



PUBLIC NOTICE

**U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT**

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**APPLICATION FOR PERMIT MODIFICATION
Modification to the City of Encinitas
Opportunistic Beach Fill Program**

Public Notice/Application No.: SPL-2008-01126-RRS

Project: City of Encinitas Opportunistic Beach Fill Program (OBFP)

Comment Period: April 10, 2015 through May 11, 2015

Project Manager: Robert R. Smith Jr.; 760-602-4831; Robert.R.Smith@usace.army.mil

Applicant

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City of Encinitas
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Contact

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Location

Leucadia and Cardiff Beaches adjacent to and in the Pacific Ocean within the City of Encinitas, San Diego, CA (Leucadia Beach location at Latitude 33.072166, Longitude -117.308333; Cardiff Beach location at Latitude 33.280000, -117.012500).

Activity

The proposed project (Project) is to amend the existing City of Encinitas (City) Opportunistic Beach Fill Program (OBFP) Department of the Army permit to include two new receiving beaches (namely Leucadia Beach and Cardiff Beach). Addition of these sites to the existing program would allow for streamlined approval of projects proposing placement of beach compatible materials derived from opportunistic sources (e.g., upland construction projects, wetland restoration, dredging, etc.) at two additional receiving beaches within the City. Addition of the beaches to the City's program would allow flexibility in placement locations to address areas of localized erosion and/or minimize haul or dredge distances from a given sediment source. The proposed project sites are: 1) Leucadia Beach between Range Street and Diana Street and 2) Cardiff Beach just south of Restaurant Row. These sites are located in the towns of Leucadia and Cardiff, respectively. Placement would occur between Labor Day and Memorial Day in association with the Encinitas OBFP (see attached drawings). For more information see page 3 of this notice.

Interested parties are hereby notified an application has been received for a Department of the Army permit for the activity described herein and shown on the attached drawings. We invite you to review today's public notice and provide views on the proposed work. By providing substantive, site-specific comments to the U.S. Army Corps of Engineers (Corps) Regulatory Division, you provide information that supports the Corps' decision-making process. All comments received during the comment period become part of the record and will be considered in the decision. This permit will be issued, issued with special conditions, or denied under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Comments should be mailed to:

Los Angeles District, U.S. Army Corps of Engineers
Regulatory Division, Carlsbad Field Office
ATTN: Robert Smith
5900 La Place Ct., Suite 100
Carlsbad, CA 92008

Alternatively, comments can be sent electronically to: Robert.R.Smith@usace.army.mil.

The mission of the Corps Regulatory Program is to protect the Nation's aquatic resources, while allowing reasonable development through fair, flexible and balanced permit decisions. The Corps evaluates permit applications for essentially all construction activities that occur in the Nation's waters, including wetlands. The Regulatory Program in the Los Angeles District is executed to protect aquatic resources by developing and implementing short- and long-term initiatives to improve regulatory products, processes, program transparency, and customer feedback considering current staffing levels and historical funding trends.

Corps permits are necessary for any work, including construction and dredging, in the Nation's navigable water and their tributary waters. The Corps balances the reasonably foreseeable benefits and detriments of proposed projects, and makes permit decisions that recognize the essential values of the Nation's aquatic ecosystems to the general public, as well as the property rights of private citizens who want to use their land. The Corps strives to make its permit decisions in a timely manner that minimizes impacts to the regulated public.

During the permit process, the Corps considers the views of other Federal, state and local agencies, interest groups, and the general public. The results of this careful public interest review are fair and equitable decisions that allow reasonable use of private property, infrastructure development, and growth of the economy, while offsetting the authorized impacts to the waters of the United States. The permit review process serves to first avoid and then minimize adverse effects of projects on aquatic resources to the maximum practicable extent. Any remaining unavoidable adverse impacts to the aquatic environment are offset by compensatory mitigation requirements, which may include restoration, enhancement, establishment, and/or preservation of aquatic ecosystem system functions and services.

Evaluation Factors

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect

the national concern for both protection and utilization of important resources. The benefit, which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof. Factors that will be considered include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, if the proposal would discharge dredged or fill material, the evaluation of the activity will include application of the EPA Guidelines (40 CFR Part 230) as required by Section 404 (b)(1) of the Clean Water Act.

The Corps is soliciting comments from the public; Federal, state, and local agencies and officials; Indian tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Preliminary Review of Selected Factors

EIS Determination- A preliminary determination has been made an environmental impact statement is not required for the proposed work.

Water Quality- The applicant has obtained a water quality certification for the Project, under Section 401 of the Clean Water Act, from the California Regional Water Quality Control Board – San Diego Region (Certification Nos. 08C-087 dated September 5, 2014).

Coastal Zone Management- The applicant received a Coastal Development Permit (No. 6-08-110-A2) from the Coastal Commission previously with an amendment to the program dated August 14, 2014. For those projects in or affecting the coastal zone, the Federal Coastal Zone Management Act requires that prior to issuing the Corps authorization for the project, the applicant must obtain concurrence from the California Coastal Commission the project is consistent with the State's Coastal Zone Management Plan. The District Engineer hereby requests the California Coastal Commission's concurrence or non-concurrence.

