It was contributing literally millions of dollars a year to the local economy."

Rincon and its world-class wave break, discovered by surfers in the late 1960s, embodies a cycle that's as regular as the tides: Surfers trek to remote reaches of the globe in search of the perfect wave. They discover prized beaches. Word gets out. Tourists pile in. Developers seize land and opportunity.

Construction alters the wave break. The surf loses its edge.

Surf advocates have long argued that Mother Nature is priceless, invoking geological and hydrological mechanics that distinguish the character and appeal of the waves. In a new strategy, Nelsen and a handful of other surf intellectuals are letting go of lofty environmentalist rhetoric and fighting economics with economics.

"Those of us who really love the ocean have an instinct when we see beautiful places like this to think that they're priceless and to think that the commodification of nature, and putting price tags on everything, is the root cause of nature's destruction. ... I think that's actually counterproductive," Jason Scorse, director of the Center for the Blue Economy, said in a TEDx talk in April. Scorse is the author of the book "What Environmentalists Need to Know About Economics" (2010). "When nature is undervalued, we make bad decisions."

Rincon was a rare victory for surfers. The international campaign to protect the wave break, led by the Surfrider Foundation, an advocacy group, blocked the condo proposal and persuaded lawmakers to designate Tres Palmas, the name of the break, as the heart of Puerto Rico's first marine reserve.

And it helped launch the science of "surfonomics."

Intrinsic value in a wave

In March, Nelsen, 42, completed a doctorate of environmental science at UCLA, where he studied the economics of surfing. Surfonomics is an offshoot of natural resource economics that seeks to quantify the worth of waves, both in terms of their value to surfers and businesses and their non-market value — or how much people would be willing to pay not to lose them.

"The assumption is often that surfing is worth zero dollars," said Nelsen, environmental director for the Surfrider Foundation. "It's taken for granted. It's not perceived as being a viable and important source of economics, particularly with decision makers in coastal zone management that we're talking to all the time."

To prove there is intrinsic value in a wave, Nelsen started at the beginning. A report he produced last August tabulates the number of surfers in the country and how much money they shell out for the privilege of riding the waves. After surveying more than 5,000 surfers, Nelsen concluded that about 3.3 million people in the country surf 108 times a year, drive an average of 10 miles per session and contribute at least $2 billion to the U.S. economy annually.

"The report is to demonstrate that, hey, there's a lot of surfers in the U.S. They go to the beach a lot, and they spend a lot of money in these communities," Nelsen said. "Therefore, you should take their interests seriously."

In part, the survey is an effort to shake the stereotype of the shaggy stoner who lives out of a van and doesn't contribute to society. Nelsen calls that misconception "the Spicoli virus" in reference to Sean Penn's iconic surfer-slacker character from the 1982 movie "Fast Times at Ridgemont High." The median surfer these days is 34 and pulls in more than $75,000 a year, according to Nelsen's study.

"Even 10 years ago, the posture was one of trying to dismiss the arguments of these 'crazy surfers,' " said Michael Walther, a coastal engineer in Florida whose research persuaded officials in Monmouth County, N.J., to rethink a beach renourishment plan that would have buried a surf break at Sandy Hook

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in 2001.

Building proposals for a new harbor in Los Angeles, a cruise ship terminal in Australia, a factory in Mexico or a jetty in France don't account for potential damage to surf breaks that bolster nearby communities with tourism dollars. When surfers have spoken up, Nelsen said, their arguments have tended to be passionate but abstract and lacking a concrete link between the building, the break and the local economy. Meanwhile, the argument of real estate developers is more easily couched in economic terms: job creation, revenue and growth.

A simple case study: A world-class surf break at Madeira, an island off the coast of Portugal, suffered a damaging blow when the government installed a seawall in the 1990s. The idea was to defend cliffs against erosion to prepare the area for tourism infrastructure. U.S.-based Save The Waves Coalition objected, saying the wall would make surfing more dangerous. The seawall was built, and surfers stopped visiting en masse. Save The Waves Founder Will Henry thinks that they lost the fight because they weren't properly equipped.

"If you talk in dollars, that's a language the government speaks," Henry said. "We didn't have any real data at the time to say, 'This asset is going to be worth X amount of dollars over the next 10 years.' It just didn't exist."

Save The Waves has since produced two studies evaluating the economic value of surf breaks, in partnership with academics at Stanford University, the University of Oregon and the University of Hawaii. Mavericks, an epicenter of big-wave surfing in Half Moon Bay, Calif., is worth $23.9 million annually in a report produced in 2010. A wave at Mundaka, off the coast of southern Spain, brings in about $4.5 million to the local economy each year, according to a 2007 study.

