CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
89 SOUTH CALIFORNIA ST., SUITE 200
VENTURA, CA 93001
(805) 585-1800

F8a

ADDENDUM

Click here to go to original staff report

DATE: October 7, 2015

TO: Commissioners and Interested Parties

FROM: South Central Coast District Staff

SUBJECT: Agenda Item 8a on Friday, October 9, 2015
Coastal Development Permit 4-15-0390 (Broad Beach GHAD)

The purpose of this addendum is to make corrections/revisions to the staff report, attach and respond to correspondence received to date, and attach documentation regarding Ex Parte Communications received from Commissioners to date.

A. REVISIONS/CORRECTIONS TO THE STAFF REPORT

(Language to be added is shown in underline and language to be deleted is shown in ~~strikeout~~).

1. Revision to Project Description by Applicant

In a letter from the applicant dated October 5, 2015 (discussed in Part D of this addendum) and a follow-up e-mail message dated October 6, the applicant clarified that a revision to the proposed re-alignment of the downcoast portion of the revetment transmitted to Commission staff on September 24, 2015 (in which the pullback starts at 31020 Broad Beach Road and continues for a 1,800 linear foot length, as depicted on Exhibit 8a of the staff report), is no longer the formal proposal and their original revetment re-alignment proposal is, in which the pullback starts 5 lots farther downcoast, at 30980 Broad Beach Road, and continues for a 1,600 linear foot length. As such, all references in the staff report to the applicant's proposed revetment realignment length and upcoast pullback start location shall be changed from an 1,800 linear foot length (in which the pullback starts at 31020 Broad Beach Road) to a 1,600 linear foot length (in which the pullback starts at 30980 Broad Beach Road). In addition, Exhibit 8a of the staff report shall be replaced with the revised Exhibit 8a that is included as **Attachment 1** of this addendum.

This recent change by the applicant to the proposed project description to reduce the length of revetment that is proposed to be relocated landward does not affect the staff recommendation or the provisions of Special Condition One (1), which requires that an approximately 2,000 linear foot portion of the revetment (commencing at 31030 Broad Beach Road) be relocated further landward.

2. The following minor clarifications shall be added to Special Condition 4.B.(1-2) on Page 16 of the staff report:

(1) *Small-scale Interim Renourishment:* If the dry beach width near Profile 411 is narrower than 30 feet for 6 consecutive months, ~~and is~~ as recorded by two (2) consecutive full beach profiles, AND~~,~~ either there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand or backpassing is not an available option for any other reason (for example because a prior backpassing event occurred within the last year, so it is prohibited by section A.(4) of this condition), a small-scale interim renourishment event may be proposed. An interim renourishment plan, adding no more than 75,000 cubic yards of new sand may be proposed (no more than once per year) and small-scale nourishment shall be initiated in a timely manner, such that the deficit conditions shall not persist for more than 6 months following the initial trigger period, or as soon after 6 months as possible, given restrictions on beach disruptions during the summer season.

(2) *Major Renourishment*: If (a) the dry beach width near Profile 411 is narrower than 30 feet for 12 consecutive months, ~~and is~~ as recorded by three (3) consecutive full beach profiles~~, AND,~~; (b) either there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand or backpassing is not an available option for any other reason (for example because a prior backpassing event occurred within the last year, so it is prohibited by section A.(4) of this condition); and (c) an interim renourishment has occurred but failed to remedy the situation, then a major renourishment event, adding an additional 300,000 cubic yards of new sand shall be proposed and nourishment shall be initiated within the approved project reach in a time manner, such that the deficit conditions shall not persist for more than 4 months following the initial trigger period.

3. The second sentence of the first full paragraph on Page 57 of the staff report shall be corrected as follows:

Thus, in addition to the loss of ~~public~~ sandy beach area from the direct occupation of the revetment itself (approximately 3.02 acres in area) since the back of the beach has been effectively “fixed” by the revetment, the revetment will also result in the loss of beach area for public use landward of the revetment that would have become available for public use as the shoreline continued to erode and the mean high tide line would have continued to move landward.

4. The following sentence at the end of Page 69/beginning of Page 70 of the staff report shall be corrected as follows:

In contrast, ***Alternative 3*** showed the replacement of the revetment with a new vertical seawall in a much farther landward location only approximately 6 ft. seaward of the existing septic leach fields; however, it also incorrectly included protection for “Future” leach fields on site that do not currently exist.

5. The following correction shall be made to the second sentence of the second paragraph in Section IV.B.5 on Page 76 of the staff report:

Sand deposition for beach restoration is an allowable use of fill pursuant to Section 30233(a)(5)-(a)(7) of the Coastal Act.

6. The third sentence of the second full paragraph on Page 79 of the staff report shall be corrected as follows:

Therefore, Special Condition Two (2) also limits the duration of the ~~period of time that development an~~ approved development ~~on a temporary basis only for~~ to a period of ten (10) years from the date of Commission action.

7. The text of Coastal Act Section 30233 on Page 85-86 of the staff report erroneously includes a subsection that was deleted from Public Resources Code Section 30233 by the California Legislature in 2006. As such, subsection (a)(3) of Coastal Act Section 30233 on Page 86 of the staff report shall be deleted, and the remaining subsections shall be renumbered accordingly.

8. The first full sentence on Page 88 shall be revised as follows:

The Coastal Act allows restoration, resource dependent uses, and mineral extraction, including sand extraction and deposition for restoring beaches, in coastal waters, with the exception of mineral extraction in environmentally sensitive areas.

B. EX PARTE COMMUNICATIONS

Ex Parte communications received (from Commissioners Bochco, Groom, and Luevano) are included as **Attachment 2** of this addendum.

C. THIRD PARTY CORRESPONDENCE

Attachment 3 of this addendum includes correspondence that has been received to-date from interested third parties:

- Letter from Hans Laetz, dated September 28, 2015, expressing support of the beach nourishment project.
- Letter from Jason Williams, dated September 25, 2015, expressing concern regarding shoreline armoring in general.

D. APPLICANT CORRESPONDENCE

Attachment 4 of this addendum is correspondence received from the applicant, dated October 5, 2015. The letter indicates that the applicant has four important remaining points of disagreement with the Commission staff recommendation. Below is a summary of the concerns stated by the applicant, along with staff's response to the four points raised in the letter (and staff recommends the Commission incorporate as part of its findings). The applicant's letter also attaches line edits to the staff-recommended special conditions of the staff report to address the applicant's concerns; however, Commission staff cannot support the applicant's edits because they would lessen or negate the intended effect of the conditions recommended by staff.

1. <u>Revetment Alignment</u>. The applicant asserts that the staff-recommended revetment relocation depicted on Exhibit 8a of the September 25, 2015 staff report will impinge upon existing and “reserve” leach fields and expose them to flooding hazard. Although the applicant transmitted a revision to its proposed downcoast revetment alignment on September 24, 2015, in which the pullback starts at 31020 Broad Beach Road and continues for a 1,800 linear foot length, as also depicted on Exhibit 8a of the staff report, the applicant’s October 5 letter and follow-up e-mail retracts that offer and reverts to their former revetment alignment proposal, in which the pullback starts at 30980 Broad Beach Road and continues for a 1,600 linear foot length, as depicted on Exhibit B of the applicant’s letter.

   In response, Commission staff would note that the issue of leach field protection in regards to the applicant’s assertions and the staff-recommended revetment alignment are addressed in detail on pages 70-74 of the staff report. To summarize, the staff-recommended alignment for the revetment shown on Exhibit 8a would protect all existing septic system leach fields (including the provision of a 15 ft. setback between the seaward extent of existing leach fields and the relocated portions of the revetment). However, the areas shown on the applicant’s site plan designating “reserve” or “future” expansion leach fields on these properties do not constitute existing development and, therefore, do not constitute development that is entitled to be protected pursuant to any form of shoreline protection.

   As for the applicant’s assertion that the Malibu LCP requires such expansion leach fields, the certified LCP requires the use of alternative onsite wastewater treatment systems (AOWTS) for new development on beachfront properties, such as the properties on Broad Beach, which typically occupies a smaller area of beach than traditional systems and provides a substantially higher level of effluent treatment. Moreover, neither the City nor the Commission has typically authorized “future” locations for leach fields, if such fields would result in additional encroachment onto a sandy beach, since these leach fields may be rehabilitated in place. Specifically, in the event that a leach field reaches filtration capacity it is feasible to excavate the leach field area and replace the footprint with a new volume of sand materials eliminating the need for the identification of a “future” field in a different location on the site. For instance, in 2010 and 2011, the City of Malibu approved CDPs 10-063 and 11-050 for the demolition of existing residences and construction of new residences at 31260 and 31302 Broad Beach Road, within the area of Broad Beach that is subject to this application. In both of the coastal development permit actions, the City specifically required the applicants to submit project plans showing only a single AOWTS leach field in the most landward location feasible, with no provision for any “future” field on site.

   In regard to the protection of existing leach fields, Commission Staff Engineer, Dr. Lesley Ewing, has indicated that since these properties will have shoreline protection (in the combined form of the rock revetment and beach nourishment project), a 15 ft. setback between the rock revetment and the existing septic system leach fields is appropriate in this case and would be adequate to ensure protection of the existing leach fields, although some minor additional erosion control improvements might be considered on a case-by-case basis for individual properties if such problems occur in the future, such as the installation of a gravel or cobble blanket where leach fields are located to reduce scour, or subsurface drainage improvements to reduce salt water flooding. In fact, this setback is greater than the 5 ft. setback required pursuant to City of Malibu's Environmental Health Division's policies. In addition, staff's recommended revetment realignment is situated more than 15 ft. from the majority of existing septic leach fields on the beach.

In addition, while it is unclear why the applicant is no longer proposing the revetment realignment proposed in their September 24, 2015 correspondence and is reverting to their original revetment realignment proposal, the difference between the applicant's two alignments is not significant and does not substantively change the consistency analysis and staff recommendation contained in the staff report. However, references to the applicant's proposed revetment realignment length and upcoast pullback start location will be changed in the staff report from an 1,800 linear foot length (in which the pullback starts at 31020 Broad Beach Road) to a 1,600 linear foot length (in which the pullback starts at 30980 Broad Beach Road), as detailed in Part A.1 of this addendum.

2. Lateral Public Access License Agreements. The applicant's letter indicates that while the BBGHAD agrees to the concept of an ambulatory public access area moving landward up to the seaward face of the revetment as the nourished beach erodes, the applicant objects to the following provisions of the staff recommendation:

   A. The applicant states that the staff-recommended license agreement should not cover the "BBGHAD-created accreted public land seaward of the 2010 MHTL." In response, Commission staff notes that the staff-recommended license agreement would not cover any lands seaward of the 2010 MHTL. Section B of Special Condition 13 specifically limits the license requirement to areas "landward of the 2010 MHTL." Special Conditions 13 and 14 refer expressly to the provision, via license, of lateral public access on, and only apply to, "private property" (section B.1. of Special Condition 13) and the "licensor's property" (section A.2 of Special Condition 14), meaning areas landward of the 2010 MHTL. Special Condition 13 addresses the area seaward of the 2010 MHTL separately, in paragraph A, specifically for this reason, requiring only an acknowledgment that all areas seaward of the 2010 MHTL are, and will remain, public property.

   B. The applicant states that it objects to the staff-recommended 10 foot wide lateral public pedestrian path immediately landward of the revetment that would be required when there are insufficient areas of dry beach seaward of the revetment available for lateral public access (Special Condition 14). The applicant's letter provides no explanation for this objection. Commission staff would note that the rationale and basis for the lateral public access requirement landward of the revetment of Special Condition 14 is detailed in Section IV.E (Public Access and Recreation) of the staff report.

C. The applicant states that it objects to the requirement for public access stairways extending over the revetment from the 10 ft. wide public pedestrian path to the toe of the rock revetment below because it would invade their privacy, pose public safety concerns, and expose them to liability. In response, staff would first note that Civil Code Section 846 protects property owners from liability for any harm that may occur to people who use their property for recreational purposes, broadly defined. It states that anyone who owns any interest in real property "owes no duty of care to keep the premises safe for entry or use by others for any recreational purpose or to give any warning of hazardous conditions, uses of, structures, or activities on such premises to persons entering for such purpose, except as provided in this section." The exceptions referred to at the end of that quote are not relevant here, and the section defines the phrase "recreational purpose" to include hiking, sightseeing, picnicking, nature study, nature contacting, gleaning, and viewing or enjoying scenic and natural sites. Thus, the concern over property owner liability is unfounded. Similarly, as a public entity, the GHAD itself would be protected from liability by Government Code section 831.4.

D. The applicant states that it is not practical to obtain lateral public access license agreements signed by all 78 revetment homeowners, as required by Special Conditions 13 and 14. However, Commission staff would note that it was the applicant who proposed this approach to providing for public access via individual license agreements signed by each property owner. This is an alternative mechanism to the typical easement or deed restriction required by the Commission and by the Malibu LCP. Commission Staff adopted this approach only after the applicant insisted that the individual property owners would not encumber their properties with deed restrictions or easements but that they would be willing to enter into license agreements, and only after considerable discussion and legal research to confirm that this alternative mechanism would provide continuing assurance of public access under any foreseeable conditions, while also providing a more streamlined and less complex condition compliance process that is responsive to the applicant's prior concerns regarding getting homeowners to agree to record easements against their properties. Finally, the applicant does not propose any viable alternative. The applicant simply proposes that the permittee will "ensure" public access to the specified area, but without explaining what mechanism it would use to do so in the absence of individual property owner agreement.

Finally, related to the concerns articulated in this section, the applicant's proposed alteration of these special conditions would remove the requirement that the property owners all agree to these requirements prior to the issuance of the permit. That requirement is critical in light of the fact that the applicant recently indicated that the revetment would actually be constructed by individual property owners rather than the BBGHAD. Without a requirement that all property owners agree before the permit issues, that approach raises the possibility of piecemeal construction of the revetment by individual property owners that could result in a patchwork of revetment pieces that could do more harm than good.

E. The applicant states that it objects to the provision of ambulatory public access on private property extending 25 feet inland of the wet sand, as provided by Special Condition 13, because it is both ambiguous and harmful to the dune habitat. In response, Commission staff would note that wet sand was chosen to demarcate the 25 foot ambulatory lateral public accessway on the beach precisely because it is a visible and easily understood boundary and would therefore be easier to implement than a line keyed off of the MHTL. This is important given the difficulties and conflicts surrounding public and private rights at Broad Beach in the past.

As an alternative, the applicant proposes that the lateral public access area should extend 10 feet inland from where the eroding beach becomes impassable, up to the seaward slope of the restored dune, or the seaward face of the revetment where there is no dune. However, the applicant's proposed "impassable" threshold is far more subjective and confusing, and it might never occur, because the seaward slope of the restored dune may retreat inland before the area in front of it became impassible, but that area would be nevertheless be wet, if not inundated, resulting in there being no dry beach sand for public access.

The applicant also asserts that Commission staff never communicated to the applicant the concept of using wet sand as a basis for the ambulatory public access requirement prior to publishing the staff report. In response, Commission staff would note that the approach of providing for ambulatory public access on private property extending 25 feet inland of the wet sand, as provided by Special Condition 13, was transmitted to the applicant by Commission staff, in writing, at a meeting on August 28, 2015.

3. Permit Term. The applicant seeks a 20 year permit term and right to maintain the revetment alignment for that term (instead of the staff-recommended 10 year permit term) to avoid costly permitting and reassessment of the revetment and nourishment project. However, because of the significant uncertainty of beach nourishment success and viability into the future and potential changed circumstances, Commission staff recommends that the authorization of the revetment and beach nourishment project be limited to ten years, with an Adaptive Management Plan for on-going monitoring and assessment. In the event that the project performs as planned, including continuing to provide public beach access and avoiding significant environmental impacts, the Commission may extend its authorization of the revetment and beach nourishment program for another ten year period pursuant to a permit amendment.

4. Septic Conversion Implementation Study. The applicant asserts that the timeframes recommended by Commission staff for the Septic Conversion Implementation Study

(Special Condition 16) are problematic because the applicant does not have the resources to focus on the nourishment project and septic conversion for the Broad Beach community within that timeframe. The applicant proposes to complete the required Septic Conversion Implementation Study within 3 years of permit issuance, and not specify a timeframe goal for conversion implementation. However, for the reasons explained in the staff report, Commission staff continues to recommend a swifter timeframe for completing the septic conversion study and establishing a goal for implementation.

EAST BROAD BEACH REVETMENT RELOCATION

ALT 4C AND CCC STAFF REPORT 9-25-2015 - REVETMENT FOOTPRINT COMPARISON

Revetment Pullback Comparison - BBGHAD Proposed and CCC Recommended

N

150 0 75 150

SCALE 1" = 150'

LEGEND

EXISTING LEACH FIELDS (ACTIVE)

EXISTING LEACH FIELDS (EXPANSION)

EXISTING EMERGENCY REVETMENT OUTLINE

CCC STAFF REPORT - PROPOSED REVETMENT FOOTPRINT

BBGHAD ALT 4C - PROPOSED REVETMENT FOOTPRINT (09-15-2015 UPDATE)

CCC Recommended Revetment Pullback Location (landward edge)

Exhibit 8a
4-15-0390 (Broad Beach GHAD)
Comparison of
CCC Recommended Revetment Pullback &
BBGHAD Revised Proposed Revetment Pullback

AERIAL IMAGE
DATE: FEBRUARY 23, 2011
SOURCE: ROBERT J LUNG & ASSOCIATES

ATTACHMENT 1
Addendum - 4-15-0390 (Broad Beach GHAD)
Revised Exhibit 8a

File: P:\6935 Broad Beach\7 Design Information\CADD_Active\NEPA\4C_GHAD\Figure for CCC Hearing_Oct 2015\Mod_4C_Revet_pullback_c_for CCC hearing; Plotted: 10/5/2015 11:46 AM by HOLLOWAY, AARON; Saved: 10/5/2015 11:46 AM by AHOLLOWAY

EX PARTE COMMUNICATION DISCLOSURE FORM

Filed by Commissioner: Bochco

1) Name or description of project: F 9a Broadbeach

2) Date and time of receipt of communication: 9/22 3pm

3) Location of communication: my office

(If not in person, include the means of communication, e.g., telephone, e-mail, etc.)

4) Identity of person(s) initiating communication: David Neish

5) Identity of person(s) on whose behalf communication was made: Broadbeach GHAD

6) Identity of persons(s) receiving communication: Bochco

7) Identity of all person(s) present during the communication: ~~Mike~~ Mark Goss Ken Ehrlich D Neish

Complete, comprehensive description of communication content (attach complete set of any text or graphic material presented):

See attached

Date 9/24/15

Signature of Commissioner V Bochco

TIMING FOR FILING OF DISCLOSURE FORM: File this form with the Executive Director within seven (7) days of the ex parte communication, if the communication occurred seven or more days in advance of the Commission hearing on the item that was the subject of the communication. If the communication occurred within seven (7) days of the hearing, provide the information orally on the record of the proceeding and provide the Executive Director with a copy of any written material that was part of the communication. This form may be filed with the Executive Director in addition to the oral disclosure.

Attachment 2 – Ex Parte Communications
4-15-0390 (Broad Beach GHAD)
Addendum

Applicants were able to negotiate all the conditions with staff except 2: the revetment alignment and the easement on the landward side of the dune if ocean washes away all the sand and dunes. Applicants agreed on vertical easements, sand size, Science Advisory Panel, permit term and dune footprint, except in a couple of areas. They agreed not to nourish the Western end, leaving 22 homes out of the GAAD.

They have agreed to do a study of septic placement before the end of 2015. The homeowners are anxious to get off septic as well.

Applicants cannot get the homeowners to agree to give easement on their back yards. In some cases it is a matter of a few feet. They explained that there may only be once every few years that this could be an issue since they are going to nourish sand continuously during the months staff allows nourishment. But if a 100 year storm comes right before summer, there won't be time and there might be no sand during the summer months. Even so, the public still has access to the wet sand. Owners are actually creating a new MHTL more seaward because of nourishment providing more beach.

Applicants thought they had an agreement with the ED at what was a compromise line offered by J. Ainsworth (the Jack Line). It was in between where BB wanted and staff had asked for. They got the board to approve --- but ED reneged. Staff has now insisted on keeping the revetment line at the original staff-requested place even though some septics will be effected.

The 13' dune is also an issue re revement line. Some homeowners will have only a few feet between their back door and the tall dune. Applicants want to tweak the dune footprint where it is too close to some homes.

As to the easement is on private property, the homeowners would become liable for injuries to people. If the easement stays on GAAD property or public property, GAAD can have the insurance or public is at own risk.

EX PARTE COMMUNICATION DISCLOSURE FORM

Filed by Commissioner: Carole Groom

1) Name or description of project: Item F8a - Broad Beach Geologic Hazard Abatement District

2) Date and time of receipt of communication: October 2, 2015 at 10:30 a.m.

3) Location of communication: Telephone

(If not in person, include the means of communication, e.g., telephone, e-mail, etc.)

4) Identity of person(s) initiating communication: Stephanie Sekich

5) Identity of person(s) on whose behalf communication was made: Surfrider Foundation and Heal the Bay

6) Identity of persons(s) receiving communication: Carole Groom

7) Identity of all person(s) present during the communication: Carole Groom, Stephanie Sekich, Dana Murray

Complete, comprehensive description of communication content (attach complete set of any text or graphic material presented):

The representatives of Surfrider Foundation and Heal the Bay expressed that ideally they would like to see the revetment relocated, however they understand that is not an option and that they are overall in agreement with staff's recommendation. They added that they would like to see additional conditions such as of fewer pathways between homes to preserve dune habitat as well as a total limit of re-nourishment events. Ms. Sekich reaffirmed two of staff's recommended conditions: the pulling back of 2000 of 4000 feet of revetment as well as maintaining lateral as well as maintain lateral access points. She also urged the Commission to consider preserving access through an alternate to licensing.

OCT 5 2015

Date

Carole Groom

Signature of Commissioner

TIMING FOR FILING OF DISCLOSURE FORM: File this form with the Executive Director within seven (7) days of the ex parte communication, if the communication occurred seven or more days in advance of the Commission hearing on the item that was the subject of the communication. If the communication occurred within seven (7) days of the hearing, provide the information orally on the record of the proceeding and provide the Executive Director with a copy of any written material that was part of the communication. This form may be filed with the Executive Director in addition to the oral disclosure.

EX PARTE COMMUNICATION DISCLOSURE FORM

Filed by Commissioner: Carole Groom

1) Name or description of project: Item F8a - Broad Beach Geologic Hazard Abatement District

2) Date and time of receipt of communication: September 29, 2015 at 8:30 a.m.

3) Location of communication: Redwood City

(If not in person, include the means of communication, e.g., telephone, e-mail, etc.)

4) Identity of person(s) initiating communication: David Neish

5) Identity of person(s) on whose behalf communication was made: Broad Beach Geologic Hazard Assessment District

6) Identity of persons(s) receiving communication: Carole Groom

7) Identity of all person(s) present during the communication: Carole Groom, David Neish, David Neish, Jr., Mark Goss

Complete, comprehensive description of communication content (attach complete set of any text or graphic material presented):

The representatives of Broad Beach Geologic Hazard Assessment District indicated that they are in agreement with staff's recommendation of approval. They mentioned that there are two outstanding issues. They maintained that Special Condition 1 should be moved back as far as feasible but not to the point that it impedes septic systems ("Hudson line"). They also maintained that Special Condition 14's requirement to provide lateral access easements is a liability to homeowners since it would require public access through private yards, which the GHAD is against. All materials provided have been provided to staff.

OCT 5 2015
Date

Carole Groom
Signature of Commissioner

TIMING FOR FILING OF DISCLOSURE FORM: File this form with the Executive Director within seven (7) days of the ex parte communication, if the communication occurred seven or more days in advance of the Commission hearing on the item that was the subject of the communication. If the communication occurred within seven (7) days of the hearing, provide the information orally on the record of the proceeding and provide the Executive Director with a copy of any written material that was part of the communication. This form may be filed with the Executive Director in addition to the oral disclosure.

---------- Forwarded message ----------
From: **David Neish** <dbneish@dbnplanning.com>
Date: 30 September 2015 at 11:17
Subject: FW: Summary booklet
To: Mary Luevano
4-15-0390 (Broad Beach Geologic Hazard Abatement District, Malibu)

Mary, see below to download the Broad Beach info that we will be discussing on Friday.
Thanks!

From: Kenneth A. Ehrlich [mailto:KEhrlich@elkinskalt.com]
Sent: Friday, September 25, 2015 9:06 AM
To: 'David Neish' <dbneish@dbnplanning.com>; 'David Neish' <djneish@dbnplanning.com>
Subject: FW: Summary booklet

Click on link below.

Kenneth A. Ehrlich
Elkins Kalt Weintraub Reuben Gartside LLP
2049 Century Park East, Suite 2700 | Los Angeles, California 90067
Direct Dial: (310) 746-4412 | Direct Fax: (310) 746-4462 | Cell Phone: (310) 962-4100
Main: (310) 746-4400 | Fax: (310) 746-4499 | Email: kehrlich@elkinskalt.com | Web: www.elkinskalt.com

From: Dorielle A. Hammonds
Sent: Thursday, September 24, 2015 2:35 PM
To: Markchristiangoss@gmail.com; dbneish@dbnplanning.com
Cc: Kenneth A. Ehrlich
Subject: Summary booklet

A file has been sent to you via **Hightail**.

Download the file - BBBGHAD CCC Cmmssnrs 091715_ppt.zip

Your file never expires.

On behalf of Mr. Ehrlich, please see attached link.

Broad Beach Sand & Dune Habitat Restoration Project

CCC Commissioners
September-October 2015

Proposed Broad Beach Restoration

MISSION:

1. ***Restore historically wide beach by adding sand and restoring dune habitat***
2. ***Maintain buried permanent revetment for future storm protection.***

Progress Since Dec. 2014

- **Project Footprint:** No nourishment west of 31380 Broad Beach Road
- **Revetment Alignment:** Affects 30760-30978 BB Rd
- **Revised Dune Plan:** 3:1 ratio of dunes restored to dunes impacted
- **Septic Feasibility Study:** Within 2 yrs of const. start
- **Public Access & Nourishment Triggers:** Avoid lateral access easements
- **Comprehensive Monitoring Plan & Science Advisory Panel:** BBGHAD & CCC to share management
- **Requested 20 year term: 10 yr + extension**

BROAD BEACH

Project Update

- **Post 12/14:** Extensive meetings with senior regulatory staff members
- **Progress:** overall Project concept, west end nourishment, revetment location and entitlement; sand source, spec, and logistics
- **Alternative 4C:** submitted 4/15
- **CCC hearing:** anticipated 10/15
- **Army Corps & others:** approx Fall 2015
- **Proposed Construction Start:** Early 2016?

Moving Forward

BROAD BEACH

1. Revised Engineer’s Report- Board adopted July 2015; Resolution No. 2015/03
2. New Assessment Passed 9/6: $595/linear foot; 25% for those west of 31380
3. New Assessment commits approx $3.1M/yr toward Project
4. Construction Schedule: Early 2016?

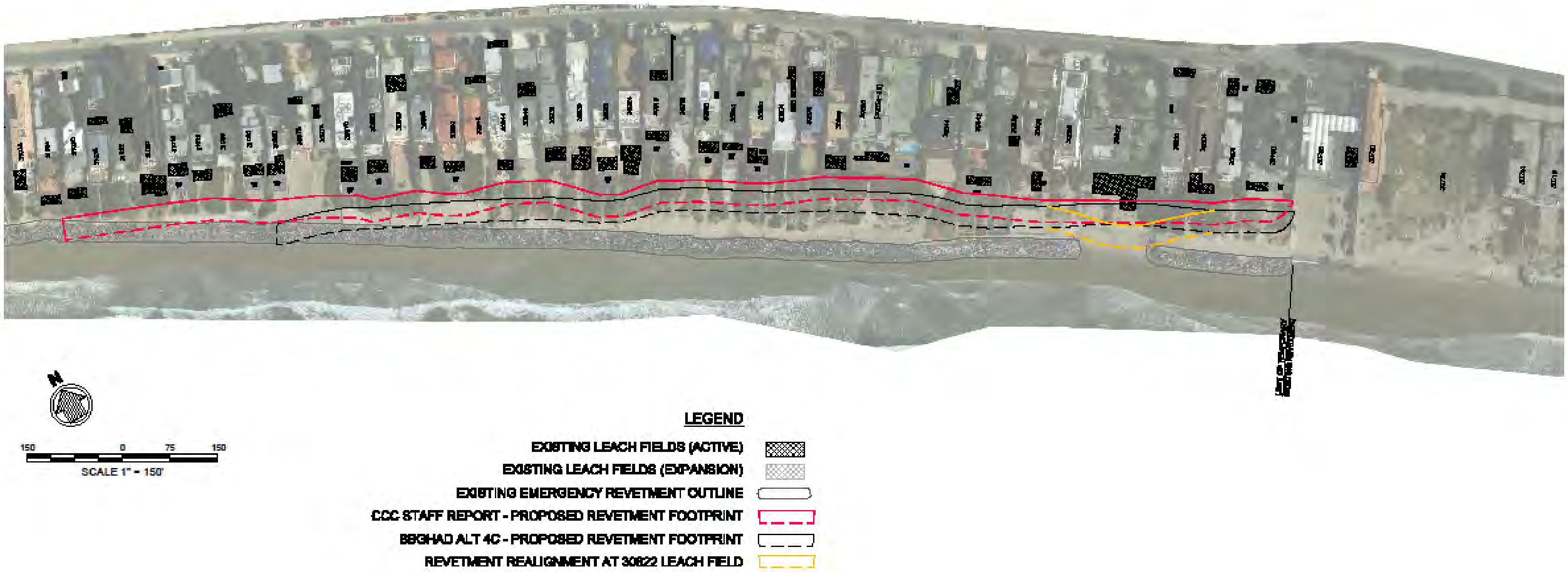
Beach Restoration: Photo Simulation- West

Beach Restoration: Photo Simulation- Central

Beach Restoration: Photo Simulation- East

Revetment Realignment- updated 8/28/15

EAST BROAD BEACH REVETMENT RELOCATION
ALT 4C AND CCC STAFF REPORT 11-26-2014 - REVETMENT FOOTPRINT COMPARISON



AERIAL IMAGE
DATE: FEBRUARY 23, 2011
SOURCE: ROBERT J LUNG & ASSOCIATES

Post Construction Condition Eastern End of Revetment

Pulled Back Revetment Covered with Dune Plants

Nourished Beach

Final dune design subject to approved dune restoration plan

Existing Condition

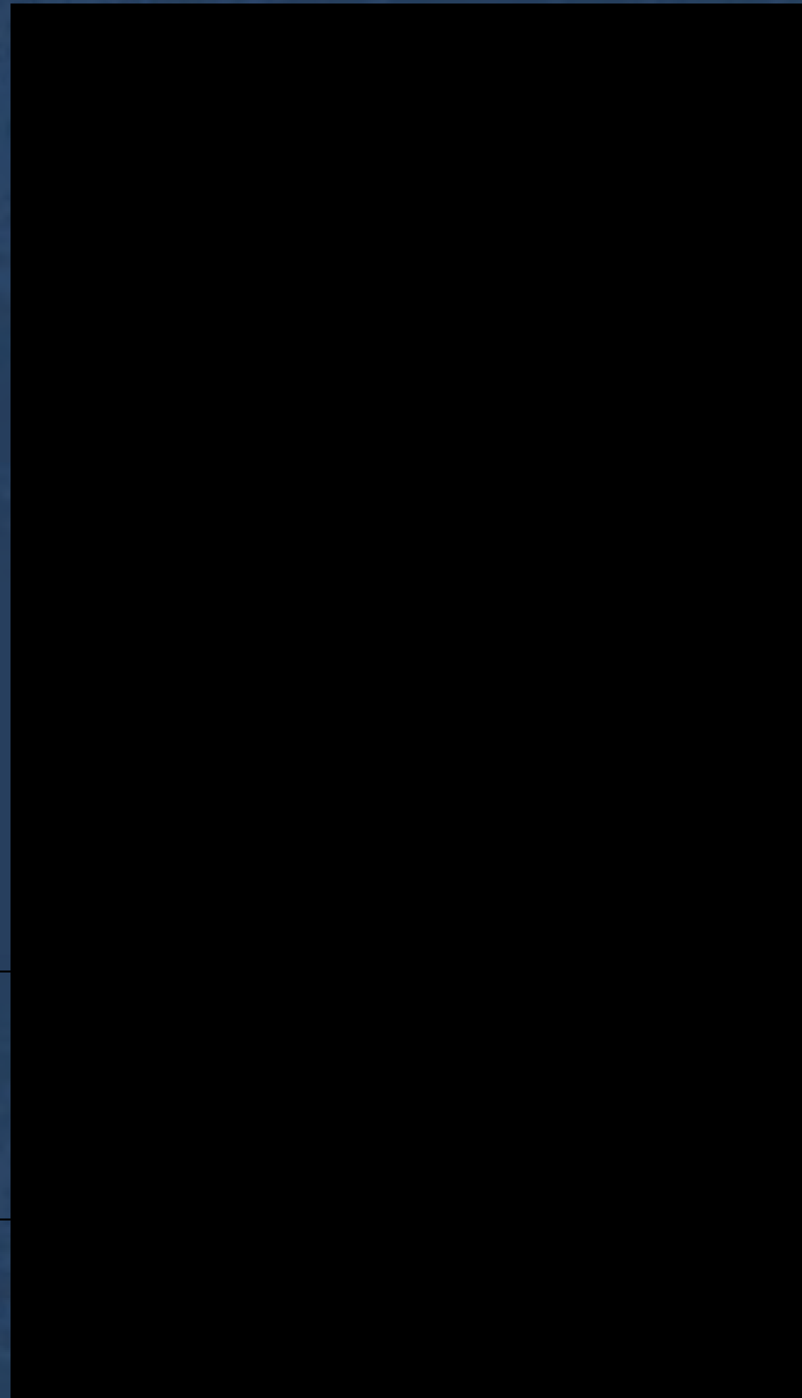
Existing 2010 Revetment

As shown: 30860 Broad Beach Rd.

BBGHAD Proposed Revetment Pullback

Nourished Beach Condition

As shown:
30860 Broad Beach Rd.



Pulled Back Revetment Covered with Dune Plants

Nourished Beach

Existing Leach Fields

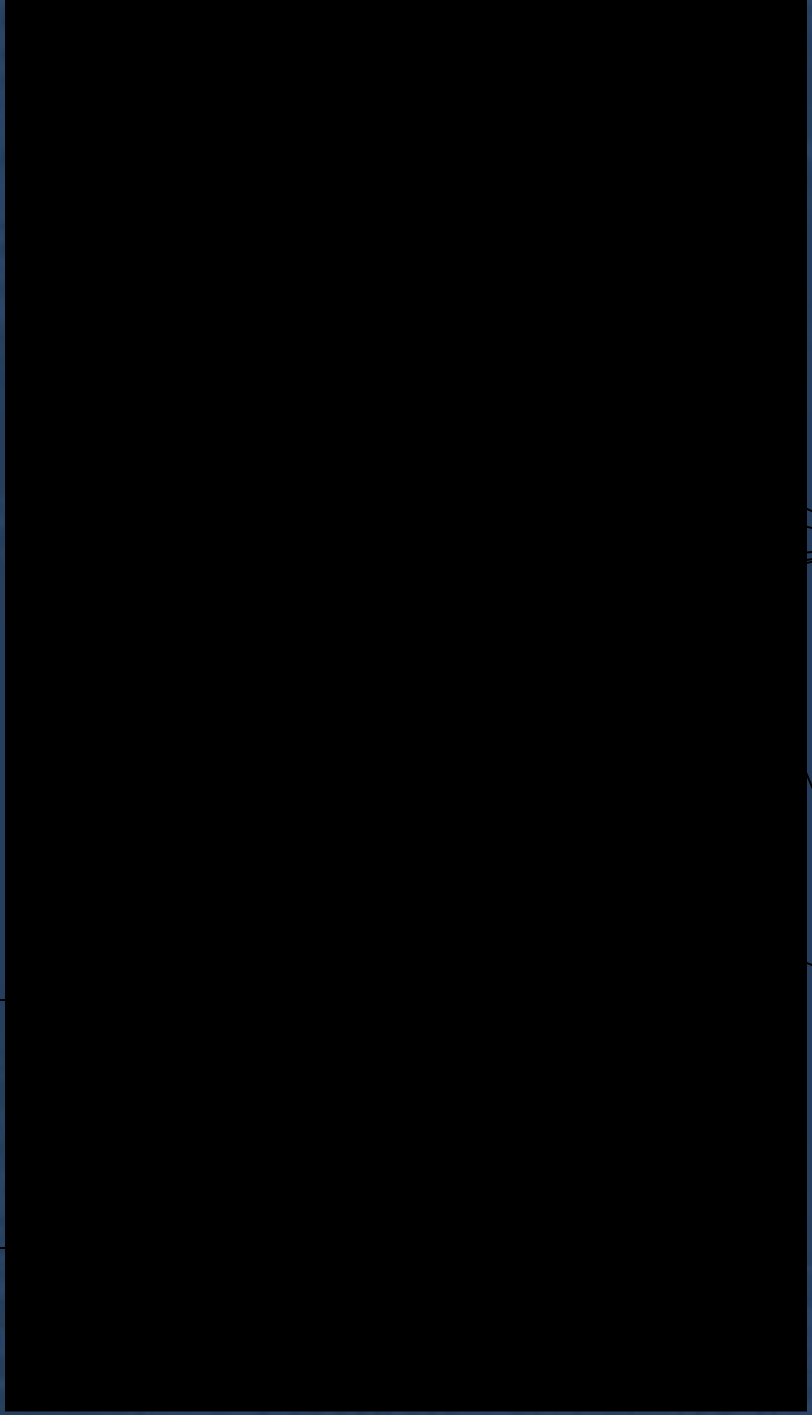
Future Leach Field

Final dune design subject to approved dune restoration plan

BBGHAD Proposed Revetment Pullback

As shown:
30866 Broad Beach Rd.

Nourished Beach Condition



Pulled Back Revetment Covered with Dune Plants

Nourished Beach

Existing Leach Fields

Future Leach Fields

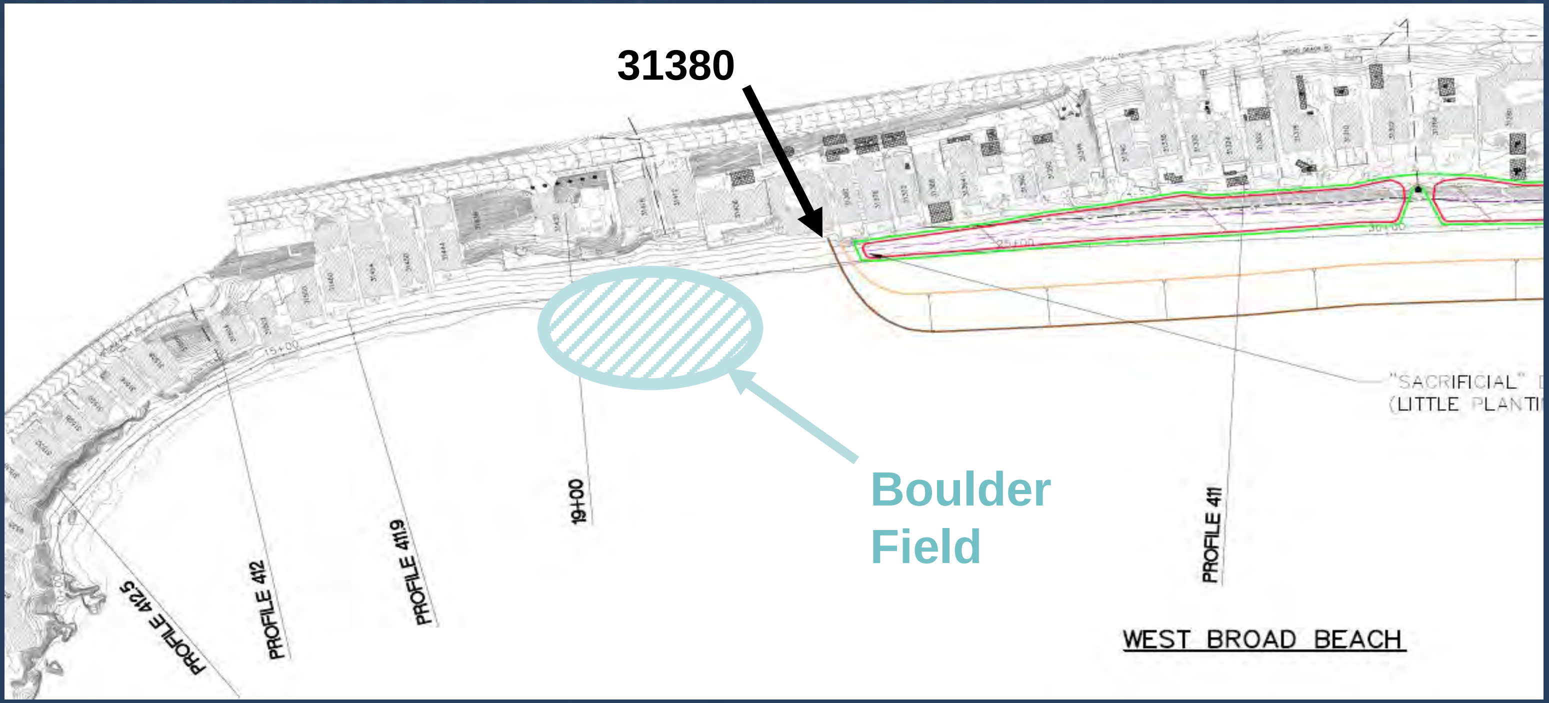
Final dune design subject to approved dune restoration plan

Alternative 4C: Proposed Dune Footprint: West to Middle Area

BROAD BEACH

Alternative 4C: Proposed Dune Footprint: Middle to East End

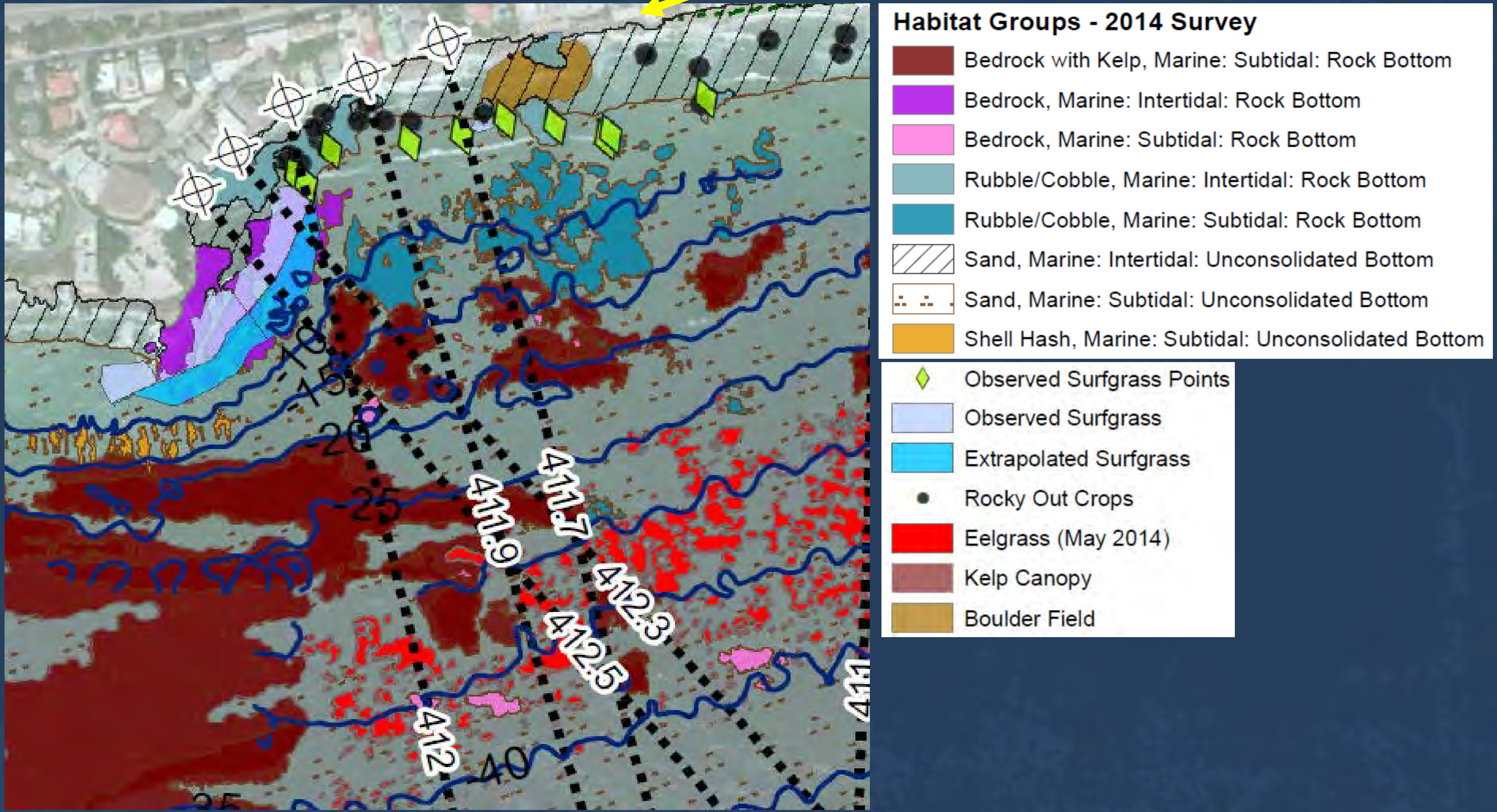
West End Nourishment Limitation



- Ends nourishment at 31380 Broad Beach Rd.
- Preserves "boulder field" between 31444 and 31380
- Limits depth of cover to approximately natural conditions west of 31380

West End Sensitive Marine Resources

31380 Broad Beach Rd



Summary of West End Analyses

GOAL 1: **Natural sedimentation levels determined**

- Spring accumulation varies up to 3 feet
- Fall accumulation up to 5 feet

GOAL 2: **Project-related sand transport & burial determined**

- 3D mapping used to quantify Project burial exceeding natural levels

GOAL 3: **Impacts to sensitive resources analyzed**

- No predicted impact to eelgrass and kelp
- Impacts to surfgrass predicted to be less than significant
- Impacts to lower intertidal boulder field predicted to be less than significant
- As expected, beach nourishment project adds sand to upper intertidal and sandy habitats

Septic System Study

Proposed Compromise:

- 2 years after CDP becomes effective
- Implementation based on findings: 6+ yrs

Proposed Backpassing & Renourishment Triggers

Activity	Triggered when…
Backpassing	• West end beach less than 75' for 3 months and sufficient sand at east end to backpass: likely 1-2x per 5 years
Interim Nourishment	• West end beach less than 30' for 6 months • Add up to 75,000 cy: proposed assessment funds no more than 3 per 5 yrs. • Avoid summer placement • Discretionary
Erosion Nourishment	• Less that 10' dry beach width fronting revetment • Place at least 75,000 cy / avoid summer placement • Not discretionary – GHAD commits to keep minimum 10' beach width fronting revetment instead of providing lateral access easements landward of revetment • Maximum 3 erosion nourishments within 10-yr period

BBGHAD’s Proposed Monitoring

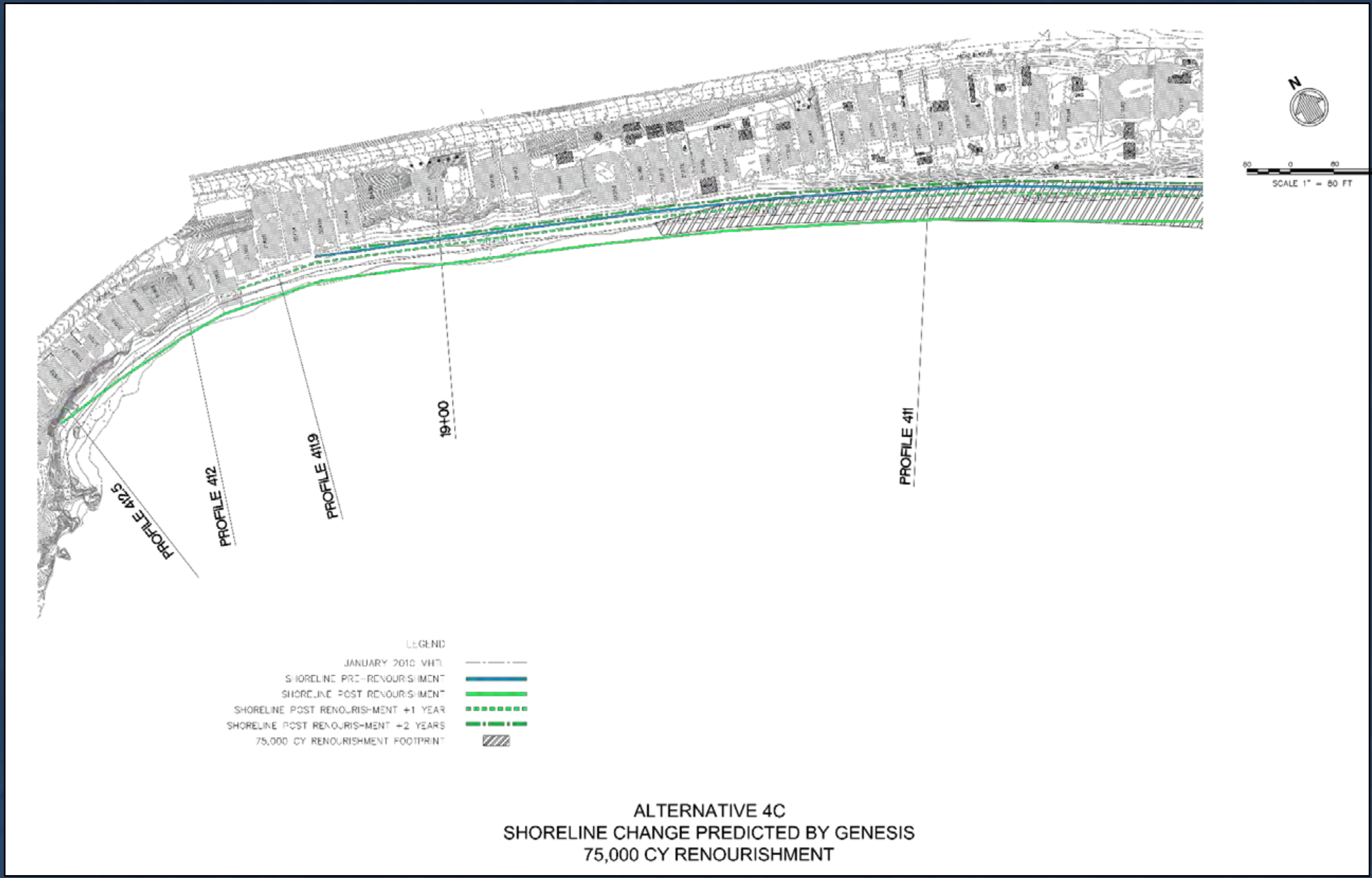
- Resource Monitoring During Construction
- Adaptive Management and Monitoring
- Dune Habitat Restoration and Monitoring Plan
- Long-term Marine Resources Monitoring, Reporting, and Mitigation Plan
- Public Access Management Program
- Science Advisory Panel ("SAP“)
- Cost: Approximately $3M/10 years

Primary Remaining Issues With CCC

1. Revetment Alignment & Duration
2. Dune footprint
3. Scope of public/lateral access
4. Permit term
5. SAP Details
6. Sand specification

END

Predicted Westward Sand Transport After 75,000 cy "Interim Nourishment"



Revetment Realignment – 30760 to 30968

- **Pullback contemplated since 2010 ECDP**
- **BBGHAD contested & negotiated pullback mandated by CCC/ other agencies**
- **Realignment may alter certain backyard improvements**

BBGHAD Proposed Revetment Pullback

As shown:
31022 Broad Beach Rd.

Nourished Beach Condition

Existing Leach Fields

Pulled Back Revetment Covered with Dune Plants

Future Leach Fields

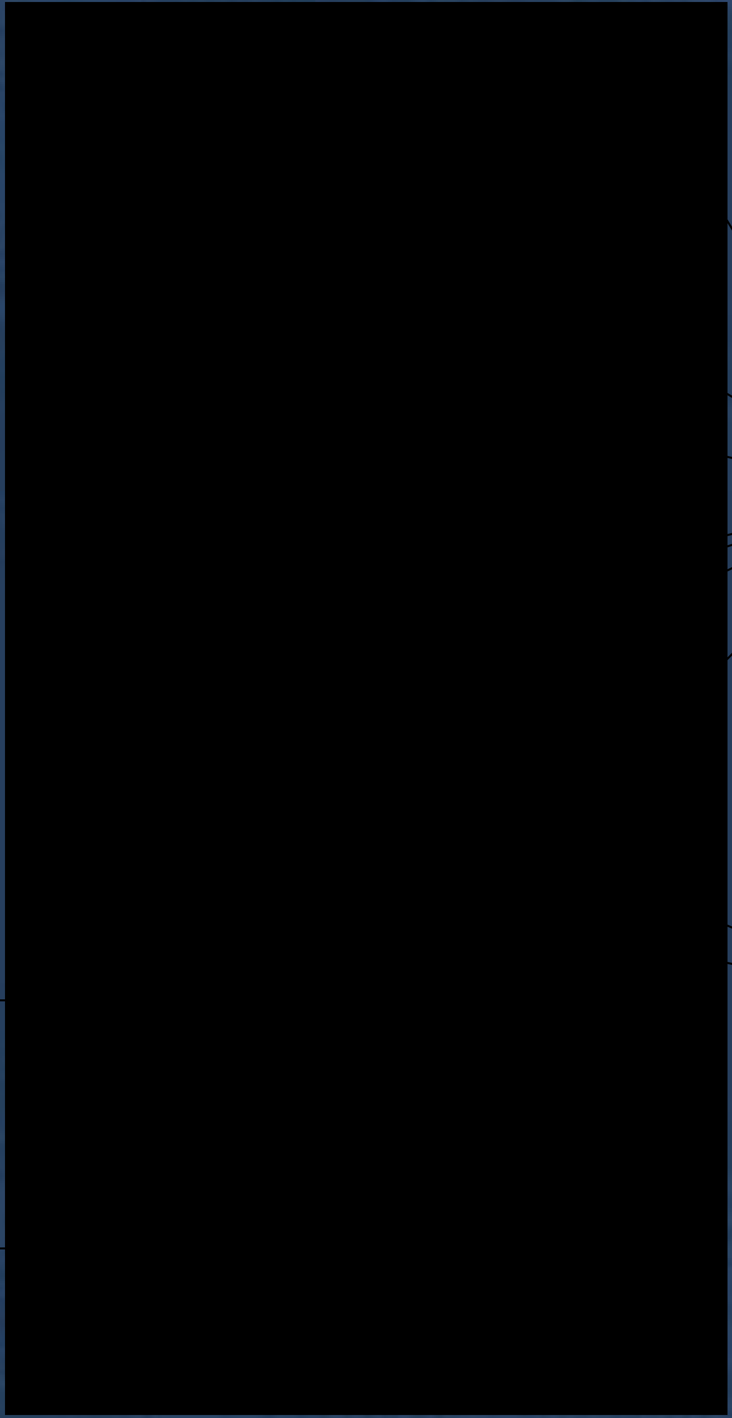
Nourished Beach

Final dune design subject to approved dune restoration plan

BROAD BEACH

BBGHAD Proposed Revetment Pullback

Nourished Beach Condition



As shown:
30952 Broad Beach Rd.

Existing
Leach Fields

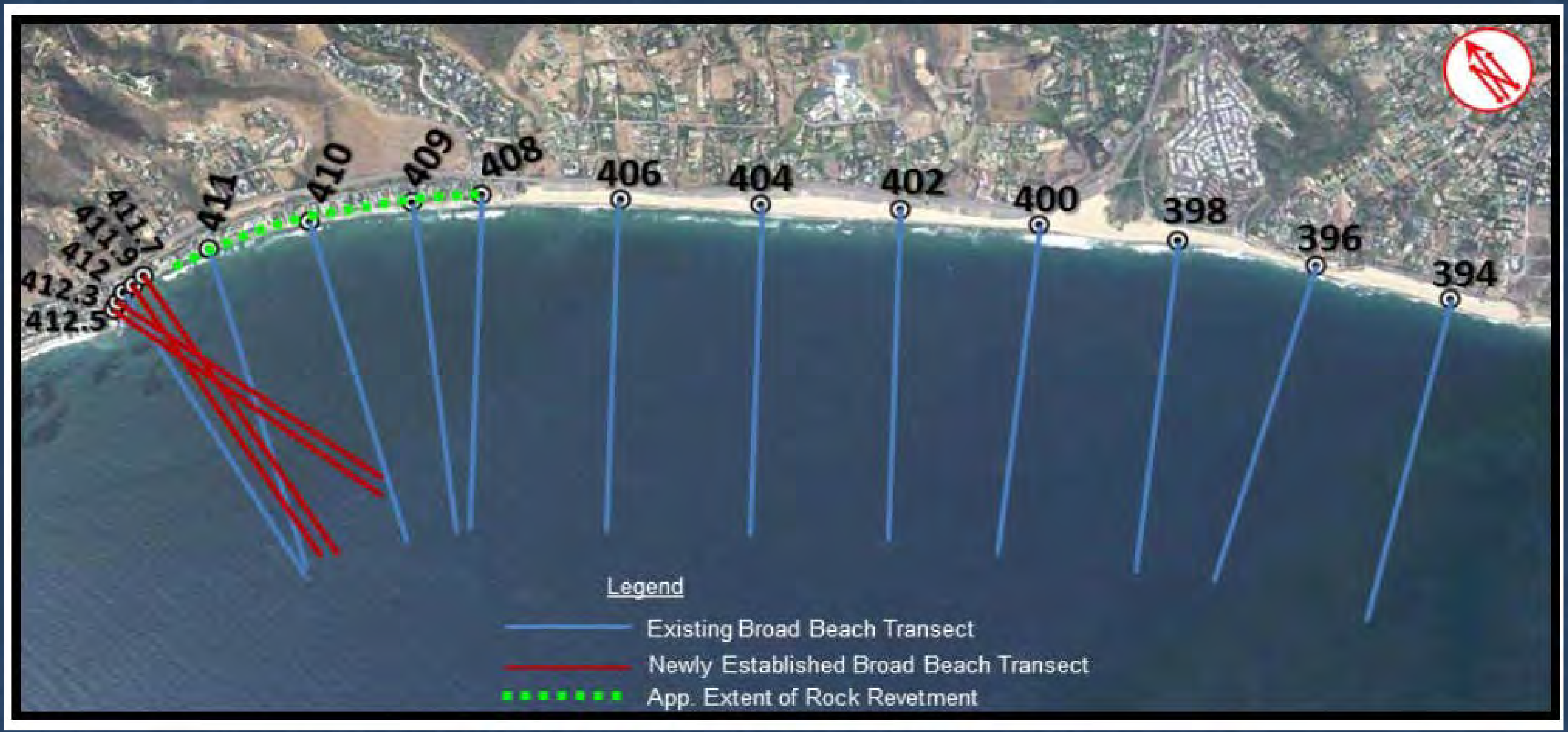
Pulled Back Revetment Covered with Dune Plants

Future Leach Fields

Nourished Beach

Final dune design subject to approved dune restoration plan

Beach Width Monitoring "Transects"



hans laetz, j.d.
zuma impact environmental analysis
6402 surfside way / malibu ca 90265
hanslaetz@gmail.com / office, cell, home (424) 442-ZUMA (6972)

Kenneth Ehrlich,
Broad Beach GHAD
Malibu CA

Mr. Ehrlich, Malibu, 28 Sept. 2015

As you know, I speak informally on behalf of many of the 20 homes east of Broad Beach, on Surfside and Seastar drives. We do not have a formal HOA and this letter has not been reviewed by my neighbors. But acting on their behalf, I have had extensive talks with you on this project.

There could be no better project planned for Malibu's Broad Beach than the beach replenishment project envisioned by Coastal Commission staff, and the BBGHAD.

I have spent long hours working with California State Parks, the Mountains Recreation Conservation Agency, Caltrans and L.A. County DPW (Flood) and other agencies on the proposed restoration of Trancas Creek and its degraded lagoon.

Your project protects Trancas Creek, while maintaining Broad Beach as a viable, publicly-accessible, environmentally-responsible beach.

The Broad Beach homeowners had some shameful history, but new property owners have demonstrated stewardship, responsibility and public-spiritedness here. And they are putting their money where their mouths are.

I welcome your efforts to lessen the impact of the temporary Zuma Beach construction yard — in front of our homes — on us. We will work closely with you to make sure the construction project is as quiet and orderly as you can make it.

Thank you and the members of the BBGHAD for restoring our beach.

Hans Laetz

Broad Beach Revetment

Jason Williams [andingela@gmail.com]
Sent: Friday, September 25, 2015 2:13 PM
To: BroadBeach@Coastal

Dear Coastal Commisioners,

Beach erosion is a natural reality for coastal communities. It is my hope that you will continue to support the natural evolution of our shoreline. Armored coasts are both a visual and ecologic tragedy. As a resident of a beach town, we all known that we are living on borrowed time, and that someday, our property and public spaces will be absorbed by a changing surf zone. More than ever in the current climate of warming seas we must plan for and assist with a natural controlled retreat from advancing seas. If not, if we choose to armor and wall off our coasts, all we will generate is an ugly and dangerous shoreline of ever increasing expense to manage. Please, please stop the mismanagement of the last century, and allow our coasts to stay alive! Thank you for considering my perspective.

Kind Regards,

Jason Williams
Carmel by the Sea

Sent from my T-Mobile 4G LTE Device

BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

October 5, 2015

VIA E-MAIL AND HAND DELIVERY OR FEDEX

Hon. Steve Kinsey, Chair
Dayna Bochco, Vice Chair
Wendy Mitchell
Effie Turnbull-Sanders
Hon. Martha McClure
Hon. Erik Howell
Mary Luevano
Mary Shallenberger
Mark Vargas
Hon. Carole Groom
Hon. Gregory Cox
Hon. Roberto Uranga

Re: Broad Beach Geologic Hazard Abatement District ("BBGHAD")
Beach and Dune Restoration Project ("Project")
CCC Consideration: October 9, 2015; Agenda Item 8(a)
CDP APPLICATION NO. 4-15-0390

Dear Chair Kinsey and Commissioners:

The Broad Beach Geologic Hazard Abatement District ("BBGHAD") proudly presents this unique Project to create, with 100% private funds, a new 1.1 mile public beach, complete with a public dry sand beach and a restored dune system. When restored, the new beach will serve as a natural continuation of LA County's Zuma Beach, which is believed to be the most heavily visited beach in southern California. The Project calls for a restored dry sand beach, restored dune system, and expansive public access area—including areas where no public access currently exists. The Project creates unprecedented public benefits at no taxpayer cost.

Since 2010, the BBGHAD has worked tirelessly with CCC staff with the primary desire of obtaining an acceptable Coastal Development Permit ("CDP"). We redoubled our efforts after voluntarily withdrawing our application at the CCC's December 2014 meeting, and have met repeatedly with the Executive Director and other staff members to achieve a mutually beneficial result. We have made major concessions since December 2014 and are very close on the remaining items where we ask for Commissioner support to assure that the BBGHAD property owners will accept the resulting CDP. As a result of staff input, the BBGHAD has revised the Project as follows:

- Avoiding perceived impacts by reducing the placement volume of the initial and subsequent 5-year major nourishments from 600,000 cy to 300,000 cubic yards;

ATTACHMENT 4
Applicant Correspondence
4-15-0390 (Broad Beach GHAD)
Addendum

- Similarly avoiding impacts by agreeing not to directly place sand nourishment placement west of 31380 Broad Beach Road;

- Completely avoiding sand placement at the "boulder field" by ending direct placement of beach and dune building material at 31380 Broad Beach Rd;

- Committing to study the feasibility of moving all Broad Beach homes from individual septic systems to a community waste treatment and disposal system, with the goal of implementing a community-wide system in accordance with the findings of the study;

- Relocating the eastern 1600 feet of the 2010 emergency revetment as far landward as feasible without increasing the chances for septic system failure due to ocean water inundation;

- Agreeing to create, fund, and empanel a Science Advisory Panel to analyze Project performance and implement adaptive management techniques;

- Maximizing Project benefits through a revised Dune Plan to accommodate the CCC staff's request for a 3:1 ratio of dunes restored to dunes allegedly impacted; and

- Agreeing with staff's recommended sand specification.

The BBGHAD modifications have come at great cost and effort. Our commitment to end direct nourishment at 31380 Broad Beach Rd. alone caused a complete legal and fiscal reformulation of the BBGHAD itself whereby the BBGHAD:

a) significantly reduced the assessment on west end property owners (from 100% to 25% of the assessment per foot per year);

b) dramatically increased the assessment on the remainder of owners (from $418 per foot per year to $595 per foot per year); and

c) conducted a second successful Proposition 218 vote on the new assessment.

Despite these and other significant BBGHAD concessions, some differences exist between the BBGHAD's proposed Project and the CCC staff position.

For over four (4) years, BBGHAD representatives have negotiated with the staff on various Project components. Repeatedly, BBGHAD representatives believed issues were resolved only to subsequently learn that CCC staff reverted to its previous position. Not only has this dynamic confounded the BBGHAD Board and staff, it has affected support for the CCC staff position among BBGHAD owners.

In the spirit of compromise and resolution, we present the most important remaining points of disagreement with the hope of resolving these final issues. In addition, we attach as Exhibit "A" a BBGHAD-proposed redline of the staff report's Special Conditions.

We present below the most important remaining issues as we understand the staff report and our specific requests of the Commission:

1. Revetment Alignment

CCC Staff Report:

The staff proposes that the current emergency revetment approved by the CCC and constructed at great cost under an emergency permit (which emergency exists to this date) be moved significantly landward to a location as described in Exh. 8a to the staff report. The staff report implies that the revetment relocation proposed by Exhibit 8a is acceptable to the applicant and it is not. This move would provide, at most, only a 15' buffer from existing septics, and would extend the realignment area west to 31030 Broad Beach Road encompassing many parcels where the relocation would impinge upon leach fields and cause a disproportionate loss of property. The staff proposed revetment line is not feasible and poses an unacceptable risk to the environment and the residences. This risk will further increase as sea level rise accelerates.

BBGHAD Position:

- The staff-proposed relocation would exacerbate leach field damage from flooding when waves overtop the revetment. Therefore, the risk of sewage spill is heightened where (to our knowledge) none has otherwise occurred.

- The staff's proposed alignment does not account for the existence of reserve replacement leach fields as **required** by the Malibu Local Coastal Plan, many of which are located seaward of existing leach fields. Malibu Local Implementation Plan, Section 18.7(Q). When a property owner proposes an otherwise appropriate development that prevents the owner's ability to provide a 100% reserve septic area, the City of Malibu requires the recording of a covenant that specifies, among other points, the owner's assumption of risk for not providing the reserve area. See, e.g., Los Angeles County Recorder Document No. 20131460143. The dedicated reserve leach field areas of many of the residences lie within the footprint of the staff's proposed relocated revetment (See, e.g., Staff Report, Exh. 8a, 30970 Broad Beach Road), and none of these property owners have waived the LIP's reserve field requirements. The staff's proposed revetment alignment ignores the Malibu LIP and, if effectuated, would compromise public health and the safety of these parcels.

- The BBGHAD's proposed alignment, attached as Exhibit "B", begins the revetment relocation on the west end at 30980 Broad Beach Rd., fulfills all Coastal Act, LCP (Malibu LCP, Section 10.3(A)(5)), and State Lands Commission requirements, and protects the existing sewage treatment systems—at least until coordinated action occurs on removing septic systems.

2. Proposed License Agreements

The staff report proposes 78 separate license agreements to be signed by all 78 BBGHAD revetment owners (of the 121 total parcels) to create new lateral and public access on the dry sand beach once nourished, and as the beach erodes between nourishments. The BBGHAD appreciates staff's progress on this issue since December 2014 and agrees with much of the staff report in this regard. However, key differences exist between the staff position and the BBGHAD position.

CCC Staff Report:

Prior to the issuance of the CDP, staff calls for each revetment property owner to enter into a license agreement with CCC and BBGHAD in the form of an irrevocable license providing for public access landward of the 2010 MHTL to the crest of the restored dunes (Special Condition 13, p. 36), and:

1. the public shall have lateral access and passive recreational use over the seaward portion of the licensor's private property extending 25 feet inland from the landward extent of the **wet sand**, until that point reaches the seaward face of the revetment, at which point the area to which the public shall have such rights will only extend landward from the **wet sand** to the seaward face of the revetment.

2. if, at any time, 10 feet of dry sandy beach does not exist extending seaward from any point along the seaward face of the approved revetment, BBGHAD to provide for lateral public access via a 10' walkway landward of the revetment.

3. each license agreement would run with the land, binding successor owners; be recorded against the property as part of a blanket recordation; and must include a provision requiring the Property Owner to disclose the existence of the agreement to any prospective successor;

4. prior to issuance of the Coastal Development Permit, each license agreement must be recorded against the property to which it applies.

5. a license agreement shall be completed for every property extending from 31350 to 30760 Broad Beach Road, inclusive [78 homes];

6. each license agreement shall be enforceable by the BBGHAD and/or the Commission, such that the entity enforcing the agreements can seek specific performance for enforcement purposes, and the Commission can impose administrative penalties for any violation. Special Condition 13, p. 36.

7. BBGHAD revetment owners must provide lateral public access over the revetment and a 10' strip of land immediately landward of the revetment if at any time less than 10' of dry sandy beach exists <u>or</u> any circumstance occurs (such as, but not limited to, an oil spill) that prohibits the public's use, access, and enjoyment of any of the area of licensor's property seaward of the revetment or of any property within 100 feet upcoast or downcoast thereof.

The staff report also calls for the BBGHAD to designate a 10 ft. wide public pedestrian path located immediately landward of the entire length of the revetment, including the relocated portion, as a "public accessway" when no areas of dry beach seaward of the revetment are available for pass and re-pass. Special Condition 1(A)(4), p. 13. The BBGHAD must also provide access stairs for public and property owner use "extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below. The number and location of the access stairways shall generally align with the shared private beach access paths" for the property owners.

<u>BBGHAD Position</u>:

The BBGHAD <u>agrees</u> with the staff-proposed concepts of:

1. The area seaward of the 2010 MHTL to remain public property regardless of the Project.

2. An ambulatory public access area moving landward up the seaward face of the revetment crest as the nourished beach erodes; this ambulatory public access area shall exist until the next nourishment occurs.

3. To the extent of the BBGHAD's ability, holding BBGHAD owners responsible to disclose the existence of the CDP to any prospective successor(s).

However, as explained below, the BBGHAD <u>disagrees with staff's position, and cannot gain acceptance of certain provisions</u>, as follows:

A. No such agreements or access provisions are necessary on BBGHAD-created accreted public land seaward of the 2010 MHTL; all such newly created land is public property under California law.

B. The BBGHAD cannot agree with the proposed 10' walkway in private backyards landward of the revetment. Special Condition 1(A)(4), p. 13; Special Condition 14.

C. The BBGHAD cannot agree with the staff's related, proposed requirement to build multiple access stairs from the beach into areas of the residences (generally, one stairway for every two homes) through the revetment to the proposed walkway. Special Condition 1(A)(4), p. 13; Special Condition 14, p. 37. These rock stairs without handrails would invade privacy, pose significant public safety concerns, and expose the BBGHAD and its owners to significant liability.

D. The BBGHAD does not believe it is practical to obtain 78 separate license agreements signed by all revetment homeowners. Special Conditions 13,14.

E. The Commission should not force the BBGHAD or its owners to provide public access in an ambulatory 25' wide area from "wet sand" up to the seaward face of the revetment crest. "Wet sand" is too ambiguous and would create unnecessary confusion, and public passage in a 25' area would destroy important dune habitat created by, and to be rebuilt with, BBGHAD resources.

The BBGHAD proposes that this area should be 10' wide and should extend from where the eroding beach becomes **impassable** up to the seaward face of the revetment crest. Individual BBGHAD property owners have significant privacy, security, public safety, and liability concerns over the prospect of opening their backyards to the public at any time. In addition, the prospect of all 78 property owners agreeing to the proposed license agreement is unlikely. As posed by the CCC staff, each of the 78 owners would individually have veto power over the entire Project. This power neither serves the public, the CCC, nor the BBGHAD.

Moreover, prior to the issuance of the staff report, staff never discussed with BBGHAD representatives the concept of using "wet sand" as the basis for the BBGHAD owners to provide ambulatory access up the seaward slope of the restored dune. This staff-proposed standard is too ambiguous and ignores the fact that beachgoers typically and safely walk on wet sand. Sand becoming wet should not serve as the standard for opening a restored dune system to public access. Instead, the standard should be based on **impassability of the beach**-- i.e., once the eroding beach becomes impassable, the BBGHAD shall provide public lateral access up the seaward slope of the restored dune. The BBGHAD is prepared to spend millions of dollars restoring Broad Beach's dune system. It seeks to minimize dune damage anticipated to be caused by opening the dune to public access as the beach erodes (and until the next nourishment occurs) by limiting the access area to **10' wide (instead of 25')** up to the seaward face of the revetment crest.

The BBGHAD has committed to unprecedented, perpetual beach nourishment: 300,000 cubic yards every five (5) years and up to 75,000 cubic yards in other years. The BBGHAD has committed to place this sand on the beach within the construction parameters and scheduling imposed by CCC staff (among other limitations, September through May yearly). These BBGHAD commitments translate to dramatically expanded public access, especially considering the current limited access to any sandy beach. In short, the BBGHAD has shown its commitment to keep dry sand on Broad Beach and this commitment coupled with the acceptable provisions of Special Condition 13 should ensure unprecedented public access at Broad Beach.

3. Permit Duration

CCC Staff Report

The staff report provides for a **10-year permit**, and a potential 10-year permit extension subject to Executive Director and CCC discretion. Special Condition 2(A), (B), p. 13. After 10 years, authorization ceases unless Commission re-authorizes as part of permit amendment. Permittee may apply for 10-year extension within 6 months of 10/9/25. Special Condition 2(B), p. 13. The 10-year reauthorization must include a "complete evaluation of all feasible alternatives to the retention of the rock revetment" should beach re-nourishment fail to consistently maintain a 30' wide dry sand beach over the 10-year Project period. The BBGHAD must submit 5-year adaptive management report for Executive Director's review at year 5. Special Condition 2(C), p. 14. If the Project is not maintaining 30' dry sand beach or if significant adverse impacts arise, the Executive Director may require an amended CDP application with Project modifications. *Id.*

BBGHAD Position:

The BBGHAD seeks a twenty **(20) year permit**, and a 20-year right to maintain an agreed revetment alignment (if agreement can be achieved). The BBGHAD has spent five (5) years and in excess of $8,000,000 in the permitting process. The BBGHAD agrees with the staff report's concept **of 5-year Executive Director reviews** and adaptive management principles. Special Condition 2. This should give the CCC the security to know that the BBGHAD will implement necessary Project changes to adapt to the dynamic beach environment. We seek a CCC commitment to the Project that will allow the BBGHAD a semblance of security and safety for the duration of the Project and avoid perpetual permitting.

4. Septic Conversion

CCC Staff Report

The staff report proposes the BBGHAD's completion of a feasibility report for the conversion of septic systems at approximately 115 Broad Beach parcels (the remaining parcels already have a package plant) **within two (2) years of the October 9, 2015 hearing date** and an initial conversion implementation goal (for the removal of the existing septic systems on the beach and connection to either a new or upgraded sewage treatment plant) of **six (6) years from issuance of this coastal development permit.**

BBGHAD Position:

The BBGHAD agrees with the concept of converting homes with individual septic systems to a community-wide waste treatment system. To this end, and since December 2014, the BBGHAD has met with waste treatment engineers, County officials, and representatives of a neighboring retail center to discuss waste treatment alternatives. See, Exhibit "C". Nonetheless, and as a result of input received from these efforts, the timeframes posed by the staff pose significant concerns. The BBGHAD intends to focus its resources on permitting and constructing the beach restoration project, and does not have the resources to jointly focus on the Project and a major separate endeavor of transforming the waste treatment system for an entire community.

Specifically, the BBHAD proposes the following schedule for septic conversion:

a. Feasibility Report- **three (3) years from the issuance of the CDP**.

b. Implementation- the BBGHAD cannot commit to a 6-year, or any other, implementation goal without knowing the results of the Feasibility Study. Therefore, the BBGHAD proposes to complete the Feasibility Study and with the goal of **implementing a community-wide system in accordance with the findings of the study** and consultation with the Executive Director.

5. Conclusion

For your assistance, we attach as Exhibit "D" a PowerPoint presentation outlining the Project, the BBGHAD's major concessions to date, the areas of major difference between the BBGHAD and CCC staff, and our proposed resolution of the major issues. Other issues concern the BBGHAD, which we will specify in further detail during our October 9 presentation to the Commission.

We appreciate your attention to this matter, and look forward to your leadership on this important project. The BBGHAD remains hopeful that we can achieve a viable Project for all concerned.

Very truly yours,

BBGHAD BOARD OF DIRECTORS

Norton L. Karno

Norton Karno, Chair
Marshall Grossman, Vice Chair

Enclosures

cc: Charles Lester
Jack Ainsworth
Janelle Beland
Jennifer Lucchesi
Dale Jones

Exhibit A

CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
89 SOUTH CALIFORNIA ST., SUITE 200
VENTURA, CA 93001
(805) 585-1800

F8a

Filed:	6/5/15
180th Day:	12/2/15
Staff:	Staff
Staff Report:	9/25/15
Hearing Date:	10/9/15

STAFF REPORT: REGULAR CALENDAR

Application No.:	**4-15-0390**
Applicant:	**Broad Beach Geologic Hazard Abatement District**
Agents:	**Moffat and Nichol Engineers**
Project Location:	**30708 Broad Beach Road to 6526 Lechuza Point Road, Malibu; Los Angeles County.**
Project Description:	**Authorization and permanent retention of an existing, approximately 4,150 ft. long, 12-15 ft. high, as-built, rock revetment constructed pursuant to two emergency coastal development permits. In addition, the project includes re-location of the downcoast approximately 1,800 linear feet of the as-built rock revetment further landward; implementation of a beach nourishment program for a period of 20 years involving deposition of 300,000 cu. yds. of sand on the beach from inland sand quarries during the first year and approximately 300,000 cu. yds. of sand approximately every five years thereafter; periodic interim nourishments involving up to 75,000 cu. yds. of sand as needed; periodic sand backpassing operations to occur no more than once per year, and dune habitat restoration. The proposed project is described in more detail in Section IV.A below.**

SUMMARY OF STAFF RECOMMENDATION

Commission staff is recommending conditional approval of the Broad Beach Geologic Hazard Abatement District's (BBGHAD) proposed revetment, beach nourishment, and dune restoration project at Broad Beach in the City of Malibu in Los Angeles County. The recommended approval is limited to 20 ~~10~~ years with conditions to address coastal hazards and impacts to public
access, marine, beach and dune habitats, and visual resources. The recommendation also includes

a requirement for a comprehensive implementation and monitoring program, including providing for adaptive management at Broad Beach considering project uncertainties and projected global sea level rise.

Project Description and Background

In a prior permit application for a modified version of the same project (Application No. 4-12-043), the BBGHAD proposed to (1) permanently retain an approximately 4,150 foot long rock revetment that was temporarily authorized and constructed under Coastal Commission emergency permits in January of 2010 without relocating any of it; and (2) implement a twenty-year beach nourishment and dune restoration program on top and in front (seaward) of portions of the revetment that included deposition of 600,000 cubic yards of sand from inland sand quarries in year one and another 450,000 cubic yards in year ten, with periodic backpassing no more than once per year and periodic interim nourishments of up to 75,000 cubic yards of sand between major nourishment efforts. Commission staff recommended approval of this prior application with conditions to relocate a portion of the as-built revetment, reduce the quantity and footprint of the beach nourishment program to avoid filling of sensitive rocky intertidal habitat areas, limit the permit term to 10 years, and require significant implementation and monitoring provisions to address impacts to public access, marine, beach and dune habitats, and visual resources. Staff recommended relocating the approximately 2,000 linear ft. portion of the revetment at the eastern (downcoast) end of the beach up to 100 feet further landward (between 31030 and 30760 Broad Beach Road) so that the landward edge of the revetment is setback approximately fifteen (15) ft. from (seaward of) existing, legally-established septic systems/leach fields.

The project had a public hearing before the Commission at the December 11, 2014 meeting in Monterey. After listening to Commissioner deliberations and concerns raised regarding the proposed project and the staff recommendation, the applicant withdrew the application during the hearing and expressed their intent to continue working with Commission staff to address Commissioner concerns prior to submitting a new application for the project. On April 3, 2015, the BBGHAD submitted a new permit application (the subject Application No. 4-15-0390) for the revetment, beach nourishment, and dune restoration project that includes the following changes:

- **Revetment Alignment**. Re-location of the downcoast approximately 1,600 linear feet of the as-built rock revetment up to 75 feet landward of the as-built revetment alignment (approximately 40-50 feet seaward from existing septic systems/leach fields on the beach). In addition, on September 24, 2015, the applicant transmitted a revision to the proposed downcoast revetment alignment (called “Revision D”) to Commission staff. This revised revetment alignment, which is depicted in Exhibit 8a, extends the pullback approximately 200 feet further upcoast than previously proposed (for a 1,800 linear foot length), such that the pullback starts at 31020 Broad Beach Road instead of 30980 Broad Beach Road. The revised pullback alignment is also a more smooth line (less angular curves), and the downcoast portion of the pullback was shifted seaward to avoid a recently surveyed large existing leachfield on the beach at 30822 Broad Beach Road. However the new proposed revised revetment alignment is still approximately 40-50 feet seaward from most existing septic systems/leach fields on the beach.

- **Beach Nourishment Program**. Modification to the beach nourishment program to limit direct nourishment to the area between 31380 Broad Beach Road at the upcoast end and 30708 Broad Beach Road at the downcoast end (eliminating direct nourishment between Point Lechuza and 31380 Broad Beach Road), consistent with Commission staff's recommendation. The proposed beach nourishment program was also modified to reduce the quantity of nourishment deposition to 300,000 cu. yds. of sand from inland sand quarries during the first year, approximately 300,000 cu. yds. of sand approximately every five years thereafter or as needed, periodic interim or erosion nourishments involving up to 75,000 cu. yds. of sand as needed, and periodic backpassing no more than once per year.

- **Dune Restoration and Enhancement**. Modification to the footprint and design of the proposed dune restoration and enhancement plan, and a proposal to incorporate one non-shared private vertical access path through the restored dunes for every residence with forty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residences with less than forty feet of beach frontage. In addition, on September 24, 2015, the applicant transmitted a revision to the proposed private vertical access path plan in order to address Commission staff concerns and to reduce the number of paths through the dunes. The revised proposal now reflects one non-shared private vertical access path through the restored dunes for every residential lot with sixty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residential lots with less than sixty feet of beach frontage.

- **Lateral Public Access**. Proposal to maintain at least ten feet of sand seaward of the revetment for lateral public access along the beach; however, if there is erosion back to the revetment for six consecutive months despite backpassing and up to three interim nourishment attempts within a ten year period, and access seaward of the revetment is impossible, the applicant would agree to grant the public a "temporary license" to access a limited area on the landward side of the revetment for pass and repass.

- **Septic System Conversion Study**. And although not proposed as part of the formal revised project description, correspondence from the applicant (dated March 31, 2015 and June 16, 2015) states that the applicant agrees to conduct and complete a "Septic Conversion Implementation Study" within three (3) years of permit effectiveness to study alternatives and cost associated with implementing the conversion of individual on-site septic systems on BBGHAD parcels to a community-wide system. The applicant's correspondence also states that a timeline for transition would be identified based upon the results of the conversion study.

The BBGHAD encompasses the entirety of Broad Beach, including 114 individual property owners with homes on 122 single-family residential parcels. Approximately 86 homes were present prior to the establishment of coastal permit requirements in 1972 under Proposition 20. Forty-six of those homes are located behind the proposed revetment. Many of the existing homes were either constructed or substantially improved with permits issued by the Coastal

Commission, its predecessor, or the City of Malibu after 1972. As a result of conditions imposed in those permits, fifty-one of the parcels have restrictions protecting and/or providing for public lateral beach access, thirty-two of which are directly underneath or landward of the revetment. Thirty-six of those 51 parcels have easements held by the State Lands Commission (SLC), twenty of which are in the revetment area. Another eleven of the existing residences have "no future seawall" conditions required by the Commission or the City of Malibu. Seven of these eleven residences are located behind the proposed revetment. The offshore and beach areas below mean high tide at Broad Beach are in the Point Dume State Marine Conservation Area MPA and a State Water Resources Control Board designated Area of Special Biological Significance (ASBS).

Broad Beach Erosion and Project Impacts

Although the width of Broad Beach has varied over the last century, evidence shows that the beach has been receding at about an average of 2 feet per year since 1970. And while sea level rise over the proposed 20 years of the beach replenishment may only range from 3.4 to 17.9 inches (with a projected value of 8.5 inches), the SLC analysis of public trust resources concludes that erosion rates at Broad Beach may be accelerating, and certainly over the longer run (after 2050) sea level rise will become a significant erosion challenge. In recent years the erosional trend at Broad Beach has placed the existing beach-level residential development directly in danger, and several homes were lost in the 1998-99 El Nino year and at least one home was significantly damaged in the 2009-10 storm events that led to the construction of the emergency revetment.

The proposed BBGHAD revetment would result in significant public access and beach resource impacts that typically follow from shoreline structure projects on eroding shorelines. It will cause the direct passive erosion loss of the fronting beach due to the fixing of the back beach and the resulting inability of the beach to naturally retreat. It will also prevent the erosion of beach and bluff sand that would otherwise naturally nourish local and regional beaches. The existing revetment has been blocking lateral public access in front of the revetment for almost five years at high and even mid-range tides (the applicant describes Broad Beach currently as a "narrow, 'low-tide beach"). And, the revetment is sitting on approximately 3.02 acres of beach, including directly encroaching on approximately between 1.5 and 2 acres of public tidelines and existing SLC public access easements. The revetment also is visually unattractive. Finally, due to the loss of the beach, the revetment causes the direct loss of dry and wet sand beach habitat resources.

To their credit, and in recognition of the severe impacts of the revetment, the Broad Beach homeowners formed the BBGHAD, voting to assess themselves $20 million dollars over 20 years to finance a beach replenishment program along with the revetment to assure protection of their homes and rebuild Broad Beach for public benefit. If successful, the BBGHAD hopes to continuously maintain a sandy beach and dune field that will provide public beach access and restore beach and dune habitats. The beach replenishment and restoration program will also cover and thus mitigate the visual impacts of the rock revetment.

The proposed beach restoration could significantly offset the impacts of the revetment, but there is substantial uncertainty about how it will perform. The SLC analysis of public trust resource impacts concludes that with projected sea level rise, the proposed beach restoration is most likely to last 10-20 years. However, it could be shorter, and a series of significant storms or El Nino years could seriously and quickly degrade the beach restoration. In addition, as proposed, the sand replenishment will use sand with a larger average grain size, and of a different color, than is currently found at Broad Beach. These differences will change both the aesthetic character of Broad Beach and potentially the habitat values of the beach area. And, the placement of sand will have direct and indirect impacts of covering existing habitats, including existing rocky intertidal areas at the upcoast end of the project area. The proposed replenishment will also be accomplished by driving the sand from the Moorpark/Simi Valley area 40 to 45 miles in 14-cubic yard trucks, resulting in 22,000 truck trip loads of sand across local highways and streets (420 truck trips/day for approximately 3-5 months), and construction staging in a public access parking lot on nearby Zuma County Beach.

Coastal Act Consistency and Conditions of Approval

The BBGHAD project raises fundamental questions about how to address significant coastal hazard risks to development while protecting other coastal resources, including public beach access and recreation and natural shoreline habitat and aesthetic values. Staff recommends that the Commission find that many of the homes in the BBGHAD as they exist today are entitled to shoreline protection under Coastal Act Section 30235 because they existed in some form prior to 1973 are in danger from erosion. Other homes, though, were built or improved with coastal development permits subject to the Section 30253 requirement that new development not require future shoreline protection; some properties even have Commission-required recorded prohibitions against future protection like the proposed revetment. Thus, some homes are not necessarily entitled to, or in some cases are affirmatively prohibited from, receiving authorization of a shoreline protective device under the Coastal Act.

Unfortunately the proposed revetment ultimately would likely not protect those homes that are entitled to protection if there are physical gaps in the revetment in front of those intermingled homes that are not entitled to protection. Erosion would be exacerbated in these gaps, ultimately wrapping around and undermining the revetment. In the alternative, the Commission could consider requiring that existing homes in danger be relocated further inland, but there is very little room on some of the lots to make this a viable strategy over the longer run given the on-going erosion at Broad Beach. Existing structures could also potentially be raised to safer elevations on deep-seated caissons, as is required under the City's Local Coastal Program (LCP) when homes along Broad Beach are redeveloped (and some have been), but this alternative is extremely expensive and the Commission would need to require that many endangered structures essentially be entirely reconstructed on new elevated caisson foundations.

The BBGHAD project, particularly as originally proposed, raises significant conflicts with the Coastal Act's hazards, public access and recreation, habitat protection, and visual resource policies. However, the proposed beach replenishment and dune restoration components offset some of these inconsistencies by seeking to bury the revetment and restore the beach to create a condition as if the revetment were not there at all. If successful, these components would address many of the beach resource and aesthetic impacts caused by the revetment. Unfortunately there is significant uncertainty about how long the restored beach will remain given on-going erosion and potentially more-erosive storm events. It is possible that the beach and the dunes would be substantially reduced or even completely eliminated in places, and the revetment exposed, within several years of the initial replenishment. The BBGHAD is proposing to do a second major replenishment in year five, and every five years thereafter for the proposed twenty year term of the project, to address this concern. Nonetheless, because of the significant uncertainty of restoration success, even with the repeated replenishments, staff recommends that the Commission limit the authorization of the revetment and beach restoration to ten years, with additional beach nourishment of up to 300,000 c. yds. subject to the requirements of an Adaptive Management Plan with on-going monitoring and assessment. In the event that the project performs as planned, including continuing to provide public beach access and dune habitat and avoiding significant environmental impacts, the Commission may extend its authorization of the revetment and beach restoration program in ten years' time, for another ten year period.

A limited ten year authorization allows the Commission to support an adaptive management approach to shoreline erosion at Broach Beach, providing protection to existing development but not authorizing *permanent* shoreline structures for development not entitled to such protection. Further, the City of Malibu LCP requires that shoreline homes be moved as far landward as possible and elevated on caissons when they redevelop so as to minimize or not require at all any shoreline protection at the beach level. Although that LCP is not the standard of review here, it does serve as guidance, and to support this adaptive approach, staff also recommends that the Commission clearly authorize the revetment only to protect the eligible development that exists today, and that the BBGHAD and participating members assume the risks of developing in this hazardous location. At some point in the coming decades it may be that all of the homes along Broad Beach would no longer have need for shoreline protection such as the proposed revetment because they would be elevated through the redevelopment process above flood levels along the back of Broad Beach. This would enable the revetment to be removed in the event that the beach replenishment and dune restoration components were no longer functioning as planned, and allow maximum opportunities for maintaining the public beach. Of course, as time passes and sea level rise accelerates, it will likely become increasingly difficult to maintain Broad Beach through artificial replenishment. If and when this reality comes to pass, it will need to be addressed by the Broad Beach homeowners, the City of Malibu, and the State in later phases of development review and adaptive management.

In past Commission actions, the Commission has generally found that siting and designing the shoreline protection device to be located as far landward as feasible so that the device occupies less sandy beach and is acted upon by wave action less frequently is the preferred alternative to minimize adverse impacts to shoreline processes, sand supply, public access and recreation. In this case, the proposed revetment configuration would not relocate the revetment as far landward as feasible. Under the applicant's proposal, only approximately 1,800 linear ft. of the rock revetment (commencing at 31020 Broad Beach Road) would be relocated to a location that would still be approximately 30 - 40 ft. seaward of the existing septic systems of the beach and thus, approximately 15 - 25 ft. further seaward of the revetment relocation identified by staff (**Exhibit 8a**). Staff is recommending the Commission require further landward relocation of a longer segment of the downcoast revetment (2,000 linear ft., commencing at 30980 Broad Beach Road), as generally depicted in **Exhibit 8a**, to generally maintain a 15 foot setback from existing leach fields (excluding any "future" leach fields that had not yet been built at the time this application was submitted to the Commission) and to be configured in a manner that maintains a relatively straight or gently curving line.

Staff is recommending a variety of other conditions to address the impacts of the BBGHAD project. Most important, staff recommends that the BBGHAD address the uncertainty of maintaining public beach access in two primary ways. First, staff recommends a condition to provide unambiguous public access landward from the mean high tide line to the toe of the proposed dune restoration or 25 feet inland of the wet sand, whichever is farther landward, recognizing that both lines would be ambulatory back to the toe of the revetment if necessary. Providing a clear and consistent area of public access seaward of the revetment is one of the stated goals of the BBGHAD, and a critical measure to address Coastal Act public access and recreation policies. Staff recommends that this requirement be implemented through a condition requiring a lateral public access license agreement with each property owner on which the approved revetment will lie, as well as by imposing the burden directly. Staff is also recommending the submittal of a final beach adaptive management plan that requires additional nourishment of the beach should the beach recede to within 30 feet of the revetment at a designated point. Second, staff recommends requiring a “back up” lateral public access area (again secured both through a license agreement with each property owner on which the approved revetment will lie and directly in the condition language) on top of and just landward of the revetment in the event that public access is not available on the beach seaward of the revetment. This requirement to provide alternative lateral public access would only be triggered in the event that the planned beach restoration fails to maintain public access on the dry sandy beach seaward of the revetment as proposed by the BBGHAD.

This approach to providing for public access via a license agreement is an alternative mechanism to the typical easement or deed restriction required by the Commission and by the Malibu LCP. The applicant insisted that it could not get all of its members to agree to record easements against their properties, but that they would be able to secure license agreements from all of them, and staff endeavored to honor the Commission’s stated desire (at the December hearing) that staff be flexible in working with the applicant. Special Conditions 13 and 14 recommended by Commission staff require the lateral public access license agreements to be irrevocable and binding on successor owners of the property and that they be recorded against the property to ensure this. The BBGHAD has assured Commission staff that, with the property owners’ consent, as part of their execution of the license agreements, the BBGHAD will have the authority to record all of the licenses in a single, blanket recordation, as it did with the BBGHAD Assessment Diagram that it recorded after the assessment was put in place. This will provide for a more streamlined and less complex condition compliance process that is responsive to the applicant’s concerns, while still providing a continuing assurance of public access under any foreseeable conditions and affirmative notice to future property owners of the public access license agreement.

Public access impacts are also being addressed by the BBGHAD proposal to pull the revetment back closer to the existing septic leach fields at the down-coast end of the project where there is a significant area between the landward edge of the emergency revetment and residential development. Staff supports this relocation, and is recommending a slight expansion of this pull-back to further maximize beach area for public access and recreation (as required by the Malibu LCP) and to reduce the likelihood that the sea will reach the revetment. Finally, other recommended conditions address the need for clear on-going public access signage and management to assure maximum public access to and along Broad Beach.

Staff also recommends that the BBGHAD complete a Septic Conversion Implementation Study within two years of Commission action on this permit to plan for the removal of individual on-site septic systems on the beach and hooking up of Broad Beach homes to either a new or upgraded existing local community wastewater treatment system. The condition includes a goal for the complete removal of the septic systems within six years from the date of issuance of the permit. This would provide even more beach area for adaptation to coastal hazards and protection of beach resources over time. It would also have the secondary benefit of eliminating septic discharges taking place directly under Broad Beach.

Concerning dune habitat impacts, staff recommends that the Commission require a modification to the applicant's proposed dune restoration plan to include areas of additional dune restoration to fully mitigate the loss of dune habitat resources from the project. This restored dune will be considered ESHA and off-limits to public access except as may be necessary only at the dune's seaward margin as the beach erodes. The BBGHAD has also proposed comprehensive monitoring of various project components, and staff is recommending various refinements to assure adequate feedback loops over the first ten years of project implementation. This includes a five year review to provide for "mid-course corrections" if necessary for any unanticipated significant impacts.

Finally, given the potential for disagreement and the many parties involved, staff is recommending that the BBGHAD indemnify the Commission for any future litigation costs related to its action.

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I. MOTION AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

MOTION: *I move that the Commission* ***approve*** *Coastal Development Permit No.* *4-15-0390* *pursuant to the staff recommendation.*

STAFF RECOMMENDATION OF APPROVAL:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

RESOLUTION TO APPROVE THE PERMIT:

The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration.** If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

1. Final Revised Plans

A. *Prior to issuance of the Coastal Development Permit*, the applicant shall submit, for the review and approval of the Executive Director, two (2) sets of Final Revised Plans, prepared and stamped by a registered engineer. The Final Revised Plans shall demonstrate the following:

(1) Landward Relocation of Revetment. Landward re-location and re-construction of the approximately 1,600 ~~2,000~~ linear ft. downcoast end of the rock revetment (including all portions of the proposed rock revetment and sand bag wall between 30968 ~~31030~~ Broad Beach Road and 30760 Broad Beach Road) as generally depicted in **Exhibit ~~8a~~ "A"**. The relocated revetment shall be configured in a manner that maintains a relatively straight or gently
curving line as generally depicted in **Exhibit "A"~~8a~~**. The realigned revetment shall generally maintain a 20-30~~15~~ foot setback from existing leach fields (excluding any "future" leach fields that had not yet been built at the time this application was submitted to the Commission), based upon a survey of existing leach fields by a qualified sanitary engineer or other qualified professional. Any substantial modifications to the revetment alignment generally depicted in Exhibit "A"~~8a~~, based upon the future septic survey, shall require an amendment to this permit unless the Executive Director determines that no amendment is required. All portions of the relocated revetment shall be configured as a single contiguous structure without any gaps or breaks (including the property at 30822 Broad Beach Road) and shall generally utilize the same design as the existing, as-built revetment. Minor modifications to the design to ensure structural stability may be implemented subject to the review and approval of the Executive Director. No portion of the revetment shall extend further upcoast than 31350 Broad Beach Road, nor further downcoast than 30760 Broad Beach Road.

(2) Beach Nourishment/Beach Width. The total amount of beach/dune nourishment material for the initial nourishment event, and each separate renourishment event shall not exceed 300,000 cu. yds. of sand for each event. The footprint for beach nourishment/beach width shall be generally consistent with **Exhibit 7a**, which reflects that no beach nourishment shall occur upcoast of the property at 31380 Broad Beach Road.

(3) Dune Restoration. The dune restoration and enhancement area proposed by the applicant shall be revised to comport with the boundaries generally shown on **Exhibit 8b** and to be consistent with all provisions of the Revised Final Dune Habitat Restoration and Enhancement Plan required pursuant to Special Condition 5.

(4) ~~Public Access. Designate a 10 ft. wide public pedestrian path located immediately landward of the entire length of the rock revetment, including the portion of the revetment to be relocated/reconfigured pursuant to Part A.1 of this condition. The pathway shall utilize a sand surface only. The plans shall depict this path as a 'public accessway' available for public use when there are no areas of dry beach seaward of the revetment available for pass and repass, consistent with the terms of Special Condition 14 below. In addition, access stairways (for the provision of both public and private vertical access) shall be shown extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below. The number and location of the access stairways shall generally align with the shared private beach access paths allowed on site consistent with Special Condition 5, Part 5. All such access stairways shall be designed and constructed by reconfiguring existing stones within the revetment to form steps. No handrails shall be installed~~.

B. The Permittee shall undertake the development in accordance with the final approved plans. Any proposed changes to the approved plans shall be reported to the Executive Director. No changes to the plans shall occur without a Coastal Commission approved amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

2. Development Authorization Period and Reporting Requirement

A. This Coastal Development Permit authorizes the approved development on a temporary basis only for a period of twenty ~~ten~~ (2~~1~~0) years from the date of Commission action (i.e., until October 9, 203~~2~~5). After such time, the authorization for continuation and/or retention of any development approved as part of this permit (including, but not limited to, the rock revetment and beach re-nourishment/backpassing activities) shall cease, unless re- authorized by the Commission pursuant to a permit amendment, such as provided in Part B of this condition.

B. If the Permittee wishes to retain the revetment beyond the twenty~~ten~~-year term for which this permit provides authority and to continue the nourishment program, then no later than six months prior to the end of that twenty ~~ten~~ year term, the Permittee or successor in interest shall submit a complete coastal development permit amendment application for the re- authorization of the beach nourishment program and to retain the rock revetment for an additional twenty ~~ten~~ (2~~1~~0) year term to protect existing residential development at risk from wave hazards and tidal action. The amendment application shall include the results of the required annual and five year biological and physical beach monitoring reports and the septic conversion implementation study, required pursuant to Special Conditions 4, 5, 6, 7 & 16 of this permit, in order to evaluate the effectiveness and impacts of the project; address changed circumstances and/or unanticipated impacts; consider modifications to the location and design of the sand fill area; and consider additional mitigation measures necessary to compensate for any adverse impacts to marine and/or upland coastal resources/habitats resulting from the continued retention of the rock revetment and implementation of the Adaptive Beach Nourishment and Management Program. Failure to either (1) obtain a permit amendment authorizing the Permittee to retain the rock revetment and continue the Adaptive Beach Nourishment and Management Program for an additional term or (2) remove the revetment and cease the program, shall constitute a violation of the terms and conditions of this coastal development permit, unless the Executive Director grants additional time for good cause.

C. Five (5) years from the date of issuance of this coastal development permit, and every five (5) years thereafter, the applicant shall submit a report to the Executive Director, documenting the status of the project, including the Beach Nourishment and Management Program. The report shall summarize the results and findings of the annual physical and biological monitoring reports and the status of septic conversion implementation as required pursuant to Special Conditions 4, 5, 6, 7 &16 Should the monitoring reports reveal any unanticipated significant adverse resource/ habitat or public access impacts not addressed in the initial Commission authorization, and/or that the Beach Nourishment and Management Program is not maintaining a thirty foot wide sandy beach fronting the approved revetment pursuant to the beach replenishment triggers pursuant to Special Condition 4(B), the Executive Director may require the submittal of a permit amendment application for the review and approval by the Commission to address and evaluate mitigation measures to compensate for any unanticipated adverse resource/habitat impacts, public access impacts, and/or require any mid-course corrections or adjustments to the Beach Nourishment and Management Program. Significant impacts shall be understood to be greater than de minimis increases over previously identified impacts based on the approved monitoring program. Failure to submit a permit amendment application in response to the Executive Director's direction, pursuant to this paragraph, shall constitute a violation of the terms and conditions of this coastal development permit.

D. The coastal development permit amendment application submitted by the permittee for an additional twenty ~~ten~~ (2~~1~~0) year term, pursuant to Part B of this special condition, shall include a complete evaluation of all feasible alternatives to the retention of the rock revetment in its current location should beach re-nourishment measures outlined in Special Condition 4(B) fail to consistently maintain at least a 30 foot wide sandy beach over the 2~~1~~0 year period. Project alternatives evaluated shall include, but not be limited to, landward relocation of part or all of the revetment and removal of part or all of the revetment; construction of an alternative shoreline protective structure in a more landward location; status of removal of the existing septic systems and connection to a new or upgraded package sewage treatment plant based on the septic conversion implementation study required pursuant to Special Condition 16; and options for removal and/or landward relocation of existing private residential development. The information concerning these alternatives must be sufficiently detailed to enable the Coastal Commission to evaluate the feasibility of each alternative for addressing site shoreline protection, public access, and sensitive resource issues under the Coastal Act and the City of Malibu Local Coastal Program.

3. Implementation of Project Improvements & Removal of Unpermitted Development

A. The applicant shall implement and complete the landward re-location and re-construction of the approximately 1,600 ~~2,000~~ linear ft. downcoast end of the rock revetment (including all portions of the rock revetment between 30968 ~~31030~~ Broad Beach Road and 30760 Broad Beach Road) consistent with the requirements of Special Condition 1.A.1. within 1 year of the issuance of this permit. The Executive Director may grant additional time for good cause. All sandbags that were included in the construction of this portion of the revetment shall be removed from the beach and are not to be used in the reconstruction of the rock revetment, which shall be composed entirely of rock.

B. ~~The applicant shall construct the access stairways (for the provision of both public and private access) consistent with the requirements of Special Condition 1, Part 4 and Special Condition 5.A.5 concurrent with the re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment required pursuant to Part A of this condition. The Executive Director may grant additional time for good cause.~~

C. The applicant shall remove and dispose of, in accordance with all applicable laws, all unpermitted private stairways (approximately 40), sandbags and remnants of all materials such as plastic and fiber netting that made up the sand bags located both seaward and landward of the existing revetment, unpermitted wooden decks located atop or adjacent to the revetment, and "no trespassing" or "private property" signs or other signs that discourage or mislead the public from using public areas on and adjacent to the approved rock revetment concurrent with or prior to the re-location and re-construction of the approximately 1,600 ~~2,000~~ linear ft. downcoast end of the rock revetment required pursuant to Part A of this condition, unless additional time is granted by the Executive Director for good cause.

4. Final Adaptive Management and Monitoring Plan

Prior to issuance of the Coastal Development Permit, the applicant shall submit, for the review and approval of the Executive Director, a Final Adaptive Management and Monitoring Plan. The final plan shall be prepared by a qualified engineer with experience in coastal engineering and incorporate all provisions of the Final Backpassing Guidelines (as presented in the Project Description 12/21/12), except that it shall be consistent with the following revisions:

A. Backpassing Provisions and Triggers

Sand Back Passing activities shall be implemented consistent with the following provisions:

(1) *Limits of Back Passing:* Source and receiver locations shall be generally identified based upon the approved nourishment limits (as identified in Special Condition 1).
(2) *Methods of Backpassing:* Equipment for backpassing shall be identified. Mechanical equipment shall be minimized, and limited to the use of scrapers, or bulldozers.
(3) *Backpassing Transport Routes:* The general routes that will be used for taking sand from the source site to the receiver sites shall be identified.

(4) *Backpassing Triggers:* Backpassing shall be undertaken at most once per year, and only if the recorded dry beach berm width at Profile 411 is 50 feet or less for three (3) consecutive months.
(5) *Limits on Source Sites for Backpassing Sand:* Source areas shall extend no further west than Profile 410, no further east than the limits of the approved nourishment area (as identified by Special Condition #1), at least 10 feet seaward of the dune toe and no further seaward than the wetted bound. No more than 7 feet of dry sand, by depth shall be taken from any location, and the maximum backpassing volume shall be 25,000 cubic yards per backpassing event. *Reporting*: Within 30 days of each backpassing event, the Permittee shall provide the planning staff of the California Coastal Commission's South Central Coast District Office with a written summary of the backpassing event, including a map or aerial photograph that shows both the scraped areas and the placement areas, information on the surface areas and depths of the scraping and the volumes of sand removed, areas and depths of sand placed and volumes of sand placed. If sand is placed on a dune, the method of placement shall be described.
(6) *Backpassing Evaluation:* After three backpassing events, the Permittee shall prepare a short evaluation report on the effectiveness of the backpassing and providing, if necessary, recommendations for revisions to the Backpassing Plan. No changes to the Backpassing program shall be implemented without written concurrence from the Executive Director.

B. Small-scale Interim Renourishment or Major Renourishment Triggers

(1) *Small-scale Interim Renourishment:* If the average dry beach width near Profile 411 is narrower than 30 feet for 6 consecutive months, and is recorded by two (2) consecutive full beach profile surveys~~s~~, AND, there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand, a small-scale interim renourishment event may be proposed. An interim renourishment plan, adding no more than 75,000 cubic yards of new sand may be proposed (no more than once per year) and small-scale nourishment shall be initiated in a timely manner, such that the deficit conditions shall not persist for more than 6 months following the initial trigger period, or as soon after 6 months as possible, given restrictions on beach disruptions during the summer season.

(2) *Major Renourishment*: If the average dry beach width near Profile 411 is narrower than 30 feet for 12 consecutive months, and is recorded by three (3) consecutive full beach profiles, AND, there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand, a major renourishment event, adding an additional 300,000 cubic yards of new sand shall be proposed and nourishment shall be initiated within the approved project reach in a time manner, such that the deficit conditions shall not persist for more than 4 6 months following the initial trigger period.

(3) *Renourishment Plan*: For either small-scale interim renourishment or major renourishment within the project reach, the permittee shall provide a renourishment plan, for review and approval of the Executive Director that shall include the following:

a. Source and quality of renourishment sand,

b. Results from sediment sampling and testing, following the requirements of Special Condition 8.

C. Monitoring and Reporting Requirements

The Final Adaptive Management Plan shall be revised to acknowledge the prior baseline beach monitoring study conducted by the applicant's consulting coastal engineer (which has been in progress for several years now) and shall be continued throughout the duration of the ten year term of this permit, as specified below. In addition, the Plan shall also provide that the applicant shall conduct monitoring to provide an annual assessment of the shoreline morphology, beach profile, and beach width consistent with the following provisions:

(1) *Periodic Beach Profile Surveys*: A licensed surveyor or engineer shall survey full beach profiles for each of the 17 identified beach profile transect lines at Broad Beach and Zuma Beach (412.5, 412.3, 412, 412.9, 411.7, 411, 410, 409, 408, 406, 404, 402, 400,
398, 396, and 394, as shown on **Exhibit 12**) on a semi-annual basis each spring and fall season for one year prior to the commencement of development and for a period of 10 years after initial construction. Each the beach profile transects shall be established with a permanent location that can be identified by Baseline Survey Markers and GPS coordinates. The landward limit of the full beach profile shall extend at least 10 feet inland of the inlandmost position of the revetment, and the seaward limit of the full beach profile shall be out to the depth of closure (approximately -40 ft., MSL).

(2) *Beach Berm Width Measurements*: Beach berm width measurements will be performed by the applicant using a tape measure and a differentially corrected digital global positioning system (GPS) unit to record the beach width on a monthly basis for at least one year prior to the commencement of development and for a period of 10 years after initial construction. Measurements will occur from the Baseline Survey Marker out to the wetted bound (seaward limit of the dry beach area) and shall be performed at the same locations each month and in essentially the same location as the beach profile surveys (412, 411, 410, 409, and 408, or equivalent locations identifiable through fixed structures such as access stairs, offsets from storm drains, etc.). The beach berm width measurements shall be recorded each month and results shall be included in the annual post-construction reporting. The date, time and tidal conditions for all measurements shall be recorded and signed by the person(s) who has undertaken the measurements.

(3) *Wetted Bound Surveys:* The location of the wetted bound, from Point Lechuza to the eastern limit of the revetment or nourishment, whichever is farther east, shall be recorded monthly, at the same time as the beach berm width measurements and plots of each wetter bound survey shall be prepared and included in the annual post-construction reporting. The date, time and tidal conditions for all wetted bound plots shall be recorded and signed by the person(s) who has undertaken the survey.

(4) *Trancas Estuary Mouth Changes*: The applicant shall conduct visual surveys of the Trancas estuary mouth on a monthly basis for the purpose of recording changes in the estuary system and morphology of the estuary mouth.

(5) *Aerial Photography*: Aerial photographs of the subject reach (covering, at a minimum, the entire project reach and all 9 transect locations shall be taken concurrent with the fall season beach profile on an annual basis to provide a continuous assessment of the shoreline for one year prior to the commencement of development and for a period of 10 years after initial construction.

(6) *Post-Construction Reporting Requirements*: The applicant shall submit an annual monitoring report, for the review and approval of the Executive Director, for a period of 10 years after initial construction is complete. The monitoring report shall be submitted on an annual basis and shall include all survey data (full beach profile surveys, beach berm width measurements, wetted bound surveys, Trancas estuary mouth changes, and aerial photographs) and a written report prepared by a qualified coastal engineer indicating the results of the shoreline profile and beach width monitoring program. The monitoring report shall include conclusions regarding the level of success of the project, a detailed analysis of any change in shoreline position, increase or decrease in beach widths and footprint of dune systems within the project reach, details on any nourishment efforts undertaken during the year with the volume and placement location specified, and any back passing operations that took place. More specifically, the report shall include, but not be limited to, the following:

- Quantification of the volumetric change in the beach and dune for each survey period, using the pre-project condition (2014 or 2015) as the baseline.
- Analysis of the seasonal and interannual changes in width and length of dry beach, subaerial and nearshore slope, offshore extent of nourished toe for profiles within the nourishment area, and overall volume of sand in the profile; changes in dune profile; and, estimates of the rate and extent of transport of material up- and down-coast from the beach nourishment receiver site.
- Comparison of the actual changes to the shoreline in relation to the predicted changes that were anticipated based on the results of the Pre-construction numerical and physical modeling.
- Analysis of the expected time period over which the beach benefits related to the initial nourishment volume can be identified as distinct from background conditions; and qualify any abnormal wave and current conditions that could account for changes to the beach outside what was anticipated.
- Provision of cumulative data detailing the annual quantity and placement of material, including interaction of the replenishment project with other beach replenishment projects or other shoreline projects that occur in the project area or in the same littoral cell.
- Utilization of aerial photographs, to the extent feasible, to prepare a summary of beach width and dune profile changes.
- Conclusions regarding the level of success and any adverse effects, including any observed beach/dune erosion and any changes in the frequency that the Trancas Estuary mouth opens and closes and/or changes to the duration the estuary mouth remains open/closed. The report shall include a brief history of all previous

years' monitoring results to track changes in shoreline, dunes, and estuary mouth conditions.

5. Final Revised Dune Habitat Restoration and Monitoring Program

Prior to issuance of the Coastal Development Permit, the Permittee shall submit, for the review and approval of the Executive Director, two (2) copies of a Final Revised Dune Habitat Restoration and Enhancement Program. The Program shall provide for the restoration and enhancement of coastal strand and southern foredune habitat on-site, at a minimum ratio of 3:1 (restored area to impacted area), as mitigation for an estimated 3.62 acres of impacts to existing dune habitat that resulted from the installation of the as-built sandbag seawall, as-built rock revetment, and relocated rock revetment as required pursuant to Special Condition 1(A). The final dune footprint and area will largely conform to the BBGHAD proposed dune footprint in Exhibit 8b, but will be finalized via the Final Revised Dune Habitat Restoration and Enhancement Program. The Program shall be prepared by a qualified biologist(s), ecologist(s), or resource specialist(s), hereafter, referred to as the environmental resource specialist(s), with experience in the field of dune restoration, beach ecology, and marine biology. The permittee shall provide the environmental resource specialist's qualifications, for the review and approval of the Executive Director, prior to Program development. The Program shall be in substantial conformance with the "Conceptual Foredune Creation and Enhancement Plan," by WRA Environmental Consultants, dated October 15, 2013, but shall be revised to provide for the following requirements:

A. Dune Habitat Restoration and Enhancement Plan

(1) *Restoration/Enhancement Area Footprint.* The dune habitat restoration/enhancement area on-site shall generally include a footprint that extends from the property at 31350 Broad Beach Road to the property at 30708 Broad Beach Road, and that begins as far landward as feasible (at a stringline of approved development across the subject properties) and extends seaward to the expected maximum wave uprush limit, except for the Malibu West Beach Club at 30756 Pacific Coast Highway, which need not construct dunes for safety and security purposes.~~.~~ The stringline of approved development that is to be the landward limit of the dune restoration/enhancement area shall be generally located at the seaward edge of any legally existing residential structures, patios/decks. Sandy beach areas where existing septic leach fields are located seaward of the stringline shall be revegetated with native dune plant species and mounding techniques using minor amounts of sand fill material without the use of heavy equipment. The stringline for the landward limit of dune restoration shall be configured in a manner that maintains a relatively straight or gently curving line as generally depicted in **Exhibit 8b**. Short segments of the landward limit of the dune restoration stringline may be located further seaward if necessary to avoid creating sharp angles in the configuration of the dune restoration area. Restoration/enhancement of the landwardmost areas within the above described dune habitat restoration/enhancement area shall be prioritized.