Essential Fish Habitat- The Corps preliminary determination indicates the proposed activity may adversely affect Essential Fish Habitat (EFH). Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Los Angeles District hereby requests initiation of EFH consultation for the proposed project. This notice initiates the EFH consultation requirements of the MSA (or via subsequent letter/email if deemed necessary). In order to comply with the MSA, pursuant to 50 CFR 600.920(e)(3), I am providing, enclosing, or otherwise identifying the following information:

1. Description of the proposed action: See project description on page 1 of this public notice.
2. On site inspection information: See baseline information on page 5 of this public notice.

3. Analysis of the potential adverse effects on EFH: Project may result in indirect adverse effects from turbidity to nearby EFH resources and coastal aquatic sites.

4. Proposed minimization, conservation, or mitigation measures: Project will have monitoring for turbidity and coverage impacts from material placement, seasonal and beach placement restrictions, and mitigation may occur if the Corps determines that impacts to coastal aquatic resources have occurred. See Tables 1-3 in this notice. No mitigation is proposed unless impacts are documented per the OBFP permit.

5. Conclusions regarding effects of the proposed project on EFH: EFH consultation is warranted and hereby initiated due to adverse effects of the Project.

Therefore, it is my initial determination the proposed activity may adversely affect and would have a substantial adverse impact on EFH or federally managed fisheries in California waters. My final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the NOAA Fisheries. If I do not receive written comments (regular mail or e-mail) within the 30-day notification period, I will assume concurrence by NOAA Fisheries with the proposed mitigation measures.

Cultural Resources- The Corps determined that due to previous disturbances within these two additional beach areas from previous beach nourishment projects that there is No Potential to Cause Effects to cultural resources at these two receiver sites. The latest version of the National Register of Historic Places has been consulted and these two proposed receiver sites are not listed. This review constitutes the extent of cultural resources investigations by the District Engineer, and she is otherwise unaware of the presence of such resources.

Endangered Species- The closest endangered California least tern (*Sterna antillarum browni*) and threatened western snowy plover (*Charadrius alexandrinus nivosus*) nesting sites to the Leucadia receiver site are located at Batiquitos Lagoon, which is approximately 0.8 mile up coast. Additionally, potential snowy plover wintering areas are located approximately 3,000 feet up coast. Historically, least terns and snowy plovers have nested at San Elijo Lagoon east of Interstate 5, at locations more than 1-2 miles from the proposed Leucadia receiver site. However, there have been no recent records of successful nesting activity in the last five years.

Additionally, the proposed Cardiff receiver site is located nearly three miles from the new nest sites constructed at San Dieguito Lagoon. Endangered light-footed clapper rail (*Rallus longirostris levipes*) have been documented more than 500 feet away from the Cardiff site (AECOM 2011) at the San Elijo lagoon. Proposed biological monitoring measures would also avoid effects to listed species. With the implementation of the proposed measures (Tables 1 and 2) preliminary determinations indicate the proposed activity would not affect federally-listed endangered or threatened species, or their critical habitat. Therefore, formal consultation under Section 7 of the Endangered Species Act does not appear to be required at this time.

Public Hearing- Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearing shall state with particularity the reasons for holding a public hearing.

Proposed Activity for Which a Permit is Required

Basic Project Purpose- The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the Corps to determine whether the applicant's project is water dependent (i.e., requires access or proximity to or siting within the special aquatic site to fulfill its basic purpose). Establishment of the basic project purpose is necessary only when the proposed activity would discharge dredged or fills material into a special aquatic site (e.g., wetlands, pool and riffle complex, mudflats, coral reefs). No direct sand placement would occur on special aquatic sites. There could be minor turbidity impacts to adjacent areas that have reef resources and surfgrass, however no significant impacts to reefs or aquatic resources are foreseeable given the project area has been used for beach nourishment projects such as the Regional Beach Sand Project (RBSP) I, RBSP II, and as identified in the San Diego Regional Sediment Management Plan (RSMP), no significant impacts occurred. Nevertheless the Corps has identified the Project's basic project purpose as beach nourishment. The Project is water dependent.

Overall Project Purpose- The overall project purpose serves as the basis for the Corps' 404(b)(1) alternatives analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals for the project, and which allows a reasonable range of alternatives to be analyzed. The overall project purpose for the proposed project modification is to restore the Leucadia and Cardiff beaches with suitable material, in the City of Encinitas, CA.

Additional Project Information

Baseline information- Baseline information includes information on the shoreline of the City of Encinitas, littoral cells in San Diego County, the existing setting for each receiver site and associated haul routes, and surrounding land uses. The receiver sites are sandy beaches exposed to the Pacific Ocean. The shoreline is a valuable asset to the residents, environment, and economy of San Diego County. The beaches and seacliffs are natural features that define the region. Many of the beaches and bluffs in the City have been eroding as a result of reduced sediment supply to the coastline and sea level rise. In 1993, the Shoreline Preservation Strategy (SPS) for the San Diego region was adopted by the SANDAG Board of Directors. The SPS proposes an extensive beach building and maintenance program for the critical shoreline erosion problem areas in the region and includes a comprehensive set of recommendations on the beach building program and implementation. The proposed project continues the goals and efforts set forth in the SPS.