Economists calculate the value of a surfable wave by tabulating visiting expenses of surfers and surf spectators. Some of the indicators they watch: distance traveled, visits per year, time taken off work, length of stay, drive time, gas money, parking fees, food breaks, gear rentals. The theory is that such figures represent how much money a person is willing to part with for the experience. At Mavericks, for example, economists calculated that more than 420,000 people, not just surfers, visit each year to watch the waves and spend an average of $56.70 per visit.

'Waves are our Yosemite Valleys'

The practice of protecting natural resources for public use is as old as Yellowstone, the country's first national park. It was established in 1872 "for the benefit and enjoyment of the people," according to the statute signed by President Ulysses S. Grant. The field of natural resource economics is a natural outgrowth of the same idea. It began as a means of quantifying value in mining, fishing and timber industries, and it provides a method of assessing dollar values for travel and activities around places where people recreate. The methodology gives economists tools to gauge how much people are willing to pay to go skiing or whale-watching or to hike the Appalachian Trail.

"These waves are our Yosemite Valleys," Nelsen said. He believes they deserve the same considerations and protections. "We think of these as national treasures."

The same way national parks set use restrictions on select areas, surfers are beginning to induct unique wave breaks into what they call World Surfing Reserves. The designation was created in 2009 by Save The Waves and modeled on an Australian organization called National Surfing Reserves that has had success coordinating protection plans with government officials for about a dozen surf breaks. What is

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often lacking is the financial element — key to swaying decision makers, said Neil Lazarow, an economist who evaluated surfing on Australia's famed Gold Coast.

The movement to apply economics to environmentalism got a boost last year from the President's Council of Advisors on Science and Technology. In a report issued to the White House, the council recommends investing in research surrounding "environmental capital," or non-consumptive natural resources that people will pay to enjoy. The idea that self-sustaining resources such as waves don't attract dollars simply because you can't count people moving through a turnstile is outdated thinking, said Pendleton, the Duke economist.

"We've tended to focus on big industrial uses of the outdoors while forgetting about these much more sustainable uses of the outdoors, especially recreation," Pendleton said. "And we do it at our own economic peril."

Economic studies of activities like surfing are critical when economists are calculating damage assessments in the wake of environmental disasters, such as the Deepwater Horizon oil spill in the Gulf of Mexico.

"Unfortunately, we've been performing a lot of crisis-driven studies where we are figuring things out after the fact," said Charles Colgan, chief economist for the National Ocean Economics Program, a project of the Monterey Institute of International Studies. "We don't want to wait for the next oil spill or hurricane to figure out what's going on. It's a costly way to do things."

As industries such as commercial fishing have taken a plunge, tourism has come to account for a larger chunk of the ocean economy. Commercial fishing produced slightly less than $5.7 billion in 2009 while coastal tourism and recreation accounted for more than $61 billion that year, according to NOAA reports.

Colgan thinks the rise in coastal tourism is partly because of the economic downturn driving people to cheaper housing inland. Because it is too expensive to live where they can surf, people are traveling farther to do so.

"As growth is shifting inland and people are traveling to the coast from further inland, the idea of surfing as just a cultural issue on the coast needs to be shifted," Colgan said. "It's not about that one stretch of beach. It affects a larger geographical area."

A risky proposition

Surf economists admit that surfonomics is a risky proposition. The few reports documenting the value of waves have not, so far, been challenged or scrutinized by developers. But what if, for example, a wave worth $24 million annually is pitted against a new hotel that would bring in $30 million a year, Surfers Against Sewage, another advocacy group, says in a 2010 report on ocean resources. "Are the developers then in a position to 'buy' that wave from the surfers?"

"That's everyone's fear, especially when you start stacking up recreation against offshore oil," Pendleton said. "How can we ever compete?"

Scorse, the marine policy advocate, is in the final stages of a study that he said proves that surfing contributes potentially hundreds of millions of dollars — not in tourism, but in property tax revenue. He said his research, which he expects to complete this year, shows that houses within walking distance of

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surf spots in Santa Cruz, Calif., are worth far more than coastal homes farther from great wave breaks.

Nelsen, for his part, isn't worried about the implications.

"We're not arguing that the world is one big cost-benefit analysis," he said. "You could probably make more money on Yosemite than you make today if you filled it with condos. But no one is arguing that we should. Surfonomics is just one measure of the value of these resources. It's not the only measure."

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Surfonomics 101

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A good break has a value that ripples out into the surrounding community -- but calculating that cost can be tricky.

By Paul Kvinta

PHOTO: MARTIN BERNETTI/AFP/GETTY IMAGES

This break is worth something. But how much?

