Memorandum

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CC:

Date: October 10, 2013

Subject: Supplemental data and analyses for the Broad Beach Restoration Project

This memorandum provides supplementary information in response to the California Coastal Commission ("CCC") request of February 18, 2013 for additional information related to the proposed Broad Beach Restoration Project located in Malibu, Los Angeles County, California ("Project Area"; Figure 1 of this document). The information provided here is intended to supplement information presented in the Summer Biological Survey Report (WRA 2013a), the Dune Design Parameters Memorandum (WRA 2013b), the Conceptual Foredune Creation and Enhancement Plan (WRA 2013c), and the Foredune Impact Analysis Memorandum (WRA 2013d). For the purposes of clarity, this communication references the three previous Coastal Development Permit submittals made to the CCC as follows:

Submittal No. 1: Initial CDP application (submitted June 28, 2012)

Submittal No. 2: Response to CCC July 27, 2012 request for additional information (submitted August 31, 2012)

Submittal No. 3: Response to CCC September 28, 2012 request for additional information (submitted December 21, 2012)

Current Submittal: Response to CCC February 8, 2013 request for additional information

The responses provided herein focus strictly on foredune habitat and associated species. Although other habitats or species may be discussed for contextual purposes, WRA did not assess impacts to other habitats or species. The information provided herein follows a call and response format, with each of the original CCC questions provided in italics and immediately followed by WRA's response. Figures referenced in the text are provided at the end of the document.

CCC Comments 8a-d. Temporary Emergency Revetment, Sandbags, Existing Unpermitted Revetment Sections.

CCC Comment 8a: *As the permanent retention of the emergency revetment, unpermitted sandbags, and unpermitted revetment sections are all now included in the subject proposed project, please submit information and analysis documenting the baseline conditions that existed on Broad Beach prior to construction of the temporary emergency rock revetment, sandbag walls, and existing unpermitted revetment sections including but not limited to the following habitats: kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth.*

WRA Response 8a:

As indicated in Submittal No. 3, the existing emergency revetment materials at Broad Beach were either unpermitted or were installed under Emergency Coastal Development Permits, and therefore, no biological surveys were performed prior to or immediately following installation of the revetment materials. As such, little information is available regarding the historical composition of habitats at Broad Beach (i.e., baseline conditions). No quantitative data are available regarding the historical habitat composition at Broad Beach. Given this general lack of information, it was necessary to infer baseline conditions at Broad Beach from historic aerial imagery, accounts of vegetation composition from similar habitats in southern California, and habitat conditions observed at a nearby reference site, Ormond Beach. The previous assessment of historical habitat composition prepared by WRA (Submittal No. 3) used a baseline year of 1997 which is believed to be the year in which the first revetment materials may have been installed. WRA has revised our assessment of historical habitat composition at Broad Beach using a baseline year of 2005, which is believed to be the year prior to which the majority of emergency sand bag materials were installed (Moffatt and Nichol 2013).

<u>Habitat Extent</u>

A wide range of dune formations and communities have been described in California (e.g., Cooper 1967; Pickart and Sawyer 1998; Pickart and Barbour 2007). These descriptions primarily focus on either geomorphology or vegetation communities. A range of dune definitions have been used or implied in the CDP submittals (Submittal No. 1 through 3), in the Analysis of Impacts to Public Trust Resources and Values for the Broad Beach Restoration Project document (referred to herein and elsewhere as the "APTR document"; AMEC 2012), and in CCC correspondence, and this has caused some confusion. Based on dune geomorphology, foredune habitat consists of relatively young, incipient dunes (i.e., low sand mounds) occurring along the immediate shoreline. Using a geomorphology-based definition, all of the sand behind the emergency rock revetment at Broad Beach could be considered remnant foredune habitat. The term *southern foredune*, as used by the CCC, appears to be a reference to the vegetation community with the same name described in the California Department of Fish and Wildlife's ("CDFW") *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986). Based on this definition, little southern foredune habitat occurs at Broad Beach as most vegetation at the site is dominated by iceplant (*Carpobrotus* spp.) and a range of non-native ornamental species. Herein, a geomorphology-based definition has been used to define the

extent of remnant foredune habitat at the site. Moreover, the term *southern foredune* is used only to describe the vegetation community, not the dune formations.

WRA reassessed the extent of remnant foredune habitat at Broad Beach using a geomorphology-based definition and a baseline year of 2005. As shown in Figure 2 of the Foredune Impact Analysis Memorandum (WRA 2013a), approximately 12.23 acres of remnant foredune habitat may have been present at Broad Beach in 2005. This assessment was based on the approximate location of the beach-dune escarpment line visible in false infrared aerial imagery of the site captured in 2005; this imagery was sourced from the U.S. Department of Agriculture's ("USDA") National Agricultural Imagery Program ("NAIP"). The location of this line was verified using oblique aerial photos of the site also captured in 2005 (Figure 2 of this document). All habitat located landward of the escarpment line and seaward of the residences and associated developed areas was assumed to be remnant foredune habitat, regardless of the vegetation that may have been present in 2005. This assessment is supported by oblique aerial photographs of the site captured in 1972 and 1979 which show foredune habitat extending inland to the edge of development along the beach (Figure 3 of this document).

Species Composition

Baseline (2005) species composition of foredune habitat at Broad Beach was determined utilizing a combination of (1) historic aerial imagery of the site; (2) vegetation descriptions from Holland (1986), Pickart and Barbour (2007) and references therein, and Sawyer et al. (2009); (3) observations of current species composition at the Ormond Beach reference site; and (4) observations of current species composition at Broad Beach.

Based on descriptions of dune communities provided by Holland (1986), it was determined that the most likely community present at Broad Beach in 2005 would have been the *southern foredune* community. Holland describes southern foredune vegetation as similar to northern foredune vegetation, but without perennial grasses and with a higher proportion of suffrutescent plants. Native species characteristic of this community include red sand verbena (*Abronia maritima*), pink sand verbena (*Abronia umbellata*), beach bur (*Ambrosia chamissonis*), beach salt bush (*Atriplex leucophylla*), beach morning glory (*Calystegia soldanella*), beach evening primrose (*Camissonia cheiranthifolia*), salt grass (*Distichlis spicata*), and Menzies' goldenbush (*Isocoma menziesii*, as *Haplopappus venetus*). Non-native species often found in this community include sea rocket (*Cakile maritima*) and iceplant (*Carpobrotus edulis*). Species such as red sand verbena, beach bur, and sea rocket generally occur in exposed sites, and species such as pink sand verbena, beach morning glory, and beach evening primrose generally occur in more protected sites. Holland does not provide additional information on species composition such as density or cover.

In their chapter on beach and dune vegetation in the book *Terrestrial Vegetation of California*, *Third Edition*, Pickart and Barbour (2007) provide meta-analysis of beach and dune vegetation in California. Pickart and Barbour recognize four beach and dune zones: beach, nearshore dunes, moving dunes, and backdunes. Their analysis suggests that beach vegetation (i.e., coastal strand vegetation) is not significantly different from nearshore dune vegetation (i.e.,

Holland's southern foredune community) and does not warrant separate treatment. As such, WRA does not distinguish between coastal strand and southern foredune communities here or elsewhere in this submittal. Similarly, vegetation in these two areas cannot be differentiated in the aerial photography reviewed from the subject timeframe. Although they do not provide information on species density or cover specific to southern California, Pickart and Barbour indicate that only a total of 15 to 30 species were common to the entire California coastline, with only five species present at any given beach. Their estimate of plant cover ranged from 10 to 25 percent, rising to more than 50% on the seaward face of foredunes. They recognize two major coastal floristic zones in California which meet at Point Conception in Santa Barbara County, with nearshore vegetation south of Point Conception being characterized by relatively few species. Pickart and Barbour describe nearshore vegetation in southern California as being dominated by a mix of annual and herbaceous to suffrutescent perennials similar in composition to Holland's southern foredune community.

In their book *A Manual of California Vegetation, Second Edition*, Sawyer et al. (2009) describe three vegetation alliances that may have occurred at Broad Beach in 2005. These alliances include the yellow sand verbena-beach bur (*Abronia latifolia-Ambrosia chamissonis*) herbaceous alliance (also referred to as *dune mat*)[1], sea rocket (*Cakile edentula* or *C. maritima*) semi-natural provisional herbaceous stands (also referred to as sea rocket sands), and iceplant (*Carpobrotus edulis*) semi-natural herbaceous stands (also referred to as iceplant mats). They do not provide lists of specific species associated with these communities in southern California, nor do they provide specific information on species distribution, density, or cover for these communities.

