SAN MARCOS HIGHLANDS

HABITAT MITIGATION AND MONITORING PLAN

SAN MARCOS, CALIFORNIA

REVISED BY

WILLIAM T. EVERETT
EVERETT AND ASSOCIATES
ENVIRONMENTAL CONSULTANTS
POST OFFICE BOX 1085
LA JOLLA, CALIFORNIA 92038
858 456-2990
everett@esrc.org

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NOTE

This document was originally prepared in October of 2005 by PCR Services Corporation for KB Home Coastal.

The October 2005 version contained a Water Quality Management Plan. Due to recent changes in stormwater policies and regulations, all water quality information has been removed from this document. A separate stormwater management document based on current requirements has been prepared for this project.

No other changes have been made to the 2005 document. The 2005 document is available for review upon request.

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PCR Services Corporation (PCR), under contract to KB Home Coastal, Inc., initially prepared this draft mitigation plan in 2005 to recreate riparian and sensitive upland habitats to satisfy San Marcos Highlands project permit requirements. The San Marcos Highlands project site (Site) is located partly within the City of San Marcos and partly in unincorporated northwestern San Diego County. The project consists of the subdivision of approximately 80.0 acres into 191 single-family homes. This includes associated fuel modification zones, graded slopes, roads, and a 1-acre active-use park. As a part of this project, Las Posas Road will be extended solely to provide access to the project site. Construction will permanently impact 5,565 linear feet of four ephemeral drainages and 23 linear feet of Agua Hedionda Creek. Total permanent and temporary impacts include 0.80 acre (0.74 acre permanent and 0.06 acre temporary) of U.S. Army Corps of Engineers/Regional Water Quality Control Board (ACOE/RWQCB) jurisdictional "waters of the U.S.," including 0.09 acre of wetlands (0.05 acre permanent and 0.04 acre temporary), and approximately 1.38 acres (1.22 acre permanent and 0.16 acre temporary) of California Department of Fish and Game jurisdictional streambed and associated riparian habitat.

The mitigation measures involve on- and off-site activities, including restoration of Agua Hedionda Creek's degraded riparian areas, totaling 7.0 acres. Of this, approximately 2.6 acres will function as ACOE "waters of the U.S.", including 0.05 acres of wetland creation, a measure taken to ensure "no-net-loss" of wetlands. These activities will also address impacts to the least Bell's vireo (*Vireo bellii pusillus*) by providing enhanced riparian habitat.

Additional mitigation in the form of Diegan coastal sage scrub (DCSS) preservation and restoration is proposed to address impacts to a sensitive species, the coastal California gnatcatcher (*Polioptila californica californica*). A minimum 2:1 mitigation ratio for impacts to DCSS will be accomplished through on-site preservation of 106.2 acres, restoration of an additional approximately 7.2 acres of on-site DCSS, an easement for off-site restoration and preservation of approximately 4.7 acres, and the purchase of approximately 22.8 acres immediately off-site and adjacent to the northwest and another 61.8 acres off-site and contiguous to the east of the Site. The off-site easement adjacent to the northern property boundary will allow the project to maintain a minimum 400-foot wide wildlife corridor.

Areas that are temporarily impacted will be restored to pre-construction conditions. All mitigation areas will be preserved in perpetuity and managed under a conservation easement with the exception of 2.3 acres of enhanced riparian habitat in the upper reaches of Agua Hedionda Creek. In this area, existing infrastructural easements preclude this assurance. However, KB Home Coastal, Inc. will provide funds to maintain the ecological integrity of riparian zone where the Vista Irrigation District pipeline crosses it.

1.0 INTRODUCTION

1.1 PROJECT SUMMARY

1.1.1 Project Location

The San Marcos Highlands project site ("the Site") is located in San Diego County, California (Figure 1, *Regional Map,* on page 2). The approximately 204.5-acre Site is partly in the City of San Marcos (southern portion of Site; 113 acres) and partly in unincorporated San Diego County (northern portion of Site; 91.5). The unincorporated portion of the Site will be incorporated into the City. The Site is north of highway 78, west of Twin Oaks Valley Road (S 14), and south of Buena Creek Road (Figure 2, *Vicinity Map,* on page 3). The Site can be found on the United States Geological Survey (USGS) 7.5' San Marcos quadrangle in Sections 34 and 35, T. 11 S., R. 3 W., as shown in Figure 2, *Vicinity Map*. The UTM coordinates corresponding to the approximate center of the Site are Zone 11N 483180m E and 3670140m N.