(2) *Dune Specifications.* The dune habitat restoration/enhancement area shall be designed and contoured based on natural dune morphology (using historical records of the area and the most proximal reference site(s)). The footprint and the number of dune ridges shall increase from west (upcoast) to east (downcoast) across the restoration area. For

instance, there shall be one dune ridge at the west (upcoast) end of the restoration area, transitioning to two and, if adequate area is available, three ridges, at the east (downcoast) end. The restored and enhanced dune ridges shall be oriented perpendicular to the prevailing wind direction (estimated to be WNW or about 60 degrees west of north) with dune faces that have a slope no steeper than 3:1. The Plan shall include a grading plan that includes a detailed description of dune restoration and enhancement (dune creation) timing, phasing, daily schedule aspirations, methods including equipment to be used, staging area location(s), and relationship to the beach nourishment program. The plan must include an explanation of how the grading activities meet these requirements. For the portion of the restoration/enhancement area between the top of revetment and the stringline of approved development pursuant to Subsection 1 above, restoration shall be limited to minor mounding, removal of non-natives and invasive plant species, and planting of native plant species (without the use of significant grading or sand placement) where existing septic leach fields are located.

The dune habitat restoration/enhancement plan design shall include Best Management Practices to maximize the success of restoring and enhancing natural dune system physical and biological processes and functions. Discontinuous sand fencing that is placed perpendicular to the prevailing wind direction shall be temporarily employed to facilitate establishment of dune hummocks. In addition to sand fencing, the design shall include strategic placement of native dune vegetation for dune hummock establishment. Temporary sand fencing and strategic planting, rather than motorized equipment, shall be employed to establish a natural pattern of dune hummocks. Drainage/runoff control measures and creation of dune swales (low areas between dune ridges) shall also be used to function as natural drainage devices within the dune system.

(3) *Dune Sand Source and Composition.* Sand source and composition within the dune habitat restoration/enhancement area shall be consistent with the specifications of Special Condition 8 (Sediment Analysis and Monitoring). Existing native beach sand in the project area that is excavated for relocation of any portion of the as-built emergency rock revetment (pursuant to Special Condition 1) shall be temporarily stockpiled during beach nourishment and construction activities and then applied as a top layer on the landwardmost portions of the restored dunes to facilitate successful reestablishment of dune vegetation on site. Prior to application of the native sand on the restored dunes, non-native and invasive plant species shall be removed to the maximum extent feasible.

(4) *Dune Planting.* The dune habitat restoration/enhancement plan shall include a planting plan using native coastal strand and southern foredune plant species (plant palette) including the number of container plants and amount (lbs.) of seeds, source of plant material, provision for collection, storage, propagation and use of existing native plants, and plant installation methods. The plant palette shall be made up exclusively of native plants appropriate to the habitats and region, grown from seeds or vegetative materials obtained from the site or from an appropriate nearby beach location to maintain the genetic integrity of the area. No horticultural varieties, and no coastal bluff or back dune species shall be used (e.g. *Artemisia californica, Ericameria ericoides, Eriogonum parvifolium, Perritoma arborea, Rhus intergrifolia*). The plan shall also include an exhibit that shows the planned locations,

numbers, and spacing of the individual plant species, i.e. that depicts their distribution and abundance across the restoration area. The plan shall include sufficient planting plan technical detail including a description of planned site preparation, method and location of exotic species removal (all non-native plant material shall be removed from the restoration/enhancement area including *Carpobrotus edulis*, highway iceplant), timing of planting, temporary irrigation plans if necessary, and maintenance timing and techniques. The abundance, distribution, and percent cover of native coastal strand and southern foredune plant species shall be based on historical records, the literature, and/or the most proximal reference site(s). The planting plan shall incorporate the recommendations regarding soil preparation, planting palettes, and revegetation techniques that are contained in the "Analysis of Dune Restoration associated with the Broad Beach Restoration Project," by Coastal Restoration Consultants, Inc. dated September 23, 2015.

(5) *Access Paths and Fencing.* The dune habitat restoration/enhancement plan shall incorporate a maximum of one shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every two residences adjacent to the restoration area both of which have less than a sixty foot frontage, and one non-shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every residence with a frontage of sixty feet or more. The private beach access paths shall extend through the restored dune system out to the shore from the private properties and the paths shall not exceed 3 feet in width, with the exception that the Malibu West Beach Club located at 30756 Pacific Coast Highway ~~Broad Beach Road~~ may maintain its own separate 10 ft. wide beach access path. ~~Further, the dune restoration and enhancement area shall incorporate a 10 foot wide public pedestrian path (natural sand path) running generally parallel to the shore and located immediately landward of the entire length of the approved rock revetment, as relocated/reconfigured pursuant to Special Condition 1 above. The public pedestrian path shall be bordered by symbolic post and cable/rope fencing to maintain dune processes to the greatest extent possible (e.g. water, sand, plant, and animal movement/dispersal).~~ No fencing, other than necessary sand fencing as provided in subpart 2 above, shall be placed seaward of the revetment.

(6) *Signage.* Signs shall be installed and maintained in conspicuous locations along the approved accessways adjacent to the restoration/enhancement ~~area (excluding the public pedestrian path immediately landward of the revetment, signage for which is addressed by Special Condition 15),~~ to notify the public and residents that the area is a sensitive habitat restoration area and to keep out of the dune restoration areas. The signs shall indicate "Habitat Restoration In Progress: Please Keep Out of Dune Restoration Area", or alternative language that is substantially similar. Similar signage shall be installed at or near the seaward most limit of dune vegetation ("Vegetation Line") once dune restoration has commenced, but that signage shall indicate that if the beach becomes impassable ~~wet sand ever comes~~ to within 10 ~~25~~ feet of the Vegetation Line, the area available for public access will extend 10~~25~~ feet inland from impassable area ~~the wet sand~~, even though that will encroach into the dune habitat restoration/enhancement area.

Interpretive signage shall also be placed within or adjacent to the two Los Angeles County vertical public accessways generally describing the approved project, including identification of sensitive habitats in the area; the public access features/requirements incorporated into the project and the role of various Local/State/Federal agencies and stakeholder groups who contributed to the formation of the project. The signage shall blend in with the surrounding natural environment and not detract from the character of the area~~, and with the exception of signage approved pursuant to Special Condition 15,~~ in no instance shall the BBGHAD post signs ~~be posted~~ which read "*Private Beach*" or "*Private Property*." The location, size, design, and content of all signs to be installed shall be specified in the plan, for the review and approval of the Executive Director. Signs that become subject to erosion shall be relocated or removed.

(7) *Maintenance.* The plan shall include provisions for on-going maintenance and/or management of the dune habitat restoration/enhancement area for the term of this coastal development permit. At a minimum, semi-annual maintenance and/or management activities shall include, as necessary, debris removal, periodic weeding of invasive and non-native vegetation and replacement planting consistent with the approved plan.

(8) *Implementation.* The approved dune habitat restoration/enhancement plan shall be implemented within 90 days of the completion of initial beach nourishment activities. The Executive Director may grant additional time for good cause.

B. Monitoring Program

A monitoring program shall be designed and implemented to provide data that will guide the dune habitat and enhancement plan and direct any adaptive management actions that will increase the likelihood that the enhancement and restoration will be successful. The monitoring program shall provide, at a minimum, for the following:

(1) *Performance Standards*: Determination of annual and final performance standards selected based on a reference site (s) and/or the literature. The performance standards shall relate logically to the goals of the dune habitat restoration and enhancement plan and include standards for special status species, species diversity, vegetative cover, and approximate dispersion patterns of major species. Native plant cover shall not exceed that found in southern California coastal strand and southern foredune natural habitats. The rationale for the selection of each performance standard must be explained.

(2) *Procedure for Judging Success*: Detailed description of the qualitative and quantitative sampling methods and statistics intended to be used to monitor dune habitat restoration and enhancement shall be provided.

(3) *Initial Monitoring Report*: Submission of a written report, prepared by a qualified environmental resource specialist, upon completion of the initial dune habitat restoration and enhancement work, for the review and approval of the Executive Director. The

report shall document completion of the initial work and include photographs taken from pre-designated sites (annotated to a copy of the site plans).

(4) *Interim Monitoring Reports*: After initial dune habitat restoration and enhancement work is completed, the applicant shall submit, by no later than December 31st each year, for the review and approval of the Executive Director, annual monitoring reports prepared by a qualified environmental resource specialist indicating the progress and relative success or failure of the dune habitat restoration and enhancement. These reports shall also include recommendations for modifications or new approaches that would help the project meet the performance standards. These report shall also include photographs taken from pre-designated sites (annotated to a copy of the site plans) indicating the dune habitat restoration and enhancement progress at each of the sites. Each report shall be cumulative and shall summarize all previous results. Each report shall also include a "Performance Evaluation" section where information and results from the monitoring program are used to evaluate the status of the dune habitat restoration and enhancement project in relation to the interim and final performance standards.

(5) *Final Report*: Prior to the date that authorization for the approved development expires, a final dune habitat restoration and enhancement report shall be submitted for the review and approval of the Executive Director. If the report indicates that the dune habitat restoration and enhancement project has, in part, or in whole, been unsuccessful, based on the specified performance standards, the applicant(s) shall submit within 90 days a revised or supplemental restoration program to compensate for those portions of the original program that did not meet the approved performance standard (s), and shall implement the measures that must be taken to reach the specified performance standard. The revised or supplemental program shall be processed as an amendment to this permit

C. Dune Habitat Restoration and Enhancement Area Open Space Restrictions

No development, as defined in Section 30106 of the Coastal Act, shall occur within the final approved Dune Habitat Restoration and Enhancement area pursuant to Special Condition 5 of this permit except as otherwise specified pursuant to this condition. It is recognized that the seaward limit of the dune system and dune vegetation within the approved restoration area is ambulatory in nature and that, therefore, the seaward extent of the area subject to this open space restriction is also ambulatory in nature. This restriction shall in no way be interpreted to limit or restrict the area of beach available for lateral or vertical public access pursuant to Special Conditions 13 ~~and 14~~ of this permit. Development allowed within Dune Habitat Restoration and Enhancement area shall be limited to:

(1) Dune habitat restoration undertaken in accordance with the final approved dune habitat restoration and enhancement plan approved pursuant to Special Condition 5.

(2) Maintenance of existing drainage improvements

(3) Construction and maintenance of the approved rock revetment, beach nourishment/renourishment (including backpassing activities), drainage and polluted runoff control activities, ~~public and private access paths~~, and other public access improvements (including fencing and signage) required and approved pursuant to Special Conditions 1, 3, and 13 and ~~-~~15 of this permit.

Prior to issuance of the Coastal Development Permit, the applicant shall submit a written agreement, in a form and content acceptable to the Executive Director, incorporating all of the above terms of this condition.

D. The Permittee shall undertake development in accordance with the final approved plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Coastal Commission - approved amendment to the coastal development permit, unless the Executive Director determines that no amendment is legally required.

6. Long-Term Marine Resources Monitoring, Reporting, and Mitigation plan

A. ***Prior to issuance of the Coastal Development Permit***, the applicant shall submit to the Executive Director, for review and written approval, a final "Marine Habitat Monitoring and Mitigation Plan" for biological resources including subtidal rocky habitats (e.g. kelp forest, rocky reef, surfgrass), subtidal habitats comprised of unconsolidated sediment (e.g. eelgrass, sand dollar beds, pismo clam beds), rocky intertidal habitats (bedrock, boulders, cobble, surfgrass) and supralittoral and intertidal sandy beach habitats. The monitoring and mitigation plan shall provide an overall framework to guide monitoring of these marine habitats in and immediately adjacent to the project footprint as well as marine habitat reference sites, and provide mitigation options for potential impacts to subtidal and intertidal marine habitats. The monitoring and mitigation plan shall be developed in consultation with state and federal agencies including the California Department of Fish and Wildlife, State Water Resources Control Board, California State Lands Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Army Corp of Engineers, and the Environmental Protection Agency. A Science Advisory Panel (SAP) will be established to oversee marine habitat monitoring and any required mitigation. The SAP will review and guide development of the marine habitat monitoring and mitigation plan and advise the Executive Director regarding final plan approval.

B. **Science Advisory Panel:** An expert panel consisting of a minimum of three marine scientists with expertise on nearshore habitats, including at least one member with expertise in experimental design and biostatistics, shall be established by the Commission. The panel shall be paid by the applicant through the Commission. The Science Advisory Panel (SAP) shall review and guide development of the final marine habitat monitoring and mitigation plan including the selection of reference sites, sampling methodology, analytical techniques, criteria for determination of adverse impacts, and mitigation options for the various marine habitats. The SAP shall also review the monitoring results and annual reports as they come in and advise the Executive Director of the Coastal Commission (and consult with State Lands Commission staff) regarding project status and their conclusions and recommendations for potential adaptive management actions. If marine habitat monitoring demonstrates that there have been adverse impacts to one or more marine habitats, the SAP shall review and guide development of specific habitat mitigation and monitoring plans.

C. **Science Advisory Panel Administrative Structure:** Costs for participation of the SAP shall include travel, per diem, meeting time, and reasonable preparation time. The amount of funding will based on a SAP budget prepared by the Executive Director in consultation with the applicant. The final SAP budget and funding shall be approved by the Executive Director and applicant prior to issuance of the Coastal Development Permit. In the event that agreement on a SAP budget and work program cannot be reached between the Executive Director and the applicant, the matter will be brought before the Commission for a final resolution. Total costs for such advisory panel shall not exceed $180,000 per year adjusted annually by any increase in the consumer price index applicable to California.

D. **Marine Habitat Monitoring Plan:** The marine habitat monitoring plan shall describe the sampling methodology, analytical techniques, and criteria for determining whether the implementation of the approved project has adverse impacts upon the respective marine habitats and shall include, at a minimum, the following:

(1) *Existing Conditions*. The Plan shall include a description and historical review of the marine resources located within the project area including subtidal rocky habitats (e.g., kelp forest, rocky reef, surfgrass), subtidal habitats comprised of unconsolidated sediment (e.g., eelgrass, sand dollar beds), rocky intertidal habitats (Lechuza Point and boulder field) and sandy beach habitats in the vicinity of the beach replenishment project. The historical review must include a summary of past quantitative sampling and survey work (e.g. yearly kelp canopy areal extent data from 1984 to present, and Partnership for Interdisciplinary Studies of Coastal Oceans, State Water Resources Control Board Areas of Special Biological Significance, Marine Protected Area Monitoring Enterprise, and Multi-Agency Rocky Intertidal Network survey work) conducted on these habitats in order to document trends in species composition, habitat areal extent, and temporal changes for comparison with the post-project marine habitat monitoring findings.

(2) *Monitoring Objectives.* The monitoring objectives must include:

a. Fine scale mapping of the marine habitats listed in section A above,
b. Identification of any adverse impacts to the sandy beach ecosystem resulting from sand replenishment with source sand that does not match existing beach sand,
c. Identification of direct or indirect adverse impacts to subtidal or intertidal habitats resulting from the proposed project,
d. Identification of likely causes of any documented adverse impacts (burial, scouring, turbidity, sand grain size, etc.),
e. Recommendations for adaptive management (e.g., future sand replenishment grain size adjustments, volume of future sand replenishment, sand placement adjustments) to avoid continuing adverse impacts, if adverse impacts are detected.

(3) *Monitoring Design.* Monitoring must be divided into two distinct phases utilizing the same monitoring design:

a. Spring and fall pre-construction monitoring initiated one year prior to project construction. If two seasons of pre-construction monitoring are not feasible, pre-construction spring monitoring must be conducted. In addition, existing data from other programs (e.g., PISCO) may be used if deemed appropriate by the SAP. The purpose of pre-construction monitoring is to establish pre-project ecological (physical and biological) baseline conditions.

b. Post-construction monitoring for 10 years (life of the permit) after construction is complete. The highly dynamic nature of the nearshore marine ecosystem and the potential for one or more marine habitats to be adversely impacted by the project must be considered in determining the frequency of monitoring (i.e. the frequency of the respective methods employed for monitoring).

(4) *Monitoring Methods***.** The plan must include monitoring methods and a schedule for their execution with the intention of meeting the monitoring objectives; specifically, methods to monitor for and quantify potential direct and indirect adverse impacts upon one or more of the marine habitats listed in section A above. The applicant shall consider using the following methods in the final "Marine Habitat Monitoring and Mitigation Plan". The monitoring methods and schedule shall be developed in close consultation with the SAP for the review and approval of the Executive Director.

a. Remote Sensing. Remote sensing techniques shall be employed to map rocky subtidal (with and without kelp) and rocky intertidal (with and without surfgrass) habitats in the project area and a minimum of two reference site outside the influence of the project area with the highest accuracy possible.

i. Multi-Spectral Aerial Surveys
Multi-spectral aerial surveys, similar to that employed by the applicant in July 2014, using an airplane fitted with specialized camera equipment designed to capture imagery within a specific array of spectral bands optimized to discern coastal marine habitats including kelp forest, understory canopy algae, eelgrass, and surfgrass. Survey results shall be groundtruthed.

ii. Multi-beam or ~~and~~ Sidescan Sonar
Multi-beam ~~and~~ or sidescan sonar surveys, similar to that conducted by the applicant in May 2014, to distinguish surficial features and to map nearshore marine benthic habitat types.

b. Subtidal and Intertidal Field Monitoring. The subtidal and intertidal monitoring methods employed must be capable of discriminating between habitats influenced by sand inundation and habitats rarely or never influenced by sand inundation, the length of time respective habitats have been inundated with sand, and the sand source (natural or project derived). The subtidal marine habitats that must be monitored are rocky bottom (with and without kelp) and unconsolidated substrates (with and without eelgrass). The intertidal habitats that must be monitored are Lechuza Point and the boulder field east of Lechuza Point and the sandy beach A minimum of two reference sites for each of the above habitat types must be monitored. The reference sites should be as close as possible to the potential impact area within an area outside the project's influence.

The marine habitat monitoring locations in the immediate project area must be established based on the project footprint and model-predicted sedimentation patterns, after consultation with the applicant, resource agencies, and the SAP. Reference site locations must be based on proximity and similarity to the respective marine habitats in the project area, after consultation with the applicant, resource agencies, and the SAP. Eelgrass mapping must be in substantial conformance with NOAA's California Eelgrass Mitigation Policy and Implementing Guidelines published in October 2014.

In order to assess whether the macroinvertebrate assemblage that colonizes Broad Beach following sand replenishment is what would be there but for on-going disturbance, a minimum of two undisturbed beaches within the Malibu littoral cell, as well as the section of Broad Beach in the project footprint, must be monitored. The undisturbed beaches must be chosen based on having sand characteristics as similar as possible to the existing Broad Beach sand (well sorted, D50 =0.25), having similar geomorphology (intermediate dissipative beaches) that face in the same general direction, and having the same general wave regime. In addition to these beaches, the section of Broad Beach west of the replenishment project and Zuma Beach east of the replenishment project must be monitored.

The beach monitoring methods must be capable of determining; 1) whether the portion of Broad Beach covered by quarry sand develops a sandy beach macroinvertebrate fauna similar to the reference beaches, and, 2) whether the project adversely impacts the beach ecosystem west and east of the project. The beach monitoring methods must be designed to identify approximately 80% of the organisms present; in order to capture this percentage of the community, approximately 3 square meters of surface area must be surveyed (Schlacher et al. 2008). In order to compare results to past surveys, the beach sampling must employ 10 cm diameter by 20 cm deep cores and sieve the samples using a 1.5mm/1.0mm aperture sieve. This monitoring shall be conducted before construction in the spring and fall and semi-annually in spring and fall for the life of the project at the replenished beach, the reference beaches and the beach west of the replenished beach and the beach east of the replenished beach.

The subtidal and intertidal monitoring must be designed to pick up, at a minimum, a 20% change between the respective impact and reference sites. That is, the monitoring must be designed to have an 80% chance of picking up a 20% change. This is sometimes referred to as the 20, 20, 20 rule where Type I error (the null hypothesis is true but rejected) or alpha is set at .20, Type II error (the null hypothesis is false but accepted) or beta is set at .20, and power is equal to 1-beta or .80.

(5) *Criteria for Detecting Adverse Impacts.* The Plan must include criteria for determining whether the project has resulted in direct or indirect adverse impacts upon one or more of the marine habitats described in Section A, above. The criteria must be amenable to quantitative assessment and must include estimates of the areas of kelp forest, eelgrass, and surfgrass lost as a result of the project.

(6) *Monitoring Reports.* Annual reports that review the results of past monitoring and report on the most recent work must be submitted no later than December 31st of each year for review by the SAP and review and approval by the Executive Director. A report at the end of 5 years shall determine whether adverse impacts to marine habitats have occurred as a result of the project as required pursuant to special condition 2C. If adverse impacts are detected that is when the need for mitigation will be determined.

E. Marine Habitat Mitigation and Monitoring. If adverse impacts are detected, mitigation will be required. The mitigation ratio for impacts upon subtidal rocky or intertidal rocky habitat shall be mitigated at a minimum of 4:1 because of the uncertainty and difficulty of mitigating for these habitats. Adverse impacts upon eelgrass shall be mitigated according to the California Eelgrass Mitigation Policy.

Upon detection of adverse impacts upon one or more habitats, the applicant, in consultation with the SAP, shall develop a habitat specific mitigation plan for each impacted habitat that will provide the overall framework to guide the mitigation work, for review and approval of the Executive Director. The revised mitigation and monitoring program shall be processed as an amendment to the coastal development permit unless the Executive Director determines that no permit amendment is required.

7. Biological Monitoring During Construction and Pre-Construction Surveys

The applicant shall retain the services of a qualified biologist or environmental resources specialist (hereinafter, “environmental resources specialist”) with appropriate qualifications acceptable to the Executive Director, to monitor the site during construction and beach nourishment activities and conduct sensitive species pre-construction surveys. Prior to the commencement of development, the applicant shall submit the contact information of all monitors with a description of their duties and their on-site schedule to the Executive Director for review and approval. The applicant shall ensure that the Environmental Specialist shall perform all of the following duties, and the applicant shall observe the following requirements:

A. The environmental resource specialists shall: (1) conduct a survey of the project site to determine presence and behavior of sensitive species one day prior to commencement of any construction activities and/or the commencement of any beach nourishment/backpassing activities on the project site, (2) immediately report the results of the survey to the applicant and the Commission, and (3) monitor the site during all construction activities related to the revetment relocation and/or any beach nourishment activities (initial nourishment, renourishment, interim nourishments, or backpassing) on the project site.

B. In the event that the environmental resources specialist reports finding that any sensitive wildlife species (including but not limited to western snowy plover or California grunion) exhibit reproductive or nesting behavior, the applicant shall cease work and immediately notify the Executive Director and local resource agencies. Project activities shall resume only upon written approval of the Executive Director.

C. Prior to construction activities and/or the commencement of any beach nourishment/backpassing activities, the applicant shall have the environmental resource specialist conduct a survey of the project site, to determine presence of California grunion during the seasonally predicted run period and egg incubation period, as identified by the California Department of Fish and Wildlife~~. If the environmental resources specialist determines that any grunion spawning activity is occurring and/or that grunion are present in or adjacent to the project site, then no construction, maintenance, grading, or grooming activities shall occur on, or adjacent to, the area of the beach where grunion have been observed to spawn until the next predicted run in which no grunion are observed. Surveys shall be conducted for all seasonally predicted run periods in which material is proposed to be placed at any of the above sites. If the applicant is in the process of placing material, the material shall be graded and groomed to contours that will enhance the habitat for grunion prior to the run period. Furthermore, placement activities shall cease in order to determine whether grunion are using the beach during the following run period.~~

The applicant shall implement the following measures to avoid impacts to mature grunion and to grunion eggs during a spawning event to the extent feasible.

- Grunion monitoring shall be conducted by a qualified biologists for 30 minutes prior to and two (2) hours following the predicted start of each spawning event. Sufficient personnel shall be utilized to insure that the entire receiver site is monitored during the specified period. The magnitude and extent of a spawning event will be defined by the length of beach of 100 yards (for the purposes of determining the Walker Scale).
- If a grunion run consisting of 0 to 100 fish (Walker Scale of 0 or 1) is reported within two (2) weeks prior to or during construction/beach replenishment, the applicant shall not implement any avoidance action for grunion eggs.
- If a grunion run consisting of more than 100 fish (Walker Scale of 2, 3, 4, or 5) is reported within two (2) weeks prior to the start of construction, the applicant shall avoid mobilization on those beach segments and no grunion eggs shall be buried or disturbed at the receiver site. The applicant shall alter the construction/beach replenishment schedule to replenish a beach segment that has not had such a grunion spawning event within two (2) weeks prior to the start of construction.
- If construction/beach replenishment has already begun when a grunion run consisting of 100-500 fish (Walker Scale of 2) hundreds of fish spawning at different times or at once in several areas of beach (Walker Scale of 2 or 3) is reported, impacts to grunion eggs may occur if avoidance is not feasible. The applicant shall first attempt to minimize impacts to grunion eggs. alteration of the discharge point and/or sand spreading. No mature grunion shall be buried or harmed as a result of construction/beach replenishment.

The applicant shall have the environmental resource specialist provide inspection reports after each grunion run observed and shall provide copies of such reports to the Executive Director and to the California Department of Fish and Wildlife.

D. Prior to initiation of daily project activities, the resource specialist shall examine the beach area to preclude impacts to sensitive species. Project activities, shall not occur until any sensitive species (e.g., western snowy plovers, etc.) have left the project area or its vicinity. In the event that the environmental resource specialist determines that any sensitive wildlife species exhibit reproductive or nesting behavior, the applicant shall cease work, and shall immediately notify the Executive Director and local resource agencies. Project activities shall resume only upon written approval of the Executive Director. The applicant shall cease work should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. The environmental resource specialist(s) shall require the applicant to cease work should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. The environmental resource specialist(s) shall also immediately notify the Executive Director if development activities outside of the scope of this coastal development permit occur. If significant impacts or damage occur to sensitive wildlife species, the applicant shall be required to submit a revised, or supplemental program to adequately mitigate such impacts.

E. Turbidity. The environmental resource specialist shall visually monitor and document the turbidity of coastal waters during all beach nourishment or backpassing activities. The extent and duration of turbidity plumes shall be recorded and mapped by the monitor during each day of disposal activities. If the turbidity plume is observed to reach kelp beds or eelgrass beds, beach nourishment or backpassing shall be terminated until the turbidity plume has dissipated. If turbidity levels are significantly above ambient levels for more than three (3) consecutive days, then the rate of sand placement shall be reduced so that large, long lasting turbidity plumes are no longer created. After all sand placement operations have ceased, the applicant shall monitor and document the extent and duration of any lasting turbidity plume. The final results of all turbidity monitoring shall be reported to the Commission within 30 days following each beach nourishment and backpassing operation.

F. The applicant shall submit documentation prepared by the environmental resource specialist which indicates the results of each pre-construction survey, including if any sensitive species were observed and associated behaviors or activities. Location of any nests observed shall be mapped.

8. Sediment Analysis and Testing

A. *Prior to issuance of the Coastal Development Permit*, an engineer(s) or environmental professional(s), with appropriate qualifications acceptable to the Executive Director, shall prepare a Sampling and Analysis Plan for the review and approval of the Executive Director. The Sampling and Analysis Plan shall address the physical and chemical sediment testing at the source site, and shall be consistent with the following:

(1) Sampling Frequency – Samples shall be collected throughout the source area, with one (1) sample per 0.5 acres, and a minimum of five (5) samples per source site for contaminant testing and a minimum of four (4) samples per source stockpile site for testing grain size, color, particle shape, and debris. Stockpile areas shall be divided into relatively equal areas (such as quadrants or cells) to provide representative samples of the source sand. The stockpile sampling depth shall extend approximately one-foot (1-ft) beyond the anticipated stockpile height. At a minimum, sample quantities shall be sufficient for appropriate testing; archive samples for chemical testing shall be maintained; archive samples for grain size testing are optional.

(2) Contaminants -- Based on U.S. EPA Tier I analyses results, Tier II bulk chemical analysis shall be conducted on representative composite samples of each source material proposed for placement at the Broad Beach deposition site. The material shall be analyzed for consistency with EPA, ACOE, State Water Resources Control Board and RWQCB requirements for beach replenishment. At a minimum, the chemical analysis shall be conducted consistent with the joint EPA/Corps *Inland Testing Manual*. If the ACOE / EPA, State Water Resources Board or RWQCB determine that the sediment exceeds Effects Range Medium (ER-M) contaminant threshold levels as specified by the U.S. EPA, the materials shall not be placed at the site.

(3) Grain Size – Grain size analysis shall be conducted on the representative stockpile samples, using a single composite sample prepared with equal volumes from each representative sampling site. Samples shall be sieved, consistent with the American Society for Testing and Materials (ASTM) D 422-63 (Standard Test

Method of Particle Size Analysis of Soils, ASTM, 2007 or as updated). Gradation curves shall be generated for each composite representative stockpile site to develop the d_{84}, d_{50} and d_{16} for visual and quantitative comparison with the established Broad Beach grain size envelope and the grain size limitations identified in Part C (Deposition of Source Material) of this condition.

(4) Color -- Color classification shall be conducted on representative samples of each source material proposed for placement at Broad Beach. The color shall reasonably match the color of the receiving beach after reworking by wave action.

(5) Particle Shape – Particle shape classification shall be conducted on representative samples of each source material proposed for placement at Broad Beach. For beach replenishment, 90% or more of the source material shall consist of rounded particles (i.e., maximum of 10% angular particles).

(6) Debris Content – A visual inspection of the source location shall be conducted to determine the presence and types of debris such as trash, wood, or vegetation. The amount of debris within the material shall be estimated, as a percentage of the total amount of source material. Prior to placement of source material at Broad Beach, all such debris material shall be separated from the sand material (by mechanical screening, manual removal or other means) and taken to a proper disposal site authorized to receive such material.

(7) Compactability – Chemical and visual inspections of the source location shall be conducted to determine the presence of elements such as iron oxides which can compact to form a hardpan surface. Source material with compactable material shall be considered for placement below the mean high tide only.

B. Results from sediment testing for contaminants, grain size, color, particle shape, debris content, and compactability shall be provided to the Executive Director for review and approval prior to each separate placement of sand at the approved Broad Beach nourishment area.

C. Deposition of source material shall occur consistent with the following:

(1) Source material that does not meet the applicable physical, chemical, color, particle shape, debris, and/or compactability standards for beach replenishment shall not be used. Specifically, the source material must meet the following specifications:

a. The source material to be used for beach nourishment purposes can only contain no more than 10% fine material that is 0.074mm in size or smaller.

b. The source material to be used for beach nourishment purposes can contain no more than 10% coarse material greater than 2.0 mm in size, and no more than 1% of material that is 4.76mm and larger.

c. The D_{50} for the source material to be used for beach nourishment and dune creation purposes must be within the range of 0.25 mm to 0.6 mm.

d. All grain size limits shall be based upon weekly averages of multiple daily samples from the delivery trucks or stockpile area.

(2) Each report on sediment analysis shall include confirmation by the U.S. Army Corps of Engineers and California Regional Water Quality Control Board that the material proposed for beach replenishment meets the minimum criteria necessary for placement on a sandy beach. If deemed necessary by the Regional Water Quality Control Board, the analysis will also include such confirmation from the State Water Resources Control Board regarding consistency with the 2012 Ocean Plan and any other regulations applicable in an Area of Special Biological Significance.

9. Construction and Operational Timing Constraints

It shall be the applicant's responsibility to assure that the following timing restrictions are observed, both concurrent with, and after completion of, all project operations:

a. All project activities, with the exception of monitoring, shall occur Monday through Friday, excluding state holidays. No work shall occur on Saturday or Sunday.

b. All work shall take place during daylight hours, except for truck arrival and departure within the limits of the existing Zuma Beach parking lot, which may occur until 9pm at night. The lighting of the beach area is prohibited unless, due to extenuating circumstances, the Executive Director authorizes non-daylight work and/or beach lighting.

c. All construction operations, including operation of equipment, material placement, placement or removal of equipment or facilities, restricting public access, and backpassing/beach renourishment or other activities (with the exception of habitat restoration/revegetation) shall be prohibited as follows:

   i. From the Friday prior to Memorial Day in May through Labor Day in September to avoid impacts on public recreational use of the beach and other public amenities in the project vicinity, unless, due to extenuating circumstances, the Executive director authorizes such work.

   ii. On any part of the beach and shorefront in the project area when California grunion (including eggs) are present during any run periods and corresponding egg incubation periods, as documented by the surveys conducted pursuant to Special Condition 7, to avoid impact on the spawning of the California Grunion.

   iii. On any part of the beach and shorefront in the project area when western snowy plover are present, as identified by the surveys conducted pursuant to Special Condition 7, to avoid adverse effects to western snowy plovers.

10. Construction and Operational Responsibilities

It shall be the applicant's responsibility to assure that the following requirements are observed both concurrent with, and after completion of, all project operations:

a. All construction materials and equipment placed on the beach during daylight construction hours shall be stored beyond the reach of tidal waters. All construction materials and equipment shall be removed in their entirety from the beach area by sunset each day that work occurs.

b. Staging areas shall be used only during active construction operations and will not be used to store materials or equipment between renourishment/backpassing operations.

c. During construction, washing of trucks, paint, equipment, or similar activities shall occur only in areas where polluted water and materials can be contained for subsequent removal from the site. Wash water shall not be discharged to the storm drains, street, drainage ditches, creeks, or wetlands. Areas designated for washing functions shall be at least 100 feet from any storm drain, water body or sensitive biological resources. The location(s) of the washout area(s) shall be clearly noted at the construction site with signs. In addition, construction materials and waste such as paint, mortar, concrete slurry, fuels, etc. shall be stored, handled, and disposed of in a manner which prevents storm water contamination.

d. Construction debris and sediment shall be removed from construction areas as necessary to prevent the accumulation of sediment and other debris which may be discharged into coastal waters. Any and all debris resulting from construction activities shall be removed from the project site within 24 hours. Debris shall be disposed at a debris disposal site outside of the coastal zone or at a location within the coastal zone authorized to receive such material.

e. At the completion of the initial beach nourishment operation and any future beach supplemental beach nourishment and backpassing activities, the sand deposited on the beach shall be graded and groomed to natural beach contours to restore the shoreline habitat and to facilitate recreational use by ~~at least~~ one week ~~month~~ prior to Memorial Day in May. Disturbance to wrack and coastal strand habitat shall be minimized to the extent feasible.

f. During all beach nourishment activities authorized pursuant to this permit, the applicant shall be responsible for removing all unsuitable material or debris within the area of placement should the material be found to be unsuitable for any reason, at any time, when the presence of such unsuitable material/debris can reasonably be attributed to the placement material. Debris shall be disposed at a debris disposal site outside of the Coastal Zone or at a location within the Coastal Zone authorized to receive such material.

g. The Permittee shall notify planning staff of the California Coastal Commission's South Central Coast District Office at least 3 working days in advance of commencement of any construction/nourishment/backpassing activities, and immediately upon completion of such activities.

11. Future Maintenance Authorized

By acceptance of this permit, the applicant acknowledges and agrees to the following:

A. Future maintenance and repair of the rock revetment between 31350 Broad Beach Road and 30760 Broad Beach Road may be completed without a new coastal development permit for a period of 10 years commencing from the date of Commission action on this permit (until October 9, 203~~2~~5) consistent with the following limitations (any other proposed maintenance or repair, and any maintenance or repair of the rock revetment after October 9, 203~~2~~5, may require the issuance of an amendment to this coastal development permit or a new coastal development permit from the California Coastal Commission):

(1) Prior to the commencement of any such repair or maintenance work, the applicant must obtain written authorization from the Executive Director of the California Coastal Commission. The permittee shall submit a written report prepared by a professional engineer, for the review and approval of the Executive Director, identifying the proposed maintenance and repair work, method for performing work, analysis of the necessity for the work, and a quantification of any additional rock to be added to the revetment. The maintenance and repair report shall be submitted at least 60 days in advance of the proposed work to allow time for review by the Executive Director. The Executive Director's review will be for the purpose of ensuring that the nature of the work, the method proposed for the work, and all other aspects of the proposed work is consistent with the provisions of this condition, including Subparts A2, A3, A4, and A5 of this condition listed below.

2. No future repair or maintenance, enhancement, reinforcement, or any other activity affecting the rock revetment shall be undertaken if such activity extends the seaward footprint of the subject shoreline protective device. No rock shall be placed seaward of the approved toe of the revetment and no increase in the approved height of the revetment shall occur. Any debris, rock, or other materials which become dislodged after completion through weathering, wave action or settlement shall be removed from the beach or deposited on the revetment on an as-needed basis as soon as feasible after discovery. The rock revetment may be maintained in its approved size, location, and configuration, no expansion to the size, height, or footprint of the revetment shall be allowed. The importation of a minor amount of new rock may be allowed if necessary to maintain the design size, height, footprint of the approved revetment although in no event shall more than 3,600 tons of new armor stone (approximately 10% of the approved volume of the revetment) be imported for any individual repair project. The addition of more than 3,600 tons of new armor stone for any individual repair project shall require an amendment to this coastal development permit or a new coastal development permit and is not exempt pursuant to this condition.

(3) Maintenance or repair work shall only occur during the late fall or winter season from October 1 to May 1 ~~arch 15~~. Any repair or maintenance of the shoreline protective device between May 1 ~~rch 16~~ and September 30 shall require an amendment to this coastal development permit or a new coastal development permit and is not exempt pursuant to this condition, with the exception that removal of any debris, rock or other material from the sandy beach that becomes displaced from the revetment and will be deposited on the revetment or exported to an offsite disposal area shall occur on an as-needed basis, regardless of the time of the year and without the requirement for submitting a written report 60 days in advance of the work or for prior written authorization from the Executive Director.

(4) Maintenance or repair work shall be completed incorporating all feasible Best Management practices. No machinery shall be allowed in the active surf zone at any time. The permittee shall remove from the beach any and all debris that results from the construction/repair work period.

(5) The applicant shall, by accepting the written authorization from the Executive Director, shall agree and ensure that the project contractor shall comply with the following construction-related requirements:

a. No construction materials, debris, or waste shall be placed or stored where it may be subject to wave erosion and dispersion;
b. Any and all debris resulting from construction activities shall be removed from the beach prior to the end of each work day;
c. No machinery or mechanized equipment shall be allowed at any time within the active surf zone, except for that necessary to remove the errant rocks from the beach seaward of the revetment;
d. All excavated beach sand shall be redeposited on the beach.

~~B. The applicant shall be responsible for maintenance, repair, and replacement of the access stairways (for the provision of both public and private access) that extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below required pursuant to Special Condition 1, Part 1 and Special Condition 3, Part B. Such maintenance shall occur on as needed basis, in perpetuity for the life of the rock revetment, in order to ensure the public's ability to use the stairways.~~

12. Future Development of the Site

Any future development of any property located landward of the revetment alignment approved in this coastal development permit (between 31350 Broad Beach Road to 30708 Broad Beach Rd.) shall not rely on the permitted revetment to establish geologic stability or protection from hazards. Any future development on those properties shall be sited and designed to ensure geologic and engineering stability without reliance on shoreline protective devices consistent with development standards and policies of the City of Malibu LCP.

13. Public Beach Access Areas

A. The permittee acknowledges that the area seaward of the 2010 mean high tide line surveyed by the California State Lands Commission ("2010 MHTL") is and will remain public property regardless of this project. Thus, although public access to some of the landward extent of that area may be limited in order to protect the dune habitat that is to be created, pursuant to Special Condition 5, public access seaward of both the ambulatory seaward limit of dune vegetation (hereinafter, the "Vegetation Line") and the 2010 MHTL shall not be impaired or restricted. Consistent with section A.(6) of Special Condition 5, public access shall also be available on some of the public property that is seaward of the 2010 MHTL but that is landward of the Vegetation Line if the area within ~~wet sand ever comes~~ within 10~~25~~ feet of the Vegetation Line becomes impassable.

B. In addition, *prior to issuance of the Coastal Development Permit*, the permittee shall confirm to the satisfaction of the Executive Director that the BBGHAD will ensure ~~that each Property Owner on which the approved rock revetment will lie enters into an agreement with the Commission and the BBGHAD in the form of an irrevocable license that provides for~~ public access landward of the 2010 MHTL under the circumstances listed Below: ~~and that satisfies all of the criteria listed below~~.

1. ~~Each license agreement shall provide that~~ T~~t~~he public shall have a right of lateral access and passive recreational use over the seaward portion of ~~the licensor's~~ private property extending 10 ~~25~~ feet inland from the landward extent of the restored beach which becomes impassable ~~wet sand~~, until that point reaches the seaward face of the approved rock revetment, at which point the area to which the public shall have such rights will only extend landward from the impassable area ~~wet sand~~ to the seaward face of the revetment.

~~2. If, at any time, there is no longer at least 10 feet of dry sandy beach extending seaward from any point along the seaward face of the approved revetment, providing for lateral public access, then the additional temporary springing license(s) described in Special Condition 14 of this permit shall take effect.~~

3. ~~Each license agreement must be drafted to run with the land, binding successor owners of the properties; must include an acknowledgment of the substance of section A of this condition; must include a provision authorizing the BBGHAD to record it against the property as part of a blanket recordation; must include a provision requiring~~ Each affected ~~the~~ Property Owner shall ~~to~~ disclose the existence of this CDP ~~e agreement~~ to any prospective successor; must be acceptable to the Executive Director in form and content; and must have the signator's signature notarized.

4. ~~Prior to issuance of the Coastal Development Permit, each license agreement shall be recorded against the property to which it applies~~

5. ~~A license agreement shall be completed for every property extending from 31350 to 30760 Broad Beach Road, inclusive.~~

6. ~~Each license agreement shall be written so that it~~ This Special Condition is enforceable by the BBGHAD and/or the Commission, and such that the entity enforcing the agreements can seek specific performance in the context of any such enforcement, and the Commission can impose administrative penalties for any violation.

C. ~~Independent of the license agreement required by section B of this condition~~, E~~e~~ach Property Owner who undertakes or allows any development authorized by this permit thereby consents to allow public use of the property on which such development occurred consistent with the terms of section B.1 of this condition and to inform any prospective successors that this requirement attaches to the property as long as the development remains in place.

~~14. Conditional Lateral Public Access over Revetment and Adjacent Pathway~~

~~A. *Prior to issuance of the Coastal Development Permit*, the permittee shall ensure that each Property Owner on which the approved revetment will lie (31350 to 30760 Broad Beach Road) enters into an agreement with the Commission and the BBGHAD in the form of an irrevocable temporary springing license that provides for lateral public access over the revetment and a strip of land immediately landward of it under the circumstances listed below and that satisfies all of the criteria listed below.~~

~~1. **Circumstances Giving Rise to the Licenses**~~
~~Each license shall provide for public access only if and when one or more of the following conditions is occurring, and only for the duration of time that one or more of the following conditions continues to occur:~~

~~a. If at any time there is less than ten feet of dry sandy beach providing for lateral public access extending seaward of the seaward face of the approved revetment on, or within 100 feet upcoast or downcoast of, any part of the licensor's parcel; or~~

~~b. Any circumstance occurs (such as, but not limited to, an oil spill) that prohibits the public's use, access, and enjoyment of any of the area of licensor's property seaward of the revetment or of any property within 100 feet upcoast or downcoast thereof.~~

~~2. **Nature of Public Access Authorized by the Licenses**~~
~~Each license agreement shall provide that the public shall have the right to pass and repass over the entire portion of the revetment that is located on the licensor's property and over an area extending from the seaward face of the revetment landward to a line parallel to and ten feet inland of the landward edge of the approved revetment for a public access pathway.~~

~~3. **Other Requirements of the Licenses**~~

~~a. Each license agreement must be drafted to run with the land, binding successor owners of the properties; must include a provision authorizing the BBGHAD to record it against the property as part of a blanket recordation; must include a provision requiring the Property Owner to disclose the existence of the agreement to any prospective successor; must be acceptable to the Executive Director in form and content; and must have the signator's signature notarized.~~

~~b. Prior to issuance of the Coastal Development Permit, each license agreement shall be recorded against the property to which it applies.~~

~~c. A license agreement shall be completed for every property extending from 31340 to 30760 Broad Beach Road, inclusive.~~

d. ~~Each license agreement shall be written so that it is enforceable by the BBGHAD and/or the Commission, and such that the entity enforcing the agreements can seek specific performance in the context of any such enforcement and the Commission can impose administrative penalties for any violation.~~

B. ~~The license agreement required by section A of this condition shall be combined with the license agreement required by Special Condition No. 13 into a single agreement with an appendix listing all of the Special Conditions of this permit so that, once recorded, the license agreement will provide record notice of all of the permit conditions.~~

C. ~~Independent of the license agreement required by section A of this condition, each Property Owner who undertakes or allows any development authorized by this permit thereby consents to allow public use of the property on which such development occurred consistent with the terms of section A.2 of this condition whenever the circumstances listed in section A.1.a or A.1.b. of this condition apply, and to inform any prospective successors that this requirement attaches to the property as long as the development remains in place.~~

15. Public Access Management Program

Prior to issuance of the Coastal Development Permit, the applicant shall submit, for the review and approval of the Executive Director, a Public Access Management Program that provides for the following:

A. Public Access Provisions During Construction Activities

(1) The Public Access Management Program shall include a plan for ensuring safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. The plan shall include a description of the methods (including signs, fencing, posting of security guards, etc.) by which safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. In the event that Broad Beach must be closed to pedestrian use during active beach nourishment/renourishment operations only, then signage shall be installed indicating alternative beach access points along Broad Beach available for public access. The applicant shall maintain public access pursuant to the approved version of the report. Any proposed changes to the approved program shall be reported to the Executive Director. No change to the program shall occur without a Commission-approved amendment to the permit unless the Executive Director determines that no such amendment is required.

(2) The program shall include all necessary temporary access provisions, including any necessary traffic control and crosswalk improvements, to maintain public pedestrian access between Zuma County Beach and the Trancas Market Property along the shoulder of Pacific Coast Highway immediately landward of the project site and staging area. Any temporary pedestrian access improvements within the highway right-of-way must be reviewed and approved by the California Department of Transportation (Cal Trans).

(3) Where public parking areas are used for staging or storage of equipment and materials, unless there is no feasible alternative, the minimum number of public parking spaces (on and off-street) that are required at each receiver site for the staging of equipment, machinery and employee parking shall be used. At each site, the number of public parking spaces utilized shall be the minimum necessary to implement the project.

(4) The applicant shall post each construction site with a notice indicating the expected dates of construction and/or beach closures.

B. Symbolic Public Access Fencing and Signage Plan

(1) The Public Access Management Program shall include a Symbolic Public Access Fencing and Signage Plan that provides for the installation of symbolic post and cable/rope fencing along the landward limit of the ten foot wide public access path located immediately landward of the approved rock revetment. The post and cable/rope fencing shall be no more than 42 inches in height and designed to be removable in the event of wave uprush. ~~The symbolic post and cable/rope fencing shall be installed by the applicant in a manner consistent with the approved plan within 30 days of the identified criteria requiring opening of the path to the public pursuant to the provisions of Special Condition 14, and in no event later than within 30 days from the date of notification if notified in writing by either the Executive Director of the California Coastal Commission or the easement holder that the identified criteria requiring opening of the path to the public pursuant to the provisions of Special Condition 14 have been met. The Executive Director may grant additional time for good cause.~~

(2) The Plan shall include the provision for the installation of signage to be incorporated into the design of the symbolic post and cable/rope fencing adequate to inform the public of their right to utilize all public access areas on site (including the lateral public access areas/paths required pursuant to Special Conditions 13 ~~and 14, and the public access stairways required pursuant to Special Conditions 1 and 4~~). At a minimum, the Program shall provide for the installation of signs ~~to be installed within 300 ft. intervals along the 10 ft. wide path and at both the western (upcoast) end and eastern (downcoast) end of the 10 ft. wide public path and~~ adjacent to each of the two Los Angeles County public vertical accessways on site.

(3) The plan shall show the location, size, design, and content of all signs. The applicant acknowledges and agrees that no signs shall be posted on the sandy beach, the rock revetment, or along the identified public access areas unless specifically authorized by the approved signage plan, a separate coastal development permit, or an amendment to this coastal permit. The signs may indicate that the areas of the site located landward of the public access areas are sensitive dune habitat and/or private property. The BBGHAD may not use ~~No~~ signs that restrict public access to State tidelands, public vertical or lateral access easement areas, or which purport to identify the boundary between State tidelands and private property shall be permitted. The applicant shall be responsible for removal of any such sign that comes to be installed that is inconsistent with these sign restrictions. Approved signage shall be installed concurrent with the installation of the symbolic public access fencing required pursuant to Part B.1 of this condition.

(4) The permittee shall install all symbolic fencing signs in accordance with the approved plans. The permittee, or its successor in interest, shall maintain the approved fencing and signs in good condition for the life of the project and replace when necessary.

C. Maintenance of Existing Public Vertical Access Improvements

The applicant shall be responsible for the cost, construction, and maintenance of any new improvements (including but not limited to repairs or modifications of the two existing public access stairways that have been previously constructed over the as-built rock revetment) within the two existing vertical public access rights-of-way necessary to maintain safe public pedestrian access from Broad Beach Road to the sandy beach as required by the Executive Director and Los Angeles County Department of Beaches substantially similar to the public access that exists on site at the time of Commission action on this permit. If any such improvements, or changes over time, are necessary to maintain safe and adequate public pedestrian access, then the applicant shall submit a detailed construction plan for the review and approval of both the Executive Director and Los Angeles County Department of Beaches and Harbors and comply with any requirements imposed by those entities.

16. Septic Conversion Implementation Study

Within three (3) ~~two (2)~~ years of the issuance of this Coastal Development Permit, ~~Commission action on this Coastal Development Permit,~~ the applicant shall submit to the Executive Director, a detailed Septic Conversion Implementation Study, prepared in part by a licensed civil/sanitary engineer or other qualified professional, analyzing alternatives for the removal of the existing on-site waste water treatment systems currently serving the residences within the Geologic Hazard Abatement District boundaries and connection of those residences to a new package sewage treatment facility or to an upgraded existing package sewage treatment facility. The study shall include an analysis and technical engineering details and requirements for the removal of the existing on-site waste water treatment systems within the District boundaries and conceptual design plans for either a new package sewage treatment plant or the upgrade of an existing treatment plant, such as the Trancas Canyon Package Sewage Treatment Plant. The study shall also include an analysis of permitting and regulatory requirements, potential environmental impacts, necessary infrastructure upgrades; alternative locations and technologies for a package sewage treatment plant; preliminary budget, including any land acquisition costs and a preliminary construction schedule/timeline for the preferred septic conversion alternative. The study shall have an initial conversion implementation goal (for the removal of the existing septic systems on the beach and connection to either a new or upgraded sewage treatment plant) of as quickly as practicable depending on the results of the Septic Conversion Implementation Study and to be determined by consultation between the applicant and the Executive Director. ~~six (6) years from issuance of this coastal development permit.~~

The study shall be prepared in consultation with the Regional Water Quality Control Board, the City of Malibu and the County of Los Angeles if applicable. Five years from the issuance of the coastal development permit, the applicant shall submit to the Executive Director a detailed progress report on the status of implementation of the preferred septic conversion alternative, including progress on design details, environmental impact analysis, and permitting.

17. Required Approvals

Prior to the issuance of this Coastal Development Permit, the applicant shall provide evidence, for the review and approval of the Executive Director, that they have obtained all other necessary State and local government permits that may be necessary for all aspects of the proposed project including, but not limited to, permits, leases, or approvals from the California State Lands Commission, California Department of Fish and Wildlife, State Water Resources Control Board, Regional Water Quality Control Board, South Coast Air Quality Management District, California Department of Transportation, and authorization for all staging and stockpile areas within Zuma Beach County Park from Los Angeles County Department of Beaches and Harbors, unless evidence is submitted that such approval(s) are not required. In addition, by acceptance of this permit, the applicant agrees to obtain all necessary Federal permits, consultations, or approvals that may be necessary for all aspects of the proposed project (including, but not limited to, the U.S. Army Corps of Engineers, and National Marine Fishery Service).

18. Assumption of Risk, Waiver of Liability and Indemnity

By acceptance of this permit, the applicant acknowledges and agrees (i) that the site may be subject to hazards from erosion, liquefaction, waves, flooding, and sea level rise; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

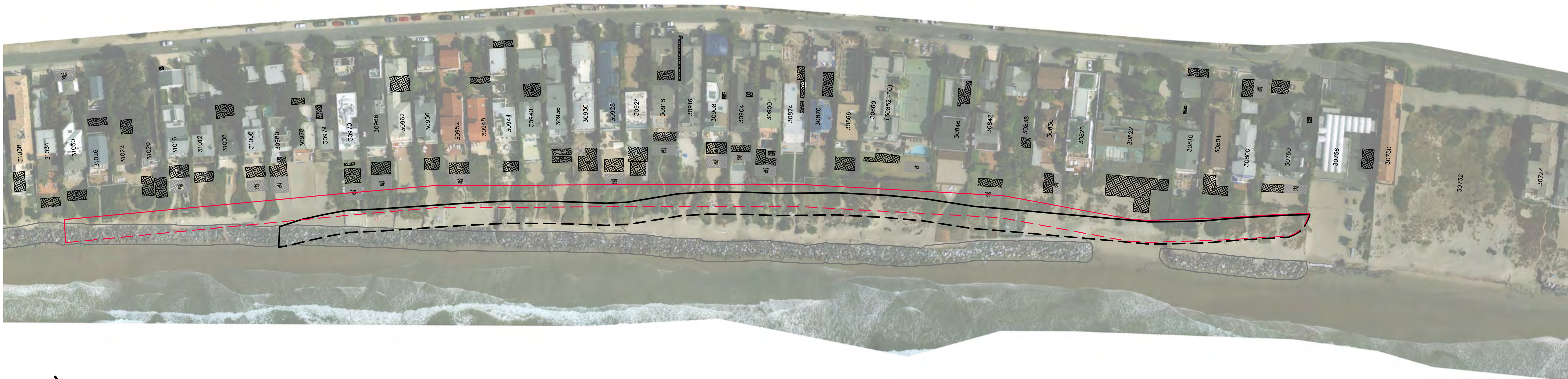
Prior to issuance of the Coastal Development Permit, the applicant shall submit a written agreement, in a form and content acceptable to the Executive Director, incorporating all of the above terms of this condition.

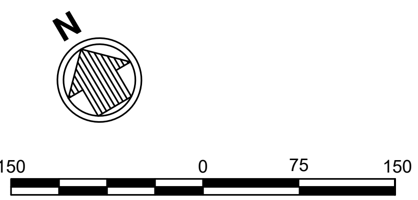
19. Indemnification by Applicant

Liability for Costs and Attorney's Fees: By acceptance of this permit, the Applicant/Permittee agrees to reimburse the Coastal Commission in full for all Coastal Commission costs and attorney's fees -- including (1) those charged by the Office of the Attorney General, and (2) any court costs and attorney's fees that the Coastal Commission may be required by a court to pay -- that the Coastal Commission incurs in connection with the defense of any action brought by a party other than the Applicant/Permittee against the Coastal Commission, its officers, employees, agents, successors and assigns challenging the approval or issuance of this permit. The Coastal Commission retains complete authority to conduct and direct the defense of any such action against the Coastal Commission.

Exhibit B

EAST BROAD BEACH REVETMENT RELOCATION
ALT 4C AND CCC STAFF REPORT 9-25-2015 - REVETMENT FOOTPRINT COMPARISON





SCALE 1" = 150'

LEGEND

EXISTING LEACH FIELDS (ACTIVE)

EXISTING LEACH FIELDS (EXPANSION)

EXISTING EMERGENCY REVETMENT OUTLINE

CCC STAFF REPORT - PROPOSED REVETMENT FOOTPRINT

BBGHAD ALT 4C - PROPOSED REVETMENT FOOTPRINT (09-15-2015 UPDATE)

AERIAL IMAGE
DATE: FEBRUARY 23, 2011
SOURCE: ROBERT J LUNG & ASSOCIATES

File: P:\6935 Broad Beach\7 Design Information\CADD_Active\NEPA\4C_GHAD\Figure for CCC Hearing_Oct 2015\Mod_4C_Revet_pullback_c_for CCC hearing; Plotted: 10/5/2015 11:46 AM by HOLLOWAY, AARON; Saved: 10/5/2015 11:46 AM by AHOLLOWAY

Exhibit C

John N. Yaroslaski PE 60149
Ensitu Engineering Inc.
780 Monterey Avenue Suite B
Morro Bay, CA 93442

ENSITU

Engineering Inc
780 Monterey
Ave., Suite B
Morro Bay, CA
93442

Tel: 805.772.0150
Fax: 805.772.0813

ensitu@ensitu.com

October 5, 2015

Charles Lester
California Coastal Commission
45 Fremont St, Suite 2000
San Francisco, CA 94105

Subject: 563-01.040 BBGHAD Waste Treatment Alternatives

Dear Mr. Lester:

My firm, Ensitu Engineering Inc., serves as the BBGHAD's waste treatment engineer. Among other tasks, we have studied septic systems on Broad Beach as part of the BBGHAD's analysis of revetment and dune placement. Since early 2015, we have worked with the BBGHAD in connection with the CCC's anticipated condition for the BBGHAD to study waste treatment alternatives to individual septic systems at Broad Beach. The BBGHAD has made significant progress on evaluating a feasibility study for future alternatives instead of septic systems. For example, the BBGHAD has met with representatives of the Trancas Center (shopping center at corner of Trancas Canyon and Pacific Coast Highway, across PCH from Broad Beach) to discuss a potential joint waste treatment project. We anticipate additional work in this regard in the near future.

If you have any questions, or require additional assistance please feel free to contact me at (805) 772-0150.

Sincerely,

J N Yasl.

John N. Yaroslaski PE 60149
Ensitu Engineering Inc.
Project Engineer

Exhibit D

Broad Beach Sand & Dune Habitat Restoration Project

CCC Hearing
October 9, 2015

Broad Beach used to have more sand coming to it than leaving from it, and it was wide…


BROAD BEACH
Broad Beach now losing more sand than it is gaining, and narrowing and lowering over time
2009
Beach profiling since 2010 reveals annual sand loss between 35,000 and 50,000 cy
3

Winter 2009-2010 Emergency Conditions

West Broad Beach Sandbagging-
Pre revetment

West vertical public access

BROAD BEACH

Winter 2009-2010 Emergency Conditions

Temporary sandbagging attempted as a "soft solution".

Sandbags failed when El Niño storm waves and high tides impacted the shoreline.

Result: threatened and damaged residential structures and debris along the beach.

Existing Conditions (east from 31450)

March 3, 2014

Tide Approx. Mean Sea Level

Existing Conditions (east from 31330)

Existing Conditions (west from 30756)

March 3, 2014

Tide Approx. Mean Sea Level

Existing Conditions (30712 PCH- East End & No Revetment)

February 2, 2014

Broad Beach Property Owner Response to Winter Storms

- Random sandbagging: 2008-09
- 2010 temporary revetment to protect 78 (of 121) parcels
- Study erosion problem- determine causes and remedies
- Form geologic hazard abatement district (BBGHAD) under CA law to fund permanent beach and dune restoration- **100% privately funded; no public $ or subsidies**
- Approved assessment (twice) to fund restoration Project
- BBGHAD Board meets regularly to implement Project
- Technical studies and permitting costs exceed $7.5M to date

Proposed Broad Beach Restoration

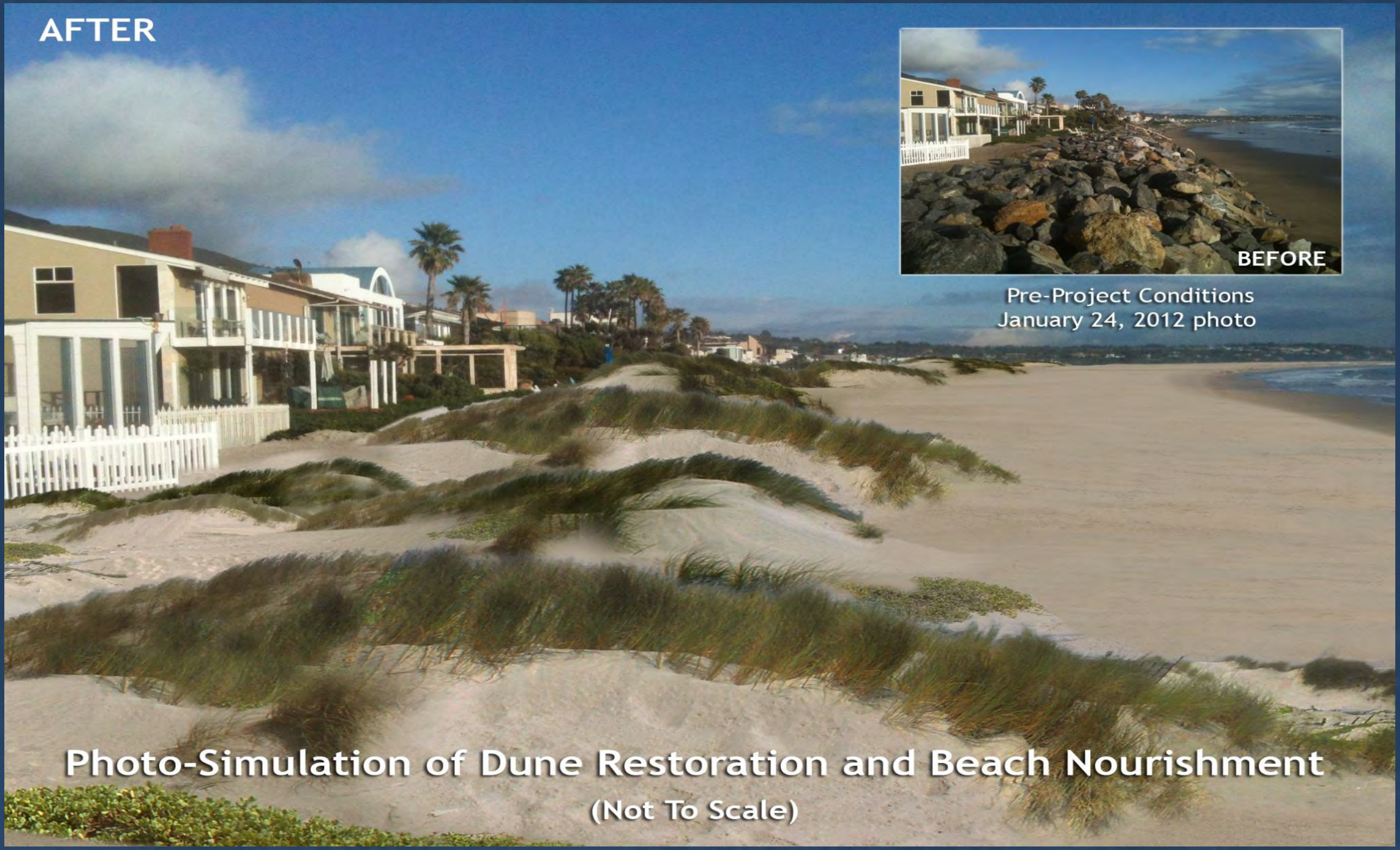
MISSION: 1) restore historically wide beach by adding sand and restoring dune habitat,
2) provide permanent public access & extensive public recreational opportunities,
3) and maintain buried revetment for future storm protection.

Simulation To Approximate Scale:
300,000 cy sand; avg. 65' beach width

Broad Beach Restoration Project Objectives

- 300,000 cy of sand to restore eroded shoreline to historic wide sandy beach and coastal dune system
- Authorization to bury emergency revetment under beach and dune sand
- Major nourishment: should provide at least 5 years of beach and dune habitat restoration
- Interim nourishments: ensure revetment coverage and dry sand beach
- Backpassing proposed to extend nourishment life and equalize benefit
- Seeking 20 year authorization, with Executive Director evaluation every 5 years

Beach Restoration: Photo Simulation- West



Compromises with CCC staff

CCC staff asked for, and received:

1. Reduced footprint to avoid sensitive habitat at West End
2. Phased sand nourishment to reduce initial mass of 600,000 cy; reduced to 300,000 cy in initial phase
3. SAP & Integrated adaptive management principles
4. Increased nourishment commitment

4. Expanded dune footprint; permanent dune area
5. Plan for moving off individual septic systems
6. Shortened permit term- BBGHAD seeks perpetual nourishment, but has compromised on 20 years

Compromises with CCC Staff (cont'd)

CCC staff asked for, and received:

7. Revised, objective triggers for backpassing and subsequent nourishments
8. Reduced property owner access to beach
9. Extensive qualitative and quantitative marine habitat surveys
10. Ongoing seasonal beach profile surveys at Project site <u>and</u> Zuma Beach
11. Staff requested and GHAD analyzed 13 alternatives and subalternatives

Progress Since Dec. 2014

- **Project Footprint:** No nourishment west of 31380 Broad Beach Road
- **Revetment Alignment:** Affects 30760-30978 BB Rd
- **Revised Dune Plan:** 3:1 ratio of dunes restored to dunes impacted
- **Septic Feasibility Study:** Multiple meetings; commitment to complete within 3 yrs of const. start
- **Public Access:** Easements avoided, agreement on major access principles
- **Extensive Monitoring Plan & Science Advisory Panel:** Members selected; agreement on approach

BBGHAD Reformulation (caused by preventing nourishment at west end)

1. Revised Engineer's Report- Board adopted July 2015; Resolution No. 2015/03
2. New Assessment Passed 9/6/15: $595/linear foot; 25% for parcels west of 31380
3. New Assessment commits approx $3.1M/yr to Project
4. Construction Schedule: Early 2016?

Primary Remaining Issues With CCC

1. Revetment alignment
2. Scope of public/lateral access
3. Permit term
4. Septic conversion timetable
5. Other details

Revetment Alignment

CCC staff:

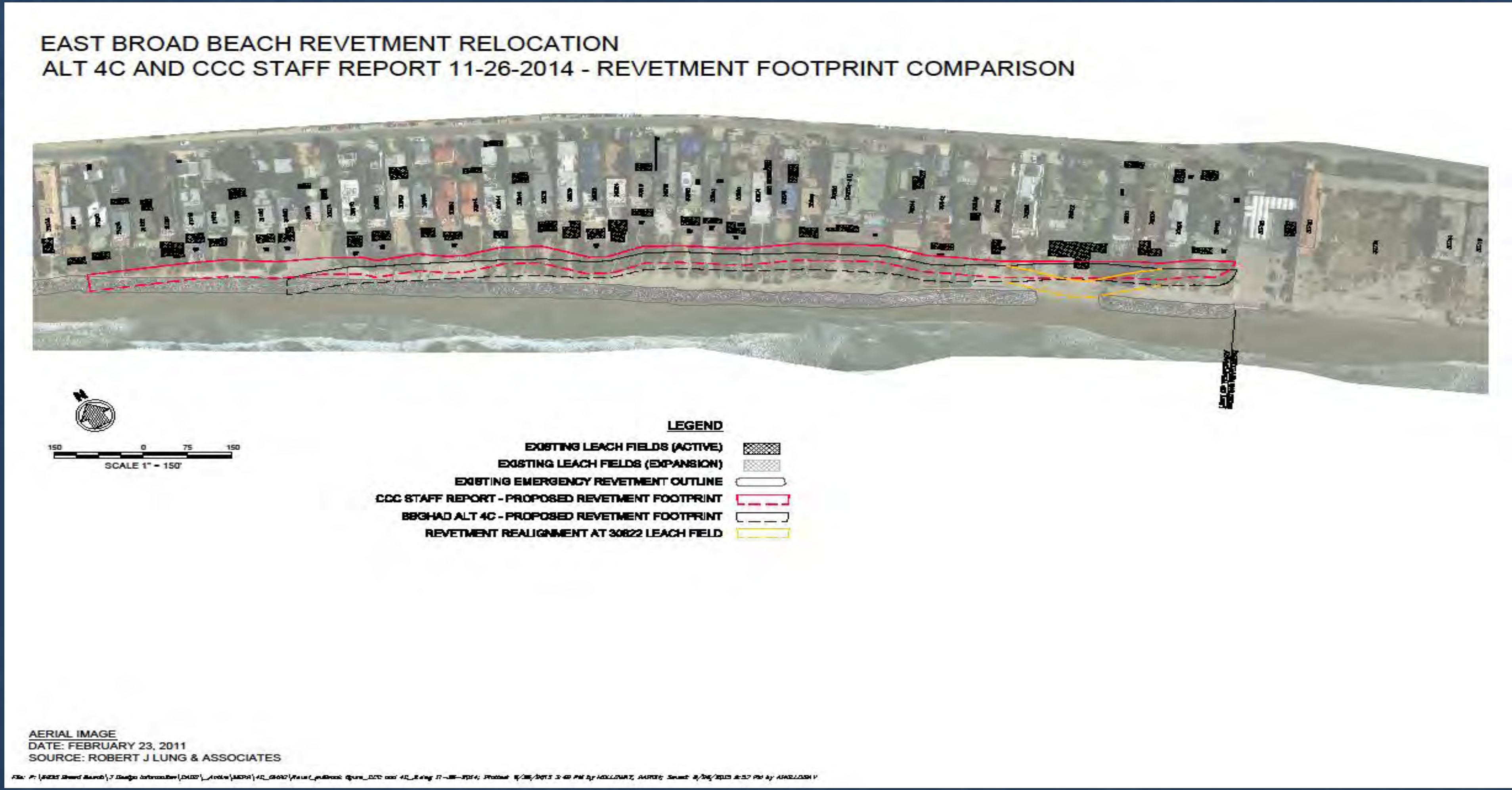
Move 50% of existing revetment drastically landward, beginning at 31030 BB Rd.

- Too close to existing septic- jeopardizes leach field integrity and could lead to overtopping & sewage spills

BBGHAD Proposal:

- Major move closer to structures, begin at 30968
- Compliant with LCP, Coastal Act and SLC staff
- Accommodates potential future overtopping & preserves integrity of existing backyards

BBGHAD-Proposed Revetment Pullback: 30760 to 30968



- Pullback off of all public lands
- Provides space for overtopping

Public Access

Staff proposal:

- Public property from 2010 MHTL seaward: AGREED
- Public access provided seaward of dune vegetation limit and 2010 MHTL up to seaward revetment crest: AGREED
- In revetment area when beach erodes, public access available on some public property seaward of 2010 MHTL and landward of dune vegetation limit: AGREED
- In revetment area, public access and passive recreational use over seaward portion of private property extending 25' inland from landward extent of "wet sand" until wet sand reaches seaward face of revetment: AGREE AS MODIFIED

Public Access

CCC staff proposal (cont’d):

- If 10’ of dry sandy beach does not exist along seaward face of revetment, BBGHAD to provide lateral public access via 10' walkway landward of revetment. NOT AGREED
- Prior to issuance of CDP, 78 separate license agreements signed by each revetment owner governing public access on private property once nourished, and as beach erodes between nourishments. NOT AGREED

Proposed Backyard Public Walkways

CCC staff's proposed public walkway:

If 10' of dry sandy beach does not exist along seaward face of revetment, BBGHAD to provide lateral public access via 10' walkway **in backyards--** landward of revetment

Public Access Stairs Proposed by CCC

CCC staff proposes:

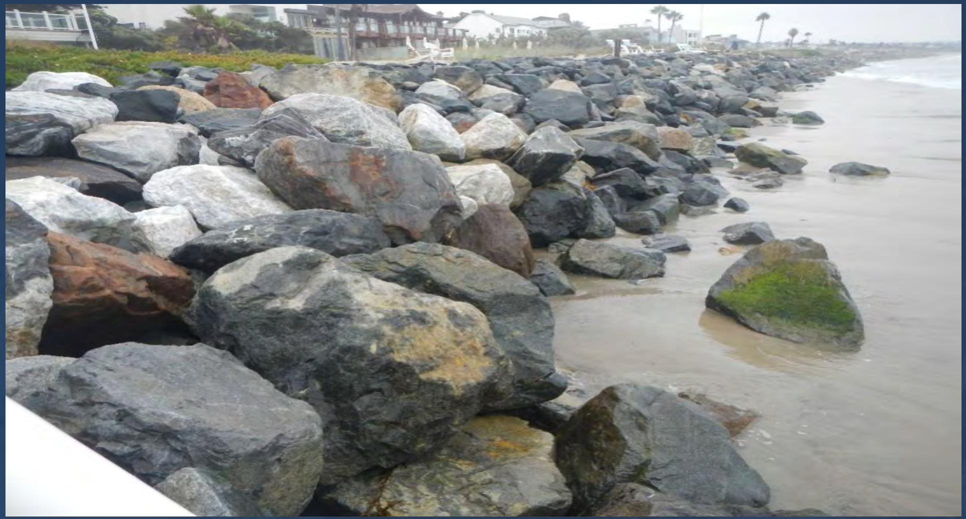
BBGHAD to provide stone access stairs, without handrails, extending from toe of revetment to the 10’ wide public pedestrian path in backyards. Special Condition 1(A)(4), p.13

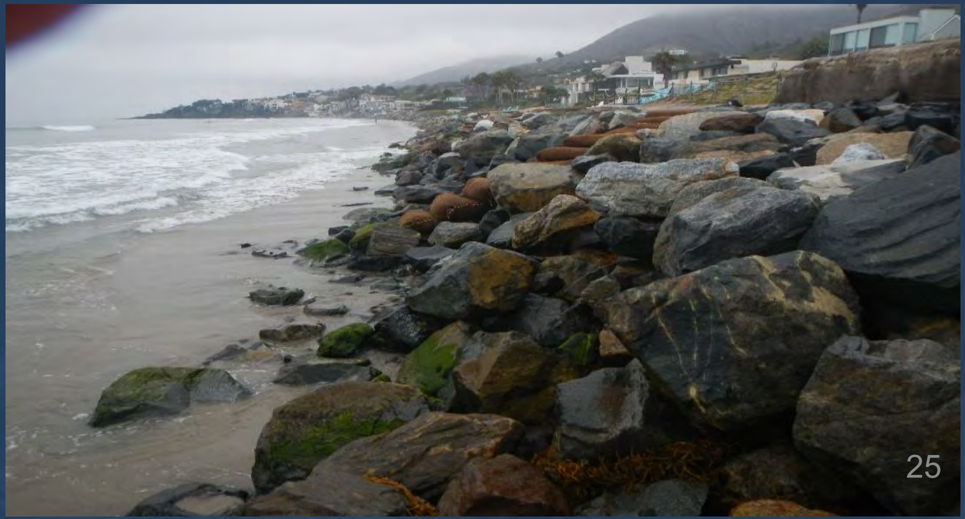
Proposed 10’ Path and Public Stairs

BBGHAD cannot accept staff proposal:

- Extreme privacy, security, public safety, and liability concerns over prospect of opening private backyards to public when the nourished beach completely erodes

- Stairs through and down exposed revetment: extreme safety hazard and liability risk





Proposed License Agreements

BBGHAD cannot accept CCC staff proposal:

- Likely impossible to obtain all 78 signatures
- Staff proposal grants each of the 78 owners veto power over the entire Project

Remedy:

- Agreement with access principles of Special Condition 13 (except 10' path)
- BBGHAD commitment to keep dry sand on beach
- If revetment exposed, nourishment will occur when next construction period opens

Scope of Public Access in Restored Dune Area

BBGHAD cannot accept CCC staff proposal:

- "Wet sand" standard too ambiguous and will create conflict; people typically walk on wet sand without problem
- Proposal of 25' wide area: too destructive of restored dune area

Remedy:

- Change "wet sand" to area in which beach becomes impassable
- Change 25' to 10' wide ambulatory access area

Permit & Revetment Duration

Staff seeks:

- 10-year permitting with Executive Director review at year 5
- Future development to assume NO revetment
- Possible CDP Amendment for another 10 yrs

Effects of CCC Staff proposal:

- Requires perpetual "review" and re-permitting efforts
- Revetment removal eliminates property owners' last line of defense
- Negates recent experience of revetment saving homes from destruction or severe damage
- Ignores prospect of sea level rise

Revetment Duration

BBGHAD Proposal:

- 20-year CDP & Revetment w/ E.D. review every 5 years
- Presumption that need for shoreline protection will exist in 20 years
- Future development recognizes existence of revetment

Septic Conversion

Staff position:

- Feasibility Study completed within 2 years of CDP hearing
- 6 year implementation goal

BBGHAD position:

- Feasibility Study completed within 3 years of CDP issuance
- Implementation goal- to be determined by results of feasibility study
- Allow BBGHAD to focus on Project, then handle septics

BROAD BEACH

Public and Homeowners Deserve a New Beach

Pulled Back Revetment Covered with Dune Plants

Nourished Beach

Final dune design subject to approved dune restoration plan

END

CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
89 SOUTH CALIFORNIA ST., SUITE 200
VENTURA, CA 93001
(805) 585-1800

F8a

Filed:	6/5/15
180th Day:	12/2/15
Staff:	Staff
Staff Report:	9/25/15
Hearing Date:	10/9/15

STAFF REPORT: REGULAR CALENDAR

Application No.:	**4-15-0390**
Applicant:	**Broad Beach Geologic Hazard Abatement District**
Agents:	**Moffat and Nichol Engineers**
Project Location:	**30708 Broad Beach Road to 6526 Lechuza Point Road, Malibu; Los Angeles County.**
Project Description:	**Authorization and permanent retention of an existing, approximately 4,150 ft. long, 12-15 ft. high, as-built, rock revetment constructed pursuant to two emergency coastal development permits. In addition, the project includes re-location of the downcoast approximately 1,800 linear feet of the as-built rock revetment further landward; implementation of a beach nourishment program for a period of 20 years involving deposition of 300,000 cu. yds. of sand on the beach from inland sand quarries during the first year and approximately 300,000 cu. yds. of sand approximately every five years thereafter; periodic interim nourishments involving up to 75,000 cu. yds. of sand as needed; periodic sand backpassing operations to occur no more than once per year, and dune habitat restoration. The proposed project is described in more detail in Section IV.A below.**

SUMMARY OF STAFF RECOMMENDATION

Commission staff is recommending conditional approval of the Broad Beach Geologic Hazard Abatement District's (BBGHAD) proposed revetment, beach nourishment, and dune restoration project at Broad Beach in the City of Malibu in Los Angeles County. The recommended approval is limited to 10 years with conditions to address coastal hazards and impacts to public access, marine, beach and dune habitats, and visual resources. The recommendation also includes a requirement for a comprehensive implementation and monitoring program, including providing for adaptive management at Broad Beach considering project uncertainties and projected global sea level rise.

Project Description and Background

In a prior permit application for a modified version of the same project (Application No. 4-12-043), the BBGHAD proposed to (1) permanently retain an approximately 4,150 foot long rock revetment that was temporarily authorized and constructed under Coastal Commission emergency permits in January of 2010 without relocating any of it; and (2) implement a twenty-year beach nourishment and dune restoration program on top and in front (seaward) of portions of the revetment that included deposition of 600,000 cubic yards of sand from inland sand quarries in year one and another 450,000 cubic yards in year ten, with periodic backpassing no more than once per year and periodic interim nourishments of up to 75,000 cubic yards of sand between major nourishment efforts. Commission staff recommended approval of this prior application with conditions to relocate a portion of the as-built revetment, reduce the quantity and footprint of the beach nourishment program to avoid filling of sensitive rocky intertidal habitat areas, limit the permit term to 10 years, and require significant implementation and monitoring provisions to address impacts to public access, marine, beach and dune habitats, and visual resources. Staff recommended relocating the approximately 2,000 linear ft. portion of the revetment at the eastern (downcoast) end of the beach up to 100 feet further landward (between 31030 and 30760 Broad Beach Road) so that the landward edge of the revetment is setback approximately fifteen (15) ft. from (seaward of) existing, legally-established septic systems/leach fields.

The project had a public hearing before the Commission at the December 11, 2014 meeting in Monterey. After listening to Commissioner deliberations and concerns raised regarding the proposed project and the staff recommendation, the applicant withdrew the application during the hearing and expressed their intent to continue working with Commission staff to address Commissioner concerns prior to submitting a new application for the project. On April 3, 2015, the BBGHAD submitted a new permit application (the subject Application No. 4-15-0390) for the revetment, beach nourishment, and dune restoration project that includes the following changes:

- **Revetment Alignment**. Re-location of the downcoast approximately 1,600 linear feet of the as-built rock revetment up to 75 feet landward of the as-built revetment alignment (approximately 40-50 feet seaward from existing septic systems/leach fields on the beach). In addition, on September 24, 2015, the applicant transmitted a revision to the proposed downcoast revetment alignment (called “Revision D”) to Commission staff. This revised revetment alignment, which is depicted in Exhibit 8a, extends the pullback approximately 200 feet further upcoast than previously proposed (for a 1,800 linear foot length), such that the pullback starts at 31020 Broad Beach Road instead of 30980 Broad Beach Road. The revised pullback alignment is also a more smooth line (less angular curves), and the downcoast portion of the pullback was shifted seaward to avoid a recently surveyed large existing leachfield on the beach at 30822 Broad Beach Road. However the new proposed revised revetment alignment is still approximately 40-50 feet seaward from most existing septic systems/leach fields on the beach.

- **Beach Nourishment Program**. Modification to the beach nourishment program to limit direct nourishment to the area between 31380 Broad Beach Road at the upcoast end and 30708 Broad Beach Road at the downcoast end (eliminating direct nourishment between Point Lechuza and 31380 Broad Beach Road), consistent with Commission staff's recommendation. The proposed beach nourishment program was also modified to reduce the quantity of nourishment deposition to 300,000 cu. yds. of sand from inland sand quarries during the first year, approximately 300,000 cu. yds. of sand approximately every five years thereafter or as needed, periodic interim or erosion nourishments involving up to 75,000 cu. yds. of sand as needed, and periodic backpassing no more than once per year.

- **Dune Restoration and Enhancement**. Modification to the footprint and design of the proposed dune restoration and enhancement plan, and a proposal to incorporate one non-shared private vertical access path through the restored dunes for every residence with forty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residences with less than forty feet of beach frontage. In addition, on September 24, 2015, the applicant transmitted a revision to the proposed private vertical access path plan in order to address Commission staff concerns and to reduce the number of paths through the dunes. The revised proposal now reflects one non-shared private vertical access path through the restored dunes for every residential lot with sixty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residential lots with less than sixty feet of beach frontage.

- **Lateral Public Access**. Proposal to maintain at least ten feet of sand seaward of the revetment for lateral public access along the beach; however, if there is erosion back to the revetment for six consecutive months despite backpassing and up to three interim nourishment attempts within a ten year period, and access seaward of the revetment is impossible, the applicant would agree to grant the public a "temporary license" to access a limited area on the landward side of the revetment for pass and repass.

- **Septic System Conversion Study**. And although not proposed as part of the formal revised project description, correspondence from the applicant (dated March 31, 2015 and June 16, 2015) states that the applicant agrees to conduct and complete a "Septic Conversion Implementation Study" within three (3) years of permit effectiveness to study alternatives and cost associated with implementing the conversion of individual on-site septic systems on BBGHAD parcels to a community-wide system. The applicant's correspondence also states that a timeline for transition would be identified based upon the results of the conversion study.

The BBGHAD encompasses the entirety of Broad Beach, including 114 individual property owners with homes on 122 single-family residential parcels. Approximately 86 homes were present prior to the establishment of coastal permit requirements in 1972 under Proposition 20. Forty-six of those homes are located behind the proposed revetment. Many of the existing homes were either constructed or substantially improved with permits issued by the Coastal

Commission, its predecessor, or the City of Malibu after 1972. As a result of conditions imposed in those permits, fifty-one of the parcels have restrictions protecting and/or providing for public lateral beach access, thirty-two of which are directly underneath or landward of the revetment. Thirty-six of those 51 parcels have easements held by the State Lands Commission (SLC), twenty of which are in the revetment area. Another eleven of the existing residences have “no future seawall” conditions required by the Commission or the City of Malibu. Seven of these eleven residences are located behind the proposed revetment. The offshore and beach areas below mean high tide at Broad Beach are in the Point Dume State Marine Conservation Area MPA and a State Water Resources Control Board designated Area of Special Biological Significance (ASBS).

Broad Beach Erosion and Project Impacts

Although the width of Broad Beach has varied over the last century, evidence shows that the beach has been receding at about an average of 2 feet per year since 1970. And while sea level rise over the proposed 20 years of the beach replenishment may only range from 3.4 to 17.9 inches (with a projected value of 8.5 inches), the SLC analysis of public trust resources concludes that erosion rates at Broad Beach may be accelerating, and certainly over the longer run (after 2050) sea level rise will become a significant erosion challenge. In recent years the erosional trend at Broad Beach has placed the existing beach-level residential development directly in danger, and several homes were lost in the 1998-99 El Nino year and at least one home was significantly damaged in the 2009-10 storm events that led to the construction of the emergency revetment.

The proposed BBGHAD revetment would result in significant public access and beach resource impacts that typically follow from shoreline structure projects on eroding shorelines. It will cause the direct passive erosion loss of the fronting beach due to the fixing of the back beach and the resulting inability of the beach to naturally retreat. It will also prevent the erosion of beach and bluff sand that would otherwise naturally nourish local and regional beaches. The existing revetment has been blocking lateral public access in front of the revetment for almost five years at high and even mid-range tides (the applicant describes Broad Beach currently as a “narrow, ‘low-tide beach”). And, the revetment is sitting on approximately 3.02 acres of beach, including directly encroaching on approximately between 1.5 and 2 acres of public tidelines and existing SLC public access easements. The revetment also is visually unattractive. Finally, due to the loss of the beach, the revetment causes the direct loss of dry and wet sand beach habitat resources.

To their credit, and in recognition of the severe impacts of the revetment, the Broad Beach homeowners formed the BBGHAD, voting to assess themselves $20 million dollars over 20 years to finance a beach replenishment program along with the revetment to assure protection of their homes and rebuild Broad Beach for public benefit. If successful, the BBGHAD hopes to continuously maintain a sandy beach and dune field that will provide public beach access and restore beach and dune habitats. The beach replenishment and restoration program will also cover and thus mitigate the visual impacts of the rock revetment.

The proposed beach restoration could significantly offset the impacts of the revetment, but there is substantial uncertainty about how it will perform. The SLC analysis of public trust resource impacts concludes that with projected sea level rise, the proposed beach restoration is most likely to last 10-20 years. However, it could be shorter, and a series of significant storms or El Nino years could seriously and quickly degrade the beach restoration. In addition, as proposed, the sand replenishment will use sand with a larger average grain size, and of a different color, than is currently found at Broad Beach. These differences will change both the aesthetic character of Broad Beach and potentially the habitat values of the beach area. And, the placement of sand will have direct and indirect impacts of covering existing habitats, including existing rocky intertidal areas at the upcoast end of the project area. The proposed replenishment will also be accomplished by driving the sand from the Moorpark/Simi Valley area 40 to 45 miles in 14-cubic yard trucks, resulting in 22,000 truck trip loads of sand across local highways and streets (420 truck trips/day for approximately 3-5 months), and construction staging in a public access parking lot on nearby Zuma County Beach.

Coastal Act Consistency and Conditions of Approval

The BBGHAD project raises fundamental questions about how to address significant coastal hazard risks to development while protecting other coastal resources, including public beach access and recreation and natural shoreline habitat and aesthetic values. Staff recommends that the Commission find that many of the homes in the BBGHAD as they exist today are entitled to shoreline protection under Coastal Act Section 30235 because they existed in some form prior to 1973 are in danger from erosion. Other homes, though, were built or improved with coastal development permits subject to the Section 30253 requirement that new development not require future shoreline protection; some properties even have Commission-required recorded prohibitions against future protection like the proposed revetment. Thus, some homes are not necessarily entitled to, or in some cases are affirmatively prohibited from, receiving authorization of a shoreline protective device under the Coastal Act.

Unfortunately the proposed revetment ultimately would likely not protect those homes that are entitled to protection if there are physical gaps in the revetment in front of those intermingled homes that are not entitled to protection. Erosion would be exacerbated in these gaps, ultimately wrapping around and undermining the revetment. In the alternative, the Commission could consider requiring that existing homes in danger be relocated further inland, but there is very little room on some of the lots to make this a viable strategy over the longer run given the on-going erosion at Broad Beach. Existing structures could also potentially be raised to safer elevations on deep-seated caissons, as is required under the City's Local Coastal Program (LCP) when homes along Broad Beach are redeveloped (and some have been), but this alternative is extremely expensive and the Commission would need to require that many endangered structures essentially be entirely reconstructed on new elevated caisson foundations.

The BBGHAD project, particularly as originally proposed, raises significant conflicts with the Coastal Act's hazards, public access and recreation, habitat protection, and visual resource policies. However, the proposed beach replenishment and dune restoration components offset some of these inconsistencies by seeking to bury the revetment and restore the beach to create a condition as if the revetment were not there at all. If successful, these components would address many of the beach resource and aesthetic impacts caused by the revetment. Unfortunately there is significant uncertainty about how long the restored beach will remain given on-going erosion and potentially more-erosive storm events. It is possible that the beach and the dunes would be substantially reduced or even completely eliminated in places, and the revetment exposed, within several years of the initial replenishment. The BBGHAD is proposing to do a second major replenishment in year five, and every five years thereafter for the proposed twenty year term of the project, to address this concern. Nonetheless, because of the significant uncertainty of restoration success, even with the repeated replenishments, staff recommends that the Commission limit the authorization of the revetment and beach restoration to ten years, with additional beach nourishment of up to 300,000 c. yds. subject to the requirements of an Adaptive Management Plan with on-going monitoring and assessment. In the event that the project performs as planned, including continuing to provide public beach access and dune habitat and avoiding significant environmental impacts, the Commission may extend its authorization of the revetment and beach restoration program in ten years' time, for another ten year period.

A limited ten year authorization allows the Commission to support an adaptive management approach to shoreline erosion at Broach Beach, providing protection to existing development but not authorizing *permanent* shoreline structures for development not entitled to such protection. Further, the City of Malibu LCP requires that shoreline homes be moved as far landward as possible and elevated on caissons when they redevelop so as to minimize or not require at all any shoreline protection at the beach level. Although that LCP is not the standard of review here, it does serve as guidance, and to support this adaptive approach, staff also recommends that the Commission clearly authorize the revetment only to protect the eligible development that exists today, and that the BBGHAD and participating members assume the risks of developing in this hazardous location. At some point in the coming decades it may be that all of the homes along Broad Beach would no longer have need for shoreline protection such as the proposed revetment because they would be elevated through the redevelopment process above flood levels along the back of Broad Beach. This would enable the revetment to be removed in the event that the beach replenishment and dune restoration components were no longer functioning as planned, and allow maximum opportunities for maintaining the public beach. Of course, as time passes and sea level rise accelerates, it will likely become increasingly difficult to maintain Broad Beach through artificial replenishment. If and when this reality comes to pass, it will need to be addressed by the Broad Beach homeowners, the City of Malibu, and the State in later phases of development review and adaptive management.

In past Commission actions, the Commission has generally found that siting and designing the shoreline protection device to be located as far landward as feasible so that the device occupies less sandy beach and is acted upon by wave action less frequently is the preferred alternative to minimize adverse impacts to shoreline processes, sand supply, public access and recreation. In this case, the proposed revetment configuration would not relocate the revetment as far landward as feasible. Under the applicant's proposal, only approximately 1,800 linear ft. of the rock revetment (commencing at 31020 Broad Beach Road) would be relocated to a location that would still be approximately 30 - 40 ft. seaward of the existing septic systems of the beach and thus, approximately 15 - 25 ft. further seaward of the revetment relocation identified by staff (**Exhibit 8a**). Staff is recommending the Commission require further landward relocation of a longer segment of the downcoast revetment (2,000 linear ft., commencing at 30980 Broad Beach Road), as generally depicted in **Exhibit 8a**, to generally maintain a 15 foot setback from existing leach fields (excluding any "future" leach fields that had not yet been built at the time this application was submitted to the Commission) and to be configured in a manner that maintains a relatively straight or gently curving line.

Staff is recommending a variety of other conditions to address the impacts of the BBGHAD project. Most important, staff recommends that the BBGHAD address the uncertainty of maintaining public beach access in two primary ways. First, staff recommends a condition to provide unambiguous public access landward from the mean high tide line to the toe of the proposed dune restoration or 25 feet inland of the wet sand, whichever is farther landward, recognizing that both lines would be ambulatory back to the toe of the revetment if necessary. Providing a clear and consistent area of public access seaward of the revetment is one of the stated goals of the BBGHAD, and a critical measure to address Coastal Act public access and recreation policies. Staff recommends that this requirement be implemented through a condition requiring a lateral public access license agreement with each property owner on which the approved revetment will lie, as well as by imposing the burden directly. Staff is also recommending the submittal of a final beach adaptive management plan that requires additional nourishment of the beach should the beach recede to within 30 feet of the revetment at a designated point. Second, staff recommends requiring a "back up" lateral public access area (again secured both through a license agreement with each property owner on which the approved revetment will lie and directly in the condition language) on top of and just landward of the revetment in the event that public access is not available on the beach seaward of the revetment. This requirement to provide alternative lateral public access would only be triggered in the event that the planned beach restoration fails to maintain public access on the dry sandy beach seaward of the revetment as proposed by the BBGHAD.

This approach to providing for public access via a license agreement is an alternative mechanism to the typical easement or deed restriction required by the Commission and by the Malibu LCP. The applicant insisted that it could not get all of its members to agree to record easements against their properties, but that they would be able to secure license agreements from all of them, and staff endeavored to honor the Commission's stated desire (at the December hearing) that staff be flexible in working with the applicant. Special Conditions 13 and 14 recommended by Commission staff require the lateral public access license agreements to be irrevocable and binding on successor owners of the property and that they be recorded against the property to ensure this. The BBGHAD has assured Commission staff that, with the property owners' consent, as part of their execution of the license agreements, the BBGHAD will have the authority to record all of the licenses in a single, blanket recordation, as it did with the BBGHAD Assessment Diagram that it recorded after the assessment was put in place. This will provide for a more streamlined and less complex condition compliance process that is responsive to the applicant's concerns, while still providing a continuing assurance of public access under any foreseeable conditions and affirmative notice to future property owners of the public access license agreement.

Public access impacts are also being addressed by the BBGHAD proposal to pull the revetment back closer to the existing septic leach fields at the down-coast end of the project where there is a significant area between the landward edge of the emergency revetment and residential development. Staff supports this relocation, and is recommending a slight expansion of this pull-back to further maximize beach area for public access and recreation (as required by the Malibu LCP) and to reduce the likelihood that the sea will reach the revetment. Finally, other recommended conditions address the need for clear on-going public access signage and management to assure maximum public access to and along Broad Beach.

Staff also recommends that the BBGHAD complete a Septic Conversion Implementation Study within two years of Commission action on this permit to plan for the removal of individual on-site septic systems on the beach and hooking up of Broad Beach homes to either a new or upgraded existing local community wastewater treatment system. The condition includes a goal for the complete removal of the septic systems within six years from the date of issuance of the permit. This would provide even more beach area for adaptation to coastal hazards and protection of beach resources over time. It would also have the secondary benefit of eliminating septic discharges taking place directly under Broad Beach.

Concerning dune habitat impacts, staff recommends that the Commission require a modification to the applicant's proposed dune restoration plan to include areas of additional dune restoration to fully mitigate the loss of dune habitat resources from the project. This restored dune will be considered ESHA and off-limits to public access except as may be necessary only at the dune's seaward margin as the beach erodes. The BBGHAD has also proposed comprehensive monitoring of various project components, and staff is recommending various refinements to assure adequate feedback loops over the first ten years of project implementation. This includes a five year review to provide for "mid-course corrections" if necessary for any unanticipated significant impacts.

Finally, given the potential for disagreement and the many parties involved, staff is recommending that the BBGHAD indemnify the Commission for any future litigation costs related to its action.

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APPENDICES

EXHIBITS

I. MOTION AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

MOTION: *I move that the Commission **approve** Coastal Development Permit No. 4-15-0390 pursuant to the staff recommendation.*

STAFF RECOMMENDATION OF APPROVAL:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

RESOLUTION TO APPROVE THE PERMIT:

> *The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.*

II. STANDARD CONDITIONS

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration.** If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

1. Final Revised Plans

A. *Prior to issuance of the Coastal Development Permit*, the applicant shall submit, for the review and approval of the Executive Director, two (2) sets of Final Revised Plans, prepared and stamped by a registered engineer. The Final Revised Plans shall demonstrate the following:

(1) <u>Landward Relocation of Revetment.</u> Landward re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment (including all portions of the proposed rock revetment and sand bag wall between 31030 Broad Beach Road and 30760 Broad Beach Road) as generally depicted in **Exhibit 8a**. The relocated revetment shall be configured in a manner that maintains a relatively straight or gently curving line as generally depicted in **Exhibit 8a**. The realigned revetment shall generally maintain a 15 foot setback from existing leach fields (excluding any “future” leach fields that had not yet been built at the time this application was submitted to the Commission), based upon a survey of existing leach fields by a qualified sanitary engineer or other qualified professional. Any substantial modifications to the revetment alignment generally depicted in Exhibit 8a, based upon the future septic survey, shall require an amendment to this permit unless the Executive Director determines that no amendment is required. All portions of the relocated revetment shall be configured as a single contiguous structure without any gaps or breaks (including the property at 30822 Broad Beach Road) and shall generally utilize the same design as the existing, as-built revetment. Minor modifications to the design to ensure structural stability may be implemented subject to the review and approval of the Executive Director. No portion of the revetment shall extend further upcoast than 31350 Broad Beach Road, nor further downcoast than 30760 Broad Beach Road.

(2) <u>Beach Nourishment/Beach Width.</u> The total amount of beach/dune nourishment material for the initial nourishment event, and each separate renourishment event shall not exceed 300,000 cu. yds. of sand for each event. The footprint for beach nourishment/beach width shall be generally consistent with **Exhibit 7a**, which reflects that no beach nourishment shall occur upcoast of the property at 31380 Broad Beach Road.

(3) <u>Dune Restoration.</u> The dune restoration and enhancement area proposed by the applicant shall be revised to comport with the boundaries generally shown on **Exhibit 8b** and to be consistent with all provisions of the Revised Final Dune Habitat Restoration and Enhancement Plan required pursuant to Special Condition 5.

(4) Public Access. Designate a 10 ft. wide public pedestrian path located immediately landward of the entire length of the rock revetment, including the portion of the revetment to be relocated/reconfigured pursuant to Part A.1 of this condition. The pathway shall utilize a sand surface only. The plans shall depict this path as a 'public accessway' available for public use when there are no areas of dry beach seaward of the revetment available for pass and repass, consistent with the terms of Special Condition 14 below. In addition, access stairways (for the provision of both public and private vertical access) shall be shown extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below. The number and location of the access stairways shall generally align with the shared private beach access paths allowed on site consistent with Special Condition 5, Part 5. All such access stairways shall be designed and constructed by reconfiguring existing stones within the revetment to form steps. No handrails shall be installed.

B. The Permittee shall undertake the development in accordance with the final approved plans. Any proposed changes to the approved plans shall be reported to the Executive Director. No changes to the plans shall occur without a Coastal Commission approved amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

2. Development Authorization Period and Reporting Requirement

A. This Coastal Development Permit authorizes the approved development on a temporary basis only for a period of ten (10) years from the date of Commission action (i.e., until October 9, 2025). After such time, the authorization for continuation and/or retention of any development approved as part of this permit (including, but not limited to, the rock revetment and beach re-nourishment/backpassing activities) shall cease, unless re-authorized by the Commission pursuant to a permit amendment, such as provided in Part B of this condition.

B. If the Permittee wishes to retain the revetment beyond the ten-year term for which this permit provides authority and to continue the nourishment program, then no later than six months prior to the end of that ten year term, the Permittee or successor in interest shall submit a complete coastal development permit amendment application for the re-authorization of the beach nourishment program and to retain the rock revetment for an additional ten (10) year term to protect existing residential development at risk from wave hazards and tidal action. The amendment application shall include the results of the required annual and five year biological and physical beach monitoring reports and the septic conversion implementation study, required pursuant to Special Conditions 4, 5, 6, 7 & 16 of this permit, in order to evaluate the effectiveness and impacts of the project; address changed circumstances and/or unanticipated impacts; consider modifications to the location and design of the sand fill area; and consider additional mitigation measures necessary to compensate for any adverse impacts to marine and/or upland coastal resources/habitats resulting from the continued retention of the rock revetment and implementation of the Adaptive Beach Nourishment and Management Program. Failure to either (1) obtain a permit amendment authorizing the Permittee to retain the rock revetment and continue the Adaptive Beach Nourishment and Management Program for an additional term or (2) remove the revetment and cease the program, shall constitute a violation of the terms and conditions of this coastal development permit, unless the Executive Director grants additional time for good cause.

C. Five (5) years from the date of issuance of this coastal development permit, the applicant shall submit a report to the Executive Director, documenting the status of the project, including the Beach Nourishment and Management Program. The report shall summarize the results and findings of the annual physical and biological monitoring reports and the status of septic conversion implementation as required pursuant to Special Conditions 4, 5, 6, 7 &16 Should the monitoring reports reveal any unanticipated significant adverse resource/ habitat or public access impacts not addressed in the initial Commission authorization, and/or that the Beach Nourishment and Management Program is not maintaining a thirty foot wide sandy beach fronting the approved revetment pursuant to the beach replenishment triggers pursuant to Special Condition 4(B), the Executive Director may require the submittal of a permit amendment application for the review and approval by the Commission to address and evaluate mitigation measures to compensate for any unanticipated adverse resource/habitat impacts, public access impacts, and/or require any mid-course corrections or adjustments to the Beach Nourishment and Management Program. Significant impacts shall be understood to be greater than de minimis increases over previously identified impacts based on the approved monitoring program. Failure to submit a permit amendment application in response to the Executive Director's direction, pursuant to this paragraph, shall constitute a violation of the terms and conditions of this coastal development permit.

D. The coastal development permit amendment application submitted by the permittee for an additional ten (10) year term, pursuant to Part B of this special condition, shall include a complete evaluation of all feasible alternatives to the retention of the rock revetment in its current location should beach re-nourishment measures outlined in Special Condition 4(B) fail to consistently maintain at least a 30 foot wide sandy beach over the 10 year period. Project alternatives evaluated shall include, but not be limited to, landward relocation of part or all of the revetment and removal of part or all of the revetment; construction of an alternative shoreline protective structure in a more landward location; status of removal of the existing septic systems and connection to a new or upgraded package sewage treatment plant based on the septic conversion implementation study required pursuant to Special Condition 16; and options for removal and/or landward relocation of existing private residential development. The information concerning these alternatives must be sufficiently detailed to enable the Coastal Commission to evaluate the feasibility of each alternative for addressing site shoreline protection, public access, and sensitive resource issues under the Coastal Act and the City of Malibu Local Coastal Program.

3. Implementation of Project Improvements & Removal of Unpermitted Development

A. The applicant shall implement and complete the landward re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment (including all portions of the rock revetment between 31030 Broad Beach Road and 30760 Broad Beach Road) consistent with the requirements of Special Condition 1.A.1. within 1 year of the issuance of this permit. The Executive Director may grant additional time for good cause. All sandbags that were included in the construction of this portion of the revetment shall be removed from the beach and are not to be used in the reconstruction of the rock revetment, which shall be composed entirely of rock.

B. The applicant shall construct the access stairways (for the provision of both public and private access) consistent with the requirements of Special Condition 1, Part 4 and Special Condition 5.A.5 concurrent with the re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment required pursuant to Part A of this condition. The Executive Director may grant additional time for good cause.

C. The applicant shall remove and dispose of, in accordance with all applicable laws, all unpermitted private stairways (approximately 40), sandbags and remnants of all materials such as plastic and fiber netting that made up the sand bags located both seaward and landward of the existing revetment, unpermitted wooden decks located atop or adjacent to the revetment, and "no trespassing" or "private property" signs or other signs that discourage or mislead the public from using public areas on and adjacent to the approved rock revetment concurrent with or prior to the re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment required pursuant to Part A of this condition, unless additional time is granted by the Executive Director for good cause.

4. Final Adaptive Management and Monitoring Plan

Prior to issuance of the Coastal Development Permit, the applicant shall submit, for the review and approval of the Executive Director, a Final Adaptive Management and Monitoring Plan. The final plan shall be prepared by a qualified engineer with experience in coastal engineering and incorporate all provisions of the Final Backpassing Guidelines (as presented in the Project Description 12/21/12), except that it shall be consistent with the following revisions:

A. Backpassing Provisions and Triggers

Sand Back Passing activities shall be implemented consistent with the following provisions:

(1) *Limits of Back Passing:* Source and receiver locations shall be generally identified based upon the approved nourishment limits (as identified in Special Condition 1).
(2) *Methods of Backpassing:* Equipment for backpassing shall be identified. Mechanical equipment shall be minimized, and limited to the use of scrapers, or bulldozers.
(3) *Backpassing Transport Routes:* The general routes that will be used for taking sand from the source site to the receiver sites shall be identified.

(4) *Backpassing Triggers:* Backpassing shall be undertaken at most once per year, and only if the recorded dry beach berm width at Profile 411 is 50 feet or less for three (3) consecutive months.
(5) *Limits on Source Sites for Backpassing Sand:* Source areas shall extend no further west than Profile 410, no further east than the limits of the approved nourishment area (as identified by Special Condition #1), at least 10 feet seaward of the dune toe and no further seaward than the wetted bound. No more than 7 feet of dry sand, by depth shall be taken from any location, and the maximum backpassing volume shall be 25,000 cubic yards per backpassing event. *Reporting*: Within 30 days of each backpassing event, the Permittee shall provide the planning staff of the California Coastal Commission's South Central Coast District Office with a written summary of the backpassing event, including a map or aerial photograph that shows both the scraped areas and the placement areas, information on the surface areas and depths of the scraping and the volumes of sand removed, areas and depths of sand placed and volumes of sand placed. If sand is placed on a dune, the method of placement shall be described.
(6) *Backpassing Evaluation:* After three backpassing events, the Permittee shall prepare a short evaluation report on the effectiveness of the backpassing and providing, if necessary, recommendations for revisions to the Backpassing Plan. No changes to the Backpassing program shall be implemented without written concurrence from the Executive Director.

B. Small-scale Interim Renourishment or Major Renourishment Triggers

(1) *Small-scale Interim Renourishment:* If the dry beach width near Profile 411 is narrower than 30 feet for 6 consecutive months, and is recorded by two (2) consecutive full beach profiles, AND, there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand, a small-scale interim renourishment event may be proposed. An interim renourishment plan, adding no more than 75,000 cubic yards of new sand may be proposed (no more than once per year) and small-scale nourishment shall be initiated in a timely manner, such that the deficit conditions shall not persist for more than 6 months following the initial trigger period, or as soon after 6 months as possible, given restrictions on beach disruptions during the summer season.

(2) *Major Renourishment*: If the dry beach width near Profile 411 is narrower than 30 feet for 12 consecutive months, and is recorded by three (3) consecutive full beach profiles, AND, there is insufficient sand at the backpass source location to provide 10,000 cubic yards of backpassing sand, a major renourishment event, adding an additional 300,000 cubic yards of new sand shall be proposed and nourishment shall be initiated within the approved project reach in a time manner, such that the deficit conditions shall not persist for more than 4 months following the initial trigger period.

(3) *Renourishment Plan*: For either small-scale interim renourishment or major renourishment within the project reach, the permittee shall provide a renourishment plan, for review and approval of the Executive Director that shall include the following:

a. Source and quality of renourishment sand,

b. Results from sediment sampling and testing, following the requirements of Special Condition 8.

C. Monitoring and Reporting Requirements

The Final Adaptive Management Plan shall be revised to acknowledge the prior baseline beach monitoring study conducted by the applicant's consulting coastal engineer (which has been in progress for several years now) and shall be continued throughout the duration of the ten year term of this permit, as specified below. In addition, the Plan shall also provide that the applicant shall conduct monitoring to provide an annual assessment of the shoreline morphology, beach profile, and beach width consistent with the following provisions:

(1) *Periodic Beach Profile Surveys*: A licensed surveyor or engineer shall survey full beach profiles for each of the 17 identified beach profile transect lines at Broad Beach and Zuma Beach (412.5, 412.3, 412, 411.7, 411, 410, 409, 408, 406, 404, 402, 400, 398, 396, and 394, as shown on **Exhibit 12**) on a semi-annual basis each spring and fall season for one year prior to the commencement of development and for a period of 10 years after initial construction. Each the beach profile transects shall be established with a permanent location that can be identified by Baseline Survey Markers and GPS coordinates. The landward limit of the full beach profile shall extend at least 10 feet inland of the inlandmost position of the revetment, and the seaward limit of the full beach profile shall be out to the depth of closure (approximately -40 ft., MSL).

(2) *Beach Berm Width Measurements*: Beach berm width measurements will be performed by the applicant using a tape measure and a differentially corrected digital global positioning system (GPS) unit to record the beach width on a monthly basis for at least one year prior to the commencement of development and for a period of 10 years after initial construction. Measurements will occur from the Baseline Survey Marker out to the wetted bound (seaward limit of the dry beach area) and shall be performed at the same locations each month and in essentially the same location as the beach profile surveys (412, 411, 410, 409, and 408, or equivalent locations identifiable through fixed structures such as access stairs, offsets from storm drains, etc.). The beach berm width measurements shall be recorded each month and results shall be included in the annual post-construction reporting. The date, time and tidal conditions for all measurements shall be recorded and signed by the person(s) who has undertaken the measurements.

(3) *Wetted Bound Surveys:* The location of the wetted bound, from Point Lechuza to the eastern limit of the revetment or nourishment, whichever is farther east, shall be recorded monthly, at the same time as the beach berm width measurements and plots of each wetter bound survey shall be prepared and included in the annual post-construction reporting. The date, time and tidal conditions for all wetted bound plots shall be recorded and signed by the person(s) who has undertaken the survey.

(4) *Trancas Estuary Mouth Changes*: The applicant shall conduct visual surveys of the Trancas estuary mouth on a monthly basis for the purpose of recording changes in the estuary system and morphology of the estuary mouth.

(5) *Aerial Photography*: Aerial photographs of the subject reach (covering, at a minimum, the entire project reach and all 9 transect locations shall be taken concurrent with the fall season beach profile on an annual basis to provide a continuous assessment of the shoreline for one year prior to the commencement of development and for a period of 10 years after initial construction.

(6) *Post-Construction Reporting Requirements*: The applicant shall submit an annual monitoring report, for the review and approval of the Executive Director, for a period of 10 years after initial construction is complete. The monitoring report shall be submitted on an annual basis and shall include all survey data (full beach profile surveys, beach berm width measurements, wetted bound surveys, Trancas estuary mouth changes, and aerial photographs) and a written report prepared by a qualified coastal engineer indicating the results of the shoreline profile and beach width monitoring program. The monitoring report shall include conclusions regarding the level of success of the project, a detailed analysis of any change in shoreline position, increase or decrease in beach widths and footprint of dune systems within the project reach, details on any nourishment efforts undertaken during the year with the volume and placement location specified, and any back passing operations that took place. More specifically, the report shall include, but not be limited to, the following:

- Quantification of the volumetric change in the beach and dune for each survey period, using the pre-project condition (2014 or 2015) as the baseline.
- Analysis of the seasonal and interannual changes in width and length of dry beach, subaerial and nearshore slope, offshore extent of nourished toe for profiles within the nourishment area, and overall volume of sand in the profile; changes in dune profile; and, estimates of the rate and extent of transport of material up- and down-coast from the beach nourishment receiver site.
- Comparison of the actual changes to the shoreline in relation to the predicted changes that were anticipated based on the results of the Pre-construction numerical and physical modeling.
- Analysis of the expected time period over which the beach benefits related to the initial nourishment volume can be identified as distinct from background conditions; and qualify any abnormal wave and current conditions that could account for changes to the beach outside what was anticipated.
- Provision of cumulative data detailing the annual quantity and placement of material, including interaction of the replenishment project with other beach replenishment projects or other shoreline projects that occur in the project area or in the same littoral cell.
- Utilization of aerial photographs, to the extent feasible, to prepare a summary of beach width and dune profile changes.
- Conclusions regarding the level of success and any adverse effects, including any observed beach/dune erosion and any changes in the frequency that the Trancas Estuary mouth opens and closes and/or changes to the duration the estuary mouth remains open/closed. The report shall include a brief history of all previous

years' monitoring results to track changes in shoreline, dunes, and estuary mouth conditions.

5. Final Revised Dune Habitat Restoration and Monitoring Program

Prior to issuance of the Coastal Development Permit, the Permittee shall submit, for the review and approval of the Executive Director, two (2) copies of a Final Revised Dune Habitat Restoration and Enhancement Program. The Program shall provide for the restoration and enhancement of coastal strand and southern foredune habitat on-site, at a minimum ratio of 3:1 (restored area to impacted area), as mitigation for 3.62 acres of impacts to existing dune habitat that resulted from the installation of the as-built sandbag seawall, as-built rock revetment, and relocated rock revetment as required pursuant to Special Condition 1(A). The Program shall be prepared by a qualified biologist(s), ecologist(s), or resource specialist(s), hereafter, referred to as the environmental resource specialist(s), with experience in the field of dune restoration, beach ecology, and marine biology. The permittee shall provide the environmental resource specialist's qualifications, for the review and approval of the Executive Director, prior to Program development. The Program shall be in substantial conformance with the "Conceptual Foredune Creation and Enhancement Plan," by WRA Environmental Consultants, dated October 15, 2013, but shall be revised to provide for the following requirements:

A. Dune Habitat Restoration and Enhancement Plan

(1) *Restoration/Enhancement Area Footprint.* The dune habitat restoration/enhancement area on-site shall generally include a footprint that extends from the property at 31350 Broad Beach Road to the property at 30708 Broad Beach Road, and that begins as far landward as feasible (at a stringline of approved development across the subject properties) and extends seaward to the expected maximum wave uprush limit. The stringline of approved development that is to be the landward limit of the dune restoration/enhancement area shall be generally located at the seaward edge of any legally existing residential structures, patios/decks. Sandy beach areas where existing septic leach fields are located seaward of the stringline shall be revegetated with native dune plant species and mounding techniques using minor amounts of sand fill material without the use of heavy equipment. The stringline for the landward limit of dune restoration shall be configured in a manner that maintains a relatively straight or gently curving line as generally depicted in **Exhibit 8b**. Short segments of the landward limit of the dune restoration stringline may be located further seaward if necessary to avoid creating sharp angles in the configuration of the dune restoration area. Restoration/enhancement of the landwardmost areas within the above described dune habitat restoration/enhancement area shall be prioritized.

(2) *Dune Specifications.* The dune habitat restoration/enhancement area shall be designed and contoured based on natural dune morphology (using historical records of the area and the most proximal reference site(s)). The footprint and the number of dune ridges shall increase from west (upcoast) to east (downcoast) across the restoration area. For instance, there shall be one dune ridge at the west (upcoast) end of the restoration area, transitioning to two and, if adequate area is available, three ridges, at the east (downcoast) end. The restored and enhanced dune ridges shall be oriented

perpendicular to the prevailing wind direction (estimated to be WNW or about 60 degrees west of north) with dune faces that have a slope no steeper than 3:1. The Plan shall include a grading plan that includes a detailed description of dune restoration and enhancement (dune creation) timing, phasing, daily schedule aspirations, methods including equipment to be used, staging area location(s), and relationship to the beach nourishment program. The plan must include an explanation of how the grading activities meet these requirements. For the portion of the restoration/enhancement area between the top of revetment and the stringline of approved development pursuant to Subsection 1 above, restoration shall be limited to minor mounding, removal of non-natives and invasive plant species, and planting of native plant species (without the use of significant grading or sand placement) where existing septic leach fields are located.