Observations of species composition and distribution made by WRA in the reference foredune habitat at Ormond Beach are presented in the Summer Biological Survey Report (WRA 2013b). The observations of species composition made by WRA at Ormond Beach largely agree with the descriptions of foredune vegetation provided by Holland (1986), Pickart and Barbour (2007), and Sawyer et al. (2009). A total of four species were observed in the foredunes at Ormond Beach: red sand verbena, beach bur, beach salt bush, and sea rocket. Red sand verbena and beach bur were the two dominant species. Cover on the foredunes ranged from 15 to 97 percent, with an average cover of 70 percent. When the open sand between the dunes was incorporated into the analysis, vegetative cover ranged from 15 to 27 percent, with an average of 23 percent.

Existing vegetation at Broad Beach is dominated by a mix of iceplant and non-native ornamental species (WRA 2013b). Examples of native and non-native vegetation at Broad Beach are shown in Figures 4 and 5 of this document. Native dune mat vegetation is limited at the site, primarily occurring in the undeveloped lot at the eastern end of the beach, as shown in Figure 4 of the Summer Biological Survey Report (WRA 2013b). A list of plant species observed at the site by WRA during surveys in 2011 and 2013 is provided in the Summer Biological Survey

[1] Observations at the Ormond Beach reference site and at Broad Beach indicated that this community is dominated by red sand verbena, rather than yellow sand verbena and as such may be more appropriately described as a *Abronia maritima-Ambrosia chamissonis* herbaceous alliance which is not described by Sawyer et al. (2009).

Report (WRA 2013b). In general, it appears that the majority of native vegetation which may have once occurred at Broad Beach has been replaced by invasive iceplant or non-native ornamental plant species.

As noted above, the composition of vegetation present at Broad Beach in 2005 was inferred from the above cited sources as well as observations of current vegetation at the Ormond Beach reference site, observations of current vegetation at Broad Beach, and vegetation signatures visible in aerial imagery of Broad Beach from 2005. In false infrared imagery (e.g., Figure 2 of the Foredune Impact Analysis; WRA 2013a), vegetation appears as red areas. In this figure, much of the vegetation appears as dark, solid red fill indicating that the vegetation is relatively dense, particularly so immediately adjacent to buildings and in back yards where iceplant and landscaping currently is more prevalent. Toward the eastern end of the beach, where native dune mat vegetation currently is more prevalent, the red fill becomes more diffuse, indicating less dense vegetation. Based on the large areas of dark red fill (i.e., dense vegetation) shown in the figure, it was inferred that much of the vegetation at the site in 2005 was dominated by a dense mix of iceplant and non-native ornamental species as currently occurs at Broad Beach. Along the seaward edge of the foredunes, the red signature becomes more diffuse, indicating less dense vegetation. It is possible that this less dense vegetation was composed of native dune mat similar to what currently occurs at Ormond Beach. This assessment is supported by oblique aerial images of the site from 2005 (Figures 2 and 4 of this document) which show a predominance of iceplant and ornamental landscaping, with only limited areas of potential dune mat vegetation occurring along the seaward edge of the foredunes, particularly at the eastern end of the beach.

Special-Status Plant Species

Surveys of the site conducted by WRA revealed only one special-status plant species present at the site: red sand verbena (WRA 2013b). Red sand verbena has a California Rare Plant Rank of 4.2 (California Native Plant Society ["CNPS"] 2013), indicating that the species has a limited distribution in California and is moderately threatened in the State. This species was documented in three main locations, in association with native dune mat vegetation as shown in Figure 4 of the Summer Biological Survey Report (WRA 2013b)[2]. A search of the CDFW's California Natural Diversity Database ("CNDDB") failed to reveal any records of other special-status plants at Broad Beach or the adjacent coastline. Based on the lack of records in the CNDDB, it is assumed that no other special-status plant species were present at Broad Beach in 2005. This is supported by the high level of disturbance at Broad Beach which, by at least 2005, had resulted in the replacement of most native vegetation with non-native ornamental and/or invasive species as shown in the photographs included as Figures 2 and 4 of this document.

[2] Locations of red sand verbena are shown in Figure 4 of the Summer Biological Survey Report (WRA 2013b) as "dune mat" vegetation.

Special-Status Wildlife Species

The area immediately adjacent to Trancas Lagoon is a known overwintering site for the federally threatened western snowy plover (*Charadrius alexandrinus nivosus*; Ryan et. al 2010, Ryan and Vigallon 2010); however, it is unclear whether this species may make use of the adjacent foredune habitat at Broad Beach. Western snowy plover prefer open, sandy habitat and forage within the upper tidal zone (USFWS 2012). Given that the foredune habitat at Broad Beach is densely vegetated by non-native plants such as iceplant, as well as the presence of domestic pets (several domestic cats were observed roaming the foredune habitat during surveys conducted by WRA in June 2013), it is unlikely that western snowy plover would use the foredune habitat at the site.

El Segundo blue butterfly (*Euphilotes battoides allyni*) is a federally endangered butterfly that has recently been rediscovered at the Ballona Wetlands Ecological Reserve located approximately 23 air miles southeast from Broad Beach (Johnston et al. 2012). This species relies on a single larval host plant, coast buckwheat (*Eriogonum parviflorum*). An ornamental variety of buckwheat was identified during surveys at Broad Beach conducted by WRA in June 2013; however, coast buckwheat, the obligate larval host plant for El Segundo blue butterfly was not observed. Based on a review of historic aerials dating back to 1972, suitable habitat for coast buckwheat likely occurred at Broad Beach; however, as a result of the severe coastal erosion and degraded habitat conditions, suitable habitat for this coast buckwheat would have been largely absent from the site in 2005 and onwards. Additionally, El Segundo blue butterfly has not been detected in other areas of the Malibu Coast where coast buckwheat is extant. Therefore, based on the absence of this species' larval host plant and lack of confirmed detections in the vicinity of the site, it was determined that El Segundo blue butterfly was not likely to be present at the site in 2005 or onwards.

Silvery legless lizard (*Aniella pulchra)* is considered a species of special concern by California Department of Fish and Wildlife. Silvery legless lizard prefers dune habitats with bush lupines and mock heather. Silvery legless lizard was not detected during WRA's field surveys or during surveys previously performed within at the site (e.g., Forde Biological Consultants 2005 in AMEC 2012). Moreover, dune habitats with bush lupine and mock heather were not observed during surveys conducted at the site by WRA. Potential habitat for silvery legless lizards was likely present historically at Broad Beach; however, residential development, the use of exotic species in landscaping (specifically iceplant and other dune stabilizing ground cover), and beach management practices (i.e., regular beach grooming) combined with coastal erosion have largely made foredune habitat at Broad Beach unsuitable for silvery legless lizard. Given the predominance of iceplant and other non-native vegetation assumed to be present at the site, as well as the high levels of disturbance at the site resulting from development, human activity, and domestic pets, the species would have had low potential to occur at the site in 2005.

Globose dune beetle (*Coelus globosus*) is a California Special Animal; however, it has no regulatory status with the USFWS and is not considered a California Special Status Invertebrate regulated by CDFW. This species occurs immediately above the mean high-tide line in coastal foredune habitat from Sonoma County south into Mexico (Sandoval 2008 in AMEC 2012).

Globose dune beetles have a subterranean lifecycle, specifically associated with native dune plants, such as sand verbena, beach bur, and sea rocket (Broughton et al. 2006 in AMEC 2012). Previous studies have documented globose dune beetle in foredune habitat at 30732 Pacific Coast Highway, a large, undeveloped lot near the eastern end of Broad Beach. Although pit-fall traps, one of which was installed in the aforementioned undeveloped lot at 30732 Pacific Coast Highway, failed to detect globose dune beetle, WRA assumes that the species is present based previous reports of the species occurring at Broad Beach and the presence of potentially suitable habitat in limited areas. It is likely that this species may have had a more widespread distribution at the site in 2005 when a relatively larger area of foredune containing native dune mat vegetation likely existed.

Common Wildlife Species

In addition to the special-status wildlife species that may have been present in foredune at Broad Beach in 2005, a number of more common wildlife species may have been present in foredune habitat. Given that the pre-2010 revetment materials were installed against the beach/foredune escarpment and did not result in permanent impacts to foredune habitat, it is unlikely that the installation of these materials caused more than temporary impacts to habitat for these species. Temporary impacts would have been those related to any access or staging that may have occurred on the landward side of the beach/foredune escarpment. Following such impacts, common wildlife species would have been able to recolonize the temporarily impacted areas.