Site elevation ranges from approximately 590 feet (ft) to 1,300 ft above mean sea level. The Site is bisected by an intermittent stream that forms the headwaters of Agua Hedionda Creek ("the Creek"). The Site is undeveloped and consists of various natural and disturbed plant communities. Adjacent land use consists of residential development to the south and a variety of open land, agriculture and rural residential uses on the north, east, and west.

1.1.2 Project Description

The project consists of the subdivision of approximately 80.0 acres into 191 single-family lots including 4.7 acres for the extension of Las Posas Road and a 1-acre active-use park. Approximately 124.5 acres will be left as open space, of which approximately 111.3 acres will be considered natural open space (Figure 3, *Proposed Development Plan and Wildlife Corridor,* on page 4*)*. Natural open space will constitute approximately 55 percent of the Site. Fuel modification zones will be established and considered permanent project-related impacts in order to buffer the proposed residential housing project from fire threats associated with the adjacent natural open space. With the exception of the portion of the development that abuts the east-west wildlife corridor, the fuel modification zone will extend a total of 150 feet from building structures. Along the wildlife corridor, the fuel modification requirement has been reduced to 100 feet (10 foot site yard set back plus 90 feet of fuel modification setback) with the inclusion of a 6 ft. high block wall at the end of the zone.

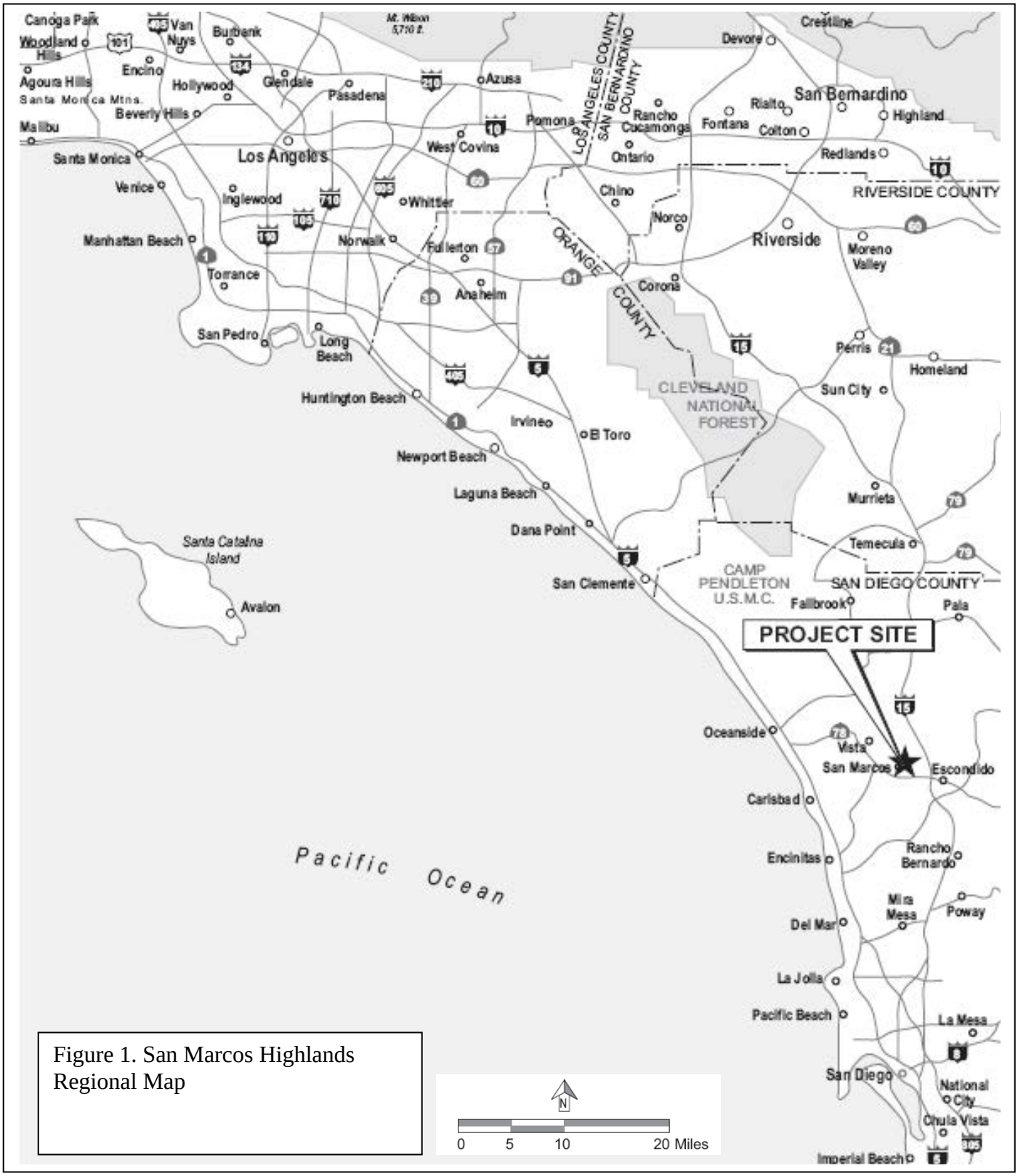

Figure 1. San Marcos Highlands Regional Map

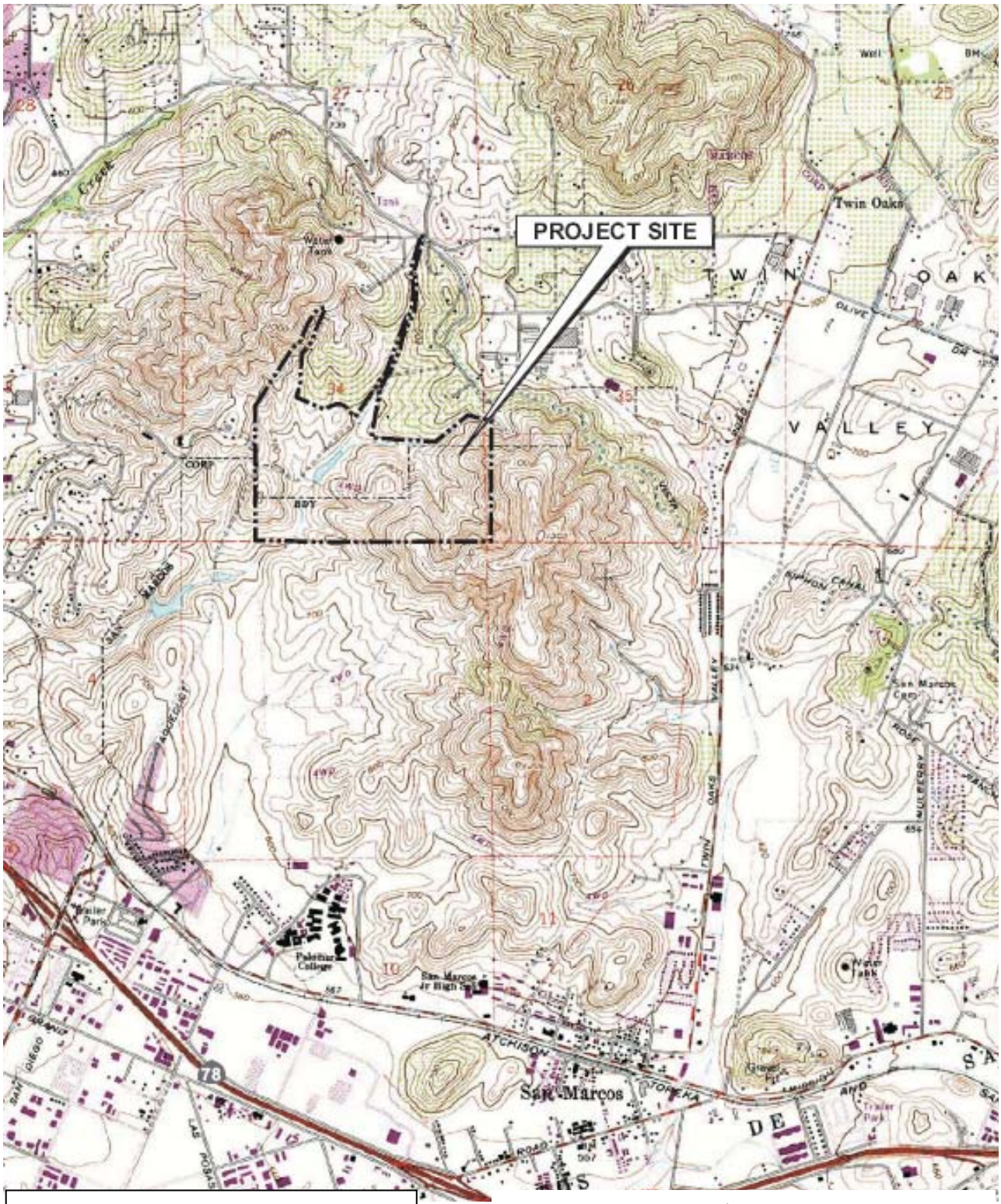

Figure 2. San Marcos Highlands Vicinity Map

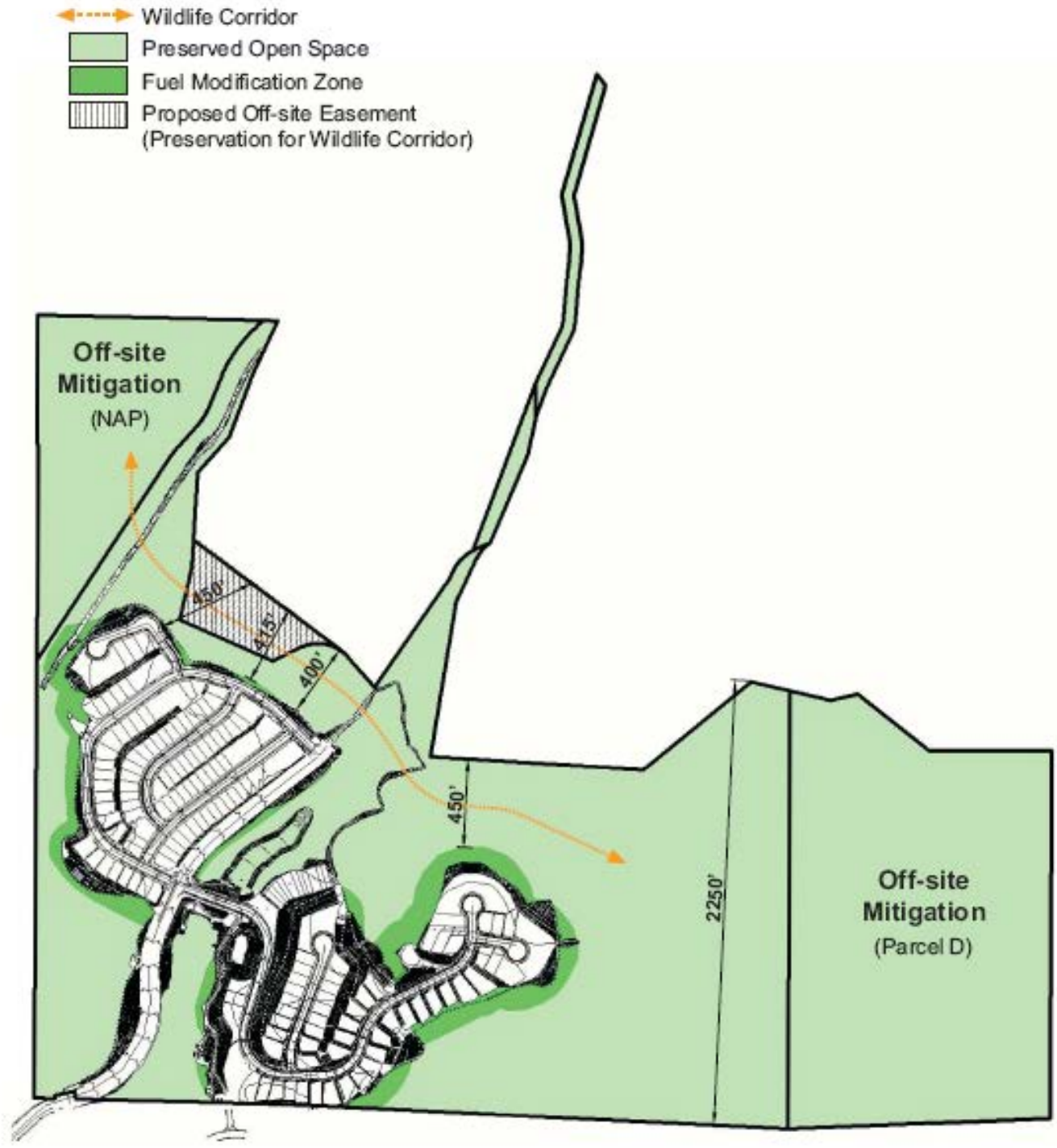

Figure 3. San Marcos Highlands Proposed Development Plan and Wildlife Corridor

The project applicant is seeking approval for grading plans which would require that a number of ephemeral stream segments located within the project Site be filled using native material, and permanently culverted below ground, to facilitate construction of the proposed project. Impacts to the Creek as a result of the proposed project include the removal and rebuilding of an existing earthen dam/road crossing over the Creek, along with impacts to be incurred by the proposed alignment of Las Posas Road. These permanent impacts to the Creek will be mitigated on-site. An arch culvert sized approximately 10 ft. high, 12 ft. wide, and 159 ft. long will be constructed over the