The Project is located in the Oceanside Littoral Cell, which extends from Dana Point in Orange County south to La Jolla and includes the shorelines of the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego. The proposed receiving beaches in the City of Encinitas are located within the Southern Oceanside Littoral Cell. Cobble can dominate the receiving beach; presently, however, the beach is sandy as a result of the placement of sand during RBSP II. California grunion could utilize this site for spawning in its present condition. Implementation of monitoring measures and a protection plan would reduce adverse impacts to the California grunion.

Leucadia and Cardiff Beaches consist of a gently sloping sand beach with scattered rocks, cobbles, and riprap. The beach is abutted by steep vegetated and structurally fortified cliffs lined with private properties. The beach is generally narrow along this reach of shoreline and water commonly approaches the toe of the bluffs during high tides and/or large waves. Near shore habitats in the project include intertidal surfgrass which is approximately 150 feet from the receiver sites. Surfgrass was observed on low-relief rock in the minus tide zone seaward of the site boundaries during site visits conducted in June 2009 and January 2010.

Localized patches of surfgrass partially buried in sand were seen during the January 2010 site visit. Near shore reef with surfgrass and understory algae begins approximately 150 feet seaward and extends farther offshore of the proposed receiver site boundaries. Kelp bed habitat was mapped approximately 1,000 feet offshore of the southern portion of the site in 2008 (AECOM 2011). Sand and cobble occur within the site as well as a few localized rocks without marine life. Implementation of monitoring measures (Table 2) and a protection plan for impacts to the California grunion would be implemented. The Leucadia Beach site is located one mile south of the Batiquitos Lagoon State Marine Conservation Area (SMCA).

Project description- The following section provides project details for each of the two receiver sites regarding: (1) sand quantities and qualities; (2) beach fill design (see attached drawings); and (3) haul routes (See Table 1). OBFP monitoring results from project implementation will be used to further refine and optimize the program as appropriate and necessary.

Sand Quantities and Qualities:

Evaluating opportunistic sources to determine if they are appropriate for beach nourishment is a process based on sediment characterization and comparison protocols. Sand material is anticipated to be from local contributions; that is, using surplus sand from upland construction, development, or dredging projects and placing it at specified beach locations to supplement ongoing beach nourishment activities in the region. Potential source material would require sampling and analysis to determine compatibility prior to placing it on the beach. Source material not meeting predetermined physical and chemistry standards would be rejected. Per the State of California Sand Compatibility and Opportunistic Use Program (SCOUP), criteria for determining suitable beach sand include that the material: 1) Cannot be found to contain hazardous chemicals; 2) Must be free of trash and debris; 3) Must reasonably match the color of natural beach sand after exposure to the marine environment; 4) Must be less than 10 percent manufactured sand; 5) Must be a minimum of 75 percent sand, optimally 80 percent sand or greater and with a percent sand content within 10 percent of the grain size envelope of the beach profile; and 6) Must not form a hardpan after placement.

Beach Fill Design:

The project proposes the addition of two new receiving beaches to the City of Encinitas OBFP. These beaches are described, as follows:

Leucadia Beach: Placement of sand will occur along 2,700 linear feet of shoreline in the northern portion of the City of Encinitas (see attached drawings). The footprint extends from Range Street to Diana Street and is identical to the area used during the RBSP I project and analyzed as part of the RBSP II project.

Cardiff Beach: Placement of sand will occur along 1,100 linear feet of shoreline in the southern portion of the City of Encinitas (see attached drawings). The footprint extends from the northern end of Restaurant Row to the intersection fronting Las Olas restaurant, which is identical to the area used for sand placement during RBSP I and RBSP II projects.

Two beach fill design options are considered for Leucadia and Cardiff Beaches: (1) placement as a beach berm, and (2) placement as low-tide linear mounds in the surf zone. The beach berm option would only be used when there is high quality sand (less than 15% fines) that would visually blend in with the native beach and would not form a hardpan. The Surf Zone placement option would be used with lesser quality materials (15 to 25% fines) and would create mounds of

sediment below the high tide line to be quickly redistributed by waves and tides.

Once the fill material is placed at a receiving beach site in either of these designs, the material would naturally redistribute in the long-shore and cross-shore direction by waves and tides. Thus, the beach fill placement footprint size would be temporary. Material would be distributed within the beach's profile until an equilibrium condition is reached. This equilibrium is dynamic, as beach sediments are constantly being reworked in response to changes in wave energy. Thus, a 100-foot-wide berm would not translate to a 100-foot-wide equilibrated beach. The long-term intent of the program is to increase sediment delivery to the system as a whole and result in the gradual widening of beaches. The following discussion includes descriptions of the beach fill designs with cross-section details for each of the receiver sites. These beach fill concepts are designed to minimize impacts to known adjacent resources.

Beach Berm

Beach berm placement is the traditional beach fill design used for beach nourishment in which sand is placed as a layer over the existing beach to build out (i.e., widen) the existing berm. The berm would be a level surface extending a certain distance from the back beach toward the ocean, then sloping gradually into the water. The elevation, width, length, and slope of the berm would vary for each project, depending upon the quantity of material to be placed and its grain size, as well as the condition of the beach at the time of material placement. This option is ideal for good quality material (i.e., less than 15% fines) with a color consistent with the native beach material.

Surf Zone Placement

Surf zone placement would entail deposition of material below the High Tide Line (HTL), which would be approximated in the field by the wrack line (i.e., line of deposited kelp or seaweed on the beach) or highest wetted line on the beach. This placement method would primarily be used for upland sources being trucked to the site. The method is ideal for material that is finer or different in color than the existing beach sand. The surf zone placement method mirrors construction methods used during the manual opening of lagoon mouths in San Diego County.