CCC Comment 8b: *The Applicant's response materials dated 1/9/13 do not provide a quantitative analysis of the habitat impacts that occurred from the construction of the emergency rock revetment. Therefore, as part of the description of the habitat impacts that resulted from construction of the existing temporary emergency rock revetment please quantify the square footage or acreage of habitat impacts including but not limited to impacts to the following habitats: kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth. In this analysis please include the impacts that resulted from all activities related to construction of the temporary emergency rock revetment including but not limited to any habitat impacts that resulted from storage and staging, beach sand sculpting, inundation/removal/degradation of any existing dune habitats, water pollution and runoff from construction activities/equipment. The applicant's response letter dated 12/21/12 states that "[…] It is not possible to provide a thorough analysis of the impacts associated with the installation of the existing emergency revetment" (pg. 14). However, the APTR document referenced in the applicant's response letter dated 12/21/12 states that permanent impacts to approximately 3 acres of sandy beach and native dune habitat, designated as ESHA in the Malibu LCP, occurred from the construction and retention for over a 3 year time period of the emergency rock revetment. Please clarify this discrepancy in your submitted project documents and identify the correct acreage of habitat impacts that resulted from the construction and retention of the existing emergency rock revetment now proposed for permanent authorization.*

WRA Response 8b:

Sandbags and rock revetment materials were installed over approximately two thirds of the horizontal extent of Broad Beach between 1998 and 2009 (see Shore Protection As-Built Plan prepared by Moffatt and Nichol), with the majority of these materials being installed in 2005 or later (Moffatt and Nichol 2013). Based on anecdotal evidence from homeowners along Broad Beach, sandbag installation occurred immediately against the beach/dune escarpment. In unprotected areas of Broad Beach, wave action resulted in a relatively sharp escarpment between beach and dune habitats, resulting in a vertical sand wall (Figure 6 of this document). Sandbags were piled against this sand wall, and therefore, did not impact foredune habitat (Figure 7 of this document). Sand used to fill the bags was taken from the beach on the seaward side of the escarpment (Figure 7 of this document). Although most work occurred from the beach, some staging and access occurred in the foredune habitat landward of the escarpment (e.g., Figure 8 of this document). Such activity may have caused temporary impacts to foredune habitat. The location and extent of access and staging on foredune habitat was not documented, and as such, cannot be accurately quantified. However, based on the assessment of vegetation provided in the response to Question 8a, it is assumed that the vast majority of foredune habitat present between 2005 and 2009 was highly degraded and that any potential impacts related to staging and access for sandbag installation would not have resulted in substantial disturbance above and beyond existing levels of disturbance at the site. Moreover, installation of the sandbags likely reduced further loss of foredune habitat at Broad Beach.

The emergency rock revetment constructed in 2010 was installed abutting the seaward edge of the sandbags and other revetment materials which installed between 1998 and 2009 (Figures 8 and 9 of this document). Prior to the installation of the emergency rock revetment in 2010, wave action regularly reached the lower limit of the sandbags and rock revetment materials installed between 1998 and 2009. This regular wave action would have precluded the development of plant communities there and would have also precluded the build-up of sand necessary for the formation of foredune habitat. The original revetment materials were not installed at lots 30948 and 30952 near the eastern portion of Broad Beach; the two public access points along the beach; and lots 31350 through 31502, 31516 through 31536, and 6515 through 6525 at the western end of the beach. Based on observations of existing conditions at Broad Beach, it was determined that wave action continued to remove sand from these unprotected areas, removing foredune habitat and creating pocket coves (Figure 10 of this document). In front of lots 30948 and 30952 and at the public access points between lots 31138 and 31202 and between lots 31340 and 31346, the emergency rock revetment (2010) was installed in-line with the adjacent sandbags, in areas where wave action would have already removed any foredune habitat.

Because the emergency rock revetment was installed abutting the sandbags and other revetment materials or in-line with these features where no sandbags were installed and no foredune habitat existing seaward of the sandbags and other revetment materials, impacts to foredune habitat related to the installation of the emergency rock revetment would have been limited to temporary impacts related to staging or access along the seaward edge of the

foredune habitat. Such impacts would have been temporary in nature and would have occurred in habitat that was already highly degraded.

The APTR document indicates that construction of the rock revetment resulted in approximately 3 acres of "sandy beach and degraded dune habitat" (AMEC 2012). This assessment appears to be based solely on the footprint of the revetment, which approximates 3 acres in size. The assessment does not distinguish between beach and foredune impacts, and as such, the use of this statement for describing dune impacts is ambiguous. The APTR document also states that "portions of [the revetment] likely impacted the disturbed dune system" (AMEC 2012). This statement more accurately reflects the likely impacts to foredune habitat associated with the rock revetment, in that only *portions* of the revetment are likely to have impacted foredune habitat, not the entire 3-acre footprint. A more accurate way of depicting such potential impacts would be to say that the *installation* of the revetment (*not the revetment itself*) may have resulted in temporary impacts to foredune habitat as a result of staging and access activities along the seaward edge of the foredunes. As noted previously, the location and extent of staging and access activities that occurred along the seaward edge of the foredune habitat were not well documented, and as such, it is not possible to provide an accurate accounting of such temporary impacts. The revetment *itself* would have directly impacted beach habitat; however, impacts to beach habitat are beyond the scope of this memorandum.

CCC Comment 8c: *Please describe the habitat impacts on kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones - epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, or Trancas estuary and creek mouth habitats impacts relating to the construction, formation and placement of any and all plastic sandbags along the shoreline area that occurred concurrently and prior to the emergency revetment construction. Please address and provide a quantitative analysis of the sand sculpting that occurred (including all bulldozing activities on the beach) to facilitate and form the sandbag walls now proposed for permanent retention as part of the subject project. In your response letter dated 12/21/12 it is stated that sandbag construction, placement and long term retention resulted in impacts to mid-intertidal habitat, sandy beach habitat, and dune habitat. As such, please include a quantitative analysis of such habitat impacts resulted from all construction, formation and placement activities that were associated with the sandbags/sandbag walls that are now proposed for permanent authorization as part of the subject project proposal.*

WRA Response 8c:

As noted in the response to Question 8b, sandbags were installed over approximately two thirds of the horizontal extent of Broad Beach between 1998 and 2009 (see Shore Protection As-Built Plan prepared by Moffatt and Nichol), with the majority of these materials being installed in 2005 or later. Based on anecdotal evidence from homeowners along Broad Beach and information provided to WRA by Moffatt and Nichol, sand bag installation occurred immediately against the beach/dune escarpment (Figure 7 of this document). In unprotected areas of Broad Beach, wave action resulted in a relatively sharp escarpment between beach and dune habitats, resulting in a relatively vertical sand wall (Figure 6 of this document). Sandbags were piled

against this sand wall, and therefore, did not directly impact foredune habitat. Sand used to fill the bags was taken from the beach on the seaward side of the escarpment (Figure 7 of this document), and as such, did not impact foredune habitat. Although most work occurred from the beach, some staging and access occurred in the foredune habitat landward of the escarpment (Figure 8 of this document). Such activity may have caused temporary impacts to foredune habitat. The location and extent of access and staging on foredune habitat was not documented, and as such, cannot be accurately quantified. However, based on the assessment of vegetation provided in the response to Question 8a, it is assumed that the majority of foredune habitat present between 2005 and 2009 was highly degraded and that any potential impacts related to staging and access for sandbag installation would not have resulted in substantial disturbance above and beyond existing levels of disturbance at the site. Moreover, installation of the sandbags likely reduced further loss of foredune habitat at Broad Beach.

Analyses by Moffatt and Nichol estimate that sand sculpting occurred over approximately 1.1 acres of the site, primarily located along the beach (data supplied by Moffatt and Nichol). This included movement of approximately 7150 cubic yards of sand. Sculpting did not occur in foredune habitat. However, sand from the beach was used to backfill gaps between the sandbag walls and the 2010 emergency revetment. Given that no foredune habitat occurred in front of the sandbag wall, the placement of sand in this area did not impact foredune habitat.

CCC Comment 8d: *Please describe the anticipated long-term effects on kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones - epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth habitats resulting from permanent authorization of the rock revetment, the unpermitted sandbags, and the unpermitted revetment sections.*

WRA Response 8d:

Given that the rock revetment was built adjacent to, but not on, foredune habitat and that the revetment serves to protect the remaining foredune habitat at Broad Beach, the permanent retention of this structure in its current state will not cause additional impacts to foredune habitat. Given the negative sand budget at Broad Beach (Moffatt and Nichol 2013), it can be assumed that removal of the rock revetment would result in significantly greater loss of foredune habitat, as well as damage to residences, on-site sewage treatment systems, and other structures. Figures 9 and 10 of the Foredune Impact Analysis Memorandum (WRA 2013a) show the potential impacts to foredune habitat that could occur given the failure of the proposed beach nourishment and dune restoration, respectively, under existing ocean levels. If beach nourishment fails, it is expected that all foredune habitat created seaward of the inland edge of the 2010 emergency rock revetment would be lost to wave action, approximately 4.64 acres (WRA 2013a). Sea level rise along the Los Angeles region is predicted to increase between 8.5 and 18 inches by the year 2040 (NRC 2012). Given the existing height of the rock revetment, an increase in sea levels of between 8 and 18 inches is unlikely to result in overtopping of the

rock revetment. Under rising sea levels, it would be expected that some portion of the restored dunes occurring on or seaward of the revetment could be lost to wave action, particularly during storm events. However, it is expected that even under rising sea levels, wave action would not completely overtop the revetment and any dune habitat located behind the revetment would be preserved. If the revetment fails, it is expected that all foredune habitat seaward of the "no project wave uprush limit" (data from Moffatt and Nichol) would be lost to wave action. Total foredune impacts under this scenario are approximately 12.34 acres, including 4.77 acres of created foredune habitat, 2.94 acres of enhanced foredune habitat, and 4.63 acres of existing remnant foredune habitat (WRA 2013a). An increase in sea level of between 8.5 and 18 inches would result in an increased level of habitat loss; the additional area of habitat loss would be incurred in remnant foredune habitat.