Creek where the existing dam is located and will serve to allow water flow and movement of wildlife. This report will address pre-development conditions, project site impacts to jurisdictional "waters of the U.S." and sensitive upland habitat, mitigation requirements, proposed mitigation implementation techniques, and management, maintenance, and monitoring.

2.1 JURISDICTIONAL WETLANDS, WATERS, AND STREAMBEDS

An assessment of jurisdictional wetlands and "waters of the U.S." on the project site was conducted by PCR Ecologists on December 4, 2001 and February 14, 2002. This assessment was conducted to determine whether or not on-site drainages are subject to the jurisdiction of the U.S. Army Corps of Engineers (ACOE) and/or the California Department of Fish and Game (CDFG) and to determine the extent of any jurisdiction on the project site. Prior to the assessment, URS (1999) conducted studies to document existing biological resources, identify vegetation communities, perform a preliminary investigation of jurisdictional wetlands and "waters of the U.S.," and assess the potential biological and regulatory constraints associated with development of the Site (see Figure 4, *Jurisdictional Waters and Wetlands*, on page 7).

The entire 204.5-acre San Marcos Highlands project site, as well as a 22.8-acre parcel to the northwest, were investigated to determine the presence or absence of ACOE, CDFG, and/or Regional Water Quality Control Board (RWQCB) jurisdiction. Drainages on site include one large intermittent stream/wetland (Agua Hedionda Creek), and tributaries to the Creek including one intermittent stream and 4 ephemeral drainage systems. In addition, the property includes two man-made ponds within Agua Hedionda Creek, determined to support freshwater marsh habitat, within jurisdiction of the regulatory agencies. Total jurisdictional area on the project site is approximately 16,993 linear feet of streambed and 4.3 acres of ACOE jurisdictional "waters of the U.S.", including approximately 2.8 acres of wetlands (the entire ACOE jurisdictional component of Agua Hedionda Creek), and approximately 10.0 acres of CDFG jurisdictional streambed and associated riparian habitat. The various jurisdictional acreages often overlap, i.e., ACOE acreage is typically included in CDFG and RWQCB acreages; therefore, they are not additive. For clarification, please see Table 1**,** *Summary of Jurisdictional Features*, on page 8 and Figure 4, *Jurisdictional Waters and Wetlands*, for the locations of jurisdictional drainages.