The dune habitat restoration/enhancement plan design shall include Best Management Practices to maximize the success of restoring and enhancing natural dune system physical and biological processes and functions. Discontinuous sand fencing that is placed perpendicular to the prevailing wind direction shall be temporarily employed to facilitate establishment of dune hummocks. In addition to sand fencing, the design shall include strategic placement of native dune vegetation for dune hummock establishment. Temporary sand fencing and strategic planting, rather than motorized equipment, shall be employed to establish a natural pattern of dune hummocks. Drainage/runoff control measures and creation of dune swales (low areas between dune ridges) shall also be used to function as natural drainage devices within the dune system.

(3) *Dune Sand Source and Composition.* Sand source and composition within the dune habitat restoration/enhancement area shall be consistent with the specifications of Special Condition 8 (Sediment Analysis and Monitoring). Existing native beach sand in the project area that is excavated for relocation of any portion of the as-built emergency rock revetment (pursuant to Special Condition 1) shall be temporarily stockpiled during beach nourishment and construction activities and then applied as a top layer on the landwardmost portions of the restored dunes to facilitate successful reestablishment of dune vegetation on site. Prior to application of the native sand on the restored dunes, non-native and invasive plant species shall be removed to the maximum extent feasible.

(4) *Dune Planting.* The dune habitat restoration/enhancement plan shall include a planting plan using native coastal strand and southern foredune plant species (plant palette) including the number of container plants and amount (lbs.) of seeds, source of plant material, provision for collection, storage, propagation and use of existing native plants, and plant installation methods. The plant palette shall be made up exclusively of native plants appropriate to the habitats and region, grown from seeds or vegetative materials obtained from the site or from an appropriate nearby beach location to maintain the genetic integrity of the area. No horticultural varieties, and no coastal bluff or back dune species shall be used (e.g. *Artemisia californica, Ericameria ericoides, Eriogonum parvifolium, Perritoma arborea, Rhus intergrifolia*). The plan shall also include an exhibit that shows the planned locations,

numbers, and spacing of the individual plant species, i.e. that depicts their distribution and abundance across the restoration area. The plan shall include sufficient planting plan technical detail including a description of planned site preparation, method and location of exotic species removal (all non-native plant material shall be removed from the restoration/enhancement area including *Carpobrotus edulis*, highway iceplant), timing of planting, temporary irrigation plans if necessary, and maintenance timing and techniques. The abundance, distribution, and percent cover of native coastal strand and southern foredune plant species shall be based on historical records, the literature, and/or the most proximal reference site(s). The planting plan shall incorporate the recommendations regarding soil preparation, planting palettes, and revegetation techniques that are contained in the "Analysis of Dune Restoration associated with the Broad Beach Restoration Project," by Coastal Restoration Consultants, Inc. dated September 23, 2015.

(5) *Access Paths and Fencing.* The dune habitat restoration/enhancement plan shall incorporate a maximum of one shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every two residences adjacent to the restoration area both of which have less than a sixty foot frontage, and one non-shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every residence with a frontage of sixty feet or more. The private beach access paths shall extend through the restored dune system out to the shore from the private properties and the paths shall not exceed 3 feet in width, with the exception that the Malibu West Beach Club located at 30756 Broad Beach Road may maintain its own separate 10 ft. wide beach access path. Further, the dune restoration and enhancement area shall incorporate a 10 foot wide public pedestrian path (natural sand path) running generally parallel to the shore and located immediately landward of the entire length of the approved rock revetment, as relocated/reconfigured pursuant to Special Condition 1 above. The public pedestrian path shall be bordered by symbolic post and cable/rope fencing to maintain dune processes to the greatest extent possible (e.g. water, sand, plant, and animal movement/dispersal). No fencing, other than necessary sand fencing as provided in subpart 2 above, shall be placed seaward of the revetment.

(6) *Signage.* Signs shall be installed and maintained in conspicuous locations along the approved accessways adjacent to the restoration/enhancement area (excluding the public pedestrian path immediately landward of the revetment, signage for which is addressed by Special Condition 15), to notify the public and residents that the area is a sensitive habitat restoration area and to keep out of the dune restoration areas. The signs shall indicate "Habitat Restoration In Progress: Please Keep Out of Dune Restoration Area", or alternative language that is substantially similar. Similar signage shall be installed at or near the seaward most limit of dune vegetation ("Vegetation Line") once dune restoration has commenced, but that signage shall indicate that if the wet sand ever comes to within 25 feet of the Vegetation Line, the area available for public access will extend 25 feet inland from the wet sand, even though that will encroach into the dune habitat restoration/enhancement area.

Interpretive signage shall also be placed within or adjacent to the two Los Angeles County vertical public accessways generally describing the approved project, including identification of sensitive habitats in the area; the public access features/requirements incorporated into the project and the role of various Local/State/Federal agencies and stakeholder groups who contributed to the formation of the project. The signage shall blend in with the surrounding natural environment and not detract from the character of the area, and with the exception of signage approved pursuant to Special Condition 15, in no instance shall signs be posted which read "*Private Beach*" or "*Private Property*." The location, size, design, and content of all signs to be installed shall be specified in the plan, for the review and approval of the Executive Director. Signs that become subject to erosion shall be relocated or removed.

(7) *Maintenance.* The plan shall include provisions for on-going maintenance and/or management of the dune habitat restoration/enhancement area for the term of this coastal development permit. At a minimum, semi-annual maintenance and/or management activities shall include, as necessary, debris removal, periodic weeding of invasive and non-native vegetation and replacement planting consistent with the approved plan.

(8) *Implementation.* The approved dune habitat restoration/enhancement plan shall be implemented within 90 days of the completion of initial beach nourishment activities. The Executive Director may grant additional time for good cause.

B. Monitoring Program

A monitoring program shall be designed and implemented to provide data that will guide the dune habitat and enhancement plan and direct any adaptive management actions that will increase the likelihood that the enhancement and restoration will be successful. The monitoring program shall provide, at a minimum, for the following:

(1) *Performance Standards*: Determination of annual and final performance standards selected based on a reference site (s) and/or the literature. The performance standards shall relate logically to the goals of the dune habitat restoration and enhancement plan and include standards for special status species, species diversity, vegetative cover, and approximate dispersion patterns of major species. Native plant cover shall not exceed that found in southern California coastal strand and southern foredune natural habitats. The rationale for the selection of each performance standard must be explained.

(2) *Procedure for Judging Success*: Detailed description of the qualitative and quantitative sampling methods and statistics intended to be used to monitor dune habitat restoration and enhancement shall be provided.

(3) *Initial Monitoring Report*: Submission of a written report, prepared by a qualified environmental resource specialist, upon completion of the initial dune habitat restoration and enhancement work, for the review and approval of the Executive Director. The

report shall document completion of the initial work and include photographs taken from pre-designated sites (annotated to a copy of the site plans).

(4) *Interim Monitoring Reports*: After initial dune habitat restoration and enhancement work is completed, the applicant shall submit, by no later than December 31st each year, for the review and approval of the Executive Director, annual monitoring reports prepared by a qualified environmental resource specialist indicating the progress and relative success or failure of the dune habitat restoration and enhancement. These reports shall also include recommendations for modifications or new approaches that would help the project meet the performance standards. These report shall also include photographs taken from pre-designated sites (annotated to a copy of the site plans) indicating the dune habitat restoration and enhancement progress at each of the sites. Each report shall be cumulative and shall summarize all previous results. Each report shall also include a "Performance Evaluation" section where information and results from the monitoring program are used to evaluate the status of the dune habitat restoration and enhancement project in relation to the interim and final performance standards.

(5) *Final Report*: Prior to the date that authorization for the approved development expires, a final dune habitat restoration and enhancement report shall be submitted for the review and approval of the Executive Director. If the report indicates that the dune habitat restoration and enhancement project has, in part, or in whole, been unsuccessful, based on the specified performance standards, the applicant(s) shall submit within 90 days a revised or supplemental restoration program to compensate for those portions of the original program that did not meet the approved performance standard (s), and shall implement the measures that must be taken to reach the specified performance standard. The revised or supplemental program shall be processed as an amendment to this permit

C. Dune Habitat Restoration and Enhancement Area Open Space Restrictions

No development, as defined in Section 30106 of the Coastal Act, shall occur within the final approved Dune Habitat Restoration and Enhancement area pursuant to Special Condition 5 of this permit except as otherwise specified pursuant to this condition. It is recognized that the seaward limit of the dune system and dune vegetation within the approved restoration area is ambulatory in nature and that, therefore, the seaward extent of the area subject to this open space restriction is also ambulatory in nature. This restriction shall in no way be interpreted to limit or restrict the area of beach available for lateral or vertical public access pursuant to Special Conditions 13 and 14 of this permit. Development allowed within Dune Habitat Restoration and Enhancement area shall be limited to:

(1) Dune habitat restoration undertaken in accordance with the final approved dune habitat restoration and enhancement plan approved pursuant to Special Condition 5.

(2) Maintenance of existing drainage improvements

(3) Construction and maintenance of the approved rock revetment, beach nourishment/renourishment (including backpassing activities), drainage and polluted runoff control activities, public and private access paths, and other public access improvements (including fencing and signage) required and approved pursuant to Special Conditions 1, 3, and 13-15 of this permit.

Prior to issuance of the Coastal Development Permit, the applicant shall submit a written agreement, in a form and content acceptable to the Executive Director, incorporating all of the above terms of this condition.

D. The Permittee shall undertake development in accordance with the final approved plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Coastal Commission - approved amendment to the coastal development permit, unless the Executive Director determines that no amendment is legally required.

6. Long-Term Marine Resources Monitoring, Reporting, and Mitigation plan

A. ***Prior to issuance of the Coastal Development Permit***, the applicant shall submit to the Executive Director, for review and written approval, a final "Marine Habitat Monitoring and Mitigation Plan" for biological resources including subtidal rocky habitats (e.g. kelp forest, rocky reef, surfgrass), subtidal habitats comprised of unconsolidated sediment (e.g. eelgrass, sand dollar beds, pismo clam beds), rocky intertidal habitats (bedrock, boulders, cobble, surfgrass) and supralittoral and intertidal sandy beach habitats. The monitoring and mitigation plan shall provide an overall framework to guide monitoring of these marine habitats in and immediately adjacent to the project footprint as well as marine habitat reference sites, and provide mitigation options for potential impacts to subtidal and intertidal marine habitats. The monitoring and mitigation plan shall be developed in consultation with state and federal agencies including the California Department of Fish and Wildlife, State Water Resources Control Board, California State Lands Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Army Corp of Engineers, and the Environmental Protection Agency. A Science Advisory Panel (SAP) will be established to oversee marine habitat monitoring and any required mitigation. The SAP will review and guide development of the marine habitat monitoring and mitigation plan and advise the Executive Director regarding final plan approval.

B. **Science Advisory Panel:** An expert panel consisting of a minimum of three marine scientists with expertise on nearshore habitats, including at least one member with expertise in experimental design and biostatistics, shall be established by the Commission. The panel shall be paid by the applicant through the Commission. The Science Advisory Panel (SAP) shall review and guide development of the final marine habitat monitoring and mitigation plan including the selection of reference sites, sampling methodology, analytical techniques, criteria for determination of adverse impacts, and mitigation options for the various marine habitats. The SAP shall also review the monitoring results and annual reports as they come in and advise the Executive Director of the Coastal Commission (and consult with State Lands Commission staff) regarding project status and their conclusions and recommendations for potential adaptive management actions. If marine habitat monitoring demonstrates that there have been adverse impacts to one or more marine habitats, the SAP shall review and guide development of specific habitat mitigation and monitoring plans.

C. **Science Advisory Panel Administrative Structure:** Costs for participation of the SAP shall include travel, per diem, meeting time, and reasonable preparation time. The amount of funding will based on a SAP budget prepared by the Executive Director in consultation with the applicant. The final SAP budget and funding shall be approved by the Executive Director and applicant prior to issuance of the Coastal Development Permit. In the event that agreement on a SAP budget and work program cannot be reached between the Executive Director and the applicant, the matter will be brought before the Commission for a final resolution. Total costs for such advisory panel shall not exceed $180,000 per year adjusted annually by any increase in the consumer price index applicable to California.

D. **Marine Habitat Monitoring Plan:** The marine habitat monitoring plan shall describe the sampling methodology, analytical techniques, and criteria for determining whether the implementation of the approved project has adverse impacts upon the respective marine habitats and shall include, at a minimum, the following:

(1) *Existing Conditions*. The Plan shall include a description and historical review of the marine resources located within the project area including subtidal rocky habitats (e.g., kelp forest, rocky reef, surfgrass), subtidal habitats comprised of unconsolidated sediment (e.g., eelgrass, sand dollar beds), rocky intertidal habitats (Lechuza Point and boulder field) and sandy beach habitats in the vicinity of the beach replenishment project. The historical review must include a summary of past quantitative sampling and survey work (e.g. yearly kelp canopy areal extent data from 1984 to present, and Partnership for Interdisciplinary Studies of Coastal Oceans, State Water Resources Control Board Areas of Special Biological Significance, Marine Protected Area Monitoring Enterprise, and Multi-Agency Rocky Intertidal Network survey work) conducted on these habitats in order to document trends in species composition, habitat areal extent, and temporal changes for comparison with the post-project marine habitat monitoring findings.

(2) *Monitoring Objectives.* The monitoring objectives must include:

a. Fine scale mapping of the marine habitats listed in section A above,
b. Identification of any adverse impacts to the sandy beach ecosystem resulting from sand replenishment with source sand that does not match existing beach sand,
c. Identification of direct or indirect adverse impacts to subtidal or intertidal habitats resulting from the proposed project,
d. Identification of likely causes of any documented adverse impacts (burial, scouring, turbidity, sand grain size, etc.),
e. Recommendations for adaptive management (e.g., future sand replenishment grain size adjustments, volume of future sand replenishment, sand placement adjustments) to avoid continuing adverse impacts, if adverse impacts are detected.

(3) *Monitoring Design.* Monitoring must be divided into two distinct phases utilizing the same monitoring design:

a. Spring and fall pre-construction monitoring initiated one year prior to project construction. If two seasons of pre-construction monitoring are not feasible, pre-construction spring monitoring must be conducted. In addition, existing data from other programs (e.g., PISCO) may be used if deemed appropriate by the SAP. The purpose of pre-construction monitoring is to establish pre-project ecological (physical and biological) baseline conditions.

b. Post-construction monitoring for 10 years (life of the permit) after construction is complete. The highly dynamic nature of the nearshore marine ecosystem and the potential for one or more marine habitats to be adversely impacted by the project must be considered in determining the frequency of monitoring (i.e. the frequency of the respective methods employed for monitoring).

(4) *Monitoring Methods***.** The plan must include monitoring methods and a schedule for their execution with the intention of meeting the monitoring objectives; specifically, methods to monitor for and quantify potential direct and indirect adverse impacts upon one or more of the marine habitats listed in section A above. The applicant shall consider using the following methods in the final "Marine Habitat Monitoring and Mitigation Plan". The monitoring methods and schedule shall be developed in close consultation with the SAP for the review and approval of the Executive Director.

a. <u>Remote Sensing</u>. Remote sensing techniques shall be employed to map rocky subtidal (with and without kelp) and rocky intertidal (with and without surfgrass) habitats in the project area and a minimum of two reference site outside the influence of the project area with the highest accuracy possible.

i. Multi-Spectral Aerial Surveys
Multi-spectral aerial surveys, similar to that employed by the applicant in July 2014, using an airplane fitted with specialized camera equipment designed to capture imagery within a specific array of spectral bands optimized to discern coastal marine habitats including kelp forest, understory canopy algae, eelgrass, and surfgrass. Survey results shall be groundtruthed.

ii. Multi-beam and Sidescan Sonar
Multi-beam and sidescan sonar surveys, similar to that conducted by the applicant in May 2014, to distinguish surficial features and to map nearshore marine benthic habitat types.

b. <u>Subtidal and Intertidal Field Monitoring.</u> The subtidal and intertidal monitoring methods employed must be capable of discriminating between habitats influenced by sand inundation and habitats rarely or never influenced by sand inundation, the length of time respective habitats have been inundated with sand, and the sand source (natural or project derived). The subtidal marine habitats that must be monitored are rocky bottom (with and without kelp) and unconsolidated substrates (with and without eelgrass). The intertidal habitats that must be monitored are Lechuza Point and the boulder field east of Lechuza Point and the sandy beach   A minimum of two reference sites for each of the above habitat types must be monitored. The reference sites should be as close as possible to the potential impact area within an area outside the project's influence.

The marine habitat monitoring locations in the immediate project area must be established based on the project footprint and model-predicted sedimentation patterns, after consultation with the applicant, resource agencies, and the SAP. Reference site locations must be based on proximity and similarity to the respective marine habitats in the project area, after consultation with the applicant, resource agencies, and the SAP. Eelgrass mapping must be in substantial conformance with NOAA's California Eelgrass Mitigation Policy and Implementing Guidelines published in October 2014.

In order to assess whether the macroinvertebrate assemblage that colonizes Broad Beach following sand replenishment is what would be there but for on-going disturbance, a minimum of two undisturbed beaches within the Malibu littoral cell, as well as the section of Broad Beach in the project footprint, must be monitored. The undisturbed beaches must be chosen based on having sand characteristics as similar as possible to the existing Broad Beach sand (well sorted, D50 =0.25), having similar geomorphology (intermediate dissipative beaches) that face in the same general direction, and having the same general wave regime. In addition to these beaches, the section of Broad Beach west of the replenishment project and Zuma Beach east of the replenishment project must be monitored.

The beach monitoring methods must be capable of determining; 1) whether the portion of Broad Beach covered by quarry sand develops a sandy beach macroinvertebrate fauna similar to the reference beaches, and, 2) whether the project adversely impacts the beach ecosystem west and east of the project. The beach monitoring methods must be designed to identify approximately 80% of the organisms present; in order to capture this percentage of the community, approximately 3 square meters of surface area must be surveyed (Schlacher et al. 2008). In order to compare results to past surveys, the beach sampling must employ 10 cm diameter by 20 cm deep cores and sieve the samples using a 1.5mm/1.0mm aperture sieve. This monitoring shall be conducted before construction in the spring and fall and semi-annually in spring and fall for the life of the project at the replenished beach, the reference beaches and the beach west of the replenished beach and the beach east of the replenished beach.

The subtidal and intertidal monitoring must be designed to pick up, at a minimum, a 20% change between the respective impact and reference sites. That is, the monitoring must be designed to have an 80% chance of picking up a 20% change. This is sometimes referred to as the 20, 20, 20 rule where Type I error (the null hypothesis is true but rejected) or alpha is set at .20, Type II error (the null hypothesis is false but accepted) or beta is set at .20, and power is equal to 1-beta or .80.

(5) *Criteria for Detecting Adverse Impacts.* The Plan must include criteria for determining whether the project has resulted in direct or indirect adverse impacts upon one or more of the marine habitats described in Section A, above. The criteria must be amenable to quantitative assessment and must include estimates of the areas of kelp forest, eelgrass, and surfgrass lost as a result of the project.

(6) *Monitoring Reports.* Annual reports that review the results of past monitoring and report on the most recent work must be submitted no later than December 31st of each year for review by the SAP and review and approval by the Executive Director. A report at the end of 5 years shall determine whether adverse impacts to marine habitats have occurred as a result of the project as required pursuant to special condition 2C. If adverse impacts are detected that is when the need for mitigation will be determined.

E. Marine Habitat Mitigation and Monitoring. If adverse impacts are detected, mitigation will be required. The mitigation ratio for impacts upon subtidal rocky or intertidal rocky habitat shall be mitigated at a minimum of 4:1 because of the uncertainty and difficulty of mitigating for these habitats. Adverse impacts upon eelgrass shall be mitigated according to the California Eelgrass Mitigation Policy.

Upon detection of adverse impacts upon one or more habitats, the applicant, in consultation with the SAP, shall develop a habitat specific mitigation plan for each impacted habitat that will provide the overall framework to guide the mitigation work, for review and approval of the Executive Director. The revised mitigation and monitoring program shall be processed as an amendment to the coastal development permit unless the Executive Director determines that no permit amendment is required.

7. Biological Monitoring During Construction and Pre-Construction Surveys

The applicant shall retain the services of a qualified biologist or environmental resources specialist (hereinafter, "environmental resources specialist") with appropriate qualifications acceptable to the Executive Director, to monitor the site during construction and beach nourishment activities and conduct sensitive species pre-construction surveys. Prior to the commencement of development, the applicant shall submit the contact information of all monitors with a description of their duties and their on-site schedule to the Executive Director for review and approval. The applicant shall ensure that the Environmental Specialist shall perform all of the following duties, and the applicant shall observe the following requirements:

A. The environmental resource specialists shall: (1) conduct a survey of the project site to determine presence and behavior of sensitive species one day prior to commencement of any construction activities and/or the commencement of any beach nourishment/backpassing activities on the project site, (2) immediately report the results of the survey to the applicant and the Commission, and (3) monitor the site during all construction activities related to the revetment relocation and/or any beach nourishment activities (initial nourishment, renourishment, interim nourishments, or backpassing) on the project site.

B. In the event that the environmental resources specialist reports finding that any sensitive wildlife species (including but not limited to western snowy plover or California grunion) exhibit reproductive or nesting behavior, the applicant shall cease work and immediately notify the Executive Director and local resource agencies. Project activities shall resume only upon written approval of the Executive Director.

C. Prior to construction activities and/or the commencement of any beach nourishment/backpassing activities, the applicant shall have the environmental resource specialist conduct a survey of the project site, to determine presence of California grunion during the seasonally predicted run period and egg incubation period, as identified by the California Department of Fish and Wildlife. If the environmental resources specialist determines that any grunion spawning activity is occurring and/or that grunion are present in or adjacent to the project site, then no construction, maintenance, grading, or grooming activities shall occur on, or adjacent to, the area of the beach where grunion have been observed to spawn until the next predicted run in which no grunion are observed. Surveys shall be conducted for all seasonally predicted run periods in which material is proposed to be placed at any of the above sites. If the applicant is in the process of placing material, the material shall be graded and groomed to contours that will enhance the habitat for grunion prior to the run period. Furthermore, placement activities shall cease in order to determine whether grunion are using the beach during the following run period. The applicant shall have the environmental resource specialist provide inspection reports after each grunion run observed and shall provide copies of such reports to the Executive Director and to the California Department of Fish and Wildlife.

D. Prior to initiation of daily project activities, the resource specialist shall examine the beach area to preclude impacts to sensitive species. Project activities, shall not occur until any sensitive species (e.g., western snowy plovers, etc.) have left the project area or its vicinity. In the event that the environmental resource specialist determines that any sensitive wildlife species exhibit reproductive or nesting behavior, the applicant shall cease work, and shall immediately notify the Executive Director and local resource agencies. Project activities shall resume only upon written approval of the Executive Director. The applicant shall cease work should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. The environmental resource specialist(s) shall require the applicant to cease work should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. The environmental resource specialist(s) shall also immediately notify the Executive Director if development activities outside of the scope of this coastal development permit occur. If significant impacts or damage occur to sensitive wildlife species, the applicant shall be required to submit a revised, or supplemental program to adequately mitigate such impacts.

E. Turbidity. The environmental resource specialist shall visually monitor and document the turbidity of coastal waters during all beach nourishment or backpassing activities. The extent and duration of turbidity plumes shall be recorded and mapped by the monitor during each day of disposal activities. If the turbidity plume is observed to reach kelp beds or eelgrass beds, beach nourishment or backpassing shall be terminated until the turbidity plume has dissipated. If turbidity levels are significantly above ambient levels for more than three (3) consecutive days, then the rate of sand placement shall be reduced so that large, long lasting turbidity plumes are no longer created. After all sand placement operations have ceased, the applicant shall monitor and document the extent and duration of any lasting turbidity plume. The final results of all turbidity monitoring shall be reported to the Commission within 30 days following each beach nourishment and backpassing operation.

F. The applicant shall submit documentation prepared by the environmental resource specialist which indicates the results of each pre-construction survey, including if any sensitive species were observed and associated behaviors or activities. Location of any nests observed shall be mapped.

8. Sediment Analysis and Testing

A. *Prior to issuance of the Coastal Development Permit*, an engineer(s) or environmental professional(s), with appropriate qualifications acceptable to the Executive Director, shall prepare a Sampling and Analysis Plan for the review and approval of the Executive Director. The Sampling and Analysis Plan shall address the physical and chemical sediment testing at the source site, and shall be consistent with the following:

(1) <u>Sampling Frequency</u> – Samples shall be collected throughout the source area, with one (1) sample per 0.5 acres, and a minimum of five (5) samples per source site for contaminant testing and a minimum of four (4) samples per source stockpile site for testing grain size, color, particle shape, and debris. Stockpile areas shall be divided into relatively equal areas (such as quadrants or cells) to provide representative samples of the source sand. The stockpile sampling depth shall extend approximately one-foot (1-ft) beyond the anticipated stockpile height. At a minimum, sample quantities shall be sufficient for appropriate testing; archive samples for chemical testing shall be maintained; archive samples for grain size testing are optional.

(2) <u>Contaminants</u> -- Based on U.S. EPA Tier I analyses results, Tier II bulk chemical analysis shall be conducted on representative composite samples of each source material proposed for placement at the Broad Beach deposition site. The material shall be analyzed for consistency with EPA, ACOE, State Water Resources Control Board and RWQCB requirements for beach replenishment. At a minimum, the chemical analysis shall be conducted consistent with the joint EPA/Corps *Inland Testing Manual*. If the ACOE / EPA, State Water Resources Board or RWQCB determine that the sediment exceeds Effects Range Medium (ER-M) contaminant threshold levels as specified by the U.S. EPA, the materials shall not be placed at the site.

(3) <u>Grain Size</u> – Grain size analysis shall be conducted on the representative stockpile samples, using a single composite sample prepared with equal volumes from each representative sampling site. Samples shall be sieved, consistent with the American Society for Testing and Materials (ASTM) D 422-63 (Standard Test

Method of Particle Size Analysis of Soils, ASTM, 2007 or as updated). Gradation curves shall be generated for each composite representative stockpile site to develop the d_{84}, d_{50} and d_{16} for visual and quantitative comparison with the established Broad Beach grain size envelope and the grain size limitations identified in Part C (Deposition of Source Material) of this condition.

(4) Color -- Color classification shall be conducted on representative samples of each source material proposed for placement at Broad Beach. The color shall reasonably match the color of the receiving beach after reworking by wave action.

(5) Particle Shape – Particle shape classification shall be conducted on representative samples of each source material proposed for placement at Broad Beach. For beach replenishment, 90% or more of the source material shall consist of rounded particles (i.e., maximum of 10% angular particles).

(6) Debris Content – A visual inspection of the source location shall be conducted to determine the presence and types of debris such as trash, wood, or vegetation. The amount of debris within the material shall be estimated, as a percentage of the total amount of source material. Prior to placement of source material at Broad Beach, all such debris material shall be separated from the sand material (by mechanical screening, manual removal or other means) and taken to a proper disposal site authorized to receive such material.

(7) Compactability – Chemical and visual inspections of the source location shall be conducted to determine the presence of elements such as iron oxides which can compact to form a hardpan surface. Source material with compactable material shall be considered for placement below the mean high tide only.

B. Results from sediment testing for contaminants, grain size, color, particle shape, debris content, and compactability shall be provided to the Executive Director for review and approval prior to each separate placement of sand at the approved Broad Beach nourishment area.

C. Deposition of source material shall occur consistent with the following:

(1) Source material that does not meet the applicable physical, chemical, color, particle shape, debris, and/or compactability standards for beach replenishment shall not be used. Specifically, the source material must meet the following specifications:

a. The source material to be used for beach nourishment purposes can only contain no more than 10% fine material that is 0.074mm in size or smaller.

b. The source material to be used for beach nourishment purposes can contain no more than 10% coarse material greater than 2.0 mm in size, and no more than 1% of material that is 4.76mm and larger.

c. The D_{50} for the source material to be used for beach nourishment and dune creation purposes must be within the range of 0.25 mm to 0.6 mm.

d. All grain size limits shall be based upon weekly averages of multiple daily samples from the delivery trucks or stockpile area.

(2) Each report on sediment analysis shall include confirmation by the U.S. Army Corps of Engineers and California Regional Water Quality Control Board that the material proposed for beach replenishment meets the minimum criteria necessary for placement on a sandy beach. If deemed necessary by the Regional Water Quality Control Board, the analysis will also include such confirmation from the State Water Resources Control Board regarding consistency with the 2012 Ocean Plan and any other regulations applicable in an Area of Special Biological Significance.

9. Construction and Operational Timing Constraints

It shall be the applicant's responsibility to assure that the following timing restrictions are observed, both concurrent with, and after completion of, all project operations:

a. All project activities, with the exception of monitoring, shall occur Monday through Friday, excluding state holidays. No work shall occur on Saturday or Sunday.

b. All work shall take place during daylight hours, except for truck arrival and departure within the limits of the existing Zuma Beach parking lot, which may occur until 9pm at night. The lighting of the beach area is prohibited unless, due to extenuating circumstances, the Executive Director authorizes non-daylight work and/or beach lighting.

c. All construction operations, including operation of equipment, material placement, placement or removal of equipment or facilities, restricting public access, and backpassing/beach renourishment or other activities (with the exception of habitat restoration/revegetation) shall be prohibited as follows:

   i. From the Friday prior to Memorial Day in May through Labor Day in September to avoid impacts on public recreational use of the beach and other public amenities in the project vicinity, unless, due to extenuating circumstances, the Executive director authorizes such work.

   ii. On any part of the beach and shorefront in the project area when California grunion (including eggs) are present during any run periods and corresponding egg incubation periods, as documented by the surveys conducted pursuant to Special Condition 7, to avoid impact on the spawning of the California Grunion.

   iii. On any part of the beach and shorefront in the project area when western snowy plover are present, as identified by the surveys conducted pursuant to Special Condition 7, to avoid adverse effects to western snowy plovers.

10. Construction and Operational Responsibilities

It shall be the applicant's responsibility to assure that the following requirements are observed both concurrent with, and after completion of, all project operations:

a. All construction materials and equipment placed on the beach during daylight construction hours shall be stored beyond the reach of tidal waters. All construction materials and equipment shall be removed in their entirety from the beach area by sunset each day that work occurs.

b. Staging areas shall be used only during active construction operations and will not be used to store materials or equipment between renourishment/backpassing operations.

c. During construction, washing of trucks, paint, equipment, or similar activities shall occur only in areas where polluted water and materials can be contained for subsequent removal from the site. Wash water shall not be discharged to the storm drains, street, drainage ditches, creeks, or wetlands. Areas designated for washing functions shall be at least 100 feet from any storm drain, water body or sensitive biological resources. The location(s) of the washout area(s) shall be clearly noted at the construction site with signs. In addition, construction materials and waste such as paint, mortar, concrete slurry, fuels, etc. shall be stored, handled, and disposed of in a manner which prevents storm water contamination.

d. Construction debris and sediment shall be removed from construction areas as necessary to prevent the accumulation of sediment and other debris which may be discharged into coastal waters. Any and all debris resulting from construction activities shall be removed from the project site within 24 hours. Debris shall be disposed at a debris disposal site outside of the coastal zone or at a location within the coastal zone authorized to receive such material.

e. At the completion of the initial beach nourishment operation and any future beach supplemental beach nourishment and backpassing activities, the sand deposited on the beach shall be graded and groomed to natural beach contours to restore the shoreline habitat and to facilitate recreational use at least one month prior to Memorial Day in May. Disturbance to wrack and coastal strand habitat shall be minimized to the extent feasible.

f. During all beach nourishment activities authorized pursuant to this permit, the applicant shall be responsible for removing all unsuitable material or debris within the area of placement should the material be found to be unsuitable for any reason, at any time, when the presence of such unsuitable material/debris can reasonably be attributed to the placement material. Debris shall be disposed at a debris disposal site outside of the Coastal Zone or at a location within the Coastal Zone authorized to receive such material.

g. The Permittee shall notify planning staff of the California Coastal Commission's South Central Coast District Office at least 3 working days in advance of commencement of any construction/nourishment/backpassing activities, and immediately upon completion of such activities.

11. Future Maintenance Authorized

By acceptance of this permit, the applicant acknowledges and agrees to the following:

A. Future maintenance and repair of the rock revetment between 31350 Broad Beach Road and 30760 Broad Beach Road may be completed without a new coastal development permit for a period of 10 years commencing from the date of Commission action on this permit (until October 9, 2025) consistent with the following limitations (any other proposed maintenance or repair, and any maintenance or repair of the rock revetment after October 9, 2025, may require the issuance of an amendment to this coastal development permit or a new coastal development permit from the California Coastal Commission):

(1) Prior to the commencement of any such repair or maintenance work, the applicant must obtain written authorization from the Executive Director of the California Coastal Commission. The permittee shall submit a written report prepared by a professional engineer, for the review and approval of the Executive Director, identifying the proposed maintenance and repair work, method for performing work, analysis of the necessity for the work, and a quantification of any additional rock to be added to the revetment. The maintenance and repair report shall be submitted at least 60 days in advance of the proposed work to allow time for review by the Executive Director. The Executive Director's review will be for the purpose of ensuring that the nature of the work, the method proposed for the work, and all other aspects of the proposed work is consistent with the provisions of this condition, including Subparts A2, A3, A4, and A5 of this condition listed below.

2. No future repair or maintenance, enhancement, reinforcement, or any other activity affecting the rock revetment shall be undertaken if such activity extends the seaward footprint of the subject shoreline protective device. No rock shall be placed seaward of the approved toe of the revetment and no increase in the approved height of the revetment shall occur. Any debris, rock, or other materials which become dislodged after completion through weathering, wave action or settlement shall be removed from the beach or deposited on the revetment on an as-needed basis as soon as feasible after discovery. The rock revetment may be maintained in its approved size, location, and configuration, no expansion to the size, height, or footprint of the revetment shall be allowed. The importation of a minor amount of new rock may be allowed if necessary to maintain the design size, height, footprint of the approved revetment although in no event shall more than 3,600 tons of new armor stone (approximately 10% of the approved volume of the revetment) be imported for any individual repair project. The addition of more than 3,600 tons of new armor stone for any individual repair project shall require an amendment to this coastal development permit or a new coastal development permit and is not exempt pursuant to this condition.

(3) Maintenance or repair work shall only occur during the late fall or winter season from October 1 to March 15. Any repair or maintenance of the shoreline protective device between March 16 and September 30 shall require an amendment to this coastal development permit or a new coastal development permit and is not exempt pursuant to this condition, with the exception that removal of any debris, rock or other material from the sandy beach that becomes displaced from the revetment and will be deposited on the revetment or exported to an offsite disposal area shall occur on an as-needed basis, regardless of the time of the year and without the requirement for submitting a written report 60 days in advance of the work or for prior written authorization from the Executive Director.

(4) Maintenance or repair work shall be completed incorporating all feasible Best Management practices. No machinery shall be allowed in the active surf zone at any time. The permittee shall remove from the beach any and all debris that results from the construction/repair work period.

(5) The applicant shall, by accepting the written authorization from the Executive Director, shall agree and ensure that the project contractor shall comply with the following construction-related requirements:

a. No construction materials, debris, or waste shall be placed or stored where it may be subject to wave erosion and dispersion;
b. Any and all debris resulting from construction activities shall be removed from the beach prior to the end of each work day;
c. No machinery or mechanized equipment shall be allowed at any time within the active surf zone, except for that necessary to remove the errant rocks from the beach seaward of the revetment;
d. All excavated beach sand shall be redeposited on the beach.

B. The applicant shall be responsible for maintenance, repair, and replacement of the access stairways (for the provision of both public and private access) that extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below required pursuant to Special Condition 1, Part 1 and Special Condition 3, Part B. Such maintenance shall occur on as needed basis, in perpetuity for the life of the rock revetment, in order to ensure the public's ability to use the stairways.

12. Future Development of the Site

Any future development of any property located landward of the revetment alignment approved in this coastal development permit (between 31350 Broad Beach Road to 30708 Broad Beach Rd.) shall not rely on the permitted revetment to establish geologic stability or protection from hazards. Any future development on those properties shall be sited and designed to ensure geologic and engineering stability without reliance on shoreline protective devices consistent with development standards and policies of the City of Malibu LCP.

13. Public Beach Access Areas

A. The permittee acknowledges that the area seaward of the 2010 mean high tide line surveyed by the California State Lands Commission ("2010 MHTL") is and will remain public property regardless of this project. Thus, although public access to some of the landward extent of that area may be limited in order to protect the dune habitat that is to be created, pursuant to Special Condition 5, public access seaward of both the ambulatory seaward limit of dune vegetation (hereinafter, the "Vegetation Line") and the 2010 MHTL shall not be impaired or restricted. Consistent with section A.(6) of Special Condition 5, public access shall also be available on some of the public property that is seaward of the 2010 MHTL but that is landward of the Vegetation Line if the wet sand ever comes within 25 feet of the Vegetation Line.

B. In addition, *prior to issuance of the Coastal Development Permit*, the permittee shall ensure that each Property Owner on which the approved rock revetment will lie enters into an agreement with the Commission and the BBGHAD in the form of an irrevocable license that provides for public access landward of the 2010 MHTL under the circumstances listed below and that satisfies all of the criteria listed below.

1. Each license agreement shall provide that the public shall have a right of lateral access and passive recreational use over the seaward portion of the licensor's private property extending 25 feet inland from the landward extent of the wet sand, until that point reaches the seaward face of the approved rock revetment, at which point the area to which the public shall have such rights will only extend landward from the wet sand to the seaward face of the revetment.

2. If, at any time, there is no longer at least 10 feet of dry sandy beach extending seaward from any point along the seaward face of the approved revetment, providing for lateral public access, then the additional temporary springing license(s) described in Special Condition 14 of this permit shall take effect.

3. Each license agreement must be drafted to run with the land, binding successor owners of the properties; must include an acknowledgment of the substance of section A of this condition; must include a provision authorizing the BBGHAD to record it against the property as part of a blanket recordation; must include a provision requiring the Property Owner to disclose the existence of the agreement to any prospective successor; must be acceptable to the Executive Director in form and content; and must have the signator's signature notarized.

4. Prior to issuance of the Coastal Development Permit, each license agreement shall be recorded against the property to which it applies

5. A license agreement shall be completed for every property extending from 31350 to 30760 Broad Beach Road, inclusive.

6. Each license agreement shall be written so that it is enforceable by the BBGHAD and/or the Commission, and such that the entity enforcing the agreements can seek specific performance in the context of any such enforcement, and the Commission can impose administrative penalties for any violation.

C. Independent of the license agreement required by section B of this condition, each Property Owner who undertakes or allows any development authorized by this permit thereby consents to allow public use of the property on which such development occurred consistent with the terms of section B.1 of this condition and to inform any prospective successors that this requirement attaches to the property as long as the development remains in place.

14. Conditional Lateral Public Access over Revetment and Adjacent Pathway

A. *Prior to issuance of the Coastal Development Permit*, the permittee shall ensure that each Property Owner on which the approved revetment will lie (31350 to 30760 Broad Beach Road) enters into an agreement with the Commission and the BBGHAD in the form of an irrevocable temporary springing license that provides for lateral public access over the revetment and a strip of land immediately landward of it under the circumstances listed below and that satisfies all of the criteria listed below.

1. **Circumstances Giving Rise to the Licenses**
Each license shall provide for public access only if and when one or more of the following conditions is occurring, and only for the duration of time that one or more of the following conditions continues to occur:

a. If at any time there is less than ten feet of dry sandy beach providing for lateral public access extending seaward of the seaward face of the approved revetment on, or within 100 feet upcoast or downcoast of, any part of the licensor's parcel; or

b. Any circumstance occurs (such as, but not limited to, an oil spill) that prohibits the public's use, access, and enjoyment of any of the area of licensor's property seaward of the revetment or of any property within 100 feet upcoast or downcoast thereof.

2. **Nature of Public Access Authorized by the Licenses**
Each license agreement shall provide that the public shall have the right to pass and repass over the entire portion of the revetment that is located on the licensor's property and over an area extending from the seaward face of the revetment landward to a line parallel to and ten feet inland of the landward edge of the approved revetment for a public access pathway.

3. **Other Requirements of the Licenses**

a. Each license agreement must be drafted to run with the land, binding successor owners of the properties; must include a provision authorizing the BBGHAD to record it against the property as part of a blanket recordation*;* must include a provision requiring the Property Owner to disclose the existence of the agreement to any prospective successor; must be acceptable to the Executive Director in form and content; and must have the signator's signature notarized.

b. Prior to issuance of the Coastal Development Permit, each license agreement shall be recorded against the property to which it applies.

c. A license agreement shall be completed for every property extending from 31340 to 30760 Broad Beach Road, inclusive.

d. Each license agreement shall be written so that it is enforceable by the BBGHAD and/or the Commission, and such that the entity enforcing the agreements can seek specific performance in the context of any such enforcement and the Commission can impose administrative penalties for any violation.

B. The license agreement required by section A of this condition shall be combined with the license agreement required by Special Condition No. 13 into a single agreement with an appendix listing all of the Special Conditions of this permit so that, once recorded, the license agreement will provide record notice of all of the permit conditions.

C. Independent of the license agreement required by section A of this condition, each Property Owner who undertakes or allows any development authorized by this permit thereby consents to allow public use of the property on which such development occurred consistent with the terms of section A.2 of this condition whenever the circumstances listed in section A.1.a or A.1.b. of this condition apply, and to inform any prospective successors that this requirement attaches to the property as long as the development remains in place.

15. Public Access Management Program

Prior to issuance of the Coastal Development Permit, the applicant shall submit, for the review and approval of the Executive Director, a Public Access Management Program that provides for the following:

A. Public Access Provisions During Construction Activities

(1) The Public Access Management Program shall include a plan for ensuring safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. The plan shall include a description of the methods (including signs, fencing, posting of security guards, etc.) by which safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. In the event that Broad Beach must be closed to pedestrian use during active beach nourishment/renourishment operations only, then signage shall be installed indicating alternative beach access points along Broad Beach available for public access. The applicant shall maintain public access pursuant to the approved version of the report. Any proposed changes to the approved program shall be reported to the Executive Director. No change to the program shall occur without a Commission-approved amendment to the permit unless the Executive Director determines that no such amendment is required.

(2) The program shall include all necessary temporary access provisions, including any necessary traffic control and crosswalk improvements, to maintain public pedestrian access between Zuma County Beach and the Trancas Market Property along the shoulder of Pacific Coast Highway immediately landward of the project site and staging area. Any temporary pedestrian access improvements within the highway right-of-way must be reviewed and approved by the California Department of Transportation (Cal Trans).

(3) Where public parking areas are used for staging or storage of equipment and materials, unless there is no feasible alternative, the minimum number of public parking spaces (on and off-street) that are required at each receiver site for the staging of equipment, machinery and employee parking shall be used. At each site, the number of public parking spaces utilized shall be the minimum necessary to implement the project.

(4) The applicant shall post each construction site with a notice indicating the expected dates of construction and/or beach closures.

B. Symbolic Public Access Fencing and Signage Plan

(1) The Public Access Management Program shall include a Symbolic Public Access Fencing and Signage Plan that provides for the installation of symbolic post and cable/rope fencing along the landward limit of the ten foot wide public access path located immediately landward of the approved rock revetment. The post and cable/rope fencing shall be no more than 42 inches in height and designed to be removable in the event of wave uprush. The symbolic post and cable/rope fencing shall be installed by the applicant in a manner consistent with the approved plan within 30 days of the identified criteria requiring opening of the path to the public pursuant to the provisions of Special Condition 14, and in no event later than within 30 days from the date of notification if notified in writing by either the Executive Director of the California Coastal Commission or the easement holder that the identified criteria requiring opening of the path to the public pursuant to the provisions of Special Condition 14 have been met. The Executive Director may grant additional time for good cause.

(2) The Plan shall include the provision for the installation of signage to be incorporated into the design of the symbolic post and cable/rope fencing adequate to inform the public of their right to utilize all public access areas on site (including the lateral public access areas/paths required pursuant to Special Conditions 13 and 14, and the public access stairways required pursuant to Special Conditions 1 and 4). At a minimum, the Program shall provide for the installation of signs to be installed within 300 ft. intervals along the 10 ft. wide path and at both the western (upcoast) end and eastern (downcoast) end of the 10 ft. wide public path and adjacent to each of the two Los Angeles County public vertical accessways on site.

(3) The plan shall show the location, size, design, and content of all signs. The applicant acknowledges and agrees that no signs shall be posted on the sandy beach, the rock revetment, or along the identified public access areas unless specifically authorized by the approved signage plan, a separate coastal development permit, or an amendment to this coastal permit. The signs may indicate that the areas of the site located landward of the public access areas are sensitive dune habitat and/or private property. No signs that restrict public access to State tidelands, public vertical or lateral access easement areas, or which purport to identify the boundary between State tidelands and private property shall be permitted. The applicant shall be responsible for removal of any such sign that comes to be installed that is inconsistent with these sign restrictions. Approved signage shall be installed concurrent with the installation of the symbolic public access fencing required pursuant to Part B.1 of this condition.

(4) The permittee shall install all symbolic fencing signs in accordance with the approved plans. The permittee, or its successor in interest, shall maintain the approved fencing and signs in good condition for the life of the project and replace when necessary.

C. Maintenance of Existing Public Vertical Access Improvements

The applicant shall be responsible for the cost, construction, and maintenance of any new improvements (including but not limited to repairs or modifications of the two existing public access stairways that have been previously constructed over the as-built rock revetment) within the two existing vertical public access rights-of-way necessary to maintain safe public pedestrian access from Broad Beach Road to the sandy beach as required by the Executive Director and Los Angeles County Department of Beaches substantially similar to the public access that exists on site at the time of Commission action on this permit. If any such improvements, or changes over time, are necessary to maintain safe and adequate public pedestrian access, then the applicant shall submit a detailed construction plan for the review and approval of both the Executive Director and Los Angeles County Department of Beaches and Harbors and comply with any requirements imposed by those entities.

16. Septic Conversion Implementation Study

Within two (2) years of Commission action on this Coastal Development Permit, the applicant shall submit to the Executive Director, a detailed Septic Conversion Implementation Study, prepared in part by a licensed civil/sanitary engineer or other qualified professional, analyzing alternatives for the removal of the existing on-site waste water treatment systems currently serving the residences within the Geologic Hazard Abatement District boundaries and connection of those residences to a new package sewage treatment facility or to an upgraded existing package sewage treatment facility. The study shall include an analysis and technical engineering details and requirements for the removal of the existing on-site waste water treatment systems within the District boundaries and conceptual design plans for either a new package sewage treatment plant or the upgrade of an existing treatment plant, such as the Trancas Canyon Package Sewage Treatment Plant. The study shall also include an analysis of permitting and regulatory requirements, potential environmental impacts, necessary infrastructure upgrades; alternative locations and technologies for a package sewage treatment plant; preliminary budget, including any land acquisition costs and a preliminary construction schedule/timeline for the preferred septic conversion alternative. The study shall have an initial conversion implementation goal (for the removal of the existing septic systems on the beach and connection to either a new or upgraded sewage treatment plant) of six (6) years from issuance of this coastal development permit.

The study shall be prepared in consultation with the Regional Water Quality Control Board, the City of Malibu and the County of Los Angeles if applicable. Five years from the issuance of the coastal development permit, the applicant shall submit to the Executive Director a detailed progress report on the status of implementation of the preferred septic conversion alternative, including progress on design details, environmental impact analysis, and permitting.

17. Required Approvals

Prior to the issuance of this Coastal Development Permit, the applicant shall provide evidence, for the review and approval of the Executive Director, that they have obtained all other necessary State and local government permits that may be necessary for all aspects of the proposed project including, but not limited to, permits, leases, or approvals from the California State Lands Commission, California Department of Fish and Wildlife, State Water Resources Control Board, Regional Water Quality Control Board, South Coast Air Quality Management District, California Department of Transportation, and authorization for all staging and stockpile areas within Zuma Beach County Park from Los Angeles County Department of Beaches and Harbors, unless evidence is submitted that such approval(s) are not required. In addition, by acceptance of this permit, the applicant agrees to obtain all necessary Federal permits, consultations, or approvals that may be necessary for all aspects of the proposed project (including, but not limited to, the U.S. Army Corps of Engineers, and National Marine Fishery Service).

18. Assumption of Risk, Waiver of Liability and Indemnity

By acceptance of this permit, the applicant acknowledges and agrees (i) that the site may be subject to hazards from erosion, liquefaction, waves, flooding, and sea level rise; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

Prior to issuance of the Coastal Development Permit, the applicant shall submit a written agreement, in a form and content acceptable to the Executive Director, incorporating all of the above terms of this condition.

19. Indemnification by Applicant

Liability for Costs and Attorney's Fees: By acceptance of this permit, the Applicant/Permittee agrees to reimburse the Coastal Commission in full for all Coastal Commission costs and attorney's fees -- including (1) those charged by the Office of the Attorney General, and (2) any court costs and attorney's fees that the Coastal Commission may be required by a court to pay -- that the Coastal Commission incurs in connection with the defense of any action brought by a party other than the Applicant/Permittee against the Coastal Commission, its officers, employees, agents, successors and assigns challenging the approval or issuance of this permit. The Coastal Commission retains complete authority to conduct and direct the defense of any such action against the Coastal Commission.

IV. FINDINGS AND DECLARATIONS

The Commission hereby finds and declares:

A. PROJECT DESCRIPTION AND BACKGROUND

1. Project Description and Location

The applicant, Broad Beach Geologic Hazard Abatement District (BBGHAD), is requesting authorization of an approximately 4,150 ft. long, 12-15 ft. high, as-built, rock revetment constructed pursuant to two emergency coastal development permits. In addition, the project includes re-location of the downcoast approximately 1,800 linear feet of the as-built rock revetment further landward; implementation of a beach nourishment program for a period of 20 years involving deposition of 300,000 cu. yds. of sand on the beach from inland sand quarries during the first year and approximately 300,000 cu. yds. of sand approximately every five years thereafter or as needed; periodic interim or erosion nourishments involving up to 75,000 cu. yds. of sand as needed; periodic sand backpassing operations to occur no more than once per year, and dune habitat restoration (**Exhibits 7 and 19**).

In a prior permit application for the project (Application No. 4-12-043), the BBGHAD proposed to (1) permanently retain an approximately 4,150 foot long rock revetment that was temporarily authorized and constructed under Coastal Commission emergency permits in January of 2010; and (2) implement a twenty-year beach nourishment and dune restoration program on top and in front of portions of the revetment that included deposition of 600,000 cubic yards of sand from inland sand quarries in year zero and another 450,000 cubic yards in year ten, with periodic backpassing no more than once per year. The project had a public hearing before the Commission at the December 11, 2014 meeting in Monterey. After listening to Commissioner deliberations and concerns raised regarding the proposed project and the staff recommendation, the applicant withdrew the application during the hearing and expressed their intent to continue working with Commission staff to address Commissioner concerns prior to submitting a new application for the project.

On April 3, 2015, the property owner submitted a new permit application (the subject Application No. 4-15-0390) for the revetment, beach nourishment, and dune restoration project that includes the following changes:

- **Revetment Alignment**. Re-location of the downcoast approximately 1,600 linear feet of the as-built rock revetment up to 75 feet landward of the as-built revetment alignment (approximately 40-50 feet seaward from existing septic systems/leach fields on the beach). In addition, on September 24, 2015, the applicant transmitted a revision to the proposed downcoast revetment alignment (called “Revision D”) to Commission staff. This revised revetment alignment, which is depicted in Exhibit 8a, extends the pullback approximately 200 feet further upcoast than previously proposed (for a 1,800 linear foot length), such that the pullback starts at 31020 Broad Beach Road instead of 30980 Broad Beach Road. The revised pullback alignment is also a more smooth line (less angular curves), and the downcoast portion of the pullback was shifted seaward to avoid a recently surveyed large existing leachfield on the beach at 30822 Broad Beach Road. However the new proposed revised revetment alignment is still approximately 40-50 feet seaward from most existing septic systems/leach fields on the beach.

- **Beach Nourishment Program**. Modification to the beach nourishment program to limit direct nourishment to the area between 31380 Broad Beach Road at the upcoast end and 30708 Broad Beach Road at the downcoast end (eliminating direct nourishment between Point Lechuza and 31380 Broad Beach Road), consistent with Commission staff's recommendation. The proposed beach nourishment program was also modified to reduce the quantity of nourishment deposition to 300,000 cu. yds. of sand from inland sand quarries during the first year, approximately 300,000 cu. yds. of sand approximately every five years thereafter or as needed, periodic interim or erosion nourishments involving up to 75,000 cu. yds. of sand as needed, and periodic backpassing no more than once per year.

- **Dune Restoration and Enhancement**. Modification to the footprint and design of the proposed dune restoration and enhancement plan, and a proposal to incorporate one non-shared private vertical access path through the restored dunes for every residence with forty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residences with less than forty feet of beach frontage. In addition, on September 24, 2015, the applicant transmitted a revision to the proposed private vertical access path plan in order to address Commission staff concerns and to reduce the number of paths through the dunes. The revised proposal now reflects one non-shared private vertical access path through the restored dunes for every residential lot with sixty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residential lots with less than sixty feet of beach frontage.

- **Lateral Public Access**. Proposal to maintain at least ten feet of sand seaward of the revetment for lateral public access along the beach; however, if there is erosion back to the revetment for six consecutive months despite backpassing and up to three interim nourishment attempts within a ten year period, and access seaward of the revetment is impossible, the applicant would agree to grant the public a "temporary license" to access a limited area on the landward side of the revetment for pass and repass.

- **Septic System Conversion Study**. And although not proposed as part of the formal revised project description, correspondence from the applicant (dated March 31, 2015 and June 16, 2015) states that the applicant agrees to conduct and complete a "Septic Conversion Implementation Study" within three (3) years of permit effectiveness to study alternatives and cost associated with implementing the conversion of individual on-site septic systems on BBGHAD parcels to a community-wide system. The applicant's correspondence also states that a timeline for transition would be identified based upon the results of the conversion study.

The project site is located along an approximately 1.16 mile long reach of Broad Beach between Pacific Coast Highway, Broad Beach Road, and the ocean in western Malibu (**Exhibit 1**). The subject area is characterized as a built-out portion of Malibu consisting of beachfront residential development. Zuma Beach County Park, which is heavily used by beachgoers, is located approximately 150 ft. to the east of the subject site. Broad Beach is also subject to significant use by beachgoers who access the beach from Zuma Beach County Park or from the two Los Angeles County-owned public vertical accessways along Broad Beach within the project reach.

Broad Beach was historically a wide beach which supported an active dune system, identified as an environmentally sensitive habitat area in both the Malibu/Santa Monica Mountains Land Use Plan, certified by the Commission in 1986, as well as the City of Malibu's certified Local Coastal Program (LCP) which was adopted by the Commission in 2002. However, in recent years, Broad Beach has been subject to periodic erosional events which appear to have increased in both frequency and duration and have endangered existing residential development located along portions of the beach that were historically considered safe. Although the dune system on the subject site has been highly disturbed from past residential development, unpermitted landscaping, backyard improvements, and wave erosion, the Commission has consistently found that coastal dunes such as those at Broad Beach are rare and meet the definition of ESHA. Broad Beach is unique in that it is the only area along the Malibu coastline where a system of vegetated sand dunes is found. Native sand dune species found on the dune system which are characteristic of dune habitat include: Silver Beach Bur, Pink sand verbena, beach salt bush, and beach evening primrose. The Commission further notes that the Broad Beach dunes have been classified as "Southern Foredune" in the Holland community classification system by the California Department of Fish and Wildlife and that such communities are listed as "very threatened" by the State of California. In addition, the subject area contains a broad array of other sensitive habitats and species, including, but not limited to rocky reefs and tide pools, kelp forests, pismo clam and sand dollar beds, coastal foredune habitat, and the Trancas Creek estuary.

The off shore marine area and beach area below the mean high tide line at Broad Beach lies within a Marine Protected Area (MPA) known as the Point Dume State Marine Life Protection Area (SMCA). This area is also adjacent to the Point Dume State Marine Reserve (SMR), which begins at Westward Beach and continues around Point Dume to the west end of Paradise Cove. The purpose of these MPAs was to ensure the long-term ecological viability and biological productivity of marine and estuarine ecosystems and preserve cultural resources for future generations. These adjoining MPAs became effective on January 1, 2012. Within the Point Dume SMCA fishing activities are restricted to recreation fishing very limited commercial fishing. In the Point Dume SMR taking of fish is prohibited all together.

The Broad Beach area is also located in an area designated as an Area of Special Biological Significance (ASBS). In the 1970's, California designated 34 regions along the coast as ASBs in an effort to preserve biologically unique and sensitive marine ecosystems for future generations. ASBS are designated by the State Water Resources Control Board (SWRCB) to protect species or biological communities from undesirable alterations in natural water quality (McArdle 1997). This designation recognizes that certain biological communities, because of their fragility or value, deserve special protection. Under the California

Ocean Plan (COP), the discharge of wastes to ocean waters in these areas is generally prohibited. The COP states: “Waste shall be discharged a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas” (State Water Board 1972).

The width of the shoreline within the project area has varied over the past century and half, with wave action occurring at the base of the coastal sea bluff located landward of Broad Beach Road as recently as the 19th century. The western (upcoast) segment of the project reach (that portion located immediately downcoast of Lechuza Point) has historically maintained a narrower shoreline profile than other segments of Broad Beach. A review of historical records and aerial photographs shows that the beach on site was at its widest point over the last century in 1970 with a yearly average of 60 feet landward of the mean high tide line. However, this widened condition in the 1970’s constitutes a relatively brief anomalous period given that beach widths on site were substantially narrower prior to the 1970’s. Beginning in approximately1974, the Broad Beach shoreline began to recede, and developed what is described as a negative sand budget. The sand budget turned negative in 1974, accelerating to approximately 35,000 cu. yds. per year from 2004 to 2009 and to 45,000 cubic yards 45,000 cy. yds. per year from 2009 to 2012. From 1974- 2007, the applicant’s engineering consultants have estimated that the beach has lost approximately 600,000 cu. yds. of sand. In addition, the 1997 – 1998 El Nino storm season resulted in significant erosion of the beach and homes on the western end of the beach were damaged.

In response to shoreline erosion, in 2008, and again in 2009, the homeowners began constructing large sand bag walls to protect their properties. Although some homeowners obtained emergency coastal development permits from the City of Malibu the majority of the homeowners constructed these sand bag seawalls without benefit of either an emergency coastal development permit or a regular coastal development permit from either the City of Malibu or the Coastal Commission. In January 2010, the Trancas Property Owners Association obtained emergency permits from both the California Coastal Commission (CDPs 4-10-003-G and 4-10-029-G) and the City of Malibu for the temporary authorization of the 4,150 linear ft. long rock revetment on 79 of the properties within the Project Reach, extending from 31346 – 30760 Broad Beach Road.

The majority of the residences were constructed prior to the Coastal Act on conventional at grade concrete foundations and rely on septic systems and leach fields located on the sandy beach and dune areas seaward of homes. Thus, protection of these residences on at grade foundations with septic systems and leach fields located a significant distances seaward of the residences was a principle factor driving the location of the sand bags, which were installed in approximately the same location as the current footprint of the revetment seaward of more than 70 homes.

As proposed, the applicant is requesting permanent authorization of the as-built emergency rock revetment that was permitted on a temporary basis in the Commission’s 2010 emergency permit action. In addition, due to emergency conditions that existed at the time of construction, the temporary sand bag walls were never removed and the rock revetment was constructed immediately seaward of the sand bags. Thus, the proposed project also includes the request for permanent authorization of the approximately 4,100 linear ft. sand bag wall on site which has been incorporated into the design of the rock revetment. In addition, the proposed project includes re-location of a portion of the as-built rock revetment (the easternmost approximately 1,800 linear feet) to a more landward configuration.

The proposed project also consists of the importation of 300,000 cu. yds. of sand material (proposed initial nourishment amount) from sand quarries located approximately 40-45 miles inland of the project site. Trucking operations to import sand material approximately 40-45 miles from Moorpark/Simi Valley to the project site would require approximately 22,000 truck trips. Heavy equipment consisting of scrapers, large 40 ton-capacity trucks, and bulldozers would be used to distribute the imported sand along the beach within the project reach. As proposed, the reconstructed/post-nourishment combined beach and dune system would extend approximately 240 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes.

The project also includes back-passing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. As proposed, the applicant would conduct major renourishments of the beach (300,000 cu. yds. each)approximately every five years after the initial nourishment had been completed. As designed, the proposed rock revetment would be buried beneath at least 4-8 ft. of imported sand material and the reconstructed dunes on site would be revegetated with native dune plant species. The applicant also proposes “interim” nourishments of up to 75,000 cubic yards (subject to availability of additional BBGHAD funding) and up to three “erosion” nourishments of up to 75,000 cubic yards per 10-year period. The “interim” nourishments would be triggered when the average dry beach width fronting the western revetment near transect 411 is approximately 30 feet or less for 6 consecutive months and is recorded by two consecutive full beach profile surveys and there is insufficient beach width to provide 10,000 cubic yards of backpassing sand from the eastern end of Broad Beach. The “erosion” nourishments would be triggered if natural ocean forces, backpassing, and the interim nourishments fail to cause at least 10 feet of sand to remain seaward of the revetment between transects 408-411 for six consecutive months.

Finally, there are a number of private beach access stairways that have been built on top of and over the as-built emergency permit without the benefit of a coastal development permit. The applicant is proposing to remove all unpermitted stairways from the emergency revetment as part of the project proposal.

2. Broad Beach Geologic Hazard Abatement District

As proposed, the project area includes 121 separate private properties (**Exhibit 18**) (the rock revetment would be located on 79 properties). The applicant for this project is a Geologic Hazard Abatement District (GHAD), formed as a ‘subdivision of the state’ (and not a special district) under Sections 26500 et seq. of the California Public Resources Code. GHADs can be formed and legally authorized to undertake those improvements which would be deemed specific actions necessary to prevent or mitigate an emergency.[1] Under GHAD law 'improvements' are defined as: *"any activity that is necessary or incidental to the prevention, mitigation, abatement, or control of a geologic hazard, including, but not limited to, all of the following:*

> *(a) Acquisition of property or any interest therein*
>
> *(b) Construction*
>
> *(c) Maintenance*
>
> *(d) Preparation of geologic reports required pursuant to Section 2623 for multiple projects within an earthquake fault zone or zones*
>
> *(e) Issuance and servicing of bonds, notes, or debentures issued to finance the costs of the improvements specified in subdivisions (a), (b), (c), and (d) (Section 26505).*

In this case, the Broad Beach GHAD was formed to abate or mitigate the following main geologic hazards that the specific project area is subject to: (1) beach/dune erosion and (2) damage to residential properties from flooding due to wave action.

Section 26580 of the Public Resources Code gives the GHAD the power to "acquire, construct, operate, manage, or maintain improvements on public or private lands. Such improvements shall be with the consent of the owner, unless effected by the exercise of eminent domain pursuant to Section 26576." Hence, a GHAD has the authority to exercise the power of eminent domain, with an option not to exercise such power. There are no provisions of GHAD law suggesting a decision on eminent domain power, once included in the GHAD's governing document (the "Plan of Control" required by Public Resources Code Section 26509), cannot be changed by later amending the Plan of Control., In this case, the Broad Beach GHAD Plan of Control waives the power of eminent domain. Additionally, Section 26580.1 states that, "the district may make improvements to existing public or private structures where the board of directors determines that it is in the public interest to do so."

The intent of a GHAD is to authorize a group of owners of private properties and/or larger expanses of land to organize and gain some governmental powers to abate, mitigate, and manage the hazards to which the area is subject. The legal structure of a GHAD seeks to allow for more expedient and wholesale action than singular private property owners could effectuate on an individual basis. Additionally, given the unexpected and evolving nature of hazards in general, GHAD law also allows for flexibility in each GHAD structure and management to allow the entity to best address the unique hazards it faces. To allow for this, GHAD law authorizes the GHAD Board of Directors to pass resolutions which modify or restrict the powers of the GHAD itself, most importantly with respect to eminent domain powers. However, once passed, these resolutions can always be reversed by another majority action of the board.

A GHAD may consist of two or more properties. While the properties within a GHAD are typically comprised of contiguous properties, they are not required to be contiguous under law and can also include scattered properties within a general area that are subject to the same hazard(s). (Pub. Res. Code §26530.) The area, landscape and properties within a GHAD may

[1] The BBGHAD approved the project without conducting review under the California Environmental Quality Act (CEQA). The BBGHAD relied on Public Resources Code Section 26559 to file a Notice of Exemption from the California Environmental Quality Act.

face varying levels or types of hazards that require different kinds or degrees of improvements to address. As such, GHAD law does not require each legal property within a GHAD to receive an equal benefit from the improvements proposed. Instead, Public Resources Code Section 26534 states that: "All lands within a district shall be *specially benefitted* by construction proposed in a plan of control approved by the legislative body". (Emphasis added.)

A GHAD has the authority to construct, maintain, and manage any improvements on public or private land that will abate or mitigate the hazards it faces. (Pub. Resources Code §26525.) Additionally, such improvements may be tailored to the needs of different properties and areas within the district to best address the varying levels and types of hazards posed to different segments of the shoreline. (Pub. Res. Code §26534) A GHAD can also modify its legal boundaries through the removal or addition of properties over time and may choose to seek dissolution from the Legislative Body that authorized it. (Pub. Res. Code Section 26567.1(a)(2).). A GHAD may not, however, allow a GHAD boundary that would bisect a parcel. (Pub. Res. Code. §26533.) Thus, in this case, the Broad Beach GHAD has the legal ability to implement the special conditions recommended in this staff report as an individual applicant for the term of the permit.

3. Past Commission Action

Broad Beach has been the focus of several previous permit and enforcement actions by the Commission. During the 1997/1998 El Nino winter storm season, wave-caused erosion was endangering several homes along the upcoast portion of Broad Beach. A rock revetment was constructed on approximately a dozen lots at that time. Although some of the property owners obtained emergency coastal permits for the work, granting temporary authorization at the time, others did not, and none of the property owners obtained a regular coastal development permit for permanent authorization after the work was completed, as required by the emergency permits.

Separately, for several years, the Trancas Property Owners Association (TPOA) installed numerous unpermitted signs along the public portions of the approximately 1-mile stretch of Broad Beach indicating that it was a private beach. Additionally, the TPOA hired private guards to patrol the beach on All Terrain Vehicles (ATVs) and confront public beachgoers, discouraging and restricting public access. In August, 2005, the Commission approved Cease and Desist Order No. CCC-05-CD-09, which, among other things, required the TPOA to remove unpermitted development; cease and desist from placing, maintaining or conducting any unpermitted development on Broad Beach on either private and/or public property; and refrain from undertaking any activity that discourages or prevents use of public tidelands, public lateral access easements, or areas deed restricted for public access on Broad Beach, including through the use of private security guards. The TPOA sued the Commission over its action, but significant portions of the order were upheld.

In 2005, the TPOA constructed an unpermitted berm, using sand excavated from the state tidelands, along the length of the beach and along the toe of the dunes. The berm was partially placed in various lateral public access easements, areas deed restricted for public access, and below the MHTL. In response, the Executive Director issued Executive Director Cease and Desist Order (ED-CDO) No. ED-05-CD-04, requiring removal of the berm and restoration of the beach, and the Commission (together with the State Lands Commission) subsequently filed suit against the TPOA, which was eventually settled.

In February and March of 2006, eight months after the Executive Director issued ED-CDO No. ED-05-CD-04 to the TPOA requiring the removal of the above-described sand berm, and while litigation initiated by the Commission was pending, several property owners placed rocks and sandbags along the beach in a similar location to that of the 2005 sand berm and, again, within lateral public access easements, areas deed restricted for public access, and/or below the MHTL. A few of the property owners responded to Commission enforcement action by removing the revetments at that time, others did not.

Subsequently, in 2008, and again in 2009, the TPOA obtained emergency coastal permits from the City of Malibu for the installation of sand bag walls. Prior to the installation of the sand bags, Commission staff informed the TPOA that the development appeared to be located within the Commission's retained coastal development permit jurisdiction and, therefore, a CDP from the Commission would be required. However, the TPOA failed to apply for or obtain the required emergency permit for the sand bags from the Coastal Commission. The emergency permits issued by the City were valid for no more than a 90-day period of time. Although the authorization period for these sand bag walls has expired, the sand bags were never removed by the TPOA.

In January 2010, the TPOA applied for and obtained Emergency Coastal Development Permits 4-10-003-G and 4-10-029-G for the construction of the 4,150 linear ft. long rock revetment. Due to the need for immediate action to prevent damage to the adjacent residences from wave-caused erosion, the applicants indicated that it was infeasible to remove the temporary sand bag walls that had been constructed on site. Thus, the rock revetment was constructed immediately seaward of the sand bag wall on site. The applicant is now requesting after-the-fact authorization of the sand bag walls as part of the permanent authorization of the rock revetment on site.

Further, the unpermitted rock revetment that was constructed during the 1997/1998 El Nino storm season (as described above) was removed and the rock material was re-utilized, in part, to construct the new 4,150 linear ft. rock revetment. Since the current rock revetment was installed in 2010, additional unpermitted development has occurred along the length of Broad Beach, including: 1) construction of private beach stairways across the revetment, composed of one or more of the following materials: sandbags, jute netting, rocks, cement, matting, metal, wood, and rope; 2) placement of sand, sandbags, dirt, and landscaping on and adjacent to the rock revetment, used to build up the yards of private residences; 3) construction of patios, sitting areas, and decks on and adjacent to the revetment; 4) placement of "private property" and "no trespassing" signs; and 5) removal of native dune vegetation and construction of walkways and patios in the dunes.

4. Standard of Review

The proposed project includes components that are located within the City of Malibu's Local Coastal Program (LCP) jurisdiction as well as components within the retained coastal development permit issuance jurisdiction of the Coastal Commission. The City of Malibu would typically review the coastal development permit application for the upland portions of the project within the City's LCP jurisdiction. However, Section 30601.3 of the Coastal Act authorizes the Commission to process a consolidated coastal development permit application, when the criteria listed in that section are satisfied, for all aspects of a proposed project that would otherwise require a coastal development permit from both a local government with a certified local coastal program and the Commission.

The proposed development consists of the construction of a rock revetment, beach nourishment, and dune habitat reconstruction/re-establishment. Although portions of the project (primarily portions of the proposed revetment and the proposed beach/dune nourishment activities located seaward of the existing 'as-built' rock revetment) are located within the Commission's retained coastal development permit jurisdiction, the construction and replacement of the upland components of the project would be located in the City of Malibu's CDP jurisdiction. Typically, development located within a certified area requires a coastal development permit from the certified local government. However, in this case, the portions of the proposed project located within the Commission's retained permit jurisdiction is physically integrated with the development that would occur outside the area of retained permit jurisdiction (i.e. in the City's LCP jurisdiction).

Pursuant to Section 30601.3(a) (2), the applicant, appropriate local government, and the Commission may agree to consolidate a permit action for a project that spans local and state jurisdictions. In this case, the City of Malibu, in a letter to Commission staff dated January 27, 2012, requested that the Commission assume jurisdiction over all activities associated with the proposed project. The applicant both consented to and facilitated this consolidated jurisdictional process. Further, public participation is not substantially impaired by the consolidated review in this case because portions of the project were reviewed by the City of Malibu in a public hearing process and an Initial Study and Mitigated Negative Declaration was prepared for this project in May 2012. Thus, the Commission is processing this application as a single, consolidated permit application. Finally, the subject application will be noticed and heard consistent with the Coastal Commission's public hearing process, which facilitates both written and oral comment.
The standard of review for a consolidated coastal development permit application submitted pursuant to Section 30601.3(a) is the Chapter 3 policies of the Coastal Act (commencing with Section 30200) with the City of Malibu's certified Local Coastal Program used as guidance.

B. HAZARDS AND SHORELINE PROCESSES

Section 30253 of the Coastal Act, which is also incorporated as part of the City of Malibu LCP, states, in part, that new development shall:

> *(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> *(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.*

However, the Coastal Act contains another provision that specifically requires the approval of shoreline protective devices under the right circumstances. Section 30235 of the Coastal Act, which is also incorporated as part of the City of Malibu LCP, states:

> *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.*

In addition, the City of Malibu LCP includes the following provisions:

<u>Applicable City of Malibu Land Use Plan Policies</u>

LUP Policy 4.22:

> *Siting and design of new shoreline development and shoreline protective devices shall take into account anticipated future changes in sea level. In particular, an acceleration of the historic rate of sea level rise shall be considered. Development shall be set back a sufficient distance landward and elevated to a sufficient foundation height to eliminate or minimize to the maximum extent feasible hazards associated with anticipated sea level rise over the expected 100 year economic life of the structure.*

LUP Policy 4.23

> *New development on a beach or oceanfront bluff shall be sited outside areas subject to hazards (beach or bluff erosion, inundation, wave uprush) at any time during the full projected 100-year economic life of the development. If complete avoidance of hazard areas is not feasible, all new beach or oceanfront bluff development shall be elevated above the base Flood Elevation (as defined by FEMA) and setback as far landward as possible. All development shall be setback a minimum of 10 feet landward of the most landward surveyed mean high tide line. Whichever setback method is most restrictive shall apply. Development plans shall consider hazards currently affecting the property as well as hazards that can be anticipated over the life of the structure.*

LUP Policy 4.33:

> *All new beachfront and blufftop development shall be sized, sited and designed to minimize risk from wave run-up, flooding and beach and bluff erosion hazards without requiring a shoreline protection structure at any time during the life of the development.*

LUP Policy 4.35:

> *All new beachfront development shall be required to utilize a foundation system adequate to protect the structure from wave and erosion hazard without necessitating the construction of a shoreline protection structure.*

LUP Policy 4.36:

> *New development on or along the shoreline or a coastal bluff shall include, at a minimum, the use of secondary treatment waste disposal systems and shall site these new systems as far landward as possible in order to avoid the need for protective devices to the maximum extent feasible.*

Applicable City of Malibu Implementation Plan Provisions

LIP Section 10.4.A:

> *Siting and design of new shoreline development and shoreline protective devices shall take into account anticipated future changes in sea level. In particular, an acceleration of the historic rate of sea level rise shall be considered and its potential impact on beach erosion, shoreline retreat, and bluff erosion rates shall be evaluated. Development shall be set back a sufficient distance landward and elevated to a sufficient finished floor height to eliminate or minimize to the maximum extent feasible hazards associated with anticipated sea level rise over the expected 100 year economic life of the structure.*

LIP Section 10.4.B:

> *New development on a beach or oceanfront bluff shall be sited outside areas subject to hazards (beach or bluff erosion, inundation, wave run-up) at any time during the full projected 100 year economic life of the development. If complete avoidance of hazard areas is not feasible, all new beach or oceanfront bluff development shall be elevated above the base Flood Elevation (as defined by FEMA) and sited as far landward as possible to the maximum extent practicable.*
>
> *All development shall be setback a minimum of 10 feet landward of the most landward surveyed mean high tide line. Whichever setback method is most restrictive shall apply. Development plans shall consider hazards currently affecting the property as well as hazards that can be anticipated over the life of the structure.*

LIP Section 10.4.H:

> *All new beachfront and bluff-top development shall be sized, sited and designed to minimize risk from wave run-up, flooding and beach and bluff erosion hazards without requiring a shoreline protection structure at any time during the life of the development.*

LIP Section 10.4.I:

> *All new beachfront development shall be required to utilize a foundation system adequate to protect the structure from wave and erosion hazard without necessitating the construction of a shoreline protection structure.*

LIP Section 10.4.J:

> *New development shall include, at a minimum, the use of secondary treatment waste disposal systems and shall site these new systems as far landward as possible in order to avoid the need for protective devices to the maximum extent feasible.*

LIP Section 10.4.K:

> *Shoreline and bluff protection structures shall not be permitted to protect new development, except when necessary to protect a new septic system and there is no feasible alternative that would allow residential development on the parcel. Septic systems shall be located as far landward as feasible. Shoreline and bluff protection structures may be permitted to protect existing structures that were legally constructed prior to the effective date of the Coastal Act, or that were permitted prior to certification of the Malibu LCP only when it can be demonstrated that existing structures are at risk from identified hazards, that the proposed protective device is the least environmentally damaging alternative and is designed to eliminate or mitigate adverse impacts to local shoreline sand supply and public access. Alternatives analysis shall include the relocation of existing development*

landward as well as the removal of portions of existing development. "Existing structures" for purposes of this policy shall consist only of enclosed buildings used for living space or required parking, e.g. residential dwelling, guesthouse, or garage, and shall not include accessory or ancillary structures such as decks, patios, pools, tennis courts, cabanas, stairs, landscaping etc.

LIP Section 10.4.L:

No shoreline protection structure shall be permitted for the sole purpose of protecting an ancillary or accessory structure. Such accessory structures shall be removed if it is determined that the structure is in danger from erosion, flooding or wave run-up. Such structures shall be considered threatened if the bluff edge encroaches to within 10 feet of the structure as a result of erosion, landslide or other form of bluff collapse. Accessory structures, including but not limited to, patios, stairs, recreational facilities, landscaping features, and similar design elements shall be constructed and designed to be removed or relocated in the event of threat from erosion, bluff failure or wave hazards.

LIP Section 10.6.C:

As a condition of approval of new development on a vacant beachfront or bluff-top lot, or where demolition and rebuilding is proposed, where geologic or engineering evaluations conclude that the development can be sited and designed so as to not require a shoreline protection structure as part of the proposed development or at any time during the life of the development, the property owner shall be required to record a deed restriction against the property that ensures that no shoreline protection structure shall be proposed or constructed to protect the development approved and which expressly waives any future right to construct such devices that may exist pursuant to Public Resources Code Section 30235.

Section 30253 of the Coastal Act, which is also incorporated in the City's LCP, mandates that new development not create or contribute significantly to erosion. However, it also requires that new development minimize risks to life and property in areas of high geologic and flood hazard. In addition, Coastal Act Section 30235, as incorporated in the City's LCP, specifically provides that shoreline protective devices must be permitted when both of the following two criteria are met: (1) the device is required to serve coastal-dependent uses or to protect existing structures or public beaches if these areas/structures are in danger from erosion <u>and</u> (2) the device is designed to eliminate or mitigate adverse impacts on local shoreline sand supply. In addition to the construction of a rock revetment, the proposed project also includes the placement of sand for the purpose of beach nourishment in open coastal waters.

The proposed project, including the construction of a 4,150 linear ft. rock revetment designed to be overlain by reconstructed dunes and the implementation of beach nourishment to substantially widen the beach with an annual backpassing program should be considered an experimental pilot project. It will cover or modify up to 24.3 acres. The proposed dune restoration/enhancement and beach nourishment components of the project, involving the proposed placement of 300,000 cu. yds. of sand, would provide a dune and beach system that will be approximately 240 ft. in width (as measured from the top of the rock revetment to the water) and which would extend from the mouth of Trancas Creek (at the downcoast end) to 31380 Broad Beach Road (at the upcoast end). The dune elevation would be similar to the height of the existing downcoast dunes (+20 MLLW) and would be 165 to 180 feet wide; the initial back beach would be at elevation +12' to +15' MLLW, sloping down to the surfzone, with a total dry beach width of 60 to 75 feet.

Sand for the beach widening would come from inland sand quarries located approximately 40-45 miles inland and would be trucked over local roads to the site in 14-cubic yard capacity trucks.

Based on the information submitted by the applicant's geologic and engineering consultants, it is clear that at different periods of time, Broad Beach (also known as Trancas Beach) has been both much wider and narrower than its current 2015 condition. Specifically, from the late 1960's to the late 1970's the beach extended seaward from its current shoreline position by more than 100 to 200 feet in some locations. Coincidentally, this period of 10 years or so, when the beach was at its widest point in at least the last 100 years or more, the beach reached a peak width in 1970 with a yearly average of 60 feet landward of the existing MHTL, although the beach has been receding since this time.

Between 1974 and 2009, approximately 600,000 cy of sand has been lost at Broad Beach, a majority of which moved east to nourish Zuma Beach and other locations down coast. The shoreline moved landward an average of 65 feet during that time period. The area of greatest beach erosion has occurred at the upcoast end of the project reach at Lechuza Point and tapered off at the downcoast end of the project reach at the mouth of Trancas Creek. Since the sand budget became negative in approximately 1974, the sand loss rate for Broad Beach has accelerated from about 20,000 cu. yds. per year since the 1970's to approximately 35,000 cu. yds. per year between 2004 and 2009[2] and has further accelerated to approximately 45,000 cu. yds. per year between 2009 and 2012[3]. Therefore, while it is has at times been characterized as a wide beach, from the historical evidence and underlying geomorphological characteristics of the shoreline, it can be concluded that the 1960's-1970's period of maximum beach width was an anomalous condition, and not indicative of the average beach width over the past 100 years or so. The most recent sand loss rate of 45,000 cu. yds. per year may be a short-term anomaly; regardless, it is also clear that Broad Beach is currently subject to significant shoreline erosion that is expected to continue for the foreseeable future.

1. Sea Level Rise

Sea level has been rising slightly for many years. As an example, in the Santa Monica Bay area, the historic rate of sea level rise, based on tide gauge records, has been 1.8 mm/yr. or about 7 inches per century[4]. Recent satellite measurements have detected global sea level rise from 1993 to present of 3 mm/yr. or a significant increase above the historic trend observed from tide gauges. Recent observations of sea level along parts of the California coast have shown some anomalous trends, however; there is a growing body of evidence that there has been a slight increase in global temperature and that an accelerated rate of sea level rise can be expected to accompany this increase in temperature. Sea level rise is expected to increase significantly throughout the 21st century and some coastal experts have indicated that sea level rise of 3 to 5 feet or more could occur by the year 2100[5]. Mean water level affects shoreline erosion in several

2 (Everts Coastal 2014)
3 (Everts Coastal 2014)
4 Lyles, S.D., L.E. Hickman and H.A. Debaugh (1988) Sea Level Variations for the United States 1855 – 1986. Rockville, MD: National Ocean Service.
5 Cayan, D.R., M. Tyree, M. Dettinger, H. Hidalgo, T. Das, E. Maurer, P. Bromirski, N. Graham, and R.E. Flick, 2009. *Climate Change Scenarios and Sea Level Estimates for the California 2008 Climate Change Scenarios Assessment*, Draft Paper, CEC-500-2009-014-D, 62 pp, http://www.energy.ca.gov/2009publications/CEC-500-2009-014/CEC-500-2009-014-D.pdf.

ways and an increase in the average sea level will exacerbate all these conditions. The Coastal Commission's Sea Level Rise Policy Guidance, adopted August 12, 2015, discusses many of the concerns related to sea level rise along the California coast and it provides both general and specific approaches for the review, analysis, siting and design of both new development and shoreline armoring to minimize current and future risks related to rising sea level.

On the California coast the effect of a rise in sea level will be the landward migration of the intersection of the ocean with the shore. On a relatively flat beach, with a slope of 40:1, a simple geometric model of the coast indicated that every foot of sea level rise will result in a 40-foot landward movement of the ocean/beach interface. For fixed structures on the shoreline, such as a single family residence, pilings, or seawalls, an increase in sea level will increase the inundation of the structure. More of the structure will be inundated or underwater than is inundated now and the portions of the structure that are now underwater part of the time will be underwater more frequently.

Accompanying this rise in sea level will be increased wave heights and wave energy. Along much of the California coast, the bottom depth controls the nearshore wave heights, with bigger waves occurring in deeper water. Since wave energy increases with the square of the wave height, a small increase in wave height can cause a significant increase in wave energy and wave damage. Combined with the physical increase in water elevation, a small rise in sea level can expose previously protected back shore development to both inundation and wave attack, and those areas that are already exposed to wave attack will be exposed to more frequent wave attack with higher wave forces. Structures that are adequate for current storm conditions may not provide as much protection in the future.

2. Shoreline Armoring Impacts

Coastal Act Section 30235 acknowledges that shoreline armoring, including seawalls, revetments, cliff retaining walls, groins and other such structural or "hard" methods designed to forestall erosion also alter natural landforms and natural shoreline processes. Accordingly, Section 30235 only requires the approval of shoreline protective works when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion (and when designed to address impacts on local shoreline sand supply). The provision is so limited because shoreline structures can have a variety of adverse impacts on coastal resources, including adverse effects on sand supply, public access, coastal views, natural landforms, and overall shoreline beach dynamics on and off site, ultimately resulting in the loss of beach.

Shoreline armoring or protection devices also directly interfere with public access to tidelands by impeding the ambulatory nature of the mean high tide line (the boundary between public and private lands) during high tide and severe storm events, and potentially throughout the entire winter season. The impact of a shoreline protective device on public access is most evident on a beach where wave run-up and the mean high tide line are frequently observed in an extreme landward position during storm events and the winter season. As an unarmored shoreline retreats landward due to the natural process of erosion, the boundary between public and private land also retreats landward. Construction of rock revetments and seawalls to protect private property fixes the inland limit of the shoreline and prevents any landward migration of the shoreline inland of the structure. The dry beach area will narrow and eventually the mean high tide line will intersect the structure on a regular basis. The intertidal zone (the distance between the high water mark and low water mark) will narrow and eventually these two will both intersect the structure. As the distance between the high water mark and low water mark becomes narrower, the seawall effectively eliminates lateral access opportunities along the beach as the entire area below the fixed high tideline is inundated. The ultimate result of a fixed tideline boundary (which would otherwise normally migrate and retreat landward, while maintaining a passable distance between the high water mark and low water mark overtime) is a reduction or elimination of the area of sandy beach available for public access and recreation.

Interference by shoreline protective devices can result in a number of adverse effects on the dynamic shoreline system and the public's beach ownership interests. First, changes in the shoreline profile, particularly changes in the slope of the profile that result from a reduced beach berm width, alter the usable area under public ownership. A beach that rests either temporarily or permanently at a steeper angle than under natural conditions will have less horizontal distance between the mean low water and mean high water lines. This reduces the actual area in which the public can pass on their own property. The second effect on access is through a progressive loss of sand as shore material is not available to nourish the nearshore sand bar. The lack of an effective bar can allow such high wave energy on the shoreline that materials may be lost far offshore where it is no longer available to nourish the beach. This affects public access again through a loss of area between the mean high water line and the actual water. Third, shoreline protective devices such as revetments and bulkheads cumulatively affect shoreline sand supply and public access by causing accelerated and increased erosion on adjacent public beaches. This effect may not become clear until such devices are constructed individually along a shoreline and they reach a public beach. In addition, if a seasonally-eroded beach condition occurs with greater frequency due to the placement of a shoreline protective device on the subject site, then the subject beach would also accrete at a slower rate. Fourth, if not sited landward in a location that ensures that the seawall is only acted upon during severe storm events, beach scour during the winter season will be accelerated because there is less beach area to dissipate the wave's energy and more wave energy will be reflected off the face of the seawall or revetment rocks.

Shoreline protective devices such as seawalls, revetments, gunnite facings, groins et cetera are all physical structures that occupy space. When a shoreline protective device is placed on a beach area, the underlying beach area cannot be used as beach. This generally results in a loss of public access as well as a loss of sand-generating area. The area where the structure is placed will be altered from the time the protective device is constructed, and the extent or area occupied by the device will remain the same over time, until the structure is removed or moved from its initial location, or in the case of a revetment, as it spreads seaward over time. The beach area located beneath a shoreline protective device, referred to as the encroachment area, is the area of the structure's footprint.

Further, when a shoreline or beach segment is developed with a shoreline protective device, the natural exchange of material between the back beach, dune systems, foreshore and intertidal region can all be interrupted. The natural shoreline processes affecting the formation and retention of sandy beaches can be significantly altered by the construction of shoreline armoring structures depending on where these devices are located on the beach and the site specific geomorphological characteristics of the shoreline. There are effects that a shoreline protective structure has on a shoreline which can be quantified, including, (1) the loss of beach area on which the structure is located, (2) the long-term loss of beach which will result when the back beach location is fixed on an eroding shoreline (also known as passive erosion); and (3) the amount of material that would have been supplied to the beach if the back beach were allowed to erode naturally. As follows, the location and alignment of a shoreline protective device on a beach dictates the amount of material that would otherwise have been supplied to the beach seaward of the device. Thus, generally the Commission has found in past approvals of shoreline protective devices that locating such a device in the furthest landward position possible will maximize the amount of sandy beach available for public access seaward of the device and reduce impacts to the natural environments and natural sand exchange systems existing along a beach. While the location of the existing development along Broad Beach in between the sea cliff and the rest of the beach has already modified the normal sand interaction and movements along this shoreline, construction of a shoreline protective device in the proposed location would function to further divide portions of the existing beach and would 'fix' the back beach in a much farther seaward location that that which currently exists without a shoreline protective device along the subject shoreline.

In this case, the applicant has submitted a Coastal Engineering Report by Moffatt & Nichol[6] dated October 2013, which indicates that although the rate of erosion of the beach on site is increasing, the historical rate of erosion on Broad Beach since the 1970's has been approximately 2 ft. per year. Thus, in addition to the loss of public sandy beach area from the direct occupation of the revetment itself (approximately 3.02 acres in area) since the back of the beach has been effectively "fixed" by the revetment, the revetment will also result in the loss of beach area for public use landward of the revetment that would have become available for public use as the shoreline continued to erode and the mean high tide line would have continued to move landward. Thus, given the historical average rate of 2 ft. of shoreline erosion per year over the project life of 10 or 20 years, the proposed revetment would result in the expected loss of another 20 to 40 ft. of beach over the full 4,150 foot length of the revetment that would otherwise be available for public use.

Experts generally agree that where the shoreline is eroding and armoring is installed, as would be the case here, the armoring will eventually define the boundary between the sea and the upland. On an eroding shoreline fronted by a beach, the beach will be present as long as some sand is supplied to the shoreline and the beach is not submerged by sea level rise. As erosion proceeds, the beach also retreats. This process stops, however, when the retreating shoreline comes to a revetment or a seawall. While the shoreline on either side of the armor continues to retreat, shoreline retreat in front of the armor stops.

In this case, the proposed revetment would occupy 3.02 acres of beach. Although the proposed revetment would be situated on a mix of public trust land, private property unencumbered by any public rights, and public easements, it would effectively limit the amount of sand available to the public beach area as a whole and the overall shoreline width and shape. Moreover, Dr. Lesley

[6] The initial study was dated Octobetr 2013. The report has been updated and revised multiple times since October 2013, most recently by Moffatt & Nichol's Broad Beach Restoration Project Coastal Engineering Appendix To the Broad Beach Geologic Hazard Abatement District Engineers Report 2015 Update.

Ewing, Commission's Staff Engineer, has determined that, in this case, the as-built rock revetment has fixed the location of the back of the beach, which has resulted in the narrowing of the beach seaward of the revetment particularly during medium/high tide and high wave events since its construction in 2010. To illustrate this point, a photograph from a site visit by Commission staff to the project site after the construction of the revetment/sand bag wall is included as **Exhibit 10** which clearly demonstrates this process at work. In addition, an aerial photograph of the entire project reach provided by the applicant's coastal engineer and included as **Exhibit 3**, also clearly demonstrates this same process as evidenced by the lack of dry beach area seaward of the as-built revetment on site during medium and higher tide conditions. Eventually, the shoreline fronting the armor protrudes into the water, with the mean high tide line fixed at the base of the structure. In the case of an eroding shoreline, this represents the loss of a beach as a direct result of the armor.

As noted previously, the revetment will cover 3.02 acres of beach, some that is public trust land, some that is, for now, private property unencumbered by any public rights, and some that is private property subject to public easements, deed restrictions, and permit conditions granting public access. The revetment will also prevent the inland migration of the beach (often referred to as passive erosion), at an average retreat rate of 2 feet per year, as determined by the applicants' coastal engineer. Dr. Ewing has reviewed the various coastal studies for this section of coast and concurred with the provided average retreat rate.

At Broad Beach, under natural conditions, the ambulatory mean high tide line (MHTL) defines the landward boundary of public trust land. The changes in the MHTL locations surveyed for the Broad Beach area in 2009 and 2010 show a one year trend that closely tracks the average annual retreat rate. While most years will not track the average retreat rate as closely as this, nevertheless, over multiple years (5 to 10 or more), the actual retreat should be well-represented by the average annual retreat. As such, the future MHTL would be approximately 28 feet farther inland over a 10-year project life (including the 4 years that the emergency revetment has been in place) and 48 feet farther inland over a 20-year project life. For the 4,150-foot long revetment, the public trust lands would have expanded by 25,200 sq. ft. (0.58 acres) during the time that the emergency revetment has been in place, by an additional 83,000 sq. ft. (1.9 acres) during the 10-year project life or an additional 166,000 sq. ft. (3.8 acres) during the 20-year project life.

The revetment will also prevent erosion from contributing inland sand to the littoral cell. With an average back beach elevation of 15 feet (based on project plans provided by the applicant), and an average composition of the back dune material of 95% sand (based on provided grain size analysis in Figure 11 of Exhibit 14 "Dr. Jonna Engel's Memo" of this staff report), 2-feet of erosion of the back dunes each year would contribute 28.5 cu. ft. of sand (1.056 cubic yards) per foot of beach per year. For the 4,150- foot long revetment, the littoral sand contributions would have been approximately 17,530 cu. yds. of sand during the time that the emergency revetment has been in place, an additional 43,800 cu. yds. during the 10-year project life or an additional 87,650 cu. yds. during the 20-year project life. In addition to the volume of sand trapping inland of the revetment, the revetment will accelerate beach scour seaward of the structure. While this sand will remain within the littoral cell, the revetment will cause localized sand losses that, while attributable to the structure, cannot be quantified.

Thus, for the above cited reasons, the Commission finds that the existing as-built rock revetment has resulted in the narrowing of the beach on site which has adversely impacted shoreline sand supply and public access/recreation due to the loss of sandy beach area seaward of the revetment.

3. Proposed Shoreline Protection Device

The proposed project includes permanent retention of the emergency rock revetment, which was authorized on a temporary basis by the Commission in 2010, with the exception of the downcoast approximately 1,800 linear feet of the as-built rock revetment, which is proposed to be relocated up to 75 feet further landward. The emergency revetment is 4,150 ft. long, rises approximately 12-15 ft. above the low tide beach with an average crest elevation of 13 ft. above mean lower low water, and is 22 to 38 ft. wide at its base. The emergency revetment was constructed in April of 2010 with boulders with a size range of 0.5 to 2 tons to facilitate fast construction, and a shallow toe elevation to reduce the need for digging. Approximately 36,000 tons of rock were placed along 4,150 ft. of the shoreline, seaward of the stretch from 30760 Broad Beach Road to 31346 Broad Beach Road with the exception that the property owner at 30822 Broad Beach Road opted not to participate in the emergency revetment and, as such, maintains an approximately 100 ft. wide gap in front of the property, which would be retained as part of the applicants proposed project. Prior to construction of the emergency revetment much of the stretch of shoreline from 30760 Broad Beach Road to 31346 Broad Beach Road had already been armored with geotextile sand bag revetment walls which had been constructed pursuant to emergency coastal development permits issued by the City of Malibu (**Exhibit 6**).

However, the City's emergency permits authorized the sand bag walls on a temporary basis only for a period of only 90 days. During the emergency construction of the revetment in 2010, the applicant's coastal engineering consultants asserted that it was infeasible to remove these sand bag walls during construction of the new revetment due to timing constraints and the need for urgent action to protect existing development on the beach. As a result, these sand bag walls were left in place with the revetment constructed on top of or immediately seaward of them. The proposed project would permanently retain all of these sand bag walls in place underneath and landward of the emergency rock revetment.

The alignment of the existing rock revetment/sand bag wall occupies approximately 3.02 acre of beach and is situated closer to the stringline of development on the west (upcoast) end of the beach and much further seaward of the developed areas of the individual properties along the middle and east (downcoast) segments of the beach, where the beach widens significantly. Specifically, on the east (downcoast) end the distance between the homes and the revetment generally ranges from 80 ft. to 120 ft. and approximately 40 ft. along the more narrow west (upcoast) end. No shoreline protection was proposed west or upcoast of the property at 31346 Broad Beach Road because the residences at the furthest upcoast end of the beach are already protected by a mix of permitted and unpermitted seawalls, revetments, and bulkheads. The upcoast terminus of the as-built revetment extends partially onto the property at 31350 Broad Beach, where it abuts the existing vertical seawall on that property.

4. Need for Shoreline Protection at Broad Beach and Alternatives Analysis

Coastal Act Section 30235 acknowledges that seawalls, revetments, cliff retaining walls, groins and other such structural or "hard" methods designed to forestall erosion also alter natural landforms and natural shoreline processes. Accordingly, Section 30235 only requires the approval of shoreline protective works when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion. The Coastal Act provision is so limited because shoreline structures can have a variety of negative impacts on coastal resources including adverse effects on sand supply, public access, coastal views, natural landforms, and overall shoreline beach dynamics on and off site, ultimately resulting in the loss of beach.

Specifically, Coastal Act Section 30235 only requires that shoreline protection devices shall be permitted when all of the following four criteria are met: (1) there is an existing structure, public beach area, or coastal dependent use; (2) the existing structure, public beach area, or coastal dependent use is in danger from erosion; (3) shoreline-altering construction is required to protect the existing threatened structure or public beach area, or to serve the coastal dependent use; and (4) the required protection is designed to eliminate or mitigate its adverse impacts on shoreline sand supply. The first three questions relate to whether the proposed shoreline protection device is necessary, while the fourth question applies to avoiding or mitigating any unavoidable impacts from it. In addition, even where all four criteria are satisfied, and thus, shoreline protection devices must be permitted, the other policies in Chapter 3 of the Coastal Act do not become irrelevant, so the devices must be located, designed, and maintained in a manner that is consistent with those other policies to the greatest extent possible.

a. Existing Development to be Protected

In regards to the first question, the approximately 4,150 linear ft. rock revetment was constructed on the sandy beach seaward of 78 existing beachfront residences between 31350 Broad Beach Road and 30760 Broad Beach Road pursuant to Emergency Coastal Development Permit 4-10-003-G. Many of these properties were developed with leach fields and/or septic systems (or in a few cases, seepage pits) that were predominantly located seaward of the homes. As some of the historically developed properties have been redeveloped since the effective date of the Coastal Act, January 1, 1977, many of these permittees have been required to remove or relocate these systems landward of their residences and/or upgrade the septic system and leach fields that serve the new primary residences. As such, there is a mix of septic systems and leach fields built landward and seaward of the primary residences, in a patchwork along the subject shoreline.

The Coastal Act requires that new development to be sited and constructed in a manner that minimizes risks to life and property in high geologic, flood, and fire hazard areas; that does not contribute significantly to erosion or destruction of the site or surrounding area; and that does not in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. (Pub. Resources Code Section 30253(a)-(b).) In its approval of a coastal development permit for any of the structures that were built along this stretch of beach after 1973, the Commission was required to find that the approved structures would not require shoreline protection because it was constructed with adequate setbacks and/or other measures in order to negate the need of future armoring.

Coastal Act Section 30235 requires approval of shoreline protection in certain circumstances (if warranted and otherwise consistent with Coastal Act policies), but only as needed for "existing" structures. Coastal Act Section 30235 allows for the use of shoreline protection for "existing" structures when it is designed to eliminate or mitigate adverse effects on local shoreline sand supply. The Commission may also impose conditions to require compliance with other Coastal Act requirements. (*Ocean Harbor House Homeowners Association v. Cal. Coastal Comm.* (2008) 163 Cal.App.4th 215, 242; Pub. Resources Code Section 30607.) Here, 46 of the 78 residences that will be located landward of the rock revetment were constructed prior to the Coastal Act and are thus entitled to protection pursuant to Section 30235. Twenty-five more of these residences were authorized under the Coastal Act without a waiver of rights to shoreline protection, but based on the analysis in the prior paragraph, those approvals must have been based on the conclusion that these residences would not need shoreline protection; and 7 other houses were permitted subject to a condition expressly requiring waiver of rights to shoreline protection. As explained below, the 46 pre-Coastal Act houses are located in a patchwork manner along the entire length of Broad Beach. Only a revetment that runs the entire length of Broad Beach can provide effective protection for those houses.

As proposed, the rock revetment would be a continuous 4,150 linear ft. structure. The above referenced properties containing residences constructed pursuant to CDPs approved after the effective date of the Coastal Act and the properties where owners have waived any rights to a future shoreline protective device are also located in a patchwork manner throughout the project reach. Thus, the as-built rock revetment may not be modified to remove shoreline protection on these properties without breaking up the continuous revetment into several smaller segments resulting in significant "edge effects" (which include increased scour and erosion where the revetment ends) wherever a gap in the revetment would occur. Thus, the Commission finds that in this unique case, in order to allow for a single, unbroken revetment that minimizes edge effects, it would be necessary to allow for the construction of the rock revetment on both those properties where waivers are in effect and those properties developed with residential structures after the effective date of the Coastal Act.

The Commission's approval of a continuous revetment does not in any way invalidate or override any previous permit conditions or recorded documents[7] regarding the waiver of rights to shoreline protection.

Moreover, there is also a mix of accessory development on many of the properties within the subject area including patios, decks, "teahouses", gazebos, yard areas, and landscaped areas. Pursuant to Section 10.4.L of the City of Malibu's certified IP, accessory development, such as the patios, decks, "teahouses", gazebos, yard areas, and landscaped areas, is specifically not

[7] The Commission and local governments with certified LCPs have sometimes required applicants for immediate shoreline development (like blufftop or beachfront houses) to waive any right to a shoreline protective device, pursuant to Section 30235 of the Coastal Act or the like, through recordation of a deed restriction on the subject property(ies). In other words, applicants are required to stipulate that the structures being permitted will not be considered existing structures, relative to their interpretation pursuant to Section 30235 of the Coastal Act, in the future because they have been sited and designed to not need shoreline armoring in the future.

entitled to be protected pursuant to any form of shoreline protection, such as the proposed rock revetment. Section 10.4.L of the City's adopted IP states:

> *No shoreline protection structure shall be permitted for the sole purpose of protecting an ancillary or accessory structure. Such accessory structures shall be removed if it is determined that the structure is in danger from erosion, flooding or wave run-up. Such structures shall be considered threatened if the bluff edge encroaches to within 10 feet of the structure as a result of erosion, landslide or other form of bluff collapse. Accessory structures, including but not limited to, patios, stairs, recreational facilities, landscaping features, and similar design elements shall be constructed and designed to be removed or relocated in the event of threat from erosion, bluff failure or wave hazards.*

This is consistent with a limitation inherent in section 30235 (discussed in Section IV.B.4.c, below). Thus, the patios, decks, yard areas/landscaped areas, "teahouses", gazebos, and other forms of accessory development on each site are not entitled to be protected pursuant to any form of shoreline protection. However, the existing single family residences and septic systems within the project area, that were constructed prior to the effective date of the Coastal Act, do constitute development that may be protected by a shoreline protective device as referenced by Section 30235.

b. Erosion Danger

In regards to the second question, the applicant has also established that the existing development on site (including the single family residences and those septic systems located seaward of residences that were constructed prior to the effective date of the Coastal Act) are in danger of serious damage or destruction due to further wave attack and associated beach erosion. In this case, the problem of ongoing erosion at this beach has been previously acknowledged by the Commission in its approval of Emergency Coastal Development Permits 4-10-003-G and 4-10-029-G in 2010 which authorized the construction of the 4,150 linear ft. as-built rock revetment on site in response to previous wave caused erosive events.

Moreover, with global warming and sea level rise, increased relative wave heights and wave energy are expected. Along much of the California coast, the bottom depth controls the nearshore wave heights, with bigger waves occurring in deeper water. Since wave energy increases with the square of the wave height, a small increase in water depth and wave height can cause a significant increase in wave energy and wave damage. Thus, combined with the physical increase in water elevation, a small rise in sea level can expose previously safe backshore development to both inundation and wave attack, and those areas that are already exposed to wave attack will be exposed to more frequent wave attack with higher wave forces. Therefore, given the effects of expected sea level rise at the subject site, the upland areas of Broad Beach are expected to be subjected to greater wave action more frequently in the future.

The width of Broad Beach has varied greatly in recent history and has been subject to fluctuation over time, with the widest recorded point occurring in the late 1960's- mid 1970's. The western (upcoast) segment of the project reach (that portion located immediately downcoast of Lechuza Point) has historically maintained a narrower shoreline profile than other segments of Broad Beach. A review of historical records and aerial photographs shows that the beach on site was at its widest point over the last century or so in the 1970's and reached its peak width in 1971.

However, starting in 1974 the shoreline began to experience significant rates of erosion, and developed what is described as a negative sand budget. From 1974- 2007, the applicant's engineering consultants have estimated that the beach lost approximately 600,000 cu. yds. of sand material. Additionally, El Niño events in the 1980's, 1990's and 2000's subjected the shoreline to dramatic erosive episodes, exacerbating the naturally occurring 'negative sand budget'. A report submitted by the applicant (Gary Griggs, 2011) states that:

> *"The initial development of Broad Beach involved construction of homes and other improvements that encroached 200 to 250 feet onto the original beach and dunes, leaving only a narrow fronting beach with little seasonal buffer. With sea level rise and the associated process of shoreline retreat, we are seeing passive erosion of the active beach, which is caught between high tides and wave run-up and the shoreline protection structures. The beach and dunes can no longer retreat towards the old seacliff and have continued to narrow."*

It is evident that the width of the subject shoreline has fluctuated back and forth over time and that the existing development along the shoreline has interfered with the natural flux of sand accumulation and loss. While there is a small possibility that at some point in the future the beach could naturally begin to widen again, it is not a likely possibility given expected sea level rise in this area and other extenuating factors. The applicant's coastal engineering consultants have indicated that the historic erosion rates on the subject shoreline range from 20,000 to 40,000 cu. yds. yearly toward the east and included the loss of approximately 2 ft. of beach width per year; however, the calibrated future rate of erosion provided by the applicant's engineering consultants is between 50,000 to 100,000 cu. yds. yearly toward the east.

Many of these properties were developed with leach fields and/or septic systems (or in a few cases, seepage pits) that were predominantly located seaward of the homes. As some of the historically developed properties have been redeveloped over time, they have been required to remove, relocate and/or upgrade the septic system and leach fields that serve the new primary residences. Most of the CDPs that were issued for such redevelopment projects required the new onsite wastewater treatment systems to be located landward of the proposed residences. Additionally, most homes that were built after the effective date of the Coastal Act on previously undeveloped lots within the project boundary were also required to locate their septic and leach fields landward of the proposed residence, consistent with Section 30253. As such there is a mix of septic systems and leach fields built landward and seaward of the primary residences, in a patchwork along the subject shoreline.

In addition, the project site has been subject to wave-caused erosional events in the past. During the 1997/1998 El Nino winter storm season, wave-caused erosion was endangering several homes along the upcoast portion of Broad Beach. An unpermitted rock revetment was constructed on approximately a dozen lots at that time, although some of the property owners obtained emergency coastal permits for the work granting temporary authorization at the time, others did not. The unpermitted rock revetment was removed by the applicant during the construction of the 4,150 linear ft. long rock revetment that is the subject of this application.

Subsequently, in response to continued shoreline erosion, in 2008, and again in 2009, the TPOA obtained emergency coastal permits from the City of Malibu for the installation of sand bag walls on many of the same properties where the as-built rock revetment is now located. In

January 2010, the TPOA applied for and obtained Emergency Coastal Development Permits 4-10-003 and 4-10-029 for the construction of the 4,150 linear ft. long rock revetment. The TPOA's engineering consultants asserted at the time that the existing emergency sandbag wall protective works were in danger of failure and that a rock revetment was necessary to provide temporary emergency protection.

Thus, the Commission finds that there is adequate evidence to demonstrate that existing single family residences and septic systems within the project area that were constructed prior to the effective date of the Coastal Act within the project reach have been subject to potential damage from wave caused erosion and are currently in danger from erosion.

c. Alternatives to Use of a Shoreline Protection Device

The third criterion, pursuant to Section 30235, that must be met before approval of a shoreline protective device can be considered necessary is that the proposed device or shoreline-altering construction is required to protect the existing threatened structure or public beach area, or to serve the coastal dependent use. In other words, a shoreline protection device must be permitted if approval of such a device is the only feasible means of protecting the endangered existing development or coastal dependent use. Further, a particular device may not be approved if there are less environmentally damaging alternatives or alternatives that are more consistent with other Chapter 3 policies. Other alternatives typically considered include: the "no project" alternative; abandonment of threatened structures or use areas; relocation of the threatened structures or use areas; sand replenishment programs; and combinations of each.

The applicant's Coastal Engineering Consultant, Moffatt & Nichol, has prepared an alternatives analysis identifying potential alternatives to the use of the rock revetment to protect the existing structures on site. In addition, a Revised Analysis of Impacts to Public Trust Resources and Values (APTR) has also been prepared by AMEC consultants for the California State Lands Commission dated July 2014, which considers a range of alternatives to the proposed project.

In regards to the "No Project" alternative, the applicant's coastal engineering consultants determined this alternative is infeasible as it would not meet the stated goals of the project to protect the existing residential development on site. Similarly, the applicant did not include an analysis of the abandonment of threatened structures for the same reason that the "No Project" alternative was not found to be feasible. The applicant included a brief analysis of a "Managed Retreat" alternative involving the landward relocation of existing residences and septic systems on each site and found that although this alternative would reduce or delay exposure of these structures to coastal erosion it would not meet the primary objective of providing long-term shoreline protection of the existing residences on site, particularly given the relatively limited area for retreat to occur given the location of the subject properties between the beach and Broad Beach Road.

In regards to the use of beach nourishment as an alternative to the use of the rock revetment, the proposed project already includes of the importation of 300,000 cu. yds. of sand material from sand quarries located approximately 40-45 miles inland of the project site. As proposed, the reconstructed/post-nourishment combined beach and dune system would extend approximately

240 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes.

The project also includes backpassing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. As proposed, the applicant would conduct major renourishments (300,000 cu. yds. of sand material from inland sand quarries) of the beach every 5 years after the initial nourishment had been completed, and smaller interim or erosion renourishments (75,000 cu. yds. of sand material from inland sand quarries) as needed when certain spatial and temporal erosion triggers are reached. As designed, the proposed rock revetment would be buried beneath at least 2-5 ft. of imported sand material and the reconstructed dunes on site would be revegetated with native dune plant species.

However, although the project, as proposed, includes the provision for substantial widening of the beach from nourishment activities, the applicant's coastal engineering consultants have also indicated that the beach is expected to be subject to continuing erosion and that the created or widened beach area seaward of the revetment could be entirely or substantially eroded within a few years years, and possibly even less time in the event of a significant storm or wave-caused erosion event. Thus, the applicant's coastal engineering consultants have concluded that the revetment is necessary to provide "backstop" protection in the event that the proposed beach nourishment/widened beach fails.

Given the dynamic, ever-changing nature of the beach morphology and coastal process acting on this beach it is very difficult to model or predict how the beach nourishment program will perform over time as well as predict if unanticipated changes could result in adverse impacts to marine resources and habitats. The Commission finds that the proposed project is, in part, an experimental effort, or pilot project, to create a widened sandy beach within the project reach to reduce the potential for periodic wave-caused erosion to upland areas of the site and enhance public access and recreational opportunities. Thus, in this case, the Commission finds that given the experimental nature of the proposed nourishment project and the dynamic variability of conditions in coastal areas, it is not possible to ensure that the proposed beach nourishment efforts will be adequate to establish and maintain the necessary beach width to protect the existing residential development on each site without the use of the proposed rock revetment to serve as "backstop" protection.

With respect to the accessory development on many of the properties that was discussed at the end of Section IV.B.4.c, above, because such development is easily movable or removable, even if it were to qualify as "existing," it could satisfy Section 30235's requirement that a protective device is "required . . . to protect" it. As mentioned in Section IV.B.4.c, this is consistent with Section 10.4.L of the City of Malibu's certified IP, which expressly designates such accessory development as not being entitled to be protected pursuant to any form of shoreline protection. Thus, for these structures, an alternative is available, and no shoreline protection is required.

d. Alternatives to Avoid or Minimize Adverse Impacts From Rock Revetment

The fourth, and final, test of Section 30235 of the Coastal Act that must be met in order to require Commission approval is that a shoreline protective structure must be designed to eliminate or mitigate adverse impacts to local shoreline sand supply. Specifically, in the event that it is determined that there is no alternative to the use of a shoreline protection device, then alternatives to the design and location of the device must be analyzed to ensure that adverse impacts to shoreline processes, and in particular to local shoreline sand supply, are eliminated or mitigated. In addition, because any shoreline protective device must comply with other Chapter 3 policies to the extent possible, impacts to public access and recreation must also be minimized. In past Commission actions, the Commission has generally found that siting and designing the shoreline protection device to be located as far landward as feasible so that the device occupies less sandy beach and is acted upon by wave action less frequently is the preferred alternative to minimize adverse impacts to shoreline processes, sand supply, public access and recreation.

As discussed in more detail in Section IV.B.1 of this report (titled "Shoreline Armoring and Impacts"), the existing as-built rock revetment on site has resulted in, and is continuing to cause, adverse impacts to shoreline sand supply, coastal processes, and public access/recreation. The quantifiable impacts from the revetment will be encroachment onto the beach, preclusion of passive erosion landward of the revetment through fixing the back beach location, and denial of sand to the littoral cell. The as-built emergency revetment has resulted in the encroachment on 3.02 acres of beach, losses (in the form of opportunity costs) of 0.58 acres of inland migration of the MHTL and denial of 17,530 cu. yds. of sand to the littoral cell. The proposed project would maintain the 3.02 acres of encroachment, result in an additional loss of 1.9 acres of beach area that would have become public as a result of the inland migration of the MHTL for a 10-year project life (or 3.8 acres for a 20-year project life), and denial of 43,800 cu. yds. of sand to the littoral cell for a 10-year project life (or 87,650 cu. yds. for a 20-year project life) that would have been available if not for the revetment. Total impacts from the as-built emergency revetment to date and an additional 10-year project life would be 3.02 acres of direct encroachment onto the beach, loss of 2.48 acres of inland migration of the MHTL, and denial of 61,330 cu. yds. of sand to the littoral cell. Total impacts from the as-built emergency revetment to date and an additional 20-year project life would be 3.02 acres of direct encroachment onto the beach, loss of 4.38 acres of inland migration of the MHTL and denial of 105,130 cu. yds. of sand to the littoral cell.

In most situations, the land impacts from a revetment resulting from encroachment and passive erosion are mitigated by an in-lieu fee for recreational and access losses. However, in-kind mitigation is always preferred, and in this situation, there is additional land inland of the proposed revetment location that can provide for direct mitigation. As discussed below, the revetment can be relocated landward. Approximately 2,000 feet of the revetment can be relocated landward by up to 100 feet. This will provide approximately 160,000 sq. ft. (3.67 acres) of new beach areas, mitigating, in-kind, for much of the passive erosion and encroachment loss.

In order to mitigate potential impacts to the sand supply, coastal processes, and public access and recreation associated with the proposed project there are two main factors to consider: (1)

providing for beach nourishment to mitigate the impacts of the proposed revetment device and (2) siting the revetment in the landward-most location feasible.

In regards to the first factor, in past permit actions involving the construction of a shoreline protection device, the Commission has typically required either beach nourishment or the provision of an in-lieu fee for the purpose of providing beach nourishment to offset adverse impacts to shoreline sand supply and coastal resources. In this particular case the applicant is already proposing to import 300,000 cu. yds. of sand for beach nourishment and dune restoration activities for the express purpose of creating a wider beach on site and enhancing the effectiveness and longevity of the proposed rock revetment. As proposed, the project would specifically include deposition of 300,000 cu. yds. of sand on the beach from inland sand quarries during the first year, approximately 300,000 cu. yds. of sand approximately every five years thereafter or as needed for the proposed 20 year term of the project, and periodic interim or erosion nourishments involving up to 75,000 cu. yds. of sand as needed when certain spatial and temporal erosion triggers are reached . The applicant also proposes to conduct periodic sand back-passing operations to occur no more than once per year for a period of 20 years. Thus, as proposed, the project would include some mitigation for the adverse impacts to shoreline sand supply and coastal processes resulting from the rock revetment.