Similar to the rock revetment, the retention of sandbags is not expected to result in additional impacts[3] to foredune habitat. However, degradation of sandbag fabric could have effects on foredune habitat or the species that occur there. The proposed dune restoration will result in the burial of all sandbag material under at least three feet of sand. While the sandbags remain buried, it is expected that their degradation will be contained and will not have measurable effects on existing or created foredune habitat or the species that occur there. If the sandbags become exposed, their degradation could result in the release of sandbag fabric which could affect wildlife species that occur in the foredune habitat. The California Coastal Commission indicates that silt fencing composed of geotextile fabric, which is a material to that used in plastic sandbags, may fray and develop holes after being left in place that may create a wildlife entanglement hazard (CCC 2012). Plastic netting products, including plastic sand bag material, commonly associated with erosion and sediment control have been found to entangle wildlife including reptiles, amphibians, birds, small mammals, and snakes; biodegradable materials such as jute are less likely to have detrimental effects on wildlife (Barton 2005; CCC 2012; Kapfer 2011; Walley 2005). The sandbags and erosion control fabric used at Broad Beach over the years includes both natural jute materials and plastic materials. The natural jute materials are not expected to detrimentally affect wildlife; however, the plastic materials have the potential to cause entanglement or other detrimental effects to wildlife. Such effects would only occur if the beach nourishment and dune restoration fail and the revetment and sandbags become exposed.

CCC Comments 9a-g. Proposed Beach Nourishment

CCC Comment 9a: *Please conduct comprehensive and quantitative surveys (in summer and winter) to accurately characterize the existing seasonal baseline conditions of all Broad Beach habitats.*

[3] The term "impact" is used here to convey habitat removal or destruction. The term "effects" is used to describe potential habitat degradation.

WRA Response 9a:

In June 2013, WRA conducted summertime biological surveys within the foredune habitat at Broad Beach. The results of the surveys are presented in the Summer 2013 Biological Survey Report prepared by WRA (WRA 2013b).

CCC Comment 9b: *Provide an associated analysis of the habitat impacts to kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredunes, and Trancas estuary and creek mouth habitats associated with the proposed beach nourishment element of the project including but not limited to noise, timing, sand placement, sand depth, associated turbidity plume, and associated construction storage and staging.*

WRA Response 9b:

Given that no foredune habitat currently occurs seaward of the rock revetment (Figure 4 of the Summer Biological Survey Report; WRA 2013b), the proposed beach nourishment is not expected to affect foredune habitat. Noise associated with the beach nourishment has the potential to temporarily affect wildlife species in the area; however, most wildlife species observed at the site by WRA biologists are either common bird species adapted to high levels of anthropogenic disturbance (WRA 2013b). As such, it is unlikely that the noise from beach nourishment activities will affect wildlife species associated with the foredune habitat.

Although the proposed beach nourishment is unlikely to affect foredune habitat or the species that occur there, the proposed foredune enhancement has potential to impact globose dune beetle which is assumed to be present at the site. Given that foredune enhancement would occur on only a portion of the remnant, degraded foredune habitat at the site, it is unlikely that project activities would result in the extirpation of this species from the site. Individuals of globose dune beetle, are likely to be present in the portions of remnant foredune habitat at the site not subject to foredune enhancement activities, and these individuals would not be directly impacted by the work. If globose dune beetle is present in the unaffected portions of remnant foredune habitat, those individuals would be likely to recolonize the enhanced foredune habitat following initial construction and habitat development. The proposed foredune creation and enhancement activities would provide a substantial increase in high quality habitat for this species.

Similar to the potential temporary impacts to globose dune beetle, other common wildlife species, including both vertebrates and invertebrates, are likely to be present within the existing remnant foredune habitat at the site. The placement of sand in the foredune enhancement areas is likely to result in impacts to these species. However, these species are also likely to be present within the unaffected portions of remnant foredune habitat at the site and should be able to recolonize the enhanced foredune habitat following initial construction.

CCC Comment 9c: *Please include an analysis of the impacts to kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach ((upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth habitats and the associated biological communities that would occur as a result of long-term beach maintenance activities including but not limited to backpassing, beach sculpting, and recurrent beach nourishment. The submitted response letter dated 12/21/12 and associated attachments submitted on 1/9/13 did not discuss or include and analysis of all long-term beach maintenance activities including, but not limited to, backpassing and beach sculpting. Additionally, the Applicant's most recent response package did not adequately quantify the habitat impacts that would result from proposed nourishment events, backpassing, or sand scuplting. As such, please submit additional qualitative and quantitative information to satisfy this requirement.*

WRA Response 9c:

Because all beach maintenance and nourishment activities will occur seaward of the created and enhanced foredune habitat, it is expected that these activities will not affect foredune habitat. Noise associated with beach maintenance and nourishment activities has the potential to affect wildlife species in the area; however, most wildlife species observed at the site by WRA biologists are either common bird species adapted to high levels of anthropogenic disturbance or domestic pets (WRA 2013b). As such, it is unlikely that the noise from beach maintenance and nourishment activities will affect wildlife species associated with the foredune habitat.

CCC Comment 9d: *Please include an analysis of the habitat impacts to kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth habitats associated with each of the seven (7) project alternatives considered in the alternatives analysis. The submitted response letter dated 12/21/12 did not include an adequate analysis of the habitat impacts associated with the sensitive habitats mentioned above. Specifically, the subject response package did not include quantitative information and a comparative analysis of all habitat impacts associated with each proposed project alternative, as described in further detail in the attached draft APTR document.*

WRA Response 9d:

An assessment of the potential impacts to foredune habitat associated with each of the nine project alternatives is provided in the Foredune Impact Analysis Memorandum (WRA 2013a).

CCC Comment 9e: *Please provide a detailed strategy for minimizing, to the greatest extent possible, all adverse impacts to kelp/eelgrass/surfgrass, rocky reef, shallow soft bottom subtidal, sandy beach (upper, mid, lower zones – epifauna and infauna for each zone including shorebirds), wrack, rocky intertidal, coastal strand, southern foredune, and Trancas estuary and creek mouth habitats from all activities associated with sand nourishment. Specifically, this analysis needs to address the importance of determining potential impacts to infaunal and epifaunal animals such as longer-lived tubicolous polychaetes, clams, snails, crabs, sea*

cucumbers, sand dollars, sea pens and sea pansies and should evaluate the relative abundance of shorter-lived versus longer-lived benthic species in the identification of source sites. The strategy should include ecological considerations of timing, sensitive resource avoidance, sand deposition location, and enhanced habitat recovery, at a minimum. Specifically, the analysis should also evaluate the relative abundance of shorter-lived versus longer-lived benthic species in the identification of source sites.

WRA Response 9e:

Because all beach maintenance and nourishment activities will occur seaward of the created and enhanced foredune habitat, it is expected that these activities will not affect foredune habitat. However, a number of avoidance and minimization measures may be implemented during both the initial beach nourishment and foredune creation/enhancement activities and subsequent habitat maintenance activities to ensure that foredune habitat and the species that occur there are not adversely affected. These measures include the following:

- To the extent feasible, all ground disturbance and vegetation removal should occur outside of the bird breeding season which occurs from March 1 to August 31. For any ground-disturbance activities and/or vegetation removal proposed to occur during the breeding season, breeding bird surveys should be conducted by a qualified biologist within 14 days of initiating the work.

- An exclusion zone should be established around any active nests of any avian species found in the Project Area until a qualified biologist has determined that all young have fledged. Suggested buffer zone distances differ depending on species, location, and placement of nest and will be established under the direction of a qualified biologist.

- Work windows should be implemented to avoid periods of the year when wintering western snowy plovers are present within the Study Area. If work cannot be performed when western snowy plover are not present, a qualified biologist should be present at the site at all times and should be responsible for monitoring construction activity to ensure that no western snowy plover are harmed. Additional avoidance and minimization measures related to western snowy plover may be required by the regulatory agencies.

- Prior to initial ground disturbance or vegetation removal, a qualified biologist should oversee the installation of exclusion fencing around any dune mat vegetation to be preserved as well as around any other sensitive biological resources at the site.

- Prior to conducting beach maintenance activities which could result in disturbance to foredune habitat, orange construction fencing (or similar) should be installed along the seaward edge of foredune habitat to prevent maintenance activities from encroaching on foredune habitat.