Typically, material would be rear dumped by trucks at the receiving beach (below the HTL) to create a linear series of mounds approximately 3 to 4 feet in height. The series of mounds parallel to the coast would be reworked by waves during the following rising tide. Dimensions may vary depending on conditions at the time of construction, including time of year, quantity, and specific beach fill design. Based on the construction of these types of projects in San Diego County, the mounds are quickly reworked by the subsequent high tide and are practically unnoticeable within 24 hours (Moffat & Nichol 2010). If conditions at the beach during the time of placement do not allow trucks to access the placement area (below HTL), the material would be deposited above the HTL and spread in the seaward direction by a loader or bulldozer. Spreading may also be required should volume of material being delivered to the beach exceed that which can be quickly reworked by waves.

Proposed Mitigation– The proposed mitigation may change as a result of comments received in response to this public notice, the applicant's response to those comments, and/or the need for the project to comply with the 404(b)(1) Guidelines. In consideration of the above, the proposed mitigation sequence (avoidance/minimization/compensation), as applied to the proposed project is summarized as follows:

Avoidance: The Project will not allow for any direct fill within any special aquatic sites (e.g., surfgrass, reefs, kelp, wetlands) but placement may allow turbidity, littoral drift, and currents to move

plumes up coast or down coast depending on the swell, wind, and wave conditions.

Minimization: Refer to Tables 1-3.

Compensation: No mitigation is currently proposed as no substantial adverse impacts to coastal aquatic resources are foreseen. If monitoring documents impacts such as sand coverage of resources occurs, the Corps in consultation with the resource agencies may require mitigation per the special conditions of the OBFP permit.

Table 1 - Project Summary

Receiver Site	Beach Fill Design	Amount of Sand Per Year (cy)	Maximum Number of Truck Trips Per Year*	Season and Duration	Trucking Ingress / Egress
Leucadia Beach	<u>Beach Berm:</u> create an approximately 100-foot beach berm at an elevation of approximately +12 feet MLLW with 20:1 slope and approximately 150 to 200 feet offshore. Less than 25% fines. <u>Surf Zone:</u> create 3- to 4-foot high mounds of sand below the high tide line.	132,000	9,429	<u>September 15 – May 31st:</u> unrestricted if <10% fines, up to 50,000 cy if 11% – 25% fines. <u>June 1 – September 14:</u> no placement to avoid high beach use season.	South Carlsbad State Beach from southbound Carlsbad Boulevard or Moonlight State Beach via B Street.
Cardiff Beach		101,000	7,214		Lifeguard Ramp, Los Olas Stoplight and Cardiff State Beach Parking Lot. Egress would favor the Los Olas Stoplight to utilize the existing signaled intersection.

* Assumes 14 cy per load.

Table 2 - Summary of Project Design Features and Monitoring Actions

Monitoring Activity	Leucadia Beach	Cardiff Beach	Responsible / Implementing Party	Reporting
Beach Profiles	<u>Pre-construction Baseline Monitoring:</u> Collection of beach profiles at two established monuments Routine, biannual monitoring program. <u>Post-construction Monitoring:</u> Collection of wading depth surveys (i.e., to a depth of -		City via consultant	Data included in Post-construction Monitoring report to be submitted to resource

Monitoring Activity	Leucadia Beach	Cardiff Beach	Responsible / Implementing Party	Reporting
	10 feet MLLW) at established locations immediately after completion if placement volume is greater than 50,000 cy.			agencies within 60 days following construction.
Sediment Gradation	<p><u>Pre-construction Baseline Monitoring:</u> Establish sediment gradation baseline (i.e. composite grain size envelope) from two transects for each receiving beach.</p> <p><u>Construction Monitoring:</u> Confirmation testing may be conducted daily at the receiving beach to verify the sediment quality being deposited. Turbidity monitoring if exceedances occur.</p> <p><u>Post-project Monitoring:</u> Sediment gradation baseline should be evaluated every three years to determine if the prior baseline represents existing conditions.</p>		City or consultant	Coordination with resource agencies if Corps deems necessary (greater than 50%) sediment gradation deviation during construction. Report to be submitted to resource agencies within 60 days following construction.
Grunion	<p><u>Pre-construction Monitoring:</u> If project construction is scheduled between March 1st and May 31st, pre-project surveys would be conducted to identify beach suitability for grunion activity.</p> <p>If suitable habitat is present, a grunion monitor will be present to observe grunion runs two to three weeks prior to construction during a predicted grunion run (according to the grunion calendar produced by the California Department of Fish and Wildlife), and immediately prior to construction. If grunion are not present during the predicted run, no further monitoring is required until the next predicted run. If grunion are present during predicted runs, beach nourishment will only occur above the spring high tide line/kelp line or in the nearshore until the spawning season is over.</p> <p><u>Construction Monitoring:</u> If suitable habitat is present and grunion are identified during a predicted run, beach nourishment will only occur above the spring high tide line/kelp line or in the nearshore until the spawning season is over. Grunion</p>		Qualified grunion monitor (City or consultant)	If suitable habitat is found during construction, coordination with and reporting to the California Department of Fish and Wildlife.