FORTUNE -- One glorious Sunday morning last fall, economist Jason Scorse was strolling down 41st Avenue in Santa Cruz, Calif., dodging surfers. They were everywhere -- bustling in and out of surf shops, gearing up in parking lots behind their SUVs, schlepping boards down the steep steps to the world-class breaks beneath Pleasure Point. Scorse lives to surf but not on weekends. Too crowded. Still, the 44-year-old college professor -- erudite, bald, and with a neatly trimmed beard -- in many ways represents the face of surfing in America today. "The sport has lost the image of being a thing for hippies and stoners, of being kinda ragtag and stupid," he says. "Surfing today is the Silicon Valley CEO. It's the brain surgeon. It's the super-athlete. It's dad, mom, and the kids." It's also significant business.

Over the last decade the number people in America who surf at least once a year has increased by nearly half to 2.6 million (more than a million surf at least eight times annually). The median surfer these days earns $75,000 a year, and in 2010 some $6.3 billion was spent on boards, wetsuits, sunglasses, and surf-related clothing and accessories. With women increasingly joining the lineup (they comprise 36% of American surfers) and with the sport swelling in Europe, China, and Korea, some analysts predict that the global surf industry will generate more than $13 billion by 2017. That number doesn't include revenue generated by the growing international surf travel business. Companies like Santa Monica-based Waterways Travel specialize in sending well-heeled surfers on two-week safaris to hard-to-reach surf breaks in places like Peru, Indonesia, and Fiji for up to $12,000.

But Scorse says these numbers tell only part of the story. As director of the **Center for the Blue Economy at the Monterey Institute** and author of the book *What Environmentalists Need to Know About Economics*, he and a handful of other surf-minded economists are pioneering "**surfonomics**," a field that attempts to show that the waves themselves have economic value. From the sweeping vantage atop Pleasure Point, Scorse points out The Hook, Sharks, Privates, and several other breaks crowded with surfers. "All those guys are surfing for free," he says. "No one's taking any tickets. But those waves still have an economic value, and we can measure that in several different ways."

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Surfonomics was born on the northwest coast of Puerto Rico in 2002 when surfers feared that a proposed beachfront condo development would spoil the hydraulics of the 30-foot waves that had made the sleepy town of Rincon legendary. Determined to do battle with more than just emotional arguments, a trio of environmental groups commissioned a study showing that tourism -- most of it surf-related -- generated at least $52 million a year for Rincon. Armed with this price tag, the surfers successfully blocked the condo project. In 2007 a similar study concluded that the surf break at Mundaka on the coast of southern Spain generated $4.5 million annually for the local economy.

These studies revealed a market value for the waves. But waves also have a measurable non-market value that benefits surfers. "It's a hidden value, because no money changes hands," Scorse says. "Basically you're trying to determine what people would pay to surf if someone was taking tickets. Or you're trying to determine what surfers would pay not to lose a wave." Economists capture this with "travel cost studies" that measure things like the distance surfers and spectators travel to a surf break, the number of times they visit, the amount of time they take off work, and the amount they spend on gas. A 2010 study valued the big-wave break at Mavericks off Half Moon Bay, Calif., at $23.9 million after determining that 420,000 people visit each year and spend an average of $56.70 per visit. A 2012 study of the break at Trestles in San Diego County found that 300,000 visitors spent an average of $80 a visit, for a total valuation of $24 million.

But Scorse says these studies are just nibbling around the edges. The full value of surf breaks, he insists -- the Big Kahuna, as it were -- is capitalized into real estate. "See these houses," he says, nodding towards the multi-million-dollar homes along Santa Cruz's Pleasure Point. "The irony of travel cost studies is that when you ask the guy who spent $2 million on a house here, 'How far did you travel?' 'Did you use your car?' 'Did you buy gas?' You get zero for all that. He can walk right out his front door and surf. So those studies aren't picking up the full value." What Scorse wanted to know was this: If he woke up tomorrow and the surf was gone in Santa Cruz, would all this real estate be worth what it is?

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In a study he conducted last year, he compared three beachfront neighborhoods in Santa Cruz, two within walking distance to surfing, one not. After controlling for several variables -- proximity to the beach, ocean views, home characteristics, neighborhood amenities -- he found that a house next to a surf break is valued approximately $106,000 more than a comparable house a mile away. Given the value of coastal real estate in California, even if just a tiny fraction can be attributed directly to surfing, that's huge money. "Then there's the tax revenue from that," Scorse says. "Property tax is around one-and-a-half percent in California, so it's not a tremendous amount, but if you're talking hundreds of millions of dollars in real estate, that's millions of dollars a year in perpetuity. It's not nothing. It's not trivial."