- Access routes should be identified and marked between the western parking lot of Zuma Beach and the Project Area, limiting the area of disturbance associated with vehicle and equipment access.

- A strict 5MPH speed limit should be enforced for Project related vehicles and equipment.

- Project activities should be limited to daylight hours, beginning at least 30 minutes after sunrise and concluding 30 minutes prior to sunset.

- Any waste generated by the project, including food scraps, should be placed in sealed receptacles and removed from the Project Area on a daily basis.

- Project personnel should not be allowed to bring pets to the Project Area.

CCC Comment 9f: *Please provide a dune restoration plan designed by a qualified ecologist that incorporates native coastal strand and southern foredune species. In this restoration plan please address the potential for recurring beach nourishment and backpassing operations to impact the proposed dune restoration area. Identify and quantify the potential impact this could have on the Broad Beach Dune habitat. Additionally, please provide data and biological evidence supporting the findings in the Applicant's proposed dune restoration plan that the proposed height, hummock shape and positioning of the proposed dunes will be the most effective design for successful dune restoration, either from a sand retention or habitat creation standpoint. Please provide evidence and data that the dune morphology plans and the plant palette and plant placement design reflect the physical dimensions (the natural form) of southern foredune systems and the species and locations of southern foredune plants, respectively.*

WRA Response 9f:

The dune restoration plan is provided as a separate document (WRA 2013c). Beach nourishment and backpassing operations are beyond the scope of the dune restoration plan, and as such, are not discussed there. However, as noted in the response to CCC Comment 9c, all beach maintenance and nourishment activities will occur seaward of the created and enhanced foredune habitat, and as such, these activities will not result in impacts to foredune habitat. A description of the methods used by WRA to design the proposed foredune habitat is provided in the Dune Design Parameters Memorandum (WRA 2013d); the memo provides WRA's justification for the proposed dune geomorphology as well as the proposed planting palette.

CCC Comment 9g: *Please specify how the salinity of the dredged sand proposed for use to construct the dunes will be addressed to ensure the success of native dune restoration. Provide details and evaluate all associated impacts. One solution that has been proposed is use of a clean cap of sand. If this is the preferred solution please address the following: where will this*

sand come from?, what are the habitat conditions at that site?, and how will the habitat be affected by removing the sand? The Applicant's response package dated 1/9/13 included only potential scenarios to address the salinity of dredged sand used to construct the proposed dune habitat and did not include a final proposal of all the methods that will be utilized by the Applicant. Please provide a final proposed plan with measures to address this component of the proposed project.

WRA Response 9g:

Because of a number of issues related to the use of offshore-sourced sand, it has been determined that the use of offshore-sourced sand is not a feasible approach for beach nourishment and dune creation/enhancement. Instead, sand will be sourced from inland quarries in the region. As the use of offshore-sourced sand is no longer under consideration, salinity is no longer a relevant issue. Soil fertility/toxicity analyses were conducted on sand samples from three potential inland sources by a third party analytical laboratory. In general, all three samples were found to be suitable for plant growth with the reasonable addition of soil amendments. Salinity levels ranged from 0.2 to 2.3 dS/m (approximately 128 to 1,1472 parts per million), levels which are well within the tolerance of plant species adapted to coastal environments (Pickart and Barbour 2007). More details regarding potential sand sources and the use of soil amendments can be found in the Conceptual Foredune Creation and Enhancement Plan (WRA 2013c).

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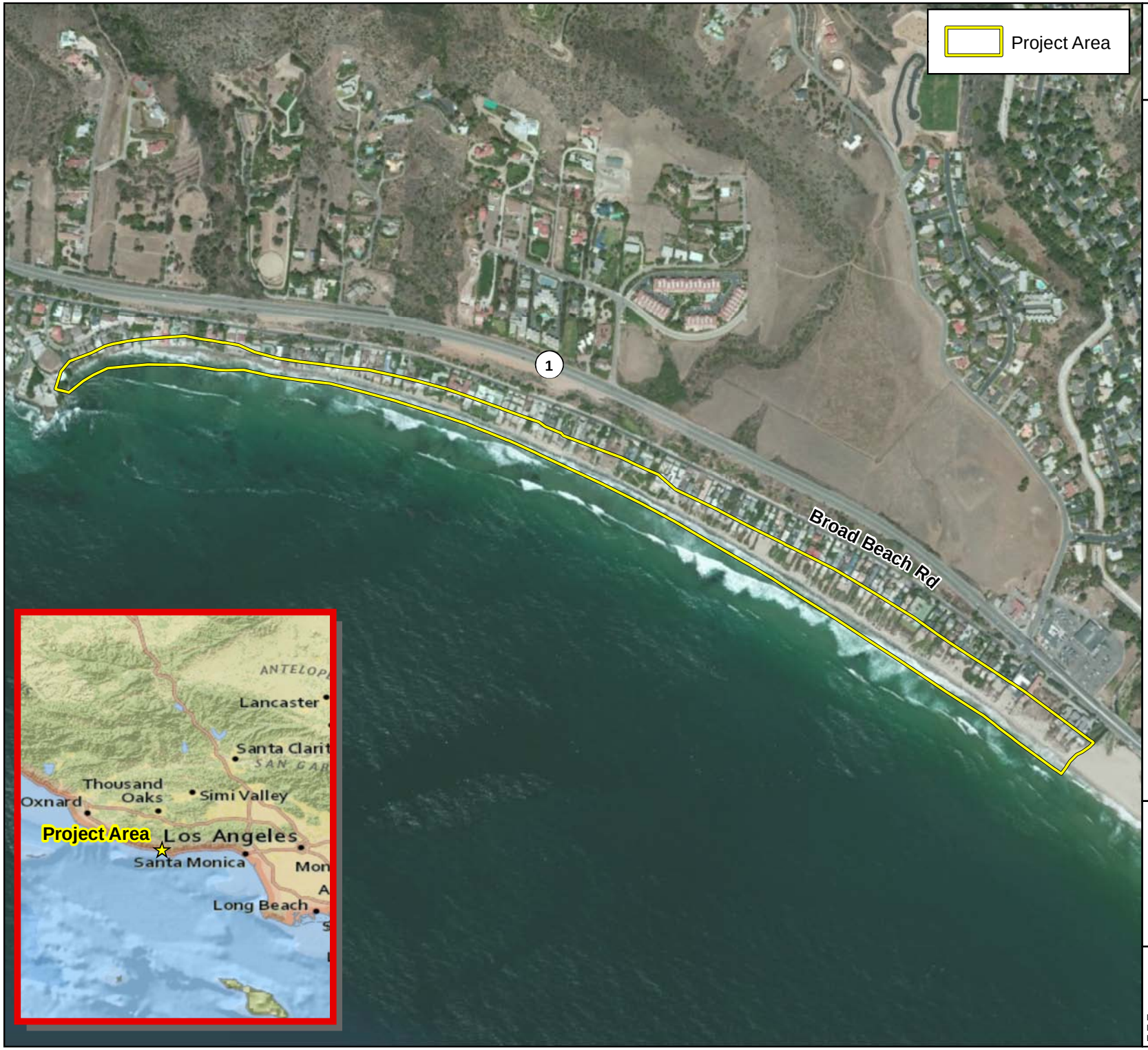
WRA, Inc. 2013d. Broad Beach Dune Design Parameters. Broad Beach, Malibu, Los Angeles County, California. Memorandum prepared for Moffatt and Nichol, Long Beach, California.



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Broad Beach Restoration Project

Malibu, California

Figure 1.

Project Area Location Map

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W E
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0 250 500 1,000

Feet

Map Date: September 2013
Map By: Michael Rochelle
Base Source: ESRI Imagery & National Geographic

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Figure 2a. Example of oblique aerial imagery of Broad Beach in 2005 used to verify the location of the beach/foredune escarpment line. Top: eastern end of beach; bottom: middle section of beach.

Photographs courtesy of California Coastal Records Project.

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Figure 2b. Example of oblique aerial imagery of Broad Beach in 2005 used to verify the location of the beach/foredune escarpment line. Western end of beach.

Photographs courtesy of California Coastal Records Project.

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Figure 3a. Example of oblique aerial imagery of Broad Beach in 1979 used to verify the extent of foredune habitat.

Photographs courtesy of California Coastal Records Project.

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Figure 3b. Example of oblique aerial imagery of Broad Beach in 1972 used to verify the historical extent of foredune habitat at the western end of the beach.

Photograph courtesy of California Coastal Records Project.