Monitoring Activity	Leucadia Beach	Cardiff Beach	Responsible / Implementing Party	Reporting
	monitoring will continue throughout construction, and if they do not spawn during a predicted run then sand could be placed below the spring high tide line.			
Threatened and Endangered Species	<u>Construction Monitoring:</u> If sand placement occurs during California least tern breeding season (April 1 st to September 15 th) or the Western Snowy Plover breeding season (March 1 st to September 15 th); then coordinate with Corps to determine monitoring requirements during construction.	<u>Construction Monitoring:</u> Although the placement site is located over 500 yards from western snowy plover and 1,000 yards from California least tern breeding colonies, coordination with the Corps will be conducted if construction is proposed to occur during the breeding season to determine if monitoring is required during construction.	Qualified biological monitor (Consultant) or City. City monitoring may include the extent of turbidity plumes outside the surf zone where water transparency is reduced to less than 3 feet.	City - Monitoring may include observations of timing of nesting activity and the extent of turbidity plumes outside the surf zone, where water transparency is reduced to less than 3 feet.

Table 3 - Summary of Placement Allowances and Seasonal Restrictions

	Leucadia Beach	Cardiff Beach
Receiver Site Length (ft)	2,700	1,100
Maximum Annual Vol. (cy)	132,000	101,000
Timing and Duration for Placement	During typical construction hours (7:30 a.m. to 7:30 pm); no weekends or holidays	
Seasonal Restrictions for Placement		
September 15th – February 28th	11 – 25 % fines; up to 50,000 cy per fill event.	
March 1st – May 31st	11 – 25 % fines; up to 50,000 cy per fill event. Grunion monitoring may be required if habitat suitable for spawning. No restriction at cobble beaches.	
June 1st – September 14th	No placement to avoid high beach use season.	

Proposed Special Conditions

The existing OBFP Permit special conditions to be modified to reflect this new proposed work will be applicable. For additional information please call Robert Smith of my staff at 760-602-4831 or via e-mail at Robert.R.Smith@usace.army.mil. This public notice is issued by the Chief, Regulatory Division.



Regulatory Program Goals:

- To provide strong protection of the nation's aquatic environment, including wetlands.
- To ensure the Corps provides the regulated public with fair and reasonable decisions.
- To enhance the efficiency of the Corps' administration of its regulatory program.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS
Regulatory Division, Carlsbad Field Office
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Figure 1. Regional Location Map