However, it is important to note that, while the applicant has submitted estimations, the anticipated longevity of the sand nourishment is uncertain. The applicant has submitted an analysis by their coastal engineering consultants that anticipate that the upcoast portions of the nourished beach will be significantly lost due to erosion within 2 years from completion of the proposed initial 300,000 cu. yd. nourishment. Further, since it is anticipated that opportunities for effective backpassing of sufficient sand surplus at the downdrift end of the project may be limited after the first one to two years after the initial nourishment, the applicant is proposing an interim or erosion nourishment of 75,000 cu. yds. when the average dry beach width fronting the western revetment near transect 410 is approximately 30 feet or less for 6 consecutive months and there is insufficient beach width to provide 10,000 cubic yards of backpassing sand from the eastern end of the beach, which the applicant’s sediment transport modeling predicts may occur within two years of the initial 300,000 cu. yd. nourishment. Even with implementation of an interim nourishment event two years after initial nourishment, the applicant’s consultants anticipate significant loss of the nourished beach approximately two years later (five years from initial nourishment). To maintain the nourished beach condition, the applicant is proposing another major nourishment of an additional 300,000 cu. yds. five years from initial nourishment, and every five years thereafter for the proposed 20 year life of the project.

Even with the proposed back-passing and interim and erosion nourishment efforts, there could be significant periods of time when the upcoast beach area is relatively narrow. Under worst case conditions, the upcoast dry beach (near Transect 411) could be less than 75 feet wide for up to 6 months between back-passing episodes. If there is not enough sand downcoast to allow for backpassing, this section of Broad Beach could have a dry beach width of about 30 feet, or less, until another major nourishment event were to be undertaken. The dry beach could be less than 30 feet wide for up to a year before interim nourishment would occur and the dry beach could be less than 10 feet wide for up to 10 months before erosion nourishment would occur. These are worst case conditions for this portion of the beach, and ideally the western placement of nourishment sand will provide for a wide section of dry beach longer than indicated by the worst case situation. But, the worst case conditions indicate that even with the proposed project, portions of the beach seaward of the revetment might provide very little long-term access opportunity.

Thus, while the proposed sand nourishment will offset or partially offset the adverse effects to shoreline sand supply from the proposed rock revetment for the period of time that the nourishment material remains on the beach, it is expected that the nourishment sand will be lost over time and the revetment exposed both during and after the 20 year period that such nourishment activities are proposed. Further, although the applicant is requesting permanent authorization of the rock revetment pursuant to this application, the applicant is not committing to any future beach nourishment activities after 20 years. Thus, as proposed, although the benefits to shoreline sand supply from the proposed nourishment would be temporary for a period of 20 years, the adverse impacts resulting from the proposed authorization of the rock revetment would be permanent.

In regards to the second factor, the construction of the 4,150 linear ft. rock revetment was authorized through two emergency permits (CDPs 4-10-003-G and 4-10-029-G) in 2010, during a period of rapid and advancing erosion along the Broad Beach shoreline. Given the need for immediate action in light of the emergency that was occurring at the time, it was not possible for the Commission to fully evaluate the proposed configuration and location of the rock revetment. Thus, these emergency coastal development permits specifically authorized the emergency work on a temporary basis only in order to allow the applicant to prepare further studies of the shoreline processes at the subject site and evaluate long-term solutions, including solutions other than retention of the rock revetment and the relocation of the revetment to a further landward location which would be fully evaluated by the Commission in its review of the required follow-up regular coastal development permit application. This subject application for the permanent authorization of the rock revetment constitutes that required follow-up application for those emergency coastal development permits.

The alignment of the as-built 4,150 linear ft. rock revetment occupies approximately 3.02 acre of beach and is situated substantially closer to the stringline of existing residential development on the west (upcoast) end of the beach than the approximately 2,000 linear ft. portion of the revetment at the eastern (downcoast) end of the beach, where the beach widens significantly. In fact, the seaward toe of the rock revetment along the downcoast portion of the site is located between 160 – 200 ft. seaward of many of the residences at the downcoast end of the beach. Although many of the residences utilize septic systems with leach fields located on the sandy beach seaward of the residence, the seaward toe of the rock revetment would still be generally located from 80 – 160 ft. seaward of these leach fields. Thus, given the large area of sandy beach located between the as-built rock revetment on the downcoast end of the site and the line of residential development (including the existing septic systems), it is clear that there is a feasible alternative to substantially relocate the approximately 2,000 linear ft. portion of the revetment at the eastern (downcoast) end of the beach farther landward.

Thus, in its review of this pending application, Commission staff requested the applicant provide analysis of relocating the rock revetment as far landward as feasible to protect the residential development on site that is eligible for protection (single family residences and their associated septic systems) and of the possibility of reducing the quantity and footprint of fill material, and eliminating the placement of sand fill material at the western end of the beach (upcoast of the western terminus of the rock revetment) in order to avoid the filling of sensitive rocky intertidal habitat areas. As part of the coastal development permit application, the applicant's coastal engineering consultants, Moffatt & Nichol, submitted several project alternatives which examined different beach nourishment scenarios as well as several alternatives related to a more landward location for the rock revetment. In addition, the Revised Draft Analysis of Public Trust Resources (APTR) prepared by AMEC for the California State Lands Commission dated July 2014 also examined the applicant's identified alternatives. The alternatives identified by the applicant and APTR include:

1. Minor relocation of a more robust revetment landward of the mean high tide line with beach nourishment and dune restoration;
2. Relocation of a more robust revetment landward of existing lateral access easements with beach nourishment and dune restoration;
3. Replacement of revetment with further landward-located vertical seawall with beach nourishment and dune restoration;
4. Reduction in beach nourishment volume with revetment in current location and dune restoration;
5. Beach nourishment and dune restoration with full removal of revetment; and
6. Landward relocation of more robust revetment along eastern portion of the project with beach nourishment and dune restoration.
7. Removal of emergency revetment on eastern (downcoast) end of beach with beach nourishment/dune restoration and both with and without replacement and relocation of existing leach fields further landward.
8. No beach nourishment at western end of beach (upcoast of revetment)
9. Reduced beach nourishment at western end of beach (upcoast of revetment).

The majority of the above referenced alternatives did not adequately address the above stated goals identified by Commission staff, including relocating the revetment as far landward as feasible, reduction of quantity and footprint of fill material, and eliminating fill of rocky intertidal habitat at the western end of the beach, upcoast from the western terminus of the revetment in order to minimize impacts to coastal resources. For instance, the identified ***Alternative 1*** for the minor relocation of revetment immediately landward of the mean high tide line would only have relocated the majority of the revetment approximately 3–5 ft. further landward, although a small portion on the eastern (downcoast) end of the revetment would be located 15-20 ft. landward. Due to the relatively minor distance the revetment would be relocated under this alternative, this alternative would result in a very limited reduction in adverse impacts to shoreline process, sand supply, and public access/recreation, while resulting in new impacts to the remaining sensitive dune habitat on site.

In addition, ***Alternatives 2, 6, and 7*** also similarly addressed the potential landward relocation of the revetment; however, each of these alternatives analyzed a location for the relocated revetment that would be farther seaward than necessary. In contrast, ***Alternative 3*** showed the replacement of the revetment with a new vertical seawall in a much farther landward location only approximately 6 ft. seaward of the existing ; however, it also incorrectly included protection for "Future" leach fields on site that do not currently exist. In the case of ***Alternative 3***, the use of a vertical seawall in this location was found to be less conducive to the success of the proposed dune habitat restoration program than the proposed rock revetment, which is designed to be covered by sand.

The applicant's engineering consultants found that ***Alternative 5***, involving removal of the revetment and use of nourishment only, would not provide the necessary protection for existing residential development on the beach in the event that the proposed nourishment failed to maintain an adequate beach width. In regards to changes to beach nourish amounts and footprints, Alternatives 4, 8, and 9 failed to analyze reductions in the quantity and footprint of the proposed beach nourishment fill adequate to avoid adverse impacts to the identified sensitive rocky intertidal areas located at the western (upcoast) end of the project reach.

In respect to the alternative of relocating some or all portions of the as-built rock revetment further landward, the Commission notes that the presence of the septic systems with leach fields located on the sandy beach seaward of many of the residences is the principle factor in the determination of how far landward the revetment may be re-sited. In this case, 46 of the properties where the as-built revetment is located have septic system leach fields located on the sandy beach seaward of the existing residential structures. The majority of these septic system leach fields generally extend approximately 40 - 70 ft. seaward of the residential structures. Coastal Commission staff have coordinated closely with City of Malibu Planning and Engineering staff regarding the required setbacks for septic systems from shoreline protection devices and City staff have indicated that the appropriate setback is no less than 5 ft. between any form of long-term shoreline protective device and a septic system pursuant to the City's Environmental Health Division's Policies. In addition to meeting this provision of the City's Code, any new development must also be consistent with all provisions of the City's adopted LCP, which specifically provides that new shoreline protective devices shall be located as landward as feasible. Thus, pursuant to the City's typical requirements for septic systems, the rock revetment may be relocated as close as 5 ft. from the seaward limit of the septic system leach fields on each site. In this case, although the approximately 2,190 linear ft. upcoast end of the as-built rock revetment is located very close to the existing residential development on each site, the landward edge of the as-built revetment is located only approximately 5 – 20 ft. seaward of the leach fields on each property. Thus, it is not possible to relocate the revetment further landward on the western (upcoast) portion of the site given that this portion of the revetment is already located as landward as feasible.

However, the approximately 1,960 linear ft. portion of the revetment at the eastern (downcoast) end of the project reach is located in an area where the beach widens significantly. In fact, the seaward toe of the rock revetment along the downcoast portion of the site is located from 160 – 200 ft. seaward of many of the residences at the downcoast of the end of the beach. Moreover, the landward edge of the as-built rock revetment is located approximately 80 – 100 ft. seaward of the majority of the septic system leach fields within this area. Thus, a feasible alternative would be to relocate the rock revetment landward based on the line of the existing septic systems, with a 15 ft. setback or separation between the seaward limit of the septic system leach fields and the landward edge of the rock revetment as generally shown on **Exhibit 8a**. Although an even smaller 5 ft. setback between the revetment and leach fields would also be feasible and would serve to comply with the City of Malibu Environmental Health Review requirements, Commission staff is recommending the provision of a 15 ft. wide setback to allow for both the provision of the 10 ft. wide public access path on the landward side of the rock revetment pursuant to Special Conditions 1 and 14, as well as to provide for an adequate hazard setback from potential storm waves overtopping the revetment should the beach renourishment efforts fail to provide protection from wave attack.

Commission staff provided the above direction to the applicant regarding relocation of the as-built revetment further landward, keying off of the seaward extent of the existing septic systems with no more than a 15 ft. setback between the revetment and septic systems. In response, the applicant is proposing to relocate a portion of the as-built revetment landward of its current location as part of the subject application. Specifically, the applicant is proposing to relocate the downcoast approximately 1,800 linear feet of the as-built rock revetment (between 31020 and 30760 Broad Beach Road) up to 75 feet landward from the revetment's existing location. However, the applicant's proposal would neither relocate the revetment as far landward as the location identified by staff on Exhibit 8a, nor would it relocate as long of a segment of the revetment. Under this new alternative by the applicant only approximately 1,800 linear ft. of the rock revetment (commencing at 31020 Broad Beach Road) would be re-sited to a location that would still be approximately 30 - 40 ft. seaward of the existing septic systems on the beach, and thus, approximately 15 - 25 ft. further seaward of the revetment location identified by staff in Exhibit 8a. The applicant's engineering consultants have asserted that the proposed distance between the existing septic systems and the revetment is necessary to provide an adequate setback of the septic systems from any potential wave uprush in the event that the proposed beach nourishment program fails to maintain an adequately wide beach.

Specifically, one concern raised by the applicant regarding the size of the setback between the septic systems and leach fields and the revetment, is that these systems could be at-risk from extreme events and overtopping of the revetment by wave action. The proposed revetment and beach nourishment effort will greatly improve the protection of these existing systems above the unprotected condition. Nevertheless, some risks to the systems remain, including scour of the septic system or leach field by overtopping waves, or damage to the system if it is flooded by saltwater. Such overtopping is not expected unless the proposed nourishment project fails to maintain an adequately wide beach seaward of the relocated rock revetment.

As noted in the City of Malibu's Environmental Health Division's policies for properties with a long-term shore protection device:

> *The minimum horizontal distance between any portion of the onsite wastewater treatment system and the shoreline protection device, including returns shall not be less than five (5) feet measured horizontally.*

The required 5 ft. setback has been developed specifically to protect the onsite wastewater treatment system from possible scour inland of the shore protection. Although the Health Division's policies are not part of the adopted LCP, these policies are directly applicable to new onsite wastewater treatment systems on Broad Beach and provide guidance for the appropriate protection of the existing systems at Broad Beach. As such, the 15 ft. setback identified by Commission staff between the onsite wastewater treatment system dispersal area and the shore protection device (the revetment) would exceed the 5 ft. minimum setback required by the City and provides for more than adequate separation.

In addition, the City of Malibu's Environmental Health Division also has policies for the location of onsite treatment systems for properties without shoreline protection devices or with only temporary protection requiring the provision of a 15 ft. setback for new septic systems and leach fields from the maximum wave uprush scour line. In this case, although Special Condition Two (2) would limit the term of authorization for this coastal development permit, the proposed rock revetment is intended to function as a long-term shoreline protection solution, thus, the 15 ft. setback from the wave uprush limit for septic systems (as opposed to from the revetment itself) would not be applicable in this case). Regardless, the applicant's engineering consultants have noted that since the revetment is designed with a relatively low elevation to allow for dune construction, they believe the revetment is likely to be overtopped during certain storm events in the event that the proposed beach nourishment project fails to maintain an adequately wide beach and that; therefore, the 15 ft. setback from the inland extent of the maximum run-up (which the applicant has delineated as being landward of the revetment) would be more protective and should be used. The applicant has provided site plans that depict the proposed inland relocation of the revetment that would provide for a 15 ft. setback from the maximum wave uprush limit effectively resulting in a configuration of the revetment that would, in most sections of the relocated segment, be approximately 30 to 40 ft. seaward of the septic system leach fields on site as shown on Exhibit 8a.

Dr. Lesley Ewing has reviewed the applicant's proposal and noted that these plans show the inland extent of run-up and not of actual scour which would be farther seaward than the run-up extent. Moreover, based on her review of the project plans, Dr. Ewing has concluded that since these properties will have shoreline protection (in the combined form of the rock revetment and beach nourishment project) the provision of a15 setback from the inland scour line is not appropriate in this case. The use of 15 ft. setback from the maximum wave uprush limit between onsite wastewater treatment system and the maximum run-up inland of the shore protection provides duplicative protection and there are other options to supplement the protection of the onsite wastewater treatment system that do not require a more seaward revetment location.

Thus, Dr. Ewing believes a 15 ft. setback between the rock revetment and the existing septic system leach fields on each site is appropriate in this case and this setback would be adequate to ensure protection of the existing leach fields, although some minor additional erosion control improvements may be necessary on certain sites such as the installation of a gravel or cobble blanket where leach fields are located. Specifically, Dr. Ewing finds that although some potential risk remains that some of the onsite wastewater treatment systems may subject to overtopping or salt water flooding with a setback of 15 ft. of separation between the rock revetment and the seaward extent of the leach fields, a feasible solution to provide protection, if necessary, would be to provide additional erosion control measures such as a gravel overlayer to the leach field to reduce scour, or install subsurface drainage improvements to reduce salt water flooding. Such site-specific options might be considered on a case-by-case basis for individual properties if such problems occur in the future. Based on her review of the project, Dr. Ewing determined that the more landward relocation of the revetment, as required pursuant to **Special Condition One (1)** will not interfere with the use of these potential site-specific erosion control measures. Dr. Ewing further concludes that given all of the project alternatives, a 15 ft. setback between the landward edge of the rock revetment and any leach fields (which will provide for a greater setback than the 5 ft. setback required pursuant to City of Malibu's Environmental Health Division's policies) would result in the least impact to coastal resources and be the most consistent with applicable Chapter 3 policies of the Coastal Act and the City of Malibu's LCP.

In addition, in their analysis of their revised project the applicant failed to distinguish between existing septic leach fields and "future" leach fields which do not exist but are shown on the applicant's plans as existing leach fields for potential future expansion/replacement areas. The applicant has asserted that property owners within the project reach have a right to develop these "future" leach fields. As discussed in detail in the above section titled Existing Development to be Protected (Section IV.B.3.a), although the existing septic systems constitute "existing" development which may be protected pursuant to Section 30235 of the Coastal Act, the future construction of a new expansion or replacement leach field on these properties does not constitute existing development and; therefore, does not constitute development that is entitled to be protected pursuant to any form of shoreline protection. Moreover, construction of a new or "future" leach field would require the issuance of a discretionary coastal development permit in which all feasible alternatives must be considered, including relocation of all septic system improvements to a further landward area of the site and/or rehabilitation and re-use of the existing leach field on site in order to avoid any further seaward encroachment by development on site.

Moreover, in past permit actions involving the redevelopment of existing residential properties, both the City of Malibu and the Coastal Commission have required that new septic systems (including leach fields) be located as landward as feasible to minimize their encroachment onto the beach. In addition, the certified LCP requires the use of alternative onsite wastewater treatment system (AOWTS) for new development on beachfront properties, such as the properties on Broad Beach, which typically occupies a smaller area of beach than traditional systems and provides a substantially higher level of effluent treatment. Moreover, neither the City nor the Commission has typically authorized "future" locations for leach fields, if such fields would result in additional encroachment onto a sandy beach, since these leach fields may be rehabilitated in place. Specifically, in the event that a leach field reaches filtration capacity it is feasible to excavate the leach field area and replace the footprint with a new volume of sand materials eliminating the need for the identification of a "future" field in a different location on the site. For instance, in 2010 and 2011, the City of Malibu approved CDPs 10-063 and 11-050 for the demolition of existing residences and construction of new residences at 31260 and 31302 Broad Beach Road, within the area of Broad Beach that is subject to this application. In both of the coastal development permit actions, the City specifically required the applicants to submit project plans showing only a single Onsite Alternative Wastewater Treatment System leach field in the most landward location feasible, with no provision for any "future" field on site.

Thus, in this case, the Commission finds that the proposed revetment configuration would not relocate the revetment as far landward as feasible. Under this proposal by the applicant, only approximately 1,800 linear ft. of the rock revetment (commencing at 31020 Broad Beach Road) would be relocated to a location that would still be approximately 30 - 40 ft. seaward of the existing septic systems of the beach and thus, approximately 15 - 25 ft. farther seaward of the revetment location identified by staff (**Exhibit 8a**). As shown on Exhibit 8a, an additional approximately 200 linear ft. section of the revetment could also be relocated landward for a total pullback of approximately 2,000 linear ft. of revetment (commencing at 31030 Broad Beach Road).

The Commission has in past permit actions required that shoreline protective structures be located as far landward as feasible in order minimize adverse impacts on the beach profile and public access. In addition, the City of Malibu LCP, whose LCP is used as guidance in this permit action, requires that new shoreline protective structures be located as far landward as feasible to protect existing development, taking into account effects of accelerated sea level rise. In this case it is feasible to relocate a larger segment of the revetment further landward which will serve to minimize the potential adverse impacts of the revetment on shoreline sand supply, as required by Section 30235 of the Coastal Act, as well as impacts to public access and recreation. Therefore, **Special Condition One (1)** requires the landward re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment (including all portions of the proposed rock revetment between 31030 Broad Beach Road and 30760 Broad Beach Road) so that the landward edge of the revetment is setback approximately fifteen (15) ft. from existing, legally-established septic systems/leach fields (excluding any designated "future" leach fields that had not yet been built at the time this application was submitted to the Commission) as generally depicted in Exhibit 8a. The relocated revetment shall be configured in a manner that maintains a relatively straight or gently curving line as generally depicted in Exhibit 8a. Short segments of the revetment may be located more than 15 ft. seaward from the existing leach fields if necessary to avoid creating sharp angles in the configuration of the revetment. All portions of the relocated revetment shall be configured as a single contiguous structure without any gaps or breaks (including the property at 30822 Broad Beach Road) and shall generally utilize the same design, size, and dimensions as the existing, as-built revetment. No portion of the revetment shall extend farther upcoast than 31350 Broad Beach Road, nor farther downcoast than 30760 Broad Beach Road. Further, to ensure that the project is implemented in a manner consistent with the revised plans required pursuant to Special Condition One (1), **Special Condition Three (3)** requires that the applicant shall implement and complete the landward re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment (including all portions of the proposed rock revetment between 31030 Broad Beach Road and 30760 Broad Beach Road) consistent with the requirements of Special Condition 1.A.1. within 1 year of the issuance of this permit. The Executive Director may grant additional time for good cause.

Moreover, failure to maintain the approved revetment in good condition may result in adverse impacts to the marine/beach environment and public access/recreation if errant rocks migrated unintentionally onto the sandy beach or surf zone. In order to ensure that the approved revetment is adequately maintained, S**pecial Condition Eleven (11)** requires that such maintenance or repair occur in a timely manner incorporating all Best Management practices. This condition provides that it is the property owner's responsibility to maintain the revetment in a structurally sound manner. Removing or re-depositing any debris, rock or material that becomes dislodged shall occur on an as-needed basis after such displacement occurs.

In addition, the Commission finds that given the experimental nature of the proposed rock revetment/beach and dune nourishment plan and given the dynamic variability of conditions in coastal areas, it is not possible to ensure that the proposed beach nourishment efforts will be adequate to establish and maintain the desired beach width seaward of the proposed revetment or to prevent the revetment from becoming exposed. Therefore, **Special Condition Two (2)** limits the duration of the approval to a period of ten (10) years from the date of Commission action. After such time, the authorization for continuation and/or retention of any development approved as part of this permit (including, but not limited to, the rock revetment and beach re-nourishment/backpassing activities) shall cease unless the project is re-authorized pursuant to an amendment to this permit. **Special Condition Two (2)** further requires that prior to the date that authorization for the development expires (10 years from the date of Commission action), the applicant or successor in interest shall submit a complete coastal development permit amendment application for the re-authorization of the beach nourishment program and to retain the rock revetment for an additional ten (10) year term, if necessary, to protect existing development at risk from wave hazards and tidal action.

Further, **Special Condition Twelve (12)** provides that any future development of any property located landward of the approved revetment alignment (i.e. 31350 Broad Beach Road to 30708 Broad Beach Rd.) shall not rely on the permitted revetment to establish geologic stability or protection from hazards. Any future development on those properties shall be sited and designed to ensure geologic and engineering stability without reliance on shoreline or bluff protective devices consistent with development standards and policies of the City of Malibu LCP. Sea level rise will cause an increase in beach retreat and passive erosion over what has happened historically. Monitoring shoreline change will be necessary to understand changing beach conditions and to determine if a new retreat rate will be more appropriate for future project analysis, after the initial permit period. Moreover, to ensure that this critical information regarding potential impacts to marine resources is recorded and reported to the Executive Director for consideration of future project approvals, **Special Conditions Four (4) and Six (6)** require that extensive monitoring of the effects of the project on shoreline processes be implemented to assess the effects of the beach nourishment program (initial nourishment, renourishment, interim nourishment sand all using courser than native sand, and backpassing) for the term of this permit. Further, to ensure that the project complies with all other regulatory requirements, **Special Condition Seventeen (17)** requires the applicant submit evidence to the Executive Director that all local, State and Federal permits necessary for the proposed project have been obtained.

In addition, Coastal Act section 30620(c)(1) authorizes the Commission to require applicants to reimburse the Commission for expenses incurred in processing CDP applications. *See also* 14 C.C.R. § 13055(e). Thus, the Commission is authorized to require reimbursement for expenses incurred in defending its action on the pending CDP application. Therefore, consistent with Section 30620(c), the Commission imposes **Special Condition Nineteen (19)**, requiring reimbursement of any costs and attorney's fees the Commission incurs "in connection with the defense of any action brought by a party other than the Applicant/Permittee challenging the approval or issuance of this permit."

In conclusion, the Commission finds that the proposed project, only as conditioned, will be consistent with provisions of Section 30235 of the California Coastal Act.

5. Beach Nourishment Program

The project also includes the importation of 300,000 cu. yds. of material to provide donor material for beach nourishment and dune enhancement on site. Beach nourishment to establish a wider sandy beach at the subject site will serve to enhance public recreational and access opportunities and provide greater protection of public property and infrastructure at risk from shoreline erosion. Section 30233 of the Coastal Act allows filling of coastal waters (or wetlands) only where feasible mitigation measures have been provided to minimize adverse environmental effects, and for only the following seven uses listed in Section 30233(a) of the Coastal Act:

> *(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*
> *(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.*
> *(3) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.*
> *(4) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.*
> *(5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.*
> *(6) Restoration purposes.*
> *(7) Nature study, aquaculture, or similar resource dependent activities.*

In this case, the proposed fill would restore former dunes and public beach areas where erosion has narrowed the width of the beach. Sand deposition for beach restoration is an allowable use of fill pursuant to Section 30233(a)(5) of the Coastal Act. Coastal Act Sections 30230 and 30231 also require that the proposed development be carried out in a manner that protects water quality, biological productivity and marine resources.

At erosional shorelines, such as the current condition at Broad Beach, the active dune (foredune) forms shift inland as the beach retreats. If there is no space for the dune to shift inland as the shoreline erodes, the dunes will not persist. Since 2005, wave-caused erosion, the construction of sandbag walls, and the emergency rock revetment in 2010 resulted in the loss of a substantial area of beach and dune habitat along Broad Beach.

In regards to the use of dune enhancement and beach nourishment as an alternative to the use of the rock revetment, the proposed project includes of the importation of 300,000 cu. yds. of sand material from sand quarries located approximately 40-45 miles inland of the project site. As proposed, the reconstructed/post-nourishment combined beach and dune system would extend approximately 240 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes.

The project also includes backpassing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, and interim or erosion renourishments of 75,000 cy .yds. of sand, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. As proposed, the applicant would conduct a major renourishment of the beach 5 years after the initial nourishment had been completed, and every five years thereafter for the proposed 20 year project term. As designed, the proposed rock revetment would be buried beneath at least 4-8 ft. of imported sand material and the reconstructed dunes on site would be revegetated with native dune plant species.

The applicant has submitted a coastal engineering analysis for the proposed project by Moffatt and Nichol analyzing how the proposed beach nourishment project is expected to function. In order to analyze the potential effects of the proposed beach nourishment project, the applicant utilized GENESIS (Generalized Model for Simulating Shoreline Change) which was developed by the United States Army Corps or Engineers (USACE) Coastal Engineering Research Center. GENESIS is a computer program that predicts the shift in the position of the shoreline at mean sea level from a designated starting point, existing conditions in this case, in response to a proposed action. It utilizes data of existing shoreline conditions, wave conditions, and proposed project changes (beach fills and/or structures) to calculate sediment transport, consequent erosion and deposition, and resulting changes in shoreline position. Model predictions should be considered as trends (i.e., erosion, accretion, no change) to be evaluated at the first order for planning, rather than absolute, accurate shoreline positions for any sort of precise engineering design.

The modeling predictions for the proposed nourishment project anticipate that the upcoast portions of the nourished beach will be significantly lost due to erosion within 2 years from completion of the proposed initial 300,000 cu. yd. nourishment. Further, since it is anticipated that opportunities for effective backpassing of sufficient sand surplus at the downdrift end of the project may be limited after the first one to two years after the initial nourishment, the applicant is proposing an interim nourishment of 75,000 cu. yds. when the average dry beach width fronting the western revetment near transect 411 is approximately 30 feet or less for 6 consecutive months and there is insufficient beach width to provide 10,000 cubic yards of backpassing sand from the eastern end of the beach, which the applicant's sediment transport modeling predicts may occur within two years of the initial 300,000 cu. yd. nourishment. Even with implementation of an interim nourishment event two years after initial nourishment, the applicant's consultants anticipate significant loss of the nourished beach approximately two years later (five years from initial nourishment). To maintain the nourished beach condition, the applicant is proposing another major nourishment of an additional 300,000 cu. yds. five years from initial nourishment, and every five years thereafter for the proposed 20 year life of the project.

Thus, while the proposed sand nourishment will offset or partially offset the adverse effects to shoreline sand supply from the proposed rock revetment for the period of time that the nourishment material remains on the beach, it is expected that the nourishment sand will be lost over time and the revetment exposed both during and after the 20 year period that such nourishment activities are proposed. Further, although the applicant is requesting permanent authorization of the rock revetment pursuant to this application, the applicant is not committing to any future beach nourishment activities after 20 years. Thus, as proposed, although the benefits to shoreline sand supply from the proposed nourishment would be temporary for a period of 20 years, the adverse impacts resulting from the proposed authorization of the rock revetment would be permanent.

Moreover, Commission Staff Coastal Engineer, Dr. Lesley Ewing, has reviewed the results of the applicant's GENESIS modeling and concluded that the GENESIS modeling performed by the applicant's engineering consultants is generally adequate from an engineering perspective although it must also be acknowledged that all predictive models include some inherent possibility for error and cannot guarantee certainty in regards to anticipating the effects of any project for specific year-to-year changes. Further, given the dynamic ever changing nature of the beach morphology and coastal process acting on this beach it is very difficult to model or predict how the beach nourishment program will perform over time as well as predict if unanticipated changes could result in adverse impacts to marine resources and habitats.

Given the experimental nature of this project, it is not possible to predict with certainty whether the proposed beach/dune nourishment program will serve to maintain a widened beach condition on site adequate to prevent erosion of all dry sandy beach areas seaward of the revetment and/or to prevent the revetment from becoming exposed. Therefore, in order to ensure that a an adequately wide beach area is maintained on site seaward of the revetment to avoid or minimize adverse impacts to coastal resources and scenic coastal views, **Special Condition Four (4)** requires that the applicant submit, for the review and approval of the Executive Director, a Final Adaptive Management and Monitoring Plan that would require that renourishment on an as-needed basis (rather than once every five years) if certain triggers are reached, including if the beach narrows to a specific identified threshold width. Specifically, Special Condition Four (4) requires that a small-scale *Interim Renourishment* would be required if the dry beach width near Profile 411 (as shown on **Exhibit 12**) is narrower than 30 feet for 6 consecutive months, and is recorded by two (2) consecutive full beach profiles, and, there is insufficient sand at the backpass source location for backpassing to occur. In addition, a *Major Renourishment* would be required if the dry beach width near Profile 411 is narrower than 30 feet for 12 consecutive months, and is recorded by three (3) consecutive full beach profiles, and, there is insufficient sand at the backpass source location for backpassing to occur. Further, Special Condition Four (4) provides for small-scale interim renourishment and major renourishment to occur on an as-needed basis to ensure that the protective beach and dune system that will be maintained at an adequate width, to the extent feasible.

Moreover, to ensure that this critical information regarding potential impacts to marine resources is recorded and reported to the Executive Director for consideration of future project approvals, **Special Condition Four (4)** requires that an extensive monitoring program be established to investigate shoreline conditions, report any changes and respond promptly and pro-actively to these changes**. Special Condition Four (4)** requires that the monitoring provisions of the Final Adaptive Management Plan be revised to require that all monitoring shall conducted for the life of the project. The applicant shall also be required to submit, on an annual basis, all survey data and a written report prepared by a qualified coastal engineer indicating the results of the shoreline profile and beach width monitoring program. The annual monitoring report shall include conclusions regarding the level of success of the project, a detailed analysis of any increase or decrease in beach widths and shoreline erosion rates, changes in the frequency and/or duration of all Trancas Creek lagoon mouth opening/closure events, details on any nourishment and/or backpassing efforts undertaken during the year with the volume and placement location specified.

Furthermore, to ensure that potential adverse effects to coastal resources are minimized, **Special Condition Two (2)** also requires that five (5) years from the date of issuance for this coastal development permit, the applicant shall submit a report to the Executive Director, documenting the status of the project and the Beach Nourishment and Management Program. The report shall summarize the results and findings of the annual physical and biological monitoring reports and the status of alternative sewage treatment feasibility study as required pursuant to Special Conditions 4, 5, 6, 7 & 16. Should the monitoring reports reveal any significant adverse resource/ habitat impacts, and/or the Beach Nourishment and Management Program is not performing as anticipated, the Executive Director may require the submittal of a permit amendment, to address and evaluate mitigation measures to compensate for any adverse resource/habitat impacts and/or require any mid-course corrections or adjustments to the Beach Nourishment and Management Program.

However, the Commission also finds that the marine and beach environment within the project site area are dynamic systems that are subject to potential changes over time as new species migrate into the area or as potential unidentified impacts from the proposed dredging operation may be discovered over time. Moreover, given the experimental nature of this project, it is not possible to ensure that the proposed beach nourishment efforts will be adequate to establish and maintain the desired beach width seaward of the proposed revetment or to prevent the revetment from becoming exposed. Therefore, **Special Condition Two (2)** also limits the duration of the period of time that development an approved development on a temporary basis only for a period of ten (10) years from the date of Commission action. After such time, the authorization for continuation and/or retention of any development approved as part of this permit (including, but not limited to, the rock revetment and beach re-nourishment/backpassing activities) shall cease. **Special Condition Two (2)** further requires that prior to the date that authorization for the development expires (10 years from the date of Commission action), the applicant or successor in interest shall submit a complete coastal development permit amendment application for the re-authorization of the beach nourishment program and to retain the rock revetment for an additional ten (10) year term, if necessary, to protect existing development at risk from wave hazards and tidal action.

In order to avoid the impact of direct burial of marine resources, including sensitive rocky intertidal habitat, the applicant is proposing to limit the footprint of nourishment activities at the western (upcoast) end of the revetment and the amount of sediment/beach replenishment material to no more than 300,000 cu. yds. of material for the initial nourishment event with no placement of sand upcoast of the property at 31380 Broad Beach Road.
As noted by the modeling of sand transport, it is likely that natural wave action will move some sand to the beach and nearshore area west of 31380 Broad Beach Road, thus still providing for a

small amount of sand to serve as feeder sand for times of eastern transport. In addition, the 300,000 cubic yards of sand will be available for transport within the rest of Broad Beach project area. This volume of sand can provide for a wider recreational beach at the central and eastern sections of the nourishment area, focusing the bulk of the recreational use away from the ecologically sensitive western shoreline area. However, it is anticipated that the upcoast portions of the nourished beach will be significantly lost due to erosion within 2 years from completion of the proposed initial 300,000 cu. yd. nourishment. Further, since it is anticipated that opportunities for effective backpassing of sufficient sand surplus at the downdrift end of the project may be limited after the first one to two years after the initial nourishment, the applicant is proposing an interim nourishment of 75,000 cu. yds. when the average dry beach width fronting the western revetment near transect 411 is approximately 30 feet or less for 6 consecutive months and there is insufficient beach width to provide 10,000 cubic yards of backpassing sand from the eastern end of the beach, which the applicant's sediment transport modeling predicts may occur within two years of the initial 300,000 cu. yd. nourishment. Even with implementation of an interim nourishment event two years after initial nourishment, the applicant's consultants anticipate significant loss of the nourished beach approximately two years later (five years from initial nourishment). To maintain the nourished beach condition, the applicant is proposing another major nourishment of an additional 300,000 cu. yds. five years from initial nourishment, and every five years thereafter for the proposed 20 year life of the project.

Dr. Lesley Ewing, the Commission's Staff Engineer, believes that the proposed nourishment project of 300,000 cubic yards of nourishment sand focused on the west-central, central and eastern segments of the coast, with backpassing, small-scale interim sand additions and a shorter interval between renourishment events will still provide significant shore protection and recreational beach area. At Broad Beach the dominant downcoast transport direction is from west to east; however, as noted in the coastal engineering report, sand moved both up and down coast in the area and some of the nourishment sand will move westward and be stored for future eastward transport. Thus, Dr. Ewing has further determined that the western section of beach located upcoast of the property at 31380 Broad Beach Road where nourishment would not occur would be still be expected to widen slightly as a result of the downcoast beach nourishment operations; however, the beach will not be as wide as the nourished beach areas located downcoast and will not provide much additional protection to the development beyond the main defense for this area provided by the revetment and existing seawalls.

The westernmost section of the beach has been narrow for many years and the shoreline position had far less variability and sand loss than beach sections farther to the east. It is the beach areas to the east of this area that has experienced significant recent beach erosion and for which a wider beach will return the shoreline to the condition viewed as being the pre-erosion condition. While greater beach width at the westernmost section of beach might provide protection, Lechuza Point shelters this area from some storm events and the westernmost beach area has not relied upon a wide sand beach for protection.

Dr. Ewing concludes that the resulting section of the beach where nourishment will occur will still be approximately 1 mile in length and this is expected to be an adequate beach segment for undertaking beach nourishment as well as a backpassing program. The success of those efforts will not be put into jeopardy. As initially proposed, the beach areas would go through large 10-year cycles of widening and narrowing. The smaller sand volume, the back passing, the small-scale interim additions of sand and the more frequent renourishment intervals will provide for a more consistent inter-annual beach condition within the proposed project area.

The applicant has identified three inland sources of sand that could be used for beach nourishment. The potential quarry sources are CEMEX, Grimes Rock, and the Gillibrand. According to the applicant's October 2013 Revised Sampling and Analysis Plan and Test Results Report (SAP), "Grimes Rock and CEMEX each possess the capacity to provide the quantity of sand required for the project." Gillibrand does not have the capacity to provide the total quantity of sand required for the project (300,000 cubic yards); however, it could provide a portion of the needed beach sand or could provide the quantity of sand needed for a small-scale interim nourishment event. The characteristics of the various sand material and general quarry information, as excerpted from the SAP (October 2013) are summarized in the following table (Different Sand Sources). Information from Broad Beach and Zuma are also provided for information on the current site conditions.

Different Sand Sources

	CEMEX	Grimes Rock	Gillibrand (1)	Broad Beach	Zuma
Grain size d_{50}	0.95mm (5/2013) 0.85 mm (10/2013)	0.60 mm (5/2013) 0.47 mm (10/2013)	1.00 mm	0.25 (dry beach) 0.32 (dunes)	0.4 mm
Stockpile Area	1.2 acres	0.22 acres	2.6 acres	NA	NA
Coarse Sand (2)	21%	10%	1%	ND	ND
Medium Sand (2)	59%	71%	99%	ND	ND
Fine Sand (2)	12%	12%	0%	ND	ND
Silts & Clays (2)	8%	7%	0%	ND	ND

(1) Table 2 of the SAP (October 2013) states that only 66% of the sand from Gillibrand is in the medium sand size; however, Figure 14, the Composite Grain Size Envelope for Broad Beach vs. P.B. Gillibrand shows that 99% of the sand is medium, with 80% of the sampled sand having a diameter greater than a 0.7 mm.

(2) The sand classifications are based upon the Unified Soil Classification, as follows:
Coarse Sand – 2.0 mm – 4.76 mm
Medium Sand – 0.42 mm – 2.0 mm
Fine sand – 0.074 mm – 0.42 mm
Silts and clays – less than 0.074 mm

The above table provides two separate d_{50} values for the sand from both CEMEX and Grimes Rock. Subsequent to taking samples from all three quarries in May 2013, the applicant's consultant learned that both CEMEX and Grimes Rock had both relocated the cut locations in their quarry sites and that each quarry intended to work these new locations for well into the future. Additional sediment samples were obtained for the new cut locations, and in both cases, the median grain size for the October 2013 samples dropped by approximately 0.1 mm in size, bringing both sites closer to the median grain size of the sand currently found on Broad Beach. The lack of fine sand, silts and clays in the Gillibrand was not explained, but, based on visual observations of the sand by the Commission's Coastal Engineer, Lesley Ewing, it is her opinion that the lack of fine material is likely due to a washing process that occurred prior to placing the sand into the stockpile from which the sample was obtained.

Special Condition Eight (8) would limit the proposed nourishment material to have a d_{50} between 0.24 mm and 0.6 mm. The 0.24 mm limit is the median diameter of the sand that is now present on Broad Beach and the 0.60 limit is the upper value of the sand material available from Grimes Rock. As demonstrated by the provided sediment grain size analysis, sand between 0.24 mm and 0.60 mm can be provided through the identified quarry options and it can be available to the site for the proposed nourishment effort. Also, there would not be the need for special and potentially costly sieving or sand washing to meet this size constraint.

The options for use of a larger or coarser sand material than native will modify the existing beach characteristics slightly. The larger grain size will establish a slightly steeper shore face and should allow the nourished sand to remain on the beach area for a longer time period than the native sand. Also, the difference in grain size is not so large that distinct zones of coarser and finer material would develop on the beach face, such as can be observed on mixed sand and cobble beaches.

The applicant has proposed the use of much coarser sand (ranging in median grain size from 0.47 mm – 1.0 mm in diameter) for beach nourishment than the native sand currently found on Broad Beach (with a median grain size of 0.25 mm – 0.32 mm in diameter). The applicant has proposed to use sand with a median grain size of up to 0.85mm, since sand of such coarseness would allow greater flexibility in sand acquisitions, allowing sand from Grimes alone, CEMEX alone, Grimes and CEMEX mixed, Grimes and Gillibrand mixed, or, Grimes, CEMEX and Gillibrand mixed. Sand with a median grain size of up to 0.85 mm would also remain on the beach longer than the native sand and presumable longer than sand with a median grain size of 0.6 mm. The idea that coarser sand will remain in a beach longer than finer sand is not a new concept. The sand composition and beach profile reflect the sand available in the littoral cell and the wave conditions that work and transport sand within the littoral cell. Eventually, the grain sizes may become so large than the material is no longer considered sand and it will move only during extreme wave and storm conditions. Such a change in the beach character would not result either from the introduction of coarser sand with either a maximum median grain size of either 0.60 mm or 0.85 mm.

The applicant has provided analysis of the coarser sand performance[i]. This analysis examines the change in diffusion for the more coarse sand with a d_{50} of 0.85 mm and shown that its longevity performance will be better than sand with a d_{50} of 0.24 mm and there will be less need for maintenance. It also examines the underfoot feel and impacts to surfing, notes that the sand just downcoast at Zuma has coarser sand (with a d_{50} of 0.4 mm) and also provides details about already approved nourishment of other beaches in southern California that have used coarser than native sand. Those examples cover beaches with a native grain size similar to that at Broad Beach and with coarser nourishment sand that has a d_{50} less than or up to 0.60 mm. Some of the same sites noted in the Moffatt-Nichol report on Coarser than Native Grain Size are:

- 75,000 cubic yards (cy) at Seal Beach in 2009 (native beach sand = 0.35 mm; beach fill = 0.42 mm);
- 2 million cy at Surfside Colony/Sunset Beach in 2009/2010 (native sand = 0.25 mm; beach fill = 0.42 mm);
- 2.1 million cy by SANDAG in 2001 (native beaches = 0.25 mm; beach fill at 6 of 12 sites was 0.62 mm); and
- 1.5 million cy by SANDAG in 2012 (native beaches = 0.25 mm; beach fill was up to 0.61 mm).

Based on the evidence supplied by the applicant, the use of 0.85 mm median diameter sand is not within the routine “coarser than native” nourishment efforts.

The sand used for beach nourishment would also be used for dune nourishment or might be carried onto the dune by waves and aeolian (wind) transport. The dune configuration has not been analyzed for various sand diameters and there has been no analysis of the improvements and beach changes that would result between nourishment of 0.6 mm and 0.85 mm. However, the coarser sand may affect which organisms will colonize the beach after the nourishment event. Further, the use of larger grain sizes will establish a slightly steeper shore face than the native sand.

Given that the coarser than native examples provided by the applicant have had a “coarser” limit of about 0.6 mm or less, and given that the coarser sand present at Zuma is only 0.4 mm, the limit of grain for the nourishment to be between 0.24 mm and 0.60 mm is already in excess of the sand coarseness identified at Zuma Beach, and is at the upper limit of the difference between native and coarse nourishment sand used in recent nourishment efforts. Special Condition 8 will allow for the use of quarry sand in the nourishment effort, without requiring additional treatment, and will provide for a somewhat greater longevity of the nourishment sand over the native sand, without pushing the limits for coarser sand beyond what exists locally or have been used in other southern California nourishment projects.

Thus, for the reasons discussed in detail in Section IV.C (Marine Resources) of this report, **Special Condition Eight (8)** has been required in order to minimize potential impacts to marine and coastal resources. This special condition would limit the allowed nourishment material to a median diameter (d50) between 0.24 mm and 0.6 mm. The 0.24 mm limit is the median diameter of the sand that is now present on Broad Beach and the 0.60 limit is the upper value of the sand material available from Grimes Rock where donor sand may feasibly be obtained.

Special Condition 8 also limits the allowed nourishment material to no more than 10% coarse material greater than 2.0 mm in size and no more than 1% coarse material that is 4.76 mm and larger. The coarse grain size percentages would be based on the average of weekly sand samples taken from the deliveries or stockpile area. Since it is possible that individual deliveries might exceed the 10% limit, the weekly average will allow the applicant to monitor sand quality throughout the week. The applicant is confident that most of the sand supplies can meet the 10% coarse grain limit; however, in the event that the supplier moves into an area with slightly coarser sand, the weekly average will allow the applicant to adjust the sand source if the deliveries begin to contain a higher amount of coarse sediment.

The applicant's engineering consultants have previously indicated that any restriction in the allowable median grain size will adversely impact the ability of the nourishment project to maintain a widened beach condition for a longer duration of time. The applicants' consultants modeled the nourishment duration for the native sand and for a 0.85 mm median grain size, the upper limit of the sand available from the CEMEX quarry. The 0.85 median grain size was modeled to examine the effects of the two primary sand sources, or a blend of the three sources. There was no grain size optimization or determination of when the benefits of a larger grain size drop or greatly diminish. Based on the analysis submitted by the applicant, there is no evidence that a change in maximum allowable grain size from 0.85 to 0.6 would significantly change the duration of the proposed nourishment efforts. Thus, based on the analysis submitted by the applicants engineering consultants it is not clear that the change in allowable grain size would significantly impact the expected duration of time that fill material would remain on the beach. However, given that the coarser than native examples provided by the applicant's engineering consultants had a "coarser" limit of about 0.60 mm or less, and given that the coarser sand present on the subject beach is only 0.24 mm in diameter, the grain size limit of 0.24 mm to 0.60 mm for the nourishment is already in excess of the sand coarseness identified on the subject site, and is at the upper limit of the difference between native and coarse nourishment sand used in recent nourishment efforts. Thus, the provisions required by **Special Condition 8** to limit the median grain size to more closely match the native sand on Broad Beach will still provide for a somewhat greater longevity of the nourishment sand over the native sand, without pushing the limits for an exceedingly coarser sand beyond what exists locally or have been used in other southern California nourishment projects.

Further, although the applicant has previously tested the sediment in the areas proposed for sand acquisition and determined the material to be adequate for use for beach nourishment at the subject site, sediment conditions may be altered by a number of episodic factors, including heavy rainfall events or spills. Thus, the Commission finds that is not possible to ensure that chemical and contaminant levels of sediment will not change over time as the result of a single chemical spill or contamination event. Therefore, to ensure that all future nourishment material is physically and chemically compatible with the proposed deposition site and suitable for beach nourishment, the Commission finds it necessary to require **Special Condition Eight (8)** which requires the applicant to test the physical and chemical characteristics of representative samples of the quarry areas consistent with U.S. Army Corps of Engineers (Army Corps), Environmental Protection Agency (EPA), and State Water Resources Control Board and California Regional Water Quality Control Board (RWQCB) criteria for beach replenishment and disposal in intertidal areas prior to the commencement of nourishment activities. In addition, **Special Condition Eight (8)** also ensures that the nourishment material meets minimum standards for particle sizes and distribution typically allowable for beach nourishment purposes.

In addition, the Commission notes, based on the information submitted by the applicant, that the proposed development is located in an area of the Coastal Zone which has been identified as subject to waves and surges, high surf conditions, erosion, and flooding. As such, the Commission notes that evidence exists that the project site is subject to potential risk. Although the proposed development is intended to reduce the potential for damage to residential development on Broad Beach from wave caused erosion, there remains some inherent risk to coastal development and the construction of any type of shoreline protective device. The Coastal Act recognizes that certain types of development, such as the proposed project, may involve the taking of some risk. Coastal Act policies require the Commission to establish the appropriate degree of risk acceptable for the proposed development and to determine who should assume the risk. When development in areas of identified hazards is proposed, the Commission considers the hazard associated with the project site and the potential cost to the public, as well as the individual's right to use his property. As such, the Commission finds that due to the unforeseen possibility of erosion, liquefaction, waves, flooding, and effects from sea level rise, the applicant shall assume these risks as a condition of approval. Therefore, **Special Condition Eighteen (18)** requires the applicant to waive any claim of liability against the Commission for damage to life or property which may occur as a result of the permitted development.

Therefore, for reasons discussed in the preceding section, the Commission finds that the proposed project, only as conditioned, is consistent with Coastal Act Sections 30233, 30235, and 30253.

C. MARINE RESOURCES AND WATER QUALITY

Section 30230 of the Coastal Act states:

> *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 of the Coastal Act states that:

> *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 ground water 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.*

Section 30233 of the Coastal Act states that:

> *(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:*
>
> *(l) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*

(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities, shall not exceed 25 percent of the degraded wetland.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

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

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource dependent activities.

(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 longshore current systems.

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the l9 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division.

For the purposes of this section, "commercial fishing facilities in Bodega Bay" means that not less than 80 percent of all boating facilities proposed to be developed or improved, where such improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities.

(d) Erosion control and flood control facilities constructed on water courses can impede the movement of sediment and nutrients which would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible

mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for such purposes are the method of placement, time of year of placement, and sensitivity of the placement area.

Additionally, the certified City of Malibu Land Use Plan contains the following policies that serve as guidance:

3.1 As set forth in Policy 3.4, any marine area that meets the ESHA criteria, including Areas of Special Biological Significance and Marine Protected Areas (as designated by the California Department of Fish and Game) is ESHA, and shall be accorded all of the protections provided for ESHA in the LCP.

3.2 Marine ESHAs shall be protected against significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas. Residential, commercial, or institutional uses shall not be considered resource dependent uses.

3.3 Permitted land uses or developments shall have no significant adverse impacts on marine and beach ESHA.

3.4 Development on beach or ocean bluff areas adjacent to marine and beach habitats shall be sited and designed to prevent impacts that could significantly degrade the Environmentally Sensitive Habitats Areas. All uses shall be compatible with the maintenance of the biological productivity of such areas.

3.5 New development shall prevent or reduce non-point source pollution in the near shore environment through implementation of the non-point source pollution and private sewage disposal system policies.

3.6 Grading and landform alteration shall be limited to minimize impacts from erosion and sedimentation on marine resources.

3.7 Marine mammal habitats, including haul-out areas shall not be altered or disturbed by development of recreational facilities or any other new land uses.

3.8 Efforts by the California Department of Fish and Game and Regional Water Quality Control Board to increase monitoring to assess the conditions of near shore species, water quality and kelp beds, and to rehabilitate or enhance areas that have been degraded by human activities shall be encouraged and allowed.

3.9 Near shore shallow fish habitats and shore fishing areas shall be preserved, and where appropriate and feasible, enhanced.

The Coastal Act and City of Malibu Local Coastal Program (LCP) policies identified above require the protection of marine resources, particularly in areas of special biological significance. Marine resources must be maintained, enhanced or restored, as required by Section 30230 of the Coastal Act. Section 30230 further requires that special protection be given to areas and species of special biological or economic significance. Uses of the marine environment must be carried out in a manner that will sustain the biological productivity of coastal waters. The biological productivity and the quality of coastal waters appropriate to maintain optimum populations of marine organisms and for the protection of human health must be maintained. Development in areas adjacent to sensitive marine habitat areas, marine parks, sensitive habitats protected by federal or state laws, MPAs, and recreation areas, must be sited and designed to prevent impacts which would significantly degrade those areas. Certain types of development are allowed in open coastal waters where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects. The Coastal Act allows mineral extraction, including sand for restoring beaches in coastal waters, except in environmentally sensitive areas. Additionally, the material removed from erosion and flood control facilities on streams may be placed at appropriate points on the shoreline. While the Coastal Act does not specifically provide for the placement of sand from other sources, the Commission has consistently interpreted the restoration of beaches to be a permitted use in open coastal waters. In such projects, the Commission has addressed the impacts on marine resources by considering the timing of deposition of the material on the beach, the composition of the material, the location of the receiver beach, and the presence of environmentally sensitive resources.

1. Marine Resources at Broad Beach

The marine habitats in and immediately adjacent to the proposed project footprint include upper sandy beach, intertidal sandy beach, rocky intertidal (bedrock, boulders, cobble at Lechuza Point), intertidal boulder field, soft bottom subtidal that supports eelgrass beds and soft bottom epi- and infaunal invertebrates (e.g. sand dollar beds), hard bottom subtidal (bedrock and cobble rocky reef) that supports kelp beds and understory algae and invertebrates, as well as several special status species. While these habitats may be considered separately, they comprise a vital transition zone interconnected by complex physical and biological interactions that occur across variable spatial and temporal scales and that inexorably link terrestrial and marine ecosystems.

2. Significance of Resources

The Coastal Act requires that special protection be given to marine areas and species of special biological or economic significance. The significance of the marine resources in the Broad Beach and surrounding areas has long been recognized by State and Federal resource agencies, and local government.

a. Areas of Special Biological Significance

The California State Water Quality Control Board (Resolution No 74-28), designated certain Areas of Special Biological Significance (ASBS). The ASBS (most recently referred to as State Water Quality Protection Areas – Areas of Special Biological Significance) are intended to afford special protection to marine life through prohibition of waste discharged to ocean waters. The concept of “special biological significance” recognizes that certain biological communities, because of their value or fragility, deserve very special protection that consists of preservation and maintenance of natural water quality conditions.

Broad Beach is located within the Mugu Lagoon to Latigo Point ASBS (#24), which contains five major habitat types: a barrier beach, open coast kelp beds, open coast sandy beaches, semi protected kelp beds and submarine canyons, the combination of which is unique to all of southern California. The reconnaissance survey report prepared through an interagency effort between California Department of Fish and Wildlife and the SWRCB for ASBS #24 (in March of 1979) states that the Trancas/Zuma beach is representative of these special open coast sandy beach habitats and possesses the most extensive untouched subtidal sand communities in the region. The survey report states that "the community structure of Trancas and Zuma is dominated by sand dollars, sea pansies, and pismo clams and the margins of the beach contain peculiar community interfaces between areas of rock and sand." The ASBS baseline report points out that the surfgrass (*Phyllospadix torreyi*), which commonly occupies these nearshore rock/sand interfaces and rocky intertidal zones is a very important member of the subtidal ASBS community and that its presence near the high energy surf zone tends to reduce wave energy, thus decreasing wave caused erosion. The report goes on to say that, "this true grass has roots which attach to the rocks; soil, which is rich in decaying organic material, accumulates around the roots. These soil areas contain a number of obligate understory species, including certain annelid worms (lumbrinereids) which clearly could not exist in these surf swept locations without the protection afforded by the surf grass roots. Other organisms have obligate relationships with the blades of this plant. [..] An important relationship has been demonstrated between surfgrass and the lobster, *Panulirus interruptus*." *Phyllospadix* surfgrass, acts as a nursery for juvenile lobster and is apparently very long lived, up to 50 years, and recruits slowly. The ASBS baseline report concludes that, "This species [phyllospadix surfgrass] therefore warrants special protection from both physical removal and potential pollutants as it has a particularly important ecological role and is not easily replaced." Additionally, the report also identifies that there are extensive offshore rocky reefs at Lechuza point that support eel grass beds. Specifically it states that, "The bed at Lechuza Point has remained there for several years and is fairly large (2-5 meters wide x 40 meters long)."

Other sensitive and special resources identified in the Trancas Beach and Lechuza Point region include extensive sand dollar and pismo clam beds, tube worms, kelp forests, nearshore sand habitats, and sandy bottom habitats (offshore sands). The intent of the ASBS designation was to protect, maintain, and enhance these special marine resources and the overall water quality of the area. As such, this baseline report also included potential threats to the ASBS objectives. Of these, seepage from septic tank leaching along this stretch of the coast was identified as a primary threat to water quality and marine habitats. Additionally, the report also includes 'dredging and/or spoil disposal' as a potential point source pollution threat to the resources of the ASBS. The intent of the ASBS and the Ocean Plan is to maintain habitat integrity of these special marine resource areas even in those sections of the coast experiencing ongoing and intensifying coastal developments. This report was compiled and adopted long before the establishment of the Marine Protected Areas up and down California's coast, however, it includes the following statement, "Maintenance of habitat within the ASBS available for recolonization [of sensitive and valuable marine species] in the future is essential to assure continued recruitment and potential recovery of these species to their previous levels. In addition, this area can act as a reservoir for recruitment into nearby areas in which populations have been depleted by fishing pressure, adjacent land development and/or deteriorating water quality."

The protection of these ASBSs is regulated through the California Ocean Plan, which, exempts dredged material from the definition of 'waste'. However, because the sand materials proposed for deposition by the applicant is from an inland source, and not an offshore source, the deposition is subject to the specific requirements and restrictions of the Ocean Plan. As such, the sand deposition portion of the proposed project may require an exception to the Ocean Plan in order to proceed with the proposed deposition of "waste" within the ASBS area.

b. Marine Protected Areas

The Marine Life Protection Act (MLPA) of 1999 required the California Department of Fish and Wildlife to redesign its system of marine protected areas (MPAs) to increase the protection of the state's marine life, habitats, and ecosystems. For the purposes of MPA planning, a public-private partnership (MLPA Initiative) was established, and the state was split into five distinct regions (four coastal and the San Francisco Bay) each with its own MPA planning process. There are different classifications used in California's MPA network. This includes three MPA designations (State Marine Reserve, State Marine Conservation Area, State Marine Park), a marine recreational management area (State Marine Recreational Management Area), and special closures. Access into marine protected areas or marine managed areas for non-consumptive uses including but not limited to swimming, surfing, diving, boating, hiking, and walking is allowed unless otherwise specified in individual MPA regulations. Unless authorized by the Fish and Wildlife Commission or as a result of authorized fishing activities, the release of any fish or wildlife species, including domestic or domesticated species, or the introduction of any plant species, is prohibited. The department may reintroduce endemic species to marine protected areas or marine managed areas for management purposes.

Broad Beach is located within the Point Dume State Marine Conservation Area. Each MPA has specific objectives designed to help achieve the goals of the MLPA. The Point Dume SMCA was established to protect "some of the most diverse habitats in Los Angeles County", including unique rocky reef structures, extensive kelp and surfgrass, diverse understory algal habitat, and the biological diversity associated with those habitats. Additionally, this SMCA was located within the ASBS to take advantage of the water quality protections provided through the Ocean Plan. Further, the Point Dume SMCA is part of a system of MPAs that function together to protect marine resources. According to the California Department of Fish and Wildlife:

> Point Dume SMCA/Point Dume SMR are an important cluster of MPAs that provide moderate or greater levels of key hard bottom habitats, including rocky shores, nearshore reefs (0-30meters(m)), 30m and deeper reefs, as well as biogenic habitats that are supported by nearshore reef habitats, including kelp and surfgrass. Moreover, the kelp and shallow 0-30m hard substrate habitats within these two MPAs facilitate dispersal and connectivity along the mainland between the Campus Point SMR and the cluster of MPAs off Palos Verdes (Point Vicente No Take SMCA and Abalone Cove SMCA).[8]

Great care, scrutiny, and effort went into establishing the boundaries of the MPAs within the network. Capturing representative intertidal and subtidal hard bottom habitat, which is relatively uncommon along the southern California shoreline (encompassing less than 20% of the nearshore habitat in Los Angeles and Orange Counties), required by the MPA science guidelines, was a challenge in southern California. This habitat type accounts for only 1% (39.3 acres) of the Point Dume SMCA. The specific protection provisions of the Point Dume SMCA state that the take of all living marine resources is prohibited except:

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[8] California Department of Fish and Wildlife, Revised Analysis of Impacts to Public Trust Resources for the Broad Beach Restoration Project Letter, August 8, 2014

1. The recreational take by spearfishing of white sea bass and pelagic finfish is allowed.
2. The commercial take of swordfish by harpoon and coastal pelagic species by round haul net, brail gear, and light boat is allowed. Not more than five percent by weight of any commercial coastal pelagic species catch landed or possessed shall be other incidentally taken species.
3. Take pursuant to beach nourishment and other sediment management activities is allowed inside the conservation area pursuant to any required federal, state, and local permits, or as otherwise authorized by the department.

While the Point Dume SMCA regulations allow certain sand nourishment and other sediment management activities, significant burial of marine habitat is inconsistent with the intent of this provision. According to California Department of Fish and Wildlife staff: "The regulations that were established for the Point Dume SMCA do not have provisions to allow for significant or adverse impacts that would require compensatory mitigation within this area".[9]

c. Essential Fish Habitat and Special Aquatic Sites

The areas offshore Broad Beach also include Essential Fish Habitat, as provided in the Magnuson-Stevens Fishery Conservation and Management Act. Essential fish habitat (EFH) is that habitat necessary for managed fish to complete their life cycle. It is defined as those waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity. Whenever federal agencies authorize, fund, or carry out actions that may adversely impact EFH, they must consult with the National Marine Fisheries Service.

Additionally, two of the of the six Special Aquatic Site types (sanctuaries/refuges and vegetated shallows), that are given special recognition under Clean Water Act regulations, occur at Broad Beach. [10] Special Aquatic Sites are defined as: "Geographic areas, large or small, possessing special ecological characteristics of productivity, habitat wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region". The Sanctuaries/Refuges designation applies to areas designated as such under state and federal laws or local ordinances. Vegetated Shallows are: "permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems…"

d. Environmentally Sensitive Habitat Area

In recognition of the rarity and sensitivity of marine habitats, the City of Malibu Land Use Plan (Policy 3.74) states that: "All Areas of Special Biological Significance and Marine Protected Areas shall be considered ESHA and shall be accorded all protection provided for ESHA in the LCP." The LUP requires that marine ESHAs are protected against significant disruption of

[9] Revised Analysis of Impacts to Public Trust Resources for the Broad Beach Restoration Project, letter to California State Lands Commission, dated August 11, 2014.
[10] 40 CFR Part 230 –Section 404(b)(1) EPA and ACOE Guidelines for Specification of Disposal Sites for Dredge or Fill Material (EPA and ACOE) Subpart B – Compliance With the Guidelines, Subpart D-Potential Impacts on Biological Characteristics of the Aquatic Ecosystem, Subpart E. Potential Impacts on Special Aquatic Sites, Subpart H-Actions to Minimize Adverse Effects, Subpart J-Compensatory Mitigation for Losses of Aquatic Resources.

habitat values, and only uses dependent on such resources shall be allowed within such areas. Further, the LUP requires that near shore shallow fish habitats and shore fishing areas must be preserved, and where appropriate and feasible, enhanced.

3. Proposed Project

The applicant proposes an approximately 4,150 ft. long, 12-15 ft. high, as-built, rock revetment constructed pursuant to two emergency coastal development permits. In addition, the project includes re-location of the downcoast approximately 1,800 linear feet of the as-built rock revetment further landward.

The proposed project includes initial beach nourishment comprising the importation of 300,000 cu. yds. of sand material from sand quarries located approximately 40-45 miles inland of the project site. Additionally, the applicant proposes to place 300,000 cu. yds. of sand approximately every five years after the initial nourishment is completed. The applicant also proposes “interim” nourishments of up to 75,000 cubic yards and up to three “erosion” nourishments of up to 75,000 cubic yards per 10-year period. Finally, the proposed project also includes back-passing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. Heavy equipment consisting of scrapers, large 40 ton-capacity trucks, and bulldozers would be used to distribute the imported sand (and to backpass sand) along the beach within the project reach. As proposed, the reconstructed/post-nourishment combined beach and dune system would extend approximately 250 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes.

4. Previous Proposal

The project proposed in CDP Application 4-12-043 would include the retention of the revetment in the existing location and the placement of 600,000 cu. yds. of sand in a beach fill and to construct dunes over the top of the revetment. This project would include the placement of sand fill in the upcoast areas of Broad Beach, all the way to Lechuza Point. At the westernmost end of the cove, the sand fill would extend approximately 162 feet seaward, including 107 feet of beach and a 56 foot wide dune form. Further downcoast, the width of the sand fill would transition to a width of approximately 263 feet, including 215 feet of beach and a 48 feet wide dune form. From the upcoast end of the revetment along the remainder of the project site, the proposed sand fill would be approximately 300 feet wide, with dune creation/restoration approximately 50 feet wide and located on and landward of the revetment.

This project also would include backpassing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. This project would also include a single renourishment of the beach 10 years after the initial nourishment is completed. Finally, the rock revetment would be buried beneath at least 4-8 ft. of imported sand material and the reconstructed dunes on site would be revegetated with native dune plant species.

Based on detailed surveys of existing marine resources in the project area, the applicant's consultants quantified the areas within various habitat categories that would be directly impacted by the sand fill aspect of the proposed project. The direct impacts are those resulting from sand burial within the proposed footprint of the beach nourishment. The applicant's consultants considered the direct fill of sand on both intertidal and subtidal sandy bottom to be a temporary impact, regardless of the depth of coverage. They argue that these habitats are adapted to periodic burial. Although the initial placement of many feet of fill in sandy habitats would result in substantial mortality of species, the applicant's consultants conclude that organisms would re-colonize these areas quickly.

The applicant's consultants also estimated potential indirect burial impacts by modelling the areas outside the sand placement footprint where sand is expected to migrate over time. Again, the applicant's consultants considered indirect impacts to sandy bottom habitats (both intertidal and subtidal) to be temporary for the reason described above. With regard to other habitat types, the applicant's agents stated that the appropriate threshold for determining indirect permanent impacts to marine resources resulting from burial by sand is one foot of sand that buries rocky habitats for more than one year (1 foot/ 1 year). In other words, the applicant has asserted that rocky areas where sand burial resulting from the proposed beach fill would be less than 1 foot deep as measured 1 year after the placement of sand on the beach should not be considered a permanent impact.

Following are the applicant's consultants' estimates of the areas (in acres), by habitat type, that would potentially be impact directly or indirectly by the project proposed in CDP Application 4-12-043[11]:

	Direct Burial (acres)		**Indirect Burial (acres)**	
Habitat Type	**Permanent**	**Temporary***	**Permanent**	**Temporary***
Surfgrass	0.96	0	0.96	0.96
Kelp	0	0	1.70	3.50
Kelp attached to bedrock	0	0	0.88	2.30
Rocky Outcrop	0.02	0	0.02	0
Bedrock Intertidal	0.03	0	1.91	0
Bedrock Subtidal	0	0	0.08	0.16
Cobble/Rubble Intertidal	1.20	0	1.37	0
Cobble/Rubble Subtidal	0.06	0	2.60	2.80
Boulder Field	0.71	0	0	0.71
Sandy Bottom Intertidal	2.25	20.5	2.25	22.8
Sandy Bottom Subtidal	0	13.5	0	51.8
Total	5.23	34	11.77	85.03

* Temporary impact is defined by the applicant as habitat area buried by sand that is less than 1 foot deep at one year after the sand placement.

[11] The values in this chart were compiled from tables of Estimated Predicted Temporary Impact of Direct Fill and Indirect Fill to Vicinity, prepared by Moffat & Nichol, June 26, 2014

This project would have significant permanent impacts (loss of habitat/habitat conversion) to surfgrass, kelp forest, intertidal and subtidal hard and soft bottom habitats. In addition, there would be indirect impacts that the applicant estimated to be temporary that could actually be permanent, based on the use of the threshold of 1 ft. of sand burial after 1 year (the Commission's ecologists Dr. Jonna Engel and Dr. John Dixon have determined that this threshold would underestimate potential indirect impacts because many of the marine resources onsite are acclimated to much narrower tolerances of sand burial).

The applicant's consultants asserted that the proposed project would restore the beach to a historic width and morphology that existed before the area was subject to beach erosion and negative sand budgets. They further asserted that the marine resources in the western area of the project site are acclimated to shifting beach widths and sand amounts. However, as described above, the western (upcoast) segment of the project site (that portion located immediately downcoast of Lechuza Point) has historically maintained a narrower shoreline profile than other segments of Broad Beach. A review of historical records and aerial photographs shows that the beach on site was at its widest point over the last century or so in the early 1970's. However, this widened condition constitutes a relatively brief anomalous period given that beach widths on site were substantially narrower prior to the 1970's. Moreover, beginning in approximately 1974, the shoreline on site began to experience significant rates of erosion.

The applicant's agents also stated that it was important to the success of the project that the proposed sand fill be anchored by Lechuza Point. They stated that eliminating the upcoast portion of the sand nourishment will reduce the longevity of the beach. In addition to the fact that the volume of sand will be reduced, the applicant's consultants have asserted that the longevity would also be reduced because fill material is concentrated closer to the downcoast end of the beach. Finally, they stated that a larger percentage of fill material would be lost to downcoast beaches, reducing the effectiveness of sand backpassing.

However, this proposed project, as is true of many large scale projects, is multi-purpose and has multiple metrics for success. Staff recommended that the project be redesigned such that the maximum amount of sand placed at one time would be 300,000 cu. yds., and that the westernmost limit for sand nourishment was located to a point seaward of the residence at 31380 Broad Beach Road. Both measures were recommended to protect the ecological resources that are located near to and west of this nourishment limit. Such a project modification also necessitated a slight modification in other project goals and criteria for success. As discussed later in this section, the subject proposed project includes an initial sand nourishment of 300,000 cu. yds. (and additional sand nourishments of 300.000 cu. yds. every five years for the term of the permit) and the upcoast limit of all proposed beach nourishment is located seaward of 31380 Broad Beach Road.

<u>5. Other Project Alternatives</u>

As previously described, the applicant considered several project alternatives that include different siting, design, and sizing of the proposed revetment and beach fill. Additionally, at Commission staff's request, the applicant also considered additional alternatives that could reduce or minimize environmental impacts, involving the relocation or pull-back of the revetment further landward, the relocation and/or redesign of existing septic facilities, and the resizing of the proposed beach fill. Further, Commission staff has had numerous discussions with the applicant's representatives about minimizing the environmental impacts of the project to ensure consistency with the policies of the Coastal Act and the LCP. The following alternatives include modifications to the design of the proposed beach fill to address impacts to marine resources:

Alternative 4 considered a reduced beach nourishment volume project with dune restoration and retention of the revetment at the current location. With this alternative project, the total amount of sand fill placed at any one time would be reduced with the lineal extent remaining the same. The beach width would be reduced along the entire length. Sand fill would be placed in more frequent events. The total volume of nourishment and dune restoration would be reduced to approximately 400,000 cu. yds. for the initial nourishment with the addition of a maximum of 150,000 cu. yds. 3-5 years later. At the westernmost end of the cove, the sand fill is proposed to extend approximately 130 feet seaward, including 74 feet of beach and a 56 foot wide dune form. In this alternative, the width of the beach fill increases gradually downcoast from the cove to the upcoast end of the revetment, without the large transition included in the proposed project design. From the upcoast end of the revetment along the remainder of the project site, the proposed sand fill would be approximately 246 feet wide, including the dune creation/restoration areas proposed to be approximately 48 feet wide and located on and landward of the revetment

Alternative 8 considered a project with no beach nourishment at West Broad Beach and retention of the revetment at the current location. With this alternative project, no beach nourishment or dune restoration would occur west of 31346 Broad Beach Road (west end of temporary revetment). In this alternative, the beach fill design does not transition or taper from a narrow width to the full width. Rather, the beach fill would begin exactly at the end of the existing revetment and extend to its full width. East of this location, the revetment, beach nourishment and dune restoration are the same as that for the proposed project. The total volume of nourishment and dune restoration would be reduced to about 460,000 cu. yd.

Alternative 9 considered a project with reduced beach nourishment at the western end of Broad Beach with retention of the revetment at the current location. With this alternative project, the beach nourishment west of 31346 Broad Beach Road (west end of temporary revetment) would be limited to about 60,000 cu. yds., or approximately 50 percent of the sand volume that would be placed in this area as part of the proposed project. At the westernmost end of the cove, the sand fill is proposed to extend approximately 80 feet seaward, including 60 feet of beach and a 80 foot wide dune form. This width of sand fill would extend downcoast to the property at 31346 Broad Beach Road. At this point, the sand fill would transition to the same width as the proposed project. East of this location the revetment, beach nourishment and dune restoration are the same as proposed for the project. The total volume of nourishment and dune restoration would be reduced to about 520,000 cu. yd.

Alternative 4B considers a project with a portion of the revetment located further landward (the revetment design is discussed in detail in Section B above), dune restoration and a phased beach nourishment component (including no more than 300,000 cu. yds. of sand in the initial nourishment). With this alternative project, no beach nourishment or dune restoration would occur west of 31502 Victoria Point Road. The width of the sand fill on the far western portion of the beach transitions from about 100 feet of sand fill to no fill terminating about 450 feet east of Point Lechuza. This fill includes a sand dune/ berm feature located on the back of beach which is intended to act as a sand reservoir to feed the down coast areas with sand. The applicant's consultants have modelled the potential area of impact to marine resources, including direct burial resulting from the initial placement of the sand and indirect impacts resulting from burial by sand transported to marine habitat areas after the initial placement. **Exhibit 14** shows the applicant's estimate of areas of direct impact (proposed beach nourishment footprint), permanent indirect impacts, and temporary indirect impacts associated with the proposed project. Following are the marine habitat types and acreage of impacts that the applicant has estimated resulting from the sand fill design:[12]

	Direct Burial (acres)		**Indirect Burial (acres)**	
Habitat Type	**Permanent**	**Temporary***	**Permanent**	**Temporary***
Surfgrass			<0.01	0.75
Kelp				0.01
Cobble/Rubble Intertidal	0.12		0.62	0.59
Cobble/Rubble Subtidal			0.08	1.21
Boulder Field		0.5	0.07	0.14
Sandy Bottom Intertidal		17.28		6.7
Sandy Bottom Subtidal				29
Total	0.12	17.78	0.78	38.4

* Temporary impact is defined by the applicant as habitat area buried by sand that is less than 1 foot deep at one year after the sand placement.

It should be noted that the applicant's consultants consider the sand on sand placement for sandy bottom, both intertidal and subtidal to be a temporary impact, regardless of the depth of coverage.

6. Analysis of Marine Resource Impacts

One of the biological resource concerns raised by the project is the potential for direct or indirect burial of habitats and organisms on the beach and in the nearshore environment by the placement of sand. Burial of habitats will result in mortality of species that cannot tolerate the amount of sand burial and/or are not sufficiently mobile to flee to other areas. These impacts could potentially shift population dynamics of the beach and nearshore ecosystems as well as affect available prey sources for nearshore fish and avian populations. If persistent over a long temporal scale or if impacts occur repeatedly, certain habitats will be lost within and adjacent to the impact area and converted to other habitat types. Additionally, significant shifts in grain size conditions could also alter the physical beach environment and result in diversity and abundance changes in the beach system species assemblage. Such impacts will result in marine resources on the project site being diminished, not maintained, enhanced or restored, as required by Section 30230 of the Coastal Act. Further, if the proposed project results in these impacts, it would not give special protection to areas and species of special biological or economic significance. The

[12] Broad Beach—Outline of Alternative 4B Impacts, Moffat & Nichol, November 18, 2014.

use of the marine environment on the project site for beach nourishment and the protection of residential development, as proposed, must be carried out in a manner that would sustain the biological productivity of coastal waters and that would maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes, as required by Section 30231 of the Coastal Act. Further, the proposed project must be consistent with the marine resource policies of the certified Malibu LCP that provide guidance. Specifically, the proposed project must conform to Malibu LUP Policy 3.75 that requires development to protect Marine ESHA (as designated by the LCP) against significant disruption of habitat values. Finally, development must preserve or enhance near shore shallow fish habitats as required by Malibu LUP Policy 3.82.

The Commission's ecologist, Dr. Jonna Engel has prepared an analysis of the project: "Potential Impacts of the Broad Beach Geologic Hazard Abatement District Proposed Project on Terrestrial and Marine Resources In and Adjacent to Project Footprint, Broad Beach, Malibu, California" dated November 25, 2014. The Commission incorporates the findings of that analysis here as if set forth in full. The proposed project could have significant permanent impacts (loss of habitat/habitat conversion) to surfgrass, kelp forest, intertidal and subtidal hard and soft bottom habitats. While it is important to characterize the separate types of marine habitat that are present, it is also critical to note that these habitats are interconnected. When taken together, the permanent direct and indirect impact areas could result in the complete loss or conversion of a substantial portion of the sensitive habitats at the western end of Broad Beach, near Lechuza Point.

a. Direct Burial Impacts

The proposed project includes an initial beach nourishment comprising 300,000 cu. yds. of sand and the placement of 300,000 cu. yds. of sand approximately every five years after the initial nourishment is completed. The applicant also proposes "interim" nourishments of up to 75,000 cubic yards and up to three "erosion" nourishments of up to 75,000 cubic yards per 10-year period. Finally, the proposed project also includes back-passing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for a period of 20 years, if needed for the purpose of maintaining adequate beach width for a prolonged period of time.

The upcoast (western) end of the proposed sand nourishment is proposed to be located seaward of the property at 31380 Broad Beach Road (**Exhibit 7**). This location for the terminus of the sand fill was chosen because it will minimize impacts to marine resources and allow sand to be placed both over the existing revetment and for a distance of approximately 300 feet upcoast of the end of the revetment. To place sand fill any further upcoast than 31380 Broad Beach Road would result in direct burial of marine resources, in particular the boulder field habitat identified just seaward of the property at 31412 Broad Beach Road. The proposed sand nourishment, as sited and designed, will avoid direct burial impacts to intertidal and subtidal hard bottom habitats. As discussed in subsection 6c below, although direct burial of hard bottom habitats will be avoided, there will still be some unavoidable direct burial of intertidal sandy bottom habitat, given the nature of the proposed sand nourishment aspect of the proposed project.

The Commission finds that it is particularly critical to employ siting and design alternatives for beach nourishment to avoid direct burial impacts to sensitive resources in the marine environment, where feasible. These resources are recognized by state and federal agencies as particularly important, and are given strong protections under the policies of the Coastal Act. Additionally, it is very difficult, costly, and time consuming to provide compensatory mitigation for such impacts through the creation or enhancement of in-kind habitat, and some types of habitat creation/enhancement may not even be feasible.

In order to avoid the impact of direct burial of marine resources (including intertidal and subtidal hard bottom habitats), the Commission finds it is necessary to require (**Special Condition 1**) that all final plans reflect the upper terminus of the sand nourishment at 31380 Broad Beach Road and that the project be implemented in accordance with said plans.

b. Indirect Burial Impacts

Even though the direct burial of marine resources (other than sandy bottom habitats) can be avoided by the proposed design of the beach fill terminating at 31380 Broad Beach Road (as proposed and as limited by **Special Condition No. 1**), indirect marine resource impacts cannot be completely avoided while still providing beach nourishment at the proposed project site. The potential impacts will be minimized by ensuring that the proposed beach nourishment aspect of the project includes no more than 300,000 cu. yds. of sand (including beach nourishment and dune creation) at the initial nourishment and no more than 300,000 cu. yds. in any additional major sand renourishments, as outlined in the Adaptive Beach Management and Monitoring Plan, required pursuant to Special Condition 4 of this permit. **Special Condition No. 1** requires that the total amount of beach/dune nourishment material for the initial nourishment event, and each separate renourishment event shall not exceed 300,000 cu. yds. of sand for each event. Additionally, the footprint for beach nourishment/beach width will be limited to approximately 50 feet at the upcoast (western) portion of the sand fill, and as generally shown on **Exhibit 7a**.

The proposed volume of sand placed and the beach width limitation will serve to minimize the amount of sand that will migrate upcoast to the west and bury marine resources. The applicant's earlier modelling of potential marine resource impacts for an alternative project that includes a reduction of sand volume to 300,000 cu. yds. indicates that the alternative would significantly reduce the potential indirect burial of marine resources in the westernmost area of the project site. Nonetheless, given the proximity of the proposed beach nourishment to these areas, there is still a potential for significant adverse impacts to occur from indirect burial of marine habitats.

The applicant's agents have stated that the appropriate threshold for determining permanent impacts to marine resources resulting from burial by sand is one foot of sand that buries rocky habitats for more than one year (1 foot/ 1 year). In other words, the applicant has asserted that rocky areas where sand burial resulting from the proposed beach fill is less than 1 foot deep as measured 1 year after the placement of sand on the beach should not be considered a permanent impact. The applicant's consultants have stated with regard to the 1 foot at 1 year permanent impact threshold that: "This depth of coverage is based on model predictions and is identical to other large scale beach nourishment projects RBSP I and II, and USACE Feasibility Studies" and "It is noteworthy that similar assumptions were employed for RBSP I and were found to overestimate potential impacts".[13] However, the Commission did not make specific findings in these particular cases that it was appropriate to determine whether impacts to marine resources were temporary or permanent based on a 1 foot after 1 year threshold. Additionally, the site locations for beach nourishment in those cases did not contain the same types of sensitive resources present at Broad Beach and were significant distances from sensitive resources, so this is not a fair comparison. Rather, the Commission found that: "Sand is the predominant existing habitat at the proposed receiver sites, although most have bands of cobblestones"[14] and "The project has been designed to avoid sensitive marine resources by choosing both dredge sites and the receiver beaches in locations that do not contain biological resources such as reefs, surfgrass beds, and kelp canopies"[15].

In order to model the potential indirect impacts of the beach fill, it was necessary to choose a threshold whereby an impact would be identified. However, the Commission's ecologists Dr. Jonna Engel and Dr. John Dixon have determined that this threshold would underestimate potential indirect impacts because many of the marine resources onsite are acclimated to much narrower tolerances of sand burial. Furthermore, it is impossible to come up with a single threshold for temporary vs permanent impacts because the individual algal and invertebrate species inhabiting nearshore marine habitats are adapted to sand inundation survival to greater or lesser degrees and all respond differently. Dr. Jonna Engel has indicated [16]that very few peer-reviewed studies have been conducted on nearshore algal and invertebrate species' tolerance to sand burial. The few that have been published suggest that for many species mortality occurs well before the applicant's threshold. For instance, research on the effect of short term (12 days) sediment burial on eelgrass (*Zostera marina*) showed that mortality was increased and productivity substantially reduced when only 25 percent of the plant height was buried. Further, when plants were buried to 75 percent of their height, all the plants died. The study results indicate that eelgrass can only tolerate short term burial that covers much less than the height of the plant. Similarly, research on the effect of sediment burial on surfgrass (*Phyllospadix torreyi* showed that short term burial (15 days) burial results in shoot mortality and reduced growth. A species that is often found in areas characterized by seasonal sand inundation is the aggregating anemone, *Anthopleura elegantissima.* It has been observed to resist shallow sand burial by extending its columns so that the oral disc and tentacles reach the surface[17]. However, Sebens suggested that survival of aggregating anemones buried deeper for 3 months or greater was due to body tissue metabolism[18]. The sand burial depth and length of time that would result in mortality is not known but is likely less than 1 foot for 1 year. Thus, permanent impacts to some organisms and habitat are likely to occur with sand burial well below the 1 foot of burial at one year after sand placement threshold.

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[13] Broad Beach Restoration Program Approach to Determination of Temporary and Permanent Impact Areas, Moffat & Nichol, July 3, 2014.
[14] Coastal Commission Staff Report Coastal Development Permit 6-00-038 (San Diego Association of Governments), November 2, 2000.
[15] Coastal Commission Staff Report Coastal Development Permit 6-11-018 (San Diego Association of Governments), June 2, 2011.
[16] Potential Impacts of the Broad Beach Geologic Hazard Abatement District Proposed Project on Terrestrial and Marine Resources In and Adjacent to Project Footprint, Broad Beach, Malibu, California, Jonna Engel, Ph.D., November 25, 2014
[17] O'Brian, P.Y. and M.M. Littler. 1977. Biological Features of Rocky Intertidal Communities at Coal Oil Point, Santa Barbara County, California. In: Littler M.M. (ed.) Spatial and Temporal Variations in the Distribution and Abundance of Rocky Intertidal and Tidepool Biotas in the Southern California Bight. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. pp.317-405.
[18] Sebens, K.P. 1980. The Regulation of Asexual Reproduction and Indeterminate Body Size in the Sea Anemone *Anthopleura elegantissima* (Brandt). Biological Bulletin Marine Biological Lab, Woods Hole, V. 158:370-382.s. 1980

The applicant's consultants (Moffat and Nichol) also analyzed the potential indirect impacts of the proposed sand nourishment aspect of the proposed project (including the placement of 300,000 cu. yds. of sand with the upcoast limit of sand placement located seaward of 31380 Broad Beach Road) on marine resources, in consideration of the depth of cover that can be expected to occur naturally in the area. In order to estimate the location and depth of sand that can be expected to indirectly bury marine areas through the migration of sand upcoast, the applicant's consultants first compared maximum and minimum sedimentation levels along five transects surveyed every fall between 2009 and 2014, and every spring between 2011 and 2015. Using this survey data, the consultants determined the natural variation in depth of sand cover in each season over the period of time covered. Further, the consultants modeled the anticipated burial levels resulting from the proposed beach nourishment, using the GENESIS model as well as beach profile and sediment diffusion analysis tools. GENESIS (Generalized Model for Simulating Shoreline Change) was developed by the United States Army Corps of Engineers (USACE) Coastal Engineering Research Center. GENESIS is a computer program that predicts the shift in the position of the shoreline at mean sea level from a designated starting point, existing conditions in this case, in response to a proposed action. It utilizes data of existing shoreline conditions, wave conditions, and proposed project changes (beach fills and/or structures) to calculate sediment transport, consequent erosion and deposition, and resulting changes in shoreline position. Based on the survey data and the depth of cover estimates, the consultants identified areas where the predicted burial resulting from the beach nourishment will exceed the highest depth of cover observed in the period from 2009-2014.

Finally, the consultants identified the marine habitat types and areas that are estimated to be subject to more depth of cover than observed occurring naturally, at six months, 1 year, 1.5 years and 2 years after project construction. For instance, **Exhibit 13** shows the estimated depth of cover resulting from the sand nourishment as compared to the highest spring accumulation level (based on survey results) 1 year after construction (assuming the sand nourishment is completed in spring). The mapped marine resources at Broad Beach are also shown on this exhibit.

Based on this analysis of predicted marine resource impacts, the applicant concludes that the following depth of burial is likely for the following habitat types:

- <u>High intertidal</u>: Some rocks would remain buried, upper beach rocks buried at 6 months could be exposed. Most of the species populating Broad Beach's high intertidal rocks, eg. acorn barnacles and green algae, are rapid colonizers expected to recolonize rocks once they become exposed.
- <u>Mid-intertidal</u>: Additional sand cover between 6" and 1 ft. above spring seasonal average, lowest rocks and bottom portions of higher rocks would still be covered.
- <u>Low intertidal and shallow subtidal</u>: Additional 6" to 1 ft. sand cover above seasonal average, surfgrass on lowest rocks might have rhizomes buried, impacts to surfgrass expected to be minimal.
- <u>Upper beach</u>: Spring sand levels could be 2 to 4 ft above seasonal average and all but the higher rocks would likely still be buried.
- <u>Mid-intertidal area</u>: Sand levels about 1 ft above the seasonal average, only the lowest rocks would still be buried.

- Lower intertidal and shallow subtidal areas: Burial of 1 ft. beyond the spring average out to a depth of -6 feet MLLW which represents less than 1 ft. above the seasonal spring high.
- Mid-intertidal area: Scattered rocks would be subjected to sand levels about 1 to 2 ft. above seasonal average, some low rocks remain buried.
- Low-intertidal: Rocks are predicted to have 6" to 1 ft of sand above average spring profile out to depth of – 9 feet MLLW.
- Scattered Rocks: Additional 6" to 1 ft. of coverage should have little impact on very low rocks that are buried and scoured naturally, surfgrass on low rocks might continue to experience rhizome burial.

Based on their modeling and analysis, the applicant's consultants conclude that the impacts of the proposed sand nourishment on sensitive marine resources will be minimized. They conclude that there are no predicted impacts to eelgrass and kelp; that impacts to surfgrass are predicted to be less than significant; that impacts to lower intertidal boulder field are predicted to be less than significant. Finally, they conclude that the predicted additional 6" to 1 ft. of depth of sand should have little impact on very low rocks that are buried and scoured naturally, although surfgrass on low rocks might continue to experience rhizome burial. With regard to the applicant's proposed interim nourishments, erosion nourishments, and backpassing operations, the consultants conclude that the predicted indirect sand burial impacts would be less than those resulting from the initial (and subsequent) nourishments of 300,000 cu. yds. Additionally, the applicant's consultants state that their engineering analysis does not predict any additional burial from backpassing operations.

As previously discussed, in order for the proposed project to be successful in protecting existing structures at risk from beach erosion and in providing sandy beach available for public access and recreation, it is necessary for a substantial amount of sand to be placed seaward of the proposed revetment. As designed to avoid direct placement of sand on marine resources and to place no more than 300,000 cu. yds. of sand at any one time, indirect impacts of sand burial will be minimized.

However, there are inherent uncertainties presented by the use of models to predict future outcomes. As previously discussed, the predictions resulting from the GENESIS model should be considered as trends (i.e., erosion, accretion, no change) to be evaluated at the first order for planning, rather than absolute, accurate shoreline positions for any sort of precise engineering design. Additionally, assumptions used in the analysis may not prove to represent the actual field conditions. Further, the site-specific survey data utilized to determine the natural variation between spring high and low sand level, and fall high and low sand level were collected over a short time frame (four years of spring data and five years of fall data) which may or may not represent the normal condition or future conditions at Broad Beach. Finally, although the applicant's consultants have evaluated the potential burial impacts resulting from the proposed interim renourishments, erosion renourishments, and backpassing, it is not known what potential cumulative impacts may result from the implementation of all of these sand placement/movement activities even with the restrictions required by Special Condition 4 (Final Adaptive Management and Monitoring Plan). According to the Commission's ecologist, Dr.

Jonna Engel: "Ecological recovery following direct and indirect impacts of beach replenishment depends on successful recolonization and recruitment of the respective habitat organisms and reprieve from subsequent disturbance".[19] The cumulative effect of frequent sand placement or movement activities may result in less recolonization or loss of mature population size structure and long-lived taxa. Cumulative indirect sand burial impacts to marine resources may be prolonged by yearly burial or turbidity impacts from smaller nourishment activities or backpassing operations, even though they individually represent much smaller amounts of sand placement or movement.

In order to allow for the beach nourishment aspect of the project to be carried out while ensuring that adverse impacts to marine resources are avoided where feasible and minimized, the Commission finds it necessary to require the applicant to carry out extensive marine habitat monitoring as part of the project to identify the actual impacts of the project. This is necessary both to provide evidence to inform the implementation of project modifications for future beach renourishment or other construction at Broad Beach and to ensure that mitigation of any impacts that do occur is provided by the applicant. The monitoring and mitigation requirements are discussed in detail in subsection 7 below.

c. Impacts to Sandy Bottom Habitats

The applicant's consultants have argued that impacts to sandy bottom habitats, both intertidal and subtidal, resulting from sand burial are only temporary impacts, regardless of the depth of coverage. The applicant's consultants indicate that these habitat areas are acclimated to sand burial and disturbance. While it is acknowledged that organisms without sufficient mobility to avoid burial are likely to die, the applicant asserts that the created beach areas are likely to be recolonized in a fairly short period of time and that long term significant adverse impacts are unlikely to occur.

The Commission has typically found that placement of sand nourishment on sandy beach areas are unlikely to result in permanent to impacts to sandy habitats, so long as the project is designed to time the deposition of the material on the beach to protect sensitive resources and to match the composition of the material as close as feasible to the existing sand at the beach. In this case, the sand grain size proposed would be significantly coarser than that normally found at Broad Beach or at Zuma Beach (just downcoast). The applicant's proposed use of much coarser sand is by design so that sand nourishment is more likely to remain on the beach for a longer period of time. However, the coarser sand may affect which organisms will colonize the beach after the nourishment event. The Commission's ecologist, Dr. Jonna Engel has indicated that coarser sand and the resultant change in the steepness of the beach, as compared to the typical beach profile at Broad Beach (before erosion and the fixing of the back beach by the emergency revetment) may adversely affect the sandy bottom habitats. Specifically, she states the following[20]:

> Surf regime and sand grain characteristics allow beaches to be described in terms of morphodynamic state or type, ranging from dissipative to reflective conditions. Beach

[19] Potential Impacts of the Broad Beach Geologic Hazard Abatement District Proposed Project on Terrestrial and Marine Resources In and Adjacent to Project Footprint, Broad Beach, Malibu, California, Jonna Engel, Ph.D., November 25, 2014
[20] Potential Impacts of the Broad Beach Geologic Hazard Abatement District Proposed Project on Terrestrial and Marine Resources In and Adjacent to Project Footprint, Broad Beach, Malibu, California, Jonna Engel, Ph.D., November 25, 2014

slope, sand grain size, and the wave-breaking and nearshore circulation patterns differ along the gradient from dissipative to reflective beaches. Dissipative beaches have wide, high energy surf zones that dissipate large amounts of incoming wave energy before it reaches the intertidal swash zone. These wide flat beaches typically have very fine sand and laminar, long period swash climates[21]. Reflective beaches have very narrow surf zones where waves break near or directly on the shore and some wave energy is reflected seaward. Reflective beaches generally have coarse sediments, steep slopes, and short period, turbulent swash climates. The majority of beaches in California and across the globe are intermediate beaches that lie within the broad spectrum between dissipative and reflective types and represent a wide range of sizes and shapes as well as sand grain sizes. Sandy beaches, particularly intermediate types, can exhibit seasonal shifts in morphodynamic state in response to storm and swell conditions. However, a beach of coarse sediments may remain reflective and a fine-sand beach may remain dissipative regardless of wave conditions[22].

Grain size also strongly affects the structure and diversity of benthic invertebrate communities[23] including those on open coast sandy beaches[24,25,26]. Burrowing performance of benthic animals is strongly influenced by grain size with subsequent effects on their distribution and abundance in different habitats. On open coast beaches, due to the fact that survival in the turbulent wave wash depends on burrowing speed and ability, the distributions of many species of intertidal macroinvertebrates are strongly linked to sand grain size[27,28,29]. When sand grain size exceeds the tolerance of a particular species or group of taxa, those species can be directly excluded from the beach and/or experience reduced growth, reproduction and lifespans. Important beach taxa that are known to be sensitive to sand grain size include clams, crabs, amphipods, isopods and polychaetes[30,31,32]. These taxa make up the majority of the biomass and abundance of intertidal animals on southern California beaches and are very important prey for birds and fishes[33].

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[21] McArdle, S. B. & A. McLachlan. 1992. Sand beach ecology: Swash features relevant to the macrofauna. Journal of Coastal Research, V.8:398–407.
[22] Bryant 1982
[23] Johnson, R. G. 1971. Animal-sediment relations in shallow water benthic communities. Marine Geol., V.11: 93-104.
[24] McLachlan, A. & A. Dorvlo. 2005. Global patterns in sandy beach macrobenthic communities. Journal of Coastal Research, V.21(4), 674–687.
[25] Rodil, I.F. & M. Lastra. 2004. Environmental factors affecting benthic macrofauna alog a gradient of intermediate sandy beaches in northern Spain. Estuarine, Coastal and Shelf Science, V. 61 (1): 37-44.
[26] Peterson et al. 2014. Ibid.
[27] R. Nel, A. McLachlan & D. Winter. 1991. The Effect of Sand Particle Size on the Burrowing Ability of the Beach Mysid *Gastrosaccus psammodytes* Tattersall. Estuarine, Coastal and Shelf Science, V. 48: 599-604.
[28] R. Nel, A. McLachlan & D. Winter. 2001. The effect of grain size on the burrowing of two *Donax* species. Journal of Experimental Marine Biology and Ecology, V. 265:219-238.
[29] Dugan, J.E., D.M. Hubbard & M. Lastra. 2000. Burrowing abilities and swash behavior of three crabs, *Emerita analoga* Stimpson, *Blepharipoda occidentalis* Randall and *Lepidopa californica* Efford (Anomura, Hippoidea), of exposed sandy beaches. J. Exp. Mar. Biol. Ecol., V.255(2): 229-245.
[30] Nel et al. 2001. Ibid.
[31] Dugan et al. 2000. Ibid.
[32] Viola, S.M., D.M. Hubbard, J.E. Dugan & N.K. Schooler. 2013. Burrowing inhibition by fine textured beach fill: Implications for recovery of beach ecosystems. Estuarine, Coastal and Shelf Science, pgs 1-7.
[33] Dugan et al. 2003. Ibid.

> Beaches with coarse sediments support much lower biodiversity than beaches with fine to medium sand[34,35]. For example, sand grain size was identified as a very important physical factor influencing the intertidal community structure of sandy beaches during the South Coast MPA baseline study[36].

As a result of a steepened beach slope angle to a more reflective beach type, the species composition in sandy bottom intertidal and subtidal habitats may be less diverse. Additionally, the abundance of individual macroinvertebrate species may be greatly reduced, limiting the prey available to bird and fish. In this way, the burial impacts to sandy bottom habitat that the applicant predicts to be temporary become permanent because certain species cannot recolonize after beach conditions change. In order to ensure that impacts to sandy bottom habitats are minimized to the maximum extent feasible, the sand grain size used for beach renourishment should match the existing beach condition closely.

As previously described, the applicant has identified three inland sources of sand that could be used for beach nourishment. The potential quarry sources are CEMEX, Grimes Rock and the Gillibrand. According to the applicant's October 2013 Revised Sampling and Analysis Plan and Test Results Report (SAP), "Grimes Rock and CEMEX possess the capacity to provide the quantity of sand required for the project (600,000 cy of material)." Gillibrand does not have the capacity to provide the total quality of sand, even at the smaller project size of 300,000 cubic yards; however, it could provide a portion of the needed beach sand or could provide the quantity of sand needed for a small-scale interim nourishment event. The characteristics of the various sand material and general quarry information, as excerpted from the SAP (October 2013) are summarized in the table below. Information from Broad Beach and Zuma are also provided for information on the current site conditions.

	CEMEX	Grimes Rock	Gillibrand(1)	Broad Beach	Zuma
Grain size d_{50}	0.95mm (5/2013) 0.85 mm (10/2013)	0.60 mm (5/2013) 0.47 mm (10/2013)	1.00 mm	0.25 (dry beach) 0.32 (dunes)	0.4 mm
Stockpile Area	1.2 acres	0.22 acres	2.6 acres	NA	NA
Coarse Sand (2)	21%	10%	1%	ND	ND
Medium Sand (2)	59%	71%	99%	ND	ND
Fine Sand (2)	12%	12%	0%	ND	ND
Silts & Clays (2)	8%	7%	0%	ND	ND
(1) Table 2 of the SAP (October 2013) states that only 66% of the sand from Gillibrand is in the medium sand size; however, Figure 14, the Composite Grain Size Envelope for Broad Beach vs. P.B. Gillibrand shows that 99% of the sand is medium, with 80% of the sampled sand having a diameter greater than a 0.7 mm.					

[34] McLachlan, A. 1996. Physical factors in benthic ecology: effects of changing sand particle size on beach fauna. Marine Ecology Progress Series, V.131:205-217.
[35] McLachlan & Dorvlo. 2005. Ibid.
[36] Dugan J. E., Hubbard D.M., Nielsen K.J., Altstatt J., and J. Bursek. In review. Baseline Characterization of Sandy Beach Ecosystems along the South Coast of California. Final Report for the South Coast Marine Protected Area Baseline Study to California Ocean Protection Council and California Sea Grant.

(2) The sand classifications are based upon the Unified Soil Classification, as follows[37]:
Coarse Sand – 2.0 mm – 4.76 mm
Medium Sand – 0.42 mm – 2.0 mm
Fine sand – 0.074 mm – 0.42 mm
Silts and clays – less than 0.074 mm

This table provides two separate d50 values for the sand from both CEMEX and Grimes Rock. Subsequent to taking samples from all three quarries in May 2013, the applicant's consultant learned that both CEMEX and Grimes Rock had both relocated the cut locations in their quarry sites and that each quarry intended to work these new locations for well into the future. Additional sediment samples were obtained for the new cut locations and in both cases, the median grain size for the October 2013 samples dropped by approximately 0.1 mm in size, bringing both sites closer to the median grain size of the sand currently found on Broad Beach. The lack of fine sand, silts and clays in the Gillibrand was not explained, but, based on visual observations of the sand by the Commission's coastal engineer, Dr. Lesley Ewing, it is her opinion that the lack of fine material is likely due to a washing process that occurred prior to placing the sand into the stockpile from which the sample was obtained.

In order to minimize potential impacts to marine resources, the Commission finds it necessary to require **Special Condition 8**, which would limit the proposed nourishment material to have a d50 between 0.25 mm and 0.6 mm. The 0.25 mm limit is the median diameter of the sand that is now present on Broad Beach and the 0.60 limit is the upper value of the sand material available from Grimes Rock. As demonstrated by the provided sediment grain size analysis, sand between 0.24 mm and 0.60 mm can be provided through the identified quarry options and it can be available to the site for the proposed nourishment effort. Also, there would not be the need for special and potentially costly sieving or sand washing to meet this size constraint.

The options for use of a larger or coarser sand material than native will modify the existing beach characteristics slightly. The larger grain size will establish a slightly steeper shore face and should allow the nourished sand to remain on the beach area for a longer time period than the native sand. Also, the difference in grain size is not so large that distinct zones of coarser and finer material would develop on the beach face, such as can be observed on mixed sand and cobble beaches.

The applicant has proposed to use sand with a median grain size of up to 0.85mm, since sand of such coarseness would allow greater flexibility in sand acquisitions, allowing sand from Grimes alone, CEMEX alone, Grimes and CEMEX mixed, Grimes and Gillibrand mixed, or, Grimes, CEMEX and Gillibrand mixed. Sand with a median grain size of up to 0.85 mm would also remain on the beach longer than the native sand and presumable longer than sand with a median grain size of 0.6 mm. The idea that coarser sand will remain in a beach longer than finer sand is not a new concept. The sand composition and beach profile reflect the sand available in the

[37] While engineers tend to base sand classification on the Unified Soil Classification, biologists use the Wentworth sand classification scale where very fine and fine sand is 0.0625 to 0.25 mm in diameter, medium sand is 0.25 to 0.50 mm in diameter, and coarse and very coarse sand is 0.50 to 2.0 mm in diameter. The top size range for fine, medium, and coarse sand is much larger under the Unified Soil Classification system compared to the Wentworth Scale.

littoral cell and the wave conditions that work and transport sand within the littoral cell. Eventually, the grain sizes may become so large than the material is no longer considered sand and it will move only during extreme wave and storm conditions. Such a change in the beach character would not result either from the introduction of coarser sand with either a maximum median grain size of either 0.60 mm or 0.85 mm.

The applicant has provided analysis of the coarser sand performance. This analysis examines the change in diffusion for the more coarse sand with a d50 of 0.85 mm and shown that its longevity performance will be better than sand with a d50 of 0.24 mm and there will be less need for maintenance. It also examines the underfoot feel and impacts to surfing, notes that the sand just downcoast at Zuma has coarser sand (with a d50 of 0.4 mm) and also provides details about already approved nourishment of other beaches in southern California that have used coarser than native sand. Those examples cover beaches with a native grain size similar to that at Broad Beach and with coarser nourishment sand that has a d50 less than or up to 0.60 mm. Some of the same sites noted in the Moffatt-Nichol report on Coarser than Native Grain Size are:

- 75,000 cubic yards (cy) at Seal Beach in 2009 (native beach sand = 0.35 mm; beach fill = 0.42 mm);
- 2 million cy at Surfside Colony/Sunset Beach in 2009/2010 (native sand = 0.25 mm; beach fill = 0.42 mm);
- 2.1 million cy by SANDAG in 2001 (native beaches = 0.25 mm; beach fill at 6 of 12 sites was 0.62 mm); and
- 1.5 million cy by SANDAG in 2012 (native beaches = 0.25 mm; beach fill was up to 0.61 mm).

Based on the evidence supplied by the Applicant, the use of 0.85 mm median diameter sand is not within the routine “coarser than native” nourishment efforts.

The sand used for beach nourishment would also be used for dune nourishment or might be carried onto the dune by wave and wind transport. The dune configuration has not been analyzed for various sand diameters and there has been no analysis of the beach changes that would result between nourishment of 0.60 mm and 0.85 mm. Given that the coarser than native examples provided by the applicant have had a “coarser” limit of about 0.60 mm or less, and given that the coarser sand present at Zuma is only 0.40 mm, the grain size limit of 0.24 mm to 0.60 mm for the nourishment is already in excess of the sand coarseness identified at Zuma Beach, and is at the upper limit of the difference between native and coarse nourishment sand used in recent nourishment efforts. **Special Condition 8** will allow for the use of quarry sand in the nourishment effort, without requiring additional treatment, and will provide for a somewhat greater longevity of the nourishment sand over the native sand, without pushing the limits for an exceedingly coarser sand beyond what exists locally or have been used in other southern California nourishment projects.

<u>d. Backpassing</u>

The project also includes backpassing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis for the life of the project, if needed for the purpose of maintaining adequate beach width for a prolonged period of time. The annual direct disturbance of beach and sandy bottom habitat may prevent re-establishment by many of the macroinvertebrate species that utilize this habitat. Sand crabs and other crustaceans, various polychaete worm species, amphipod species, Pismo clam and other clam species may be adversely impacted by the backpassing activity. Additionally, indirect sand burial impacts to marine resources may be prolonged by yearly burial or turbidity impacts from backpassing operations, although backpassing would involve much smaller amounts of sand movement. In order to minimize potential impacts to marine resources resulting from backpassing operations, the Commission finds it necessary to require limitations on the frequency of such backpassing and parameters for implementation. **Special Condition 4** limits backpassing to no more than one time per year, if certain criteria regarding loss of sand fill and beach width are met. Source areas for removing sand are limited to the eastern areas of Broad Beach. No backpassing may extend upcoast of 31380 Broad Beach Road, as limited by **Special Condition 1**.

e. Turbidity Impacts

In addition to direct impacts from immediate sand burial, and indirect impacts from burial over time, there is also the potential of indirect impacts resulting from increased turbidity during construction of the sand fill. Temporary increases in turbidity and suspended solids decrease light penetration, causing a decline in primary productivity due to decreased photosynthesis by phytoplankton, inhibition of kelp and algae growth, and adverse impacts to marine organisms. Any appreciable turbidity increase may also cause clogging of gills and feeding apparatuses of fish and filter feeders. Turbidity impacts are anticipated to have the maximum concentrations generally restricted to the lower water column, and decreasing rapidly with distance due to settling and dilution. However, the impacts of beach fill placement activities (i.e., increased turbidity, sedimentation, dissolved oxygen reduction, burial of organisms) are expected to be relatively localized in nature and mobile organisms would likely relocate to an undisturbed area. Following deposition activities, organisms are expected to recolonize previously disturbed areas.

The composition (i.e., grain size) of the deposition material can affect the extent of the turbidity plume in the marine environment. For instance, material with higher fine-grained material content will contribute to higher rates of turbidity. In general, the higher the amount of coarse grained sand, the lower the turbidity and its associated impacts. As a result, the grain-size of the material is an important design characteristic of the project. In this case, turbidity plumes are expected to be minimized, as the proposed source material is sandy sediment which is coarser than the existing beach grain size with a low percentage of fines. Additionally, the sand will be trucked in and placed as dry material, further reducing the potential for the release of fines during construction. **Special Condition 8** requires that any source material used for beach nourishment purposes can only contain no more than 10% fine material that is 0.074mm in size or smaller.

Additionally, in order to further ensure that potential impacts to marine habitats resulting from turbidity during construction are minimized, **Special Condition 7** requires a qualified biologist or resource specialist to monitor turbidity during all project construction activities. The qualified biologist or environmental resource specialist is required to visually monitor and document the turbidity of coastal waters during all sand nourishment or back-passing activities. The extent and duration of turbidity plumes shall be recorded and mapped by the monitor during each day of sand nourishment or back-passing activities. If the turbidity plume is observed to reach kelp beds or eelgrass beds, disposal shall be terminated until the turbidity plume has dissipated. If significant levels of turbidity above ambient levels lasts more than three (3) consecutive days, then the rate of disposal is required to be reduced so that large, long lasting turbidity plumes are no longer created. After all beach fill operations have ceased, the applicant is required to monitor and document the extent and duration of any lasting turbidity plume.

7. Marine Resource Impact Monitoring and Mitigation

As conditioned, to limit the beach nourishment aspect of the proposed project, to 1) limit the sand fill amount; 2) to place sand no further upcoast than 31380 Broad Beach Road; 3) to limit the proposed sand nourishment material to have a D 50 between 0.25 mm and 0.60 mm; and 4) to limit interim nourishments and backpassing operations, significant adverse impacts to marine resources will be minimized. However, there is still potential for impacts to occur. In some ways, the proposed project is a pilot project to study and learn how beach nourishment can function as a shoreline protection strategy while simultaneously resulting in less than significant adverse ecological impacts. In order to allow for the beach nourishment aspect of the project to be carried out while ensuring that adverse impacts to marine resources are avoided where feasible and minimized, the Commission finds it necessary to require the applicant to carry out extensive marine habitat monitoring as part of the project to identify actual impacts. This is necessary both to provide evidence to inform the implementation of project modifications for future beach renourishment or other construction at Broad Beach and to ensure that mitigation of any impacts is provided by the applicant. **Special Condition No. 6** requires the applicant to finance a Scientific Advisory Panel (SAP) comprised of marine scientists who will consult in the preparation and review of monitoring protocols and reporting, as well as the design and implementation of habitat creation or enhancement projects designed to mitigate marine resource impacts identified through the monitoring. The mitigation program, if necessary, would be processed as an amendment to this permit.

Special Condition No. 6 includes the general monitoring requirements that must be included in the marine resource monitoring program. The specific monitoring requirements and methods will be determined by the applicant in close consultation with the SAP and presented in a Final Marine Habitat Monitoring and Mitigation Plan for review and approval of the Executive Director prior to issuance of the Coastal Development Permit for the project. **Special Condition 6** requires the applicant to monitor the project site and two reference sites with similar characteristics and containing similar habitats. The reference sites should be as close as possible to the potential impact area within an area outside the project’s influence. The purpose of subtidal and intertidal field monitoring is to characterize the various habitats in the Broad Beach study area and to assess whether documented changes through time can be attributed to the project or are the result of more regional wide patterns. To accomplish this, the marine habitats in the study area that are at risk from the project and those on a minimum of two marine habitat reference sites must be monitored.

The use of multi-spectral aerial photography and sidescan sonar may be employed to identify changes in areal extent of habitat and depth of sand burial. Multi-spectral aerial surveys (as employed by the applicant's consultants in July 2014) may be conducted in the Broad Beach study area from an airplane fitted with specialized camera equipment designed to capture imagery within a specific array of spectral bands optimized to discern coastal marine habitats including kelp forest, understory canopy algae, eelgrass, and surfgrass. This technique is useful for surveying large study areas such as the Broad Beach nearshore area. The flights should be planned to occur, to the degree possible, during high visibility (clear water), calm ocean conditions, and clear air conditions. Multi-beam and sidescan sonar surveys (similar to the one conducted by the applicant's consultants in May 2014) may be conducted in the Broad Beach study area to distinguish surficial features and to map nearshore marine benthic habitat types.

Employing both multi-spectral aerial and side scan sonar surveys would ensure that the most accurate representation of existing marine habitat conditions is captured because the two methods are complimentary. While multi-spectral aerial imagery is best at capturing surface and shallow water habitat imagery, it and is limited in its ability to penetrate the water column. Sidescan sonar is best at capturing benthic habitat imagery, but is limited in its ability to sample shallow water habitats. When using these remote sensing techniques, diver surveys are required to ground truth the results of this data.

Intensive intertidal sandy beach monitoring is required to assess the macroinvertebrate assemblage that colonizes Broad Beach following sand replenishment. The beach ecosystem at Broad Beach has been impacted over the years from both permitted and unpermitted development, including the 2010 emergency revetment, and therefore the current upper and intertidal beach communities are not what one would expect in absence of disturbance. In fact currently most of the beach system is gone. Therefore a minimum of two beaches most proximal to Broad Beach with similar sand envelopes (well sorted, D50 =0.25), exposure, wave regime, and beach morphology (intermediate dissipative beaches) must be identified and monitored through time for comparison to the macroinfaunal sand assemblage that establishes at Broad Beach following replenishment with the quarry sand. The beach system monitoring must also include monitoring the beaches just west of the project footprint and Zuma Beach, just east of the project footprint to study the indirect impacts of the project. The beach monitoring methods identified in the monitoring plan must be capable of determining; 1) whether the portion of Broad Beach covered by quarry sand develops a sandy beach macroinvertebrate fauna similar to the reference beaches, and, 2) whether the project adversely impacts the beach ecosystem west and east of the project.

The marine resource monitoring may be carried out bi-annually, with a spring survey and a fall survey conducted every year. Spring and fall represent the two most extreme seasons in terms of sand conditions. Winter storms typically result in sand being moved from onshore to offshore, so springtime is when the least amount of sand is expected to be on the beach. During the summer, the waves are smaller and have less energy and the general pattern is for sand to be built up onshore so fall is when the maximum amount of sand is expected to be on the beach. An annual report must be prepared by the applicant and submitted to Commission staff by the end of each year. Each year's monitoring reports will be reviewed by the Commission's ecologists in conjunction with the SAP to determine if mid-course corrections to back-passing or nourishment activities are necessary. A five year monitoring report is required to be prepared, compiling five years of monitoring data, which will be used to determine the areal extent, type, and significance of impacts to marine habitats. As discussed above, the applicant's agents have used a threshold for determining an impact to be that a marine habitat is buried by sand at a depth of 1 foot or more, for a period of 1 year or longer. The Commission does not agree that this is the appropriate standard to use to determine if a significant adverse impact has occurred. While it is true that marine habitats, by their very location in the marine environment are acclimated to varying amounts of seasonal sand movement and burial, most marine organisms in rocky intertidal and subtidal habitats would not survive sand burial depth that is far less than 1 ft. or duration that is far less than 1 year. The Commission's ecologists Dr. Jonna Engel and Dr. John Dixon have stated that any reduction in the areal extent of any of the marine habitats on site is considered a permanent impact for which mitigation must be required. This standard is especially important given the project site's location in a marine protected area.

Special Condition 6 requires that all impacts to marine habitats identified through the monitoring must be mitigated by the applicant through the creation or enhancement of marine habitat that is the same type of habitat, where such in-kind mitigation is feasible for the type of habitat in question. Where in-kind habitat cannot be created, other types of habitat creation may be proposed by the applicant for the review of the SAP and the Executive Director. Any impact identified to marine habitats is required to be mitigated at no less than a ratio of 4:1, in other words 4 acres (or other measure) of habitat must be created to mitigate for every 1 acre of habitat that is impacted by the project. This ratio is required in recognition of the difficulty involved in creating/enhancing marine habitat and the uncertainty that such habitat creation/enhancement will be successful. Adverse impacts upon eelgrass shall be mitigated according to the California Eelgrass Mitigation Policy.

Upon detection of adverse impacts upon one or more habitats, the applicant, in consultation with the SAP, is required to develop a habitat specific mitigation plan for each impacted habitat that will provide the overall framework to guide the mitigation work, for review and approval of the Executive Director. The revised mitigation and monitoring program must be reviewed by the Commission as an amendment to the coastal development permit.

8. Protection of Other Sensitive Species

While it is unlikely that grunion are utilizing the existing beach because of the lack of sandy beach berm areas (resulting from beach erosion and presence of the revetment), there is a potential for grunion runs during the course of the project construction. Beach nourishment activities are not proposed to occur within the seasonally predicted run period and egg incubation period of the California grunion. However, the Commission notes that any potential placement of sand on the beach may result in adverse effects to grunion due to direct disturbance by construction activity and use of heavy equipment on the sandy beach as well as indirect impacts from smothering of eggs previously deposited on the sandy beach. Therefore, in order to ensure that any potential adverse effects to grunion are avoided, **Special Condition 7** requires the applicant to survey the project site, to determine the presence of California grunion during the seasonally predicted run period and egg incubation period and **Special Condition 9** prohibits any beach nourishment activities from occurring on any part of the beach and shorefront in the project area when California grunion (including eggs) are present during any run periods and corresponding egg incubation periods.