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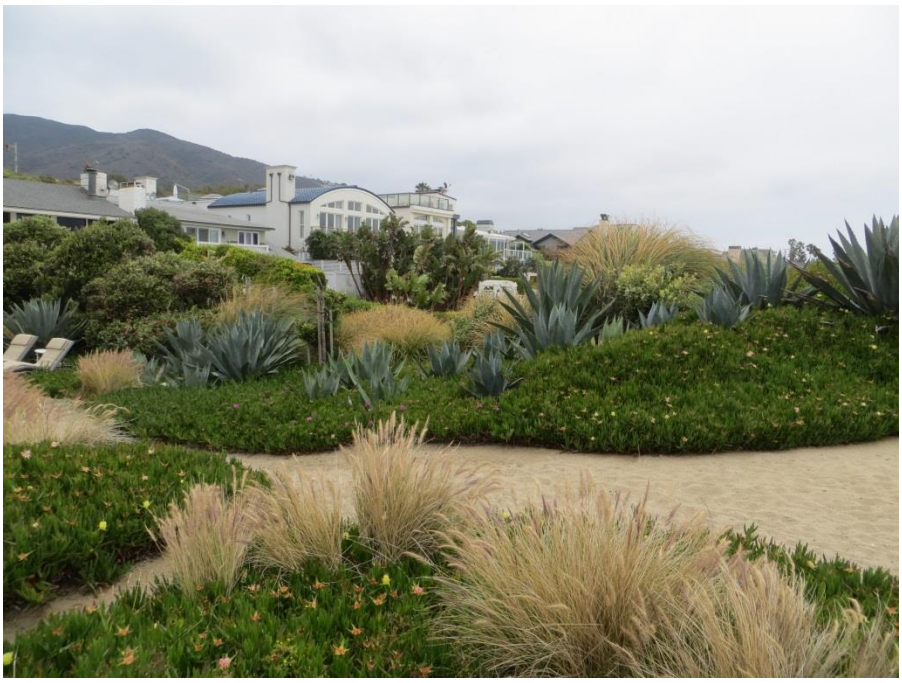

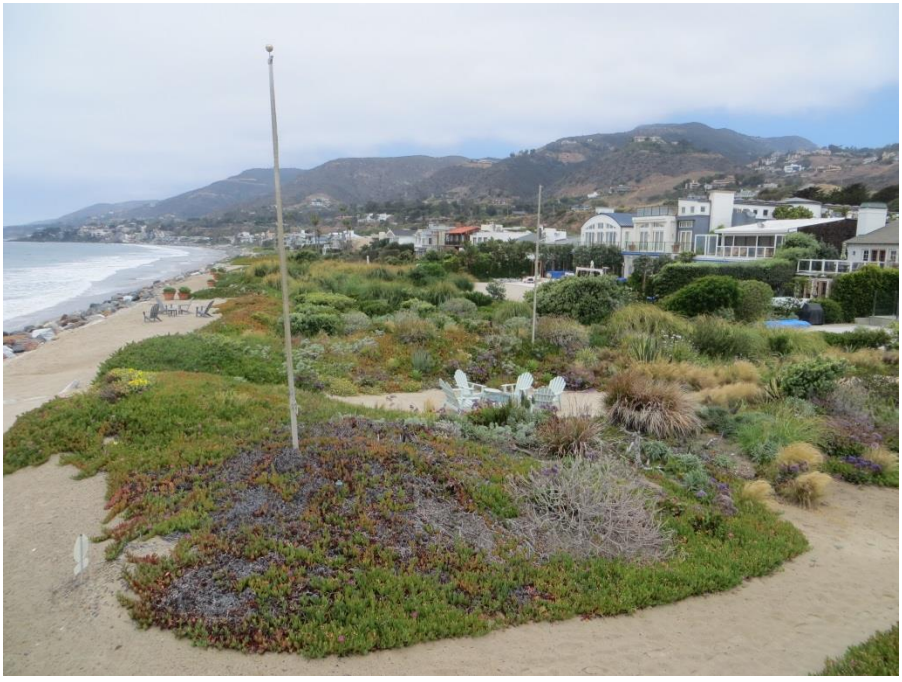

Figure 4. Examples of non-native vegetation at Broad Beach.

Photographs taken June 5, 2013

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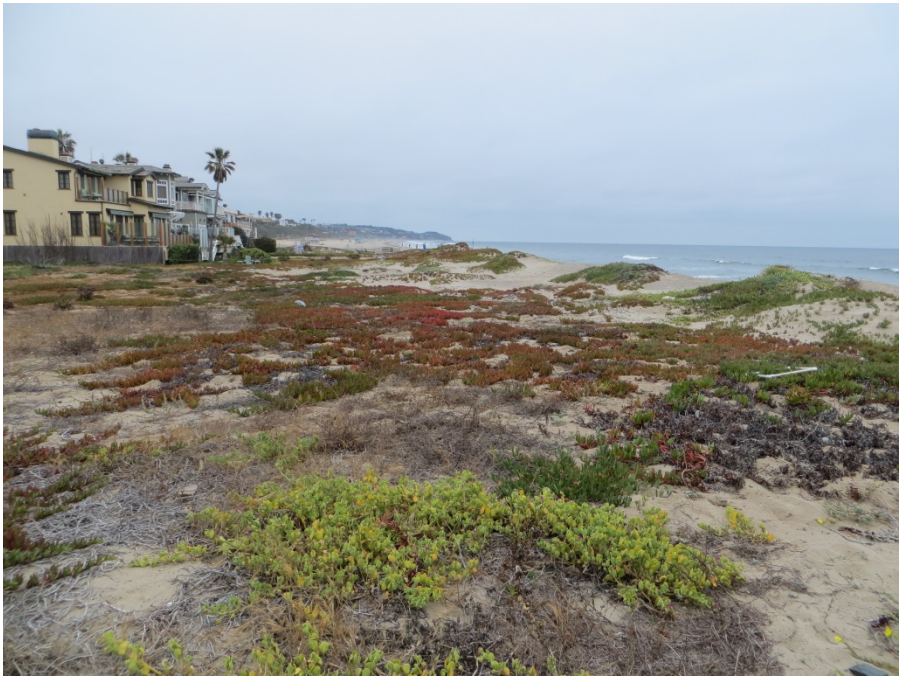

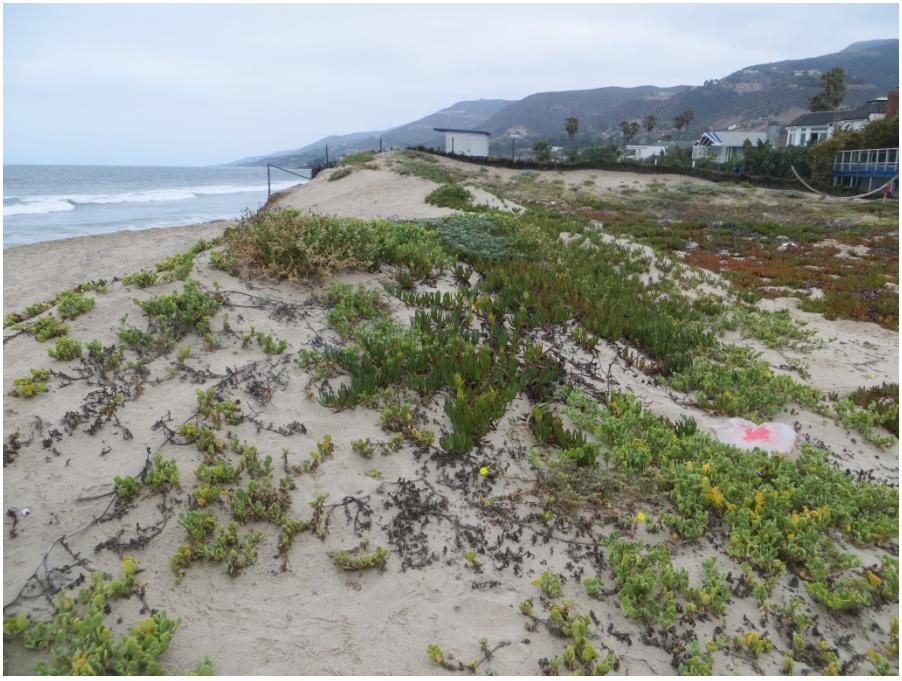

Figure 5. Examples of native dune mat vegetation at Broad Beach. In the upper image, dune mat vegetation occurs on the foredune hillocks at the right. In the lower image, dune mat vegetation is invaded by non-native iceplant.