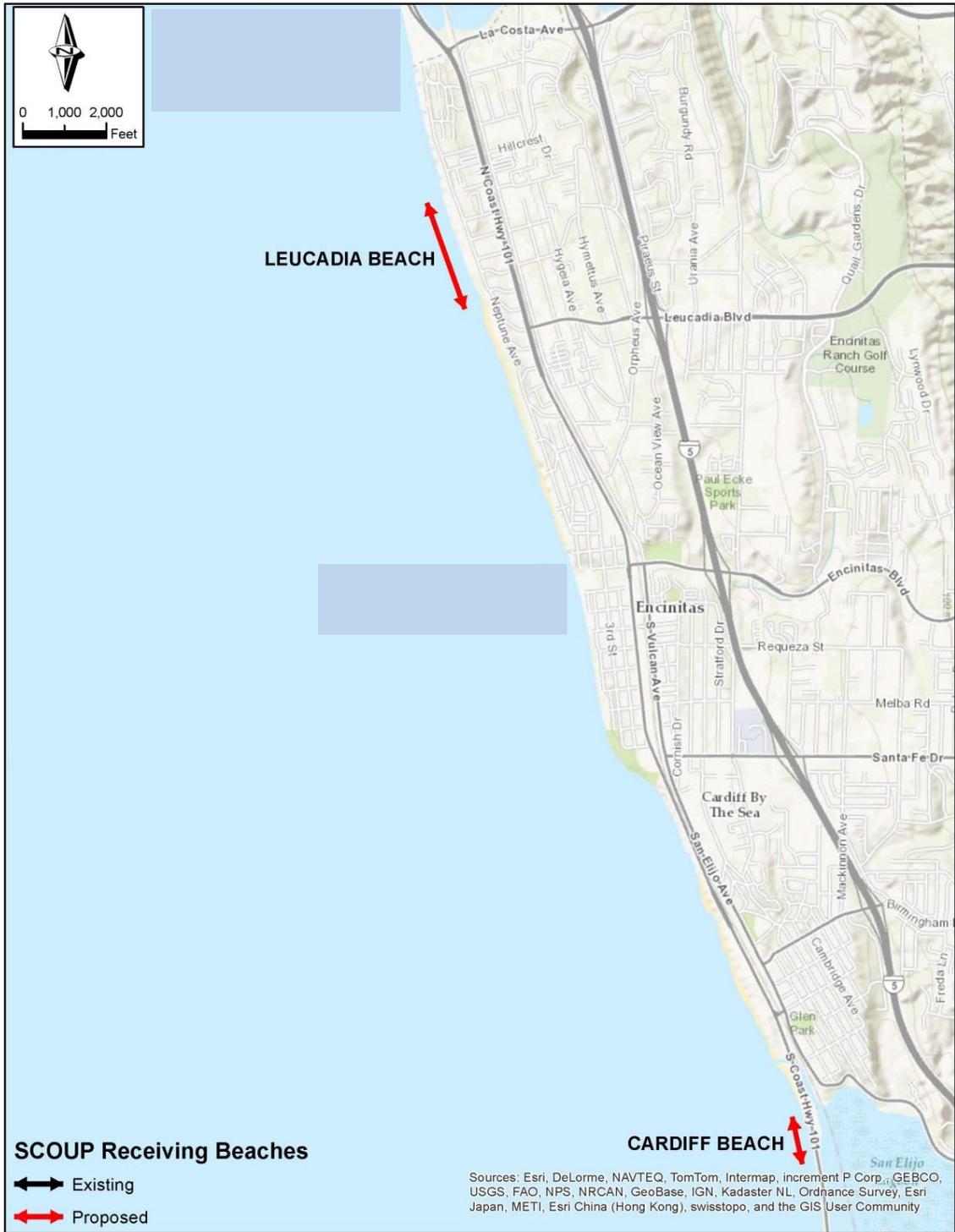


Figure 2. Proposed Receiving Beaches

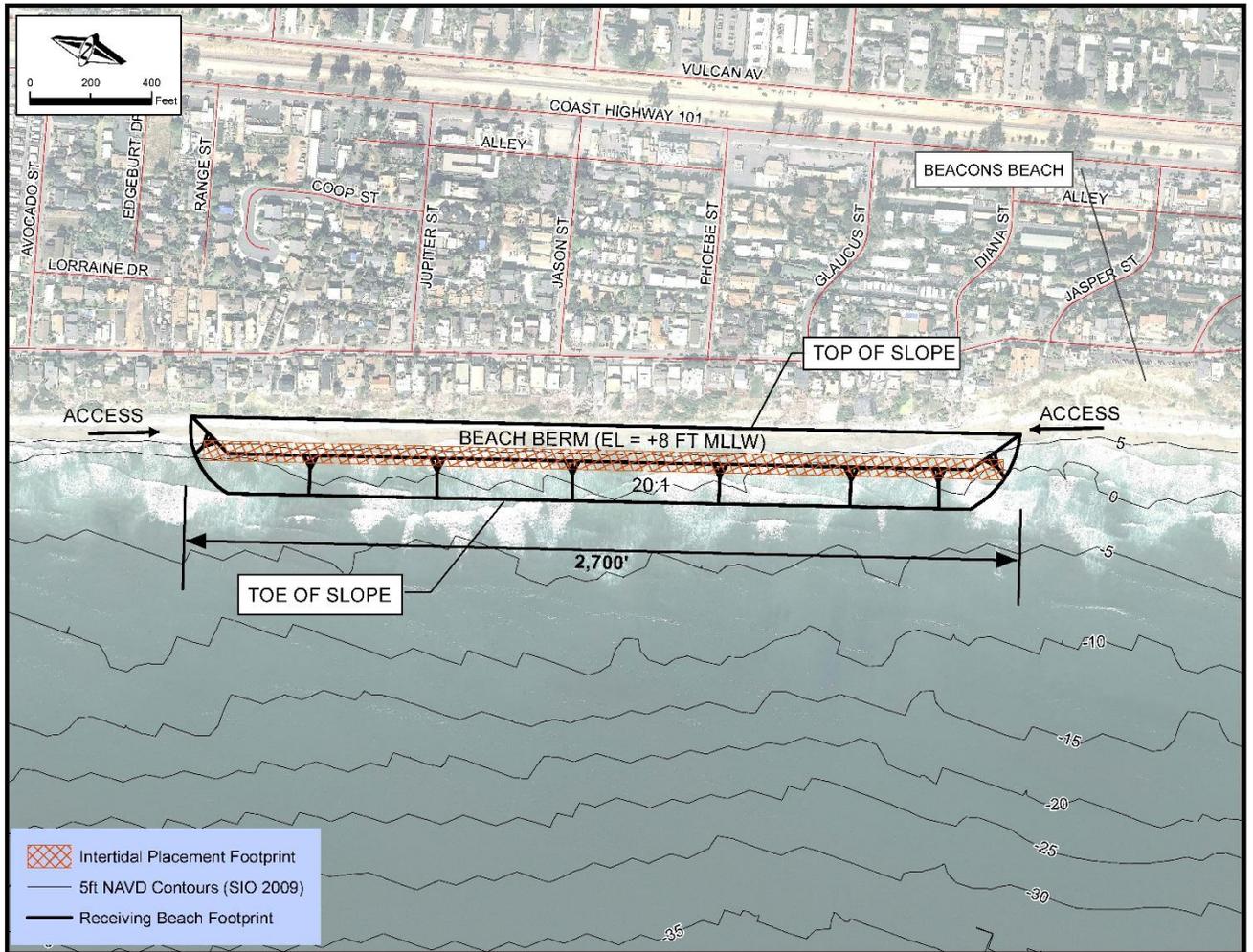


Figure 3. Leucadia Receiving Beach – Plan View