In addition, the western snowy plover, a bird species listed as federally threatened and as a state species of special concern, is known to occur in the project area. Critical habitat for the western snowy plover is designated at Zuma Beach and extends onto the downcoast area of Broad Beach. Zuma Beach supports the largest population of wintering snowy plovers in Los Angeles County. During construction of the emergency revetment in 2010, biological monitors observed snowy plovers on the sandbar at the mouth of Trancas Lagoon.[38] All construction operations, including operation of equipment, material placement, placement or removal of equipment or facilities, and backpassing/beach renourishment or other activities are prohibited pursuant to **Special Condition 9** on any part of the beach and shorefront in the project area when western snowy plover are present, as identified by the surveys conducted pursuant to **Special Condition 7**, to avoid adverse effects to western snowy plovers.

Further, in order to ensure that adverse impacts to the above referenced sensitive species are avoided, **Special Condition 7** also requires a qualified biological monitor to be present during all project activities. The monitor shall have the authority to cease operations should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. If significant impacts or damage occur to sensitive wildlife species, the applicant shall be required to submit a revised, or supplemental program to adequately mitigate such impacts. The revised, or supplemental, program shall be processed as an amendment to this coastal development permit.

9. Water Quality and Construction Impacts

In addition to potential impacts to water quality resulting from increased turbidity, the proposed project could also result in impacts resulting from contamination of the sand used for beach nourishment. The source material is proposed to be from a quarry and the applicant's testing has indicated that no toxic materials or debris were present in the sand mining areas or stockpiles at any of the proposed sources. Nonetheless, debris such as trash, wood, or vegetation could be introduced at some point in the processing or transportation of the material. **Special Condition No. 8** requires that source material is sampled and tested to ensure that the delivered material is within the acceptable size ranges for nourishment material. If the material is not sand, not within the acceptable size range, or is contaminated, that material cannot be used for beach nourishment. If the source material contains debris, the debris must be removed or the material cannot be deposited at the site.

The marine environment would also be subject to potential adverse impacts as a result of project activities if sediment, debris, fuel, oil, or chemicals with hazardous properties are unintentionally released during construction or sand nourishment activities. Therefore, to ensure that construction material, debris, or other waste associated with project activities does not enter the water, the Commission finds **Special Condition 10** is necessary to define the applicant's responsibility to ensure proper disposal of solid debris and material unsuitable for placement into the marine environment. It is the applicant's responsibility to ensure that no construction materials, debris or other waste is placed or stored where it could be subject to wave erosion and dispersion. the applicant that any and all construction debris, sediment, or trash shall be properly

[38] Revised Analysis of Impacts to Public Trust Resources and Values (APTR) for the Broad Beach Restoration Project, AMEC Environment and Infrastructure, July 2014

contained and removed from construction areas within 24 hours. Further, construction equipment shall not be cleaned on the beach or in areas that drain to streams, wetlands, ocean, or sensitive habitat areas.

10. Septic System Conversion Implementation Study

The existing residences along Broad Beach Road rely upon individual on-site waste water treatment systems (OWTSs) for the treatment and disposal of sewage effluent generated by these homes. The majority of these residences are on conventional OWTSs featuring septic tanks and leach fields that are located in most cases on the sandy beach or dune area seaward of the residences (**Exhibit 8b**). The majority of the OWTSs were constructed many years ago when Broad Beach was a wide sandy beach and the systems were protected by a large dune field. The use of OWTSs on beaches in Malibu in such close proximity to the ocean has raised concerns regarding potential adverse marine water quality impacts from the State Water Resources Control Board (SWRCB), the Los Angeles Regional Water Quality Control Board (LARWQCB) and NGO organizations such as Heal the Bay and the Surfrider Foundation. Such concerns have spurred the SWRCB & LARWQCB to begin the phase out septic systems in some areas of Malibu.

The Broad Beach area is located in an area designated as an Area of Special Biological Significance (ASBS). In the 1970's, California designated 34 regions along the coast as ASBSs in an effort to preserve biologically unique and sensitive marine ecosystems for future generations. ASBS were designated by the State Water Resources Control Board (SWRCB) to protect species or biological communities from undesirable alterations in natural water quality. This designation recognizes that certain biological communities, because of their fragility or value, deserve special protection. Under the California Ocean Plan (COP), the discharge of wastes to ocean waters in these areas is generally prohibited. The COP states: "Waste shall be discharged a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas" (State Water Board 1972).

A number of leach fields for individual OWTSs on Broad Beach extend a considerable distance out onto the sandy beach and dune area, particularly on the wider eastern portion of the beach. Some of the existing leach fields extend as far as 80 feet seaward of the residences onto the beach/dune area. The location of these leach fields in such close proximity to the ocean and sensitive marine resources raises concerns regarding the discharge of effluent resulting from wave damage; malfunctions of the OWTSs; lack of adequate maintenance; and/or simply the loss of the effectiveness of the leach field system to adequately treat or filter the septic effluent over time. In addition, given the leach fields are located so far out on to the beach the proposed revetment must be located even further seaward in order to protect the existing leach fields from wave uprush. If not for these existing leach fields the proposed revetment could be located in a much further landward location fronting the residences. As previously mentioned above, a project alternative was explored that involved the removal of the existing OWTSs including the leach fields and replacing those systems with new modern tertiary OWTSs that would be located in a more landward location and utilize much smaller leach fields. Under this alternative the rock revetment could have been moved to a more landward location on the eastern portion of the beach. However, this alternative would have been difficult to achieve as part of this coastal development permit given the significant costs associated with the comprehensive removal and relocation of all of the existing OWTSs and simply the difficulties coordinating such an effort with such a large number of homeowners. More importantly such an alternative in most cases would have resulted in the new OWTSs and leach fields still located on the sandy beach fronting the residences which again raises the same marine water quality concerns as the existing systems and places these systems in a location that could be subject to future hazards from wave uprush exacerbated by rising sea levels and a rising ground water table within the 100 year life of the residences.

This project presents a unique opportunity to not only address the immediate beach erosion and public access issues at Broad Beach but also provides an opportunity to plan and adapt to shoreline erosion and hazards resulting from sea level rise in the longer term. One component of this longer term planning approach is to explore the feasibility of removing the individual OWTSs from the beach and connecting the residences to a new state of the art package sewage treatment facility located in a more inland location which would significantly reduce or eliminate the potential for the discharge of septic effluent to reach ocean waters and thereby adversely impact sensitive marine resources. Removing this existing development from the beach and dune area would provide an opportunity for future planned retreat of the revetment on the wider eastern portion of Broad Beach. In addition, the older residences on Broad Beach constructed on at grade concrete slab foundation on this formerly wide beach are now being demolished and replaced with residences that are constructed on an elevated caisson grade beam foundation that eliminates the need for a shoreline protective device to protect the residence. The Malibu LCP specifically requires that new in-fill development on the beach must be supported on a caisson grade beam foundation that takes into account sea level rise over the next 100 years to ensure the residence would not need a shoreline protective structure. Therefore, at some point in the future all of the residences on Broad Beach will be supported on a caisson and grade beam foundation. If the residences were also connected to a package sewage treatment plant located off the beach then there would likely not be a need for a shoreline protective structure at least on the wider eastern portion of the beach.

The effluent from residences along Broad Beach Road west of Lechuza Point is currently collected through a public sewer line beneath Board Beach Road and treated at the Los Angeles County operated Trancas Waster Water Pollution Control Plant located across PCH, approximately 0.5 mile north of Broad Beach. The effluent is transported via a pipe in Broad Beach Road to the Los Angeles County Trancas Treatment Plant (**Exhibit 15**). Unfortunately when this sewer system was established in the 1960’s, property owners along the majority of Broad Beach, opted out of receiving public waste water disposal services offered by the County. In order to connect to this system and receive public wastewater services today, property owners would need authorization, including accordance from the 177 homeowners within the Malibu West subdivision; approval by the Los Angeles County Board of Supervisors and the Local Agency Formation Commission; and LARWQCB review and approval. In addition, there is limited wastewater treatment capacity at the Trancas Treatment Plant, which is currently operating at about 75 percent of capacity. Given this high level of complexity, connecting to this sewer system may be difficult option to achieve.

However, the construction of a new state of the art package sewage treatment plant plan is also a possibility on vacant land located just inland of Pacific Coast Highway a short distance from Broad Beach. Consistent with Coastal Act and City of Malibu LCP policies related to the protection coastal water quality and marine resources (Sections 30231 & 30230), public access (Sections 30211 & 30212), and marine and terrestrial habitat protection (30240 & 30230) the removal of the individual OWTSs from the beach and connection to a package waste water treatment facility and the potential removal of at least a portion of the rock revetment would result in improved marine water quality and conditions for healthy subtidal and intertidal rocky habitats; enhanced public access on the beach by removing the shoreline protective structure; and would improve the beach and dune ecology by removing development that directly impacts these habitats.

Therefore, **Special Condition 16** requires the applicant to prepare a Septic Conversion Implementation study, within two years of Commission action on this coastal development permit to analyze alternatives for the removal of the existing on-site wastewater treatment systems currently serving the residences within the GHAD boundaries and connection of those residences to a new or an existing package sewage treatment plant. The study is required to include an analysis and technical engineering details and requirements for the removal of the existing on-site waste water treatment systems within the GHAD boundaries and conceptual design plans for either a new package sewage treatment plant or the upgrade of an existing treatment plant, such as the Trancas Canyon Treatment Plant. The study shall also include an analysis of permitting and regulatory requirements, potential environmental impacts, necessary infrastructure upgrades; alternative locations and technologies for a package sewage treatment plant; preliminary budget, including any land acquisition costs and a preliminary construction schedule/time line for the preferred septic conversion alternative. The study shall be based on an initial conversion implementation goal of six years from the issuance of this coastal development permit. Furthermore, the study shall be prepared in consultation with the Regional Water Quality Control Board, the City of Malibu and the County of Los Angeles as applicable. Finally, five years from the issuance of the coastal development permit the applicant shall submit to the Executive Director a progress report on the status of implementation of the preferred septic conversion alternative, including progress on design details, environmental impact analysis, and permitting. The information in the study will be used to inform a future Commission on possible project alternatives or modifications through a new coastal development permit for reauthorization of the project at the end of the ten year term for this permit. Those alternatives shall include exploring the option of removing portions or the entire rock revetment.

11. Other Approvals

In addition, the proposed project, as required to be modified, will involve work within the marine environment, areas within the Mugu Lagoon-Pt. Latigo ASBS, the Point Dume SMCA, Essential Fish Habitat, and Special Aquatic Areas. As such, the project will require a permit, lease, consultation, or approval from other state or federal agencies including, but not limited to, the United States Army Corps of Engineers, National Marine Fishery Service, California State Lands Commission, California Department of Fish and Wildlife, State Water Resources Control Board and the Regional Water Quality Control Board. Therefore, **Special Condition 17** requires that the applicant obtain all other State or Federal approvals that may be necessary for all aspects of the proposed project, or provide evidence that such approvals are not required.

12. Conclusion

As discussed in detail, the beach nourishment aspect of the project includes an initial beach nourishment comprising the importation of 300,000 cu. yds. of sand material from sand quarries located approximately 40-45 miles inland of the project site. Additionally, the applicant proposes to place 300,000 cu. yds. of sand approximately every five years after the initial nourishment is completed. The applicant also proposes "interim" nourishments of up to 75,000 cubic yards and up to three "erosion" nourishments of up to 75,000 cubic yards per 10-year period. Finally, the proposed project also includes back-passing operations (transporting sand from wider downcoast areas of the beach to upcoast areas of the beach) on an annual basis.

The sand nourishment has been sited and designed to avoid direct sand burial of hard bottom habitat areas located on the upcoast end of Broad Beach, near Point Lechuza. The amount of sand deposited or moved at any one time has been limited to minimize upcoast sand migration that could result in indirect sand burial impacts to sensitive marine resources. Based on the applicant's modeling of sand migration and comparison with surveyed variations in sand depth of burial, the applicant's consultants predict that the proposed sand nourishment will not have significant adverse impacts to marine resources resulting from indirect sand burial. However, there are inherent uncertainties presented by the use of models to predict future outcomes. Additionally, assumptions used in the analysis and limited survey data may not prove to represent the actual or future field conditions. Finally, although the applicant's consultants have evaluated the potential burial impacts resulting from the proposed interim renourishments, and backpassing, it is not known what potential cumulative impacts may result from the implementation of all of these sand placement/movement activities.

Further, the proposed sand nourishment will by necessity result in burial of sandy bottom habitats. The Commission has typically found that placement of sand nourishment on sandy beach areas are unlikely to result in permanent impacts to sandy habitats so long as the project is designed to time the deposition of the material on the beach to protect sensitive resources and to match the composition of the material to the existing sand at the beach, to the maximum extent feasible. In this case, the applicant proposes to use much coarser sand by design so that the sand will remain on Broad Beach for a longer period of time. The use of coarser material has the potential to adversely impact sandy bottom habitats, but will also allow for the use of quarry sand in the nourishment effort, without requiring additional treatment, and will provide for a somewhat greater longevity of the nourishment sand over the native sand.

In order to allow for the beach nourishment aspect of the project to be carried out while ensuring that adverse impacts to marine resources are avoided where feasible and minimized, the Commission finds it necessary to require the applicant to carry out extensive marine habitat monitoring as part of the project to identify the actual impacts of the project. This is necessary both to provide evidence to inform the implementation of project modifications for future beach renourishment or other construction at Broad Beach and to ensure that mitigation of any impacts that do occur is provided by the applicant.

In conclusion, in order to avoid, reduce, and minimize impacts to marine resources, the Commission requires conditions of approval regarding the beach nourishment aspect of the proposed project to 1) limit the sand fill amount to no more than 300,000 cu. yds. in each nourishment event; 2) to place sand no further upcoast than 31380 Broad Beach Road, 3) to limit the grain size of the proposed sand nourishment material to have a d50 between 0.24 mm and 0.6 mm; 4) to employ monitoring and best management practices during construction; 5) to carry out extensive marine habitat monitoring to identify actual impacts, according to a monitoring plan prepared in consultation with a Scientific Advisory Panel; 6) to modify the project through a CDP amendment to avoid and/or minimize impacts that are identified through monitoring; 7) to provide mitigation for any identified impacts at a ratio of 4 to 1; 8) to ensure that turbidity is minimized and sensitive species are protected during construction; and 9) to analyze alternatives for the removal of existing individual onsite wastewater treatment systems, the connection of residences to a new or existing package treatment plant, and removing the entirety or portions of the revetment. The Commission finds that only as so conditioned will the proposed project maintain marine resources and ensure that this use of the marine environment will be carried out in a manner that will sustain the biological productivity of coastal waters or that would maintain healthy populations of all species of marine organisms. The Commission further finds that only as conditioned, will the project ensure that the biological productivity and the quality of coastal waters appropriate to maintain optimum populations of marine organisms and for the protection of human health will be maintained and, where feasible, restored. Finally, the Commission finds that, only as so conditioned, will the proposed project be consistent with the marine resource policies of the certified Malibu LCP that provide guidance. Specifically, as conditioned, the proposed project conforms to Malibu LUP Policy 3.75 that requires that Marine ESHA (as designated by the LCP) be protected against significant disruption of habitat values. Finally, as conditioned, the proposed project will preserve near shore shallow fish habitats, as required by Malibu LUP Policy 3.82.

Therefore, the Commission finds that the proposed project, as conditioned, is consistent with Sections 30230, 30231, and 30233 of the Coastal Act, as well as the guidance policies of the certified City of Malibu Local Coastal Program.

D. ENVIRONMENTALLY SENSITIVE DUNE HABITAT AREAS

Applicable Coastal Act Policies

Section 30240 of the Coastal Act (incorporated into the City of Malibu's LCP) protects environmentally sensitive habitat areas (ESHA) by restricting development in and adjacent to ESHA. Section 30240 states:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.*
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.*

Section 30107.5 of the Coastal Act, defines an environmentally sensitive area as:

> *"Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Applicable City of Malibu Land Use Plan Policies

3.1 Areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments are Environmentally Sensitive Habitat Areas (ESHAs) and are generally shown on the LUP ESHA Map. The ESHAs in the City of Malibu are riparian areas, streams, native woodlands, native grasslands/savannas, chaparral, coastal sage scrub, dunes, bluffs, and wetlands, unless there is site-specific evidence that establishes that a habitat area is not especially valuable because of its special nature or role in the ecosystem. Regardless of whether streams and wetlands are designated as ESHA, the policies and standards in the LCP applicable to streams and wetlands shall apply. Existing, legally established agricultural uses, confined animal facilities, and fuel modification areas required by the Los Angeles County Fire Department for existing, legal structures do not meet the definition of ESHA.

3.4 Any area not designated on the LUP ESHA Map that meets the ESHA criteria is ESHA and shall be accorded all the protection provided for ESHA in the LCP. The following areas shall be considered ESHA, unless there is compelling site-specific evidence to the contrary:
a. Any habitat area that is rare or especially valuable from a local, regional, or statewide basis.
b. Areas that contribute to the viability of plant or animal species designated as rare, threatened, or endangered under State or Federal law.
c. Areas that contribute to the viability of species designated as Fully Protected or Species of Special Concern under State law or regulations.
d. Areas that contribute to the viability of plant species for which there is compelling evidence of rarity, for example, those designated 1b (Rare or endangered in California and elsewhere) or 2 (rare, threatened or endangered in California but more common elsewhere) by the California Native Plant Society.

3.14 New development shall be sited and designed to avoid impacts to ESHA. If there is no feasible alternative that can eliminate all impacts, then the alternative that would result in the fewest or least significant impacts shall be selected. Impacts to ESHA that cannot be avoided through the implementation of siting and design alternatives shall be fully mitigated, with priority given to on-site mitigation. Off-site mitigation measures shall only be approved when it is not feasible to fully mitigate impacts on-site or where off-site mitigation is more protective in the context of a Natural Community Conservation Plan that is certified by the Commission as an amendment to the LCP. Mitigation shall not substitute for implementation of the project alternative that would avoid impacts to ESHA.

3.16 Dune ESHA shall be protected and, where feasible, enhanced. Vehicle traffic through dunes shall be prohibited. Where pedestrian access through dunes is permitted, well-defined footpaths or other means of directing use and minimizing adverse impacts shall be used. Nesting and roosting areas for sensitive birds such as Western snowy plovers and Least terns *shall be protected by means, which may include, but are not limited to, fencing, signing, or seasonal access restrictions.*

3.23 Development adjacent to ESHAs shall minimize impacts to habitat values or sensitive species to the maximum extent feasible. Native vegetation buffer areas shall be provided around ESHAs to serve as transitional habitat and provide distance and physical barriers to human intrusion. Buffers shall be of a sufficient size to ensure the biological integrity and preservation of the ESHA they are designed to protect. All buffers shall be a minimum of 100 feet in width, except for the case addressed in Policy 3.27.

3.31 Permitted development located within or adjacent to ESHA and/or parklands that adversely impact those areas may include open space or conservation restrictions or easements over ESHA, ESHA buffer, or parkland buffer in order to protect resources.

3.51 Disturbed areas ESHAs shall not be further degraded, and if feasible, restored. If new development removes or adversely impacts native vegetation, measures to restore any disturbed or degraded habitat on the property shall be included as mitigation.

Discussion

The project area is located along an approximately 1.16 mile long reach of Broad Beach between Pacific Coast Highway, Broad Beach Road, and the ocean in western Malibu. The subject area is characterized as a built-out portion of Malibu consisting of beachfront residential development. Point Lechuza is located at the northern end of the project area, and Trancas Creek/Lagoon and Zuma Beach is located at the southern end of the project area.

Broad Beach is unique in that it is the only area along the Malibu coastline where a system of vegetated sand dunes is found. Native sand dune plant species found on the dune system which are characteristic of dune habitat include: silver beach bur, pink sand verbena, beach salt bush, and beach evening primrose. Several sensitive wildlife species have been documented at Broad Beach including the western snowy plover (federally threatened and CDFW species of special concern), California brown pelican (CDFW fully protected species), California least tern (a federal and state endangered species), globose dune beetle (California Special Animal), Allen's hummingbird (USFWS Bird of Conservation Concern), silvery legless lizard (CDFW species of special concern), and sandy beach tiger beetle (California Special Animal).

Broad Beach was historically a wide beach which supported an active dune system, identified as an ESHA in both the Malibu/Santa Monica Mountains Land Use Plan, certified by the Commission in 1986, as well as the City of Malibu's certified Local Coastal Program (LCP) which was adopted by the Commission in 2002. However, in recent years, Broad Beach has been subject to periodic erosional events which appear to have increased in both frequency and duration and have endangered existing residential development located along portions of the beach that were historically considered safe. Although the dune system in the project area has been highly disturbed from past residential development, unpermitted landscaping, yard improvements, and wave erosion, the Commission has consistently found that coastal dunes such as those at Broad Beach are rare and meet the definition of environmentally sensitive habitat areas (ESHA). In addition, Policy 3.1 of the City of Malibu LCP identifies dunes as a habitat type that is considered ESHA.

The Commission further notes that the Broad Beach dunes have been classified as “Southern Foredunes” in the Holland community classification system by the California Department of Fish and Wildlife, and that such communities are listed as “very threatened” by the State of California. Southern foredunes also represent a habitat type identified as rare by the California Natural Diversity Data Base (CNNDB) and the California Native Plant Society (CNPS), and considered environmentally sensitive habitat areas (ESHA) in the City of Malibu LCP. These dunes are a remnant of a more widespread system that historically occurred along parts of the Malibu coastline and elsewhere in Southern California. California dune ecosystems have suffered a disproportionately high amount of human impact because the coast is a highly desirable area for residential settlements, industry, tourism, and recreation. As such, undisturbed coastal dunes are becoming rarer and rarer in California. Statewide, coastal dunes have been reduced to less than 25% of the area they originally occupied. The dunes that remain tend to reflect development impacts including non-native species invasion, erosion due to off-road vehicles and trampling, pollution, and loss of natural morphology due to destruction of vegetation. In spite of these impacts, many remaining dune communities continue to support an array of native plants and animals uniquely adapted to this transition zone between land and sea. In addition to their habitat and aesthetic values, dune ecosystems are recognized for providing important protection during storm events. Dunes provide a physical barrier against storm waves, reducing the risk of flooding for the natural and anthropogenic features behind them. Dunes are a dynamic buffer; eroding or growing as they are shaped by the seasonal dynamics of storms, wind, and wave action.

Revetment Related Impacts

In order to analyze impacts to foredune habitat in the project area that resulted from the placement of the as-built shoreline protective device (sand bag and rock revetment) that is proposed to be retained permanently as part of the project, the applicant’s consultants prepared a foredune habitat impact analysis based on aerial surveys. The consultant’s chose a baseline year of 2005 for the analysis since most pre-2010 shoreline stabilization materials were installed after 2005. The extent of foredune habitat present at Broad Beach in 2005 was estimated from false infrared aerial imagery of the site taken in 2005 as well as oblique aerial photographs. Based on this analysis, the consultant’s estimated that 12.23 acres of foredune habitat occurred at Broad Beach in 2005 within the project area. It was estimated that approximately 2.05 acres of that foredune habitat area was impacted by the installation of the sand bag revetments. However, some of this habitat may have been lost to shoreline erosion prior to sand bag revetment installation. And it was estimated that the proposed as-built rock revetment that was placed in 2010 impacted approximately 1.57 acres of additional foredune habitat. As such, placement of the sand bag and rock revetments is estimated to have resulted in the direct removal of approximately 3.62 acres of foredune habitat. However, additional temporary impacts to foredune habitat likely occurred as a result of installation and construction staging activities associated with placement of the revetments.

Further, revetment installation is also adversely affecting the functional value of the coastal dune system by disrupting coastal processes, such as the natural interchange of sand between the sandy beach and dunes and dune mobility by fixing this system’s seaward edge. This major alteration of existing natural coastal processes in the area interferes with the ability of the dune system to contract or expand in response to long-term natural climatic cycles, such as changes in storms and wave activity, consequently altering the natural functioning of this system over the long-term. As such, the project has resulted and will continue to result in adverse impacts to the entire existing remnant dune habitat community landward of the as-built revetment that is proposed to be retained.

In this case, as discussed in detail in Section IV.B (Hazards and Shoreline Processes) of this report, a revetment is considered necessary to protect the existing residences and the associated existing septic systems between the properties at 31350 and 30760 Broad Beach Road. However, the proposed as-built rock revetment would effectively limit the amount of sand available to the public beach area as a whole and the overall shoreline width and shape. In order to mitigate potential impacts to the sand supply associated with the proposed project there are two main factors to consider: (1) siting the revetment in the landward most location feasible to free up as much sand as possible within the existing beach sand exchange system, and (2) a requirement for beach nourishment to mitigate the impacts of the proposed revetment device. First, the location and alignment of the revetment on the shoreline directly affects how much sand is available to naturally nourish and maintain the shoreline and beach. In this particular case it is also important to consider the sand exchange existing between the foreshore, sandy beach, and dune systems along Broad Beach. Coastal dunes exist in conjunction with the beach and are part of the sand sharing system that actively exchanges sand between the dune, beach, and the offshore bars. At erosional shorelines, such as the current condition at Broad Beach, the active dune (foredune) forms shift inland as the beach retreats. If there is no space for the dune to shift inland as the shoreline erodes, the dunes will not persist. Therefore, **Special Condition One (1)** is required, which would relocate approximately 2,000 linear ft. of the downcoast end of the rock revetment up to approximately 80 - 110 ft. further landward than the existing location of the revetment so that the landward edge of the revetment extends no further seaward than approximately fifteen (15) ft. from existing, legally-established septic systems/leach fields (excluding any designated "future" leach fields that had not yet been built at the time this application was submitted to the Commission). This recommended alignment would make approximately 195,000 cubic yards more beach sand available within the beach sand exchange system than the proposed as-built revetment alignment. The recommended alignment would provide greater opportunity for restoration of the dune system, even in the event that significant erosion of the nourished beach occurs.

Proposed Beach Nourishment and Dune Restoration

The applicant proposes to implement a beach nourishment program for a period of 20 years involving deposition of 300,000 cu. yds. of sand on the beach from inland sand quarries during the first year; deposition of approximately 300,000 cu. yds. of sand every five years thereafter; deposition of approximately 75,000 cu. yds. as needed when certain spatial and temporal erosion triggers are reached; periodic sand backpassing operations to occur no more than once per year; and dune habitat restoration. As proposed, the reconstructed/post-nourishment combined beach and dune system would extend approximately 240 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes. The height of the proposed sand dunes would be typical of the existing dunes at the east end of the project area, which are approximately 20 feet higher than MLLW, which is the average low tide line during spring tides. The applicant has prepared a "Conceptual Foredune Creation and Enhancement Plan," prepared by WRA, Inc., dated October 15, 2013. The dune system is proposed to be primarily constructed over and behind the existing emergency rock revetment. At the east end where no revetment is present, the dunes would be constructed on private land and existing public access easements landward of the MHTL. At the west end where there is no revetment and no dry sand beach remains, the dunes would be located primarily on public trust lands. Since the December 2014 Commission hearing regarding the project, the applicant has modified the footprint and design of the proposed dune restoration and enhancement plan to incorporate a number of specifications that Commission staff had recommended in Special Condition 5 of CDP Application No. 4-12-043. The proposed dune restoration footprint was modified according to the revised beach nourishment footprint and would extend from 31380 to 30708 (with a gap at the Malibu West Beach Club property at 30756 Broad Beach Road). In addition, the revised plan includes at least one dune ridge along the reach up to +17 feet MLLW along the west end and up to three dune ridges in the wider dune field at the eastern end, with sand fencing along the rear of the ridge(s) to retain sand and plantings along the top of the ridges. In addition, the project was previously designed to accommodate storm drains by leaving gaps in the dune habitat at the mouths of the storm drains. However, the applicant's engineers have since determined that the gaps are not needed and an alternative approach is feasible that involves placing sand over the proposed storm drains to enable unobstructed use of the beach and continuity of the dune system during the dry season, and using pole markers to mark their location so that the sand can be cleared away from the drain opening prior to an impending rain storm event to allow them to drain (**Exhibit 7g**). The applicant based this proposal on examples of other locations with storm drains under the beach, such as a public beach in Huntington Beach that is intensely used by the public and has multiple storm drains under the beach.

The proposed dune system is proposed to be roughly 50 to 60 feet wide along most of the nourished beach and cover an approximately 10 acre area (**Exhibit 7**). Native habitat restoration would include planting species such as beach verbena, dune primrose and other characteristic species found in this community. Removal of non-native invasive species such as iceplant, pampas grass, myoporum and European dune grass from areas within and adjacent to the restored dunes is also proposed. The applicant has agreed to assume responsibility for the construction, planting, and maintenance of the restored dune system (BBGHAD Resolution No. 2012/06). The applicant is also proposing to incorporate one non-shared private vertical access path through the restored dunes for every residence with sixty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residences with less than sixty feet of beach frontage (**Exhibit 7g**).

Although implementation of the applicant's proposed beach nourishment and dune restoration proposal will serve to substantially reduce adverse impacts to the functional value of the dune system, impacts to dune ESHA cannot be fully avoided. There has been significant temporal loss and diminishment of dune ESHA in this case as a result of the as-built revetment. Further, there will be significant construction related impacts to the dune system from beach nourishment and periodic backpassing and nourishment activities for the duration of the project. In addition, there is uncertainty regarding the success of the beach nourishment component of the project. As such, the Commission finds that adequate mitigation shall be provided. Where there are unavoidable adverse impacts to ESHA, in past permit actions the Commission has required habitat mitigation at a ratio of 3:1. In this case, at a minimum, the direct removal of approximately 3.62 acres of foredune habitat from the placement of the sand bag and rock revetments shall be mitigated at a ratio of 3:1. This mitigation shall be provided on-site through the proposed beach nourishment and dune restoration and enhancement. However, modifications are required to the proposed beach nourishment and dune restoration components of the project in order to ensure that an adequate and appropriate area is restored/enhanced and that it is designed to mimic a natural dune system in habitat function and value to the maximum extent feasible. Therefore, **Special Condition Five (5)** requires that the applicant submit a final revised dune habitat restoration and enhancement program that would provide for the restoration and enhancement of coastal strand and southern foredune habitat on-site, at a minimum ratio of 3:1 or greater, as mitigation for impacts to existing dune habitat that resulted from the installation of the as-built sandbag and rock revetments on-site (3.62 acres). The approved dune habitat restoration/enhancement plan shall be implemented within 90 days of the completion of initial beach nourishment activities, however, the Executive Director may grant additional time for good cause. Special Condition 5 requires that the Program be in substantial conformance with the proposed “Conceptual Foredune Creation and Enhancement Plan,” by WRA Environmental Consultants, dated October 15, 2013, but shall be revised to provide for the components discussed below.

The dune habitat restoration/enhancement area footprint shall extend from the property at 31350 Broad Beach Road to the property at 30708 Broad Beach Road, and that begins as far landward as feasible (at a stringline of approved development across the subject properties as generally depicted in **Exhibit 8b**) and extends seaward to the expected maximum wave uprush limit. The stringline of approved development that is to be the landward limit of the dune restoration/enhancement area shall be generally located at the seaward edge of any legally existing residential structures, patios/decks. Sandy beach areas where existing septic leach fields are located seaward of the stringline shall be revegetated with native dune plant species and mounding techniques using minor amounts of sand fill material without the use of heavy equipment. Restoration/enhancement of the landwardmost areas within the above described dune habitat restoration/enhancement area shall be prioritized. The restoration area footprint requirement specified in Special Condition 5 includes all approved revetment and beach nourishment properties, with the exception of about a dozen properties at the upcoast end of the approved nourishment footprint where the highest degree of erosion is expected and where the area available for restoration is too narrow for a sustaining dune system. Also, the applicant has proposed to eliminate the approximately 100 foot wide Malibu West Beach Club property at the east end of Broad Beach (30756 Broad Beach Road) from the proposed dune restoration area to allow for recreational uses on their nourished sandy beach. However, the proposed 100 foot wide gap in the dune restoration area would significantly interrupt the natural dune building processes and habitat function at the east end of the project area. Therefore, Special Condition 5 requires that the restoration area footprint shall include the Malibu West Beach Club at 30756 Broad Beach Road, with the exception of a 10 foot wide access path as discussed below, in order to provide for a relatively continuous dune restoration area while accommodating a wider access path for the Club’s recreational uses that receive more use than a typical single family residence.

In addition, Special Condition 5 specifies that the restoration area footprint shall begin as far landward as feasible, and prioritize the landwardmost areas, in order to minimize the area of restored dune system that may be lost due to erosion and/or approved backpassing activities. Further, enhancing the remnant dune areas landward of the approved revetment and nourishment areas by removing non-native/invasive plant species and revegetating with native plant species will also serve to minimize non-native/invasive plant species migration and colonization of the restored dune habitat and thereby maximize the success of the dune restoration.

As required by Special Condition 5, the dune habitat restoration/enhancement area shall be designed and contoured based on natural dune morphology (using historical records of the area and the most proximal reference site(s)). The footprint and the number of dune ridges shall increase from west (upcoast) to east (downcoast) across the restoration area. For instance, there shall be one dune ridge at the west (upcoast) end of the restoration area, transitioning to two and, if adequate area is available, three ridges, at the east (downcoast) end. The restored dunes shall be oriented parallel to the shore with dune faces that have a slope no steeper than 3:1. Discontinuous sand fencing that is placed perpendicular to the prevailing wind direction shall be temporarily employed to facilitate establishment of dune hummocks. In addition to sand fencing, the design shall include strategic placement of native dune vegetation for dune hummock establishment. Temporary sand fencing and strategic planting, rather than motorized equipment, shall be employed to establish a natural pattern of dune hummocks. Drainage/runoff control measures and creation of dune swales (low areas between dune ridges) shall also be used to function as natural drainage devices within the dune system. The dune habitat restoration/enhancement plan shall include a planting plan using native coastal strand and southern foredune plant species (plant palette) including the number of container plants and amount (lbs.) of seeds, source of plant material, provision for collection, storage, propagation and use of existing native plants, and plant installation methods. The plant palette shall be made up exclusively of native plants appropriate to the habitats and region, grown from seeds or vegetative materials obtained from the site or from an appropriate nearby beach location to maintain the genetic integrity of the area. The abundance, distribution, and percent cover of native coastal strand and southern foredune plant species shall be based on historical records, the literature, and/or the most proximal reference site(s). Further, as detailed in Special Condition 5, existing native beach sand in the project area that is excavated for relocation of any portion of the as-built emergency rock revetment (pursuant to Special Condition 1) shall be temporarily stockpiled during beach nourishment and construction activities and then applied as a top layer on the landwardmost portions of the restored dunes to maximize successful reestablishment of dune vegetation on site.

David Hubbard and Matt James of Coastal Restoration Consultants Inc. prepared an independent analysis of the proposed dune restoration component of the project at Broad Beach to provide additional technical input to the applicant and Commission staff to maximize success of the dune restoration effort. Their analysis report, dated September 23, 2015, is attached as **Exhibit 20** of this staff report. Their report provides, in part, several recommendations regarding the dune restoration and enhancement design and re-vegetation, and many of those recommendations are addressed in the requirements of Special Condition 5 (Final Revised Dune Habitat Restoration and Monitoring Program). The report also raises concern regarding to the approved revetment interfering with natural dune processes, which may compromise the success of the restored dunes landward, seaward, and on top of the approved rock revetment that is to be buried with beach nourishment sand. However, the proposed project is a unique shoreline armoring project with a significant beach nourishment component to offset the impacts of the shoreline armoring and to restore the beach and dunes in a manner that minimizes adverse impacts to public access, biological, and visual resources. Since the physical processes on the beach have been significantly modified by erosion and the approved emergency revetment, and will continue to be modified by the proposed project, the project cannot be made to entirely mimic natural processes. However, the specifications for dune restoration and enhancement required by Special Conditions 5 (Final Revised Dune Habitat Restoration and Enhancement Program) will serve to restore natural biological conditions and diversity and mimic natural sand conditions to the maximum extent feasible. In addition, since there remains significant uncertainty about how the restored beach and dune system will function and if it will be successful, the Commission finds it necessary to limit the term of the permit and support an adaptive management approach with comprehensive monitoring and assessment of the beach and dunes.

In order to restore natural biological conditions and diversity and mimic natural sand conditions at Broad Beach to the maximum extent feasible, it is important that sand source and composition within the dune habitat restoration/enhancement area shall be consistent with the specifications of **Special Condition Eight (8)** (Sediment Analysis and Monitoring). The requirements of Special Condition 8 limit the allowed nourishment sand material to a median diameter (d50) between 0.24 mm and 0.6 mm. The 0.24 mm limit is the median diameter of the sand that is now present on Broad Beach and the 0.60 limit is at the upper limit of the difference between native and coarse nourishment sand used in recent nourishment efforts in southern California (and is the upper value of the sand material available from Grimes Rock where donor sand may feasibly be obtained). The applicant has provided analysis of the coarser sand performance[ii]. This analysis examines the change in diffusion for the more coarse sand and shown that its longevity performance will be better than less coarse sand and there will be less need for maintenance. It also examines the underfoot feel and impacts to surfing, noting that the sand just downcoast at Zuma has coarser sand (with a d_{50} of 0.4 mm) and providing details about already approved nourishment of other beaches in southern California that have used coarser than native sand. Those examples cover beaches with a native grain size similar to that at Broad Beach and with coarser nourishment sand that has a d_{50} less than or up to 0.60 mm. Some of the same sites noted in the Moffatt-Nichol report on Coarser than Native Grain Size are:

- 75,000 cubic yards (cy) at Seal Beach in 2009 (native beach sand = 0.35 mm; beach fill = 0.42 mm);
- 2 million cy at Surfside Colony/Sunset Beach in 2009/2010 (native sand = 0.25 mm; beach fill = 0.42 mm);
- 2.1 million cy by SANDAG in 2001 (native beaches = 0.25 mm; beach fill at 6 of 12 sites was 0.62 mm); and
- 1.5 million cy by SANDAG in 2012 (native beaches = 0.25 mm; beach fill was up to 0.61 mm).

Based on the evidence supplied by the applicant, the use of up to 0.60 mm median diameter sand is at the upper limit of the difference between native and coarse nourishment sand used in recent nourishment efforts in southern California. The sand used for beach nourishment would also be used for the proposed dune restoration and enhancement and may be carried onto the dunes by waves and aeolian (wind) transport. As explained in Dr. Jonna Engel's memo regarding the project, dated November 25, 2014 and attached as **Exhibit 14** (which is incorporated herein as if set forth in full), the use of sand that is coarser than the native sand may adversely affect the structure and diversity of beach invertebrate communities and which organisms will colonize the beach after the nourishment event. Further, the use of larger grain sizes will establish a slightly steeper shore face than the native sand and narrower intertidal zone, making for a much harsher environment for beach organisms.

David Hubbard and Matt James of Coastal Restoration Consultants Inc. prepared an independent analysis of the proposed dune restoration component of the project at Broad Beach to provide additional technical input to the applicant and Commission staff to maximize success of the dune restoration effort. Their analysis report, dated September 23, 2015, is attached as **Exhibit 20** of this staff report. Regarding the issue of sand grain parameters for proposed beach nourishment and dune restoration, the analysis report raises concerns regarding the use of up to 0.60 mm median diameter source sand because it is much coarser than the natural sand at Broad Beach and the use of coarser sand is expected to decrease available soil moisture for plants and decrease aeolian sand transport to such a degree that it will not allow for restoration of natural dune processes.

However, while the median grain size limit recommended by Commission staff of 0.24 mm to 0.60 mm for the nourishment exceeds of the sand coarseness identified on the subject site and will not serve to entirely mimic natural dune processes, the limitation will serve to generally match the native sand on Broad Beach while also provide for a somewhat greater longevity of the nourishment sand over the native sand without pushing the limits for an exceedingly coarser sand beyond what exists locally or have been used in other southern California nourishment projects. The proposed project is unique in that it is a shoreline armoring project with a significant beach nourishment component to offset the impacts of the shoreline armoring and to restore the beach and dunes in a manner that minimizes adverse impacts to public access, biological, and visual resources. Given the nature of this project, the physical processes on the beach will be modified and cannot be made to entirely mimic natural processes. However, the specifications for dune restoration and enhancement required by Special Conditions 5 (Final Revised Dune Habitat Restoration and Enhancement Program) and 8 (Sediment Analysis and Monitoring) will serve to restore natural biological conditions and diversity and mimic natural sand conditions to the maximum extent feasible. Yet there remains significant uncertainty about how the restored beach and dune system will function and if it will be successful. As such, the Commission finds it necessary to limit the authorization of the revetment and beach restoration to ten years, and support an adaptive management approach with comprehensive monitoring and assessment of the beach and dunes. In the event that the project performs as planned, including continuing to provide public beach access and dune habitat and avoiding significant environmental impacts, the Commission may extend its authorization of the revetment and beach restoration program in ten years' time, for another ten year period. If not, project modifications will be necessary to address any issues that may arise.

Further, although the applicant has previously tested the sediment in the areas proposed for sand acquisition and determined the material to be adequate for use for beach nourishment at the subject site, sediment conditions may be altered by a number of episodic factors, including heavy rainfall events or spills. Thus, the Commission finds that is not possible to ensure that chemical and contaminant levels of sediment will not change over time as the result of a single chemical spill or contamination event. Therefore, to ensure that all future nourishment material is physically and chemically compatible with the proposed deposition site and suitable for beach nourishment, the Commission finds it necessary to require **Special Condition Eight (8)** which requires the applicant to test the physical and chemical characteristics of representative samples of the quarry areas consistent with U.S. Army Corps of Engineers (Army Corps), Environmental Protection Agency (EPA), and State Water Resources Control Board and California Regional Water Quality Control Board (RWQCB) criteria for beach replenishment and disposal in intertidal areas prior to the commencement of nourishment activities.

The applicant is proposing to incorporate one non-shared private vertical access path through the restored dunes for every residence with sixty feet or more of beach frontage and one shared private vertical access path through the restored dunes for every two residences with less than sixty feet of beach frontage. This proposal will provide for reasonable private beach access between the existing residences and the shore while minimizing encroachments into the dune habitat restoration area. As such, Special Condition 5 specifies that the dune habitat restoration and enhancement plan shall incorporate a maximum of one shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every two residences adjacent to the restoration area with a less than a sixty foot frontage, and one non-shared private beach access path through the dunes (natural sand path only that is delineated by a two-foot high symbolic post and cable/rope type fence) for every residence with a frontage of sixty feet or more. However, the Malibu West Beach Club located at 30756 Broad Beach Road may maintain its own separate 10 ft. wide beach access path since the Beach Club receives more visitor use for beach recreation than a typical single family residence. Further, as discussed in Section IV.E of this report (Public Access and Recreation), the dune habitat restoration/enhancement plan shall also incorporate a 10 foot wide public pedestrian path located immediately landward of the entire length of the approved rock revetment (sand surface only), as relocated/reconfigured pursuant to Special Condition 1. The public pedestrian path shall be bordered by symbolic post and cable/rope fencing to maintain dune processes to the greatest extent possible (e.g. water, sand, plant, and animal movement/dispersal).

Since the project will include restoration of a sensitive dune habitat area that is located at the interface of public and private accessways along the shore, Special Condition 5 is required to allow installation of limited signage along the approved accessways to notify the public and residents that the area is a sensitive habitat restoration area and to keep out of the dune restoration areas. The signs shall indicate “Habitat Restoration In Progress: Please Keep Out of Dune Restoration Area”, or alternative language that is substantially similar. The signs will serve to minimize unauthorized encroachments into the restored dune system.

Special Condition 5 also requires the applicant to submit and implement a monitoring program to provide data that will guide the dune habitat and enhancement plan and direct any adaptive management actions that will increase the likelihood that the enhancement and restoration will be successful. The monitoring program shall include annual monitoring for the term of the permit and the submission of written reports. If the annual monitoring indicates that the restoration project has in part, or in whole, been unsuccessful, based on the approved performance standards, the applicant shall be required to submit a revised or supplemental program to compensate for those portions of the original program which were not successful. The revised, or supplemental dune restoration program shall be processed as an amendment to this Coastal Development Permit.

Further, in order to ensure that adverse effects to the dune habitat are minimized, Special Condition 5 also requires that the applicant submit a written agreement, in a form and content acceptable to the Executive Director, stating that no development shall occur within the final approved Dune Habitat Restoration and Enhancement Plan Area (Open Space Area) with the exception of dune restoration, maintenance of existing drainage improvements, and construction/maintenance of the approved revetment, beach nourishment/re-nourishment, drainage control, and approved public access improvements. It is recognized that the seaward limit of the dune system and dune vegetation within the approved restoration area is ambulatory in nature and that, therefore, the seaward extent of the area subject to this open space restriction is also ambulatory in nature.

The proposed beach nourishment component of the project includes an Adaptive Management Plan for long-term monitoring of beach width and profile and required actions to transport sand back up coast as needed through backpassing. Backpassing of sand to maintain beach widths and prolong the longevity of the nourishment would involve the use of heavy equipment (e.g., scrapers and bulldozers) to excavate sand from the downdrift, eastern segment of Broad Beach for transport updrift to the eroding segment on the west end of Broad Beach. It is anticipated that backpassing will occur on an annual basis for the duration of the project. Backpassing will result in direct short-term impacts to the sandy beach and dune habitats by disturbance to infaunal species, beach wrack, and potentially the seaward portion of the restored dunes. However, over the longer-term, backpassing activities will serve to conserve a larger area of the newly created beach and dune habitats and slow their erosion. In order to minimize impacts to terrestrial habitats from backpassing, it is important to limit the location, timing, and duration of such activities. Therefore, **Special Condition Four (4)** limits backpassing to no more than once per year within the limits of the nourishment area and **Special Condition Nine (9)** limits backpassing activities to the fall/winter season, which will serve to avoid the beach's most biologically productive period as well as the peak season for public recreational use. Further, the haul route for the backpassing would occur at the seaward edge of the beach in order to minimize disturbance to the restored dunes.

While it is unlikely that grunion are utilizing the existing beach because of the lack of sandy beach berm areas (resulting from beach erosion and presence of the revetment), there is a potential for grunion runs during the course of the project construction. Beach nourishment activities are not proposed to occur within the seasonally predicted run period and egg incubation period of the California grunion. However, the Commission notes that any potential placement of sand on the beach may result in adverse effects to grunion due to direct disturbance by construction activity and use of heavy equipment on the sandy beach as well as indirect impacts from smothering of eggs previously deposited on the sandy beach. Therefore, in order to ensure that any potential adverse effects to grunion are avoided, **Special Condition Nine (9)** prohibits any beach nourishment activities from occurring on any part of the beach and shorefront in the project area when California grunion (including eggs) are present during any run periods and corresponding egg incubation periods.

In addition, the western snowy plover, a bird species listed as federally threatened and as a state species of special concern, is known to occur in the project area. Critical habitat for the western snowy plover is designated at Zuma Beach and extends onto the downcoast area of Broad Beach. Zuma Beach supports the largest population of wintering snowy plovers in Los Angeles County. During construction of the emergency revetment in 2010, biological monitors observed snowy plovers on the sandbar at the mouth of Trancas Lagoon. All construction operations, including operation of equipment, material placement, placement or removal of equipment or facilities, and backpassing/beach renourishment or other activities are prohibited pursuant to **Special Condition Nine (9)** on any part of the beach and shorefront in the project area when western snowy plover are present, as identified by pre-construction surveys required by Special Condition 7, to avoid adverse effects to western snowy plovers.

Trancas Creek/Lagoon is located at the eastern end of the project reach and is situated between the proposed nourishment site and the construction staging area for the nourishment site. Trancas Creek/Lagoon is identified as an ESHA under the Malibu LCP. Trancas Creek is defined as a seasonal creek, running only after heavy rains; in drier years, it does not run at all. Trancas Lagoon itself measures approximately 10 acres in area and supports a mix of southern coastal salt marsh and brackish and freshwater marsh habitats, with approximately 0.50 acre located seaward of Pacific Coast Highway. The lagoon is created by a sand berm, which limits tidal exchanges and causes the creek to pond during high seasonal flows or during times of tidal inundation or wave run-up. A jurisdictional wetland delineation was completed for the Trancas Lagoon in 2002 and identified 0.92 acre and 450 linear feet of federal jurisdictional wetlands and waters of the U.S. The lagoon supports native species, such as California bulrush, pickleweed and alkali heath; non-native species, such as brass buttons and tamarisk; and substantial areas of open water. Wildlife species known to use the lagoon and the sandy beach in the immediate vicinity include common waterfowl, such as mallard, as well as a number of shorebirds, such as double-crested cormorant and gulls. Additionally, western snowy plover, a federally threatened species and a CDFW species of special concern, has federally designated critical overwintering and foraging habitat in the immediate vicinity of the lagoon and construction staging area. The southwestern pond turtle, a CDFW species of special concern, has not been observed at Broad Beach; however, this species has historically been documented in Trancas Canyon, upstream of the lagoon. This species would be highly unlikely in the lagoon seaward of the PCH bridge, but they can occur in brackish water and could occur just upstream of the bridge. The lagoon is not known to currently support any federally or State-listed fish, such as the tidewater goby or southern steelhead, both federally endangered species. No records for steelhead trout are found in Trancas since the 1980’s. However, the National Park Service and the Resource Conservation District of the Santa Monica Mountains are currently working on a habitat restoration feasibility study for the lagoon with the hope of enhancing species diversity and restoring conditions favorable to listed species that were historically present.

The proposed beach nourishment footprint will taper off at the east end of Broad Beach and will not extend all the way to Trancas Creek or Trancas Lagoon; thus, it will not fill it. Therefore, it is anticipated that the proposed project will not interfere with the natural functioning of the creek.

Beach nourishment will eventually result in a variable widening of the beach in front of the creek mouth but will not change the existing elevation of the barrier beach, so the existing condition of episodic breaching as part of lagoon processes will be maintained as a result of the project. Access between the proposed construction staging/storage area and Broad Beach would be along a defined travel route beginning at the southern edge of Zuma Beach Parking Lot 12 and sand storage areas and continuing west along the intertidal beach. The access route will occur seaward of any inundated portion of Trancas Lagoon, thereby minimizing potential impacts to this sensitive habitat. However, while heavy equipment could cross the sand bar fronting Trancas Lagoon throughout the majority of the construction period, during winter, high flows in Trancas Creek and/or large winter waves may cause this sandbar to breach. In order to safely cross and avoid impacts to Trancas Lagoon when the sand bar is breached, construction would be halted during periods when Trancas Creek is flowing to the ocean. Further, although special status fish species (e.g., southern steelhead) are not known to currently spawn in Trancas Lagoon, this halt in construction activities during periods of breaching would avoid adverse impacts to fish passage.

In order to ensure that adverse impacts to sensitive species are avoided, **Special Condition Seven (7)** requires a qualified biological monitor to be present during all project activities and that pre-construction surveys of sensitive species be conducted. In the event that the monitor finds that any sensitive wildlife species (including but not limited to western snowy plover or California grunion) exhibit reproductive or nesting behavior, the applicant shall cease work and immediately notify the Executive Director and local resource agencies. Project activities shall resume only upon written approval of the Executive Director. The monitor shall have the authority to cease operations should any breach in permit compliance occur or if any unforeseen sensitive habitat issues arise. If significant impacts or damage occur to sensitive wildlife species, the applicant shall be required to submit a revised, or supplemental program to adequately mitigate such impacts. The revised, or supplemental, program shall be processed as an amendment to this coastal development permit.

Therefore, for the reasons discussed above, the Commission finds that the proposed project, as conditioned, is consistent with Section 30240 of the Coastal Act.

E. PUBLIC COASTAL ACCESS AND RECREATION

Applicable Coastal Act Policies

Coastal Act Section 30210 states:

> *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.*

Coastal Act Section 30211 states:

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.

Coastal Act Section 30212 states:

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,

(2) adequate access exists nearby, or,

(3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.

(b) For purposes of this section, "new development" does not include:

(1) Replacement of any structure pursuant to the provisions of subdivision (g) of Section 30610.

(2) The demolition and reconstruction of a single-family residence; provided, that the reconstructed residence shall not exceed either the floor area, height or bulk of the former structure by more than 10 percent, and that the reconstructed residence shall be sited in the same location on the affected property as the former structure.

(3) Improvements to any structure which do not change the intensity of its use, which do not increase either the floor area, height, or bulk of the structure by more than l0 percent, which do not block or impede public access, and which do not result in a seaward encroachment by the structure.

(4) The reconstruction or repair of any seawall; provided, however, that the reconstructed or repaired seawall is not seaward of the location of the former structure.

(5) Any repair or maintenance activity for which the commission has determined, pursuant to Section 30610, that a coastal development permit will be required unless the commission determines that the activity will have an adverse impact on lateral public access along the beach.

As used in this subdivision "bulk" means total interior cubic volume as measured from the exterior surface of the structure.

(c) Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the Government Code and by Section 4 of Article X of the California Constitution.

Coastal Act Section 30213 states:

> *Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred.*

Applicable City of Malibu Land Use Plan Policies

2.1 The shoreline, parklands, beaches and trails located within the City provide a wide range of recreational opportunities in natural settings which include hiking, equestrian activities, bicycling, camping, educational study, picnicking, and coastal access. These recreational opportunities shall be protected, and where feasible, expanded or enhanced as a resource of regional, state and national importance.

2.2 New development shall minimize impacts to public access to and along the shoreline and inland trails. The City shall assure that the recreational needs resulting from proposed development will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and/or development plans with the provision of onsite recreational facilities to serve new development.

2.5 New development shall be sited and designed to minimize impacts to public access and recreation along the shoreline and trails. If there is no feasible alternative that can eliminate or avoid all access impacts, then the alternative that would result in the least significant adverse impact shall be required. Impacts may be mitigated through the dedication of an access or trail easement where the project site encompasses an LCP mapped access or trail alignment, where the City, County, State, or other public agency has identified a trail used by the public, or where there is substantial evidence that prescriptive rights exist. Mitigation measures required for impacts to public access and recreational opportunities shall be implemented prior to or concurrent with construction of the approved development.

2.6 Mitigation shall not substitute for implementation of a feasible project alternative that would avoid impacts to public access.

2.63 Consistent with the policies below, maximum public access from the nearest public roadway to the shoreline and along the shoreline shall be provided in new development. Exceptions may occur only where (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby, or; (3) agriculture would be adversely affected. Such access can be lateral and/or vertical. Lateral access is defined as an accessway that provides for public access and use along the shoreline. Vertical access is defined as an accessway which extends to the shoreline, or perpendicular to the shoreline in order to provide access from the first public road to the shoreline.

2.64 An Offer to Dedicate (OTD) an easement for lateral public access shall be required for all new oceanfronting development causing or contributing to adverse public access impacts. Such easement shall extend from the mean high tide line landward *to a point fixed at the most seaward extent of development i.e. intersection of sand with toe of revetment, vertical face of seawall, drip line of deck, or toe of bluff.*

4.22 Siting and design of new shoreline development and shoreline protective devices shall take into account anticipated future changes in sea level. In particular, an acceleration of the historic rate of sea level rise shall be considered. Development shall be set back a sufficient distance landward and elevated to a sufficient foundation height to eliminate or minimize to the maximum extent feasible hazards associated with anticipated sea level rise over the expected 100 year economic life of the structure.

Applicable City of Malibu Implementation Plan Provisions

Section 12.4. - Access Required

As a condition of approval and prior to issuance of a permit or other authorization for any new development identified in A through D of this section, except as provided in Section 12.5 of the Malibu LIP, an offer to dedicate an easement or a grant of easement (or other legal mechanism pursuant to Section 12.7.1 (b) of the Malibu LIP) for one or more of the types of access identified in Section 12.2 (a-e) of the Malibu LIP shall be required and shall be supported by findings required by Sections 12.7.3-12.9 of the Malibu LIP; provided that no such condition of approval shall be imposed if the analysis required by Sections 12.7.3 (a) through (d) of the Malibu LIP establishes that the development will not adversely affect, either individually or cumulatively, the ability of the public to reach and use public tidelands and coastal resources or that the access dedication requirement will not alleviate the access burdens identified.

A. New development on any parcel or location specifically identified in the Land Use Plan or in the LCP zoning districts as appropriate for or containing an historically used or suitable public access trail or pathway.

B. New development between the nearest public roadway and the sea.

C. New development on any site where there is substantial evidence of a public right of access to or along the sea or public tidelands, a blufftop trail or an inland trail acquired through use or a public right of access through legislative authorization.

D. New development on any site where a trail, bluff top access or other recreational access is necessary to mitigate impacts of the development on public access where there is no feasible, less environmentally damaging, project alternative that would avoid impacts to public access.

Section 12.5. - Exceptions

Section 12.4 of the Malibu LIP shall apply except in the following instances:

A. Projects excepted from the definition of "new development" at Section 2.1 of the Malibu LIP.

B. Where findings required by Sections 12.7.3 and 12.8.1 of the Malibu LIP establish any of the following:

1. Public access is inconsistent with the public safety, military security needs, or protection of fragile coastal resources.

2. Adequate access exists nearby.

C. Exceptions identified in (b) shall be supported by written findings required by Section 12.9 of the Malibu LIP.

Section 12.6.1 Lateral Public Access

The public access required pursuant to Section 12.4 of the Malibu LIP shall conform to the standards and requirements set forth in Sections 12.6 through 12.7.2 of the Malibu LIP.

A. Minimum requirements. [Also to be used for blufftop access or trail access, as applicable.] A condition to require an offer to dedicate an easement or a grant of easement for lateral access as a condition of approval of a coastal development permit (or other authorization to proceed with development) pursuant to Section 12.4 of the Malibu LIP shall provide the public with the permanent right of lateral public access and passive recreational use along the shoreline (or public recreational area, bikeway, or blufftop area, as applicable); provided that in some cases controls on the time, place and manner of uses, such as limiting access to pass and repass or restricting hours of use, may be justified by site characteristics including sensitive habitat values or fragile topographic features or by the need to protect the privacy of residential development.
…

Section 12.6.7 Legal description of an accessway: recordation

A. An access dedication (offer to dedicate or grant of easement) required pursuant to Section 12.4 of the Malibu LIP shall be described, in the condition of approval of the permit or other authorization for development in a manner that provides the public, the property owner, and the accepting agency with the maximum amount of certainty as to the location of the accessway. As part of the condition of approval, easements shall be described as follows: (I) for lateral access: along the entire width of the property from the mean high tide line landward to a point fixed at the most seaward extent of development (as applicable): the toe of the bluff, the intersection of sand with toe of revetment, the vertical face of seawall, or other appropriate boundary such as dripline of deck. On beachfront property containing dune ESHA the required easement for lateral public access shall be located along the entire width of the property from the mean high tide line landward to the ambulatory seawardmost limit of dune vegetation; (2) for blufftop access or trail access: extending inland from the bluff edge or along the alignment of a recreational trail; (3) for vertical access: extending from the road to the mean high tide line (or bluff edge).
…

Discussion

Broad Beach is located in a region that is a highly desirable landscape for public recreational opportunities, for residents and visitors alike, due to its climate and the natural beauty of the ocean, beaches, and mountains. Broad Beach is located just upcoast from Zuma Beach County

Park, which is the most heavily used public beach in the Malibu area. There are currently two Los Angeles County-owned public vertical accessways along Broad Beach within the project reach many lateral public access areas established inland of the mean high tide line. Many beachgoers who access the beach from Zuma Beach County Park, or the existing public vertical accessways along Broad Beach, often walk along the shoreline between Lechuza Point (upcoast of Broad Beach) and Point Dume (downcoast of Broad Beach). Recreational use of Broad Beach consists primarily of passive recreational uses such as walking, jogging, picnicking, sun bathing, dog walking, swimming, surfing, paddleboarding, bird watching, and tide pooling. Surfing along Broad Beach primarily occurs at shore breaks at the eastern portion of the beach, or at a point break near Lechuza Point that can occur during certain winter swells. However, Broad Beach generally contains less favorable conditions for surfing than other areas in Malibu, so lower numbers of surfers have been observed in this area. Free on-street parking is available along the northern side of Broad Beach Road, as well as along Pacific Coast Highway by Zuma Beach and along the bluffs overlooking Broad Beach.

<u>Tideland Encroachment</u> – With limited exceptions not relevant here, the State owns all tidelands within the State, which are those lands located seaward of the mean high tide line as it exists from time to time. By virtue of its admission into the Union, California became the owner of all tidelands and all lands lying beneath inland navigable waters. These lands are held in the State's sovereign capacity and are subject to the common law public trust. The public trust doctrine restricts uses of sovereign lands to public trust purposes, such as navigation, fisheries, commerce, public access, water oriented recreation, open space, and environmental protection. The public trust doctrine also severely limits the ability of the State to alienate these sovereign lands into private ownership and use free of the public trust. Consequently, the Commission must avoid decisions that improperly compromise public ownership or use of sovereign tidelands.

Where development is proposed that may impair public use and ownership of tidelands, the development's proposed location in relation to tidelands must be considered. The legal boundary between public tidelands and private uplands is based on the ordinary high water mark (OHWM). In parts of California where the shoreline has not been affected by fill or artificial accretion, the ordinary high water mark of tidelands is determined by locating the existing "mean high tide line." The mean high tide line is the intersection of the elevation of mean high tide with the shore profile. Where the shore is composed of sandy beach whose profile changes as a result of wave action, the location at which the elevation of mean high tide line intersects the shore is subject to change. The result is that the mean high tide line (and therefore the boundary) is an "ambulatory" or moving line that moves seaward through the process known as accretion and landward through the process known as erosion.

Consequently, the position of the mean high tide line is ambulatory and fluctuates seasonally as high wave energy (usually, but not necessarily, in the winter months) causes the mean high tide line to move landward through erosion, and as milder wave conditions (generally associated with the summer) cause the mean high tide line to move seaward through accretion. In addition to ordinary seasonal changes, the location of the mean high tide line is affected by long term changes such as sea level rise and diminution of sand supply. On the open coast, including Broad Beach, the ambulatory nature of the MHTL, resulting from natural coastal processes such as coastal erosion and accretion, sea level fluctuations, and the physical configuration of the beach, creates a shifting public-private boundary.

To protect public tidelands when beachfront development is proposed, the Commission must consider (1) whether the development or some portion of it will encroach on public tidelands (i.e., will the development be located below the mean high tide line as it may exist at some point throughout the year) and (2) if not located on tidelands, whether the development will indirectly affect tidelands by causing physical impacts to tidelands.

As proposed, the applicant is requesting after-the-fact authorization for, and the right to permanently retain, the existing, 4,150 linear ft. emergency rock revetment constructed on 78 beachfront lots and public tidelands, which was permitted on a temporary basis in the Commission's 2010 emergency permit action, but which authorization has expired. The applicant is also requesting permanent authorization of an existing sand bag wall that was incorporated into the design of the rock revetment and approval of a beach nourishment program involving the placement of 300,000 cu. yds. of sand for approximately 4,850 linear ft. of beach on 99 beachfront lots and public tidelands. The project also includes an additional sand nourishment every five years from the date of the initial beach nourishment involving 300,000 cu. yds. of sand, as well as interim nourishments of 75,000 cu. yds. when certain spatial and temporal erosion triggers are reached.

The State Lands Commission conducted a mean high tide line (MHTL) survey at Broad Beach in January 2010. Broad Beach currently supports approximately 27 acres of intertidal public trust land (as measured between the mean lower low water (MLLW) and the January 2010 MHTL) that is generally available for public use and enjoyment, in an uninundated state at lower tides, with the majority of these lands located seaward of the existing revetment. Based on the 2010 MHTL survey, approximately 0.86 acre of public land currently lies beneath the existing revetment[39]. As such, the as-built rock revetment currently encroaches on public tidelands and displaces lateral public access.

<u>Upland Encroachment</u> – In addition, the Commission must also consider whether a project affects any public right to use shorelands that exist independently of the public's ownership of tidelands. In this case, the public has acquired numerous lateral public access easements over, and access rights based on deed restrictions on, private property adjoining the tidelands, as a result of permit conditions included in Coastal Development Permits issued by the Commission and the City of Malibu for new development on Broad Beach. Of the 99 private Broad Beach parcels within the project area, approximately 51 of those parcels have recorded easements, deed restrictions, or other legal documents providing the public with the right of lateral public access across the seaward edge of the private properties (as shown on **Exhibit 16**). The terms of these public access easements/restrictions vary, but they mainly consist of the area of sandy beach extending 25 feet inland from the MHTL or extending from the seaward extent of approved residential development to the MHTL. In total, 32 of the 51 recorded lateral accessways along Broad Beach lie beneath or landward of the proposed as-built revetment. The revetment, therefore, directly impacts an additional approximately 1 acre area of sandy beach designated for

[39] California State Lands Commission (CSLC) Revised Analysis of Impacts to Public Trust Resources and Values for the Broad Beach Restoration Project (APTR) dated July 2014.

public access[40]. The State Lands Commission is the easement holder for all 20 of the 32 lateral accessways that were required as easements and that are impacted by the proposed as-built revetment (the remaining 12 lateral accessways within this area were implemented pursuant to deed restrictions and/or the terms of special conditions of previous coastal development permits).

As such, the majority of the proposed as-built revetment (2 acres of the approximately 3 acre revetment footprint) directly impacts public access and recreational use of public trust lands and existing lateral public access easement/restriction areas, and is expected to continue impacting public access over time.

Other Impacts – In addition to direct encroachment on lands to which the public has a right of access, a shoreline protective device has a number of other adverse effects on the dynamic shoreline system causing adverse impacts to public tidelands and public access. First, changes in the shoreline profile, particularly changes in the slope of the profile, which result from reduced beach width, alter the usable area under public ownership. A beach that rests either temporarily or permanently at a steeper angle than under natural conditions will have less horizontal distance between the mean low water and mean high water lines. This reduces the actual area of public property available for public use. The second effect on access is through a progressive loss of sand as shore material is not available to nourish the bar. The lack of an effective bar can allow such high wave energy on the shoreline that materials may be lost far offshore where it is no longer available to nourish the beach. The effect of this on the public is again a loss of area between the mean high water line and the actual water. Third, shoreline protective devices such as revetments and bulkheads cumulatively affect public access by causing accelerated and increased erosion on adjacent public beaches. This effect may not become clear until such devices are constructed individually along a shoreline and they eventually affect the profile of a public beach. Fourth, if not sited landward in a location that insures that the revetment is only acted upon during severe storm events, beach scour during the winter season will be accelerated because there is less beach area to dissipate the wave energy. Finally, as mentioned, revetments and bulkheads interfere directly with public access by their occupation of beach area that will not only be unavailable during high tide and severe storm events but also potentially throughout the winter season.

Mitigation for sand losses – In this case, as discussed in detail in Section IV.B (Hazards and Shoreline Processes) of this report, a revetment is considered necessary to protect the existing residences and the associated existing septic systems between the properties at 31350 and 30760 Broad Beach Road. However, the as-built rock revetment has resulted in the narrowing of the beach particularly during high tide and high wave events since its construction in 2010 and therefore has significantly reduced the amount of sand available to the public beach area as a whole and the overall shoreline width and shape (**Exhibit 3**).

In order to mitigate potential impacts to the sand supply associated with the proposed project there are two main factors to consider: (1) siting the revetment in the landward most location feasible to free up as much sand as possible within the existing beach sand exchange system, and

[40] Ibid.

(2) a requirement for beach nourishment to mitigate the impacts of the proposed revetment device.

First, the location and alignment of the revetment on the shoreline directly affects how much sand is available to naturally nourish and maintain the shoreline and public beach area. In this particular case it is also important to consider the sand exchange existing between the foreshore, sandy beach, and dune systems along Broad Beach. Coastal dunes exist in conjunction with the beach and are part of the sand sharing system that actively exchanges sand between the dune, beach, and the offshore bars. At erosional shorelines, such as the current condition at Broad Beach, the active dune (foredune) forms shift inland as the beach retreats. If there is no space for the dune to shift inland as the shoreline erodes, the dunes will not persist. The proposed as-built revetment is located at the seaward toe of the baseline pre-project dune habitat footprint (2005). Since 2005, the construction of sandbag revetment walls and the emergency rock revetment in 2010 removed the majority of the existing foredune habitat along Broad Beach. Additionally, a variety of unpermitted landscaping and accessory improvements by private homeowners have removed portions of remaining dune vegetation landward of the revetment as discussed in more detail in Section IV.G. of this report (Unpermitted Development).

Dr. Lesley Ewing, the Commission's Staff Engineer, has determined that, in this case, the as-built rock revetment has fixed the location of the back of the beach, which has resulted in the narrowing of the beach seaward of the revetment, particularly during medium/high tide and high wave events, since its construction in 2010. To illustrate this point, a photograph from a site visit by Commission staff to the project site after the construction of the revetment/sand bag wall on site is included as **Exhibit 10**, which clearly demonstrates this process at work. In addition, an aerial photograph of the entire project reach provided by the applicant's coastal engineer and included as **Exhibit 3**, also clearly demonstrates this same process as evidenced by the lack of dry beach area seaward of the as-built revetment on site during medium and higher tide conditions. Eventually, the shoreline fronting the armor protrudes into the water, with the mean high tide line fixed at the base of the structure. In the case of an eroding shoreline, this represents the loss of a beach as a direct result of the armor.

As noted previously, the revetment will cover 3.02 acres of beach, some of which is public trust land; some of which is private property subject to public easements, deed restrictions, and permit conditions granting public access; and some of which is, for now, private property unencumbered by such public access rights. The revetment will also prevent the inland migration of the beach (often referred to as passive erosion), at an average retreat rate of 2 feet per year, as determined by the applicants' coastal engineer. Dr. Ewing has reviewed the various coastal studies for this section of coast and concurred with the provided average retreat rate.

At Broad Beach, under natural conditions, the mean high tide line (MHTL) defines the landward boundary of public trust land. The changes in the MHTL locations that were surveyed in 2009 and 2010 show a one year trend that closely tracks the average annual retreat rate. While most years will not track the average retreat rate as closely as this, nevertheless, over multiple years (5 to 10 or more), the actual retreat should be well-represented by the average annual retreat. As such, the 2010 MHTL would be approximately 28 feet farther inland over a 10-year project life (including the 4 years that the emergency revetment has been in place) and 48 feet farther inland over a 20-year project life. For the 4,150-foot long revetment, the public trust lands would have expanded by 25,200 sq. ft. (0.58 acres) during the time that the emergency revetment has been in place, by an additional 83,000 sq. ft. (1.9 acres) during the 10-year project life or an additional 166,000 sq. ft. (3.8 acres) during the 20-year project life.

The revetment will also prevent erosion from contributing inland sand to the littoral cell. With an average back beach elevation of 15 feet (based on project plans provided by the applicant), and an average composition of the back dune material of 95% sand (based on provided grain size analysis in Figure 11 of Exhibit 14 "Dr. Jonna Engel Memo" of this staff report), 2-feet of erosion of the back dunes each year would contribute 28.5 cu. ft. of sand (1.056 cubic yards) per foot of beach per year. For the 4,150- foot long revetment, the littoral sand contributions would have been approximately 17,530 cu. yds. of sand during the time that the emergency revetment has been in place, an additional 43,800 cu. yds. during the 10-year project life or an additional 87,650 cu. yds. during the 20-year project life. In addition to the volume of sand trapping inland of the revetment, the revetment will accelerate beach scour seaward of the structure. While this sand will remain within the littoral cell, the revetment will cause localized sand losses that, while attributable to the structure, cannot be quantified.

In this particular case, the applicant is proposing significant beach nourishment in order to extend the sandy beach area seaward of the revetment and enhance the effectiveness and longevity of the shoreline protective device. This proposed nourishment component will introduce a significant amount of sandy material back into a system to mitigate the loss of sand that would be caused by a protective device.

<u>Mitigation for Public Access Losses</u> – In addition, as described above, and as is typical of shoreline protective devices, the proposed revetment will effectively 'set' the back beach and the mean high tide line, ultimately narrowing and restricting lateral beach access and sandy beach area available for public recreation. By reducing the size of the beach, this project is inconsistent with Coastal Act policies such as Public Resources Code Section 30210 (which requires maximum access to the beach) and Section 30213 (which requires the protection of lower cost visitor and recreational facilities), among others. It is also inconsistent with Malibu LCP policies that serve as guidance, such as Policy 2.1 (requiring the protection of recreational opportunities), Policy 2.2 (requiring that new development minimize impact to public access along the shoreline), and Policy 2.5 (similar). Accordingly, even if the Commission is compelled to approve such a device in order to protect existing structures, when doing so, the Commission typically requires the provision of new public access amenities at or near the project site and/or payment of an in-lieu fee for beach nourishment to offset or mitigate these impacts and thereby make the project as consistent as possible with these policies.

In this particular case, the applicant is proposing significant beach nourishment in order to extend the sandy beach area seaward of the revetment and enhance the effectiveness and longevity of the shoreline protective device. Depending on the rate of coastal erosion, the proposed sand nourishment would substantially expand the amount of time that Broad Beach could be accessed by the public and would increase the types of recreational activities that could be accommodated to include those that typically occur on dry sand beaches. As proposed, the reconstructed/post-nourishment combined beach and dune system would encompass up to approximately 24 acres and extend approximately 240 ft. (at its widest point) seaward from the top of the as-built revetment to the surf zone with approximately 65-110 ft. of beach area located seaward of the constructed toe of the dunes. The sand nourishment will also help buffer the erosive scour of wave action that would otherwise occur directly at the base of a shoreline protective device.

However, while the potential impacts to public shoreline sand supply and public access/recreation from the proposed rock revetment would continue as long as the revetment is in place, the public access benefits of nourishment, although substantial, will likely be much more transitory. The sand deposition will undergo immediate reworking by waves and tides that distribute the sand both offshore and alongshore until the beach profile reaches an equilibration shape (i.e. equilibrium erosion). The modeling predictions for the proposed nourishment project anticipate that the upcoast portions of the nourished beach will be significantly lost due to erosion within 2 years from completion of the proposed initial 300,000 cu. yd. nourishment. This could result in coastal erosion eliminating the entire dry sandy beach and substantial loss of new sand dunes with potential for exposure of the revetment and the associated adverse effects of blocking public access to public trust lands. Yet it is important to note that while the applicant has submitted estimations, the anticipated longevity of the sand nourishment is uncertain over the limited term of the project. Further, given the limited term of the sand nourishment project, the long-term and persistent impacts of the shoreline protective device to sand supply and public access and recreation is not adequately addressed through the proposed beach nourishment program.

<u>Revetment location</u> – Where, as here, impacts cannot be avoided and have been reduced to the maximum extent feasible, other forms of mitigation for any remaining adverse impacts of the revetment on public access and recreation must be required in order for the development to be as consistent as possible with the public access policies of the Coastal Act and the Malibu LCP. In past permit actions, the Commission has found that adverse impacts to shoreline processes from shoreline protective devices are greater the more frequently that they are subject to wave action. As such, the Malibu LCP requires (and the Commission has required in past permit actions) that all new development on a beach, including shoreline protection devices, be located as far landward as possible in order to reduce adverse impacts to the sand supply and public access/recreation resulting from the development. In this case, the proposed as-built revetment has not been sited as far landward as feasible in order to protect existing development.

As discussed in more detail in Section IV.B. (Hazards and Shoreline Processes) of this staff report, Commission staff provided direction to the applicant regarding relocation of the as-built revetment further landward, with the location set by the seaward extent of the existing septic systems, with no more than a 15 ft. setback between the revetment and septic systems. The applicant is proposing to relocate the downcoast approximately 1,800 linear feet of the 4,150 foot long as-built rock revetment (between 31020 and 30760 Broad Beach Road) up to 75 feet landward from the revetment's existing location (which would be approximately 30 - 40 ft. seaward of the existing septic systems on the beach). However, a feasible alternative would be to relocate a longer segment of the existing revetment (the downcoast approximately 2,000 linear ft.) further landward, still keying off the line of the existing septic systems with a 15 ft. setback or separation between the seaward limit of the existing, legally-established septic systems/leach fields (excluding any designated "future" leach fields that had not yet been built at the time this application was submitted to the Commission) and the landward edge of the rock revetment, as generally shown on Exhibit 8a. This recommended alignment would make approximately 195,000 cubic yards more beach sand available within the beach sand exchange system than the proposed as-built revetment alignment. The recommended alignment would also significantly reduce impacts to sand supply and public access in the event that significant erosion of the nourished beach occurs. In addition, the Malibu LCP which serves as guidance includes provisions (Land Use Plan Policy 4.39 and Implementation Plan Section 10.4.M) that specifically require shoreline protective structures be sited as far landward as feasible to protect existing development. Thus, in this case, the Commission finds that further landward relocation of the as-built revetment, as required by **Special Condition One (1)**, would significantly reduce impacts to shoreline processes or sand supply and would serve to minimize adverse impacts to public access and recreation, consistent with both the governing Coastal Act policies and the LCP guidance.

<u>Construction-related access impacts</u> – As discussed in detail above, the construction of a shoreline protective device, such as the proposed rock revetment, even if relocated farther landward pursuant to the provisions of Special Condition 1 would still result in some unavoidable potential adverse effects to coastal processes, shoreline sand supply, and public access/recreation. In addition, the public will lose access to Broad Beach during construction and subsequent nourishment and backpassing activities. The initial beach nourishment event is estimated to take approximately 8 months of active work, and the subsequent re-nourishments after initial project implementation is estimated to require at least several months of additional work. Backpassing operations would occur no more than once per year and would take up to several weeks to complete. Although work would be conducted in the fall/winter months to avoid the summer peak beach visitation period, public access would be restricted at Broad Beach during the construction and backpassing periods. Construction equipment and materials is proposed to be staged at Zuma Beach Parking Lot 12, located at the northernmost end of Zuma Beach (a Los Angeles County Beach Park) and immediately downcoast of the project area (**Exhibit 17**). Sand would be stockpiled and construction equipment would circulate along approximately 1,000 feet of Zuma Beach occupying an estimated 5 acres of dry sand beach berm. Lot 12 and the proposed Zuma Beach sand stockpile area will be periodically closed to the general public. As such, there will be significant temporary impacts to public access associated with the proposed project.

<u>Public Accessways</u> – In past permit actions in Malibu, in order to address all of the sorts of impacts to public access and recreation listed above, the Commission has required lateral public access easements along the shoreline between the ambulatory MHTL and the seawardmost extent of approved development, such as the face or toe of a shoreline protective device, or the dripline of the structure or deck, or the seaward extent of dune vegetation where there is dune habitat present. In fact, as listed and shown on the Public Access Map in the adopted City of Malibu LCP, the Commission and the City of Malibu have previously required more than 529 public lateral access easements or deed/condition restricted areas along the shoreline of beachfront lots to mitigate potential adverse impacts to shoreline processes and supply and public access/recreation. In addition, just within the project area itself, the Commission and the City of Malibu have previously required approximately 51 public lateral access easements or

deed restricted areas along the shoreline of beachfront lots, many of which were required to mitigate potential adverse impacts to shoreline processes and supply and public access/recreation[41]. In addition, Sections 12.6.1 and 12.6.7 of the Malibu LCP (which serves as guidance in this case) specifically require that an offer-to-dedicate a lateral public access easement be required under certain circumstances as a condition of approval for new development on the beach, and that such lateral easement extend along the entire width of the property from the ambulatory mean high tide line landward to a point fixed at the most seaward extent of development (as applicable): the toe of the bluff, the intersection of sand with toe of revetment, the vertical face of seawall, or other appropriate boundary such as dripline of deck.

In the prior related permit application for the project (Application No. 4-12-043), Commission staff recommended special conditions of the permit that would provide unambiguous lateral public access between the mean high tide line and a line running parallel to the mean high tide line 25 feet inland that would be ambulatory back to the toe of the revetment if necessary. Staff recommended that the requirement be implemented through a deed restriction recorded on each separate property governed by the BBGHAD. Staff also recommended that the applicant assure a "back up" 10 foot wide lateral public access easement along or just behind the revetment in the event that public access is not available on the beach in front of the revetment. The easement would have been structured as a direct dedication to the Mountains Recreation and Conservation Authority and would have also had to be recorded on each separate property governed by the BBGHAD. Both of the lateral public access requirements previously recommended would have only come into effect if the beach renourishment and sand backpassing fails to maintain the beach seaward of the revetment. The applicant objected to the lateral public access requirements recommended by staff in the prior application for the project due to concerns regarding the BBGHAD's legal authority to grant easements and record deed restrictions on their members' properties. The applicant has also raised concerns regarding the administrative complexity of numerous property owners within the GHAD having to record two legal documents to satisfy the recommended public access conditions.

The applicant's proposed project description indicates that the applicant proposes that an October 2009 MHTL should serve as the public/private seaward boundary for public access purposes for the duration of the project. However, it was prepared by the applicant's consultants. The CSLC performed a formal MHTL survey at Broad Beach on January 19 to 20, 2010, just prior to installation of the emergency revetment. The results of the CSLC survey confirmed that the MHTL is actually farther landward than the MHTL survey that had been previously conducted in 2009 by the applicant, although an approximately 100-foot portion of both surveyed lines overlap at the western end, and are within approximately 10 feet or less of each other over a

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[41] CCC CDP Nos. P-73-1446 (Webb); P-74-2534 (Miser); P-75-4573 (Froehlich); P-75-4653 (Gardner); P-75-4957 (Wallis); P-76-9478 (Marks); A-77-226 (Smith); A-77-1760 (Shepard); P-77-2527 (Finegood); P-77-9738 (Gocke); A-79-5085 (Egg); SF-80-7373 (Irwin); A-80-7553 (Gage); 5-81-431 (Eglit); 5-83-210 (Tarlow); 5-83-372 (Mark); 5-83-783 (Borman); 5-83-796 (Koenig); 5-83-816 (Manings); 5-83-899 (Broad Beach Partners Ltd); 5-84-849 (Cramer); 5-85-015 (Green); 5-85-044 (Berkowitz); 5-85-272 (Feldman); 5-85-516 (Lemmon); 5-85-635 (Broad Beach Assoc.); 5-86-273 (Bromiley); 5-87-093 (Leff); 5-87-593 (Wells); 5-90-487 (Wax & Associates); 4-93-086 (Binder); 4-98-028 (Jacobs); 4-98-298 (McClellan); 4-98-302 (Powell); 4-99-086 (Greene); 4-99-129 (Schwab); 4-99-153 (Ioki); 4-99-154 (Montanaro); 4-99-155 (Ioki); 4-99-216 (Cohen); 4-00-275 (Spears Family Trust); 4-01-148 (Nathanson); 4-02-027 (Frank); City of Malibu CDP No. 06-060 (North Enterprises); City of Malibu CDP Amendment No. 11-008 (Marine); City of Malibu CDP Amendment No. 13-005 (Kaplan)

significant portion of the surveyed area. The applicant's proposal to formally utilize the 2009 MHTL survey as the public/private boundary for public access purposes would serve to relocate the area of the beach where public trust lands exist to a more seaward location than the CSLC 2010 MHTL. This proposal would have the effect of minimizing the area accessible to the public, and would exclude the public from many areas where the public already has rights of access. In addition, the CSLC 2010 MHTL survey is legal controlling.

As an alternative, the applicant has proposed to maintain at least ten feet of sand seaward of the approved revetment for lateral public access along the beach. However, if there is erosion of the beach extending to the revetment for six consecutive months despite backpassing and up to three interim nourishment attempts within a ten year period and access seaward of the revetment becomes impossible, the applicant has indicated that they would agree to grant the public a "temporary license" to access a limited area on the landward side of the revetment for pass and repass. The applicant's proposed alternative for providing lateral public access would also have the effect of minimizing the area accessible to the public, and would exclude the public from many areas where the public already has rights of access. In addition, the applicant's proposed terms for granting the public access landward of the revetment when erosion occurs are too restrictive. Encroaching seas could eliminate access seaward of the revetment, but significant time could lapse during erosional periods before public access would be allowed on the landward side of the revetment, pursuant to the license, because access would be dependent on re-nourishment attempts, which may not happen in a timely manner, or may not happen at all, depending on the BBGHAD's ability to obtain funding for the work.

The Commission finds that there remains a significant possibility that, over time, the beach nourishment component of the approved project will fail to maintain a widened beach condition, or even any dry sand seaward of the dune habitat or even the revetment, for the reasons indicated above. Accordingly, the Commission finds it necessary to require **Special Conditions Thirteen (13) and Fourteen (14)** to provide adequate, reliable, and consistent lateral public access along the shoreline in the face of potentially rapidly changing conditions (while maintaining a significant area of private property). The access provided by these conditions is designed to move inland onto private property when erosion occurs, due in part to the revetment itself, and beach nourishment activities are not providing any significant beach for the public's use. **Special Condition Thirteen (13)** first requires the applicant to acknowledge that all areas seaward of the 2010 MHTL is, and will remain, public property that may not be restricted. However, in order to protect the sensitive coastal dune habitat restoration area seaward of the 2010 MHTL, the license agreement provides that public access is restricted in the restored dunes as long as there is more than 25 feet of beach seaward of them, so that adequate public access is ensured. If, however, the wet sand comes within 25 feet of the seaward limit of dune vegetation, the public may traverse the dunes within the public property (seaward of 2010 MHTL). In order to address the possibility that further erosion might bring the mean high tide line landward of the 2010 MHTL, **Special Condition Thirteen (13)** goes on to require the applicant to ensure that each property owner enters into a license agreement with the Commission and the BBGHAD in the form of an irrevocable license, in a form and content acceptable to the Executive Director, that provides the public the right of lateral public access and passive recreational use along the shoreline even landward of the 2010 MHTL, extending 25 feet inland from the landward extent of the wet sand until that point reaches the seaward face of the approved revetment, at which point the license provides public access between the wet sand and the seaward face of the approved revetment. This ensures that the project will not eliminate all public access by providing such access over private property if public property is no longer available.

Under this condition, the public will only have access on private property if and when the ambulatory mean high tide line comes so far inland that the wet sand comes to within 25 feet of the 2010 mean high tide line surveyed by the State Lands Commission. The license agreement must be drafted to run with the land, binding successors owners of the properties, and include a provision authorizing the BBGHAD to record it against the properties that extend from 31350 to 30760 Broad Beach Road, inclusive, as part of a blanket recordation. The license agreement must also be drafted to include a provision requiring each property owner to disclose the existence of the agreement to any prospective successor. This approach to providing for public access via a license agreement is an alternative mechanism to the typical easement or deed restriction required by the Commission and by the Malibu LCP. The applicant insisted that it could not get all of its members to agree to record easements against their properties, but that they would be able to secure license agreements from all of them. Recognizing that neither the revetment nor the nourishment aspect of the project would function if they could only be implemented on lots in a checkerboard or piecemeal fashion, Commission staff agreed to investigate this alternative mechanism. Although the typical license is revocable by the licensor, courts have recognized irrevocable licenses where the licenses are clearly drafted with that intent or where the licensees reasonably act in reliance on the apparent irrevocability of the license. Here, the Commission, on behalf of the public, is willing to authorize the project in reliance on the applicant's acceptance of condition language requiring that the license would, among other things, be drafted to be irrevocable.

The conditions also require that the licenses be enforceable by the Commission through a demand for specific performance, ensuring that public access can be guaranteed. And the conditions require that the licenses be binding on successor owners of the property and that they be recorded against the property to ensure this. Finally, the conditions will independently impose an obligation on property owners who take advantage of the benefits provided by this permit to protect their homes to allow public access consistent with the license agreements.

Even with all of these assurances, the Commission would not be willing to deviate from the reasonable requirements of the LCP in this case were it not for the additional fact that this permit is only authorizing the work for a limited term. If, at the end of the 10-year term, this approach has not proven reliable, the Commission will have the opportunity to insist on another approach in the context of any permit extension or amendment.

Considering all of these factors, the Commission is comfortable that this approach will provide adequate protection in this case. In addition, the GHAD has assured the Commission that, with the property owners' consent, as part of their execution of the license agreements, the GHAD will have the authority to record all of the licenses in a single, blanket recordation, as it did with the Assessment Diagram that it recorded after the assessment was put in place. This will provide for a more streamlined and less complex condition compliance process that is responsive to the applicant's concerns and greatly reduce the burden on an already over-taxed Commission staff.

Further, as discussed previously, there remains a likely possibility that, over time, the beach nourishment component of the approved project will fail to maintain a widened beach condition on site adequate to ensure that the revetment does not become exposed, despite the renourishment/backpassing measures proposed by the applicant. Thus, in order to ensure that renourishment occurs, **Special Condition Four (4)** requires the applicant to submit, for the review and approval of the Executive Director, a Final Adaptive Management and Monitoring Plan. However, even with the requirement that the applicant conduct additional renourishment and backpassing activities on an as-needed basis for the life of the project, it must be recognized that the proposed project should be considered an experimental pilot project and that it is not possible to guarantee that the beach nourishment component of the approved project will be adequate maintain a widened beach condition on site adequate to ensure that the revetment does not become exposed, despite the renourishment and backpassing measures proposed by the applicant. In the event that it is not possible to maintain an adequate beach width and the revetment becomes exposed and is acted upon by wave action, then the revetment would function in a manner similar to other shoreline protective devices.

As discussed in more detail in Section IV.B (Hazards and Shoreline Processes) the impact of a shoreline protective device, such as the proposed rock revetment, on public access is most evident on a beach where wave run-up and the mean high tide line are frequently observed in an extreme landward position during storm events and the winter season. As the shoreline retreats landward due to the natural process of erosion, the boundary between public and private land also retreats landward. Construction of rock revetments and seawalls to protect private property fixes a boundary on the beach and prevents any current or future migration of the shoreline and mean high tide line landward, thus eliminating the distance between the high water mark and low water mark. As the distance between the high water mark and low water mark becomes obsolete the seawall effectively eliminates lateral access opportunities along the beach as the entire area below the fixed high tideline is inundated. The ultimate result of a fixed tideline boundary (which would otherwise normally migrate and retreat landward, while maintaining a passable distance between the high water mark and low water mark overtime) is a reduction or elimination of the area of sandy beach available for public access and recreation. The reduction of the available sandy public beach area described above is what has occurred on Broad Beach since the emergency revetment was installed in 2010. The revetment has fixed the back of the beach and has significantly reduced the beach area available for public access particularly during high tides and high wave events. During these events the beach area fronting the revetment is often impassible.

Thus, in this case, if the proposed experimental beach nourishment component of this project fails to maintain adequate dry sandy beach area seaward of all sections of the 4,150 linear ft. rock revetment on site, then the beach seaward of the revetment in those locations would be subject to frequent inundation by wave action and would be frequently unusable for pedestrian access. Therefore, in order to ensure that public lateral access is maintained along shoreline areas of the project site, **Special Condition Fourteen (14)** requires the applicant to ensure each property owner enters into a license agreement with the Commission and the BBGHAD in the form of an irrevocable temporary springing license, in a form and content acceptable to the Executive Director, that provides the public the right of lateral public access (pass and repass only) over the revetment and along a 10 ft. wide public access path immediately landward of the approved revetment. The license agreements would be in place for the entire length of the approved revetment between 31350 to 30760 Broad Beach Road and shall require the provision of public access for 100 feet upcoast and downcoast of any area where public access seaward of the revetment is unavailable and extending landward the entire area between the seaward toe of the revetment and a line parallel and ten feet inland from the landward toe of the revetment, as generally illustrated on **Exhibit 9**. The agreement pursuant to **Special Condition 14** shall provide that the public's right to pass and repass may only be exercised if and when any of the following conditions are occurring, and only for the duration of time that any of the following conditions are occurring: (1) less than 10 feet dry sandy beach exists seaward of the seaward toe of the revetment at any point along the revetment on or within 100 linear feet of any part of the licensors parcel; or (2) any circumstance occurs (for example but not limited to an oil spill) which prohibits the public's use, access, and enjoyment of any area of the licensors property seaward of the revetment or any property within 100 linear feet thereof subject to the seaward license agreement described above (Special Condition 13). After the nourishment, public access on private property provided by the condition will only take effect if and when there is less than ten feet of dry sandy beach providing public access exists seaward of the approved revetment. The license agreement must be drafted to run with the land, binding successors owners of the properties, and include a provision authorizing the BBGHAD to record it against the properties that extend from 31350 to 30760 Broad Beach Road, inclusive, as part of a blanket recordation. The license agreement must also be drafted to include a provision requiring each property owner to disclose the existence of the agreement to any prospective successor.

Further, Special Conditions 13 and 14 described above would only apply to the project properties where the approved revetment is located, and would not apply to project properties where beach nourishment only is approved (no revetment). As explained previously, there are 51 private Broad Beach parcels in the project area that have existing recorded easements, deed restrictions, or other legal documents providing the public with the right of lateral public access across the seaward edge of the private properties. The terms of these public access easements/restrictions vary, but they mainly consist of the area of sandy beach extending 25 feet inland from the MHTL or extending from the seaward extent of approved residential development and the MHTL. The applicant has proposed "suspension" of the existing lateral public access rights that have been previously recorded or required on properties within the project reach for the duration of the project. The Commission does not have authority to "suspend" such rights because the State Lands Commission (as well as several other entities) is the easement holder or holder of the relevant property interest, not the Commission. The rights to access granted by Special Conditions 13 and 14 relate specifically to the impacts of the revetment, and are independent of any pre-existing rights granted by other instruments. Those easements are held by the State Lands Commission and will continue in effect. Nothing in this permit should be read as an implicit amendment of any prior CDP requiring lateral access. However, in areas where the pre-existing easements and the new requirements overlap, the net effect is simply duplicative in ensuring public access, and no conflict is created by two separate instruments granting access.

The applicant in this case is the BBGHAD and not the individual property owners of the parcels to which recommended Special Conditions 13 and 14 would apply. The BBGHAD has asserted that it does not have the authority to convey the easement interest required by these conditions on behalf of the individual property owners. However, the BBGHAD has indicated that it can secure license agreements from the individual property owners, and if those agreements include a provision authorizing the BBGHAD to record the license agreements against the individual properties, that it can do so via a single, blanket recordation. Moreover, the BBGHAD has indicated that it will not be doing the work of building the revetment itself, but will effectively be assigning the permit rights to the individual property owners to perform that development. As such, Conditions 13 and 14 also independently require that any property owner who accepts that assignment and performs that development in reliance on the permit thereby directly consents to the conditional forms of public access that they will be licensing through their execution of the license agreements.

In addition, in order to ensure the requirements of Special Condition Fourteen 14 are adequately implemented and that the approved project plans are revised accordingly, **Special Condition One (1)** requires the submittal of revised project plans designating a 10 ft. wide public pedestrian path located immediately landward of the entire length of the rock revetment, including the portion of the revetment to be relocated/reconfigured pursuant to Part A.1 of Special Condition 1, as generally depicted in Exhibit 8a. The pathway shall utilize a sand surface only. The plans shall depict this path as a ‘public accessway’ available for public use when there are insufficient areas of dry beach seaward of the revetment available for pass and repass. In addition, access stairways (for the provision of both public and private access) shall be shown extending from the 10 ft. wide public pedestrian path to the toe of the rock revetment below. The number and location of the access stairways shall generally align with the shared private beach access paths allowed on site consistent with Special Condition 5, Part 5. All such access stairways shall be designed and constructed by reconfiguring existing stones within the revetment to form steps. No handrails shall be installed. Further, in order to ensure that the project is constructed consistent with the final approved plans, **Special Condition Three (3)** requires the applicant construct the access stairways (for the provision of both public and private access) consistent with the requirements of Special Condition 1 concurrent with the re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment.

In response to discussions with staff, the applicant has proposed the removal of the approximately 40 unpermitted private stairways that have been constructed on the rock revetment by individual homeowners without the required coastal development permit. In addition to impacts to public views along the coastline, the proliferation of private stairways on a rock revetment also results in a privatizing effect for beachgoers in the event that the revetment becomes exposed. Further, the private stairways on site would also result in potential conflicts with the public ability to access the 10 ft. wide public path along the landward side of the revetment in the event the threshold condition requiring this access way is triggered. Therefore, in order to ensure that the applicant’s proposal to remove the approximately 40 unpermitted private stairways on the rock revetment is adequately implemented, **Special Condition Three (3)** requires that the applicant to remove all unpermitted private stairways on the approved rock revetment concurrent with the re-location and re-construction of the approximately 2,000 linear ft. downcoast end of the rock revetment required pursuant to Part A of that condition, unless additional time is granted by the Executive Director for good cause.

<u>Surfing</u> – Regarding potential impacts to surfing as a result of the project, the proposed beach nourishment will likely improve surfing conditions at Broad Beach and Zuma Beach because the

addition of sand will increase the size of the sand bars at both beaches. In addition, surf breaks at or west of Lechuza Point will not be affected since the predominant longshore transport is to the east. The dynamics of sandbars, which include increased sand volumes of similar grain size, more steeply sloped beaches, and wider beach widths, contribute to a more tidally dependent surf zone. This creates multiple variations in the nearshore bathymetry and improves the sandbars and wave shape quality for surfers.

Staging and traffic – As discussed previously, the project includes implementation of a beach nourishment program with periodic sand backpassing and re-nourishment operations that will temporarily restrict public access at Broad Beach and at the construction staging area at Zuma Beach. In addition, hauling of inland quarry material to the Zuma Beach stockpile site is expected to take several months and approximately 21,000 truck trips on southbound Pacific Coast Highway (PCH). Construction vehicles and equipment would access the site via PCH into the Zuma Beach Parking Lot 12. Currently, vehicular access to Parking Lot 12 is provided by the main Zuma Beach internal circulation roadway. However, during construction, it is proposed that this circulation road to Lot 12 be closed to general public access. To facilitate project construction, vehicular access to the staging area will be provided via two temporary driveways on PCH. The inbound PCH driveway at the staging area would be located on the south side of PCH, at the east end of Lot 12 directly across from Guernsey Avenue. This temporary driveway would serve as an inbound-only driveway for project vehicles and haul trucks and would accommodate limited vehicular ingress access (i.e., right turn only ingress turning movements). No outbound turning movements would be permitted from this temporary driveway. The outbound PCH driveway at the staging area would be located on the south side of PCH, at the west end of Lot 12. This driveway would serve as an outbound-only driveway for project vehicles and haul trucks and would accommodate full vehicular egress access (i.e., both left-turn and right-turn egress turning movements). No inbound turning movements would be permitted at this driveway (**Exhibit 17**).

To facilitate traffic operations into and out of the site, a temporary eastbound right-turn/deceleration paved lane will be installed at the existing Guernsey Avenue/PCH intersection to ensure that Project truck traffic will safely and efficiently slow to turn right into Lot 12 and not impede eastbound PCH through traffic. In addition, at the project's outbound PCH driveway, a temporary traffic signal is proposed to be installed to facilitate the safe and efficient movement of outbound haul trucks onto westbound PCH. The circulation and temporary traffic improvements at the staging area are illustrated in Exhibit 17. Parking along the south shoulder of PCH would be prohibited during the construction to accommodate the recommended right-turn lane and minimize pedestrian traffic at both staging area driveways. The proposed parking prohibition on the south shoulder of PCH generally adjacent to Parking Lot 12 would be implemented in two segments: (1) the segment between the proposed inbound driveway opposite Guernsey Avenue and the proposed outbound driveway (a distance of approximately 660 feet); and (2) the segment west of the proposed inbound driveway to a point approximately 180 feet west thereof (to join the existing restricted shoulder parking area on the PCH bridge over Trancas Creek).

In addition, Zuma Beach Lot 12 and the proposed Zuma Beach sand stockpile area will be periodically closed to the general public during sand delivery hours of 7 a.m. to 9 p.m., Monday through Friday. On weekends and holidays the beach will remain open for public access. All work will be conducted during the fall/winter months in order to avoid the peak summer visitor season. The applicant proposes to maintain public access during nourishment and dune restoration activities to the maximum extent possible. At least two weeks prior to commencing nourishment operations, signs notifying the public of the dates of nourishment operations would be posted at the public access points and at other highly visible locations along the beach. Public lateral access to Broad Beach will be restricted during working hours (Monday-Friday, 7 a.m. - 6 p.m.) due to the equipment traffic associated with the beach nourishment activities. As work progresses, public access to portions of the beach would be allowed during nourishment operations to the extent possible with implementation of a construction vehicle traffic management plan. For example, as beach placement is completed at the western end of the project, this area would become available for public use. The areas of active work (e.g., access routes and areas where earthmoving equipment is being used, etc.) would be clearly delineated with access controlled by the contractor.

Given the scale of the proposed project, the construction operations will still result in temporary unavoidable adverse impacts to the public's ability to access the coast in the vicinity of Broad Beach. In order to ensure that construction-related impacts to public access and recreation are minimized to the maximum extent feasible as required by Coastal Act Section 30210 and Malibu LCP Policies 2.2 and 2.5, **Special Condition Twelve (12)** prohibits construction operations from the Friday prior to Memorial Day in May through Labor Day in September to avoid impacts on public recreational use of the beach and other public amenities in the project vicinity, unless, due to extenuating circumstances, the Executive director authorizes such work. Special Condition 12 also prohibits construction operations on weekends and holidays in order to avoid impacts to public recreational use on those higher demand public use periods.

Further, **Special Condition Fifteen (15)** is necessary, which requires that the applicant submit a Public Access Management Program for the review and approval of the Executive Director and that details provisions for public access during construction and post-construction, including signage and fencing. The Public Access Management Program shall include a plan for ensuring safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. The plan shall include a description of the methods (including signs, fencing, posting of security guards, etc.) by which safe public access to or around construction areas, beach deposition sites, and/or staging areas shall be maintained during all project operations. In the event that Broad Beach must be closed to pedestrian use during active beach nourishment/renourishment operations only, then signage shall be installed indicating alternative beach access points along Broad Beach available for public access. The applicant shall be required to maintain public access pursuant to the approved version of the report.

Since construction operations will temporarily eliminate public parking along PCH and Zuma Beach Lot 12, the Public Access Management Program pursuant by **Special Condition 15** is required to include all necessary temporary access provisions, including any necessary traffic control and crosswalk improvements, to maintain public pedestrian access between Zuma County Beach and the Trancas Market commercial property along the shoulder of Pacific Coast Highway immediately landward of the project site and staging area. Further, where public parking areas are used for staging or storage of equipment and materials, unless there is no feasible alternative, the minimum number of public parking spaces (on and off-street) that are required at each receiver site for the staging of equipment, machinery and employee parking shall be used. At each site, the number of public parking spaces utilized shall be the minimum necessary to implement the project. The applicant is also required to post each construction site with a notice indicating the expected dates of construction and/or beach closures.

In order to provide the public with clarity regarding areas that may be available for public access, the Public Access Management Program required by **Special Condition 15** shall include a Symbolic Public Access Fencing and Signage Plan that provides for the installation of symbolic post and cable fencing along the landward limit of the ten foot wide public access path located immediately landward of the approved rock revetment. The post and cable fencing shall be no more than 42 inches in height and designed to be removable in the event of wave uprush. The Symbolic Public Access Fencing and Signage Plan shall also include the provision for the installation of signage to be incorporated into the design of the symbolic post and cable fencing adequate to inform the public of their right to utilize all public access areas on site (including the recorded lateral public access path immediately landward of the revetment, the portion of the sandy beach between the mean high tide line and the toe of the revetment, and the public access stairways required pursuant to Special Conditions 1 and 4). At a minimum, the Program shall provide for the installation of signs to be installed within 300 ft. intervals along the 10 ft. wide path and at both the western (upcoast) end and eastern (downcoast) end of the 10 ft. wide public path and adjacent to each of the two Los Angeles County public vertical accessways on site. The plan shall show the location, size, design, and content of all signs. The signs may indicate that the areas of the site located landward of the public access areas are sensitive dune habitat and/or private property. No signs that restrict public access to State tidelands, public vertical or lateral access easement areas, or which purport to identify the boundary between State tidelands and private property shall be permitted. Special Condition 15 also specifies that the applicant shall be responsible for the cost, construction, and maintenance of any new improvements (including but not limited to repairs or modifications of the two existing public access stairways that have been previously constructed over the as-built rock revetment) within the two existing vertical public access rights-of-way necessary to maintain safe public pedestrian access from Broad Beach Road to the sandy beach as required by the Executive Director and Los Angeles County Department of Beaches substantially similar to the public access that exists on site at the time of Commission action on this permit. If any such improvements, or changes over time, are necessary to maintain safe and adequate public pedestrian access, then the applicant shall submit a detailed construction plan for the review and approval of both the Executive Director and Los Angeles County Department of Beaches and Harbors and comply with any requirements imposed by those entities.

In conclusion, with Special Conditions addressing adverse impacts to public access and recreation, impacts to the public will be minimized to the greatest extent feasible. Thus, as conditioned, the Commission finds the project consistent with the public access and recreation policies of the Coastal Act and the Malibu LCP.

F. VISUAL RESOURCES

The Malibu LCP provides for the protection of scenic and visual resources, including views of the beach and ocean, views of mountains and canyons, and views of natural habitat areas. The LCP identifies Scenic Roads, which are those roads within the City that traverse or provide views of areas with outstanding scenic quality, or that contain striking views of natural vegetation, geology, and other unique natural features, including the beach and ocean. The LCP policies require that new development not be visible from scenic roads or public viewing areas. Where this is not feasible, new development must minimize impacts through siting and design measures. In addition, development is required to preserve bluewater ocean views by limiting the overall height and siting of structures where feasible to maintain ocean views over the structures. Where it is not feasible to maintain views over the structure through siting and design alternatives, view corridors must be provided in order to maintain an ocean view through the project site.

Section 30251 of the Coastal Act requires that visual qualities of coastal areas shall be considered and protected, landform alteration shall be minimized, and where feasible, degraded areas shall be enhanced and restored. Section 30251 of the Coastal Act, which is incorporated as part of the Malibu LCP, states that:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinated to the character of its setting.*

In addition, the following LCP policies are applicable in this case:

6.1 The Santa Monica Mountains, including the City, contain scenic areas of regional and national importance. The scenic and visual qualities of these areas shall be protected and, where feasible, enhanced.

6.2 Places on and along public roads, trails, parklands, and beaches that offer scenic vistas are considered public viewing areas. Existing public roads where there are views of the ocean and other scenic areas are considered Scenic Roads. Public parklands and riding and hiking trails which contain public viewing areas are shown on the LUP Park Map. The LUP Public Access Map shows public beach parks and other beach areas accessible to the public that serve as public viewing areas.

6.3 Roadways traversing or providing views of areas of outstanding scenic quality, containing striking views of natural vegetation, geology, and other unique natural features, including the ocean shall be considered Scenic Roads. The following roads within the City are considered Scenic Roads:

- *Pacific Coast Highway*

- *Decker Canyon Road*
- *Encinal Canyon Road*
- *Kanan Dume Road*
- *Latigo Canyon Road*
- *Corral Canyon Road*
- *Malibu Canyon Road*
- *Tuna Canyon Road*

6.4 Places on, along, within, or visible from scenic roads, trails, beaches, parklands and state waters that offer scenic vistas of the beach and ocean, coastline, mountains, canyons and other unique natural features are considered Scenic Areas. Scenic Areas do not include inland areas that are largely developed or built out such as residential subdivisions along the coastal terrace, residential development inland of Birdview Avenue and Cliffside Drive on Point Dume, or existing commercial development within the Civic Center and along Pacific Coast Highway east of Malibu Canyon Road.

6.5 New development shall be sited and designed to minimize adverse impacts on scenic areas visible from scenic roads or public viewing areas to the maximum feasible extent. If there is no feasible building site location on the proposed project site where development would not be visible, then the development shall be sited and designed to minimize impacts on scenic areas visible from scenic highways or public viewing areas, through measures including, but not limited to, siting development in the least visible portion of the site, breaking up the mass of new structures, designing structures to blend into the natural hillside setting, restricting the building maximum size, reducing maximum height standards, clustering development, minimizing grading, incorporating landscape elements, and where appropriate, berming.

6.6 Avoidance of impacts to visual resources through site selection and design alternatives is the preferred method over landscape screening. Landscape screening, as mitigation of visual impacts shall not substitute for project alternatives including resiting, or reducing the height or bulk of structures.

6.15 Fences, walls, and landscaping shall not block views of scenic areas from scenic roads, parks, beaches, and other public viewing areas.

6.23 Exterior lighting (except traffic lights, navigational lights, and other similar safety lighting) shall be minimized, restricted to low intensity fixtures, shielded, and concealed to the maximum feasible extent so that no light source is directly visible from public viewing areas. Night lighting for sports courts or other private recreational facilities in scenic areas designated for residential use shall be prohibited.

In addition, the Malibu LIP contains several provisions regarding scenic and visual resources:

6.5 (A) Development Siting

1. New development shall be sited and designed to minimize adverse impacts on scenic areas visible from scenic roads or public viewing areas to the maximum feasible extent. If there is no feasible building site location on the proposed project site where development *would not be visible, then the development shall be sited and designed to minimize impacts on scenic areas visible from scenic highways or public viewing areas, through measures including, but not limited to, siting development in the least visible portion of the site, breaking up the mass of new structures, designing structures to blend into the natural hillside setting, restricting the building maximum size, reducing maximum height standards, clustering development, minimizing grading, incorporating landscape elements, and where appropriate, berming.*

2. *Where there is no feasible alternative that is not visible from scenic highways or public viewing areas, the development area shall be restricted to minimize adverse impacts on views from scenic highways or public viewing areas.*
3. *Avoidance of impacts to visual resources through site selection and design alternatives is the preferred method over landscape screening. Landscape screening, as mitigation of visual impacts shall not substitute for project alternatives including resiting, or reducing the height or bulk of structures.*
4. *New development, including a building pad, if provided, shall be sited on the flattest area of the project site, except where there is an alternative location that would be more protective of visual resources or ESHA.*

6.5 (E) Ocean Views

New development on parcels located on the ocean side of public roads, including but not limited to, Pacific Coast Highway, Malibu Road, Broad Beach Road, Birdview Avenue, Cliffside Drive shall protect public ocean views.

1. *Where the topography of the project site descends from the roadway, new development shall be sited and designed to preserve bluewater ocean views over the approved structures by incorporating the following measures.*

    a. *Structures shall extend no higher than the road grade adjacent to the project site, where feasible.*

    b. *Structures shall not exceed one story in height, as necessary, to ensure bluewater views are maintained over the entire site.*

    c. *Fences shall be located away from the road edge and fences or walls shall be no higher than adjacent road grade, with the exception of fences that are composed of visually permeable design and materials.*

    d. *The project site shall be landscaped with native vegetation types that have a maximum growth height at maturity and are located such that landscaping will not extend above road grade.*

In past Commission actions, the Commission has limited the seaward encroachment of new development on sandy beaches in order to minimize adverse impacts to public views along the beach. In this case, the existing as-built rock revetment, for which the applicant is requesting permanent authorization, has resulted in the significant encroachment of new development on the sandy beach and is highly visible from public viewing areas along the shoreline. However, the proposed project also includes the provision for beach nourishment and dune creation/restoration. Specifically, the beach/dune nourishment component of the proposed project includes provisions for covering the revetment with several feet of sand and constructing a new dune field over the area of the beach where the revetment is located. Thus, although the as-built revetment itself has resulted in, and continues to result in, significant adverse impacts to scenic public views along the shoreline, the proposed beach/dune nourishment component of the project would largely serve to mitigate these impacts, for the duration that the nourished beach/dune condition is able to be maintained.

As discussed in detail in Section IV.B. (Hazards and Shoreline Processes) given the dynamic ever changing nature of the beach morphology and coastal process acting on this beach it is very difficult to model or predict how the beach nourishment program will perform over time as well as predict if unanticipated changes could result in adverse impacts to marine resources and habitats. The applicant's coastal engineering consultant has predicted that the nourished beach would be expected to be eroded substantially within several years from initial nourishment.

Thus, while the proposed sand nourishment will offset or partially offset the adverse effects to shoreline sand supply from the proposed rock revetment for the period of time that the nourishment material remains on the beach, it is expected that the nourishment sand will be lost over time and the revetment exposed both during and after the 20 year period that such nourishment activities are proposed. Further, although the applicant is requesting permanent authorization of the rock revetment pursuant to this application, the applicant is not committing to any future beach nourishment activities after 20 years. Thus, as proposed, although the benefits to shoreline sand supply from the proposed nourishment would be temporary for a period of 20 years, the adverse impacts resulting from the proposed authorization of the rock revetment would be permanent.

As a result, the Commission finds that given the experimental nature of the proposed nourishment project and the dynamic variability of conditions in coastal areas, it is not possible to ensure that the proposed beach nourishment efforts will be adequate to establish and maintain the desired beach width seaward of the proposed revetment or to prevent the revetment from becoming exposed. Thus, it is not possible to predict with absolute certainty how either the proposed, or revised project, would function. The Commission finds that the proposed project is, in part, an experimental effort to create a widened sandy beach within the project reach to reduce the potential for periodic wave-caused erosion to upland areas of the site and enhance public access and recreational opportunities. Therefore, in acknowledgment of the experiment nature of this project and to ensure that adverse impacts to coastal resources are avoided or minimized, **Special Condition Two (2)** limits the duration of the period of time that development of an approved development on a temporary basis only for a period of ten (10) years from the date of Commission action. After such time, the authorization for continuation and/or retention of any development approved as part of this permit (including, but not limited to, the rock revetment and beach re-nourishment/backpassing activities) shall cease. **Special Condition Two (2)** further requires that prior to the date that authorization for the development expires (10 years from the date of Commission action), the applicant or successor in interest shall submit a complete coastal development permit amendment application for the re-authorization of the beach nourishment program and to retain the rock revetment for an additional ten (10) year term, if necessary, to protect existing development at risk from wave hazards and tidal action.

In order to ensure that a an adequately wide beach area is maintained on site seaward of the revetment to avoid or minimize adverse impacts to coastal resources and scenic coastal views, **Special Condition Four (4)** requires the applicant the applicant submit, for the review and approval of the Executive Director, a Final Adaptive Management and Monitoring Plan that would require that renourishment on an as-needed basis (rather than once every ten years) if the beach narrows to a specific identified threshold width. Specifically, Special Condition Four (4) requires that a s*mall-scale Interim* Renourishment would be required if the dry beach width near Profile 411 (as shown on Exhibit 12) is narrower than 30 feet for 6 consecutive months, and is recorded by two (2) consecutive full beach profiles, and, there is insufficient sand at the backpass source location for backpassing to occur. In addition, a *Major Renourishment* would be required if the dry beach width near Profile 411 is narrower than 30 feet for 12 consecutive months, and is recorded by three (3) consecutive full beach profiles, and, there is insufficient sand at the backpass source location for backpassing to occur. Further, Special Condition Four (4) provides for small-scale interim renourishment and major renourishment to occur on an as-needed basis to ensure that the protective beach and dune system that will be maintained at an adequate width, to the extent feasible. Moreover, to ensure that this critical information regarding potential impacts to marine resources is recorded and reported to the Executive Director for consideration of future project approvals, **Special Conditions Four (4)** requires extensive monitoring of the effects of the project on shoreline processes be implemented to assess the effects of the rock revetment and beach nourishment program for the term of this permit.

In conclusion, with special conditions addressing adverse impacts to public views will be minimized to the greatest extent feasible. Thus, as conditioned, the Commission finds the project consistent with the visual resource protection policies of the Coastal Act and the Malibu LCP.

G. GREENHOUSE GASES/CLIMATE CHANGE

The proposed project involves the initial beach nourishment transport of 300,000 cubic yards from a sand quarry located in Moorpark, California, which is about 45 miles from the project site. The sand will be transported via haul trucks capable of carrying 14 cubic yards of sand per trip. The project will require 420 truck trips per day (210 inbound and 210 out bound) for a period of about six months between October and March or 21,000 total truck trips. That translates into about 30 in-bound and out -bound trips per minute. The trucks will come south bound on Pacific Coast Highway from Ventura County and exit the highway via a temporary access lane into the western most portion of Los Angeles County Zuma Beach parking lot. The sand will be deposited in a staging area on the parking lot. The sand will then be transported from the Zuma Beach site to the deposition sites on Broad Beach by off road trucks and the sand will be worked into position by tractors. The large number of truck trips necessary to transport the sand from the quarry site to the project site raises concerns regarding the generation of greenhouse gas (GHG) emissions.