Photographs taken June 5, 2013

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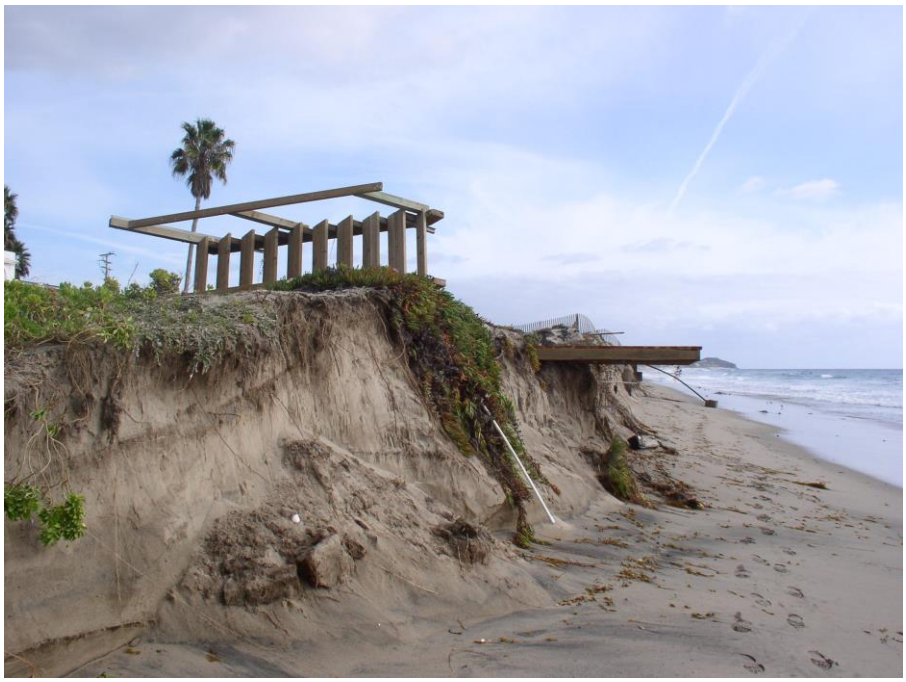

Figure 6. Examples of the vertical escarpment between beach and foredune created by wave action at Broad Beach.

Photographs from Moffatt and Nicho
Taken December 9, 2009

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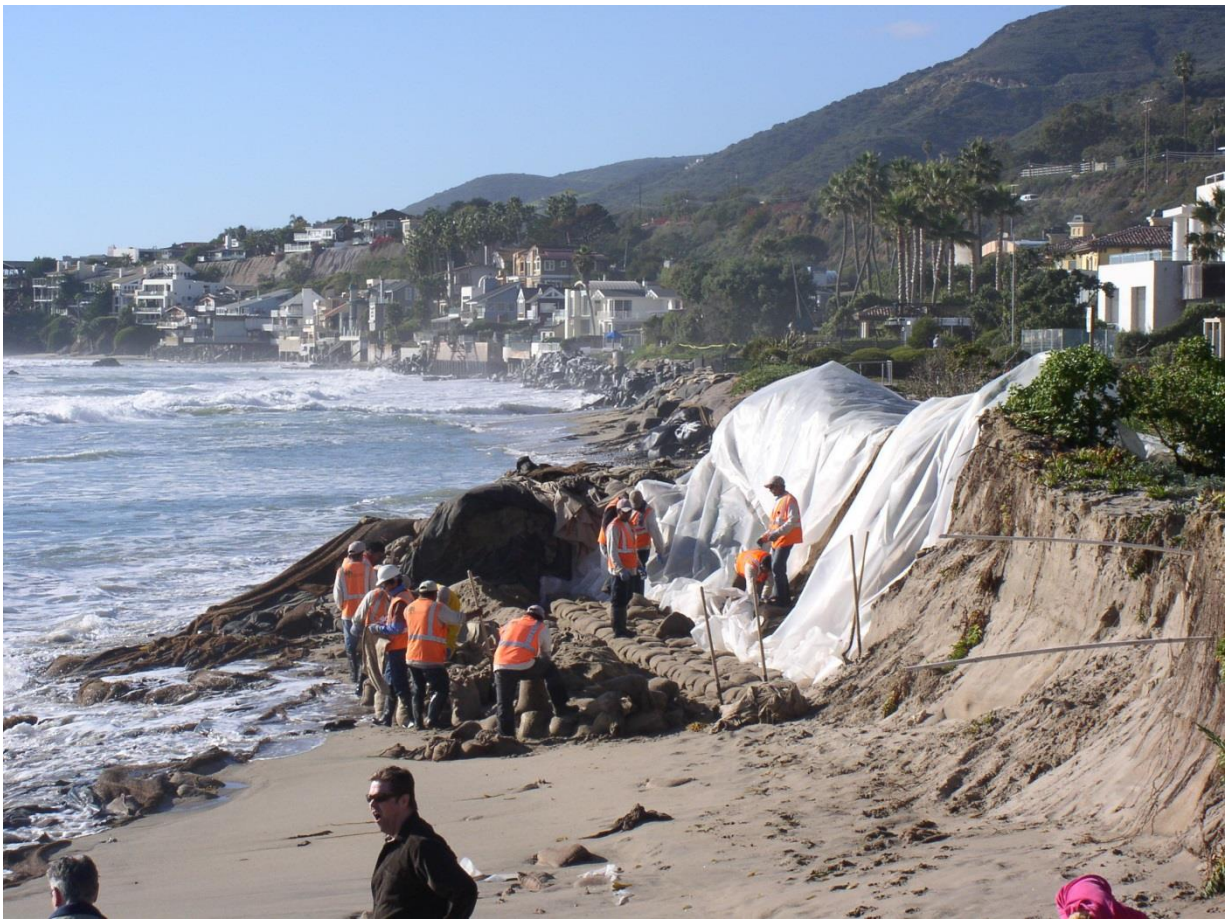

Figure 7. Sand bags being filled by hand with sand from the beach and being installed against the existing beach/dune escarpment.
Photograph from Moffatt and Nichol
Taken January 2010

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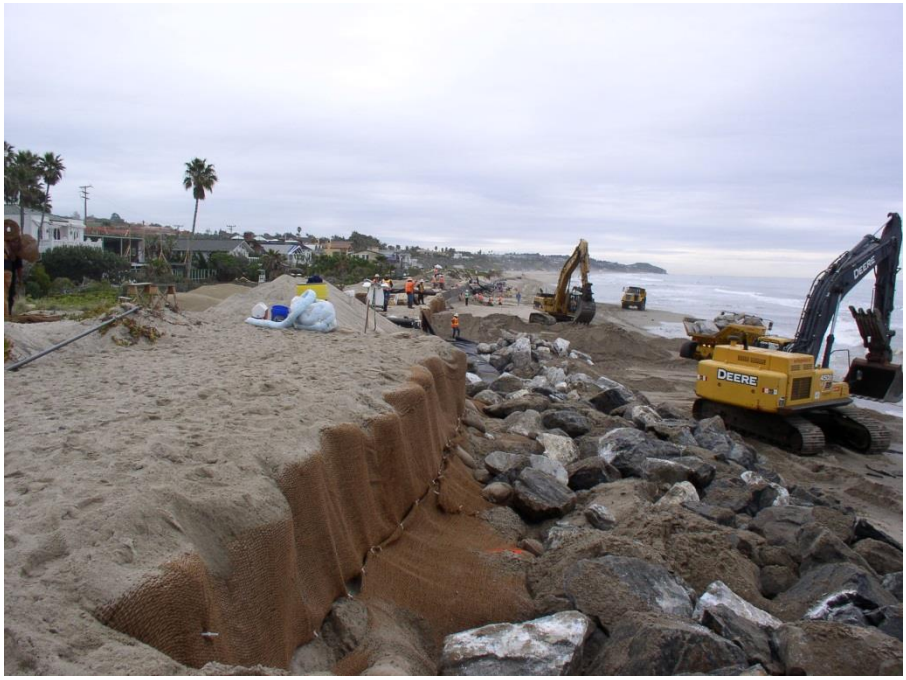

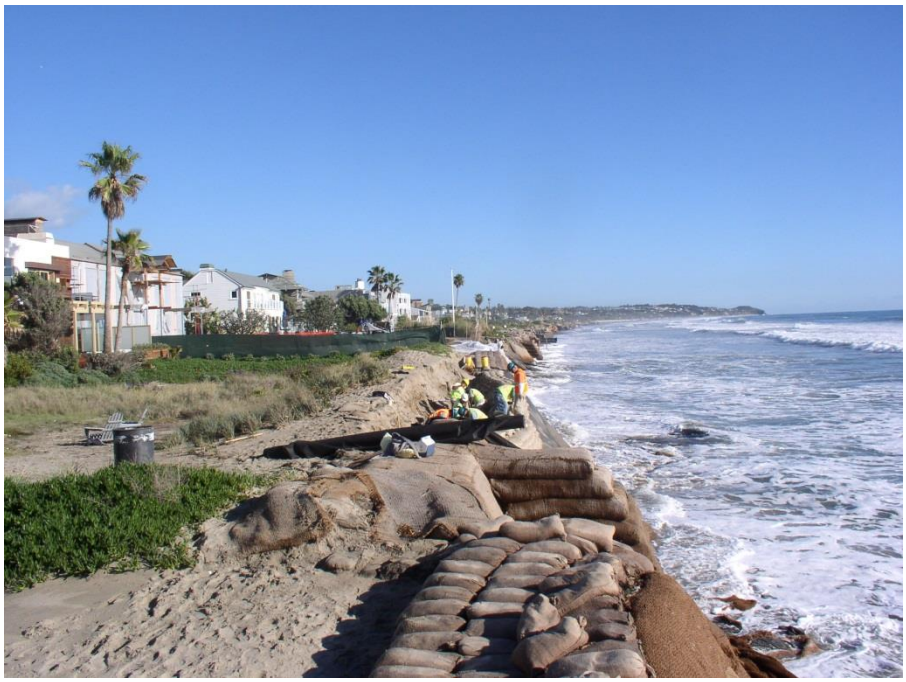

Figure 8. Staging occurring on foredune habitat at Broad Beach.