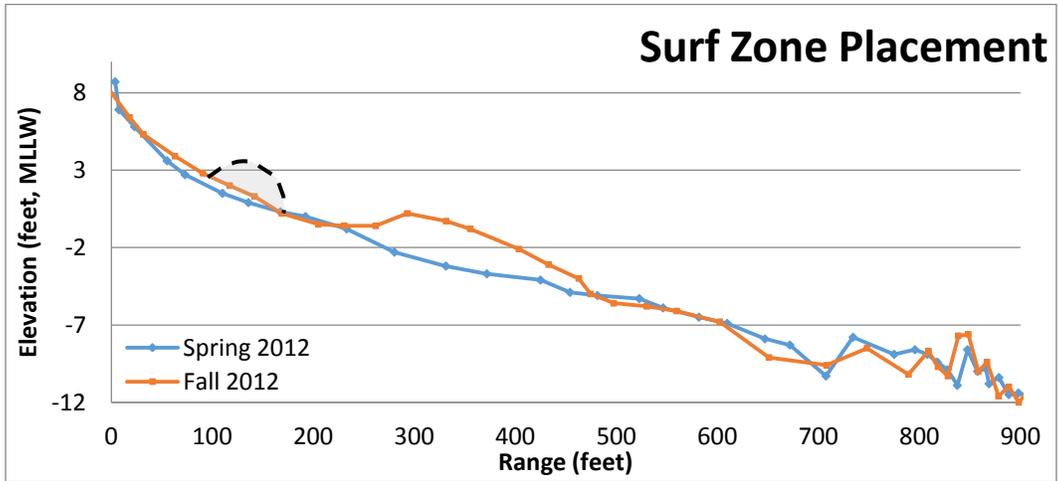
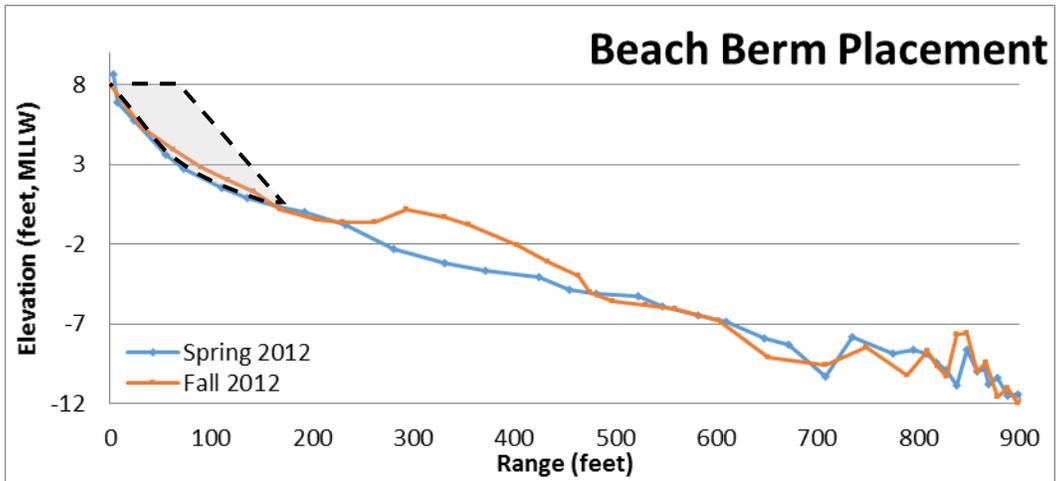


Figure 4. Leucadia Receiving Beach Typical Cross-Sections (Profile 0690)