The Commission has in past permit and LCP actions have addressed the generation GHG [42]emissions related to larger developments such as major water, energy, telecommunication, and

[42] Greenhouse gases are any gas, both natural and anthropogenic, that absorbs infrared radiation in the atmosphere and includes water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These greenhouse gases lead to the trapping and buildup of heat in the atmosphere near the earth's surface, commonly known as the

transportation projects. These types of projects can significantly increase GHG emissions and therefore global warming, which in turn can cause significant adverse impacts to coastal resources of California. The Coastal Act has a number of provisions that provide direct authority to the Commission to assess increased risks caused by climate change (i.e. increased coastal flooding and potentially increased fire danger from climatic shifts causing drier weather patterns) when considering proposals for new development. The Coastal Act also provides a regulatory avenue to ensure that proposed development is compatible with non-emission's related planning controls that can have the effect of reducing GHG emissions (where emission's specific controls are governed solely by the federal Environmental Protection Agency and state air resources agencies), like reducing vehicle miles traveled and minimizing energy consumption (i.e. through public transit and pedestrian/bike travel options when evaluating proposed development or in the context of LCP proposals). These include the Coastal Act's public access and recreation policies (Sections 30220 and 30211), marine resource and water quality policies (Sections 30230 and 30231), the environmentally sensitive habitat area protection policy (Section 30240), and the coastal hazards policy (Section 30253(a) and (b)). Further, Section 30253(c) and (d) require new development to be consistent with requirements imposed by an air pollution control district or the California Air Resources Board (CARB) and to minimize energy consumption and vehicle miles traveled.

The transport of the sand by a large number of heavy haul tricks over a six month period will generate about 2,002 metric tons of GHG. The South Coast Air Quality Management District (SCAQMD) use a significance threshold of 10,000 metric tons of GHGs per year for development projects. Projects generating over 10,000 MT/ year must provide GHG offsets to mitigate the effects of GHGs generated by the project. Although the proposed project will result in a large number of truck trips given the short term nature of the project the total amount of GHGs generated by the project totals only 2,002 metric tons (MT). This level of GHGs is well below the SCAQMD significance threshold of 10,000 MT/year and is considered to be a relatively insignificant amount of GHGs. The applicant has also proposed a Transportation Management Plan to ensure the trucks are efficiently moved in and out of the project staging area which will minimize the potential for trucks backing up and idling for long periods of time on the shoulder of the highway. To ensure the project is consistent with the air quality requirements of the SCAQMD as required by 30253(c) of the Coastal Act, **Special Condition 1**7 requires, that prior to issuance of the coastal development applicant shall submit evidence they have secured any required permits or approvals from the SCAQMD.

As described above, the project as conditioned, will not result in the generation of a significant amount of GHGs which would contribute substantially to global climate change and result in potential significant impacts to coastal resource effects, and is therefore consistent with Coastal

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"Greenhouse Effect." Carbon dioxide is the major anthropogenic greenhouse gas. All greenhouse gases are quantified collectively by the carbon dioxide equivalent, or the amount of CO2 that would have the same global warming potential, when measured over a specific time period.

Act Sections 30211, 30220, 30230, 30231, 30240, and 30253.

H. UNPERMITTED DEVELOPMENT

Unpermitted development has occurred within the project area prior to submission of this permit application. Unpermitted development includes, but may not be limited to: 1) construction of private stairways across the revetment (in non-compliance with the approved plans for Emergency Permit CDP 4-10-003-G), composed of one or more of the following materials: sandbags, jute netting, rocks, cement, matting, metal, wood, and rope; 2) placement of sand, sandbags, dirt, and landscaping on and adjacent to the rock revetment; 3) construction of patios, sitting areas, and decks on and adjacent to the revetment; 4) placement of "private property" and "no trespassing" signs; and 5) removal of native dune vegetation and construction of walkways and patios in the dunes. As proposed, this project includes the complete removal of the unpermitted private stairways but does not clearly provide for the removal of additional unpermitted development (although much of this unpermitted development is located within the proposed beach nourishment footprint).

Staff is recommending the Commission approve this application for the reasons discussed in full in the preceding sections of this report. To ensure implementation of the applicant's proposal and to prevent further adverse impacts to the beach and marine environment, **Special Condition Three (3)** requires the applicant to remove the unpermitted private stairways, sandbags, landscaping, patios, decks, and signs consistent with the final revised plans required pursuant to **Special Condition One (1)** and concurrent with, or prior to initial beach nourishment activities. The Executive Director may grant additional time for good cause. **Special Condition Five (5)** requires the removal of unpermitted development in, and restoration of, native dune habitat, including within areas of the site where unpermitted development has occurred. Additionally, the proposed project includes a requirement for dune restoration. Thus, the proposed project, if approved per the staff recommendation, will resolve the above described violations located within the project area

Approval of the application pursuant to the staff recommendation and completion of the approved project, as conditioned, will resolve the violation(s) described above, as explained in this staff report. However, unpermitted development on the west end of Broad Beach, upcoast of the rock revetment that starts at 31350 Broad Beach Road, including multiple unpermitted seawalls and revetments, will not be addressed through this project and will remain violations of the Coastal Act, to be addressed by the Commission's enforcement staff as a separate matter.

Although development has taken place prior to submission of this permit application, consideration of this application by the Commission has been based solely upon the Chapter 3 policies of the Coastal Act. Review of this permit does not constitute a waiver of any legal action with regard to the alleged violation nor does it constitute an admission as to the legality of any development undertaken on the subject site without a coastal permit.

I. CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 13096(a) of the Commission's administrative regulations requires Commission approval of a Coastal Development Permit application to be supported by a finding showing the application, as conditioned by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect that the activity may have on the environment.

The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. These findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As discussed in detail above, the proposed project, as conditioned, is consistent with the policies of the Coastal Act. Feasible mitigation measures, which will minimize all adverse environmental effects, have been required as special conditions. The following special conditions are required to assure the project's consistency with Section 13096 of the California Code of Regulations:

Special Conditions 1 through 19

As conditioned, there are no feasible alternatives or feasible mitigation measures available, beyond those required, which would substantially lessen any significant adverse impact that the activity may have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, can be found to be consistent with the requirements of the Coastal Act to conform to CEQA.

APPENDIX A

Substantive File Documents

Coastal Development Permit Application No. 4-12-043

Revised Analysis of Impacts to Public Trust Resources and Values (APTR) for the Broad Beach Restoration Project, prepared for the State Lands Commission, by AMEC Environment and Infrastructure, Inc., July 2014

Draft Analysis of Public Trust Resources, Prepared for State Lands Commission by AMEC, 2012/2014

Reports, Analyses, and Memos prepared by Moffat & Nichol:

- Coastal Engineering Appendix to the Broad Beach GHAD Engineers Report 2015 Update, dated June 2015
- Coastal Engineering Report, Exhibit L to CDP Application 4-12-043, dated October 2012
- Revised Coastal Engineering Report dated December 2012
- Broad Beach Restoration Project, Phase I Report, April 2010
- Broad Beach Restoration Project, Upland Sand Source, Coarser-than-native Grain Size Analysis, November 2013
- Addendum Number 1 to the Coastal Engineering Report, February 2014
- Broad Beach – Nourished Beach Profile Slope for all Transects, April 23, 2014
- Analysis of Extended Trucking Noise Level Impacts, June 13, 2014
- Memo regarding Approach to Integrating Storm Drain Outlets into the Broad Beach Restoration Project, dated August 7, 2015
- Depth of Cover Analysis for Proposed Project – Powerpoint Presentation, dated July 28, 2015
- Depth of Cover Analysis for Proposed Project – Summary, dated September 2015Moffatt-Nichol Consultants (November 2013) Upland Sand Source. Coarser-than-Native Grain Size Impact Analysis, prepared for: Broad Beach Geologic Hazard Abatement District

Broad Beach Fall 2011 Beach Profile Survey, Coastal Frontiers, November 16, 2011.

Broad Beach Spring 2013 Beach Profile Survey, Coastal Frontiers, July 3, 2013.

Engineers Report for the Broad Beach Geologic Hazard Abatement District, Malibu, California, ENGEO, Inc., dated January 18, 2012 and revised July 15, 2015.

Estimates of Economic Benefits/Impacts from Revised Alternatives at Broad Beach, Phillip King, PhD., February 18, 2014.

Marine Biology Analysis of Placement of Sand by Truck for the Broad Beach Proposed Project and of New Alternatives, Chambers Group, February 21, 2014.

Estimates of Beach Fill Loss Rates and Thoughts on Optimizing Placement Timing and Locations: Broad Beach, Malibu, California, prepared by Everts Coastal, February 24, 2014.

Air Quality and Climate Change Technical Report Revision 1, Environ International Corporation, June 2014.

Analysis of Extended Trucking Traffic Impacts, LLG Engineers, June 9, 2014.

Analysis of Extended Trucking Air Quality Impacts, Environ Report Revision 1, June 20, 2014.

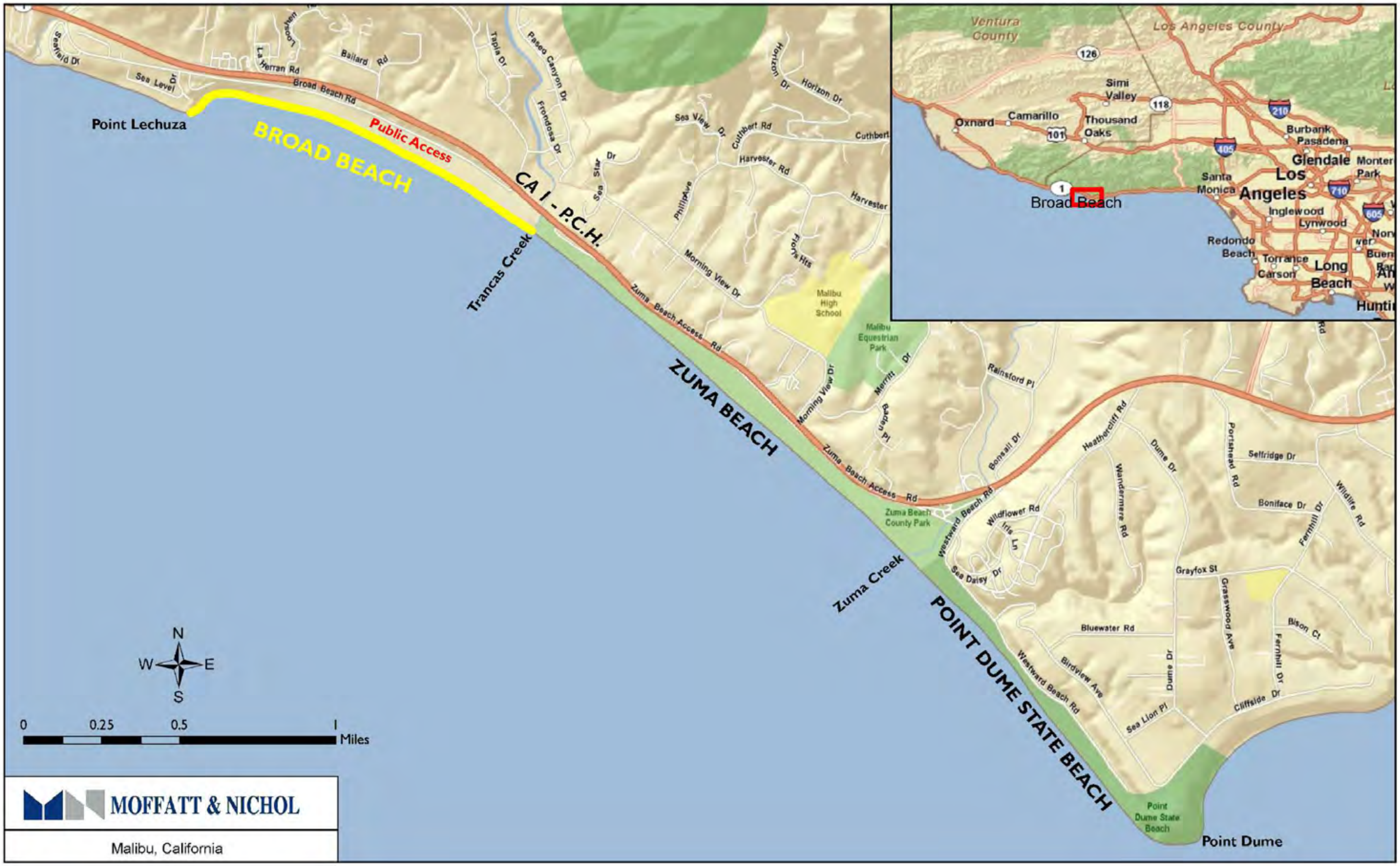


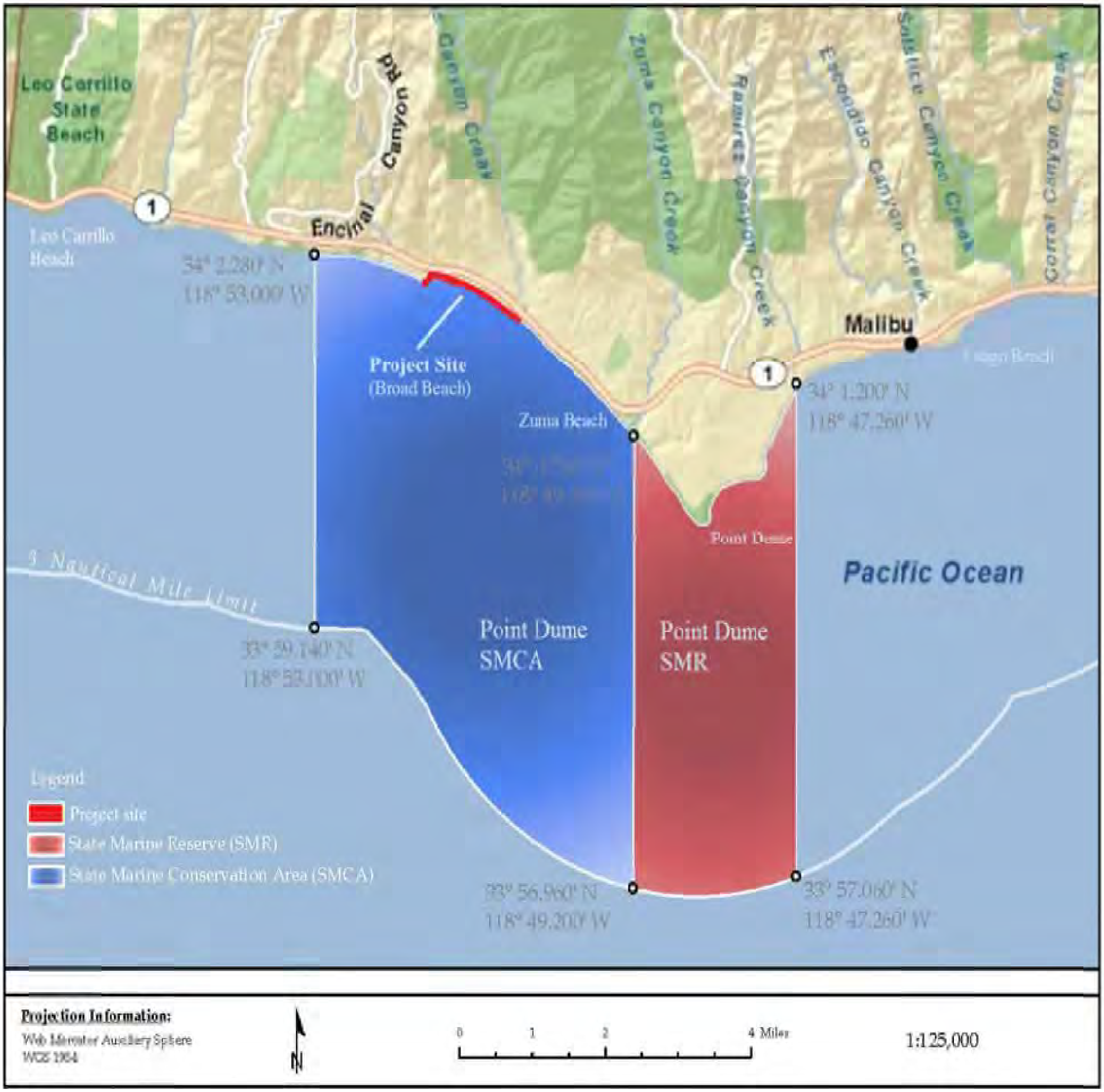
Exhibit 1
4-15-0390 (Broad Beach GHAD)
Location Map

Exhibit 2
4-15-0390 (Broad Beach GHAD)
Project Area

Source: Moffat & Nichol Engineering Report (October 2013)

Exhibit 3
4-15-0390 (Broad Beach GHAD)
Existing Emergency Rock Revetment

Marine Protected Areas



Source: Adapted from CDFW 2011

Exhibit 4
4-15-0390 (Broad Beach GHAD)
Marine Protected Areas

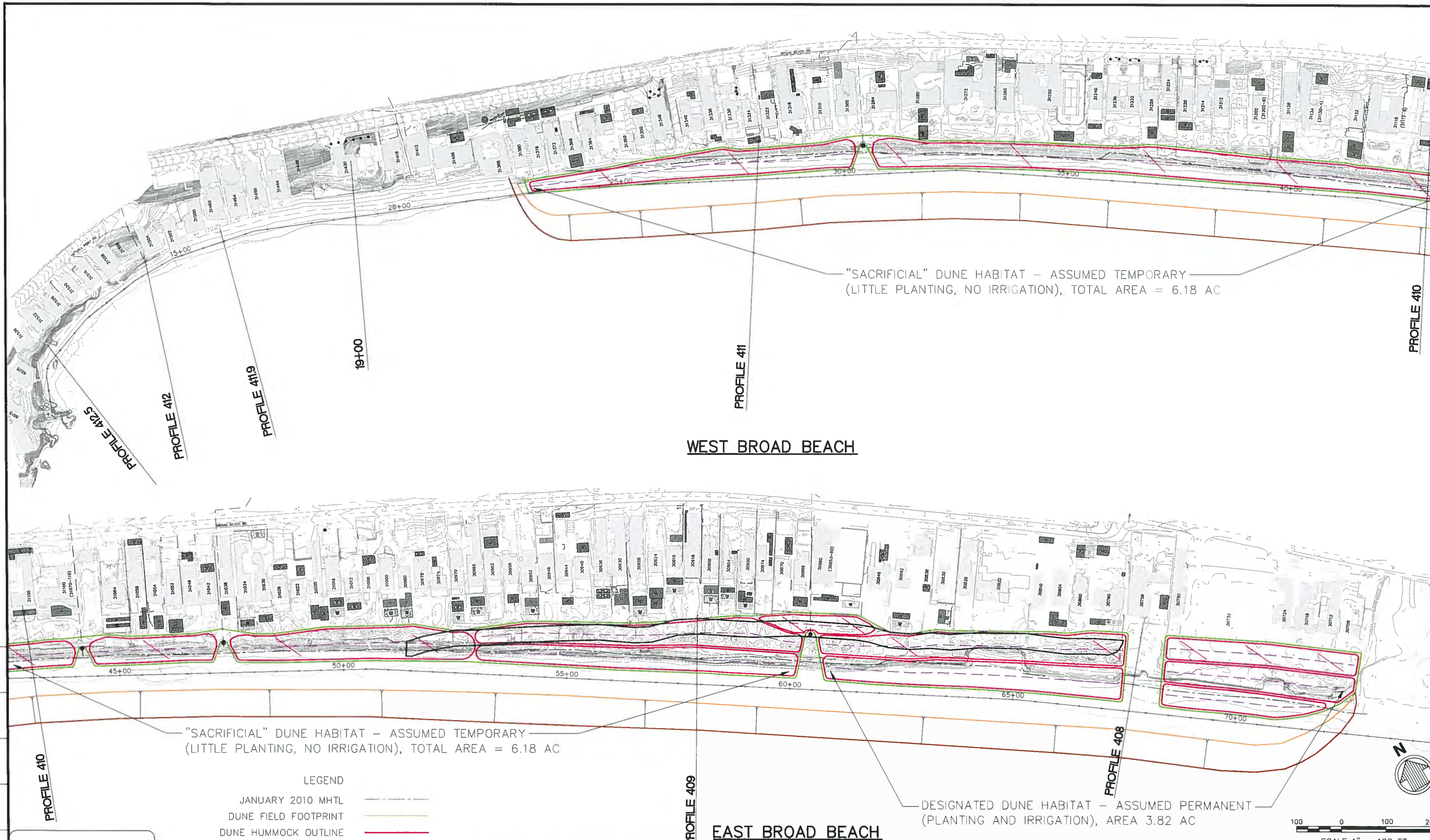
Structural Damage 1998 (West end of Broad Beach)

Structural Damage 2010 (West end of Broad Beach)

Exhibit 5
4-15-0390 (Broad Beach GHAD)
Storm Damage Photos 1998 and 2010

Broad Beach Sand Bag Seawalls

Exhibit 6
4-15-0390 (Broad Beach GHAD)
Sand Bag Seawall at Broad Beach Photos



LEGEND

- JANUARY 2010 MHTL
- DUNE FIELD FOOTPRINT
- DUNE HUMMOCK OUTLINE
- CREST OF DUNES
- SEAWARD BERM LIMIT
- TOE OF FILL
- RELOCATED REVETMENT FOOTPRINT
- STORM DRAIN LINES
- SAND FENCES

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AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

NO.	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER RUSSELL H. BOUDREAU No. C041810 EXP. 3/31/16 CIVIL STATE OF CALIFORNIA

moffatt & nichol

DESIGNED BY Aaron Holloway, P.E.
CHECKED BY Chris Webb
DRAWN BY A. Holloway
IN CHARGE Russell Boudreau, P.E.

BROAD BEACH RESTORATION PROJECT

Exhibit 7a
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

PROPOSED PROJECT

SCALE 1"=100' | DATE MAR 2015 | JOB NO. 6935-03 | SHEET 1 OF 6

STATUS: CONCEPT / 100% / FINAL

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

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LEGEND

- JANUARY 2010 MHTL
- LEACH FIELD STRINGLINE (ENSITU)
- EXISTING LEACH FIELDS
- FUTURE LEACH FIELDS
- EXISTING EMERGENCY REVETMENT
- RELOCATED REVETMENT
- RESTORED DUNE FOOTPRINT

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NO.	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER RUSSELL H. BOUDREAU No. C041810 EXP. 3/31/16 CIVIL STATE OF CALIFORNIA

moffatt & nichol

DESIGNED BY Aaron Holloway, P.E. | CHECKED BY Chris Webb
DRAWN BY A. Holloway | IN CHARGE Russell Boudreau, P.E.

BROAD BEACH RESTORATION PROJECT

Exhibit 7b
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

PROPOSED PROJECT

SCALE 1"=80' | DATE MAR 2015
JOB NO. 6935-03
SHEET 2 OF 6

STATUS: FINAL | 100% | CONCEPT

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

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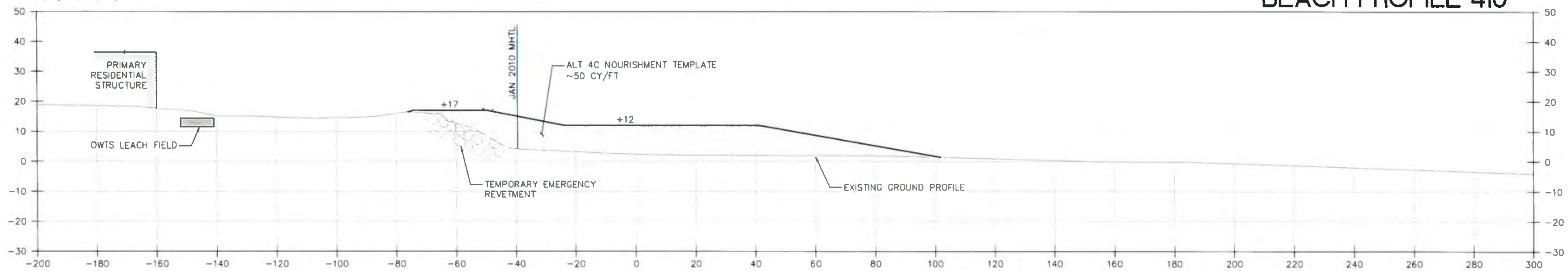
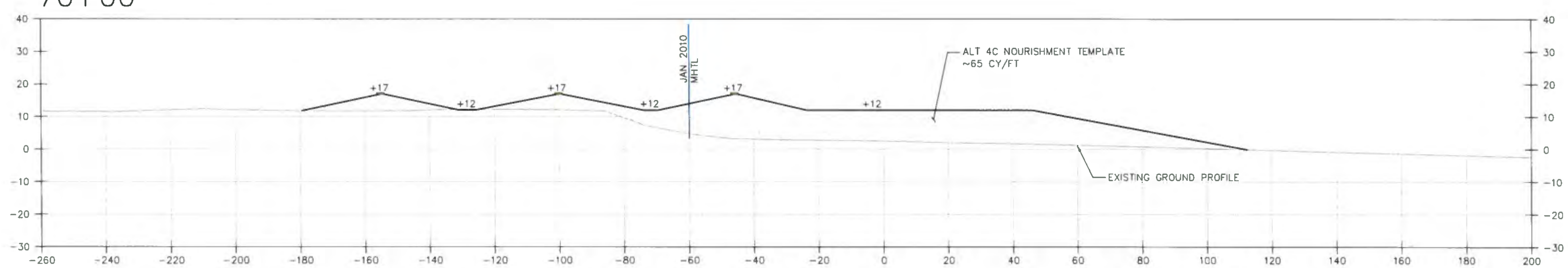
BEACH PROFILE 410



SACRIFICIAL DUNE HABITAT PROFILE

1"=20'

70+00



DESIGNATED DUNE HABITAT PROFILE

1"=20'

FINAL
100%
CONCEPT
STATUS

DIGALERT
DIAL TOLL FREE 1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

NO.	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER RUSSELL H. BOUDREAU No. C041810 EXP 3/31/16 CIVIL STATE OF CALIFORNIA

moffatt & nichol

DESIGNED BY Aaron Holloway, P.E. CHECKED BY Chris Webb
DRAWN BY A. Holloway IN CHARGE Russell Boudreau, P.E.

Exhibit 7c
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

ALT 4C - DUNE HABITAT
CROSS SECTIONS
PROPOSED PROJECT

SCALE	DATE
1"=20'	MAR 2015
JOB NO. 6935-03	
SHEET 3 OF 6	

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

P:\6935 Broad Beach\7 Design Information\CADD_Active\NEPA\4C_GHAD\SHEETS\Sheet3.dwg, Mar 25, 2015 - 4:52pm

LEGEND

- RELOCATED REVETMENT
- EXISTING EMERGENCY REVETMENT
- BACKPASS PLACEMENT FOOTPRINT
- BACKPASS SOURCE LOCATION
- 1-YEAR MEAN HIGH TIDE
- DUNE FIELD FOOTPRINT
- TOE OF FILL

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

Exhibit 7d
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

NO	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER
RUSSELL H. BOUDREAU
No. C041810
EXP 3/31/16
CIVIL
STATE OF CALIFORNIA

moffatt & nichol

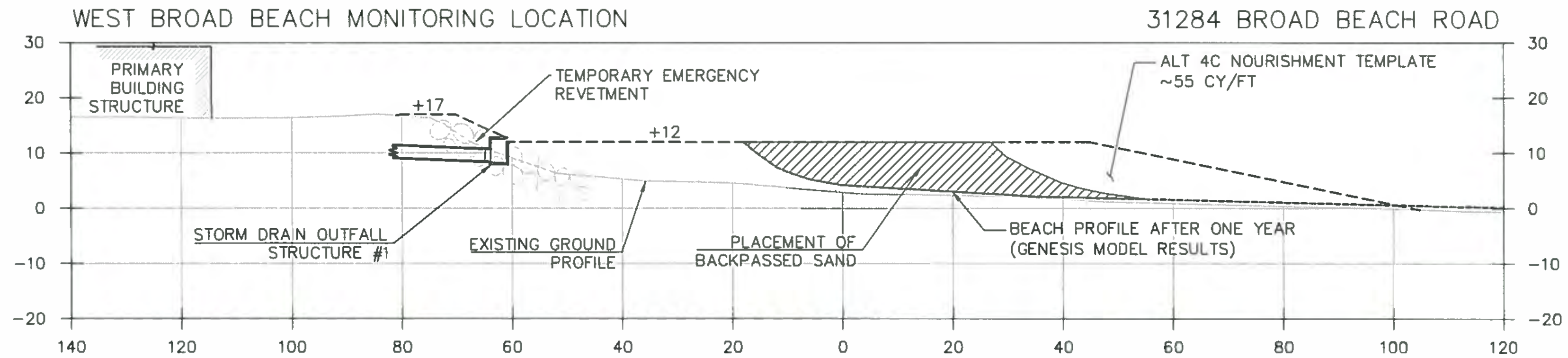
DESIGNED BY Aaron Holloway, P.E.
CHECKED BY Chris Webb
DRAWN BY A. Holloway
IN CHARGE Russell Boudreau, P.E.

ALT 4C - CONCEPTUAL PLAN FOR BACKPASS PLACEMENT PROPOSED PROJECT

SCALE	DATE
1"=100'	MAR 2015
JOB NO. 6935-03	
SHEET 4 OF 6	

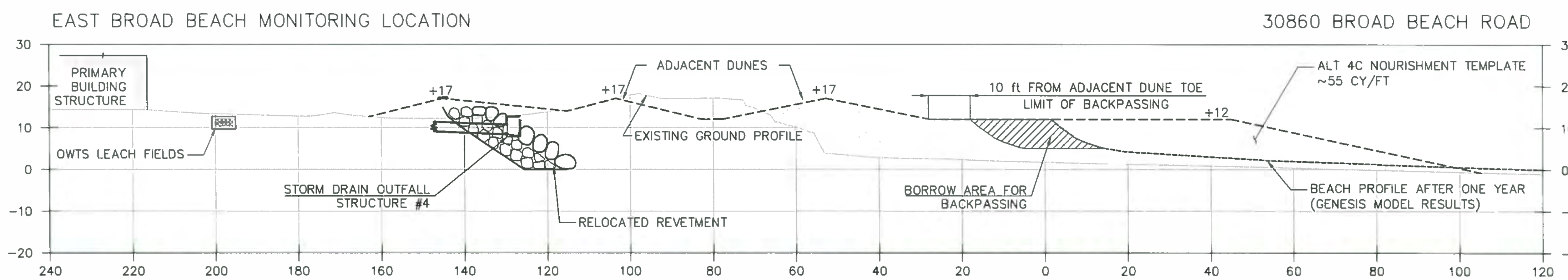
DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

STATUS CONCEPT % % 100% FINAL



BACKPASS PLACEMENT PROFILE

1"=16'



BACKPASS BORROW PROFILE

1"=16'

STATUS | CONCEPT | FINAL | 100%

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

NO	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER
RUSSELL H. BOUDREAU
No. C041810
EXP. 3/31/16
CIVIL
STATE OF CALIFORNIA

moffatt & nichol

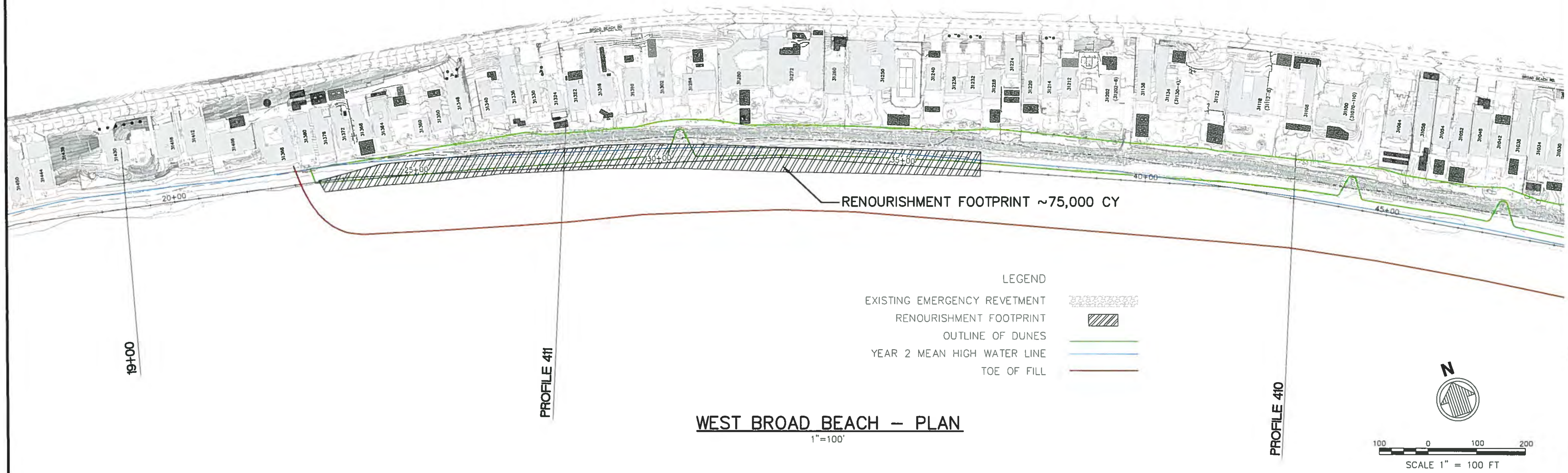
DESIGNED BY Aaron Holloway, P.E. | CHECKED BY Chris Webb
DRAWN BY A. Holloway | IN CHARGE Russell Boudreau, P.E.

Exhibit 7e
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

ALT 4C CONCEPTUAL BACKPASS
CROSS SECTIONS
PROPOSED PROJECT

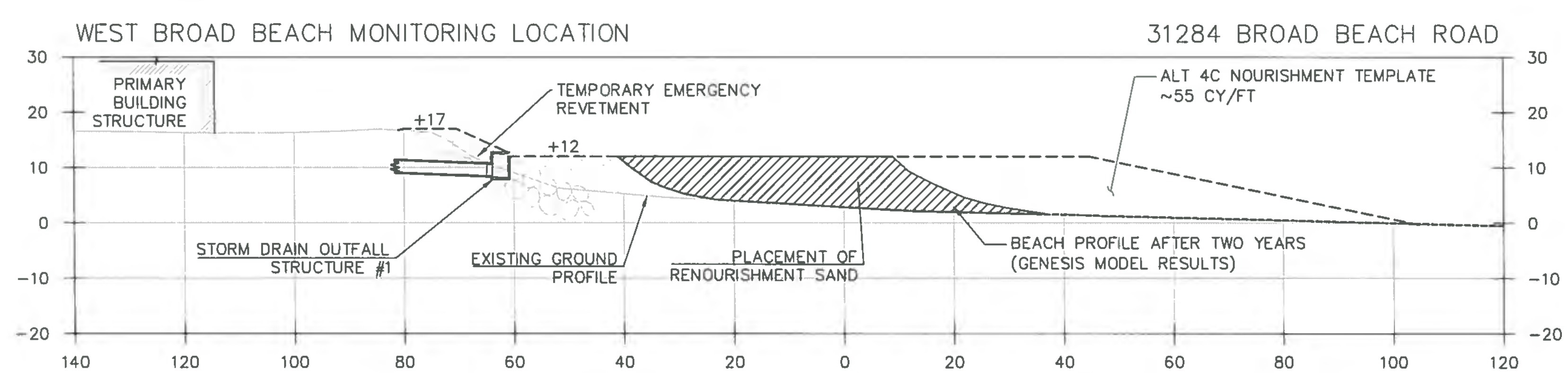
SCALE 1"=16' | DATE MAR 2015
JOB NO. 6935-03
SHEET 5 OF 6

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING



WEST BROAD BEACH – PLAN

1"=100'



WEST BROAD BEACH INTERIM RENOURISHMENT PROFILE

1"=16'

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

STATUS | CONCEPT | % | % | 100% | FINAL

NO	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER
RUSSELL H. BOUDREAU
No. C041810
EXP. 3/31/16
CIVIL
STATE OF CALIFORNIA

moffatt & nichol

DESIGNED BY Aaron Holloway, P.E.
CHECKED BY Chris Webb
DRAWN BY A. Holloway
IN CHARGE Russell Boudreau, P.E.

Exhibit 7f
4-15-0390 (Broad Beach GHAD)
Proposed Project Plans

ALT 4C - CONCEPTUAL PLAN FOR INTERIM RENOURISHMENT PROPOSED PROJECT

SCALE AS SHOWN
DATE MAR 2015
JOB NO. 6935-03
SHEET 6 OF 6

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

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NOTES

1. NON–SHARED ACCESS PATHS SHOWN FOR PROPERTY FRONTAGE OF 60–190 FEET BASED ON EXECUTED RESOLUTION NO. 2012–03
2. SHARED ACCESS PATHS SHOWN FOR PROPERTY FRONTAGE OF 0 TO 59 FEET BASED ON EXECUTED RESOLUTION NO. 2012–03
3. STORM DRAIN OUTLETS COVERED WITH SAND, NOT PLANTED WITH DUNE PLANTINGS AND CLEARED PRIOR TO STORM EVENT.

LEGEND

- JANUARY 2010 MHTL
- DUNE FIELD FOOTPRINT
- SEAWARD BERM LIMIT
- TOE OF FILL
- RELOCATED REVETMENT FOOTPRINT
- NON–SHARED RESIDENT ACCESS PATHS (NOTE 1)
- SHARED RESIDENT ACCESS PATHS (NOTE 2)
- STORM DRAIN LINES
- STORM DRAIN OUTLETS (NOTE 3)

Proposed Private Vertical Access Paths
Total 58

STATUS
FINAL
100%
%
%
CONCEPT

NO.	REVISION	BY	DATE

REGISTERED PROFESSIONAL ENGINEER RUSSELL H. BOUDREAU No. C041810 EXP. 3/31/16 CIVIL STATE OF CALIFORNIA

moffatt & nichol

DESIGNED BY	Aaron Holloway, P.E.	CHECKED BY	Chris Webb
DRAWN BY	Anthony Maggio, P.E.	IN CHARGE	Russell Boudreau, P.E.

BROAD BEACH RESTORATION PROJECT
California State Lands Commission

ALT 4C REV D - PLAN VIEW
Exhibit 7g - Proposed Private Access Paths and Storm Drains
PROPOSED PROJECT

SCALE	DATE
1"=100'	SEPT 2015
JOB NO. 6935-03	
SHEET 1 OF 6	

DRAWING SCALES SHOWN BASED ON 22"X34" DRAWING

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Revetment Pullback Comparison - BBGHAD Proposed and CCC Recommended

LEGEND

EXISTING LEACH FIELDS (ACTIVE)

LEACH FIELDS (EXPANSION)

EXISTING EMERGENCY REVETMENT OUTLINE

BBGHAD ALT 4C REV D - PROPOSED REVETMENT FOOTPRINT (09-18-2015 UPDATE)

CCC Recommended Revetment Pullback Location (landward edge)

Exhibit 8a
4-15-0390 (Broad Beach GHAD)
Comparison of
CCC Recommended Revetment Pullback &
BBGHAD Revised Proposed Revetment Pullback

AERIAL IMAGE
DATE: FEBRUARY 23, 2011
SOURCE: ROBERT J LUNG & ASSOCIATES

File: P:\6935 Broad Beach\7 Design Information\CADD_Active\NEPA\4C_GHAD\Mod_4C_Revet_pullback_d_no CCC lines; Plotted: 9/23/2015 3:22 PM by HOLLOWAY, AARON; Saved: 9/23/2015 3:16 PM by AHOLLOWAY

BROAD BEACH

Dune Footprint Comparison - BBGHAD Proposed and CCC Recommended

AERIAL IMAGE
DATE: FEBRUARY 23, 2011
SOURCE: ROBERT J LUNG & ASSOCIATES

Exhibit 8b
4-15-0390 (Broad Beach GHAD)
CCC Recommended Dune Footprint

200 0 100 200
SCALE 1" = 200'

File: P:\6935 Broad Beach\7 Design Information\CADD_Active\NEPA\4C_GHAD\Dune_Footprint_CCC and 4C 11-26-2014; Plotted: 5/11/2015 1:51 PM by LE, KIEN; Saved: 5/11/2015 1:51 PM by KHLE

DIAGRAM A Recommended Lateral Public Access Post-nourishment – Seaward of January 2010 MHTL

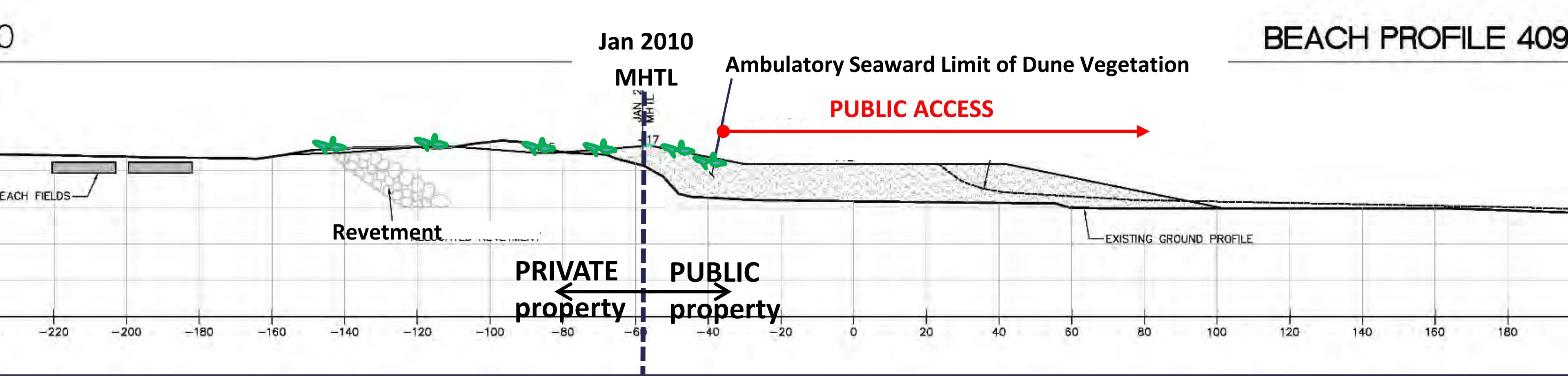


DIAGRAM B Recommended Lateral Public Access Post-nourishment – Seaward of January 2010 MHTL

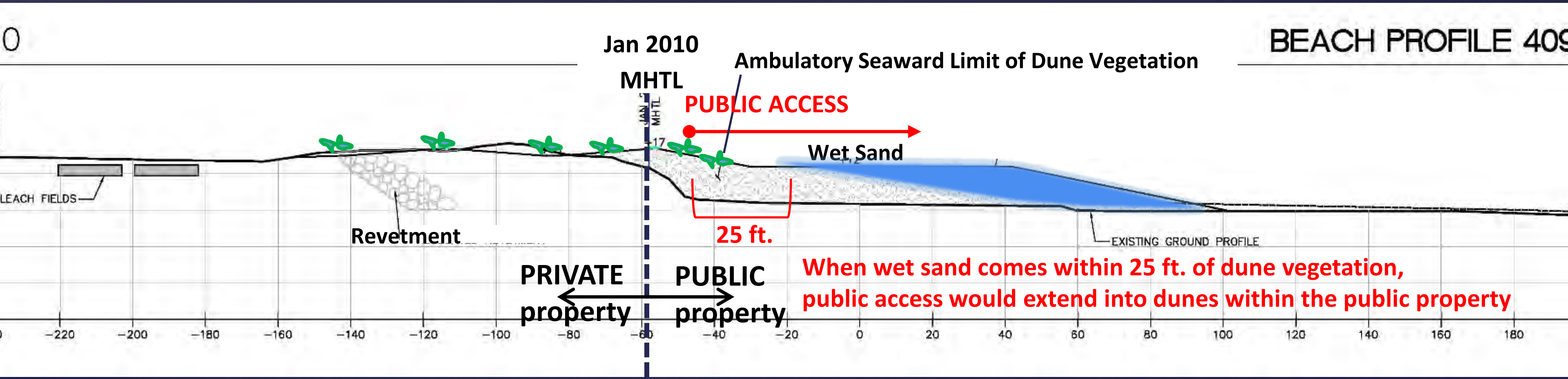


Exhibit 9
4-15-0390
Lateral Access Diagrams A-D

DIAGRAM C Recommended Lateral Public Access Post-nourishment – Landward of January 2010 MHTL

License Agreement: Public access to extend 25 feet from the wet sand, until seaward face of revetment is reached.

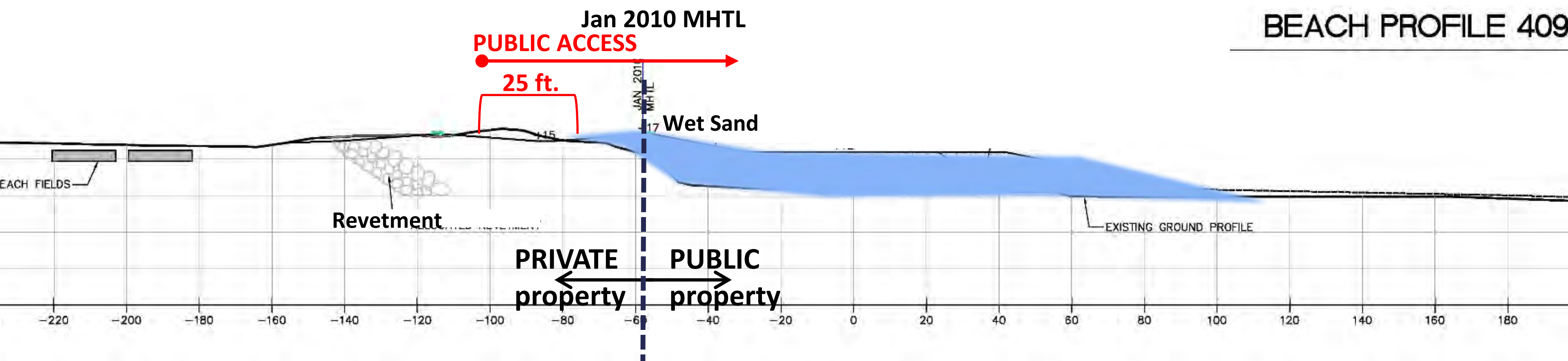
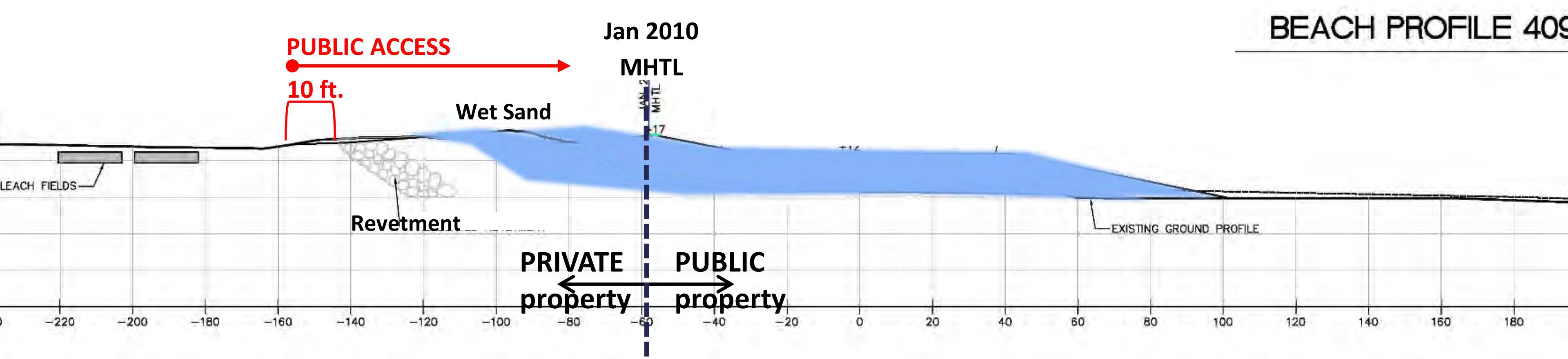


DIAGRAM D Recommended Lateral Public Access Post-nourishment – Landward of January 2010 MHTL

Springing License Agreement: Public access to extend over the revetment and 10 feet landward of the revetment if less than 10 feet of dry sandy beach exists seaward of the revetment for lateral public access.

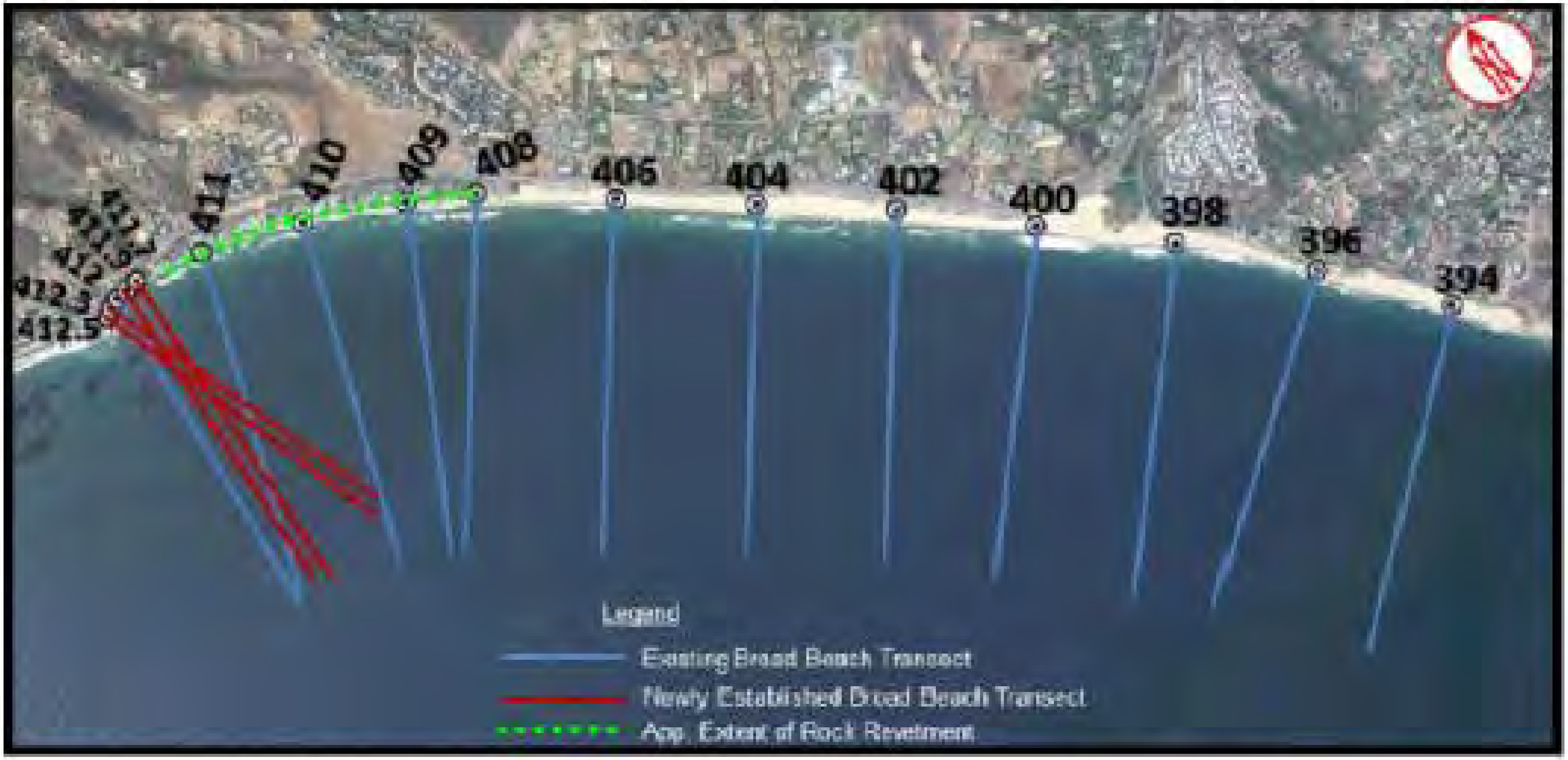


Effects of Seawall on the Width of Broad Beach (Fixing the Back of the Beach)

Exhibit 10
4-15-0390 (Broad Beach GHAD)
Broad Beach Photo – Fixing the Back of the Beach

Changes in Width of Western Reach of Broad Beach Since 1972

Exhibit 11
4-15-0390 (Broad Beach GHAD)
Changes in Beach Width
Broad Beach 1972 - 2013

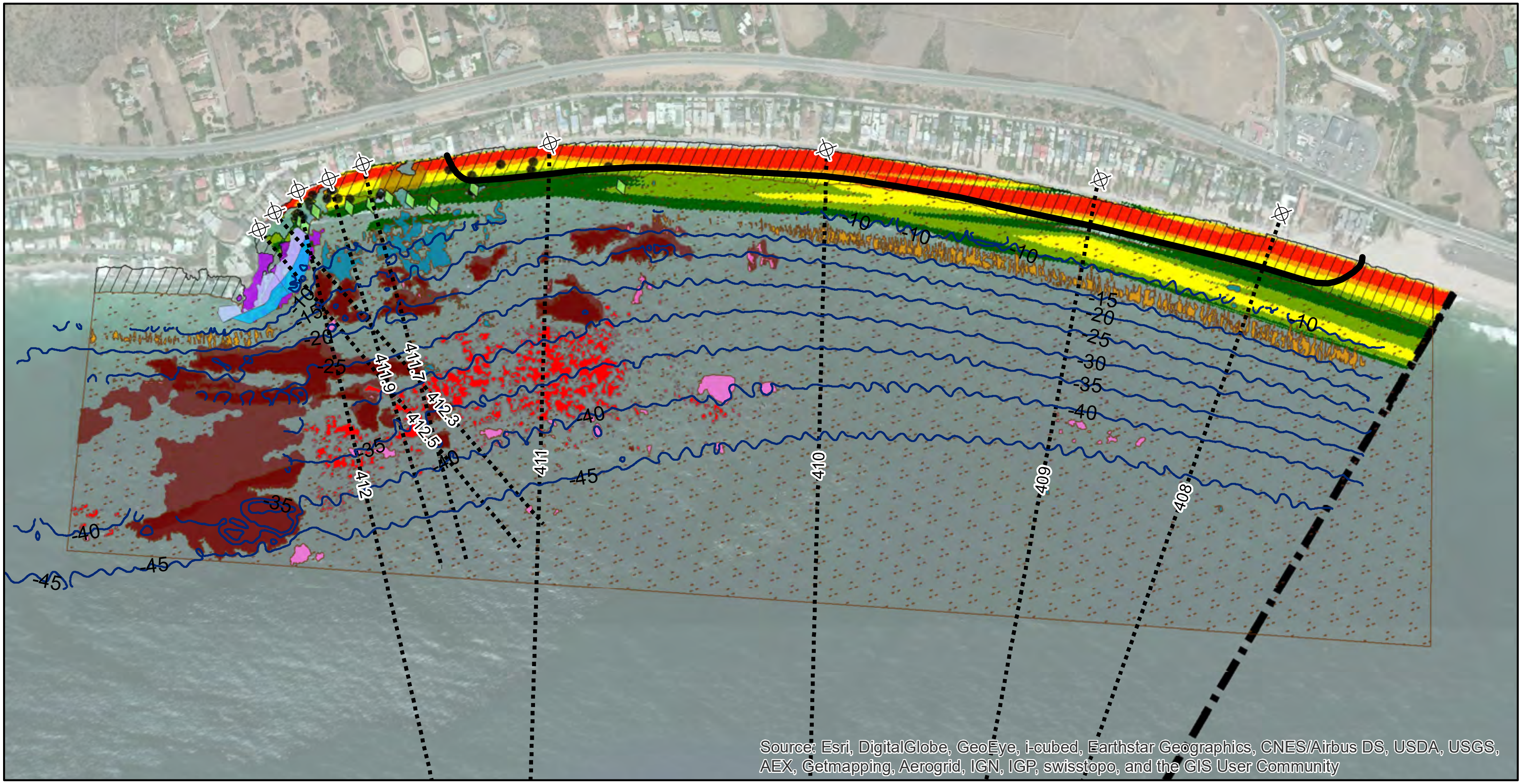


. Transects for Beach Profiling at Broad Beach and Zuma

Source: Coastal Frontiers 2013

Exhibit 12
4-15-0390 (Broad Beach GHAD)
Broad Beach Profile Transects

Path: P:\6935 Broad Beach\7 Design Information\Permits\USACE\Alts Jan 2015\Impact Comparison Table\4C-2_Export_Revised.mxd



- Alternative 4C Footprint
- 5ft Bathymetry
- Beach Profile Locations
- Beach Profile Transects
- Observed Surfgrass Points
- Observed Surfgrass
- Extrapolated Surfgrass
- Rocky Out Crops
- Eelgrass (May 2014)
- Boulder Field
- Limit of Analyzed Impacts

Habitat Groups - 2014 Survey

- Bedrock with Kelp, Marine: Subtidal: Rock Bottom
- Bedrock, Marine: Intertidal: Rock Bottom
- Bedrock, Marine: Subtidal: Rock Bottom
- Rubble/Cobble, Marine: Intertidal: Rock Bottom
- Rubble/Cobble, Marine: Subtidal: Rock Bottom
- Sand, Marine: Intertidal: Unconsolidated Bottom
- Sand, Marine: Subtidal: Unconsolidated Bottom
- Shell Hash, Marine: Subtidal: Unconsolidated Bottom

Alt.4C - 300,000cy ending at 31380 Broad Beach Rd.

Figure 4C-2 One Year Post Construction

Sand Cover compared to Spring High

- 0 - 0.5'
- 0.5 - 1'
- 1 - 2'
- 2 - 3'
- \>3'

0 350 700 1,400 Feet

Exhibit 13
4-15-0390 (Broad Beach GHAD)
Marine Resource Impact Modeling from Proposed Project Nourishment

STATE OF CALIFORNIA -- THE RESOURCES AGENCY EDMUND G BROWN JR, *Governor*

CALIFORNIA COASTAL COMMISSION
SOUTH CENTRAL COAST AREA
89 SOUTH CALIFORNIA ST., SUITE 200
VENTURA, CA 93001
(805) 585-1800

M E M O R A N D U M

FROM: Jonna D. Engel, Ph.D.
Ecologist

TO: Steve Hudson
South Central Coast District Manager

SUBJECT: Potential Impacts of the Broad Beach Geologic Hazard Abatement District Proposed Project on Terrestrial and Marine Resources In and Adjacent to the Project Footprint, Broad Beach, Malibu, California.

DATE: November 25, 2014

Documents Reviewed:

AMEC Environment and Infrastructure, Inc. July 2014. Revised Analysis of Impacts to Public Trust Resources and Values (APTR) for the Broad Beach Restoration Project. Prepared for State Lands Commission.

AMEC Environment and Infrastructure, Inc. July 2014. All Reports in Appendices B, C, D. Revised Analysis of Impacts to Public Trust Resources and Values (APTR) for the Broad Beach Restoration Project. Prepared for State Lands Commission.

Merkel & Associates, Inc. June 2014. Supplemental Marine Habitat Survey and Mapping for the Broad Beach Restoration Project. Prepared for Moffat and Nichol.

Moffat and Nichol. November 2013. Upland Sand Source: Coarser-Than-Native Grain Size Impact Analysis. Prepared for: Broad Beach Geologic Hazard Abatement District.

WRA, Inc. October 2013. Conceptual Foredune Creation and Enhancement Plan; Broad Beach Restoration Project, Malibu, Los Angeles County, California. Prepared for Moffatt & Nichol.

URS. August 2013. Malibu Beach Sand Replenishment Sand Grain Angularity Analysis Malibu, California. URS Project No. 03003261. Letter Report to Chris Webb, Moffat and Nichol.

Exhibit 14
4-15-0390 (Broad Beach GHAD)
Dr. Jonna Engel's
November 25, 2014 Memorandum

Chambers Group, Inc. July 2013. Broad Beach Intertidal Sampling for the Broad Beach Shore Protection Project, Los Angeles County, California. Prepared for Moffat and Nichols.

Chambers Group, Inc. July 2013. Summer Mapping of Eelgrass off Broad Beach in Malibu for the Broad Beach Restoration Project. Prepared for Russell Boudreau, Moffat and Nichols.

Chambers Group, Inc. December 2012. Broad Beach Intertidal Sampling for the Broad Beach Shore Protection Project, Los Angeles County, California. Prepared for Moffat and Nichols.

Chambers Group, Inc. June 2012. Survey of Marine Biological Resources of Broad Beach Malibu, California. Prepared for Moffat and Nichols.

I have been asked to review and analyze the project proposed by the Broad Beach Geologic Hazard Abatement District (BBGHAD) regarding potential adverse impacts upon terrestrial and marine natural resources in and immediately adjacent to the project footprint. To accomplish this I have reviewed the documents listed above and peer-reviewed literature, visited the site numerous times, consulted with agency biologists and academic experts, and studied historic and current aerial photographs.
The BBGHAD is seeking authorization of an approximately 4,150 ft. long, 12-15 ft. high, 25-40 ft. wide, rock revetment constructed on Broad Beach pursuant to two emergency coastal development permits. In addition, the project includes implementation of a 20 year beach replenishment program at Broad Beach, involving deposition of 600,000 cu. yds. of sand on the beach from inland sand quarries during the first year and approximately 450,000 cu. yds. of sand during the tenth year of the program. Periodic sand backpassing[1] operations and dune habitat restoration on top of and adjacent to the rock revetment are also proposed.

The proposed project raises numerous biological concerns including retention of, and concomitant dune restoration on, the emergency rock revetment, beach replenishment in and adjacent to an unusually rich and ecologically valuable marine ecosystem, use of source sand that does not match the existing beach sand, and ongoing maintenance activities including sand backpassing and future sand replenishment.

Broad Beach and the associated nearshore marine habitats are located in Malibu, California, along the shoreline within the geographic region commonly known as the Southern California Bight (Figure 1). Broad Beach falls within the Zuma Littoral Cell which extends alongshore for 30 km from Point Mugu to Point Dume (Figure 2). Broad Beach is also within the boundaries of the State Water Resources Control Board’s (SWRCB) Mugu-Latigo Area of Special Biological Significance (ASBS) established in the 1970s and the Point Dume State Marine Conservation Area (SMCA) established in

[1] Sand backpassing is the transfer of sand that accumulates at the east end of Broad Beach back up to the west end using heavy equipment.

January 2012 by the California Department of Fish and Wildlife (CDFW) under the Marine Life Management and Marine Life Protection Acts (Figure 3). In recognition of the rarity and sensitivity of marine habitats, the City of Malibu Land Use Plan (Policy 3.74) states that: “All Areas of Special Biological Significance and Marine Protected Areas shall be considered ESHA and shall be accorded all protection provided for ESHA in the LCP.” The LUP requires that marine ESHAs are protected against significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas. Further, the LUP requires that near shore shallow fish habitats and shore fishing areas must be preserved, and where appropriate and feasible, enhanced.

The nearshore marine habitats off Broad Beach are also designated as Essential Fish Habitat (EFH) under section 305(b)(6)(A) of the Magnuson-Stevens Fishery Conservation and Management Act and support two of the of the six Special Aquatic Site types (sanctuaries and refuges and vegetated shallows), that are given special recognition under Clean Water Act regulations[2]. Essential fish habitat (EFH) is that habitat necessary for managed fish to complete their life cycle. It is defined as those waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity. Whenever federal agencies authorize, fund, or carry out actions that may adversely impact EFH, they must consult with the National Marine Fisheries Service. Special Aquatic Sites are defined as: “Geographic areas, large or small, possessing special ecological characteristics of productivity, habitat wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region”. The Sanctuaries/Refuges designation applies to areas designated as such under state and federal laws or local ordinances. Vegetated Shallows are: “permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems…”

The California State Water Resources Control Board designated 34 regions along the coast as Areas of Special Biological Significance in order to preserve biologically unique and sensitive marine ecosystems from undesirable alterations in natural water quality. The Mugu-Latigo ASBS was designated due to the diversity of distinct marine habitats that collectively created a unique assemblage. The reconnaissance survey report prepared through an interagency effort between California Department of Fish and Game and the SWRCB for ASBS #24 (in March of 1979) states that the Trancas/Zuma beach is representative of these special open coast sandy beach habitats and possesses the most extensive untouched subtidal sand communities in the region. The survey report states that “the community structure of Trancas and Zuma is dominated by sand dollars, sea pansies, and pismo clams and the margins of the beach contain

[2] 40 CFR Part 230 –Section 404(b)(1) EPA and ACOE Guidelines for Specification of Disposal Sites for Dredged of Fill Material (EPA and ACOE) Subpart B – Compliance With the Guidelines, Subpart D-Potential Impacts on Biological Characteristics of the Aquatic Ecosystem, Subpart E. Potential Impacts on Special Aquatic Sites, Subpart H-Actions to Minimize Adverse Effects, Subpart J-Compensatory Mitigation for Losses of Aquatic Resources.

peculiar community interfaces between areas of rock and sand." The ASBS baseline report points out that the surfgrass (*Phyllospadix torreyi*), which commonly occupies these nearshore rock/sand interfaces and rocky intertidal zones is a very important member of the subtidal ASBS community and that its presence near the high energy surf zone tends to reduce wave energy, thus decreasing wave caused erosion. The report goes on to say that, "this true grass has roots which attach to the rocks; soil, which is rich in decaying organic material, accumulates around the roots. These soil areas contain a number of obligate understory species, including certain annelid worms (lumbrinereids) which clearly could not exist in these surf swept locations without the protection afforded by the surf grass roots. Other organisms have obligate relationships with the blades of this plant. [..] An important relationship has been demonstrated between surfgrass and the lobster, Panulirus interruptus." Phyllospadix, surfgrass, acts as a nursery for juvenile lobster and is apparently very long lived, up to 50 years, and recruits slowly. The ASBS baseline report concludes that, "This species [phyllospadix surfgrass] therefore warrants special protection from both physical removal and potential pollutants as it has a particularly important ecological role and is not easily replaced." Additionally, the report also identifies that there are extensive offshore rocky reefs at Lechuza point that support eel grass beds. Specifically it states that, "The bed at Lechuza Point has remained there for several years and is fairly large (2-5 meters wide x 40 meters long)."

Other sensitive and special resources identified in the Trancas Beach and Lechuza Point region include extensive sand dollar and pismo clam beds, tube worms, kelp forests, nearshore sand habitats, and sandy bottom habitats (offshore sands). The intent of the ASBS designation was to protect, maintain, and enhance these special marine resources and the overall water quality of the area. As such, this baseline report also included potential threats to the ASBS objectives. Of these, seepage from septic tank leaching along this stretch of the coast was identified as a primary threat to water quality and marine habitats. Additionally, the report also includes 'dredging and/or spoil disposal' as a potential point source pollution threat to the resources of the ASBS. The intent of the ASBS and the Ocean Plan is to maintain habitat integrity of these special marine resource areas even in those sections of the coast experiencing ongoing and intensifying coastal developments. This report was compiled and adopted long before the establishment of the Marine Protected Areas up and down California's coast, however, it includes the following statement, "Maintenance of habitat within the ASBS available for recolonization [of sensitive and valuable marine species] in the future is essential to assure continued recruitment and potential recovery of these species to their previous levels. In addition, this area can act as a reservoir for recruitment into nearby areas in which populations have been depleted by fishing pressure, adjacent land development and/or deteriorating water quality." According to the July 14, 2014 Revised APTR prepared by AMEC:

> *The Mugu-Latigo ASBS is the largest of the southern California mainland ASBS covering 24 miles of coastline and 18.5 sq. miles of ocean. The Mugu-Latigo ASBS was set aside, "not because of any single unique component or habitat, but because of the multiplicity of distinct habitats and organisms in a relatively*

> *healthy state, which collectively make the area unique." Specific organisms which were considered especially unique components of the ASBS at the time of its incorporation include: giant kelp, surfgrass, sand dollars, Pismo clams, tube worms, sea urchins, and California halibut. These organisms were recognized for their ecological dominance within the community structure, and/or their contribution as recreational or commercially important species.*

The Broad Beach area and beyond has recently been further recognized for its ecological significance by inclusion in the southern California Marine Protected Area (MPA) network. Great care, scrutiny, and effort went into establishing the boundaries of the MPAs within the network. Capturing representative intertidal and subtidal hard bottom habitat, which is relatively uncommon along the southern California shoreline (encompassing less than 20% of the nearshore habitat in Los Angeles and Orange Counties), required by the MPA science guidelines, was a challenge in southern California. This habitat type accounts for only 1% (39.3 acres) of the Point Dume SMCA[3]. The CDFW states the following about the Point Dume SMCA and the importance of the area within the proposed project boundaries:

> *The Point Dume SMCA/Point Dume SMR are an important cluster of MPAs that provide moderate or greater levels of key hard bottom habitats, including rocky shores, nearshore reefs (0-30 m), 30 m and deeper reefs, as well as biogenic habitats that are supported by nearshore reef habitats, including kelp and surfgrass. Moreover, the kelp and shallow 0-30 m hard substrate habitats within these two MPAs facilitate dispersal and connectivity along the mainland between the Campus Point SMR and the cluster of MPAs off Palos Verdes (Point Vicente No Take SMCA and Abalone Cove SMCA). These two habitats in particular exhibit patchy distribution along the mainland of the Santa Barbara Channel, and therefore are crucial to the fabric of the regional south coast MPA network habitat which was carefully crafted by a wide range of ocean users and informed by scientific input during the planning process for the south coast MPAs. The primary distribution of these habitats in the Point Dume SMCA is the western portion of the MPA in between Lechuza Point and Trancas Creek, directly conflicting with the proposed Project. In fact, the size of this MPA was created deliberately large enough to encompass this particular area containing these key habitats. Removal of any of this habitat may jeopardize the size and spacing requirements set forth by the MLPA South Coast Science Advisory Team, which in turn, may create a less effective South Coast network and may fail to meet the goals of the MLPA.*[4]

The specific protection provisions of the Point Dume SMCA state that the take of all living marine resources is prohibited except:

[3] See AMEC July 2014 APTR Table 3.3.4.
[4] Shuman, C. (CDFW Regional Manager, Marine Region). August 11, 2014. Revised Analysis of Impacts to Public Trust Resources for the Broad Beach Restoration Project. Comment Letter to Jason Ramos, California State Lands Commission.

1. The recreational take by spearfishing of white seabass and pelagic finfish is allowed.
2. The commercial take of swordfish by harpoon and coastal pelagic species by round haul net, brail gear, and light boat is allowed. Not more than five percent by weight of any commercial coastal pelagic species catch landed or possessed shall be other incidentally taken species.
3. Take pursuant to beach nourishment and other sediment management activities is allowed inside the conservation area pursuant to any required federal, state, and local permits, or as otherwise authorized by the department.

While the Point Dume SMCA regulations allow certain sand nourishment and other sediment management activities, significant burial of marine habitat is inconsistent with the intent of this provision. According to California Department of Fish and Wildlife staff: "The regulations that were established for the Point Dume SMCA do not have provisions to allow for significant or adverse impacts that would require compensatory mitigation within this area".[5]

The terrestrial and marine habitats in and immediately adjacent to the BBGHAD proposed project footprint include dunes (southern foredunes and coastal strand), lagoon mouth (Trancas Lagoon), upper sandy beach, intertidal sandy beach, rocky intertidal (bedrock, boulders, cobble at Lechuza Point), intertidal boulder, soft bottom subtidal that supports eelgrass beds and soft bottom epi- and infaunal invertebrates (e.g. sand dollar beds), hard bottom subtidal (bedrock and cobble rocky reef) that supports kelp beds and understory algae and invertebrates, as well as several special status species. While these habitats are treated separately here, they comprise a vital transition zone interconnected by complex physical and biological interactions that occur across variable spatial and temporal scales and that inexorably link the terrestrial and marine ecosystems.

Southern Foredunes and Coastal Strand

Dunes are a component of beach ecosystems[6]. The sandy beach lies between foredunes and the ocean and the amount of sand between the ocean and dunes varies and depends on several factors including sand supply, exposure and topography, wind and wave patterns, and presence of artificial features such as seawalls, rock revetments, and groins. Embryo dunes, also known as coastal strand habitat, are found at the seaward base of foredunes and are often initiated by kelp wrack which traps sand and seeds[7]. On open coasts, coastal strand vegetation is important in the formation of

[5] Revised Analysis of Impacts to Public Trust Resources for the Broad Beach Restoration Project, letter to California State Lands Commission, dated August 11, 2014.

[6] Barbour, M.G. T.Keeler-Wolf and A.A. Schoenherr. 2007. Terrestrial Vegetation of California. University of California Press, Berkeley, CA. 712 pp.

[7] Pickart, A.J., and J.O. Sawyer. 1998. Ecology and restoration of northern California coastal dunes. California Native Plant Society. Sacramento, CA.

hummocks that can become foredunes. This pioneering vegetation is often lost on armored beaches[8].

Dunes systems, one of the most dynamic habitat types on earth, are dependent upon, and highly influenced by, wind and wave action. These forces cause sand accretion or erosion, depending on their strength, which tends to follow seasonal patterns. Dunes form parallel to the prevailing winds and perpendicular to the coastline and support an array of native plants and animals uniquely adapted to this transition zone between land and sea. In addition to their habitat and aesthetic values, dune ecosystems are recognized for providing important protection to inland structures and lands from storm events.

Prior to residential development at Broad Beach, the beach was backed by dunes that extended to the base of coastal bluffs. The homes at Broad Beach are built in what once were dunes. Over the years, permitted and unpermitted development, in the form of backyard landscaping, patios, seawalls, sand bags, and rock revetments have encroached into the foredunes and coastal strand habitat. While dunes still exist at Broad Beach, they are a fragment of their former selves and the coastal strand has virtually been eliminated.

California dune ecosystems have suffered a disproportionately high amount of human impact because the coast is a highly desirable area for industry, tourism, recreation, and residential settlements[9]. As a result, dune ecosystems are listed as very rare by the CDFW Natural Diversity Database (CNDDB; southern foredunes, G2, S2.1; southern dune scrub, G1, S1.1)[10]. Section 30107.5 of the Coastal Act defines environmentally sensitive habitat (ESHA) as "*any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments*". The southern foredunes at Broad Beach rise to the level of ESHA because they are rare and are easily disturbed and degraded by human activities and development as shown by the significant loss of dune habitat and the high cover of non-native and invasive species.

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[8] Dugan JE, Airoldi L, Chapman MG, Walker SJ, and Schlacher T (2011) Estuarine and Coastal Structures: Environmental Effects, A Focus on Shore and Nearshore Structures. In: Wolanski E and McLusky DS (eds.) Treatise on Estuarine and Coastal Science, Vol 8, pp. 17–41. Waltham: Academic Press.

[9] Nordstrom, K.F. and N.P. Psuty, 1980. Dune District Management: A Framework for Shorefront Protection and Land Use Control. Coastal Zone Management Journal, V.7:1-23

[10] Global and State rankings represent a letter and number score that reflects a combination of rarity, threat, and trend factors, with weighting being heavier on rarity than the other two. G1 = Critically Imperiled-At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. G2 = Imperiled-At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors. S1= Critically Imperiled-Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state. S2= Imperiled-Imperiled in the state because of rarity due tvery restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

The dunes at the east end of Broad Beach were identified as ESHA by the commission in 2009. In addition to supporting dune morphology these dunes supported numerous native dune species including red sand verbena, *Abronia maritime*, a California Native Plant society 4.2 listed dune plant and globose dune beetles, *Coelus globosus,* ranked G1G2 S1S2 by the CDFW Natural Diversity Database (CNDDB).

Sandy Beach

Sandy Beaches are among the most threatened of all ecosystems under severe pressure from the combined impacts of global climate change and management actions to protect coastal properties, and loss of sand supply due to damming of rivers and armoring of coasts. Beaches are unique and dynamic ecosystems that link marine and terrestrial environments and are found on all continents of the world. Beach ecosystems consist of coastal dunes, upper beaches, and surf zones that form a single functional unit, exchanging organisms, sand, organic matter, and nutrients[11]. Along with their unique biodiversity and productive food webs, beaches provide ecological functions and services not supplied by any other open coast ecosystem[12,13]. These functions include filtering large volumes of seawater, accumulating and storing sand, wave dissipation and buffering, processing of organic matter, recycling of imported nutrients, supporting coastal fisheries and providing critical habitats (pupping, nesting and foraging sites) for wildlife species, such as marine mammals and birds[14]. While beaches are highly valued recreational areas that attract thousands of visitors and contribute greatly to coastal economies, their unique biodiversity and the ecological functions and resources supported by beach ecosystems are often under-appreciated[15].

Southern California sandy beaches can support some of the most diverse invertebrate communities ever reported for this coastal habitat[16]. According to Dugan and Hubbard:

Recent comparisons have shown that California's sandy beaches support some of the most diverse intertidal invertebrate communities ever reported for beach ecosystems with >45 species found in single surveys on a variety of beaches and >105 species recorded in southern and central regions (Straughan 1983, Dugan et al. 2000, 2003, Schooler et al. 2013, in prep.). Crustaceans, polychaete worms and mollusks are major intertidal invertebrate groups on California beaches and elsewhere. Endemic insects, including a number of flightless beetles, form an important element of the diversity of California's beaches. It is highly likely that numerous additional species are present on California beaches but

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11 Schlacher, T.A, and A.R. Jones, J.E. Dugan, M.A. Weston, L. Harris, D.S. Schoeman, D.M. Hubbard, F. Scapini, R. Nel, M. Lastra, A. Mclachlan, C.H. Peterson. 2014. Open-Coast Sandy Beaches and Coastal Dunes In: Coastal Conservation, eds. B. Maslo and J.L. Lockwood. Cambridge University Press. Pgs. 37-98.

12 Dugan, J. E. and D. M. Hubbard. Sandy Beach Ecosystems. in: Ecosystems of California – A source book. Mooney, H. and E. Zavaleta, eds. University of California Press.

13 Schlacher, T.A., J. Dugan, D.S. Schoeman, M. Lastra. A. Jones, and F. Scapini. 2007. Sandy Beaches at the Brink. Diversity Distrib. V. 13:556-60.

14 Ibid

15 Schlacher et al. 2007 ibid.

16 Dugan, J.E., Hubbard, D.M., Engle, J.M., Martin, D.L., Richards, D.M., Davis, G.E., Lafferty, K.D., and R.F. Ambrose. 2000. Macrofauna communities of exposed sandy beaches on the Southern California mainland and Channel Islands. Fifth California Islands Symposium, OCS Study, MMS 99-0038: 339-346.

identification of several important taxa, including infaunal polychaete worms and wrack-associated insects are presently limited by taxonomic knowledge. [17]

The abundant invertebrates of beaches provide prey for a remarkably rich assemblage of shorebirds averaging > 100 birds per kilometer year round for some southern California beaches[18]. Shorebird use of beaches has been positively correlated with the availability of invertebrate prey and wrack as well as beach type, width and condition[19]. A number of nearshore fish species feed on beach invertebrate providing a trophic link to subtidal food webs. The threatened western snowy plover and California least tern nest and rear their chicks on open coast and sheltered beaches in the region.

In the early 1970's Broad Beach reached an average width of approximately 70 feet. It is thought that Broad Beach was particularly wide at this time due to sediment disposal from construction of Pacific Coast Highway. From 1974 to 2009 Broad Beach lost approximately 600,000 cubic yards of sand, causing the shoreline to move inland 65 feet or more (Moffat and Nichol 2012). The narrowing of the beach appears to be the result of a combination of natural and anthropogenic factors; the natural ebb and flow of sand in the Malibu littoral cell, sea level rise, dams, and sand bags and other development [20]. It is important to note that even at it widest, the west end of Broad Beach supported significant cover of intertidal and subtidal hard bottom habitat. Aerial photos spanning from the 1970's to the present show that the west end has consistently supported hard bottom habitat with only a sliver of sandy beach [21] (Figure 4).

The high intertidal zone of southern California beaches are home to a remarkable diversity of invertebrates, many of which are associated with stranded kelps and algae. These animals make up an average of 40% of the intertidal species of beaches in the region that are not subject to grooming or nourishment or other impacts[22]. As recently as August 2002, the eastern reach of Broad Beach supported a diverse assemblage of upper beach invertebrates (14 species) including talitrid amphipods, oniscoid isopods and flightless beetles, all of which have direct development with no larval stages and low dispersal rates as adults. To persist at a given beach, these types of animals rely largely on the reproduction of resident populations. When resident populations of these types of animals are impacted, recovery can be protracted and intervention may be required to reestablish populations. For example, formerly widespread populations of

[17] **Dugan & Hubbard. 2014. Op. Cit.**

[18] Hubbard, D.M., and J.E. Dugan. 2003. Shorebird use of an exposed sandy beach in southern California. Estuar. Coastl. Shelf Sci. 58S: 169-182.

[19] Dugan, J.E., D.M. Hubbard, D.L. Revell, and S. Schroeter. 2008. Ecological effects of coastal armoring on Sandy Beaches. Marine Ecology, v. 29: 160-170

[20] Patsch, K. & G. Griggs. 2006. Littoral Cells, Sand Budgets, and Beaches: Understanding California's Shoreline. University of California, Santa Cruz. Institute of Marine Sciences. California Department of Boating and Waterways, California Coastal Sediment Management WorkGroup Brochure.

[21] Coastal Records Project, http://www.californiacoastline.org; Google Earth Historical Images

[22] Dugan, J.E., Hubbard, D.M., McCrary, M., and M. Pierson. 2003. The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. Estuar. Coastl. Shelf Sci. 58S: 133-148.

upper beach isopods (Tylos, Alloniscus) have largely disappeared from many major littoral cells in southern California[23].

Trancas Lagoon

Trancas Creek is a seasonal creek in the Santa Monica Mountains that empties into the ocean at the east end of Broad Beach where it forms a small lagoon. Trancas Creek is typically dry in the summer (with isolated ponds along it course) with periodically flowing water in the winter. In the summer the lagoon mouth is typically blocked from the ocean by a sand berm that is breached during high water flow in the winter. Historically Trancas Creek supported the endangered southern steelhead trout (*Oncorhynchus mykiss*) but they have not been observed in the creek since the 1980's. The endangered southwestern pond turtle is currently present in the creek. The Resource Conservation District of the Santa Monica Mountains is currently developing a publicly funded lagoon restoration plan that will increase lagoon habitat and opportunities for the lagoon to breach and remain connected to the ocean for longer periods under regular storms events because tidal connectivity is critical to the health of lagoon ecosystems, and to the passage of in-migrating and smolting steelhead trout.

Intertidal Hard Bottom (Lechuza Point and Boulder Field)

The rocky intertidal zone is a compact and diverse area located in the transition zone between terrestrial and marine habitats. This area, exposed for part of the day and covered for the rest, is characterized by marine organisms adapted to physical disturbance, severe temperature fluctuations, and predators from both terrestrial and marine environments. In southern California over 1,000 species of algae and invertebrates inhabit this zone[24].

East of Lechuza Point is a boulder field that is subject to seasonal sand cover and is characterized by species especially adapted to sand inundation including green algae and barnacles in the high intertidal zone, fleshy red algae including *Gracilaria andersonii*, *Ceramium sp.* and *Masaella leptorhynchos* in the mid-intertidal, and feather boa kelp*, Egregia menziesii* and surfgrass, *Phyllospadix sp.* in the low-intertidal. Ochre sea stars, *Pisaster ochraceus*, occur in significant numbers in the mid and low intertidal zones.

Soft Bottom Subtidal Habitats

Eelgrass beds (*Zostera spp.*) are considered to be one of the most productive habitat types found on soft-bottom substrate. Eelgrass typically grows in sandy, sheltered areas, such as estuaries and protected coastlines, where there is adequate protection from waves and storms. It is quite unusual to have such an extensive bed of eelgrass at Broad Beach given that it is relatively exposed to wave action – eelgrass is more typically found inside protected areas like harbors and bays. It is found in protected

[23] Hubbard, D.M., J. E. Dugan, N.K. Schooler, S. Viola. Local extirpations and regional declines: the case of endemic upper beach fauna in southern California. Est. Coastl Shelf Sci. 150: 67-75

[24] CDFW. 2009. Regional Profile of the MLPA South Coast Study Region (Point Conception to the California-Mexico Border. California Marine Life Protection Act Initiative.

areas around the Channel Islands and perhaps it is protected by its position tucked inside Lechuza Point.

The soft bottom habitat of the region supports a diverse and abundant infauna (animals that live in the substrate), with as many as 1,200 infaunal species having been reported from Santa Monica Bay. The abundance and distribution of infauna varies seasonally and inter-annually; however, infauna at Broad Beachare usually dominated, in both number of species and individuals, by polychaete worms. Other important infaunal groups in the region include crustaceans, mollusks, and echinoderms (Phylum Echinodermata).

During a 2010 subtidal survey of Broad Beach (Chambers Group 2012c), sand dollar beds were observed at depths of between 10 and 14 ft along the eastern half of the site. Other characteristic organisms observed in this area were tube worms, *Diopatra ornata*; sea pens, *Stylatula elongate*; sea pansies, *Renilla kollikeri*; and several species of crabs; *Cancer gracilis, Randallia ornata*, and *Heterocrypta occidentalis*. These species were also observed during subtidal dive surveys conducted in June 2014 (Moffatt & Nichol 2014).

Pismo clams have historically occurred in the shallow sand bottom habitats off the eastern end of Broad Beach and are most common at depths of 10 to 20 feet, while the little neck clam is found in coarse sand and gravel near rocky areas. No live pismo clams have been observed but empty shells have been observed suggesting the species may still be present in the area.

Hard Bottom Subtidal Habitats

Kelp forests are underwater areas characterized by hard substrate that supports a high density of kelp. Along the coast of California the brown alga that makes up the forest is called giant kelp or *Macrocystis pyrifera*. Kelp forests are recognized as one of the most productive and dynamic ecosystems on earth[25]. Kelp forests provide a unique three-dimensional habitat for a host of marine organisms including algae, invertebrates, fish as well as marine mammals and birds. From the holdfasts to the surface mats of kelp fronds, the array of habitats on the kelp itself may support thousands of invertebrate individuals, including polychaetes, amphipods, decapods, and ophiuroids.

Extensive reefs occur off Lechuza Point, with the reefs becoming increasingly scattered proceeding east from Lechuza Point. Shallow subtidal surveys conducted in the Broad Beach area identified surfgrass, eelgrass, giant kelp, feather boa kelp, southern palm kelp, *Eisenia arborea*, palm kelp, *Pterygophora californica*, and gorgonians*, Muricea californica* and *M. fruticosa* (Chambers Group 2012(c)). Similar species were identified during targeted dive surveys in June 2014 (Moffat and Nichol 2014). The areal extent of the various subtidal habitats offshore Broad Beach were determined using dive transect surveys, multi-spectral aerial surveys, and sidescan sonar surveys occurring primarily in 2012, 2013, and 2014.

[25] Foster, M.S. and D.R. Schiel. 1985. The Ecology of Giant Kelp Forests in California: A Community Profile. U.S Fish & Wildlife Service. Biological Report 85 (7.2). 152pp.

In recognition of the rarity and sensitivity of marine habitats, the City of Malibu Land Use Plan (Policy 3.74) states that: "All Areas of Special Biological Significance and Marine Protected Areas shall be considered ESHA and shall be accorded all protection provided for ESHA in the LCP." The LUP requires that marine ESHAs are protected against significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas. Further, the LUP requires that near shore shallow fish habitats and shore fishing areas must be preserved, and where appropriate and feasible, enhanced.

The City of Malibu is the only location along the coast of California that has taken the position that marine habitats identified as ASBS or MPA rise to the level of ESHA. The Commission fully recognizes the value and sensitivity of marine habitats and typically reviews proposed uses within and adjacent to such habitats for compliance with sections 30230, 30231, and 30233 of the Coastal Act.

Sensitive Species

The California grunion (*Leuresthes tenuis*) is a sardine-sized fish endemic to the coast of California. It is unusual because it comes ashore on sandy beaches to spawn. Although grunion are not listed as threatened or endangered, the National Marine Fisheries Service (NMFS) requires that their eggs be protected from disturbance. In addition, grunion are protected under the Malibu General Plan, which recognizes their spawning grounds as a sensitive marine resource.

Dr. Karen Martin, biology professor, Pepperdine University, studies grunion and said that grunion used to run at Broad Beach (pers. Comm. Nov. 2014). Dr. Martin has observed significant runs at Broad Beach described in her deposition following a 2005 encounter with bulldozers on Broad Beach. In an email dated November 21, 2014, Dr Martin stated that "grunion ran on the entire length of Broad Beach both before and after the 2005 grading and its removal. Obviously, they do not run there now as there is a great wall in the intertidal zone". She also stated that "grunion run at Zuma and at Trancas. I think they also run at Lechuga (sic) sometimes, but again, hard to access at night. There is a long history of them running at Zuma".

According to a CCC violation letter[26] documenting the 2005 bulldozing event at Broad Beach,

> *Broad beach is also demonstrated grunion habitat. Your employees who were operating the earthmovers indicated that the grading of the beach began on June 1, 2005. Unfortunately, this coincided with one of the first grunion runs of the season. Most grunion eggs that were laid during this run (c. May 25-28) would have hatched by June 7. These eggs were very likely destroyed by your activity. More significant is the fact that the habitat was altered in a way that will certainly*

[26] Douglas, P. (CCC Executive Director). June 8, 2005. Notice Prior to Issuance of Executive Director Cease and Desist Order for Violation No. V-4-05-060 and Notice of Intent to Commence Cease and Desist and Restoration Order Proceedings. To: Marshall Grossman and Winifred Lumsden.

> *reduce the breeding success of grunion that continue to spawn on this beach (current run is scheduled June 8-11 and the next is scheduled June 23-26). The impacts are two-fold with respect to grunion spawning. First, the intertidal area was effectively lowered and made more uniform. Therefore, waves will reach the beach nearest the land more frequently than before and will tend to wash out eggs prematurely. Second, the foot of the steep berm is still within the intertidal zone, so the berm acts as a seawall reflecting waves and further increasing the likelihood that grunion eggs will be washed out of the sand prematurely.*

Grunion runs were monitored at Broad Beach between March and August 2010. While no grunion were observed in the Broad Beach area due to the lack of a beach during spring tides, grunion were observed to spawn just east of Broad Beach on Zuma Beach near Trancas Creek.

Western snowy plover, listed as federally threatened, have been observed historically and recently on Broad Beach and are known to roost in numbers along Zuma Beach. They feed in the rocky intertidal zone near Lechuza Point and on the east end near Trancas. The Commission considers beach areas that support grunion runs to be sensitive habitat and has required special protection for them during grunion season. The Commission recognizes western snowy plovers and their nesting habitat as ESHA.

Broad Beach clearly supports a unique occurrence of sensitive and diverse terrestrial and marine habitats in close proximity that are recognized as special and deserving protection. Retention of the rock revetment, dune restoration over and around the revetment, and beach nourishment, in and immediately adjacent to this special arrangement of sensitive habitats that are vulnerable to disturbance, raises serious concerns including the potential for habitat loss due to burial and changes to community structure and function as described in detail below.

Retention of Rock Revetment and Dune Restoration

Prior to placement of the emergency rock revetment, Broad Beach was characterized by a mish mash of seawalls, concrete bags and blocks, rock revetments, and sand bags (filled with sand from Broad Beach) placed with and without permits by numerous individual home owners. In addition, long sand berms parallel to the ocean have been built several times without permits using heavy equipment and sand from the lower beach. All of these activities have contributed to the continued loss of sand at Broad Beach. While the applicant purports that the loss of sand is due to a regional pattern of sand loss that has persisted since the beach was broadest in the 1970's, Commission staff attribute the narrowing of Broad Beach to the above activities as well as natural patterns and dams, harbors, seawalls, groins and other development that blocks and impedes sediment.

The effects of alongshore coastal armoring on the physical features of open-coast beaches are well described and documented[27]. Any type of structure placed in a

[27] Griggs, G.B., 2010, The effects of armoring shorelines—The California experience, *in* Shipman, H., Dethier, M.N., Gelfenbaum, G., Fresh, K.L., and Dinicola, R.S., eds., 2010, Puget Sound

coastal setting will alter hydrodynamics and modify the flow of water, wave regime, sediment dynamics, grain size and deposition processes. In soft-sediment habitats, the loss of original habitat that is covered by the footprint of man-made coastal structures is a primary impact, along with the altered coastal hydrodynamic processes in the remaining and adjacent habitats. Beach widths are reduced seaward of shore-parallel structures, initially in response to placement loss, followed by the ongoing effects of passive[28] and active erosion. These physical changes may result in reduction or loss of key beach system exchanges and functions, including organic and inorganic material transfers (detritus, nutrients, prey, and sediments), water filtration, and nutrient uptake [29]. They can also result in ecological changes to both intertidal and subtidal benthic communities such as complete loss of habitat components (e.g. upper beach), community structure alterations (changes in organism abundance and species richness) and disruption of predator-prey interactions.

Placement of the rock revetment at Broad Beach in 2010 resulted in direct permanent loss of a significant amount of southern foredune, sandy intertidal, and sandy subtidal habitat. The location of the revetment seaward of all previous coastal structures has caused increased erosion such that beach area is only exposed during the lowest tides. Today there are no longer any southern foredunes, coastal strand, or dry upper beach in front of the revetment and there has been a significant loss of sandy intertidal habitat. In addition, while connection between the beach and dunes was already hampered by previous coastal structures, the rock revetment has greatly exacerbated this loss of connectivity.

The applicant now proposes to retain the rock revetment in the existing location and to use quarry sand to construct dunes over the top of the revetment. Restoring a dune system on top of and beyond the rock revetment is without precedent and is not ideal for numerous reasons including:

(1) The revetment is stationary and dune systems are not; dunes are dynamic, growing, shrinking and moving in response to seasonal patterns of wind and wave energy and storms[30],

(2) The planned depth of sand on top the revetment is 2 to 3 feet. This shallow veneer of sand could be lost in a short amount of time exposing the revetment,

(3) The sand proposed for dune restoration is poorly sorted and has a larger mean grain size than the existing dune sand which will make establishment of natural dune morphology and native dune plants more challenging if not impossible,

(4) The sand moisture/nutrient content needed to establish and sustain native vegetation will likely be strongly affected by presence of the rock revetment- also impeding the establishment of vegetation. Dune and coastal strand vegetation

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Shorelines and the Impacts of Armoring—Proceedings of a State of the Science Workshop, May 2009: U.S. Geological Survey Scientific Investigations Report 2010-5254, p. 77-84..

[28] Whenever a hard structure is built along an eroding coastline, the shoreline eventually migrates landward on either side of it.

[29] Dugan et al. 2008. Ibid.

[30] Southern foredunes at Broad Beach are already impeded landward by residential development but the rock revetment further impedes the natural function of the dunes.

rely on very long root networks to anchor plants and reach water. The rock revetment may not allow this, and
(5) Colonization by globose dune beetles and silvery legless lizards, *Anniella pulchra pulchra*, (a California Species of Special Concern) is unlikely because of the mismatched sand and the rock revetment barrier.

Beach Replenishment

The applicant proposes to use 600,000 cu. yds. of sand to restore dunes and replenish the beach. The primary biological resource concern raised by this is the potential for direct or indirect burial of the beach and nearshore habitats. Burial of habitats will result in mortality of species that cannot tolerate the amount of sand and/or are not sufficiently mobile to flee to other areas. Based on detailed surveys (field surveys, multi-spectral aerial photography and sidescan sonar) of existing marine resources in the project area, the applicant quantified the areas within the various habitat categories and determined, based on the project footprint design, those areas that would be directly impacted by sand fill.

While the applicant acknowledges that direct burial of intertidal and subtidal hard bottom and eelgrass habitat is a permanent impact, they consider direct sand placement on sandy bottom, both intertidal and subtidal, to be a temporary impact, regardless of the depth of coverage. They argue that these habitats are adapted to periodic burial and that although the initial placement of many feet of fill in sandy habitats would result in substantial mortality of species, they conclude that sandy bottom organisms would re-colonize these areas quickly. We do not agree for several reasons:

(1) Direct burial results in mortality of most or all organisms covered. Recolonization/ recruitment/recovery will take time and requires local source populations of larva, or propagules from nearby healthy beaches which may or may not support the same community assemblage,
(2) Recolonization is dependent on larval or other sources of propagules whose availability is influenced by daily, monthly, seasonal, yearly, and decadal patterns which are constantly changing[31],
(3) Loss of mature population size structure and long-lived taxa like pismo clam,
(4) Temporal loss of ecosystem services and function that may last many years and possibly a decade or more,
(5) Impacts from use of mismatched sand (larger mean grain size and poorly sorted) – expectation is that many species won’t recolonize/survive after beach conditions change, and
(6) Continual disturbance from backpassing and anticipated need for future replenishment; the AMEC APTR July 2014 Executive Summary states that the beach could last for three years or less.

[31] Many species in intertidal/subtidal sand do not have planktonic or other types of larvae (e.g amphipods, isopods, insects)

The applicant estimated potential indirect burial impacts by modeling the areas outside the sand placement footprint where sand is expected to migrate over time. Again, the applicant considers indirect impacts to sandy bottom habitats (intertidal and subtidal) temporary for the reason described above. With regard to other habitat types, the applicant's position is that the threshold for determining indirect permanent impacts to marine resources resulting from burial by sand is one foot of sand that buries rocky habitats for more than one year (1 foot/1 year). In other words, the applicant has asserted that rocky areas where sand burial resulting from the proposed beach fill would be less than 1 foot deep as measured 1 year after the placement of sand on the beach should not be considered a permanent impact.

This threshold that has no scientific basis; t is impossible to come up with a single threshold for temporary vs permanent impacts because individual algal and invertebrate species inhabiting nearshore marine habitats are more or less adapted to sand inundation and all respond differently. Regardless, Commission ecologists, as well several agency biologists (pers. comm. Bryant Chesney, NMFS; Becky Ota, CDFW; William Paznokas, CDFW, Bonnie Rogers, Army Corp of Engineers, Jason Ramos, California State Lands Commission, and LB Nye, Environmental Protection Agency, October 28 & 29, 2014) agree that most nearshore marine organisms likely suffer mortality and/or are severely compromised under less than a foot of sand burial for less than a year.

Very few peer-reviewed studies have been conducted on nearshore algal and invertebrate species' tolerance to sand burial. The few that have been published suggest that for many species mortality occurs well before the applicant's threshold. For instance, research on the effect of short term (12 days) sediment burial on eelgrass (*Zostera marina*) mortality and productivity found that survival and productivity were substantially reduced when only 25% of the plant height was buried and that when plants were buried to 75% of their height all the plants died. The study results indicate that eelgrass can only tolerate short term burial that covers less than half of the plants height[32]. Similarly, research on the effect of sediment burial on surfgrass (*Phyllospadix scouleri*) showed that short term (15 days) burial results in shoot mortality, decreased shoot counts and reduced growth[33]. A species that is often found in areas characterized by seasonal sand inundation is the aggregating anemone, *Anthopleura elegantissima.* It has been observed to resist shallow sand burial by extending its columns so that the oral disc and tentacles reach the surface[34]. However, Sebens

[32] Mills, K.E. & M.S. Fonesca. 2003. Mortality and productivity of eelgrass *Zostera marina* under conditions of experimental burial with two sediment types. Marine Ecology Progress Series. Vol. 255: 127-134.

[33] Craig, C., S.Wyllie-Echeverria, E. Carrington & D. Shafer. 2008. Short-Term Sediment Burial Effecs on the Seagrass *Phyllospadix scouleri*. EMRRP Technical Notes Collection (ERDC TN-EMRRP-EI-03). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[34] O'Brian, P.Y. and M.M. Littler. 1977. Biological Features of Rocky Intertidal Communities at Coal Oil Point, Santa Barbara County, California. In: Littler M.M. (ed.) Spatial and Temporal Variations in the Distribution and Abundance of Rocky Intertidal and Tidepool Biotas in the Southern California Bight. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. pp.317-405.

suggested that survival of aggregating anemones buried deeper for 3 months or greater was due to body tissue metabolism[35]. The sand burial depth and length of time that would result in mortality is not known but is likely less than 1 foot for 1 year. Because of the questionable validity of the applicant's threshold, intensive monitoring of the nearshore marine habitats, before project construction and after project construction for the life of the permit is necessary.

Following are the applicant's estimates of the areas (in acres), by habitat type, that would potentially be impacted directly or indirectly by the proposed project[36]:

	Direct Burial (acres)		**Indirect Burial (acres)**	
Habitat Type	**Permanent**	**Temporary***	**Permanent**	**Temporary***
Surfgrass	0.96	0	0.96	0.96
Kelp	0	0	1.70	3.50
Kelp attached to bedrock	0	0	0.88	2.30
Rocky Outcrop	0.02	0	0.02	0
Bedrock Intertidal	0.03	0	1.91	0
Bedrock Subtidal	0	0	0.08	0.16
Cobble/Rubble Intertidal	1.20	0	1.37	0
Cobble/Rubble Subtidal	0.06	0	2.60	2.80
Boulder Field	0.71	0	0	0.71
Sandy Bottom Intertidal	2.25	20.5	2.25	22.8
Sandy Bottom Subtidal	0	13.5	0	51.8
Total	5.23	34	11.77	85.03

Clearly, as shown by the chart above, the proposed beach replenishment will have significant permanent adverse impacts (loss of habitat/habitat conversion) eelgrass and intertidal and subtidal hard bottom habitats including surfgrass and kelp forest that are inconsistent with sections 30230, 30231, and 30233 of the Coastal Act. We also believe that the proposed beach replenishment will have significant permanent adverse impacts on intertidal and subtidal soft bottom habitats for the reasons just laid out above and those bellow.

While beach replenishment is often considered the most environmentally sensitive method ("soft solution") for maintaining eroding shorelines, the ecological consequences are poorly understood. Beach replenishment has been conducted on a large regional scale for years in southern California with little scientific evaluation of the direct or cumulative ecological effects on beach ecosystems[37]. Despite a lack of information from

[35] Sebens, K.P. 1980. The Regulation of Asexual Reproduction and Indeterminate Body Size in the Sea Anemone *Anthopleura elegantissima* (Brandt). Biological Bulletin Marine Biological Lab, Woods Hole, V. 158:370-382.

[36] The values in this chart were compiled from tables of Estimated Predicted Temporary Impact of Direct Fill and Indirect Fill to Vicinity, prepared by Moffat & Nichol, June 26, 2014

[37] Orme, A.R., J.G. Zoulas, G.B. Griggs, C.C. Grandy, D.L. Revell, & H. Koo. 2011. Beach Changes along the Southern California Coast during the 20th Century: A Comparison of Natural and Human Forcing Factors. Shore & Beach, v. 79 (4): 38-50.

California, the ecological impacts of beach replenishment on beach organisms are severe, often resulting in 100% mortality with lasting effects moving up the food web to shorebirds [38,39]. The ecological impacts (alterations in diversity, abundance, and distribution) from beach replenishment projects can persist requiring years for recovery of important invertebrate species[40,41]. The use of source sediments that are finer or coarser than the native beach sand causes greater and longer lasting ecological impacts to beach organisms[42],[43]. Ecological recovery following direct and indirect impacts of beach replenishment depends on successful recolonization and recruitment of the respective habitat organisms and reprieve from subsequent disturbance.

The physical and biological characteristics of beaches are driven largely by physical attributes such as exposure, orientation, wave energy regime, currents and tides, and material type. While beaches come in all shapes and sizes, a key feature that distinguishes beaches is the material they are made of, which is typically sand (some beaches are made of gravel, cobble, or boulders). Sand is a granular material composed of rock or mineral particles. It is defined by size, being finer than gravel and coarser than silt. According to the Wentworth scale very fine and fine sand is 0.0625 to 0.25 mm in diameter, medium sand is 0.25 to 0.50 mm in diameter, and coarse and very coarse sand is 0.50 to 2.0 mm in diameter. The composition of sand varies, but a common constituent of sand is the mineral quartz.

In addition to grain size and material type, sand color, angularity, and level of sorting are also key factors impacting the physical and biological character of respective beaches. Color influences the temperature of the sand and often dictates organism adaptations such as camouflage and thermal adaptations. Angularity (or roundness), a description of the degree of abrasion of particles, as shown by the sharpness of edges and corners of the grains, impacts the types of organisms that can survive in the sand (i.e. whether soft-bodied organisms can persist or only organisms with outer shells or carapaces for protection). And level of sorting, or range of grain sizes, determines whether large voids exist between grains, or if voids between larger grains are filled with finer grains and tends to select for infaunal organisms that are generalists in terms of grain size vs specialists that are adapted to a specific range of sand grain size.

The overall shape of a sandy beach is affected by the grain size and type of sand, the typical wave energy regime, and the influence of nearby rocky reefs, headlands and

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[38] Speybroeck, J., D. Bonte, & W. Courtens. 2006. Beach nourishment: An ecologically sound coastal defence alternative? A review. Aquatic Conservation Marine and Freshwater Ecosystems, V.16: 419–435.

[39] Peterson, C.H., M.J. Bishop, G.A. Johnson, L.M. D'Anna & L.M. Manning. 2006. Exploiting beach filling as an unaffordable experient: Benthic intertidal impacts propagation upwards to shorebirds. Journal of Experimental Marine Biology and Ecology, V. 338: 205-221.

[40] Peterson Op Cit.

[41] Peterson, C.H., M.J. Bishop, L.M. D'Anna, & G.A. Johnson. 2014. Multi-year persistence of beach habitat degradation from nourishment using coarse shelly sediments. Science of the Total Environment, V.487:481-492.

[42] Speybroeck et al. 2006. Ibid.

[43] Peterson et al. 2014. Ibid.

man-made structures on wave exposure and water circulation[44]. Sandy beaches have three major components; the beach face, beach berm, and back beach. The beach face is the zone of most active change; its slope can vary from a few to as many as 10 degrees[45]. The major factors governing the slope of the beach face and the movement of sand grains on the slope are sand grain size, wave height, and wave period/length. Sand grain size is fundamental in controlling percolation of water into the sand and thereby the amount of water in the surface backwash and the amount returning through the sand. This in turn contributes to the shape of the beach face because the amount of surface return flow is a factor in the movement of sand grains on the beach. Coarse sand beaches with a high amount of percolation have steeper faces than fine sand beaches because they have less surface backwash and therefore less seaward movement of the sand grains.

Under accreting beach conditions, a berm forms at the top of the beach face. Except on very flat beaches, the berm has a well-defined crest at the seaward edge. The beach behind the berm varies in width and character depending on many factors including decadal, yearly, and seasonal littoral cell sand volume patterns, storms, and presence of a back beach barrier such as a bluff or development. The sands of the upper beach are generally more fine-grained and better sorted compared to the beach face. The upper beach may transition into dunes in the absence of a bluff or development. Coastal sand dunes occur where there is a supply of sand, wind to move it, and a place for the sand to accumulate. Dune accumulations occur above the spring high-tide line and the back beach forms the seaward boundary of the dunes and supplies the sand.

Surf regime and sand grain characteristics allow beaches to be described in terms of morphodynamic state or type, ranging from dissipative to reflective conditions. Beach slope, sand grain size, and the wave-breaking and nearshore circulation patterns differ along the gradient from dissipative to reflective beaches. Dissipative beaches have wide, high energy surf zones that dissipate large amounts of incoming wave energy before it reaches the intertidal swash zone. These wide flat beaches typically have very fine sand and laminar, long period swash climates[46]. Reflective beaches have very narrow surf zones where waves break near or directly on the shore and some wave energy is reflected seaward. Reflective beaches generally have coarse sediments, steep slopes, and short period, turbulent swash climates. The majority of beaches in California and across the globe are intermediate type beaches that lie within the broad spectrum between dissipative and reflective types and represent a wide range of sizes and shapes as well as sand grain sizes[47]. Sandy beaches, particularly intermediate types, can exhibit seasonal shifts in morphodynamic state in response to storm and

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[44] Orme, A.R., J.G. Zoulas, G.B. Griggs, C.C. Grandy, D.L. Revell, & H. Koo. 2011. Beach Changes along the Southern California Coast during the 20th Century: A Comparison of Natural and Human Forcing Factors. Shore & Beach, v. 79 (4): 38-50.

[45] Bascom, W. 1980. Waves and Beaches. Anchor Books. Garden City, New York. 366 pgs.

[46] McArdle, S. B. & A. McLachlan. 1992. Sand beach ecology: Swash features relevant to the macrofauna. Journal of Coastal Research, V.8:398–407.

[47] Dugan, J. E. and D. M. Hubbard. 2014. Sandy Beach Ecosystems. in: Ecosystems of California – A source book. Mooney, H. and E. Zavaleta, eds. University of California Press.

swell conditions. However, a beach of coarse sediments may remain reflective and a fine-sand beach may remain dissipative regardless of wave conditions[48].

Grain size also strongly affects the structure and diversity of benthic invertebrate communities[49] including those on open coast sandy beaches[50,51,52]. Burrowing performance of benthic animals is strongly influenced by grain size with subsequent effects on their distribution and abundance in different habitats. On open coast beaches, due to the fact that survival in the turbulent wave wash depends on burrowing speed and ability, the distributions of many species of intertidal macroinvertebrates are strongly linked to sand grain size[53,54,55]. When sand grain size exceeds the tolerance of a particular species or group of taxa, those species can be directly excluded from the beach and/or experience reduced growth, reproduction and lifespans. Important beach taxa that are known to be sensitive to sand grain size include clams, crabs, amphipods, isopods and polychaetes[56,57,58]. These taxa make up the majority of the biomass and abundance of intertidal animals on southern California beaches and are very important prey for birds and fishes[59].

Beaches with coarse sediments support much lower biodiversity than beaches with fine to medium sand[60,61]. For example, sand grain size was identified as a very important physical factor influencing the intertidal community structure of sandy beaches during the South Coast MPA baseline study[62]. The species richness and abundance of the

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[48] Bryant 1982

[49] Johnson, R. G. 1971. Animal-sediment relations in shallow water benthic communities. Marine Geol., V.11: 93-104.

[50] McLachlan, A. & A. Dorvlo. 2005. Global patterns in sandy beach macrobenthic communities. Journal of Coastal Research, V.21(4), 674–687.

[51] Rodil, I.F. & M. Lastra. 2004. Environmental factors affecting benthic macrofauna alog a gradient of intermediate sandy beaches in northern Spain. Estuarine, Coastal and Shelf Science, V. 61 (1): 37-44.

[52] Peterson et al. 2014. Ibid.

[53] R. Nel, A. McLachlan & D. Winter. 1991. The Effect of Sand Particle Size on the Burrowing Ability of the Beach Mysid *Gastrosaccus psammodytes* Tattersall. Estuarine, Coastal and Shelf Science, V. 48: 599-604.

[54] R. Nel, A. McLachlan & D. Winter. 2001. The effect of grain size on the burrowing of two *Donax* species. Journal of Experimental Marine Biology and Ecology, V. 265:219-238.

[55] Dugan, J.E., D.M. Hubbard & M. Lastra. 2000. Burrowing abilities and swash behavior of three crabs, *Emerita analoga* Stimpson, *Blepharipoda occidentalis* Randall and *Lepidopa californica* Efford (Anomura, Hippoidea), of exposed sandy beaches. J. Exp. Mar. Biol. Ecol., V.255(2): 229-245.

[56] Nel et al. 2001. Ibid.

[57] Dugan et al. 2000. Ibid.

[58] Viola, S.M., D.M. Hubbard, J.E. Dugan & N.K. Schooler. 2013. Burrowing inhibition by fine textured beach fill: Implications for recovery of beach ecosystems. Estuarine, Coastal and Shelf Science, pgs 1-7.

[59] Dugan et al. 2003. Ibid.

[60] McLachlan, A. 1996. Physical factors in benthic ecology: effects of changing sand particle size on beach fauna. Marine Ecology Progress Series, V.131:205-217.

[61] McLachlan & Dorvlo. 2005. Ibid.

[62] Dugan J. E., Hubbard D.M., Nielsen K.J., Altstatt J., and J. Bursek. In review. Baseline Characterization of Sandy Beach Ecosystems along the South Coast of California. Final Report for the South Coast Marine Protected Area Baseline Study to California Ocean Protection Council and California Sea Grant.

intertidal invertebrate community of beaches were negatively correlated with sand grain size (species richness: $r = 0.775$, $p < 0.005$; log abundance: $r = 0.738$, $p < 0.01$) (Figure 5, Figure 6). Beaches with the finer sand (0.200-0.300 mm) that is typical of the region[63] support a much greater number and abundance of intertidal species compared to beaches with coarser sand (>0.500 mm). These results illustrate the strong influence that sand grain size exerts on the diversity and abundance of intertidal invertebrates on sandy beaches in the southern California region. Based on these regression results, a sand grain size of 0.40 mm and above would be expected to support very low diversity and abundance of intertidal invertebrates.

In addition to sand grain size, the level of sediment sorting (an estimate of the consistency of sand grain sizes on a beach) has also been found to influence the diversity of sandy beach macro-invertebrates. Sediment sorting was negatively correlated with the species richness of intertidal invertebrates on southern California beaches in two studies[64,65] (Figure 7). Beaches with poorly sorted sand (e.g a wide range of grain sizes) support much lower numbers of species of intertidal invertebrates than beaches with well sorted sand in the region. The southern California MPA study found that beaches with poorly sorted sand also had lower biomass ($r = 0.636$, $p < 0.05$)[66]. Dugan and Hubbard (1996) found a strong negative relationship between sediment sorting and species richness for Ventura and Santa Barbara county beaches where better sorting equaled more species. They also found that the size of sand grains is strongly correlated with sorting which has been found to be correlated with biodiversity in Southern California. Based on these results, poorly sorted sand would be expected to support low macroinvertebrate species richness.

The community structure of the beach macroinvertebrates in turn significantly affects the beach foodweb. Shorebirds are very important top predators that respond strongly to prey availability in sandy beach ecosystems in California. Shorebirds feed on all the types of intertidal invertebrates living on beaches. The species richness and abundance of shorebirds is positively correlated with the availability of wrack and the diversity, biomass and abundance of invertebrate prey, as well as tide, beach type and width[67]. Nearshore fishes such as barred surfperch, redtail surfperch, yellowfin and spotfin croaker, and corbina, feed on swash zone invertebrates, including sand crabs and mysids. Although population information for these fish is limited, it is likely that the beach macroinvertebrate community influences the community structure and population dynamics of the nearshore fish community.

[63] The average grain size for the majority of intermediate beaches in southern California (Dugan et al. in review) was 0.24 mm based on 24 beaches monitored monthly for 2 years). San Clemente state beach was much coarser (and steeper) with a mean grain size of 0.57 mm and supported less than half the intertidal species (12 species) compared to all but one of the other beaches (Carlsbad with 21 species, also somewhat coarser sand).

[64] Dugan J. E. 1999. Utilization of sandy beaches by shorebirds: relationships to population characteristics of macrofauna prey species and beach morphodynamics. Final Technical Report OCS Study, MMS 99-069. 41 pp

[65] Dugan J. E., et al. In review. Ibid.

[66] Dugan J. E., et al. In review. Ibid.

[67] Dugan et al. 2003. Ibid, Dugan et al. 2008. Ibid.