Photographs from Moffatt and Nichol
Top: February 2010, Bottom: January 2010

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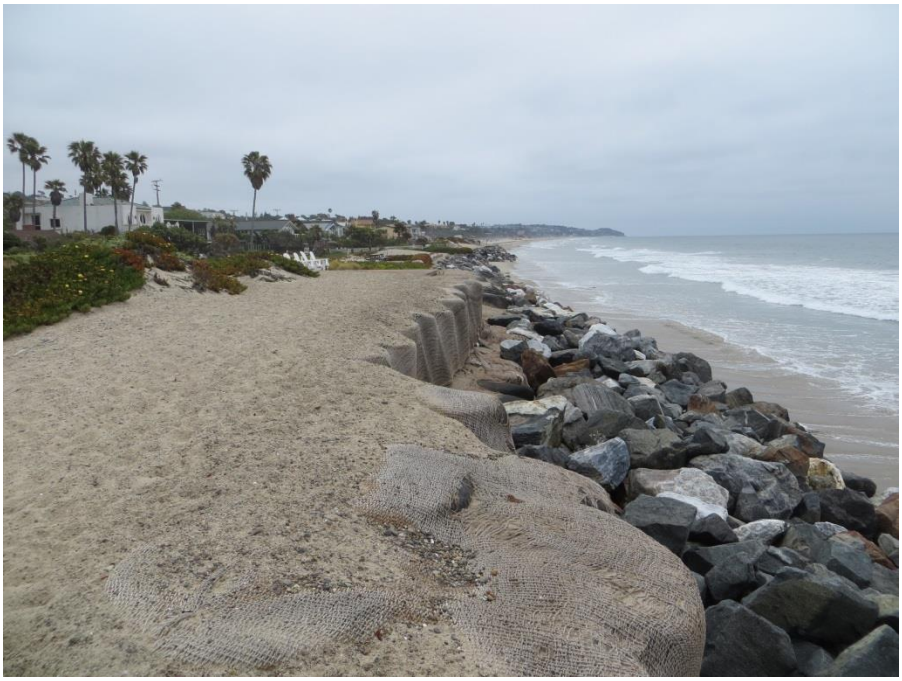

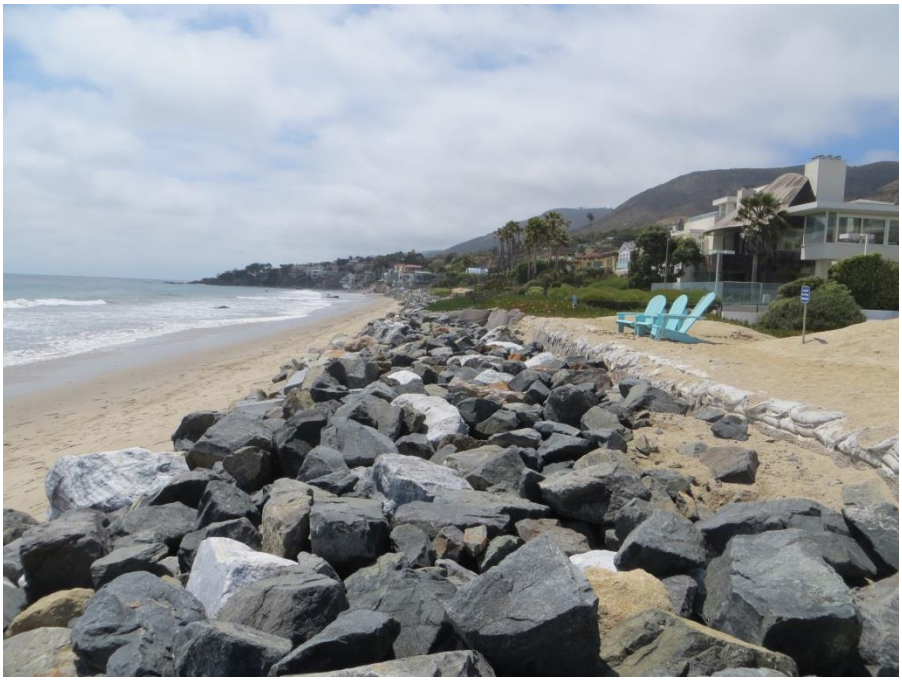

Figure 9. Images showing the location of the 2010 emergency rock revetment against the pre-revetment sandbags and other shoreline stabilization materials.

Photographs taken June 5, 2013

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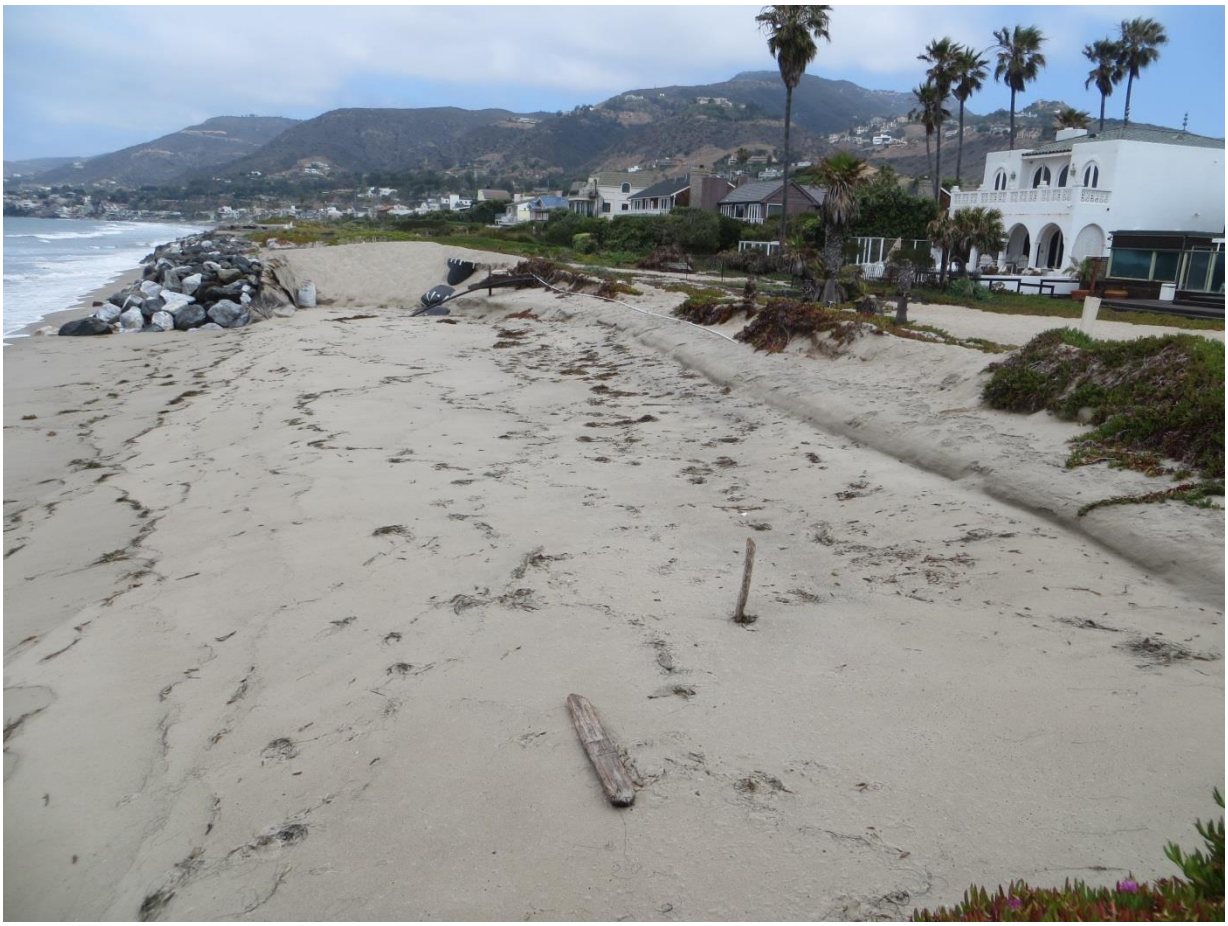

Figure 10. Example of a pocket cove formed in an area unprotected by the 2010 emergency rock revetment.

Photograph taken June 5, 2013

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