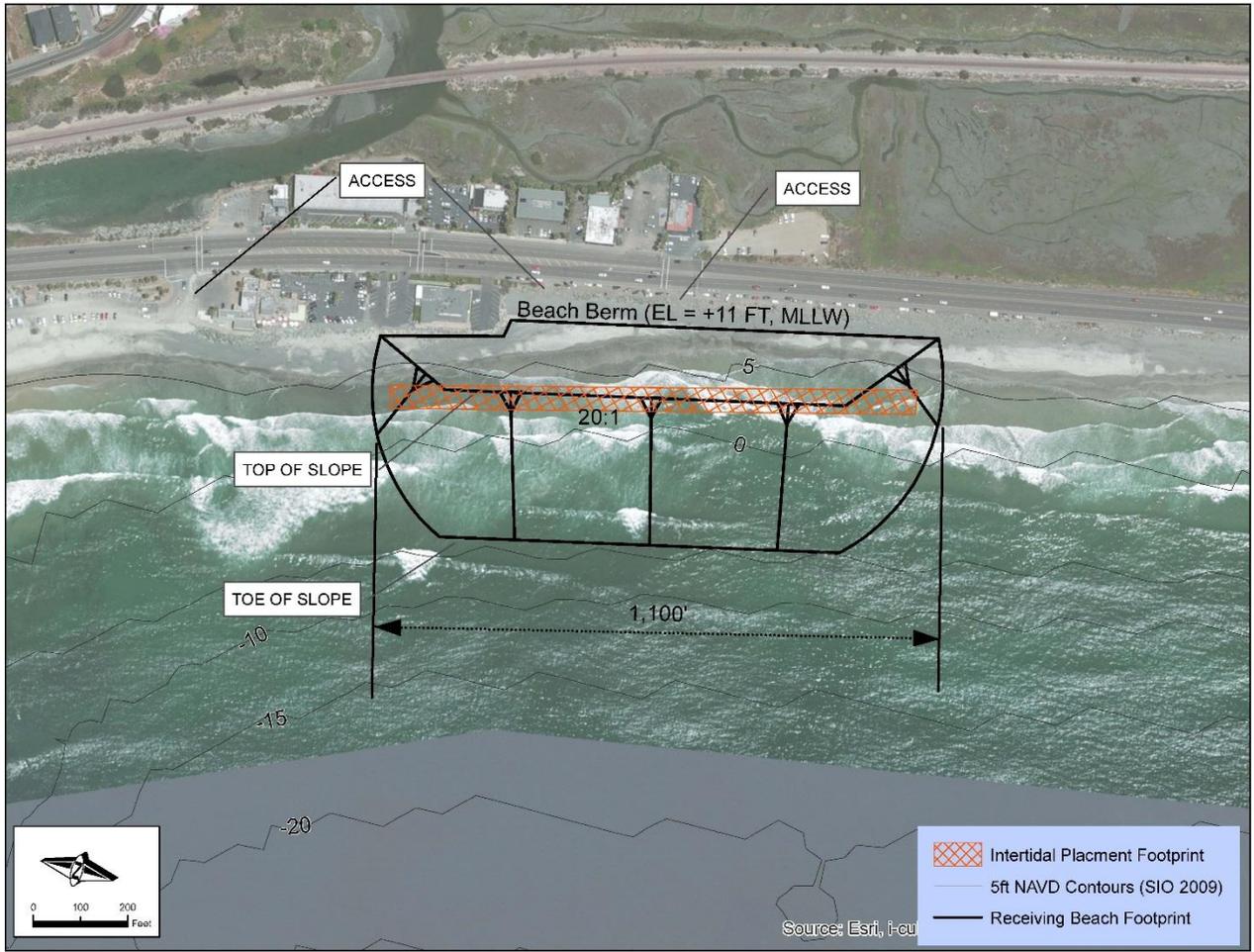


Figure 5. Cardiff Receiving Beach – Plan View

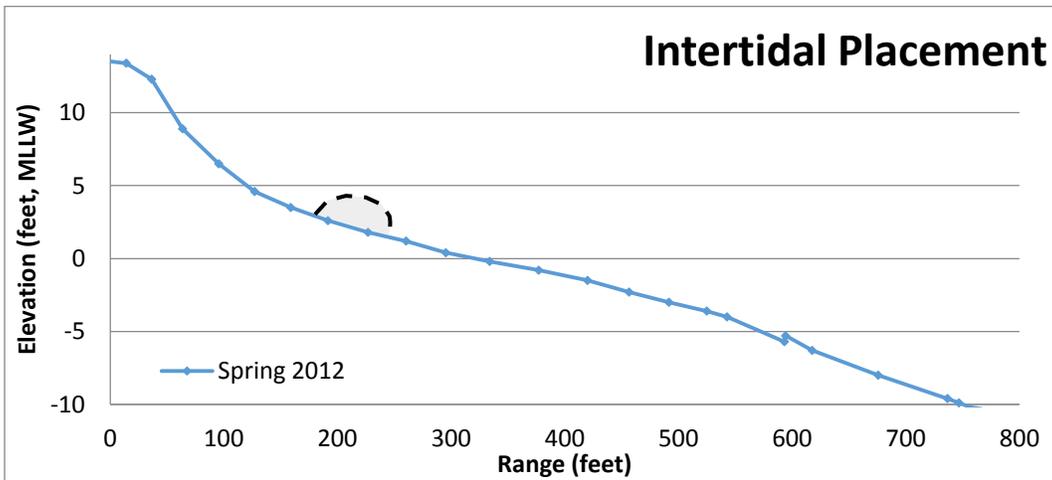
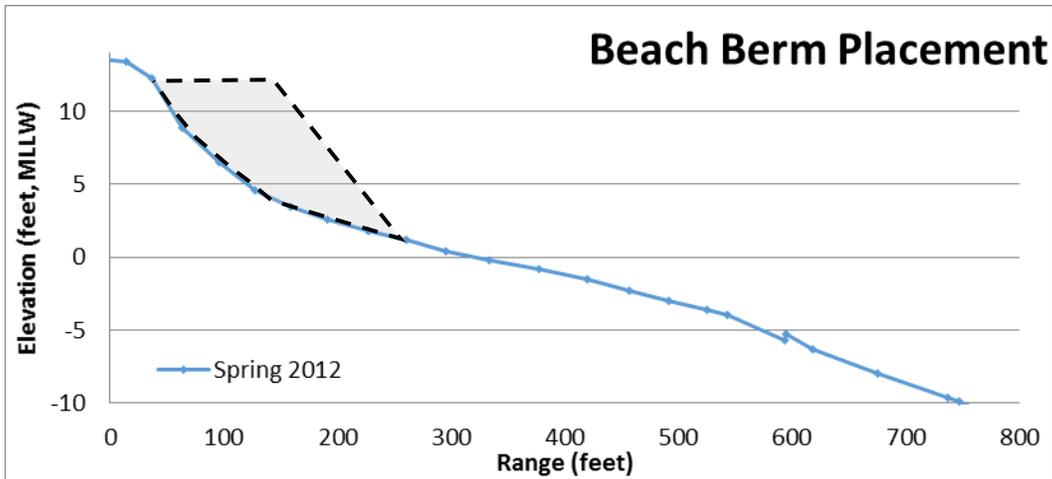


Figure 6. Cardiff Receiving Beach Typical Cross-Sections (Profile 0630)