The existing sand at Broad Beach is well sorted with a sand grain size range of 0.15 mm (D05), 0.20 mm (D16), 0.40 mm (D84), and 0.50 mm (D95), with a median grain size of 0.25 mm (D50). The percent fines range from 0.4 to 5% and the sand sorting value is 0.10 mm[68] (Figure 8). The source sand proposed by the applicant from the inland quarries, on the other hand, is poorly sorted. The Cemex quarry has a sand grain size range of 0.07 mm (D05), 0.20 mm (D16), 3.0 mm (D84), and 4.0 mm (D95), with a median grain size of 0.85 mm (D50). The sand sorting value of the Cemex sand is 1.3 mm (Figure 9). The Grimes quarry has a sand grain size range of 0.07 mm (D05), 0.20 mm (D16), 2.0 mm (D84), and 3.0 mm (D95), with a median grain size of 0.47 mm (D50). The sand sorting value of the Grimes sand is 0.90 mm (Figure 10). The D05, D16, D50, D84, and D95 values for existing sand at Broad Beach and the source sand at the Cemex and Grimes quarries come from appendix A of the Moffat and Nichol, Nov. 2013, *Upland Sand Source: Coarser-Than-Native Grain Size Impact Analysis* report (Figure 11). While Moffat and Nichol's, Nov. 2013 report identifies the median grain size or D50 value for Broad Beach sand, the Cemex quarry sand, and the Grimes quarry sand (0.25 mm, 0.85 mm, and 0.47 mm, respectively), they do not report the mean grain size, which is a larger number for each of the three areas at 0.28 mm for Broad Beach sand, 1.35 mm for Cemex sand, and 0.89 mm for Grimes sand[69]. The 20X photos of the respective sand (Figures 8, 9, 10) is a good way to visualize the difference between the well sorted Broad Beach sand compared to the poorly sorted Cemex and Grimes sand[70]. In addition, the sand sorting values for the source sand from both quarries is beyond the scale (x-axis) on the graph of species richness vs. mean sediment sorting (Figure 7)

The applicant is proposing to use sand from several quarries that is very different from the existing sand at Broad Beach. In terms of physical effects, this will likely result in a steeper beach face and narrower intertidal zone making for a much harsher environment for beach organisms. The environment will be much more abrasive, turbulent, and rough. In terms of biological effects, based on the recent southern California MPA beach studies discussed above, the beach intertidal assemblage will be characterized by low species diversity and abundance (biomass).

The replenished sand will migrate downcoast following the typical pattern of longshore transport in the Zuma Littoral Cell, and regular management (backpassing) is proposed to move sand upcoast of the mouth of Trancas Creek. It is not clear how the expanding width of the beach and potential increase to height of the beach berm will affect the ability of Trancas Creek to breach and connect to the ocean. A significant concern is that the deposition of significant additional sand, immediately adjacent to the current lagoon mouth, will lead to period of instability in the system that will require active

[68] **Calculated using the Inclusive Graphic Standard Deviation (Folk) given by the formula: (mm84 - mm16)/4 + (mm95 -mm5)/6.6. This formula includes 90% of the distribution and is the best overall measure of sorting.**

[69] **The mean grain size was calculated using a formula that is a quick approximation for mean: (D16 + D50 +D84)/3**

[70] **URS. August 2013. Malibu Beach Sand Replenishment Sand Grain Angularity Analysis Malibu, California. URS Project No. 03003261. Letter Report to Chris Webb, Moffat and Nichol.**

management and adjustment because the creek outflow will probably not be sufficient to carry out coarse sediments.

Although impacts to grunion are not anticipated, the repeated disturbance for back-passing each year during grunion breeding season could certainly have an impact, especially if the expanded beach restores habitat previously present. Incorporating grunion recovery at Broad Beach and requiring a comprehensive grunion management plan should be required.

One reason Western snowy plovers are a state and federally listed threatened species is because of highly disturbed nesting areas and beach nourishment projects that are not designed to promote habitat for this species. The Western Snowy Plover Recovery Plan (USFWS 2007) notes that dredging, placement of pipes and trenching are detrimental to the plovers. Continued operation of heavy equipment for extended periods of time, in addition to that already practiced by Los Angeles County for beach maintenance at Zuma is a major concern. In addition, whether the character of the proposed source sand is appropriate for snowy plover has not been considered. Incorporating Western snowy plover recovery at Broad Beach and requiring a comprehensive snowy plover management plan should be required.

Alternative Project

Alternative 4B considers a project with a portion of the revetment located further landward, dune restoration and a phased beach nourishment component. With this alternative project, no beach nourishment or dune restoration would occur west of 31502 Victoria Point Road. The width of the sand fill on the far western portion of the beach transitions from about 100 feet of sand fill to no fill terminating about 450 feet east of Point Lechuza. The applicant's consultants have modelled the potential area of impact to marine resources, including direct burial resulting from the initial placement of the sand and indirect impacts resulting from burial by sand transported to marine habitat areas after the initial placement. Following are the marine habitat types and acreage of impacts that the applicant has estimated resulting from the Alternative 4B sand fill design:[71]

	Direct Burial (acres)		**Indirect Burial (acres)**	
Habitat Type	**Permanent**	**Temporary***	**Permanent**	**Temporary***
Surfgrass			<0.01	0.75
Kelp				0.01
Cobble/Rubble Intertidal	0.12		0.62	0.59
Cobble/Rubble Subtidal			0.08	1.21
Boulder Field		0.5	0.07	0.14
Sandy Bottom Intertidal		17.28		6.7
Sandy Bottom Subtidal				29
Total	0.12	17.78	0.78	38.4

[71] Broad Beach—Outline of Alternative 4B Impacts, Moffat & Nichol, November 18, 2014.

* Temporary impact is defined by the applicant as habitat area buried by sand that is less than 1 foot deep at one year after the sand placement.

The modeling of the proposed project estimates that direct burial will permanently impact 5.23 acres and temporarily impact 34 acres of beach and nearshore marine habitats. And that the indirect burial will permanently impact 11.17 acres and temporarily impact 85.03 acres of beach and nearshore habitats. It is important to keep in mind that the Commission does not agree with the applicant's permanent vs. temporary threshold of 1 foot for 1 year of longer; that permanent impacts may occur well below 1 foot burial and in a shorter time than 1 year.

Modeling of Alternative 4b estimates that the direct and indirect burial will be lower than the proposed project; direct burial will permanently impact 0.12 acres and temporarily impact 17.78 acres of beach and nearshore marine habitats. And that the indirect burial will permanently impact 0.78 acres and temporarily impact 38.4 acres of beach and nearshore habitats.

Conclusions

Although modeling is only as good as its mathematical equation (s) and the data employed, it does appear that the proposed project, as well as Alternative 4b, will have significant direct and indirect burial impacts on beach and nearshore marine habitats. Because of these results, Commission staff is recommending an alternative with no direct burial of beach and nearshore habitats. In addition I recommend that the project be revised as follows:

- Move the rock revetment back to the most landward position possible,
- Dune restoration designed to restore, to the greatest extent possible, the conditions for supporting natural dune system functions and processes,
- No sand replenishment past the west end of the rock revetment; avoidance of direct and indirect burial of eelgrass and intertidal and subtidal hard bottom habitat to the greatest extent possible,
- Development of Marine Habitat Monitoring and Mitigation Program with guidance from a Science Advisory Panel designed to detect project impacts,
- Minimum of 4:1 mitigation for adverse impacts on intertidal and subtidal hard bottom habitats.
- Eelgrass mitigation based on the California Eelgrass Mitigation Program,
- Areal extent of mitigation based on quantification of adverse impacts determined at the end of 5 years,
- BMPs to ensure that no invasive species are transported during the project, especially the New Zealand Mud Snail, which has been documented in Trancas Creek,
- Development of comprehensive management plans for recovery of grunion and Western snowy plover at Broad Beach.

I have reviewed in great detail the likely negative impacts of using unsorted sand that has a much larger mean grain size from quarries. The prediction is that the macroinvertebrate beach community that colonizes this sand will be much less diverse and have much less biomass. If use of this sand is approved, I recommend treating the beach replenishment as a pilot study that includes intensive monitoring. The goal of monitoring should be to tract the physical and biological implications of using mismatched source sand. The monitoring should be conducted before project construction for a minimum of two seasons (spring and fall) and should continue twice a year for the life of the project. A minimum of 5 beach areas should be monitored; the area of Broad Beach in the project footprint, an area of beach immediately west and immediately east (Zuma) of the project footprint, and a minimum of two reference beaches chosen to closely match the physical and biological attributes of what would be expected at Broad Beach but for all the permitted and unpermitted development including the rock revetment.

Finally, several of the top beach ecologists in the world, in a review paper on threats to sandy beach ecosystems state the following regarding best management practices when conducting beach management practices. I couldn't agree more and recommend that the following be implemented to the greatest extent possible:

> *Mitigation of ecological impacts of nourishment is often impeded by limited data about the life history of the affected species, recovery rates and the cumulative effects of repeated nourishment events (Speybroeck et al. 2006). Nevertheless, basic management recommendations include: (1) the avoidance of sediment compaction; (2) careful timing of operations to minimize biotic impacts and enhance recovery; (3) the selection of locally appropriate techniques; (4) the implementation of several small projects rather than a single large project, including repeated application of sediment in shallow layers (<30cm) rather than single pulses that kill fauna by deep burial; (5) Interspersion of nourished beach sections with unaffected areas; and (6) importing sediments and creating beach profiles that match the original beach conditions as closely as possible.*[72]

[72] Defeo, O., A. McLachlan, D.S. Schoeman, T.A. Schlacher, J. Dugan, A. Jones, M. Lastra, and F. Scapini. 2009. Threats to Sandy Beach Ecosystems: A Review. Estuarine, Coastal and Shelf Science, VD. 81: 1-12.

Figure 3.3-1. Project Location within the Southern California Bight

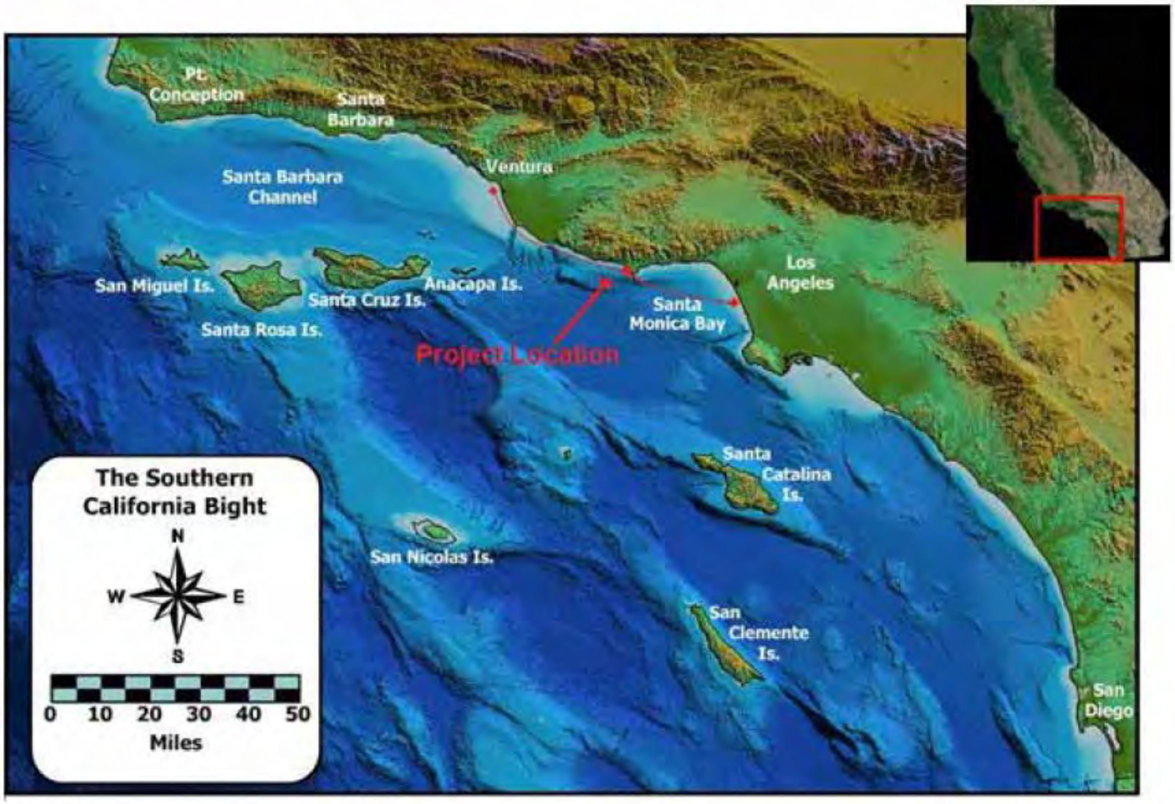


Figure 1. Project location within the southern California Bight. Exhibit 3.3-1 from the AMEC July 2014 APTR.

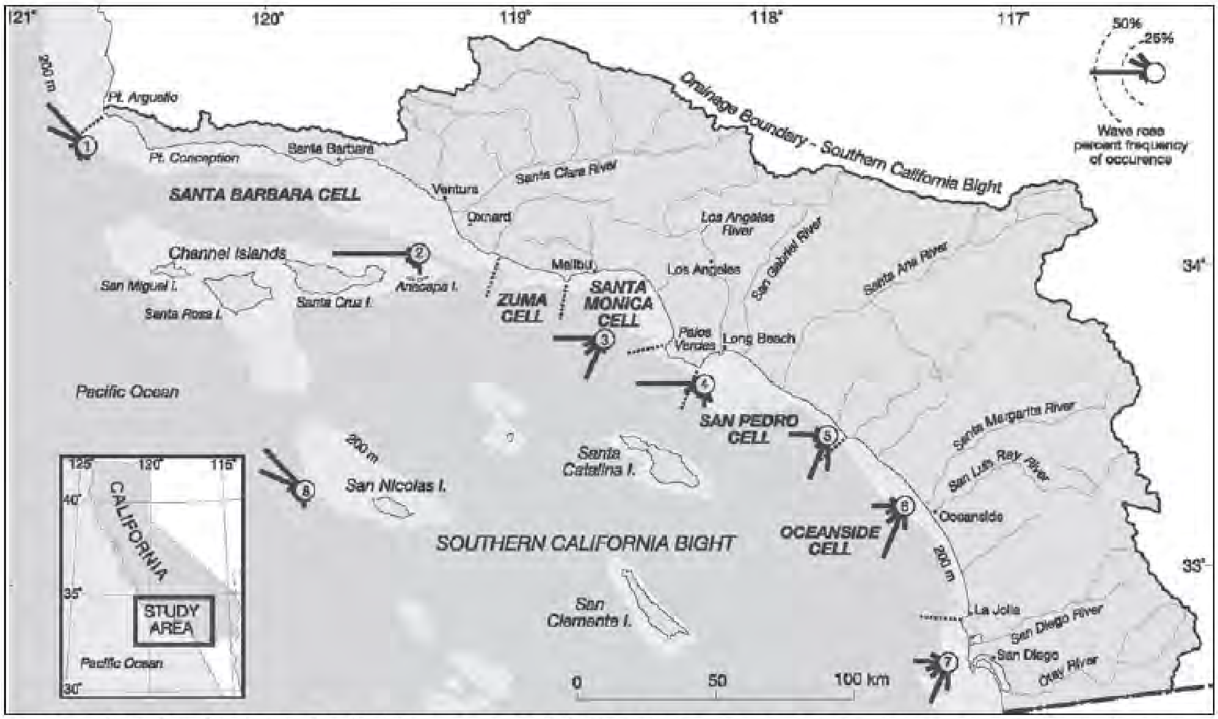
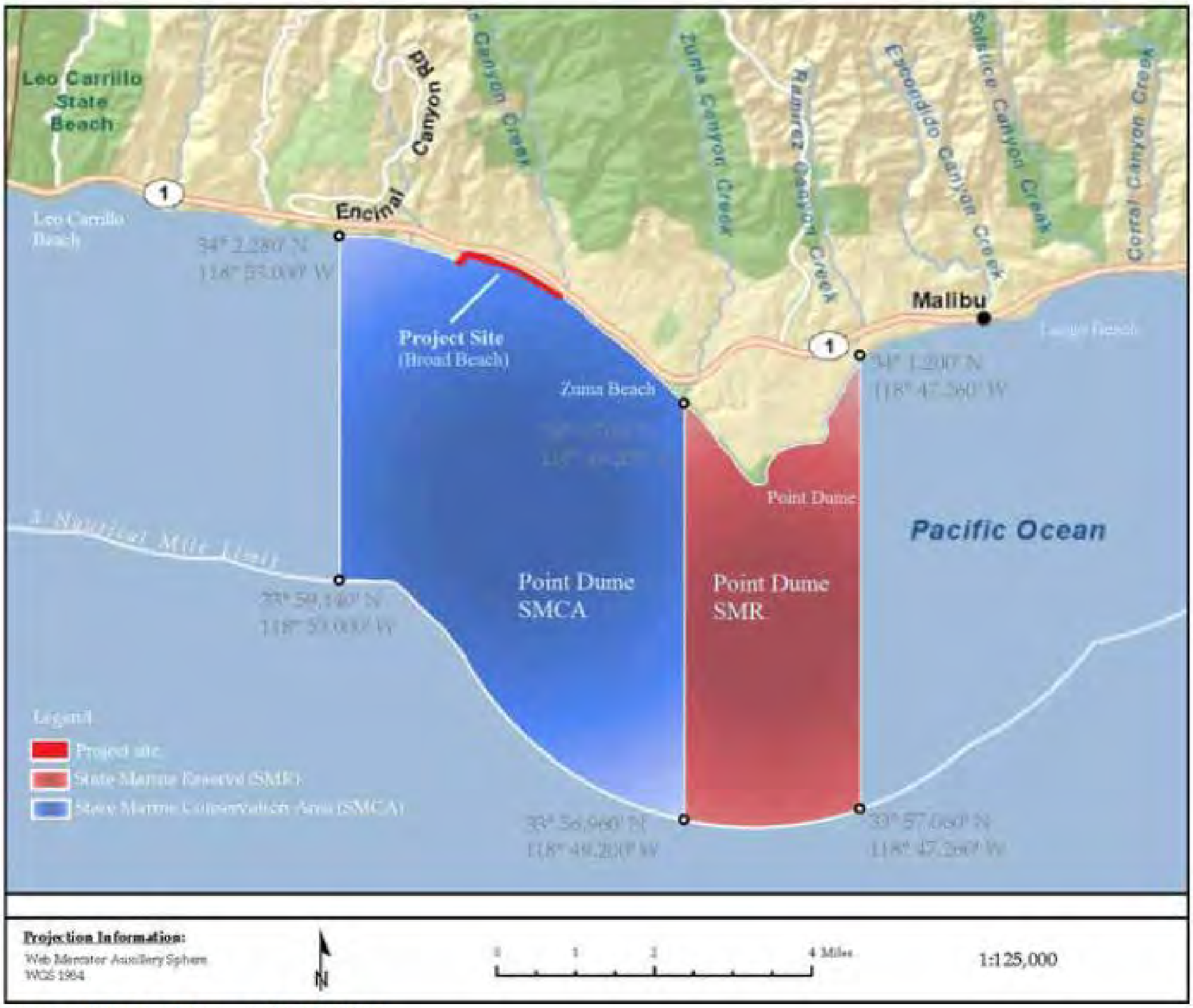


Figure 1. Southern California Bight: littoral cells, contributing rivers, and wave roses (1 Harvest, 2 Anacapa Passage, 3 Santa Monica Bay, 4 San Pedro, 5 Dana Point, 6 Oceanside Offshore, 7 Point Loma, 8, San Nicolas Island; CDIP 2008).

Figure 2. Proposed Project Located in Zuma Littoral Cell (exhibit from Orme, A.R., J.G. Zoulas, G.B. Griggs, C.C. Grandy, D.L. Revell, & H. Koo. 2011. Beach Changes along the Southern California Coast during the 20th Century: A Comparison of Natural and Human Forcing Factors. Shore & Beach, v. 79 (4): 38-50.)

Figure 3.3-5. Marine Protected Areas



Source: Adapted from CDFW 2011.

Figure 3. Project location within the Point Dume SMCA. Exhibit 3.3-5 from the AMEC July 2014 APTR.

Figure 3.3-6. Chronology of Intertidal Conditions Within Lechuza Cove

Figure 4. Chronology of intertidal conditions in Lechuza Cove. Figure 3.3-6, AMEC APTR, pg. 3.3-47.

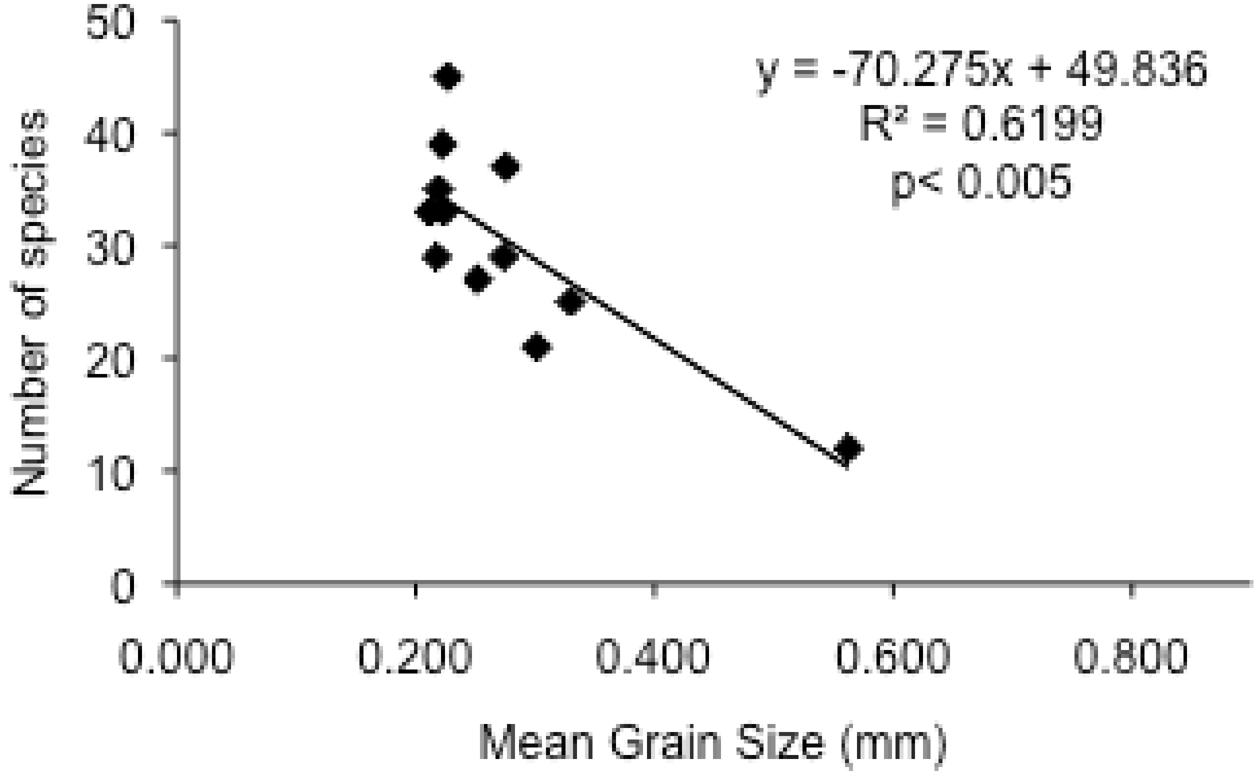


Figure 5. Significant relationship between species richness of intertidal invertebrates and mean sand grain size for 12 beaches in the South Coast MPA Baseline study (Dugan et al in review Final report to California Ocean Protection Council/California Sea Grant. Final study report and data will be available to the public at http://oceanspaces.org/)

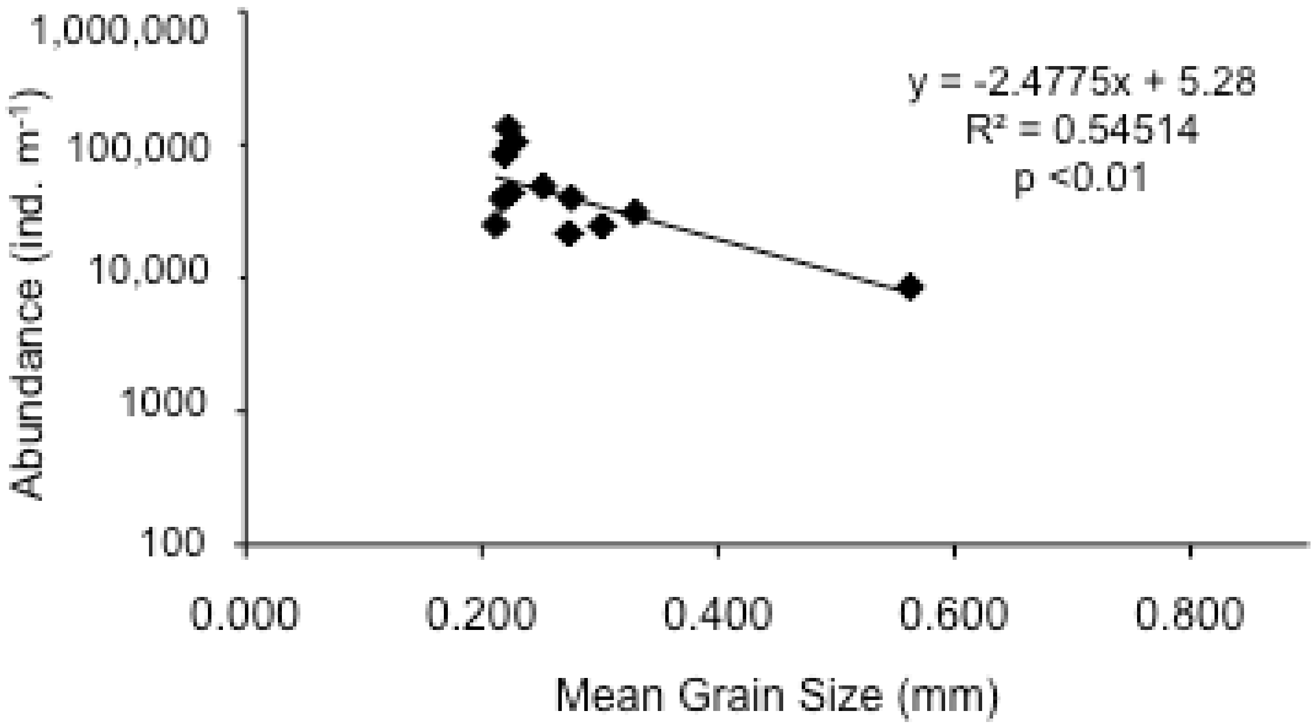


Figure 6. Significant relationship between abundance of intertidal invertebrates (note log scale) and mean sand grain size for 12 beaches in the South Coast MPA Baseline study (Dugan et al in review Final report to California Ocean Protection Council. Final study report and data will be available to the public at http://oceanspaces.org/).

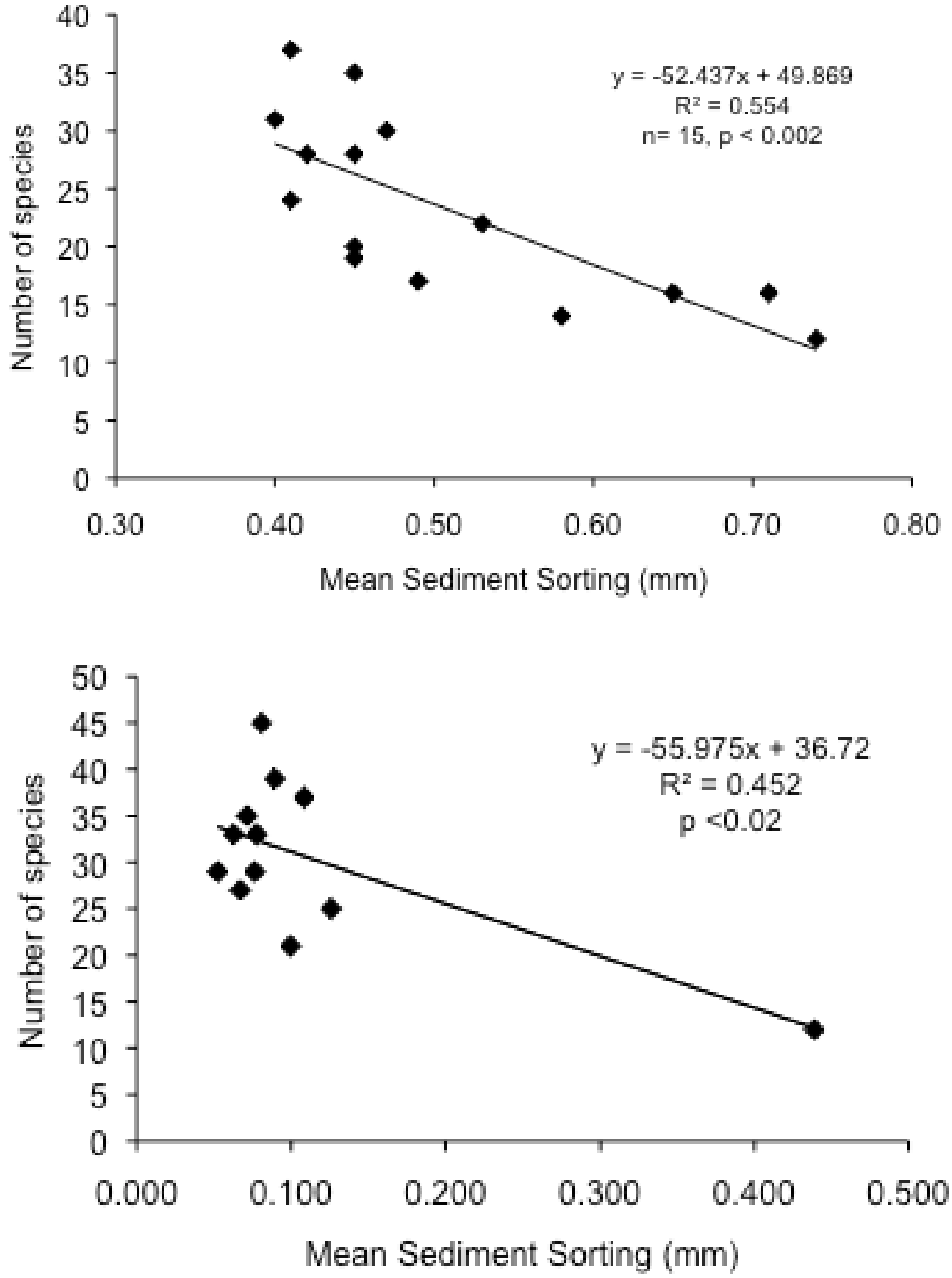


Figure 7. Significant relationships between intertidal species richness and sediment sorting for two studies in southern California. Top plot shows results for 15 beaches in Ventura and Santa Barbara Counties (Dugan 1999) and the bottom plot shows results for 12 beaches from the South Coast MPA baseline study (Dugan et al in review Final report to California Ocean Protection Council/California Sea Grant. Final study report and data will be available to the public at http://oceanspaces.org/).

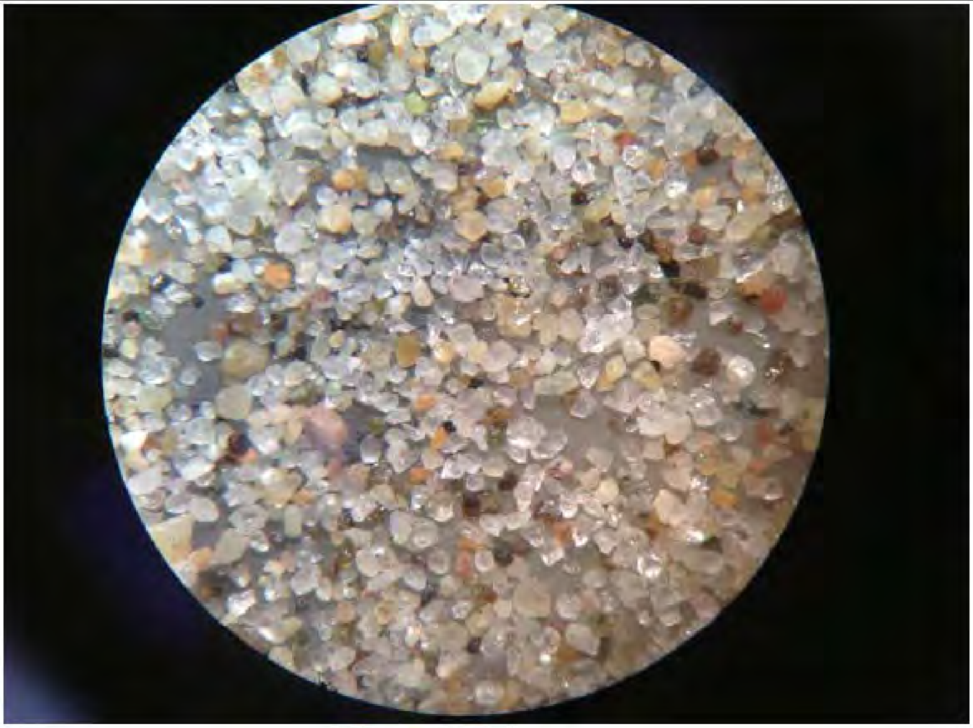
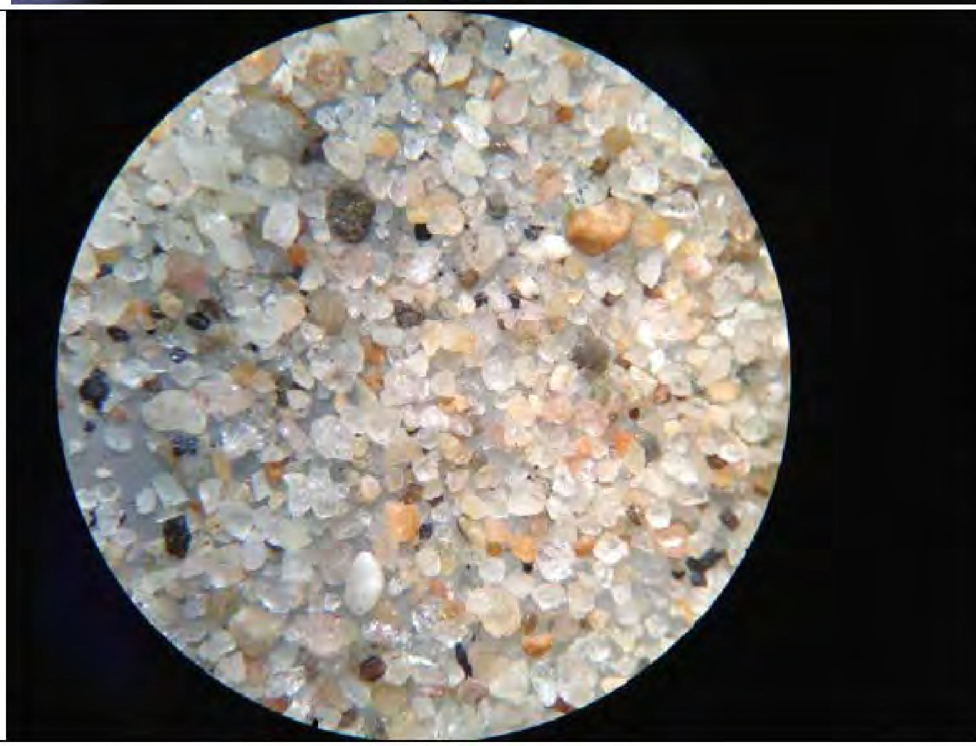
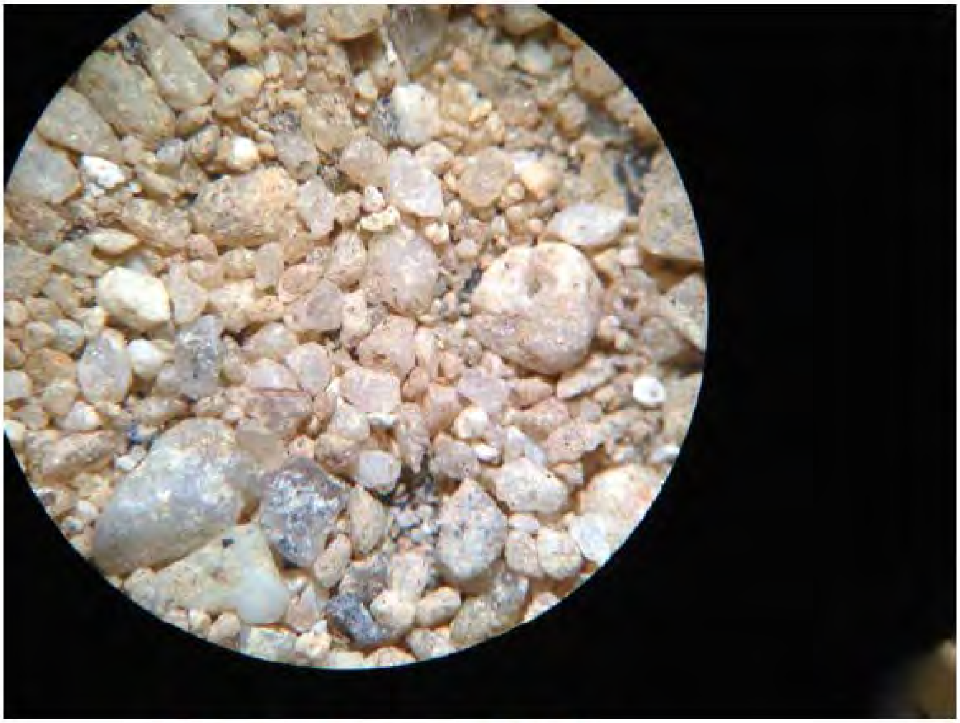
	Photograph- Broad Beach - Beach (Magnified 20x) Date: 8/13/13 Comments: The beach sand is slightly finer than the dune sand below. Note - this appears greater here due to the 20x magnification of the photo.
	Photograph- Broad Beach - Dunes (Magnified 20x) Date: 8/13/13 Comments: The dune sand is slightly coarser than the beach sand above. Also note this sample is lighter in color than above.

Figure 8. 20X Photographs of existing Broad Beach beach sand (top) and dune sand (bottom) from URS, August 2013, *Malibu Beach Sand Replenishment Sand Grain Angularity Analysis Malibu, California* report, URS Project No. 03003261.

	Photograph- Cemex Quarry 01 (Magnified 20x) Date: 8/13/13 Comments: The two photos on this page are from different parts of the same sample.
	Photograph- Cemex Quarry 02 (Magnified 20x) Date: 8/13/13 Comments: The two photos on this page are from different parts of the same sample.

Figure 9. Two 20X Photographs of Cemex Quarry sand from different parts of the same sample from URS, August 2013, *Malibu Beach Sand Replenishment Sand Grain Angularity Analysis Malibu, California* report, URS Project No. 03003261.



Photograph-
Grimes Quarry
01
(Magnified 20x)

Date: 8/13/13

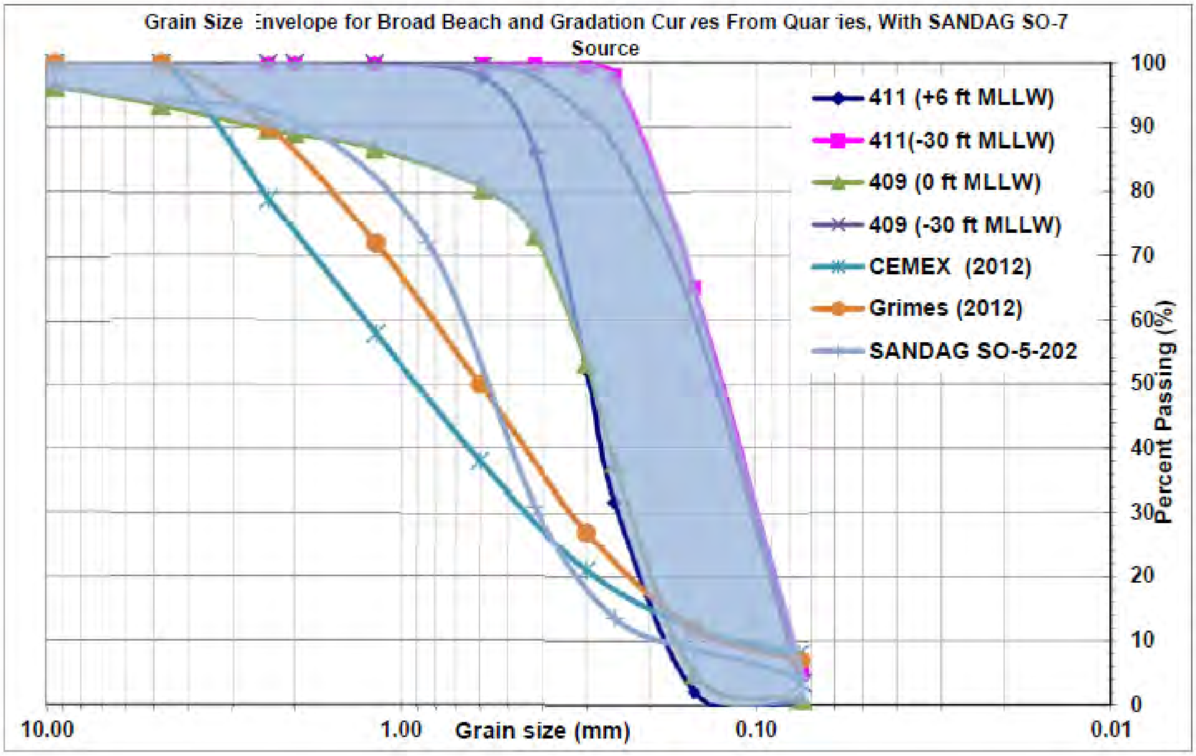
Comments:
The two photos on this page are from different parts of the same sample.

Photograph-
Grimes Quarry
02
(Magnified 20x)

Date: 8/13/13

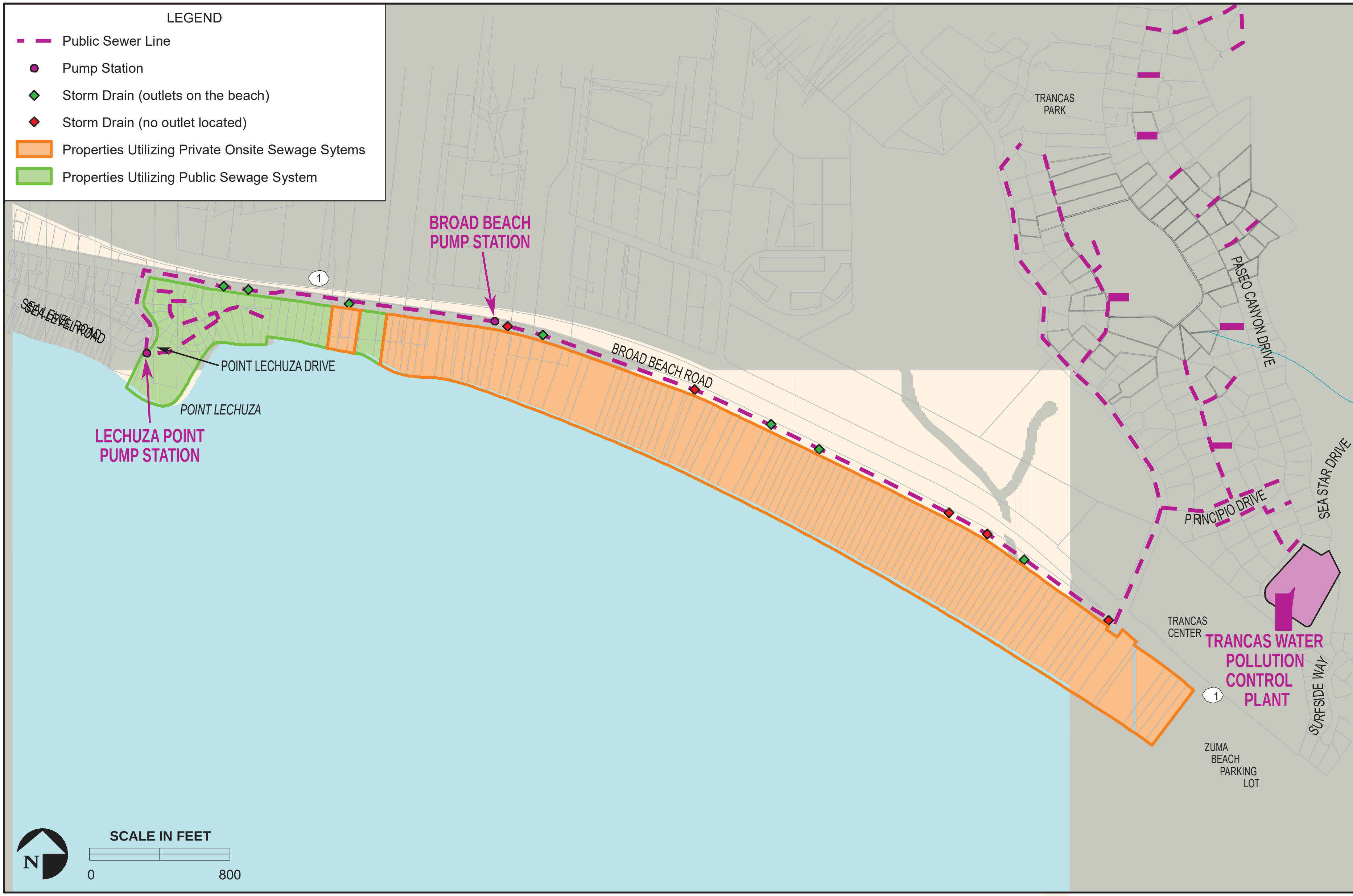
Comments:
The two photos on this page are from different parts of the same sample.

Figure 10. Two 20X Photographs of Grimes Quarry sand from different parts of the same sample from URS, August 2013, *Malibu Beach Sand Replenishment Sand Grain Angularity Analysis Malibu, California* report, URS Project No. 03003261.



Grain Size Envelope for Broad Beach (In Blue Shading) Plott :d Against Curves for Sand P oposed to be Used From Quarries, With Sand From SANDAG Offshore Site SO-5 for Reference.

Figure 11. The D16, D50, D84 values for existing sand at Broad Beach and the source sand at the Cemex and Grimes quarries come from this graph found in appendix A of the Moffat and Nichol, Nov. 2013, *Upland Sand Source: Coarser-Than-Native Grain Size Impact Analysis* report.



amec

Wastewater Treatment in the Vicinity of Broad Beach

Exhibit 15
4-15-0390
Trancas WTP
Service Area

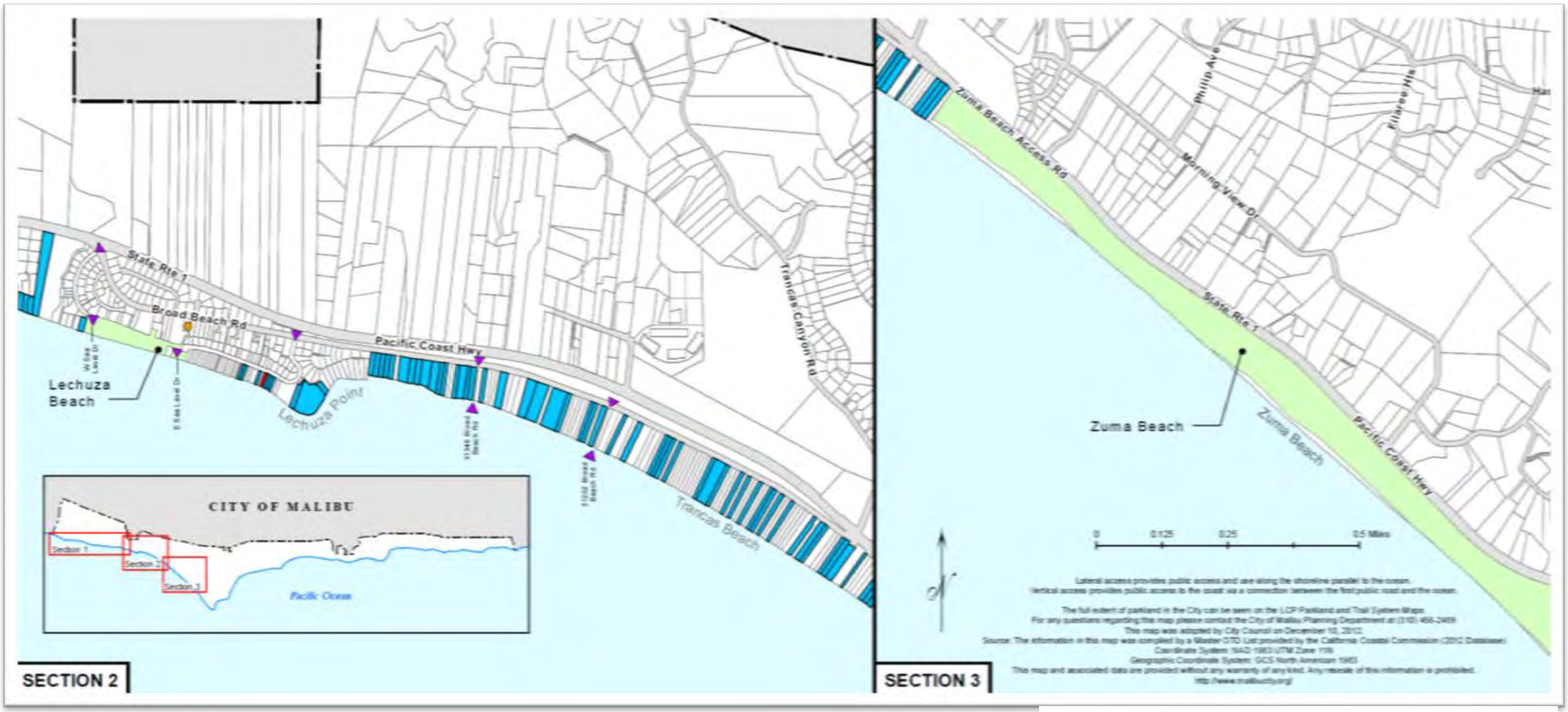


Exhibit 16
4-15-0390 (Broad Beach GHAD)
Parcels with Existing Lateral Access Easements at Broad Beach

amec

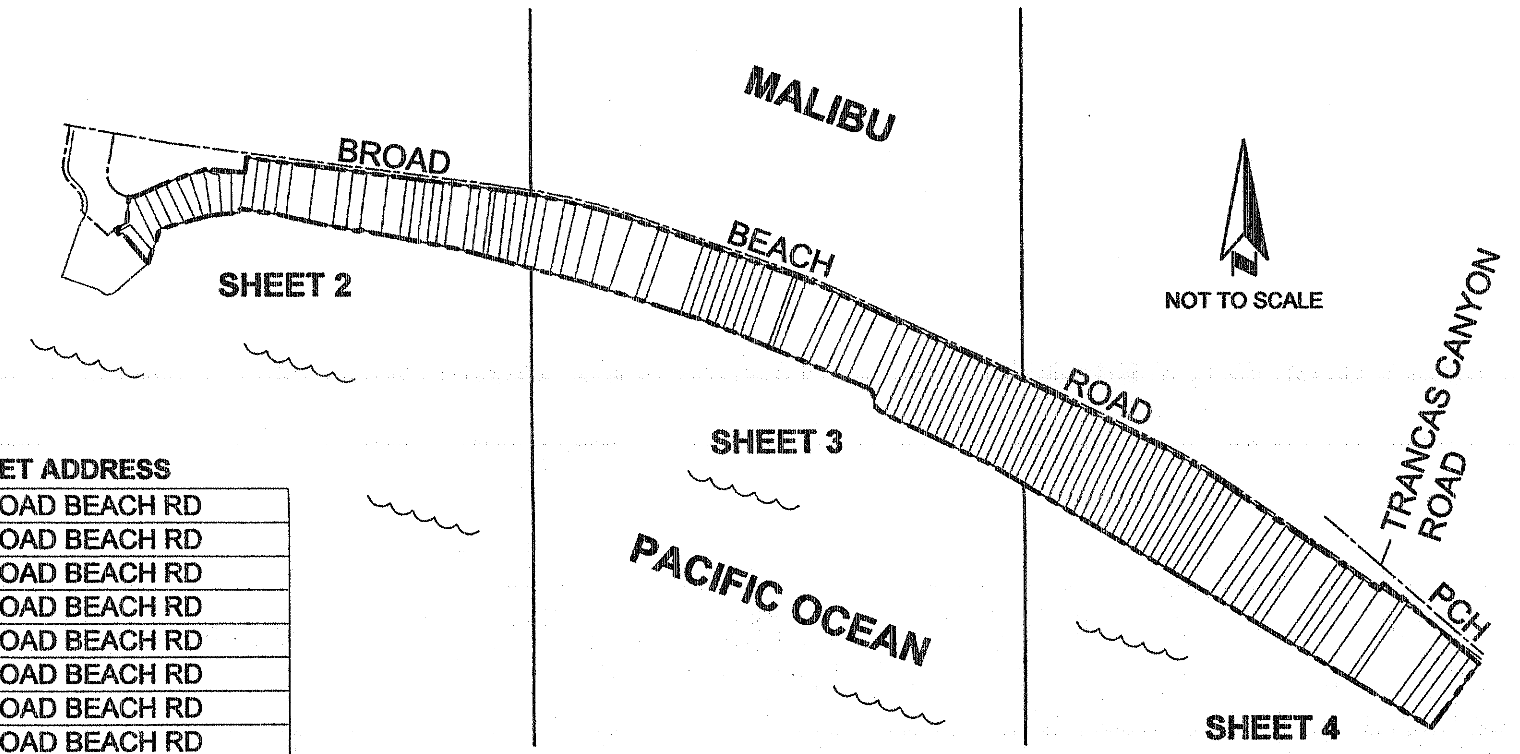
Construction Staging for Proposed Project

Exhibit 17
4-15-0390 (Broad Beach GHAD)
Proposed Zuma Beach Staging Area

BOOK 193 PAGE 65

ASSESSMENT DIAGRAM
BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

CITY OF MALIBU, LOS ANGELES COUNTY, STATE OF CALIFORNIA



FILED AT REQUEST OF CITY CLERK
39 MIN PAST 2pm
IN BOOK 193
AT PAGE 65-68
OF ASSESSMENT MAPS LOS ANGELES COUNTY CA
Registrar-Recorder/County Clerk
BY [signature]
Deputy
FEE $ 17.00 +3.00 DA

MAR 2 2 2012

COPY of Document Recorded 03/22/2012
"20120447846"
Has not been compared with Original.
LOS ANGELES COUNTY REGISTRAR - RECORDER

FILED THIS ______DAY OF ________________, 20_____, AT THE HOUR OF __________O'CLOCK ______M. IN BOOK __________OF MAPS OF ASSESSMENT AND COMMUNITY FACILITIES DISTRICTS AT PAGE _______, IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF ____________________, STATE OF CALIFORNIA.

COUNTY RECORDER OF COUNTY OF LOS ANGELES

☐ REPRESENTS COMMON OWNERSHIP OF MULTIPLE ASSESSOR PARCELS

#	ASSESSOR PARCEL #	STREET ADDRESS	#	ASSESSOR PARCEL #	STREET ADDRESS
1	4469-026-009	30708 PACIFIC COAST HWY	$\boxed{58}$	4470-015-031	31070 BROAD BEACH RD
2	4469-026-008	30712 PACIFIC COAST HWY	$\boxed{58}$	4470-015-004	31100 BROAD BEACH RD
3	4469-026-007	30718 PACIFIC COAST HWY	59	4470-015-029	31108 BROAD BEACH RD
4	4469-026-006	30724 PACIFIC COAST HWY	$\boxed{60}$	4470-015-027	31112 BROAD BEACH RD
5	4469-026-005	30732 PACIFIC COAST HWY	$\boxed{60}$	4470-015-006	31118 BROAD BEACH RD
6	4469-026-011	30750 PACIFIC COAST HWY	61	4470-015-007	31122 BROAD BEACH RD
7	4469-026-016	30756 PACIFIC COAST HWY	62	4470-015-033	31134 BROAD BEACH RD
8	4469-026-002	30760 BROAD BEACH RD	63	4470-015-011	31138 BROAD BEACH RD
9	4469-026-012	30800 BROAD BEACH RD	$\boxed{64}$	4470-015-012	31202 BROAD BEACH RD
10	4470-013-028	30804 BROAD BEACH RD	$\boxed{64}$	4470-015-013	31206 BROAD BEACH RD
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57	4470-015-030	31064 BROAD BEACH RD	113	4470-017-029	31536 VICTORIA POINT RD
			114	4470-017-028	6525 POINT LECHUZA DR

FILED IN THE OFFICE OF THE CLERK OF THE BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT, THIS 22 DAY OF March, 2012.

Barbara Hamm
CLERK OF THE DISTRICT
BROAD BEACH GHAD
COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

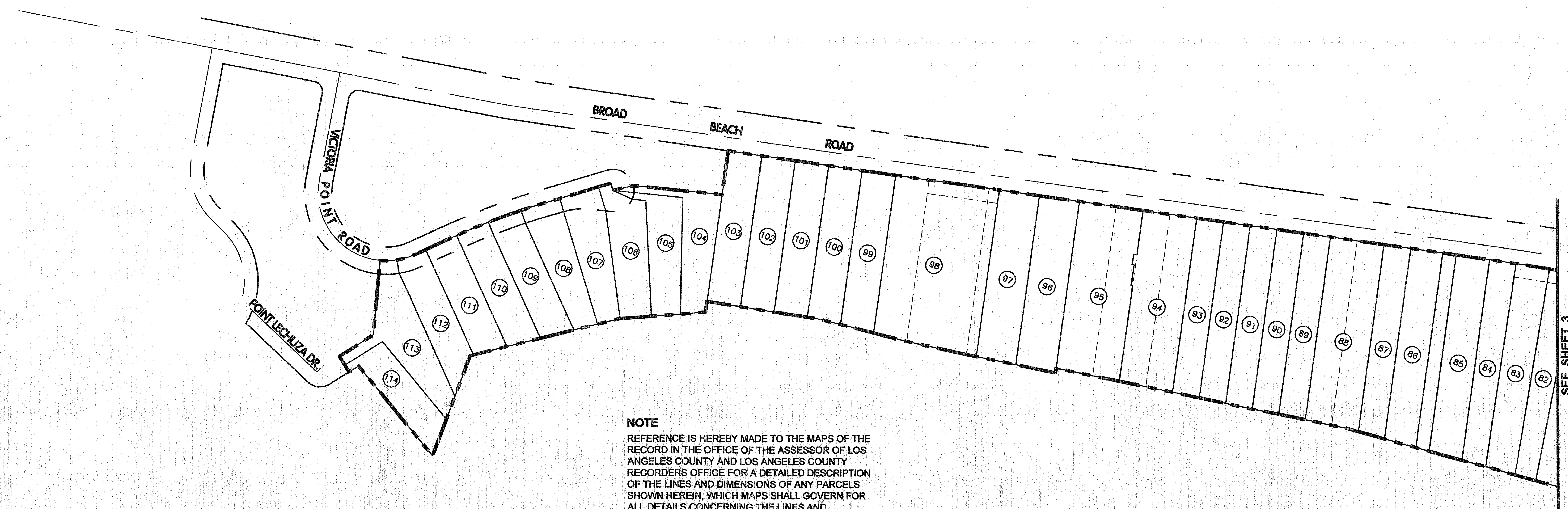
RECORDED IN THE OFFICE OF THE CLERK OF THE BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT, THIS 22 DAY OF March, 2012.

Barbara Hamm
CLERK OF THE DISTRICT
BROAD BEACH GHAD
COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

AN ASSESSMENT WAS AUTHORIZED BY THE BROAD BEACH GHAD ON THE LOTS, PIECES, AND PARCELS OF LAND SHOWN ON THIS ASSESSMENT DIAGRAM. THE ASSESSMENT WAS AUTHORIZED ON THE 11TH DAY OF MARCH, 2012; THE ASSESSMENT DIAGRAM AND THE ASSESSMENT ROLL WERE RECORDED IN THE OFFICE OF THE CLERK OF THE BROAD BEACH GHAD ON THE 11TH DAY OF MARCH, 2012. REFERENCE IS MADE TO THE ASSESSMENT ROLL RECORDED IN THE OFFICE OF THE CLERK OF THE BROAD BEACH GHAD FOR THE EXACT AMOUNT OF EACH ASSESSMENT LEVIED AGAINST EACH PARCEL OF LAND SHOWN ON THIS ASSESSMENT DIAGRAM.

Barbara Hamm
CLERK OF THE DISTRICT
BROAD BEACH GHAD
COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

Exhibit 18
4-15-0390 (Broad Beach GHAD)
GHAD Parcels



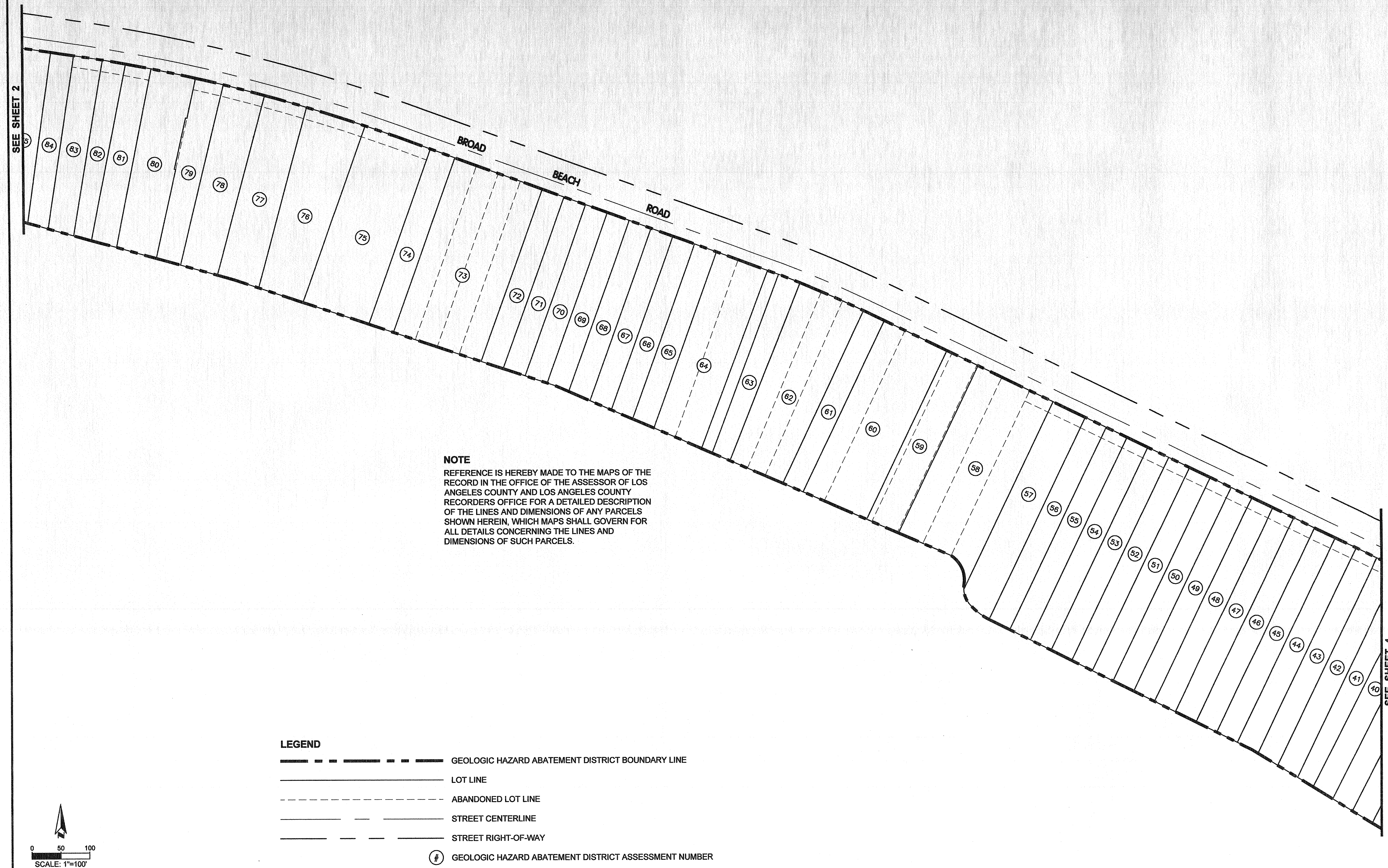
NOTE

REFERENCE IS HEREBY MADE TO THE MAPS OF THE RECORD IN THE OFFICE OF THE ASSESSOR OF LOS ANGELES COUNTY AND LOS ANGELES COUNTY RECORDERS OFFICE FOR A DETAILED DESCRIPTION OF THE LINES AND DIMENSIONS OF ANY PARCELS SHOWN HEREIN, WHICH MAPS SHALL GOVERN FOR ALL DETAILS CONCERNING THE LINES AND DIMENSIONS OF SUCH PARCELS.

LEGEND

- GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY LINE
- LOT LINE
- ABANDONED LOT LINE
- STREET CENTERLINE
- STREET RIGHT-OF-WAY
- (#) GEOLOGIC HAZARD ABATEMENT DISTRICT ASSESSMENT NUMBER

0 50 100
SCALE: 1"=100'

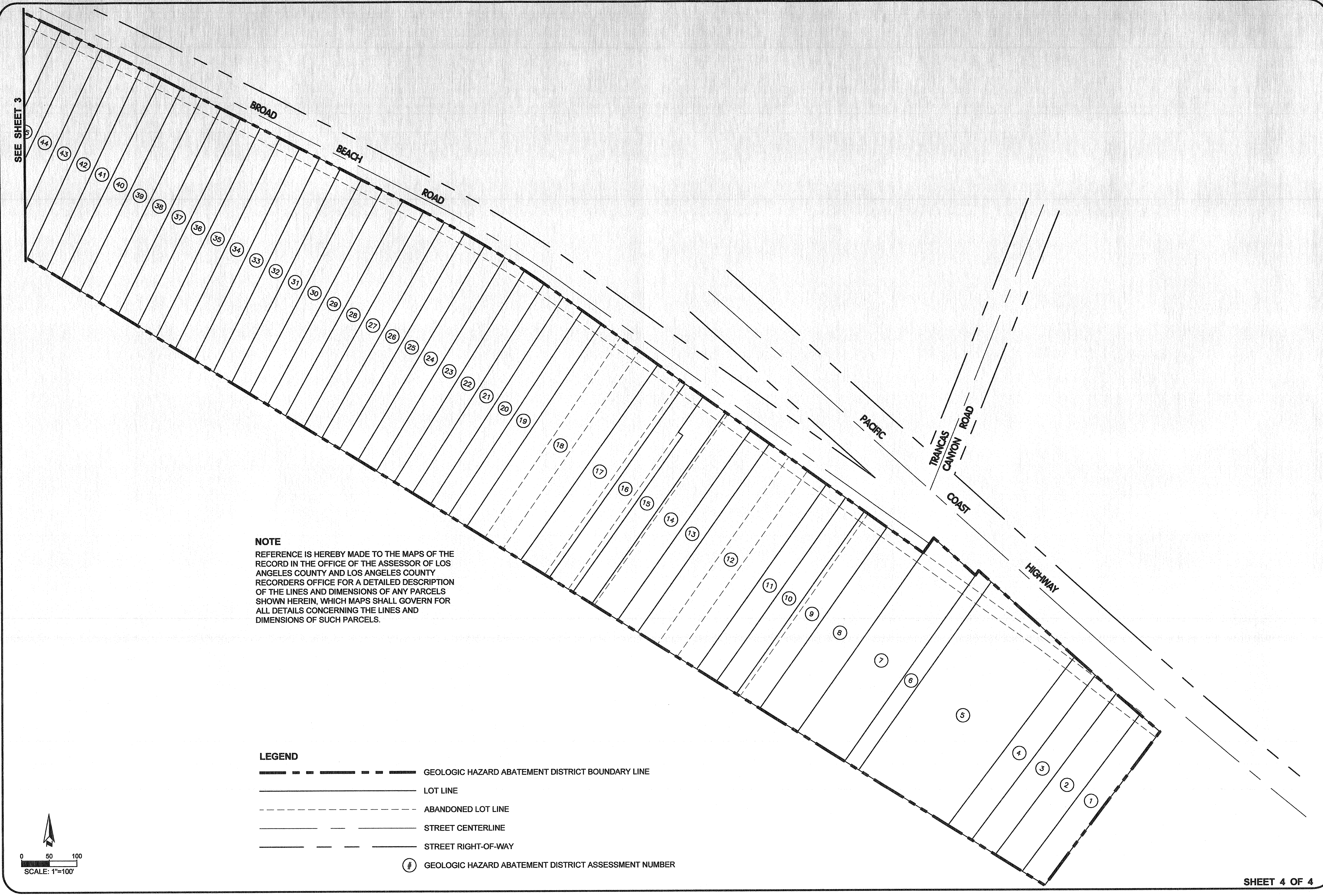


NOTE

REFERENCE IS HEREBY MADE TO THE MAPS OF THE RECORD IN THE OFFICE OF THE ASSESSOR OF LOS ANGELES COUNTY AND LOS ANGELES COUNTY RECORDERS OFFICE FOR A DETAILED DESCRIPTION OF THE LINES AND DIMENSIONS OF ANY PARCELS SHOWN HEREIN, WHICH MAPS SHALL GOVERN FOR ALL DETAILS CONCERNING THE LINES AND DIMENSIONS OF SUCH PARCELS.

LEGEND

GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY LINE
LOT LINE
ABANDONED LOT LINE
STREET CENTERLINE
STREET RIGHT-OF-WAY
(#) GEOLOGIC HAZARD ABATEMENT DISTRICT ASSESSMENT NUMBER



NOTE

REFERENCE IS HEREBY MADE TO THE MAPS OF THE RECORD IN THE OFFICE OF THE ASSESSOR OF LOS ANGELES COUNTY AND LOS ANGELES COUNTY RECORDERS OFFICE FOR A DETAILED DESCRIPTION OF THE LINES AND DIMENSIONS OF ANY PARCELS SHOWN HEREIN, WHICH MAPS SHALL GOVERN FOR ALL DETAILS CONCERNING THE LINES AND DIMENSIONS OF SUCH PARCELS.

LEGEND

GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY LINE

LOT LINE

ABANDONED LOT LINE

STREET CENTERLINE

STREET RIGHT-OF-WAY

GEOLOGIC HAZARD ABATEMENT DISTRICT ASSESSMENT NUMBER

Broad Beach Restoration Project
Project Description
for New Alternative 4C

March 2015

Exhibit 19
4-15-0390 (Broad Beach GHAD)
Proposed Project Description

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Introduction to Alternative 4C Project Description

The Broad Beach Geologic Hazard Abatement District (“BBGHAD”) has received input from state, federal, and regional regulatory agencies, including the California Coastal Commission (“CCC”), the California State Lands Commission (“CSLC”), their consulting agencies and members of the public regarding various aspects of the proposed beach and dune restoration project at Broad Beach (Project). Many stakeholders communicated a desire to avoid and minimize impacts to sensitive marine habitats, particularly in the western portion of the Project site. As a result, the BBGHAD authorized the BBGHAD Engineer, Moffatt & Nichol (“M&N”), to develop and analyze a new alternative 4C (“Alternative 4C”) which proposes separate sand placements of 300,000 cubic yards each ("Major Nourishments") approximately every five (5) years, a revised sand placement area (limiting West End sand placement at 31380 Broad Beach Rd.), and other Project revisions.

The BBGHAD proposes a significantly narrower placement footprint for Alternative 4C than that of the originally proposed Project. This new alternative does not include placing sand material seaward of the 22 western most BBGHAD parcels (19 residences), approximately 1150 feet of shoreline length. This approach differs from the original Project proposed by the BBGHAD, which contemplated an initial placement of 600,000 cubic yards within the entire BBGHAD, from Trancas Creek at the east to Point Lechuza at the west. Under Alternative 4C, no direct placement of nourishment material would occur west of 31380 Broad Beach Road. A plan view of Alternative 4C placement is provided in Figure 1 and typical sections shown in Figure 2.

The Project goals include providing a sandy beach over the revised Project length which will provide intertidal habitat value, expanded public access and recreation opportunities that presently do not exist, and the natural shore protection afforded by the sandy beach. The Project's rock revetment, seaward of 78 BBGHAD residences from 30760 - 31346 Broad Beach Road, provides a last line of defense against coastal flooding and structural damage to primary structures, including onsite wastewater treatment systems (OWTSs), in the event that the sandy beach erodes away. Both economics and concerns for environmental impacts preclude the placement of sufficient sand volume to provide the necessary protection of primary structures at an acceptable level of risk without the revetment in place.

In an effort to meet the Project goals described above, and do so in accordance with GHAD law, the BBGHAD proposes to implement revised “backpassing” from wider reaches of the beach to narrower reaches of the beach subject to objective triggers, with the frequency not to exceed one time per year. Further, if insufficient sand volume exists for backpassing, the BBGHAD intends to implement additional smaller scale interim renourishments ("Interim Nourishments") to supplement the proposed Major Nourishments. In an effort to maintain sufficient sand beach over the Project length, bury any exposed rock revetment, and maintain lateral public access to the maximum practical extent. The frequency and volume of these Interim Nourishments will be determined by additional objective renourishment triggers, and subject to availability of BBGHAD funding. The Adaptive Management Actions in Section 2.11 provides a more detailed discussion of the various renourishment triggers.

As a final measure to maintain sand on the beach, if natural ocean forces, Major Nourishments, backpassing, and Interim Nourishments fail to cause at least 10 feet of sand to remain seaward of the revetment between Transects 408-411, the BBGHAD will conduct an Erosion Nourishment (See, Section

2.1) using a maximum of 75,000 cubic yards of imported sand seaward of the revetment in the area that does not meet objective access criteria.

The BBGHAD intends to implement adaptive management techniques to the Project based on detailed, real time monitoring during the Project's duration, and implementing any revisions agreed upon with governmental agencies. Review of primary Project components will be conducted by the CCC's Executive Director every 5 years and a report will be submitted to the CCC at the 10-year mark. The BBGHAD intends for this adaptive management approach to cover the 20-year duration of the Coastal Development Permit (CDP).

In late 2014, the CCC proposed a landward relocation of approximately 1,600 linear feet of the eastern portion of the revetment to the line of the existing septic systems with the provision of a minimal 15 foot setback between the seaward limit of the leach fields and the landward edge of the rock revetment. See, CCC Staff Report Addendum, December 8, 2014 ("Addendum"), p. 11. The BBGHAD has analyzed this CCC proposal and further consulted with the CCC and other permitting agencies. As a result, and in accordance with CCC directives, the BBGHAD has agreed to relocate the eastern portion of the emergency revetment landward (see 2.3 below). The applicable setback requirement between the wave uprush line and the existing OWTS leach fields constitutes a key factor in the revetment relocation. Aside from damage due to erosion of the leach field itself, there are adverse impacts from flooding if the leach fields were located within the wave uprush zone. Some impacts related to saltwater flooding include:

- Damage to leach field biological system. Large amounts of saltwater infiltrating into leach fields could damage micro-organisms which help to treat effluent percolating through the system. The high salt concentrations will also clog the soil pores, reducing the percolation rate.
- Fines, silts and sediment deposited over a leach field may result in clogging of the drainage field and reduced percolation rates.
- Potential for effluent to be pulled into the ocean along with receding flood waters.

In coordination with the BBGHAD's OWTS consultant, Ensitu Engineering, Inc., M&N has researched applicable law regarding the placement of the revetment and determined that the appropriate setback between the wave uprush line and the existing OWTS leach fields is 15 feet (Malibu Local Implementation Plan, Section 10.5 et seq.). Consistent with the CER, the design wave uprush line considered the 100-year storm event impacting the revetment, assuming no beach nourishment material remaining in front of the revetment. M&N considered this 15 feet setback to provide a reasonable buffer from the wave uprush zone to account for the uncertainties associated with wave overtopping estimates. This provides a reasonable buffer from the wave uprush zone to account for the uncertainties associated with wave overtopping estimates. Locating the revetment such that the wave uprush limit is less than 15 feet from the leach fields is not advised and would increase the risk of damage to leach fields from flooding and erosion during a wave overtopping event.

Based on these CCC directives, the BBGHAD proposes a revised revetment pullback position shown in Figure 1. The revetment pullback location proposed in the CCC's 2014 Staff Report and Addendum does not allow for a 15 foot setback from the wave uprush line and the existing OWTS leach fields per M&N's interpretation of the Malibu Local Implementation Plan, Section 10.5 et seq. The set back from the wave uprush line and the existing OWTS leach fields in Alternative 4C is reduced to less than 10 feet at some properties (e.g. 30830 and 30804 Broad Beach Road). However, in light of the BBGHAD's commitment to maintaining beach width in front of the revetment for the permit duration, the risk of wave overtopping and leach field inundation posed by the worst-case scenario has been sufficiently lowered to justify reducing the setback of the revetment pullback's wave uprush line from the existing leach fields. Given the BBGHAD's desire to transition member properties off septic systems, the increased risk of leach field damage due to increased proximity of the wave uprush line may be acceptable given the anticipated relatively short leach field lifespan of up to 10 years. This pullback also creates sufficient land area seaward of the relocated revetment to more than offset the total amount of area the existing emergency revetment is claimed to encroach (0.85 acres) on public land as asserted by the California State Lands Commission (CSLC) according to its January 2010 survey.

The location of the revised revetment pullback is shown in Figure 1. The BBGHAD presents its rationale for the revetment setback in Figure 3.

This document provides a revised description of the proposed Project and contains the following sections:

- Section 1: Project site history and an overview of previous efforts to address beach erosion damage to structures and potential damage to private sewage disposal systems;
- Section 2: Detailed description of the components of the proposed Project; and
- Section 3: Construction activities associated with the Project.

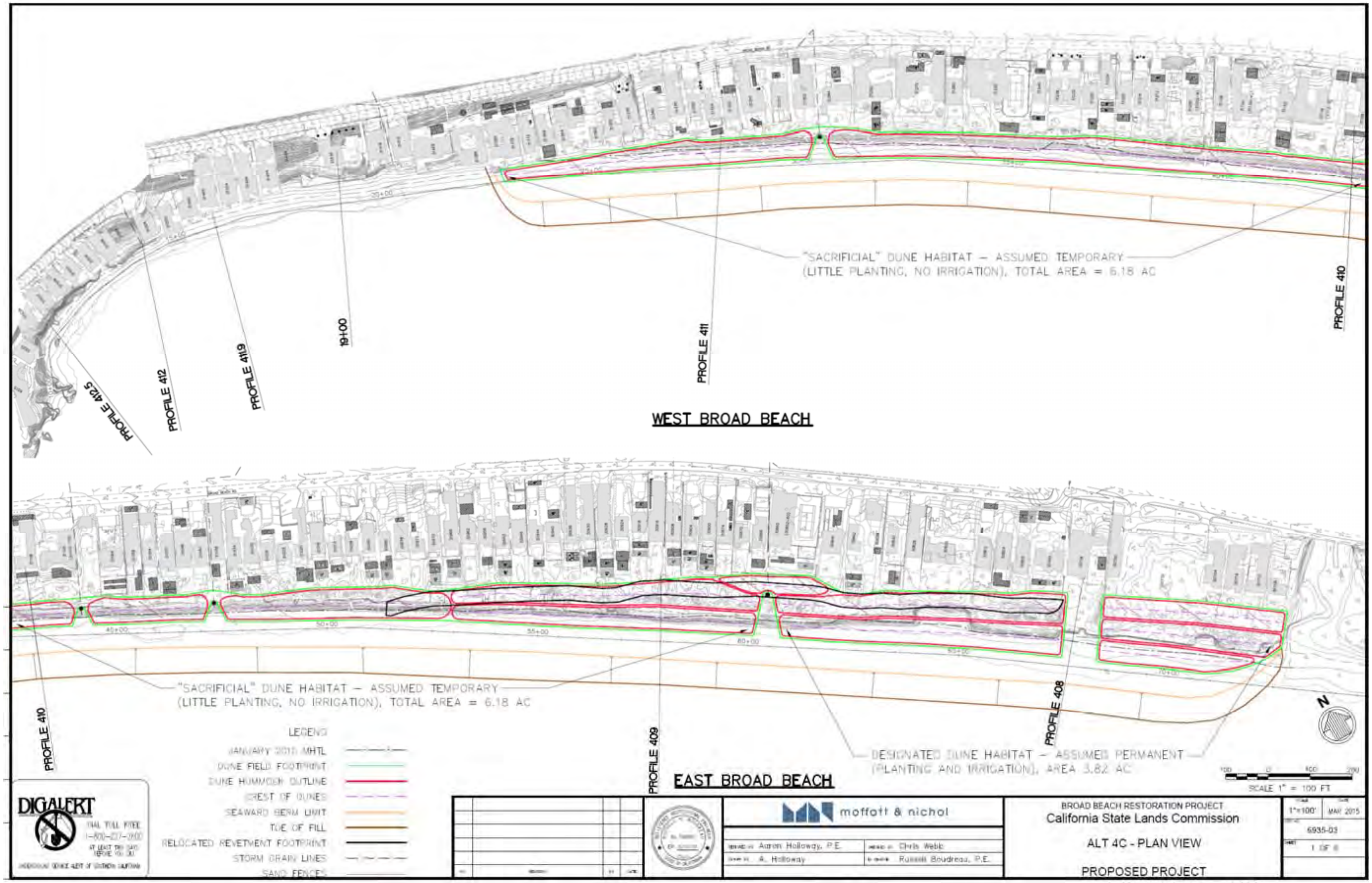


Figure 1. Plan View of Alternative 4C

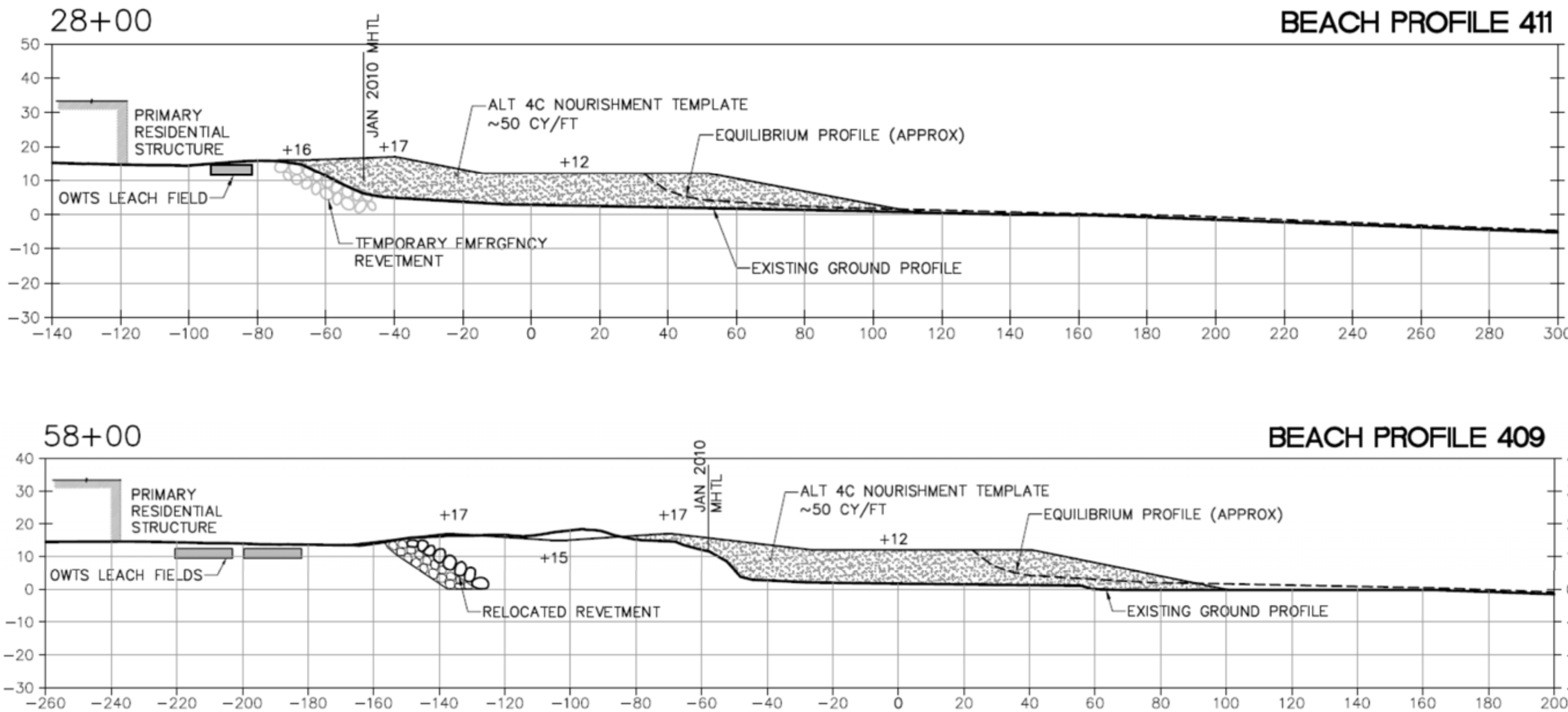


Figure 2. Alternative 4C, Typical Sections

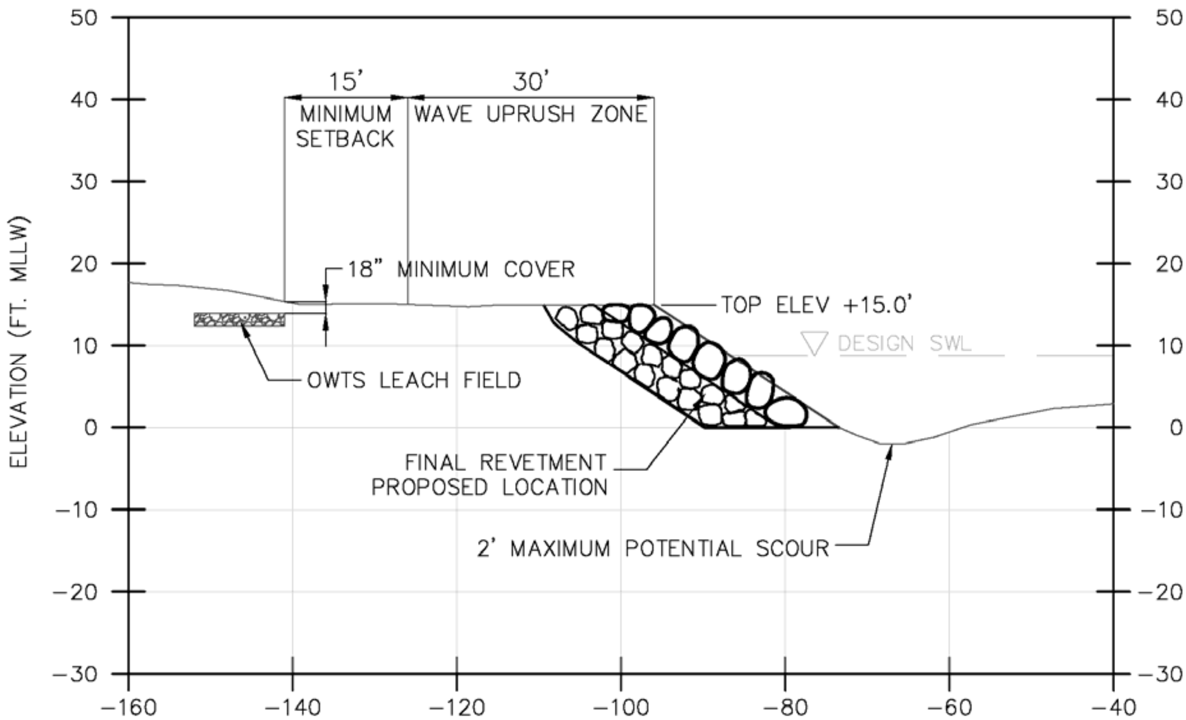


Figure 3. Recommended OWTS Setback from Relocated Revetment

1. Project Background

1.1 Project History

Historical Conditions of Broad Beach

Development along Broad Beach began in the 1930s, consisting of small beach cottages. Most lots were developed by the late 1980s. During this period, the beach remained considerably wider than it is today, especially through the early 1970s. The width of Broad Beach reached a peak in 1970 at a yearly average of 60 feet landward of the mean high tide line (MHTL); however, the beach has been receding since. Between 1974 and 2009, approximately 600,000 cubic yards of sand were lost at Broad Beach, moving the shoreline inland approximately 65 feet. The majority of the sand moved east to nourish Zuma Beach and other locations down coast. The sand budget turned negative around 1974 and from 2004-2009 the sand loss rate accelerated to approximately 35,000 cubic yards per year (Everts Coastal 2009). Between 2009 and 2014, the sand loss rate has increased to approximately 50,000 cubic yards per year based on seasonal beach profile survey data. The area of greatest beach erosion occurred close to Lechuza Point and tapered off toward Trancas Creek.

Photo 1. Western reach of Broad Beach, 1972

Photo 2. Western reach of Broad Beach, 2010

Coastal Protection and Public Access Issues

Due in part to the accelerated coastal erosion, the need for coastal protection structures increased along Broad Beach and issues arose regarding coastal access, private property rights, and the scope of the public's right to lateral access on the beach. As the beach narrowed, Broad Beach homeowners, particularly those along the central and western portions of the beach, applied for and received at least 21 permits to allow installation of individual coastal protection structures, including vertical timber piling and concrete seawalls, caissons or pilings, and rock revetments.

The 1997-1998 El Niño storm season caused considerable shoreline erosion and related storm wave damage along the California coastline. Many Broad Beach homes were threatened, causing some homeowners to construct temporary sand bag revetments to protect residential structures and leach fields. One residence suffered major structural damage.

Photo 3. Storm Damage
Wave action in the 1997-1998 El Nino led to major structural damage to one home on Broad Beach (Source: Norton Karno, 2/98)

The 2007-2008 winter season also caused significant coastal erosion at Broad Beach. Most of the homeowners responded with the placement of disparate and temporary geotextile or sand bag revetments authorized by emergency coastal development permits issued by the City of Malibu. However, the sand and geotextile bags proved inadequate for reliable shore protection, failed in some instances, and generated debris and litter on the beach the following year.

Over the years, confusion has existed among members of the public and area homeowners about the boundary between public lands and private property. A number of factors have contributed to uncertainty as to the exact or even general location of the boundary between public land (beach areas seaward of the mean high tide line) and private property. Those factors include a lack of clear demarcation and a checker board pattern of lots with and without any dedication of lateral access. As the beach eroded, trespassing increased by public beach users on private property.

Photo 4. Geotextile Bags 2008-2009

Geotextile bags were installed in winter 2008-2009 under emergency permits to protect homes and septic systems from imminent threat of coastal erosion.

Photo 5. Collapsed Geotextile Bags

Winter storms in 2008-2009 raised concerns that the geotextile bags were inadequate as protection, collapsing under storm-generated surf and exposing homes to erosion hazards.

These uncertainties and resultant conflicts were primarily complicated by inconsistent lateral access easements recorded over many years to permit the public to pass across individual properties. These factors prompted the California Coastal Commission (CCC) to prepare educational material showing the location of lateral access easements (CCC 2004). However, only about half the homes along Broad Beach have dedicated lateral access easements, and even those differ in size (refer to Section 1.4). Most of the dedicated public lateral access easements are referenced to the location of the daily high water line or the mean high tide line. Because of these inconsistent and varying reference points, no easily definable way exists for the public or homeowners to visually see or even estimate the location of the lateral access easements at any given time. This uncertainty, coupled with the narrowing of the beach, has created even greater uncertainty over the areas open to public lateral beach access or use of areas under private ownership.

Construction of Emergency Revetment (2010)

High erosion rates during the 2009-2010 winter season and widespread failure of then-existing temporary emergency sandbag revetments resulted in an application to the City of Malibu and the CCC by the local homeowners and their voluntary association, the Trancas Property Owners Association (TPOA), to permit construction of a temporary emergency rock revetment. This revetment was accepted as the minimum action necessary and the least environmentally damaging alternative to implement the interim shore protection required for structures and public health. Specific elements of the temporary rock revetment include:

- Filter fabric to eliminate loss of dune material through voids in the stone matrix;
- Reduced armor size (1/2- to 2-ton) stone to allow for faster construction; and
- Shallow toe elevation for improved constructability.

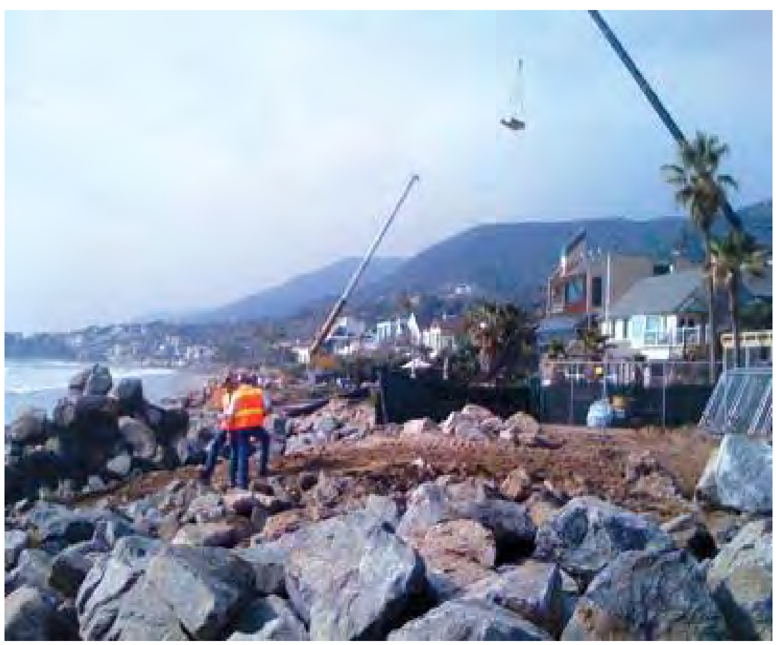


Photo 6. Construction 2010 Emergency Revetment

The existing emergency revetment completed in April of 2010 consists of boulders ranging from 0.5 to 2 tons in size. It was constructed to protect homes, septic systems and leach fields, and public drainage systems.

In total, approximately 36,000 tons of rock were placed along 4,100 feet of Broad Beach in front of homes located between 30760 and 31346 Broad Beach Road. The rock was placed on top of a filter fabric layer and the revetment varies in width from 22 to 38 feet. The revetment rises 12 to 15 feet above the average low tide elevation (mean lower low water, or MLLW1) at this beach, with an average crest elevation of +13 feet MLLW. In accordance with permits issued by the CCC, the City of Malibu, and other public agencies, homes between 31302 and 31346 Broad Beach Road received a more robust rock revetment design and larger rock (up to 4 tons per rock). The project also involved the homeowners redesigning and rebuilding the two current vertical public access ways from the street to the beach at their own cost. The rebuilt access areas include stairways and guiderails which traverse over the revetment itself to provide vertical public access to the shore.

The property owner at 30822 Broad Beach Road opted not to participate in the revetment project, resulting in a more than 100 foot-long break in the continuity of the revetment in front of this property located near the eastern end of the Project reach. The BBGHAD has committed to work with the homeowner and appropriate agencies with the goal of filling the revetment gap.

Construction of the emergency revetment required the following permits:

- City of Malibu: Emergency Coastal Development Permit No. 09-021; Engineering Permit No. 10-002;
- California Coastal Commission: Emergency Coastal Permit No. 4-10-003-G;
- U.S. Army Corps of Engineers: Sections 10 and 404 Permit File No. SPL-2009-00979-PHT;
- California Regional Water Quality Control Board (LA Region): Clean Water Act Section 401 Water Quality Certification No. 10-003;
- Los Angeles County Dept. of Beaches and Harbors: Permit #s: RE-043-09; RE-029-10; and
- California Department of Transportation (Caltrans): Encroachment Permit No. 710-6TK-0146.

Photo 7. Emergency Revetment

[1] The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch, a 19-year period established by the National Oceanic and Atmospheric Administration that currently covers the period 1983-2001.

The existing 4,100-foot-long emergency revetment at Broad Beach rises approximately 13 feet above the low tide beach and is approximately 30 feet wide at its base.

Photo 8. Coastal Access Stairway

Although the emergency revetment design accommodates two public coastal access stairways, modest higher high tides combined with beach erosion impede access.

This revetment was constructed under emergency permits and, as such, is subject to final permitting by the existing agencies. For the purposes of the Analysis of Impacts to Public Trust Resources and Values (APTR) report, the California State Lands Commission (CSLC) will be considering the location of this revetment in relation to public lands and public trust resources. Refer to Section 1.3 for a description of these issues.

Formation of the Broad Beach Geologic Hazard Abatement District, BBGHAD (2011)

GHADs are political subdivisions of the state and are formed in specific geographic areas to address potential geologic hazards. The purpose of a GHAD is to prevent, mitigate, control, or abate defined geologic hazards through maintenance, improvements, or other means. Details on GHAD formation, governance, and operations were submitted as Attachment E to the original CDP application. Approximately 40 GHADs exist in California (some are inactive) with approximately four of these formed to address coastal erosion issues.

The City of Malibu approved the formation of the Broad Beach Geologic Hazard Abatement District ("BBGHAD") for Broad Beach and appointed an initial Board of Directors on September 12, 2011. The BBGHAD spans the entirety of Broad Beach and a portion of Victoria Point starting at 30708 Broad Beach Road in the east and concluding at 6525 Point Lechuza in the west.

Financing of a GHAD is accomplished through an assessment on only those property owners who own real estate within the boundaries of the designated district. Issuing and servicing of bonds, notes, or other debentures is also authorized under GHAD law. The assessments and associated financing of the BBGHAD improvements are overseen by the BBGHAD Board of Directors. The BBGHAD Board has approved and passed a resolution (Resolution No. 2011/03) accepting the Plan of Control, which serves as the guiding document for the BBGHAD2. The Plan of Control describes the present geologic hazards and presents a plan for the prevention, mitigation, abatement, and control of the hazards. Assessments are calculated based upon the amount of linear frontage along the beach of each property in the BBGHAD. The property owners within the BBGHAD held an assessment election from late January through March 2012 and the legally required majority of property owners within the BBGHAD voted to approve the assessment to fund the proposed Project (Resolution Nos. 2012/03 and 2012/04). BBGHAD projects are also subject to all required regulatory agencies, including, but not limited to, the CCC, CSLC and the City of Malibu.

All permits required for the proposed Project are listed below.

- City of Malibu: Approval in Concept and Request for Consolidated CDP;
- California Coastal Commission: Coastal Development Permit (two applications submitted thus far);
- U.S. Army Corps of Engineers: Sections 10 and 404 Permit (application received and public notice issued);
- California Regional Water Quality Control Board (LA Region): Clean Water Act Section 401 Water Quality Certification (application received and in process);
- Los Angeles County Dept. of Beaches and Harbors: Encroachment Permit (submittal date fall 2014);
- California State Lands Commission permit (application received and in process); and
- Construction permits for the contractor are a Caltrans Encroachment permit and an Air Quality permit from the Air Board (contractor to secure these permits).

Regarding issuance of a CDP for the proposed Project, the BBGHAD seeks its CDP pursuant to a consolidated permit action by the CCC and the City of Malibu. The City Council of the City of Malibu approved the BBGHAD's consolidated CDP request at its November 26, 2012 hearing and adopted City Resolution No. 12-42.

1.2 Current Conditions at Broad Beach

At most tides, Broad Beach is a narrow ribbon of primarily wet sand beach that extends for approximately 6,000 feet from the Trancas Creek Lagoon on the east (bordering public Zuma Beach) to Lechuza Point on the west. The beach is often wider with some pockets of dry sand on the east and narrows to become more of a low tide beach to the west. The beach becomes increasingly rocky in the west in the sheltered cove inside of Lechuza Point, where rocky intertidal habitat intermingles with intermittent sandy beach. The beach and adjacent sand dunes border 114 residences and a recreational beach facility, the Malibu West Beach Club. It provides beach amenities to several hundred inland residences and hosting of church services and social functions open to the public. The residences occupy 122 lots.

Approximately two-thirds of the residences are fronted by the existing emergency revetment; one-third of the residences, located at the east and west end, are not presently protected by the emergency revetment's footprint. Residences toward the west end of the beach often have individual seawalls or rock revetments while those at the east end rely on an existing but diminishing dune system and a

[2] Section 26509 of the Public Resources Code specifies the Plan of Control requirements.

generally greater setback distance between the primary residential structures and the shoreline. The beach is accessible to residents and the public primarily at low to moderate tides, but inundated at medium to high tide[3].

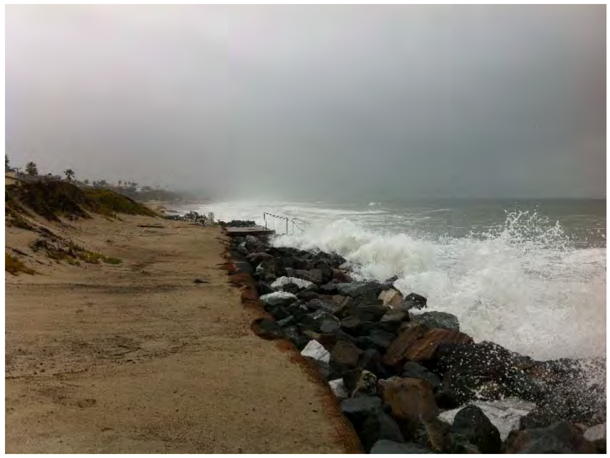


Photo 9. Wave Run Up March 2014
Overtopping of the revetment occurred during storm wave run up on March 3, 2014 during an estimated 5-ft tide.

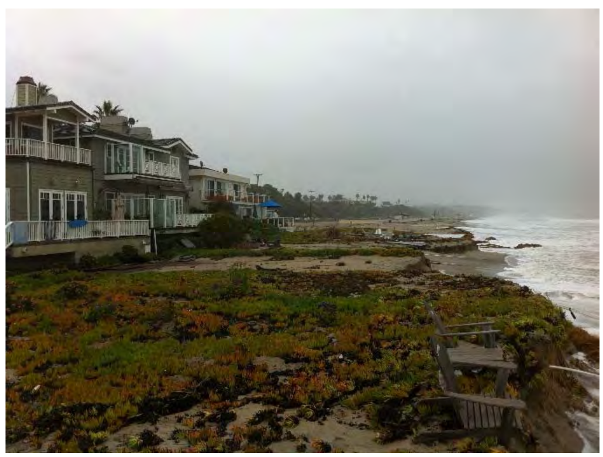


Photo 10. Erosion 2014
Substantial erosion has occurred seaward of east end residences. Photo taken during storm wave run up on March 3, 2014 during an estimated 5-ft tide.

1.3 State Sovereign Lands and Private Property Boundary

The location of the boundary between private properties along the California coast and the sovereign lands of the State of California is the ambulatory ordinary high water mark (OHWM). Generally, the

[3] During field work on September 14, 2011 during a +5 foot tide, virtually all of Broad Beach was submerged, excepting the eastern 100 feet. Observations made in 2014 indicate that the eastern portion of the site is also typically submerged during a +5 foot tide.

OHWM is measured by the mean high tide line (MHTL), except where fill has been used or artificial accretions or the boundary has been fixed by agreement or court decision. MHTL surveys do not create a permanent boundary line, but rather serve as evidence as to the MHTL location at that single point in time. The location of the MHTL is a long-term average of shoreline position, but can be affected by sand movement along the coast, variations in long-term wave and storm activity, and coastal erosion. In the absence of a boundary line agreement with the CSLC or an adjudicated boundary line, the boundary between sovereign land and privately held uplands remains subject to uncertainty and dispute.

Although the installation of the emergency revetment and the beach nourishment activities proposed by this Project has moved and will further move the MHTL seaward, the boundary between state sovereign lands and private uplands will remain at the OHWM. Broad legislation and various court decisions also provide guidance on the presumed location of the MHTL, but many variables can complicate fixing its location. In summary, definition of this line is not clear cut, may not be evident to beachgoers, its location is often required to be demarcated by surveys, and is often subject to adjudication.

Photo 11. Aerial View of Revetment

Broad Beach currently has a narrow "low tide beach" backed by the existing emergency revetment and existing single family homes. In the east-central section of the beach, homes are set back from the beach and revetment, and are backed by a steep coastal bluff. Broad Beach Road, which provides direct access to most of the homes, is located at the toe of the bluff and Pacific Coast Highway runs along the top of the bluff. Most of the septic system leach fields are located in the dunes between the homes and revetment. Property owners access the beach by historic narrow paths from the homes to the beach over the dune. (Photo: California Coastal Records Project 2011).

The location of the OHWM at Broad Beach is important to both the public and private property owners as it defines the boundary between public and private lands along the beach front. The location of the OHWM potentially affects the long-term location of the emergency revetment and it is a key element to the public's right to access along the shoreline.

The Applicant's engineers conducted a MHTL survey on October 15, 2009, and was completed specifically to satisfy the State Lands Commission as a formal MHTL survey for permitting purposes. This survey resulted in the MHTL used as the boundary of the toe of the future revetment. After construction, the revetment was mapped relative to the MHTL and the toe of the emergency revetment roughly corresponds to the MHTL. However, several short reaches of the revetment toe are several feet seaward of the MHTL leaving a fraction of an acre of the structure on public property.

CSLC also conducted a MHTL survey at Broad Beach on January 19-20, 2010 just prior to installation of the emergency revetment and in the midst of an El Nino winter storm wave event. The results of that survey identified a MHTL landward of the October 15, 2009 MHTL identified by the Applicant's engineers. Approximately 0.85 acres of the emergency revetment is located on public land according to the CSLC survey, while 0.12 acres of the revetment encroaches on public land according to the Applicant's survey.

1.4 Existing Vertical and Lateral Public Access

Photo 12. Revetment Toe

The location of the MHTL and existing easements for public lateral beach access at Broad Beach are important considerations that can affect both private property rights and public access along the coast. Applicant-prepared surveys indicate that the MHTL runs generally along or seaward of the revetment toe with limited areas under the revetment. CSLC surveys indicate that an aggregate of almost 0.85 acres of the revetment overlie public land as well as approximately 47 easements. The applicant's survey indicates a lesser area of 0.12 acres of the revetment overlie public land.

Public vertical access to Broad Beach is currently provided via two public access easements which include pathways and stairs connecting to Broad Beach Road. These access paths are shown on the As Built plan set provided as Appendix 1 to the Coastal Engineering report in Exhibit L. In recent years, severe storms have significantly damaged these vertical accessways, most recently in early 2010. After the January and February 2010 storms, the TPOA restored and re-engineered these County-owned accessways at their expense. Since the 2010 construction of the emergency revetment at homeowner expense, these public vertical access points also include engineered stairways over the revetment to the beach, also constructed at homeowner expense. These vertical access ways are owned and managed by the Los Angeles County Department of Beaches and Harbors. Unrestricted roadside parking is available along Broad Beach Road. Unlimited access is also available from Zuma Beach, immediately adjacent to Broad Beach. Extensive public parking exists at Zuma Beach in the county-owned and operated public parking lot and on both sides of Pacific Coast Highway. Existing public lateral access is currently available as a matter of right seaward of the ordinary high water mark (OHWM) and landward of the MHTL on those properties which have deeded such access, depending on seasonal sand levels and tides. Under current fall/winter conditions in 2014, a moderate high tide of 3 to 4 feet may submerge all or most of the sandy beach, limiting all lateral access along the shoreline. Under current conditions, it appears that coastal erosion has resulted in a materially diminished beach for recreation and public uses.

Photo 13. Lateral Access

Lateral access along Broad Beach from the east can be impeded by high tides which often reach to the toe of the revetment. On many parcels, existing AREs for lateral access appear to be located beneath or landward of the existing revetment.

Photo 14. Coastal Access by Stairways

Public coastal access is provided by two paths and concrete stairways across the revetment; beach access is accessible from these stairways during low to medium tides; on-street parking is available along Broad Beach Road. Note kelp deposited on lower railing from last high tide.

In addition to existing physical limitations to lateral access, lateral access along Broad Beach is affected by a complicated mix of public land, easements for public lateral access, and private property. Land seaward of the OHWM is public. Further, approximately 47 of the private parcels along Broad Beach have granted scattered easements, deed restrictions, or other legal documents providing lateral public access. Collectively, these are referred to as Access and Recreational Use Easements (AREs)[4]. These AREs vary in terms, but they typically extend 25 feet inland from above the "daily high water line" or the MHTL; in some cases AREs are restricted by privacy or set back buffers against the residential structures. Most of these AREs are currently partially or entirely covered by the emergency revetment and frequently extend landward of the revetment.

1.5 Existing Coastal Protection Structures

As discussed in Section 1, homeowners along Broad Beach have responded to threats of coastal erosion through installation of a range of inconsistent emergency and long-term coastal protection structures. In addition to the 4,100-foot long emergency rock revetment and the preceding emergency geotextile sand

[4] Also known as Offers to Dedicate (OTDs); however, OTDs are only offers of easements. The interest belongs to the property owner until the offer is accepted by a government agency or a nonprofit organization. Once the OTD is accepted, the accepting entity obtains title to the easement and the easement remains in the public domain in perpetuity. AREs are accepted OTDs and have been dedicated by former or current owners of land within the GHAD and held by various agencies including CSLC.

bag revetment(s) now located landward of the rock revetment, homeowners have installed a variety of coastal protection structures.

On the east end of Broad Beach, five existing homes, four undeveloped lots and the Malibu West Beach Club are protected from coastal erosion by existing but receding sand dunes. One homeowner further west at 30822 Broad Beach Road elected to rely upon setbacks, sand dunes and a geotextile revetment, leaving a 100-foot-long gap in the emergency revetment. At the west end of the beach (west of the proposed nourishment), 21 homes and two vacant beachfront parcels are protected by timber bulkheads, concrete seawalls, rock revetments or are constructed on pilings.

Photo 15. Home in Project Area

Photo 16. Home in Project Area

Homes along Broad Beach, especially at Little Broad Beach at the west of the Project area, have developed a variety of coastal protection structures constructed over many years.

2. Proposed Project Action

The SLC is considering the BBGHAD's lease application for beach nourishment, dune restoration, and validation of an existing emergency shoreline protective structure (revetment).

The revised Project, as proposed, would implement a shoreline protection plan along Broad Beach for at least 20 years, consisting of: 1) beach nourishment to recreate both a dry sand beach and a restored dune system; 2) at least 20 years of dune restoration; 3) at least 20 years of sand backpassing designed to prolong nourishment; and 4) permitting the partially relocated 2010 rock revetment as a permanent structure buried under both the beach nourishment and dune.

The BBGHAD proposes to conduct a minimum of two Major Nourishment events in the first 10 years of the Project. Placement 1 of 300,000 cubic yards would occur in year 0 and placement 2 would occur approximately 5 years later. The performance of the Project would be monitored regularly, assessed every 5 years, modified as required and upon permitting by all agencies. Another two Major Nourishments, also of quarry sand, would be conducted in approximately year 10 and approximately year 15 as needed in accordance with objective triggers.

The BBGHAD also proposes to conduct smaller-scale backpassing from wider reaches of the beach to narrower reaches of the beach according to certain objective triggers, with the frequency not expected to exceed one time per year. In the event that insufficient sand volume exists for backpassing, the BBGHAD intends to complete Interim Nourishments and Erosion Nourishments to maintain sufficient sand beach over the Project length to bury any exposed rock revetment and maintain lateral public access to the maximum practical extent. The frequency and volume will be determined by certain additional objective renourishment triggers, and subject to availability of additional BBGHAD funding as further discussed under Adaptive Management Actions in Section 2.11.

2.1 Physical Description of Proposed Alternative 4C Project

The proposed Project would entail the following:

- For the CCC authorization process, after-the-fact permitting is sought for: rock material deposited at the west end of Broad Beach between 1997 and 1998 pursuant to emergency Coastal Development Permits (CDPs) and subsequently used as part of the 2010 as-built emergency rock revetment, sandbags and geofabric materials installed in 2008-09 and used as temporary shoreline protective devices, and removal of unpermitted stairways from various private residences to shoreline;
- Permitting of the emergency revetment installed in 2010 as a permanent feature. This revetment will be relocated landward at the east end in response to agency requests as shown in Figure 1. Authorization to conduct maintenance of the revetment is also requested.
- Sand would be sourced from inland private local quarries (CEMEX, Grimes Rock, and P.W. Gillibrand, collectively, "Local Inland Sources") in the Moorpark/Simi area of Simi Valley, located 20 to 25 miles north of the Project site (approximately 40 to 45 miles from the site by truck);
- Major Nourishment events of 300,000 cubic yards of sand approximately every 5 years throughout the life of the Project. In the event of severe coastal storm wave event or series of events which

strip the beach of sand and subject to monitoring results and BBGHAD finances, the BBGHAD seeks the flexibility to conduct Major Nourishments more often than every five (5) years in addition to or in lieu of Interim Nourishments and Erosion Nourishments.

- Trucking of inland material directly to the beach in accordance with a transport plan and depositing the sand on the beach, including over the existing revetment, for distribution by heavy equipment;
- Use of heavy equipment (e.g., scrapers, large 40 ton-capacity off-road trucks, and bulldozers) to distribute sand to desired locations and depth within the Project area, including coverage of the existing revetment and creation of a restored sandy beach;
- The development, construction, and maintenance of a restored sand dune habitat area intended to replicate and expand on the historic structure and integrity of dunes at Broad Beach;
- The removal of non-native dune vegetation and replacement with native vegetation consistent with the CCC and the City of Malibu's applicable standards for dune habitat restoration areas;
- Backpassing operations to move sand from wider reaches of Broad Beach to narrower reaches of the beach in accordance with objective guidelines, to occur no more than once per year;
- In the event that insufficient material exists to facilitate backpassing, small scale Interim Nourishments of up to 75,000 cubic yards will occur; and,
- In addition, if natural ocean forces, backpassing, and Interim Nourishments fail to cause at least 10 feet of sand to remain seaward of the revetment between Transects 408-411, the BBGHAD will conduct up to three (3) Erosion Nourishments per 10-year period using a maximum of 75,000 cubic yards of imported sand seaward of the revetment in the area that does not meet the objective access criteria.

The BBGHAD intends to work with the appropriate regulatory agencies to monitor the performance of the Project throughout the term of the Project. Near the end of the 20-year Project duration, the Project performance will be reviewed with the CCC and SLC to evaluate any required modifications to the Project such that new and/or renewed permits to maintain the Project can be acquired. Of particular interest will be any impacts associated with climate change, changes in regional sediment supply, beneficial or negative impacts of the Project on adjacent shorelines, performance of the revetment, etc.

The BBGHAD desires the right to continue the Project after the 20 year permit period, and fully intends to do so. After every major beach nourishment and sand backpassing event, the constructed beach would remain subject to ongoing natural wave and littoral transport processes and resulting redistribution of sand. As a result, initially constructed beach profiles would evolve and change until the constructed beach reaches a natural equilibrium consistent with ongoing coastal processes. Thus, while the discussion below precisely describes the initially engineered beach, the natural equilibrium of the beach would evolve as anticipated and described via projections and modeling. More information is provided in the updated version of the Coastal Engineering report, previously submitted as Exhibit L.

The beach restoration aspects of the Project provide enhanced and quantifiable opportunities for public recreation and access, sport fishing, surfing, and other public uses of the restored beach. In addition, the restored dune system will provide enhanced dune habitat and support additional public trust resources.

These direct Project benefits more than mitigate and offset any impacts resulting from the permanent permitting of the 2010 emergency revetment. Therefore, no further public access provision or mitigation incidental to this Project are necessary.

2.2 After-the-Fact Authorization for Existing Shore Protection Structures

As requested by the CCC, the BBGHAD requests that CDP application 4-12-043 also incorporate an after-the-fact authorization for shore protection structures located at the Project site prior to construction of the 2010 emergency revetment. These structures include rock material deposited at the west end of Broad Beach between 1997 and 1998 pursuant to emergency Coastal Development Permits (CDPs) and subsequently used as part of the 2010 rock revetment, as well as sandbags and geofabric materials installed in 2008-09 and used as temporary shoreline protective devices. The location of this previously unpermitted development is shown on the as-built plan set provided as Exhibit D. In accordance with the May 15, 2013 letter from the BBGHAD's counsel, any unpermitted development west of 31346 Broad Beach Rd is outside of the BBGHAD's legal jurisdiction and is not within the BBGHAD-approved Project. As requested by the SLC and CCC, the Applicant has submitted detailed documentation addressing the amounts of grading, sand sculpting and berms that were associated with the construction of the sandbag and geofabric revetments. This information was provided in Exhibit I(f) of its submittal No. 4.

Further, the BBGHAD has agreed to the removal of unpermitted stairways from various private residences to the shoreline. Therefore, such stairways are not included in any after-the-fact authorization request.

2.3 Long-Term Authorization of 2010 Partially Relocated Emergency Revetment

As part of the long-term strategy for protection of structures, including septic systems, from coastal erosion, and provided the Applicant conducts nourishment and backpassing for at least 20 years, the BBGHAD seeks approval of the emergency rock revetment constructed in 2010, as permitted by the City of Malibu and the CCC, among others. The BBGHAD has agreed to move the eastern portion of the 2010 revetment landward of its current location as shown in Figure 1. This pullback also serves to remove that portion of the emergency revetment claimed by the CSLC to be encroaching onto public land according to its 2010 survey (approximately 0.85 acres).

If approved, the relocated revetment would be buried beneath a new sand dune system located at the landward edge of the widened, nourished beach. Nourishment is proposed to keep this shore-protection structure buried for approximately 20 years unless severe beach erosion or other conditions preclude maintaining sufficient beach width for protection. The revetment would serve as a last line of defense against future severe erosion during extreme storm events. The relocated and existing revetment would be approximately +15 feet MLLW in elevation and 22 to 38 feet wide at its base and extend for 4,100 feet, covering approximately 3.22 acres of beach.

2.4 Sand Sources for Beach Nourishment and Dune Restoration

The primary sand sources for use by the proposed Project are inland quarry material, suitable for dune and beach-quality sand (Figure 4). Since 2010, the BBGHAD has expended significant time and more than $2,000,000 investigating offshore, harbor-area, and former river bed sand sources for beach nourishment and dune building material. For example, with oversight from the primary permitting authorities, the BBGHAD conducted extensive benthic, chemistry, grain size, and other analyses on sand approximately 40-50 feet below the water surface approximately one third mile offshore Dockweiler State Beach in Los

Angeles. Subsequently, the BBGHAD discovered that the City of Los Angeles owned the subject offshore sand and was not interested in selling this sand to the BBGHAD. The BBGHAD also investigated other sand in Ventura Harbor and in Calleguas Creek in Ventura County, but these sands could not meet chemical compatibility requirements with native Broad Beach material or other governmental agency requirements.

In short, all of the alternative sand sources were discovered to either have material which was deemed incompatible with the Project's goals, presented insurmountable hurdles in securing authorization or, in the example of the offshore Trancas site, was located in a marine protected area with restrictions on allowable offshore activities.

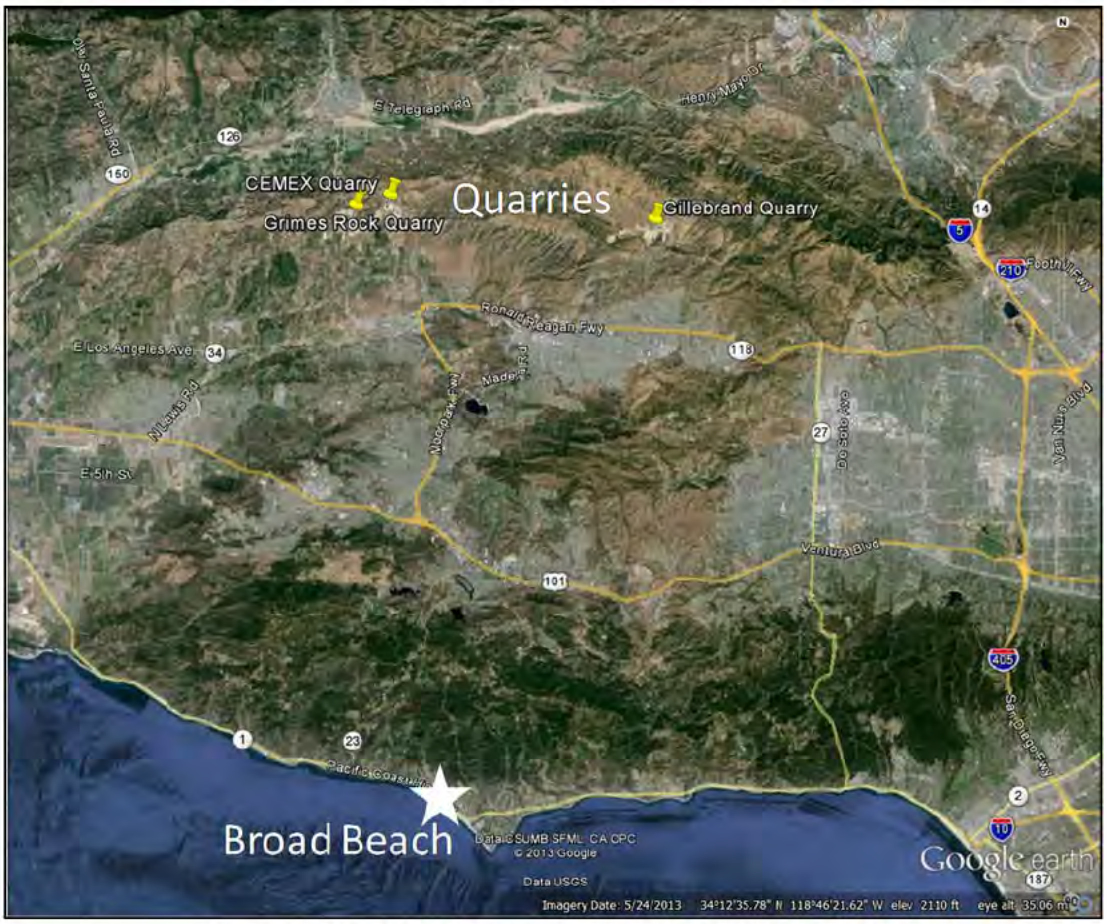


Figure 4. Broad Beach Restoration Project - Sand Source Area

Sand for beach nourishment should be of medium-grain size, coarser than the fine-medium grain size present on the existing beach in order to better resist erosion and maximize dry beach width.

The proposed source for medium-grain sand are private local commercial quarries (CEMEX, Grimes Rock, and P.W. Gillibrand, collectively, "Local Inland Sources") in the Moorpark/Simi area of the Simi Valley, 20-25 miles north of the Project site by air and 40-45 miles north of the Project site by truck. This quarry material would be transported via truck to the Broad Beach site and distributed by heavy equipment including large (40-ton capacity) off-road trucks, bulldozers and scrapers to create the final beach and dune templates. Front-end loaders would also be used to move sand as needed. The stockpiled materials originate from a sandstone geologic formation believed to be a former seabed, i.e. marine sedimentary rock (Bryan Forgey, CEMEX, Personal Communication on May 20, 2013). Two quarries, Grimes Rock and CEMEX, possess the capacity to provide the quantity of sand required for the Project (600,000 cubic yards of material). A third quarry, P.W. Gillibrand, can supplement the Project if the other quarries cannot meet the capacity needed to serve the Project, and can significantly expand operations, if needed, to potentially supply the Project with all of the material. The material is continually excavated, stockpiled, and removed as part of ongoing quarry and aggregate sales operations.

Figure 5 shows the geologic setting of the quarries and indicates that sandstone is the sediment source. Large strata of sandstone are typically formed in pre-historic marine environments, suggesting that these materials are former seabed. Sand sieve test results show the material to be 92.5% sand and 7.5% silts and clays, which is generally compatible with the beach. The median diameter of the quarry material is larger than the current beach, but this fact is an attribute for beach nourishment as the fill material will reside on the beach longer and prolong benefits. The San Diego Association of Governments used beach fill material that was coarser than the native material in both 2001 and 2012 to maximize the Project's life, and to also maximize the width of the new beach berm. Coarser sand resides higher on the beach profile and typically results in a wider recreational beach berm area than finer sand.

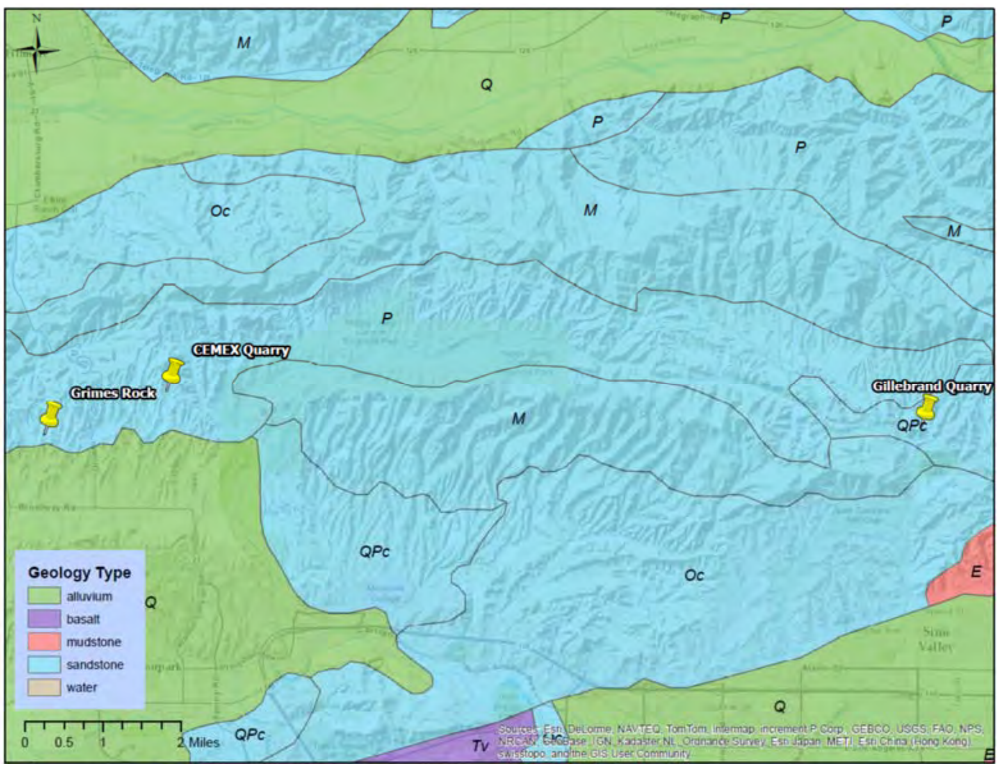


Figure 5. Geology Strata of the Quarries as Sandstone
Note: The Blue Polygon Represents the Sandstone Deposit.

In response to CCC requirements, the median grain size or d_{50} of the quarry material selected for beach and dune creation will be between 0.24 mm and 0.60 mm.

Photographs of the existing sand stockpiles at each quarry are provided below. These stockpiles are continually reworked, turned over, removed, and replaced for commercial purposes, so the sand is very well mixed and homogeneous throughout the piles.

Photo 17. Sand Stockpile at the Grimes Rock Quarry

Photo 18. Sand Stockpile at the CEMEX Quarry

The beach and dune material would be excavated from one or more of the listed quarries and would be trucked in 14-cubic-yard-capacity, bottom-dump trucks. Details on sand transport and delivery to Broad Beach are provided in Section 2.1 for the initial nourishment Project.

2.5 Permits and Approvals for Candidate Sand Sources

Authorization of use of the Moorpark/Simi quarry material has been provided in the form of letters from several sand suppliers to the BBGHAD committing to the sand supply, while the BBGHAD Board approved a motion in its March 2013 meeting to implement a Project using this material from the Local Inland Sources.

Photo 19. Sand Stockpile at the P.W. Gillibrand Quarry

Consistency with Water Quality Control Boards Area of Special Biological Significance (ASBS) Guidelines

The proposed beach and dune restoration Project site is located within the Laguna Point to Latigo Point Area of Special Biological Significance (ASBS), located in both Los Angeles and Ventura counties. It is the largest of the mainland ASBSs in Southern California, with 24 miles of coastline and 11,842 acres of marine habitat. The State Department of Parks and Recreation administers many beaches and campgrounds in the northern and central sections, and Los Angeles County administers the beaches in the southern portion. Point Mugu Naval Base occupies the far northern portion of the coast and surrounds Mugu Lagoon.

ASBS guidelines allow discharge of storm water only during a rain event and do not allow placement of new points of effluent discharge. The Project does not propose placement of any new effluent discharge points into the ASBS. There are no prohibitions to beach nourishment activities in the regulations pertaining to the ASBSs. In fact, the proposed Project has as one of its goals protection of existing septic systems reliant on leach fields by widening the current highly eroded beach and thus protecting water quality from potential septic contamination.

Consistency with State Marine Conservation Area (SMCA)

As it is not proposed to use offshore material, no conflict with SMCA regulations is anticipated. Beach nourishment and other sediment management activities are allowed in the Point Dume SMCA. '*Take pursuant to beach nourishment and other sediment management activities is allowed inside the conservation area pursuant to any required federal, state and local permits, or as otherwise authorized by the department.'* (ref http://www.dfg.ca.gov/mlpa/scmpas_list.asp CDFG website 10/12/12)

2.6 Revised Beach and Dune Design for Alternative 4C

The total Project area of new dunes, beach berm and beach face would cover up to 24.3 acres. The height of the proposed sand dunes would be typical of the existing dunes at the east end of the Project, which are approximately 20 feet higher than MLLW, which is the average low tide line during spring tides. The top of the relocated emergency rock revetment would be buried beneath at least 2 and up to 5 feet of sand. Depending on location, the profile of the new dry sand beach berm would be roughly 12 to 15 feet above MLLW or existing low tide winter sand levels. The new post-construction dry sand beach berm would extend seaward of the dunes by 60 to 75 feet. At its widest point, the combined new beach and dune system would extend for 240 feet seaward from approximately the top of the relocated revetment to the surf zone on the face of the beach berm.

Due to predicted impacts, the proposed Project under Alternative 4C has been revised not only to avoid direct placement of beach and dune building material on sensitive habitat including rocky intertidal habitat, rocky outcrops, offshore reef, and associated surf grass habitat, but also, at the CCC's request, to avoid the "boulder field" centered seaward of approximately 31418 Broad Beach Road. As a result, direct placement of beach and dune building material will end at 31380 Broad Beach Road.

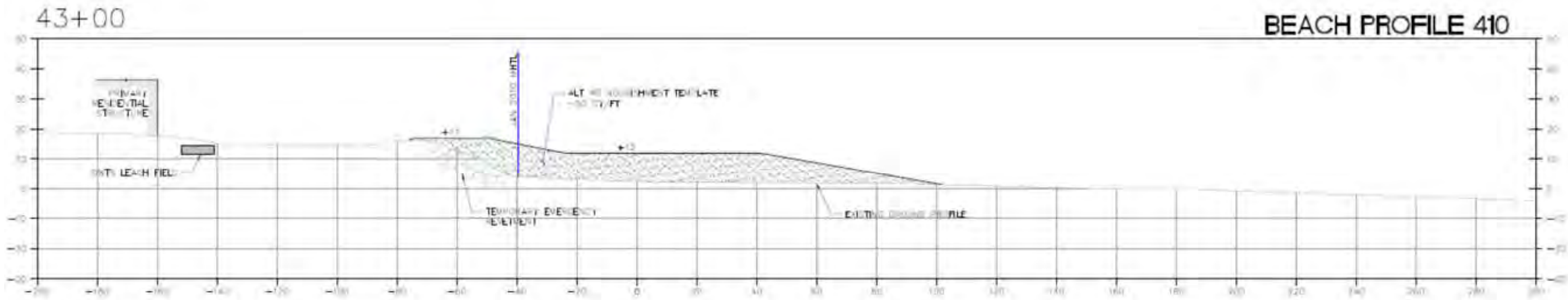
The revised dune plan incorporates the CCC staff's October 14, 2014 request that the Project incorporate a 3:1 ratio of dunes restored to dunes impacted. It also incorporates many, if not all, of the recent dune-specific suggestions from the CCC's biologist and coastal engineer. Specifically, the plan includes a linear sand mound, or ridge, along the reach with sand fences to catch sand and allow the dunes to form naturally, rather than installing a "finished" product as formed by contractors. The BBGHAD plans to install planting along the ridge to slow and trap sand in the dune. The BBGHAD has significantly modified dune plans and sections to reflect CCC input: (a) at least one "ridge" or sand peak along the reach up to +17 feet MLLW along the narrowest reach; (b) more sand ridges and wider dune field at the eastern Project area; (c) sand fencing along the rear of the ridge(s) to retain sand; and (d) planting along the top of the ridge.

The revised dune plan incorporates three (3) ridges at the east end and identifies that reach as "designated dune habitat," intending it to be permanent. The remainder of the reach west of designated dune habitat is "sacrificial dune" between 31380 Broad Beach Road and 30870 Broad Beach Road; this portion of the dune area can be lost due to the reduction in nourishment volume fronting and protecting the dunes, and would not be required to be replaced with subsequent nourishments. However, this "sacrificial dune" dune area could be replaced at BBGHAD discretion. The designated dune habitat is located between 30708 Pacific Coast Highway and 30870 Broad Beach Road and would fully mitigate impacts to existing dunes if required at a 3:1 ratio. Existing net dune impacts from the revetment are estimated to be 1.27 acres while the area of designated dunes is 3.82 acres. The BBGHAD Engineers derived the area of existing permanent dune impact by assessing the area of the relocated revetment (1.27 acres) and placed on relic and degraded dune habitat. Per the 2009 condition, the 2010 emergency revetment was not placed on dune habitat but primarily on upper back beach.

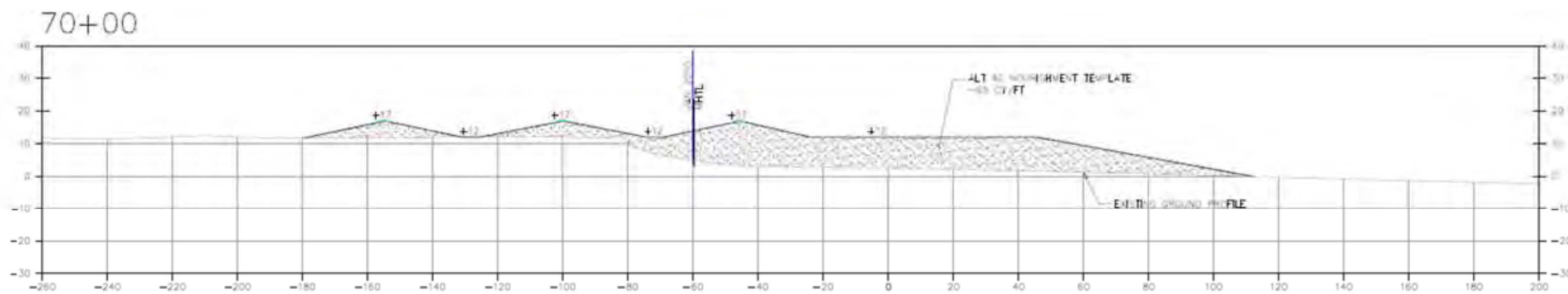
The BBGHAD has also revised the Dune Plan to reflect the CCC's agreement to, where practicable, one shared beach access path for every 2 homes with 40' of beach frontage. Homes with 40' or more of frontage will receive a non-shared beach access path.

The footprint east of 31380 Broad Beach Road and ending at 31020 Broad Beach Road would have a combined dune and dry sand beach berm approximately 125 feet wide and a beach berm face constructed at a 5:1 slope extending seaward for an additional 60 feet to the new artificially created OHWM; the beach berm in this area would be 12 feet above MLLW. Between 31016 Broad Beach Road and 30760 Broad Beach Road, where the revetment relocation landward will occur, the dune area would widen and range from approximately 75 feet in width to approximately 150 feet. The landward toe of the dune would extend up to 25’ landward of the relocated revetment and the seaward toe up to 90 feet seaward of the revetment with dune elevations at roughly 15 to 20 feet above existing MLLW to cover the existing revetment. The dune area is designed to replicate the existing dunes at the eastern end and former dunes at the site by varying in footprint and shape. The BBGHAD's updated dune restoration conceptual plan has been submitted as one of the Applicant’s sixth CDP submittal exhibits. Figure 6 shows the designated and sacrificial habitats in cross section.

In areas where the constructed dune abuts existing dune on the landward side, it would meet or exceed the elevation of the existing dune to protect existing dune habitat. In areas where the constructed dune abuts lower lying non-dune private properties, the dune would slope landward for 10 to 20 feet in a 3:1 slope. In the locations within the Project area with no rock revetment, the constructed dune system would likely be lower and tapered to integrate with conditions at each adjacent property. Dune construction would be undulated along the beach in order to preserve natural, historic dune composition.



SACRIFICIAL DUNE HABITAT PROFILE
1"=20'



DESIGNATED DUNE HABITAT PROFILE
1"=20'

Figure 6. Cross Section of Sacrificial and Designated Dune Habitat Areas

Source: Moffatt & Nichol 2015

2.7 Dune Habitat Restoration

The proposed dune restoration Project includes measures to restore native coastal dune habitats through planting of appropriate native dune vegetation, potentially restoring all such areas to their current ESHA designations and protections consistent with the City of Malibu's LCP/LUP, provided in Appendix 2D of the Coastal Engineering report in Attachment H of the Applicant's CDP submittal No. 1. Native habitat restoration would include planting species such as beach verbena, dune primrose and other characteristic species found in this community. The Applicant has agreed to assume responsibility for the construction, planting, and maintenance of the restored dune system (BBGHAD Resolution No. 2012/06). A program of initial removal of non-native invasive species such as iceplant (Hottentot fig), pampas grass, myoporum, and European dune grass from areas within and adjacent to the restored dunes would be initiated.

As proposed, signs would also be posted to demarcate sensitive dune habitats (e.g. "Habitat Area: Please Remain Seaward of Dunes on Sandy Beach"). No public access will be permitted on the dunes. By their nature, dunes are an attraction for those who desire to climb up and on top of them. Doing so will reduce the size of the dunes, weaken their structure, adversely affect burgeoning plant life, and create added risk of trespassing into protected ESHA and residential areas. Further, protocols would be implemented for long-term maintenance of restored habitats, including initial irrigation plans, ongoing invasive species/weed control and maintenance of signs and access control measures. Existing historical paths from the residences to the beach will remain and also serve as a practical and defined means for property owners to preserve and maintain the native vegetation within the protected, restored dune areas.

Paths from the residences, the Malibu West Beach Club, and the County-owned vertical access points to the new dry sand beach will provide access for those who have historically used such pathways and also protect newly established and restored dune habitat from random passage to the beach. Property owners will continue to be able to recreate at the seaward crest of the restored dunes. A conceptual rendering of the Project is shown in Figure 7.

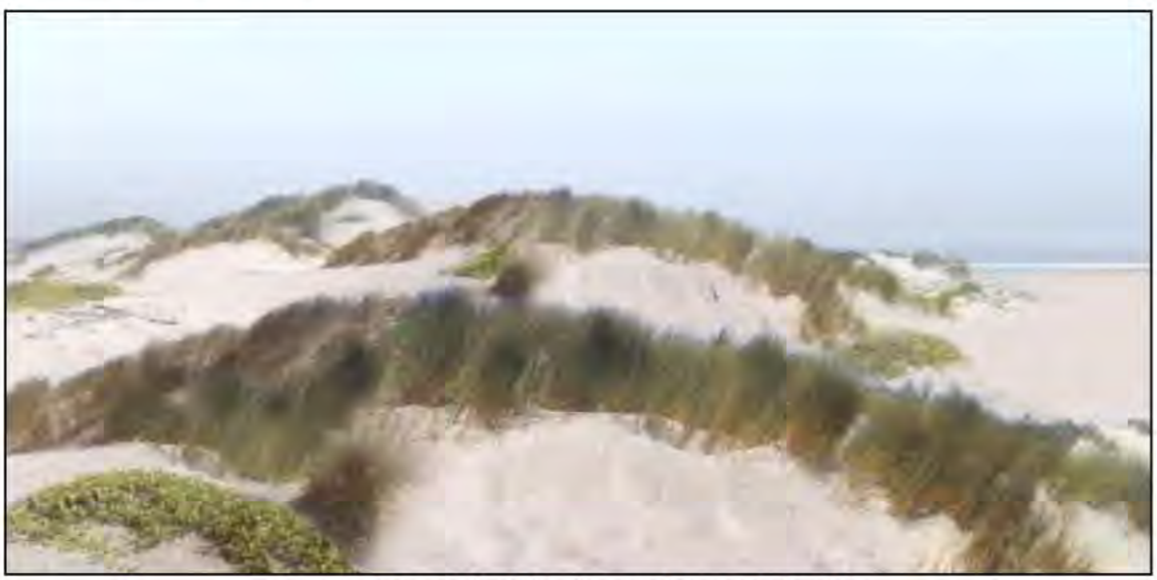


Figure 7. Conceptual Rendering of Dune Restoration
Source: Moffatt & Nichol 2015

2.8 Private Property and Public Lateral Access

As discussed above, public lateral access along Broad Beach is currently limited to times of low and moderate tides. Public access landward of the MHTL is also affected by uneven distribution of AREs for lateral access which are recorded on approximately 35% of the private parcels along Broad Beach. These AREs typically extend inland on private property between 10 and 25 feet above the MHTL. However, in some areas, the existing revetment now overlies these AREs. Nonetheless, segments of the revetment that overlie existing AREs that have been accepted and recorded by CSLC and various agencies on private land would remain in place with lateral public beach access proposed to be accommodated on the new wide sandy beach. The Project constitutes significant mitigation for the benefit of the public through beach nourishment, dune restoration, and creation of a sizeable dry sand beach adjacent to public Zuma Beach. In addition, the sand added to Broad Beach will act as feeder material to Zuma Beach and beaches downdrift, thereby enhancing the public access and natural shoreline protection aspects of those beaches.

In recognition of the public benefits from the Project and in further recognition that existing lateral easements: (a) cover a relatively small portion of the beach; (b) are inconsistent with one another and create uncertainty and confusion; and (c) are of limited value given the absence of a sandy beach under current beach conditions, all existing lateral access OTDs, AREs, and all currently existing lateral access easements shall be suspended for the duration of the Project in accordance with Project specifications and the maintenance of same. The proposed suspension of these items for the duration of the Project is intended to create a unique method of public access to the sandy beach and not simply isolated and fragmented portions - even where lateral access is currently permitted.

Additionally, if natural ocean forces, Major Nourishments, and Interim Nourishments fail to cause sufficient beach to remain seaward of the revetment, the BBGHAD will nourish with Erosion Nourishments as specified in Section 2.1.

The Applicant requests that, for the duration of the Project, the October 2009 survey serve as the public/private seaward boundary for public access purposes, subject to Project-specific restrictions on access to the restored dunes. To the extent that any restored dune area lies seaward of the October 2009 MHTL (i.e., on public property), the individual BBGHAD property owners would be granted, through leases or other legal means, unrestricted access to the public property seaward of their properties from the 2009 MHTL to the seaward toe of the restored dunes - subject to the use restrictions specified in Project permits. A cross-section of the restored dune and proposed private dune access and public beach dedication is shown in Figure 8. This will result in an unprecedented creation of public access along Broad Beach, much of which was formerly under exclusive private ownership and control. There will no longer be exclusive private property ownership rights asserted on the sandy beach. This condition will exist for so long as the Project exists.

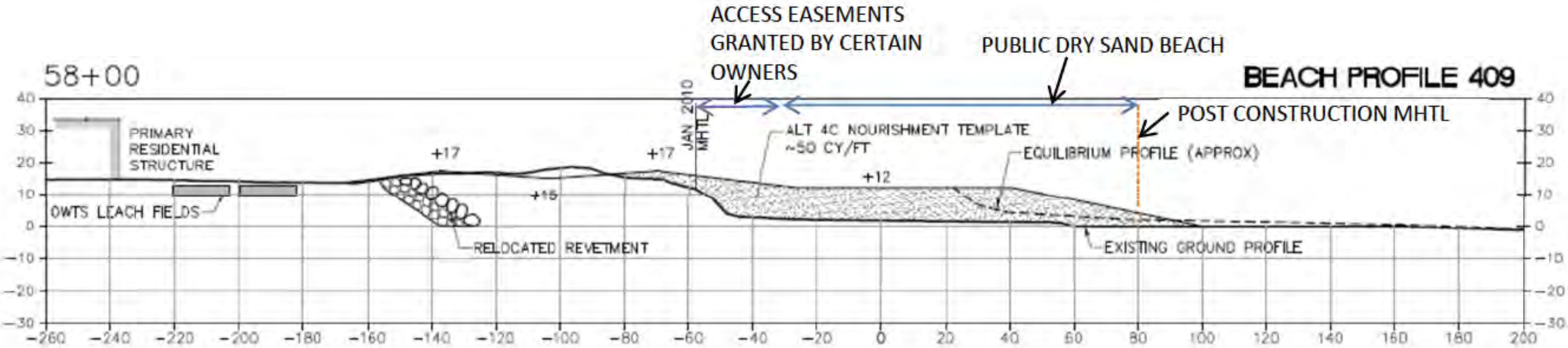


Figure 8. Conceptual Cross-Section of Restored Dune and Beach with Existing Offers To Dedicate And Public Beach Area

2.9 Equilibrium of the Beach After Nourishment

For a beach nourishment project, sand is initially placed high on the upper portion of the beach profile above the mean lower low tide area. This is done to expand the level beach berm area-for immediate benefit, to retain the sand for as long as possible, and to facilitate construction. The constructed beach immediately undergoes reworking by waves and tides that–distributes the sand both offshore and alongshore. As sand redistributes, the nourishment Project will experience a process of equilibration to a more natural condition of berm width and profile slope that depends on sand grain size and wave energy (the "equilibrium beach profile").

The equilibrium beach profile-was estimated using several different methods. Essentially, the estimates show that approximately one-quarter to one-half of the width of the beach berm is lost within approximately one season after construction (depending on conditions and nourishment sand quality), and the slope of the beach flattens (Figure 9) as the material deposits slightly farther into the nearshore.

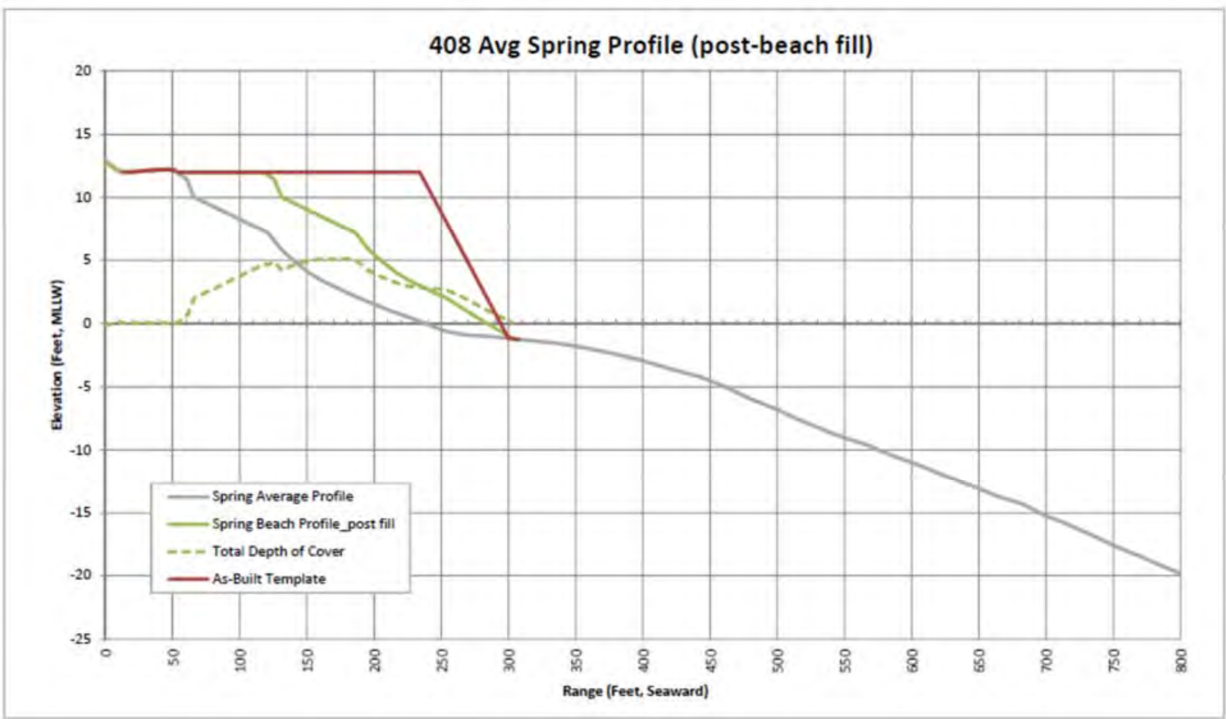


Figure 9. Example of Equilibrium Beach Profile for Alternative 4C

2.10 Long-Term Beach Profile Monitoring

In order to determine the performance of the nourishment Project and monitor the effect of coastal erosion on sand loss on the beach, the Applicant would perform long-term beach profile monitoring. The goal of this monitoring would be to identify and assess coastal erosion and the potential need to initiate backpassing or a major renourishment episode to offset such erosion. This monitoring would include:

1. Measurement points: Monthly measurement (systematically at the same time of each month) of the dry sand beach width (similar to that performed at Zuma Beach by Los Angeles County presently) from the seaward toe of the restored sand dune system to the seaward edge of dry

sand "towel area" at nine measurement point profiles specified below and shown on Figure 10. The measurement can be done with a tape measure or roll tape, or other suitable low technology device.

a) 408 (east end – 30756 Broad Beach Road)

b) 409 (east-central reach – 30916 Broad Beach Road)

c) 410 (central reach – 31108 Broad Beach Road)

d) 411 (west-central reach – 31324 Broad Beach Road)

e) 411.7* (west-central A reach – 31438 Broad Beach Road)

f) 411.9* (west-central B reach – 31460 Broad Beach Road)

g) 412 (west end – 31506/31504 Victoria Point Road)

h) 412.3* (west end A – 31520 Victoria Point Road)

i) 412.5* (west end B– 31536/31532 Victoria Point Road)

(* These transects were first surveyed in spring 2013 and were added at the request of the California Coastal Commission per its filing status letter dated February 8, 2013.)

2. Semi-annual (spring and fall) full beach profile measurements out to the closure depth (approximate ocean water depth of 40 feet).
3. Estimation of the rate and trend of beach width change and sand volume change at each of the measurement points for one year prior to construction and continually after construction for 10 years.
4. Zuma Beach Width: A total of seven beach profiles will be surveyed every six (6) months to quantify total sand volume and width changes within the littoral mini-cell between Lechuza Point and Point Dume.

Beach Berm Width Measurements

More frequent measurements of the beach berm width will be taken along Broad Beach to supplement the surveyed beach profiles. The measurements will be taken from fixed benchmarks (storm drain outfalls) at the back of the beach to the wetted bound line to provide an approximation of the dry beach width above the mean high water line. This measurement yields data of the dry beach width over time and space. The U.S. Army Corps of Engineers (USACE) performs these types of measurements along Orange County (called "Clancy measurements"). These measurements are quite useful because they are frequent (monthly) and can capture impacts from storm events.

The proposed storm drain outfall structures to be constructed at four locations along the revetment will provide visible and fixed benchmarks ideal for regular beach width measurements. The storm drain outfall structures are conveniently located near profiles 411 (west), 410 (central) and 409 (east) and will provide useful data to supplement the surveyed beach profiles. These three locations will also provide a good indicator of the remaining beach width in front of the revetment at the west, central and east ends of the Project.

In addition to measured beach widths from three benchmarks, a handheld GPS unit will be used to record the horizontal position of the wetted bound line along Broad Beach. This will provide a continuous line from Trancas Creek to Point Lechuza that can be displayed on Project drawings to provide an estimated beach width along the entire Project. The beach widths measured from the benchmarks can be used to verify and correct coordinates from the handheld GPS unit.

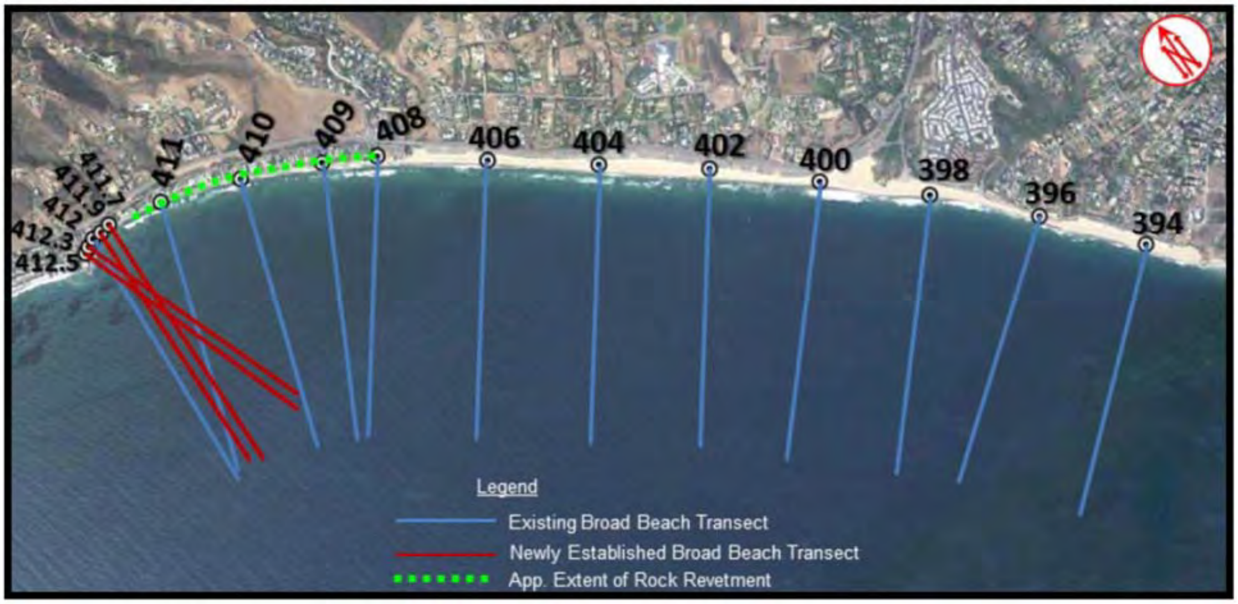


Figure 10. Transects for Beach Profiling at Broad Beach and Zuma
Source: Coastal Frontiers 2013

2.11 Adaptive Management Actions

Based on information obtained from the beach profile and beach width monitoring program, the BBGHAD will determine if site conditions trigger the need to undertake certain beach management actions. These will identify when beach erosion is reaching a point that threatens Project benefits including protection of private property and recreation, with careful attention to also maintaining public access seaward of the revetment. The triggers are crafted to permit sufficient time to implement management actions to maintain these benefits. The BBGHAD proposes these management actions to maintain a widened beach in an adaptive manner prior to the Major Nourishments at approximately 5 year intervals. In the event of a severe coastal storm wave event or series of events which strip the beach of sand and subject to monitoring results and BBGHAD finances, the BBGHAD seeks the flexibility to conduct Major Nourishments more often than every five (5) years in addition to or in lieu of Interim Nourishments and Erosion Nourishments as described below.

Adaptive management actions include: (1) short-term backpassing events meant to prolong the life of the beach nourishment activity and equalize the benefits of the Project among the homeowners within the BBGHAD; (2) Interim Nourishments of up to 75,000 cubic yards (subject to availability of additional BBGHAD funding); and (3) up to three (3) Erosion Nourishments of up to 75,000 cubic yards per 10-year period. The management actions will be triggered when the beach width data meets the criteria listed below and illustrated in Figure 11.

1. **Backpassing** will be triggered when the average dry beach width fronting the western revetment near Transect 411 is approximately 75 feet or less for 3 consecutive months. Beach widths measured from the storm drain outfall structure near Transect 411 (31284 Broad Beach Road), supplemented with surveyed beach profile data at profile 411, will be analyzed to determine when this trigger is met. Should trigger measurements be met in the spring then the 3 consecutive month window will be 'tolled' or suspended for the summer months i.e. from Memorial Day to Labor Day as no construction or backpassing activities can occur on the beach during that time.

2. **Interim Nourishments** will be triggered when the average dry beach width fronting the western revetment near Transect 411 is approximately 30 feet or less for 6 consecutive months and is recorded by two (2) consecutive full beach profile surveys and there is insufficient beach width to provide 10,000 cubic yards of backpassing sand from the eastern end of Broad Beach. Beach widths measured from the storm drain outfall structure near Transect 411 (31284 Broad Beach Road), supplemented with surveyed beach profile data at profile 411, will be analyzed to determine when this trigger is met. Should trigger measurements be met in the spring then the 3 consecutive month window will be 'tolled' or suspended for the summer months i.e. from Memorial Day to Labor Day as no construction or backpassing activities can occur on the beach during that time.

3. **Erosion Nourishments** will be triggered if natural ocean forces, backpassing, and Interim Nourishments fail to cause at least 10 feet of sand to remain seaward of the revetment between Transects 408-411 for six (6) consecutive months ("Erosion Nourishment Trigger") as measured at mean sea level as determined by the initial post-CDP survey. In this Erosion Nourishment scenario, the BBGHAD will nourish with at least 75,000 cubic yards of imported sand (meeting CCC sand specification in accordance with the Staff Report and the Addendum) seaward of the revetment in the area that does not meet the objective access criteria. The BBGHAD proposes to complete Erosion Nourishments no later than May 1 of the year following the Erosion Nourishment Trigger date and in no event shall Erosion Nourishments begin after April 15 of any year. Erosion Nourishments of a maximum of 75,000 cubic yards will be conducted no more than three (3) times per 10 years for the duration of the permit.

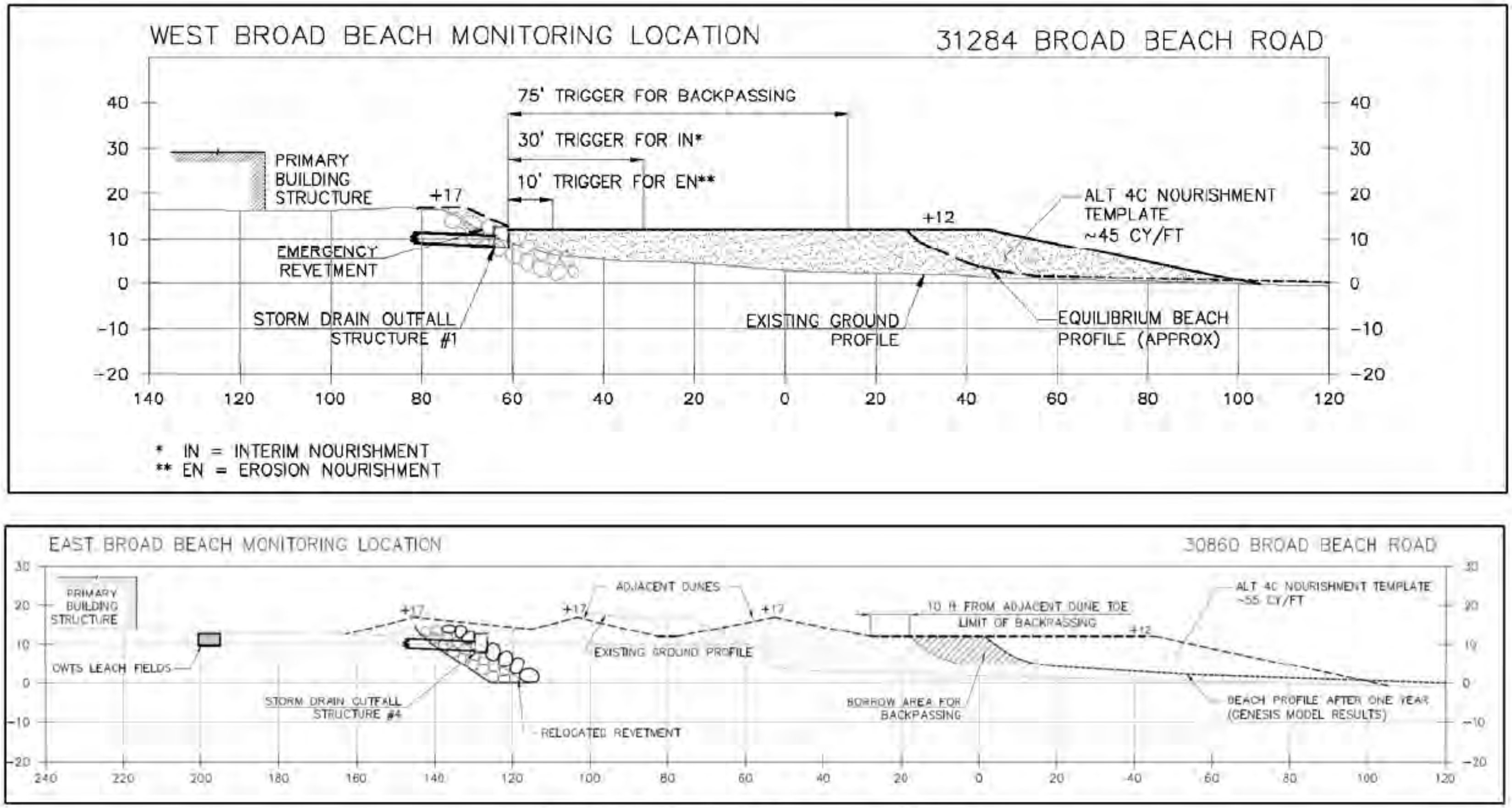


Figure 11. Adaptive Management Triggers

Backpassing

Photo 20. Sand Backpassing

Sand backpassing operations such as this one in Long Beach typically involve the use of bulldozers and scrapers to excavate sand from wider downdrift areas for movement updrift to narrow eroded beaches. Backpassing at Broad Beach would likely occur annually and involve movement of approximately 25,000 cubic yards in year 1 following initial 300,000 cubic yards nourishment with that volume dropping to a maximum of 15,000 cubic yards in subsequent years.

Backpassing would involve the use of heavy equipment (e.g., scrapers, bulldozers) to excavate sand from the downdrift "sand rich" segment of Broad Beach (anticipated to be the eastern reach) and its transport back updrift to the eroding reach of Broad Beach (anticipated to be the western reach of the Alternative 4C footprint). Backpassing is proposed to extend the practical lifetime of this beach nourishment project by recycling sand back updrift within the littoral cell and delay the need for major beach renourishment. Backpassing is less expensive than small-scale nourishment from either onshore sources via trucking due to high unit cost or from offshore dredging due to equipment mobilization costs.

Backpassing Triggers

The backpassing triggers intend to maintain a balanced benefit of the beach nourishment to the maximum extent practical for BBGHAD purposes, and to maintain dry sand beach seaward of the revetment. As part of the overall Adaptive Management Plan (AMP), these triggers will assist in identifying when beach erosion reaches a point that threatens Project benefits (e.g., protection of private property, lateral access, recreation, etc.) and to permit sufficient time to implement management actions to maintain these benefits. The triggers are meant to be used in combination with on-site observations, beach width measurements, profile monitoring, and an understanding of historical and projected future trends. The triggers should be re-evaluated frequently due to the large variability in potential shoreline change rates.

The concept of sand backpassing was incorporated into the Project at a time when the intended nourishment volume was 600,000 cubic yards. With that volume and resulting beach widths, backpassing was proposed as an effective measure to extend the life of the nourishment by scraping sand from the downdrift, wider portion of the beach and transporting it west to the updrift and narrower reaches. With the nourishment volume reduced to 300,000 cubic yards, the opportunities for effective backpassing of sufficient sand surplus at the downdrift end of the Project may be limited after the first one to two years.

Since the net direction of sand movement (littoral drift) is to the east, it is anticipated that the predominant backpassing operation will be from east (surplus) to west (deficit). The resulting action would backpass sand using mechanical equipment (scrapers and bulldozers) from the wide reach of beach (surplus area) to widen the narrow reach (deficit area) of beach.

The anticipated borrow area will extend from Transect 410, near the center of Broad Beach, toward the east for a distance of about 3,000 feet. Along this reach sand will be backpassed from the dry beach (above Mean High Water) while maintaining a 10 foot buffer from the dune restoration area. The sand volume available for backpassing operations within the borrow area will depend on the actual dispersion of the initial beach fill. Modeling results indicate there could be up to 25,000 cubic yards available within this borrow area for the first backpassing operation expected to occur about 1 year after the initial beach fill. A schematic plan and typical section of the borrow area are shown in Figure 12 for the first backpassing event. Subsequent events will involve backpassing volumes of 15,000 cubic yards or less.

The anticipated placement area for backpassed sand will be 500 feet on either side of Transect 411 i.e. a total linear length of 1,000 feet between 31272 and 31380 Broad Beach Road. Backpassed sand will be placed up to an elevation of +12 feet, MLLW and within the limits of the original beach fill template. The first backpassing event, expected to occur about 1 year after the initial fill, would increase the beach width by about 40 feet within the placement reach. A schematic plan and typical section of the placement area are shown in Figure 13 for the first backpassing event.

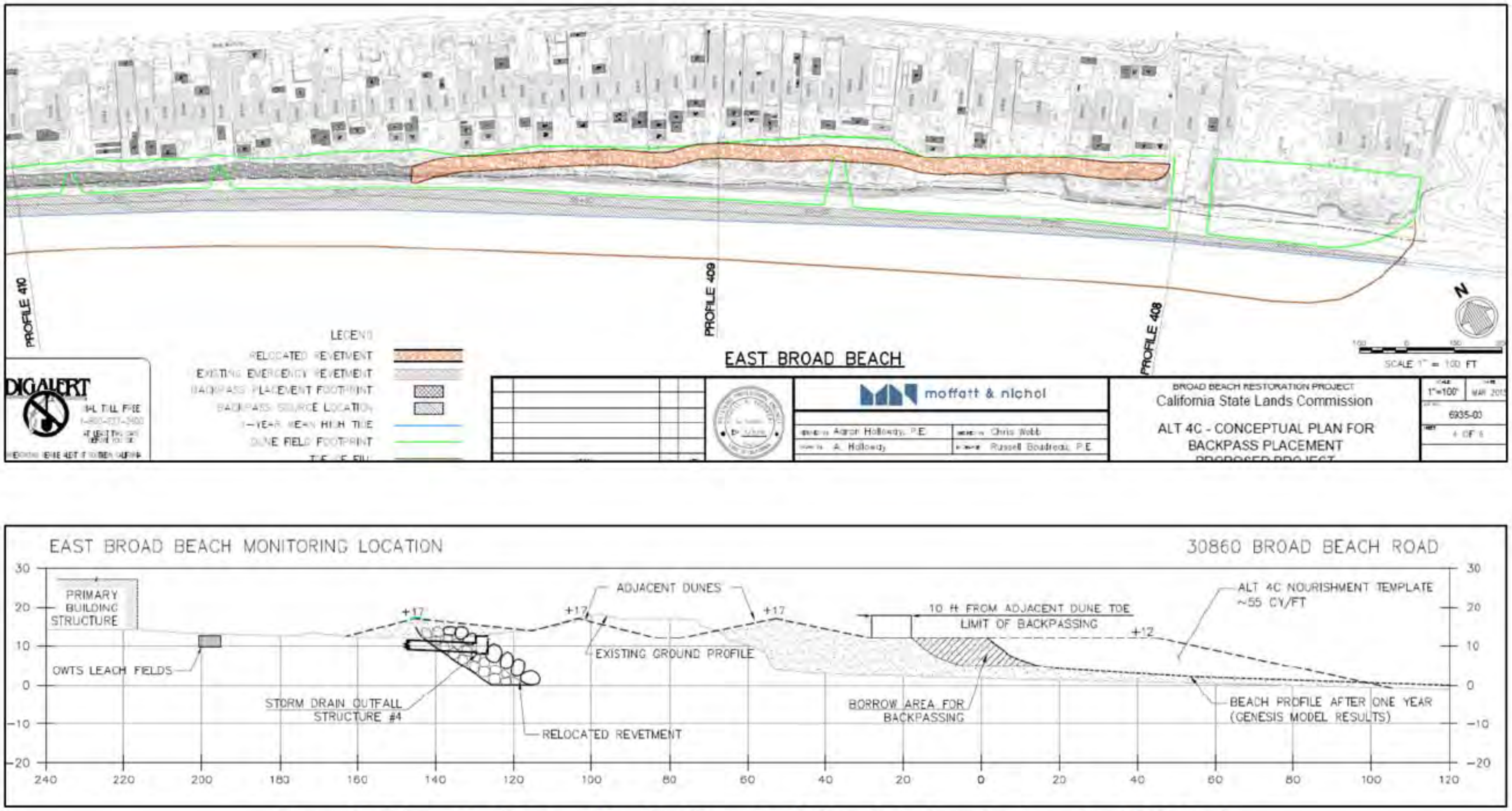
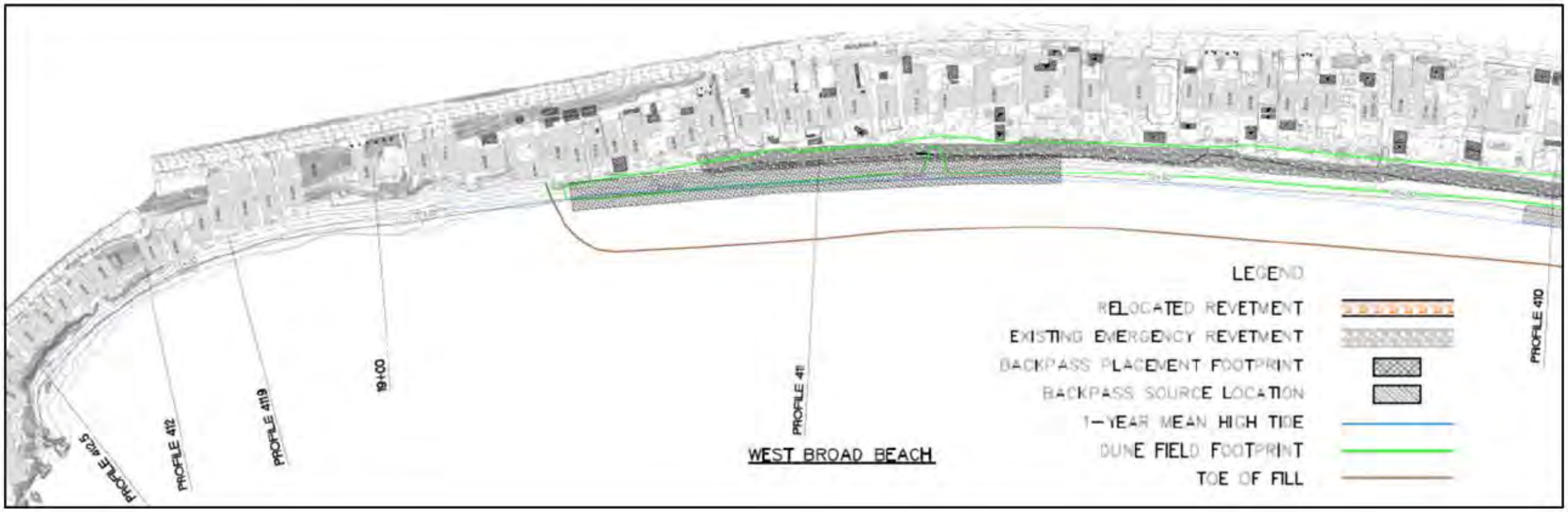


Figure 12. Schematic of Borrow Area for Alternative 4C Year 1 Backpassing Operation (15,000 cy)



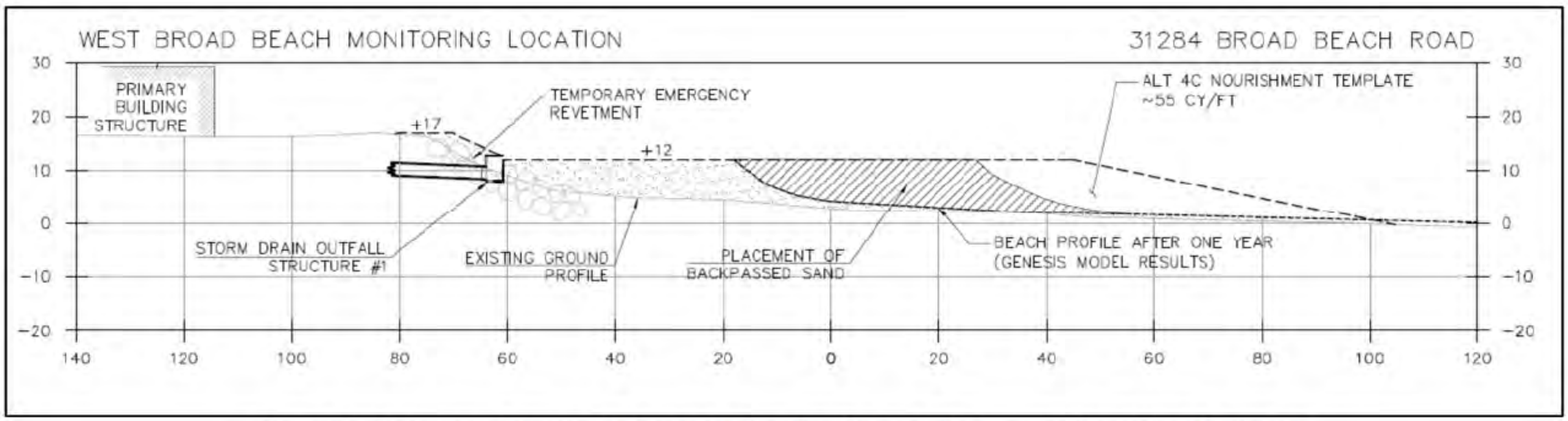


Figure 13. Schematic of Placement Area for Alternative 4C Year 1 Backpassing Operation (15,000 cy)

Interim Nourishments

Prior to the scheduled Major Nourishments after the initial sand placement, the need may arise for the placement of additional sand along Broad Beach to maintain Project objectives. Interim Nourishments, at the discretion of the BBGHAD and subject to BBGHAD finances, are proposed as an adaptive management action when beach width along the western portion of Broad Beach has narrowed to the point where seasonal fluctuations in beach width could result in revetment exposure and limited lateral beach access.

When the beach width trigger is reached and backpassing is not feasible, up to 75,000 cubic yards of Interim Nourishment sand (of same specification as original nourishment) would be obtained from an approved sand borrow site, transported from the local inland source(s), and deposited on Broad Beach. This volume will provide approximately 50 feet of dry beach width over a 2,000 foot reach of assumed sand deficit area. The sand source for these renourishments would be the same as for the initial nourishment, unless the applicable agencies approve other borrow sites and all details for construction described in the Project description would apply. A schematic plan and typical section of an Interim Nourishment is shown in Figure 14.

Erosion Nourishments

In addition, if natural ocean forces, backpassing, and Interim Nourishments fail to cause at least 10 feet of sand to remain seaward of the revetment between Transects 408-411 for six (6) consecutive months ("Erosion Nourishment Trigger") as measured at mean sea level as determined by the initial post-CDP survey, the BBGHAD will nourish with a maximum of 75,000 cubic yards of imported sand (meeting CCC sand specification in accordance with the Staff Report and the Addendum) seaward of the revetment in the area that does not meet the objective access criteria. The BBGHAD proposes to complete Erosion Nourishments up to three (3) times per 10-year period, and no later than May 1 of the year following the Erosion Nourishment Trigger date and in no event shall Erosion Nourishments begin after April 15 of any year.

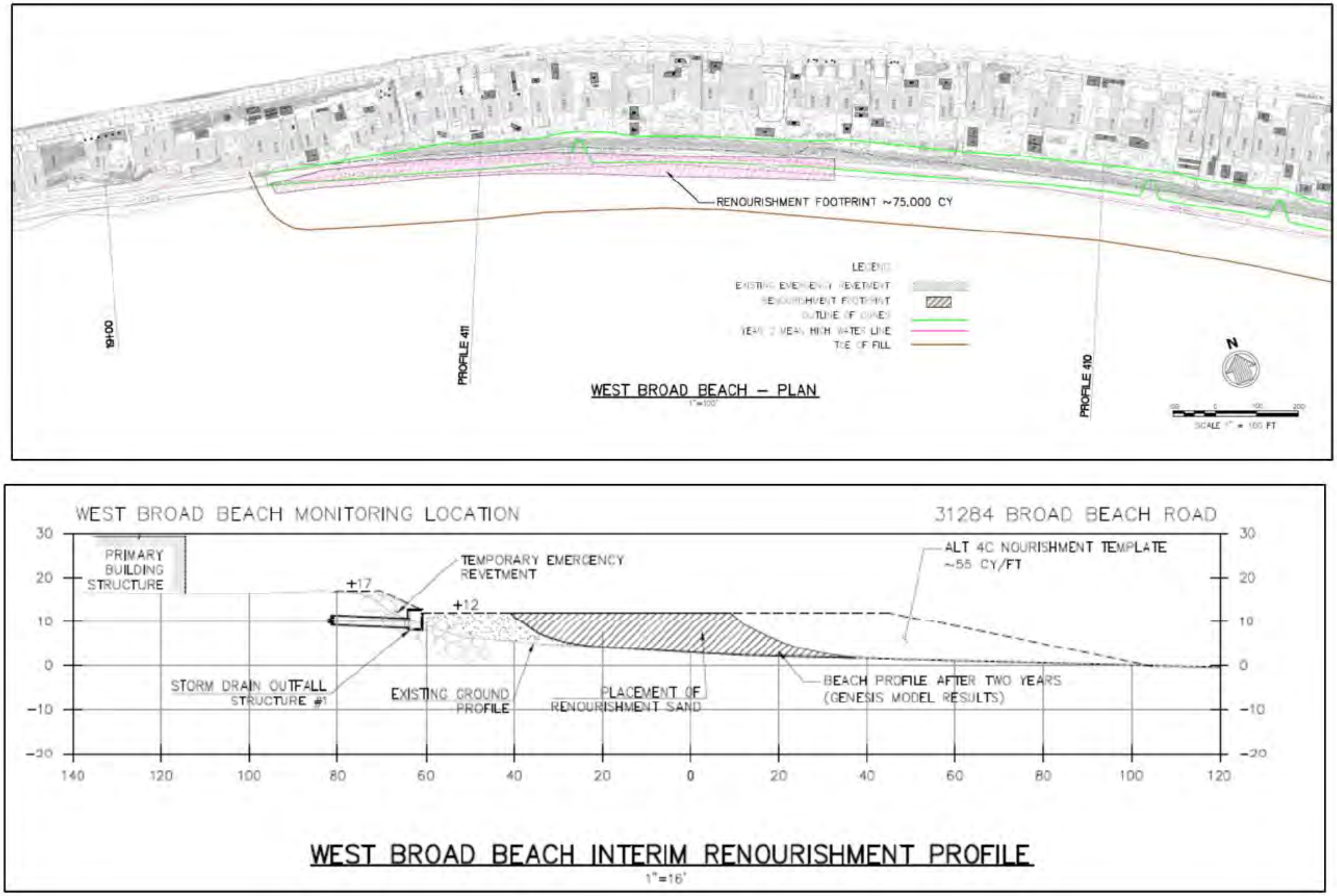


Figure 14. Schematic of Placement Area for Alternative 4C Interim Nourishment

The duration of sand backpassing could be up to three weeks under the larger quantity scenario of 25,000 cubic yards, and as short as one and a half weeks for the scenario of moving the smaller quantity of 15,000 cubic yards. Direct impacts on Broad Beach would consist of direct disturbance to the beach from excavation, driving with heavy equipment, filling, and grading. No direct effects from backpassing should occur at Zuma Beach, but the parking lot and beach is anticipated to be used for equipment delivery, staging, and site access.

Maintenance Activity Impacts Minimization

Maintenance activities including both backpassing and renourishment would occur in the fall to avoid conflict with the most productive biological period of spring and also to avoid the grunion running season - which generally ends in mid to late August according to the California Department of Fish & Wildlife grunion schedule. The Applicant will work with its contractor and biological resource consultants to determine a placement method which minimizes impacts including the possibility of phased placement of material in the west end to facilitate movement of subsurface sand dwelling organisms upwards through the placed material.

Public Access During Backpassing

At least one week prior to backpassing operations, signs notifying the public of the dates of backpassing operations would be posted at the public access points and at other highly visible locations along the beach. To the extent possible, public lateral access across the beach would be maintained during backpassing operations by implementation of a construction vehicle traffic management plan. During backpassing operations, the contractor responsible would station a flagman at each access point to control construction traffic and pedestrian foot-traffic. The majority of the working area below MHHW would be closed to the public during the operation. Members of the public would be able to use the beach above MHHW, and be able to traverse the beach to the water at the public access points.

Public Access During Interim, Erosion or Major Nourishments

Public access during renourishment activities would be maintained to the maximum extent possible. At least two weeks prior to commencing nourishment operations, signs notifying the public of the dates of nourishment operations would be posted at the public access points and at other highly visible locations along the beach. Public lateral access to Broad Beach will be restricted during working hours (7 a.m. to 6 p.m., Monday through Friday) due to the equipment traffic associated with the beach nourishment activities. On weekends and holidays the beach will remain open for public access. As work progresses, public lateral access to portions of the beach would be maintained during nourishment operations to the extent possible with implementation of a construction vehicle traffic management plan. For example, as beach placement is completed at the western end of the Project, this area would become available for public use. The areas of active work (e.g., access routes and areas where earthmoving equipment is being used, etc.) would be clearly delineated with access controlled by the contractor.

3. Construction Procedures

Construction for the proposed Project involves the following sequence of events – some of the tasks may occur concurrently:

- Transporting the sand via truck from inland quarries.
- An estimated 21,500 truck trips would be required to transport the sand for the initial nourishment of 300,000 cubic yards from the Local Inland Sources.
- Redistributing the sand as needed with earthmoving equipment, such as bulldozers, and grading the beach fills to required dimensions; and
- Annual redistribution of the sand from the wide reach of the beach to the narrow reach using heavy equipment such as scrapers and bull dozers.

3.1 Initial Project Construction Schedule

Initial and subsequent Major Nourishment construction activity is estimated to extend over approximately eight months. The window of time when an eight-month Project may occur should extend from approximately September 15 to May 15 of the years of construction. The beach nourishment portion of the Project requires approximately four (4) months, with physical construction of the dunes requiring another month. Planting, fencing, signage, and placement of temporary irrigation systems within the dunes may require another 30 days. Most activities (earthmoving and dune planting) within the Project area would occur between 7 a.m. and 6 p.m. Specifically for inland material, hauling may require 70 working days at five days per week. The trucking schedule is a 14 hour daily schedule beginning at 7 a.m. and ending at 9 p.m. The only construction activities which will occur between 6 p.m. and 9 p.m will be trucking on PCH and stockpiling activities at the Zuma parking lot and on the stockpile areas. No construction activities will occur west of Trancas Creek between 6 p.m. and 9 p.m. Trucking is estimated to be completed after 14 weeks.

3.2 Construction Staging Area and Equipment

During the construction phase of the Project, construction equipment and materials would be staged at the western most parking lot of Zuma Beach. Additional temporary staging areas for storage or stockpile of sand may also be established on the beach immediately west of the Zuma Beach parking lot, while maintaining a 100 foot buffer from the Trancas Lagoon. Construction vehicles and equipment would access the site via Pacific Coast Highway into the Zuma Beach parking lot. From the parking lot, equipment would travel down to the wet sand beach and along the beach in front of Trancas Creek and onto Broad Beach. The personnel requirements for the Project would include 12 workers during daytime construction hours (7 a.m. to 9 p.m.). Equipment anticipated to be necessary for construction activities associated with the proposed Project is summarized in Table 1 and construction staging and stockpile areas are shown in Figure 15.

Table 1. Preliminary List of Construction Equipment for the Broad Beach Restoration Project

Support Equipment	Vehicles
Contractor's mobile office (1)	Excavators (3)
Generators (estimated 2)	D-9 Bulldozers (2)
Portable restrooms (3)	Fuel truck (1, not stationed at site); Service truck (1)
Lighting (2 stands)	Delivery trucks (estimated 20)
"Grizzly" (hopper/conveyor system)(3)	Front-End Loaders (3)
Backhoes (3)	Full-size pick-up trucks (2)
Bob-cats (4)	Scrapers (3)
Plant delivery trucks for dunes (20)	Off-road 40-ton Dump Truck (7)

Fuel trucks would travel to the staging area at Zuma Beach parking lot every morning to fuel Project equipment. Service trucks providing lubricant and oils for Project equipment would visit the staging area weekly for maintenance. All fueling and/or maintenance of Project equipment would be restricted to the Zuma Beach parking lot and staging area as CSLC policies strictly prohibit this type of activity occurring on or near tidelands. Disturbed areas of the parking lot would be repaved as needed after Project completion.

Best Management Practices

Best Management Practices (BMPs) would be implemented throughout the construction phase of the proposed Project. As the proponent, the BBGHAD or its contractors would implement site-specific construction mitigation plans, including a traffic minimization plan and equipment refueling plan.

Beach Building

Beaches would be formed by placement of sand from the trucks. Sand would be graded and spread along the beach to the dimensions of the beach fill plan using two bulldozers. Sand placement around storm drain outlets would be designed to allow for proper drainage.

Figure 15. Construction Staging & Stockpile Areas For Alternative 4C Project

Dune Building and Restoration

The dune would most likely be formed by deposition of sand from the trucking deliveries using loaders and backhoes. Sand would be graded and spread over the existing revetment on the east and up against existing foundations and seawalls in the west height using smaller bulldozers. Existing large-diameter public storm drains which currently terminate at the revetment would be protected with a new concrete weir box structure and integrated into the revetment. These drains would issue under the dune and through the beach by percolation. Following sand placement and planting of approved native dune flora, public access would be through existing vertical accessways owned and operated by LA County and private access to the area would be channeled through pathways to ensure protection of the restored dune habitat.

Transportation from Local Inland Sources

Trucks hauling sand from the Local Inland Sources and other construction equipment to the Broad Beach site would access the construction staging area located at the western end of the Zuma Beach parking lot via a new temporary driveway opposite Guernsey Drive on Pacific Coast Highway (PCH), and exit the lot via the existing driveway connection to PCH. Trucks would travel southeasterly on PCH and enter the new access driveway on PCH opposite from Guernsey Drive. Although a detailed truck access plan has not yet been prepared, trucks would enter the west end of the Zuma Beach parking lot by turning right from PCH into the new driveway and queue in the parking lot to dump their sand onto grizzlies. After unloading, trucks would exit by heading to the existing driveway at the north end of the Zuma lot and turning left out of the driveway across PCH.[5] This left turn would need to be controlled with a temporary traffic signal as this volume and frequency of trucks could not safely cross the highway without such control. Employees would enter/exit the site via the main gate at the Zuma Beach County Park located east of the site.

A total of 21,500 loaded truck round trips are estimated for the transport of each 300,000 cubic yards of sand between the Local Inland Sources and Broad Beach sites assuming use of 14 cubic yard capacity trucks. It is anticipated that the haul route from the local inland sand source locations to the Broad Beach Project site will be that shown in Figure 16.

[5] Several access options were considered; however, the size of trucks prohibits using the PCH/Busch Drive underpass 1.5 miles south of the site. Traversing local neighborhoods was also considered and rejected due to local traffic impacts.

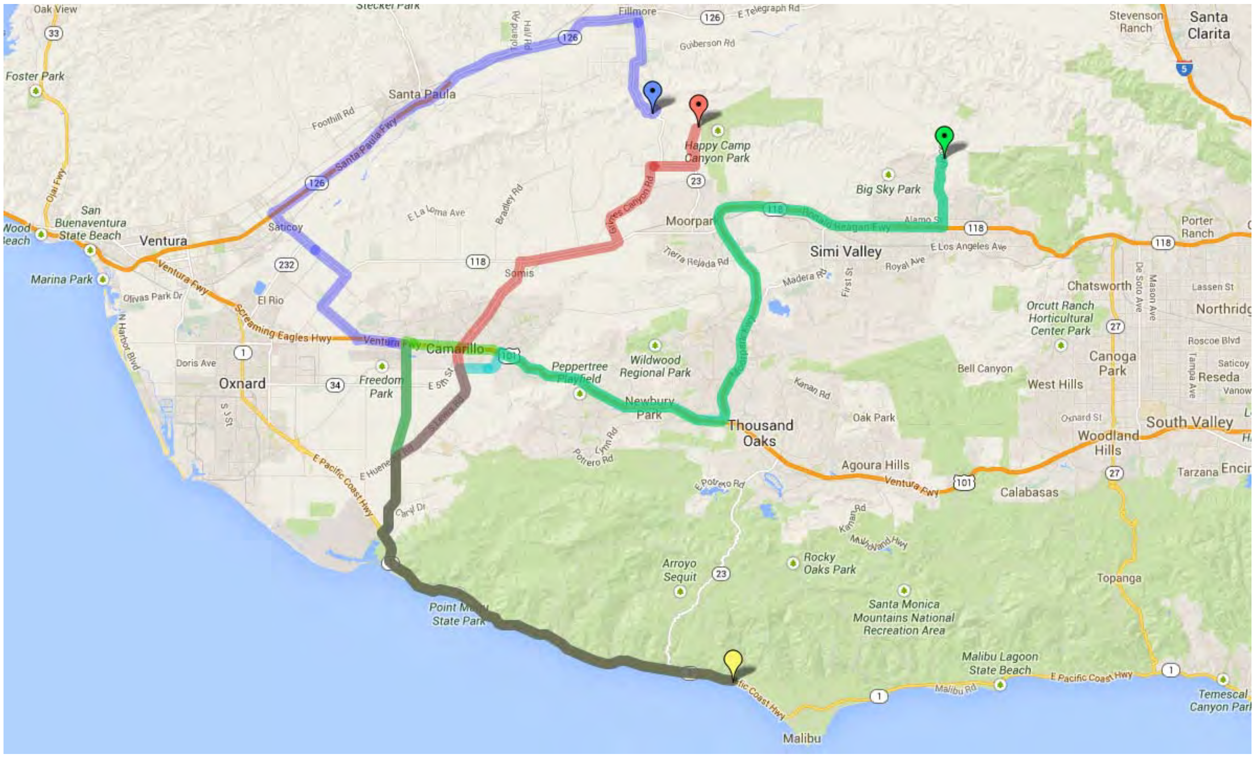


Figure 16. Proposed Haul Routes from Local Inland Sand Sources

Trucks would enter the parking lot, drive over a low "grizzly" (hopper and conveyor belt system) that will transport the sand into a stockpile on the beach. Front-end loaders will then load large 40-ton capacity off-road trucks and/or 30 CY scrapers that will drive the material down the beach and drop it within the target placement area. Bulldozers will then shape the placement area into the desired beach fill template. Dunes will be built in a similar way with front-end loaders moving sand dropped along the toe of the revetment up into the dune template, with small dozers or "bobcats" forming the dunes into their final templates.

Public Access During Construction

Public access during nourishment and dune restoration activities would be maintained to the maximum extent possible. At least two weeks prior to commencing nourishment operations, signs notifying the public of the dates of nourishment operations would be posted at the public access points and at other highly visible locations along the beach. Public lateral access to Broad Beach will be restricted during working hours (7 a.m. to 6 p.m., Monday through Friday) due to the equipment traffic associated with the beach nourishment activities. The Zuma Parking Lot 12 and the beach area at the stockpile will be closed to the public during sand delivery hours of 7 a.m. to 9 p.m. On weekends and holidays the beach will remain open for public access. As work progresses, public access to portions of the beach would be allowed during nourishment operations to the extent possible with implementation of a construction vehicle traffic management plan. For example, as beach placement is completed at the western end of the Project, this area would become available for public use. The areas of active work (e.g., access routes and areas where earthmoving equipment is being used, etc.) would be clearly delineated with access controlled by the contractor.

Backpassing Activities

Each backpassing operation would require approximately up to three weeks to complete, dependent on the amount of sand to be moved, and would include five personnel, one bulldozer, three scrapers, and a supervisor/foreman vehicle. Standard earthmoving BMPs would be used to reduce impacts from these operations.

The contractor would establish a haul route along the seaward edge of the beach, maximizing the distance between the work and residences. The contractor would establish fencing or signs to control public access to the work site. Access points through the work zone would be continuously manned by construction monitors. Sand backpassing implementation is expected to commence in the fall season and is estimated to occur over a one and a half to three week (7 to 15 working day) period. The equipment would typically operate on a 12-hour basis between 7 a.m. and 7 p.m., and approximately 5,000 cubic yards per day would be moved.

Backpassing would utilize the west end of Zuma Beach's parking lot for a staging area, as described for beach nourishment. Up to 1.5 acres would be required. Ingress and egress for the construction equipment to the staging area would be via existing driveways off Pacific Coast Highway; access to the beach would be via the existing curb cut at the parking lot's west end. The staging area will accommodate construction, materials, parking of support vehicles, and assembly of construction crews. The site would be fenced off and equipment will be stored overnight. This site was previously used for the 2010 emergency rock revetment Project.

Major Nourishments

Given that the current sand loss rate in the Broad Beach area averages about 50,000 cubic yards per year, the Project includes periodic Major Nourishments of 300,000 cubic yards at approximate 5- year intervals using sand of the same specification as the original nourishment. For the 10-year “pilot project” duration (prior to the year 10 placement) the volume of sand placed matches the original proposed Project nourishment of 600,000 cubic yards every 10 years, but in 2 smaller increments to minimize potential impacts to sensitive aquatic resources. Provided the monitoring results of the initial nourishment show no significant adverse impacts, the Major Nourishment material will be placed in the same footprint as shown in Figure 1.

Analysis of Dune Restoration Associated With the Broad Beach Restoration Project

Prepared for:
California Coastal Commission
South Central Coast Area
89 S. California St. Suite 200
Ventura, CA 93001

Prepared by:
Coastal Restoration Consultants, Inc.
772 Monte Vista Ave.
Ventura, CA 93003

Final Draft: Sept. 23, 2015

Section 0. Executive Summary

This report provides an analysis of the coastal foredune restoration aspects of the Broad Beach Restoration Project. The goal of this report is to provide additional guidance to the California Coastal Commission (CCC) and the Broad Beach Geological Hazard Abatement District (BBGHAD) to help assure that the foredune restoration aspects of the project have a reasonably high probability of meeting their ecological goals and that techniques employed in the implementation of the restoration are appropriate and cost-effective.

CRC has carefully reviewed the most current plans for the Broad Beach Restoration Project as well as the CCC Staff Report (CCC 2014a) and the Addendum to the Staff Report (CCC 2014b) for the previously proposed project. We visited the project site on August 20, 2015 with Chris Webb and Tonia McMahon of Moffat and Nichol and Mark ?? who is the project manager for the BBGHAD. We have used a combination of our own experience planning, building and monitoring dune restoration sites along with our knowledge about other dune restoration projects and examples from the literature to provide the CCC and the BBGHAD with guidance on how to successfully restore naturally functioning coastal foredune habitat at Broad Beach.

Naturally functioning coastal dunes rely on dynamic interactions between several physical and biological processes related to wind, waves, plants, soil and groundwater. Only through restoration of these processes can naturally functioning dunes be restored. Historically, Broad Beach supported naturally functioning dunes and given proper design and implementation techniques, such dunes can be restored on the site. Restoring dunes on the site will be important to mitigate the ecological impacts associated with the overall project.

Exhibit 20
4-15-0390 (Broad Beach GHAD)
Dune Restoration Analysis by
Coastal Restoration Consultants

Our key recommendations for restoring ecological functions and values related to dunes at Broad Beach include:

- Any restored foredune habitat that is considered as mitigation should function naturally and be resilient over time, *i.e.*, similar to foredunes in natural systems
- Using sand that is similar in grain size to that found naturally on Broad Beach will be necessary to restore naturally functioning dunes
- Given appropriate sand, the dunes at the far eastern end of the project, where there is no revetment, are likely to function naturally given appropriate implementation techniques
- Dunes built in front of a rock revetment will not naturally re-build if a major erosion event exposes the revetment to wave attack, therefore naturally functioning dunes can only be restored where the revetment is set far enough landward that there is extremely low probability of it being exposed
- Dunes built on top of and behind a revetment will not function like natural foredunes and probably shouldn't be given full credit as mitigation, however they do have some ecological and aesthetic value

This report also analyzes some of the specifics of the design and re-vegetation aspects of the dune restoration project. We generally agree with most of the design and re-vegetation strategies laid out in the WRA (2013) conceptual dune restoration plan. We have included some suggested changes related to the layout and orientation of the dunes, re-vegetation strategies and planting palettes.

Section I. Introduction

Background

CRC has been contracted by Moffat and Nichol, at the request of the California Coastal Commission (CCC), to provide an assessment of the dune restoration aspects of the Broad Beach Restoration Project. Our goal with this assessment is to provide guidance in restoring foredune habitat that 1) functions as naturally as possible, 2) supports natural levels of biodiversity, 3) is resilient to storms and sea level rise and 4) provides other ecosystem functions and values associated with coastal foredune ecosystems in southern California. Historically, Broad Beach was a dynamic environment where the beach and foredunes periodically eroded and re-built via natural processes related to waves, wind and vegetation. Development, coastal armoring and reductions in sand supply to the ocast have has disrupted these natural processes and led to a loss of beach and dune habitat. Restoring naturally functioning foredunes at Broad Beach will require the restoration of the natural processes that have been disrupted.

Primer on Coastal Dune Restoration

Coastal dunes are found throughout the world where there is a proper combination of sand, wind and waves. In many areas, including southern California, dunes have been lost or degraded due to development (*e.g.*, building on top of dunes, coastal armoring) or beach management that favors recreation (*e.g.*, grooming). Increasingly, coastal dunes are being restored not just for ecological reasons, but also to provide coastal protection and resilience to sea level rise for coastal communities. In order to successfully restore coastal dunes the important physical and biological processes that are needed to sustain this habitat must be restored. The important processes related to coastal dune functioning are fairly well understood.

It is important to understand that coastal dunes are dynamic in space and time and that they are connected in important ways with the beach environment. Dunes are most dynamic at their seaward margin where they tend to interact with waves during storm events (when erosion occurs) and are subject to blowing sand during wind events (when accretion or re-building occurs). Erosion events are stressful and sometimes lethal for dune plants. However, a few native plants are specifically adapted to the harsh conditions at the beach-dune transition, where they can naturally recruit after erosion events from seed deposited by waves. Such plants, especially beach saltbush (*Atriplex leucophylla*), are tolerant of inundation by seawater and the sandblasting effects of blowing sand. Most importantly though, foredune plants are adapted to being buried by blowing sand and respond by growing taller, whence they trap more sand, eventually building hummocks or embryonic dunes. These small dunes are prone to erosion by waves and might only last one season. Under certain conditions, these small dunes might last several seasons and eventually other dune plants can begin to establish, especially red sand verbena (*Abronia maritima*) and beach bur (*Ambrosia chamissonis*). These species continue to trap blowing sand and build dunes taller, becoming what are typically called foredunes. Foredunes are stressful environments for plants in other ways. Water from precipitation drains out of the upper layer of sandy soil very quickly but this water is trapped deep in the dunes, typically as a freshwater lens on top of a salty watertable. The fine-grained sands of foredunes allow for this deep store of water to be transported upward in small but sufficient amounts to sustain dune plants throughout the year. Plants are a very important part of foredunes since they create “roughness” that inhibits sand movement. This helps stabilize the dunes and prevents loss of sand to more landward areas. Foredunes are still prone to erosion during especially large (though relatively rare) wave events. On the east coast these events are often related to hurricanes and tropical storms, while in southern California, they are associated primarily (though not exclusively) with “El Nino” style winter storms. During these high wave events, the sand in the dunes is eroded and sacrificed to the beach temporarily. Once calmer waves prevail, the re-building process involving vegetation and blowing sand begins again. It is this series of processes between beaches and dunes; erosion, accretion, plant colonization, stabilization and watertable development that are crucial to natural dune functioning. All of these processes need to be restored in the context of successful coastal dune restoration.

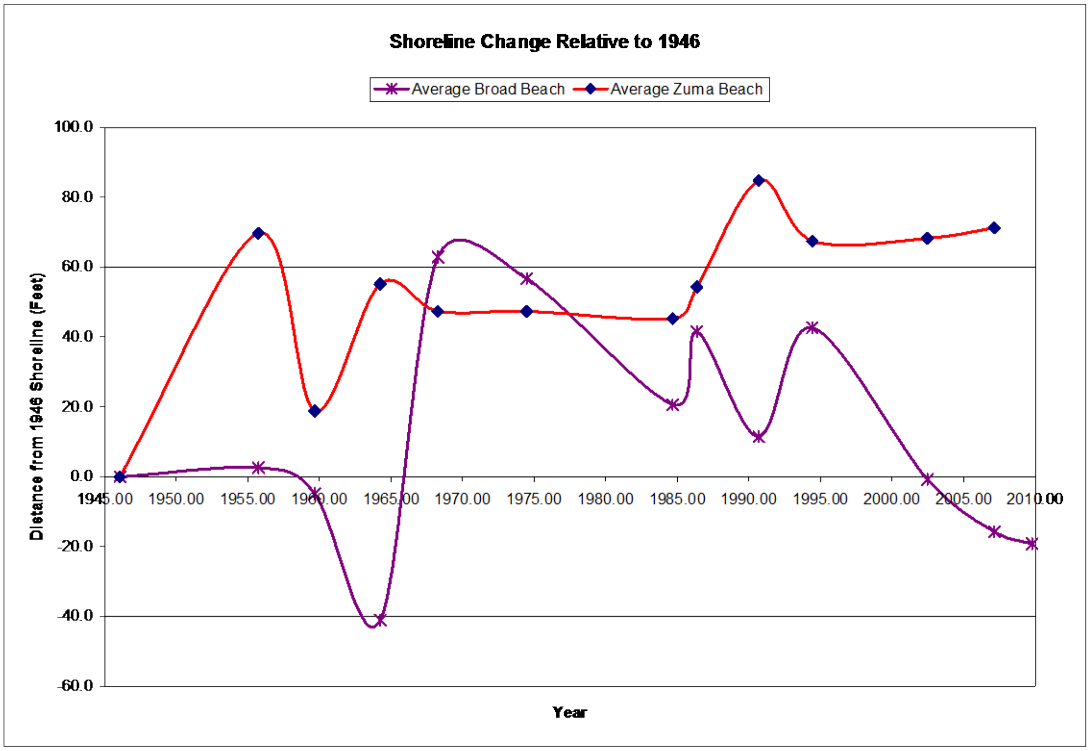
Historical Perspective on Dunes at Broad Beach

Analysis of historic aerial photographs shows that nearly the entire bight of coast from Lechuza Point to Point Dume (*i.e.*, Broad Beach and Zuma Beach) was historically a dune-backed beach system that varied greatly in width between years. The earliest aerial photos of Broad beach are suggestive of a wide dune field. By 1972 most of the dunes had been lost to development, however remnants of natural dunes can still be seen in front of some houses (Figure 1). A few scattered native dune plants remain today in a few places behind the revetment and at the far eastern end of the project area where there is no revetment.

Broad Beach, like virtually all dune-backed beaches, has varied in width considerably over time. An analysis of historic aerial photographs by Moffat and Nichol (2010) shows the change in the relative shoreline location between 1946 and the present and is a good indication of how dynamic this system was (Figure 2). It is clear that at least three times between the 1960's and 1990's that the relatively natural dune and beach systems at Broad Beach eroded and re-built naturally over relatively short periods of time. According to Moffat and Nichol (2010), small-scale armoring using primarily large sandbags began at Broad Beach in response to erosion in the 1997-98 El Nino. These actions, while probably important for protecting homes and leach fields, would have disrupted the natural connection between the dunes and the beach at the site. These shoreline protection structures do not allow for natural sand movement between the dunes and the beach. Since about this time, Broad Beach has failed to re-build naturally as it had done multiple times before (Figure 2). Just down-coast, Zuma beach, where the "dunes" now lack vegetation and topography due to grooming but nevertheless function as a sand reservoir similar to how natural dunes do, has not seen landward migration of the shoreline over the same time period (Figure 2). While the data in Figure 2 is suggestive, it is based on relatively few data points and we expect beach width dynamics at both locations are considerably more dynamic over time than this analysis suggests. Nevertheless, the recent trend is fairly clear and we do believe that the opportunity to restore naturally functioning dunes at Broad Beach is an opportunity to restore more natural erosion and re-building dynamics, which will increase resilience and have important ecological benefits.

Figure 1. Oblique aerial of Broad Beach in 1972 showing natural dune and beach habitats in front of some houses. Note non-native iceplant in front of houses at left.

Figure 2. Shoreline location change over time at Broad Beach and Zuma Beach interpreted from aerial photos (from Moffat and Nichol 2010).



Purpose of This Report

The purpose of this report is to provide the CCC and the BBGHAD with a careful analysis of how to successfully restore naturally functioning dunes as part of the Broad Beach Restoration Project. We expect that successful restoration of natural dunes as part of this project will have multiple benefits for both the BBGHAD (more resiliency to wave events, improved aesthetics, privacy, on-site mitigation, etc.) and the CCC (increased biodiversity, preservation of public access, increased resilience, etc.). We have also kept in mind that the CCC will likely require mitigation for loss of dune habitat associated with the project. Therefore we have also offered guidance as to how to restore dunes that will function like the habitats that have been lost due to placement of the rock revetment. Finally, we have suggested a series of fairly minor alterations to existing plans (Moffat and Nichol 2010 and newer revised plans provided by Moffat and Nichol and WRA 2013) that we expect will help the dunes function more naturally and will provide a cost-effective and successful approach to re-vegetation.

While this report is a fairly strict assessment of the dune restoration aspects of the project, it is important to remember that the foredunes are part of a very dynamic ecosystem that includes the upper (dry) beach and even sandy intertidal areas (wet beach). Naturally functioning foredunes erode and re-build continuously as sand is sacrificed to the beach during large wave events and is later blown back into the dunes after storms subside. Because of this strong and essential physical link between the beach and dunes, some of our recommendations include reference to the importance of restoring natural beach conditions. However, we will not directly analyze the impacts and/or benefits of the project to the ecology of the beach in this report.

Section II. Challenges and Recommendations Related to Restoring Natural Ecosystem Processes in the Restored Dunes

1. **Proposed Sand for Dune Restoration**
   Challenge: Coastal dunes in southern California, including those that still occur in patches at Broad Beach, are characterized by well-sorted fine-grained sand. The sand found in such natural systems is naturally sorted by wind and wave action. The plants and animals that depend on coastal dune ecosystems are specifically adapted to live in these soils. The proposed sand from the inland quarries is poorly sorted (*i.e.*, they include a more broadly distributed range of particle sizes) and much coarser than the natural sand found at Broad Beach.

   Implications for restored dunes: We do not know of any dune restoration projects that have used sand from inland quarries where the grain size was mismatched to that of the natural sand within a system. Without real-world examples to draw from, we must apply what is known about how natural dune soils function to sustain natural dune processes and then try to understand how different types of sand might or might not affect important natural processes.

   The quarry sand has fairly low levels (7-8%) of “fines” (*i.e.*, particles smaller than 0.074 mm). Broad Beach sand has a lower fraction of fines than either quarry site (Table 1). Nevertheless, we feel that the fraction of fines found in the quarry sands are probably within acceptable limits for dune restoration.

   The quarry sand is generally much coarser than the Broad Beach sand by all measurements (Table 1). The quarry sand is much coarser than that found in any natural beach/dune system we know of in southern California. While the mean particle size of the sand from the Grimes Quarry suggests the sand may be appropriate for dune restoration, closer analysis reveals that the sand is very poorly sorted about this mean number and is actually much coarser than this mean number might suggest (Table 1). We have significant concerns regarding the use of any of this quarry sand to restore naturally functioning dunes. Our concerns are related primarily to an expected decrease in available soil moisture for plants and a decrease in aeolian sand transport – both are critical aspects of restoring naturally functioning dunes.

   The well-sorted fairly fine-grained sands characteristic of natural dunes in coastal southern California are an important aspect of naturally functioning soil moisture dynamics. Restoring natural soil moisture dynamics is key to restoring native dune vegetation. The soil moisture dynamics in coastal dune systems are complex. Precipitation drains quickly through dune sand. Some of this water ends up in a relatively shallow freshwater lens that floats on top of salty groundwater (the elevation of the salty groundwater is closely related to sea level) and becomes perched. So even though soil moisture drops quickly in the upper layers of dune soils after rain events due to rapid drainage, a significant proportion of the water is conserved within the system in the perched groundwater. This perched watertable is crucial for the survival of dune plants. Even though the perched watertable may be too deep for plants to access directly, in natural dune systems usable amounts of water are transported up through the soil by capillarity (Maun 2009). Capillarity is a process by which moisture moves upward through the pores in the soil, forming a capillary fringe (a layer of saturated soil above the watertable) and an unsaturated zone (a layer of moist but not saturated soil). The thickness of the capillary fringe is strongly correlated with grain size (Table 2). The unsaturated zone is typically much thicker than the capillary fringe and also varies in thickness with grain size.

Table 1. Particle size comparison using data summarized from CCC Addendum to Staff Report Th17a

	Broad Beach	Cemex Quarry	Grimes Quarry
Median particle size	**0.28 mm**	1.35 mm	0.89 mm
Two standard deviation below mean (D05)	**0.15 mm**	0.07 mm	0.07 mm
One standard deviation below mean (D16)	**0.20 mm**	0.20 mm	0.20 mm
Mean particle size (D50)	**0.25 mm**	0.85 mm	0.47 mm
One standard deviation above mean (D84)	**0.40 mm**	3.0 mm	2.0 mm
Two standard deviations above mean (D95)	**0.50 mm**	4.0 mm	3.0 mm

We expect that the use of quarry sand that is coarser than the natural Broad Beach sand will not allow natural dune soil moisture dynamics to be restored. Our primary concern is that the lower capillarity of the coarser sands (*i.e*., a narrower capillary fringe and unsaturated zone above the watertable) will mean that available soil moisture will be much deeper than in natural dunes and plants will not be able to reach moist soils and will therefore not survive. We also have concerns that the coarser soils will have a negative affect on the ability of the dunes to support a perched watertable like natural dunes (*e.g.,* water may move out of the system laterally more easily through the coarser soils). Finally, other processes that may be important in terms of sustaining soil moisture in the rooting zone, including movement due to strong differences in water potential between deep (moist) and shallow (dry) sand and dew formation within the soil column due to nocturnal-diurnal temperature fluctuations (Maun 2009) may not function naturally in coarser sand.

Aeolian (wind) transport of sand from the upper (dry) beach to the dunes is a crucial natural process associated with dune re-formation after wave-caused erosion events. Foredunes are expected to naturally erode during large wave events. The sand in the dunes is “sacrificed” to the beach and intertidal zone where it helps attenuate wave energy and limit further landward erosion. Once storms are over, the calmer wave climate moves sand back on to the beach. Once a dry sand zone is formed, aeolian processes take over and sand is blown back in to the foredunes, where it is trapped by vegetation and accumulates, re-building the dunes.

Table 2. Relation between capillary rise and soil grain size (from Lohman 1972).

Table 2.4.1 Capillary Rise in Samples of Unconsolidated Materials (after Lohman[34])

Material	Grain size (mm)	Capillary rise (cm)
Fine gravel	5–2	2.5
Very coarse sand	2–1	6.5
Coarse sand	1–0.5	13.5
Medium sand	0.5–0.2	24.6
Fine sand	0.2–0.1	42.8
Silt	0.1–0.05	105.5
Silt	0.05–0.02	200[a]

Note: Capillary rise measured after 72 days; all samples have virtually the same porosity of 41 percent.

[a]Still rising after 72 days.

The ability of the wind to move sand is highly dependent on grain size. In dune systems, the majority (as high as 95%) of sand particles move by a process called saltation, whereby particles are briefly suspended by the wind and then, upon landing again, dislodge other particles, each of which then repeats the process and large amounts of sand "bounce" along until they encounter some obstacle (*e.g.*, a plant or sand fencing) that slows them down and they may stop moving and build hummocks or they may land in the lee of a dune ridge where wind speeds are too low to get sand moving again (a depositional area). The wind speed required to mobilize particles of different size increases exponentially with grain size (Davidson-Arnott 2010) and particles larger than about 0.50 mm are too large to move by saltation (Shao 2000), though they can move by a process called "creep", which accounts for about 5% of sand movement in dune systems. The natural sand on Broad Beach, 95% of which is below the 0.50 mm threshold for saltation (Table 1), is subject to natural aeolian processes and we witnessed evidence of recent sand movement (*e.g.*, ripples and hummock formation around plants) on the dry beach at the eastern end of the project site in August 2015. The coarser sand from the quarries contains a considerable fraction of particles that are too large (*i.e.*, greater than 0.50 mm) to be moved by saltation. This fact also has important implications for other aeolian processes in the dunes related to dune migration and the development of natural topography after sand is placed. The lack of natural aeolian processes in the restored dunes means that they will not function like natural dunes morphodynamically and that once they are eroded by high wave events, they will likely not re-form and the ecosystem functions and values that they provide would be lost.

Recommendations: Sourcing sand that more closely matches the sand on broad beach for the dune restoration would help assure that restored dunes function naturally.

Special Condition 8 in the CCC Staff Report calls for the use of sand with a median grain size between 0.24 mm and 0.60 mm and a fines fraction less than 10% for sand placed on the beach. The upper size range in this guidance will probably be too coarse for restoration of naturally functioning foredunes. If the restored dunes at Broad Beach are to be considered as mitigation, every attempt should be made to use appropriate sized sand for their construction (*i.e*., grain size distribution as close to natural Broad Beach sand as feasible). The use of coarser sand will not allow for restoration of natural dune processes.

In order to assure the restored foredunes function naturally, we recommend one or some combination of the following approaches:

- Find an off-site source of appropriately sized sand for use in the dune mitigation area
- Use Broad Beach sand that will be excavated when the revetment is re-located to build the dunes in the mitigation area (check with M&N to see if the volumes involved are feasible)
- In addition to sand excavated from the new revetment location, other sand that is currently behind the revetment could potentially be used (check with M&N to see if the volumes involved are feasible)
- We do not think that using a shallow layer of natural sand on top of coarse quarry sand will allow the dunes to function naturally (CCC Special Condition 5.A.4) and do not recommend this approach

If the coarser sand is used for the "dunes" in front of and on top of the revetment, we recommend the following for these areas, understanding that the use of this sand will probably not lead to naturally functioning dunes:

- To the extent that there are differences in the coarseness of the sand from different quarries, use the material that most closely mimics the natural Broad Beach sand
- Plan on irrigating to at least establish and possibly to maintain plants
- Fine tune the planting palette
- Plan on mechanically re-building the seaward extent of the dunes after erosion events if aeolian processes of re-building aren't functioning
- Use an experimental approach using natural (on-site) sand in some areas and imported sand in other areas with extensive monitoring to understand how dunes on the site are functioning compared to reference sites and within the site with respect to vegetation, groundwater, geomorphology, etc.

2. Dunes In Front of the Revetment

<u>*Challenge*</u>: Upper beach and dune habitat in front of coastal armoring structures eventually disappear due to wave erosion and do not naturally reform. If (or when) the dunes in front of the revetment are eroded out, they will not be able to re-form via natural dune processes. The restored dunes at the far eastern end (where there is no revetment) will potentially erode and re-form naturally (given appropriate sand is used, native plants establish, etc.).

Implications for the restored dunes: We question whether the restored dunes in front of the rock revetment will function naturally in the long term. Natural dunes can be severely eroded and then re-form via natural wave- and wind-driven processes. One key to this process is that the eroded dune face is “soft” and relaxes to form a sloped beach face that can be re-built by smaller waves, which transport sand back on to the beach and gradually build it up again. These re-building processes do not occur, however, when a revetment or other hard structure becomes exposed to wave attack. The increased reflectivity of a hard structure (waves hit and bounce off) does not allow for the natural re-building of the beach and therefore the dunes will not be re-built either. Vertical structures may also interfere with laminar wind flow needed for efficient dune formation. We expect all dunes in front of the revetment will be “sacrificial” ultimately, and that “permanent” dunes that function naturally are only feasible where there is no revetment present or the revetment is placed far enough landward that it will not be exposed to waves even during extreme erosion events.

Recommendations: Short of removing the revetment entirely, we recommend moving it as far landward as possible. This will allow for a wider beach and dune system in front of it and make it less likely that the revetment will be exposed to wave action. According to the latest drawings we have seen (dated March 2015), the revetment is generally located slightly seaward of a “stringline” that is 15 feet seaward of the leach fields. This alignment leaves room for foredunes only towards the eastern end of the project (see Sections 3 and 4 below for discussion of dunes on top of and behind the revetment). If the revetment is moved further landward, it would allow for restoration of more naturally functioning dunes where they can interact with the beach and are therefore more resilient to large wave events (*i.e.,* they can re-build themselves after erosion events).

We would like to see an analysis of the probability of the beach and dunes being completely eroded out in a “worst case scenario” storm event with the revetment located as drawn currently and with it set back to the maximum extent feasible. While this is a modeling exercise well beyond our ability, as a first level of estimation as to the vulnerability of the dunes to erosion, we consulted the USGS CoSMoS 1.0 model (Barnard et. al 2014), which estimates erosion rates every 100 meters along the entire southern California coast based on a single design-storm event, which they call an “ARkStorm” event (roughly equivalent to a 100-year event). Erosion estimates at Broad Beach vary but seem to average about 25 meters (82 feet) of landward beach erosion. The CCC recommends that the trigger for re-nourishment of the beach is when the beach width is less than 30 feet. If an ARkStorm were to hit with a 30-foot beach, we might expect all of the beach and about 50 feet of dunes to be eroded out. The widest dune width in front of the revetment in the latest plans is approximately 35-50 feet at the eastern end. Therefore, based on this very, very rough estimate, we are concerned that the dunes in front of the revetment, even at their widest point, might be completely eroded out. Using the same analysis, the dunes at the far eastern end of the project, where there is no revetment, would likely survive and be able to re-build. We recommend that the dunes built in front of the revetment not be considered as mitigation unless it can be shown that the revetment will not be exposed even under extreme events.

3. Dunes On Top of the Revetment

Challenge: As discussed above, dune vegetation is often reliant on a connection to moisture that is transported up through the soil from the deep freshwater watertable that is floating on top of the saltwater watertable. In the case of planted areas on top of the revetment, both the rocks and the voids between the rocks underneath the dunes will not allow water transport up in to the rooting zone and will not allow root growth down to deeper levels where there is water available. Further, dunes located on top of the revetment will not function naturally in terms of interactions with the adjacent beach (see more detailed discussion of this in the next section).

Implications for the restored dunes: We do not expect that native plants will establish or persist naturally on top of the revetment as it is designed. The relatively shallow layer of sand on top of the rocks will not hold sufficient moisture to support native dune vegetation. Sand exposed at the crest of the revetment will be exposed to considerable wind shear. Natural erosion and accretion, characteristic of foredunes, will not occur on top of the revetment.

Recommendations: We feel that a potentially sufficient connection to deeper soil moisture might be provided by completely filling the voids in the rock revetment with sand. We do not know what the coastal engineering implications of this action might be. The sand should match the natural characteristics of the sand found on Broad Beach to the maximum extent feasible. Coarse sand will probably not provide a good connection to deeper groundwater (as discussed in #1 above).

Filling the voids completely will likely require that sand be added continually as the rocks are placed when the revetment is re-located. If portions of the revetment are to be left in place and not re-built, we recommend that the voids be filled without moving the rocks. The feasibility of this approach will require discussion with contractors familiar with such procedures. If there is no feasible way to fill the voids without removing and replacing the rocks, it may be possible to establish certain dune species that do no grow deep roots (*e.g.*, salt grass) on the fill on top of the revetment. This would probably require long-term irrigation and therefore long-term weeding however.

We feel that filling the voids will provide an improved connection for plant roots to groundwater, however, if the beach and dunes erode out and the revetment is subject to wave attack, we would expect the sand in the rock voids will be washed out and would need to be replaced as part of dune re-construction activities.

Finally, since re-vegetated areas on top of the revetment will not function naturally like foredunes, we do not recommend that areas on top of the revetment be given full mitigation credit. We do believe there is some ecological (and certainly aesthetic) value to covering the revetment with sand (especially with filling of voids) and planting it with native dune species. Vegetation on top will add to aesthetics and help keep sand from blowing landward. Since the top of the dune ridge (generally on top of the revetment) will be especially prone to erosion by wind, we recommend that it be vegetated and that any lateral access paths be located landward of the dune ridge.

4. **Dunes Behind the Revetment**
   Challenge: As discussed above, foredunes interact in multiple ways with the beach. Interactions include exchange of sand between dunes and the beach (in both directions) and closely linked watertable dynamics. Attempting to build foredunes behind the revetment (or on top of it) will largely cut the dunes off from these important interactions.

   Implications for restored dunes: There is probably no natural analog to the type of growing conditions that will be created behind the revetment. Natural back dunes (the typical habitat found landward of foredunes) are characterized by species that grow in low-nutrient sandy soil, but have generally moderate tolerance to blowing sand and even rare wave over-wash (both of which will likely be characteristics of the habitat created behind the revetment). There are values associated with re-vegetating areas behind the revetment with native dune and perhaps back dune species. The area will help act as a buffer between landscaped yards and more natural dunes and it could act as a refuge for dune and some beach fauna during high water events.

   Recommendations: The area behind the revetment can probably be re-vegetated with a carefully chosen suite of native species but probably will require some increased level of maintenance (*e.g.*, irrigation, weeding, etc.) compared to the natural dunes. We don't recommend that any dunes behind the revetment be given full mitigation credit for losses to foredunes at Broad Beach.

Section III. Suggested Minor Alterations to Existing Dune Design

1. **Alignment of dune ridges**
   The current design calls for one to three shore-parallel dune ridges along the shoreline. We recommend aligning the dune ridges perpendicular to the prevailing wind direction (estimated to be WNW or about 60 degrees west of north). This would create a more natural alignment. Each dune ridge could be of fairly uniform height or could vary somewhat to create a more natural look. Wind action will ultimately interact with plants to create an even more natural look over time. The historic dunes at Broad Beach were probably no aligned in ridges (Fig 2).

2. **Alignment of sand fencing**

Sand fencing should be slightly re-aligned to run perpendicular to the prevailing wind direction. Sand fencing should be placed such that it traps blowing sand as it enters the foredunes (generally on or immediately in front of the most windward dune ridge). Fencing should be placed where it is desirable to trap sand. There will likely need to be some combination of temporary and more permanent fencing used. Temporary fencing will help keep sand in place while plants get established. More permanent fencing might be used closer to the beach where sand will tend to be ore mobile.

3. **Temporary stabilization of sand while plants establish**
   Once plants establish on the dunes, they will effectively limit sand transport out of the dunes. With appropriate soil conditions, this should only take one or two growing seasons. It will be important to keep the sand somewhat stabilized during this initial plant establishment timeframe so that seedlings don't get buried by blowing sand. Mass sand movement from the beach in to the dunes can be limited with strategic placement of sand fencing. An effective way to control sand movement within the dunes is to crimp sterile straw in to the dunes with a sheepsfoot roller very soon after the dunes are built. Sterile rice straw will last for several seasons if it is not trampled. Seeding can also occur at this time and will benefit by being crimped in to the sand as well.

4. **Re-vegetation of the foredune-beach transition**
   The natural transition between foredunes and beach habitat typically consists of low hummocks (sometimes called embryonic dunes) that build up around beach saltbush (*Atriplex leucophylla*), beachbur (*Ambrosia chamissonis*), and red sand verbena (*Abronia maritima*). In natural systems, this habitat tends to be ephemeral as it is eroded out by waves to some extent in most years. This may not occur at Broad Beach if the beach width is maintained by re-nourishment. Seeding these coastal strand species in front of the foredunes, on the landward edge of the beach, will be an effective way of trapping sand blowing into the dunes from the unvegetated beach. It might be desirable to give some mitigation credit for restoring this area since it is important for overall foredune functioning.

5. **Re-vegetation in front of the beach club**
   The current re-vegetation plan calls for leaving a flat un-vegetated gap in the dunes in front of the beach club at the eastern end of the revetment. Leaving an un-vegetated gap will leave a large area of un-stabilized sand that that will blow southeast and could have negative impacts on the downwind dunes. Ideally what is currently shown as a gap would contain dunes like those located to the east. This is especially desirable since there is no revetment behind the dunes here and they might be expected to function more naturally than dunes further west in front of the revetment. The BBGHAD is interested in maintaining visual line of sight between the beach club and the beach, which probably isn't compatible with foredune restoration here. A potential compromise might be to make very minimal dune hummocks in this area and plant most of the area landward of the

beach (leaving an access path to the beach). This will limit aeolian sand movement and maintain sight lines.

6. **Access path realignment**
   Access paths from homes towards the beach should be re-aligned to run in the depressions between the re-aligned dune ridges. Trampling and therefore lack of vegetation in the depressions will not be a problem since these areas will be naturally depositional for blowing sand. We recommend, as in current plans, that one path per two houses is appropriate for beach access. The width of the access paths should be kept as narrow as practical to minimize trampling effects

7. **Gaps in dunes for storm drains**
   The current plans call for leaving gaps in the dunes where there are storm drain outfalls. We understand that the end of the culverts will be more-or-less flush with the revetment and will have concrete headwalls and there will not be dunes in front of the headwalls. We have general concerns that these gaps in the dunes might trigger erosion of adjacent dune habitat when the storm drains are flowing or when wave attack hits the exposed headwalls. The gaps may also tend to fill in with wind-blown sand. We would like to see a discussion of how these gaps will be maintained and potentially see alternative designs explored.

Section IV. Suggested Alterations to Existing WRA Re-vegetation Plan

We have reviewed the WRA (2013) dune restoration plan for Broad Beach. We found the plan to be well thought out and very largely accurate and appropriate in it's recommendations for dune restoration on a conceptual level. Specifically, we strongly agree with:

- The need to use sand with a comparable grain size envelope as the native Broad Beach sand
- The need to test imported soil for particle size, salinity, fertility, organic matter content, weed seed content and anthropogenic contaminants
- Only sand that can be made suitable for plant establishment with reasonable levels of amendments should be used
- The need to kill iceplant and other non-natives and remove them from the site
- The need to preserve and replace "beach debris"

We generally agree with many other recommendations made in the WRA plan but we suggest minor changes to the following:

1. **Soil preparation in the dunes**
   a. *Soil nutrients*: As pointed out by WRA, dunes are naturally very low in nutrients and organic matter. WRA calls for some fertilization or addition of organic matter at the time of planting as needed. If nursery stock is used, there will be plenty of nutrients in the potting soil. If direct seeding is used, some very low level of fertilization might be desirable, depending

on the conditions of the imported sand. Before any fertilizer additions are made, careful testing of the imported sand and reference site sand should be conducted and reviewed by a restoration ecologist experienced with dune restoration. Since the desirable levels of nutrients in dunes are much, much lower than in almost all other plant communities, some landscape architects or ecologists not familiar with dunes might be expected to over-fertilize the dunes based on experience in other habitats. Additionally, we do not recommend any organic matter be added to the dunes.

b. *Soil salinity*: As pointed out by WRA, if sand is imported from a marine source, it will have high salinity initially, which will impede plant germination and establishment until salinity levels drop. Salts can probably be fairly easily leached out of the sandy soil using irrigation or waiting for enough rain to occur. Fairly simple models are available that predict the amount of water needed to leach salts out of soil and these calculations should be made if marine sand is used. Planting can occur once testing shows salinity levels near the surface and deeper in the rooting zone are close to reference sites.

c. *Soil fungi*: The importance of symbiotic root fungi (mycorrhizae) for dune plants is not very well understood. Studies suggest they may be important for water and nutrient uptake for some or all species in foredunes. Sand from marine or inland quarry sites will very likely not have appropriate (if any) soil fungi. The native sand on the site very likely does have all the necessary fungi. In order to inoculate the restored dunes with these fungi, some native sand could be mixed in with imported sand, perhaps spread on the surface before final grading. Alternatively, a small amount of native sand could be used in a potting mix used for nursery stock and plants could be infected before planting.

d. *Legacy effects of existing dune vegetation*: Most of the plants on the remnant dunes at the site are non-natives (some invasive, some naturalized and some horticultural escapees). It will be necessary to kill and remove these plants before re-planting dunes or moving sand around. Propagules of these non-natives, either rhizomes or seeds, will be easily moved around the site even after the obvious above-ground vegetation is killed. Most of the horticultural species will not establish in the restored dunes unless they are irrigated. A few species are of special concern and should be carefully monitored and killed. While WRA did not provide a plant list for the entire project area, they did point out two invasives to be especially concerned about; iceplant (*Carpobrotus* spp.) and pampas grass (*Cortedaria* spp.). On our brief site visit we found other species of concern, including maritime brome (*Bromus maritimus* – native north of Point Conception), an unidentified rhizomatous sedge species (*Carex* spp. – could be native?) and statice (*Limonium* spp.), all of which we observed near the eastern end of the project site. This suggests that a more thorough botanical survey is needed to identify potentially invasive species that need to be eradicated before sand is moved.

e. *Capping dunes with weed-free sand*: The WRA plan recommends using a layer of weed-free sand to cap restored dunes. The idea is that weed seeds will be buried underneath the clean sand and will not sprout. We generally don't think this will be very effective and probably adds unnecessarily to costs. Our concerns are 1) finding truly weed-free sand might be impossible, 2) as sand blows around, deeper "contaminated" sand will be exposed and 3) live rhizomes will sprout up even when buried fairly deep. Better to acknowledge that the dunes will require regular weeding during the rainy season (or year-round if irrigated) for several years until non-native seed banks are exhausted and all buried rhizomes are killed.

2. **Planting palettes**
    a. *General guidance*: Final planting palettes should be consistent with local and regional planning guidelines. Plant propagules should be collected from appropriately local locations to assure they are the correct species, subspecies or variety. What is "appropriately local" will vary by species and may require consultation with local botanists and/or dune ecologists.
    b. *Seaward side of dunes*: The planting list suggested by WRA for the "seaward side of dunes" needs some revision. An obvious addition to the list is beach saltbush (*Atriplex leucophylla*). Of the species included on their list (see Table 1 in WRA 2013), California spectaclepod (*Dithyerea californica)* is a species of the Mojave Desert and not appropriate. Beach spectaclepod (*Dithyrea maritima*), which is not on the WRA list, is a rare dune species listed by the state as threatened and CNPS as a 1B.1 that was historically known from Los Angeles County and could be introduced at Broad Beach. Seaside heliotrope (*Heliotropium curassavicum)* will probably only survive where there is very shallow groundwater (*i.e.*, dune swale wetlands, which we don't expect on this site).
    c. *Landward side of dunes*: The WRA planting list for the "landward side of dunes" includes a wide range of coastal strand, dune, back dune, coastal bluff and coastal sage scrub species (see Table 2 in WRA 2013). Some don't seem to be appropriate at all for coastal dunes (California spectaclepod and Parish's saltbush), some are only appropriate for the extreme seaward edge of dunes (beach saltbush) and others would only be found in stabilized back dunes (several of the shrub species). To the extent that the project is expected to restore back dune habitat (as opposed to foredune habitat), some of these shrubs might be appropriate. In general, we recommend revision of this planting list to bring it in line with regional plant distributions and target habitats in subsequent, more detailed, re-vegetation plans.
3. **Re-vegetation techniques**
    a. *Future fine-tuning*: The WRA plan, since it is a conceptual plan, does not offer details on re-vegetation techniques, which is appropriate. As more detailed plans are developed, we would like to see more emphasis on the use of direct seeding (as opposed to primarily nursery stock) and less use of irrigation. We also recommend adding seeding of coastal strand species in front of the dunes. We recommend limiting salvage of existing native

dune plant material to seed collection (*e.g.*, don't bother digging up and transplanting mature plants). We recommend the development of a detailed re-vegetation plan that outlines appropriate techniques once final grading plans, sand source, etc. are confirmed.

4. **Monitoring and adaptive management**
   a. *Monitoring plan*: The WRA plan has a broad outline for vegetation monitoring that we think is not sufficient to characterize how the dunes are functioning or to inform adaptive management strategies. Similarly, the performance goals suggested in the WRA, while largely okay, needs to be expanded and more carefully customized to the project site and the specific mitigation and restoration goals. We recommend a more comprehensive monitoring plan that includes refined performance goals related to biological indicators (e.g., vegetation) and physical indicators (e.g., topography and sand movement) and is designed specifically to inform adaptive management decisions.
   b. *Adaptive management plan*: The outline of the need for adaptive management in the WRA plan is good. We recommend further development of an adaptive management plan that addresses ways to address expected and unexpected challenges that the site might experience in meeting it's performance criteria.

Section V. Literature Cited

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