2.1.1 Hydrology

Hydrologic modeling was performed by the project engineer, Hunsaker & Associates, using the "rational method", which is a method applicable to small urban and semi-urban areas of less than 0.5 square miles. The rational method equation relates storm rainfall intensity, a selected runoff coefficient, and drainage area, to peak runoff rate. This relationship is expressed by the equation: $Q = CIA$, where Q is the peak runoff rate in cubic feet/second, C is the runoff coefficient (representing the area-averaged ratio of runoff to rainfall intensity), I is the intensity of the precipitation event, and A is the area of the drainage basin. The 100-year storm peak

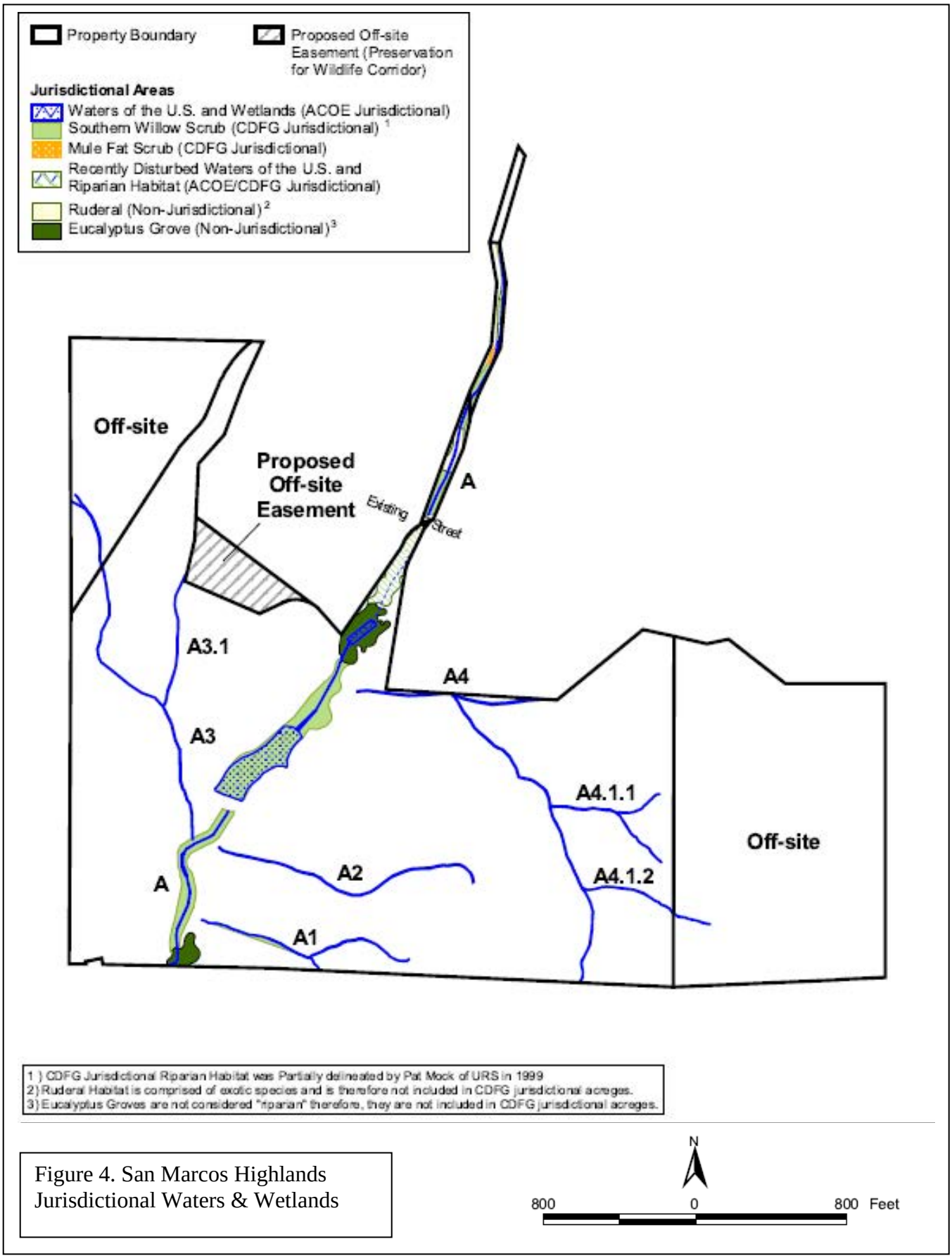

Figure 4. San Marcos Highlands Jurisdictional Waters & Wetlands

Table 1

SUMMARY OF JURISDICTIONAL FEATURES

Name	ACOE (acres) [a, c]	CDFG (acres) [c]
Drainages	1.9 (0.4)	7.2
Man-made Ponds	(2.4)	2.8
Total On-Site Jurisdiction [b]	**4.3 (2.8)**	**10.0**

[a] *Acres in parentheses are jurisdictional wetlands, which are a subset of the total acreage (i.e., the wetlands and waters acreages are not additive).*

[b] *Agency jurisdictions often overlap (i.e., the totals in each column are not additive for a given category of aquatic resource).*

[c] *0.2 acres of ACOE and 1.3 acres of CDFG are currently disturbed and not exhibiting normal features; however, they are jurisdictional and therefore are included in the above totals. These areas are proposed for restoration as mitigation for the proposed future development.*

Source: PCR Services Corporation

discharges (Q_{100}) were calculated for the existing and developed conditions, as detailed in the *Preliminary Hydrology Study for San Marcos Highlands* (June 2001), under separate cover.

Results of the analysis of peak flow rates (as shown in Table 2, *Hydrology – Comparison of Pre- and Post-Developed Conditions*, on page 9) are provided for two locations on the project site: (1) at the existing pond in the center of the Site (Node 109); and (2) at the downstream end of the Site (Node 113). Unlike most development projects, the models show that post-developed conditions exhibit a decrease in peak flows. Hunsaker & Associates explains that this is due to the proposed drainage facilities (storm drains) within the project having the capacity to convey peak flows to the downstream end of the property well before the peak flows from the remaining watershed arrive at the same point. Therefore, the increased volume of runoff associated with the proposed project is distributed over a longer time period. This is explained further in the following paragraph.

When a detailed hydrology study is performed, such as the Modified Rational Method, with confluence analyses of all the significant tributaries, the "effective area" concept is operative. This concept describes how and when the volume of runoff increases due to paving over of a previously undeveloped, pervious area. The change in peak *rate* of runoff is determined by how the additional runoff is distributed over time. In the case of San Marcos Highlands, development will occur at the lower portion of the tributary watershed, while a larger percentage of undeveloped land will remain as open space at the top of the watershed. Because the time of concentration (the time it takes peak flow to arrive at a given point) for undeveloped land is longer than the time of concentration for developed land, which is paved and has hydraulically efficient drainage conveyance facilities (storm drains), peak flows from the developed areas will arrive at the downstream end of the property well before 100 percent of the remaining watershed begins contributing flows. In other words, by the time 100 percent of the undeveloped watershed starts contributing flows, as rainfall intensity decreases, less runoff will be generated. Therefore, the location of the proposed undeveloped land (in the upper reaches of

Table 2

HYDROLOGY – COMPARISON OF PRE- AND POST-DEVELOPED CONDITIONS

Outlet Node	Drainage Area (acres)	100-Year Peak Flow Rate (Q) (cfs)
109 (pre-developed)	339	638
109 (post-developed)	331	609
Percent Change		**-1.05%**
113 (pre-developed)	495	890
113 (post-developed)	496	737
Percent Change		**-1.21%**

Source: Hunsaker & Associates, 2005.

the watershed on-site), along with the fact that there will be significant differences in the times of concentration of flow between the developed and undeveloped areas, means that peak flow rates will actually not change appreciably on-site as a result of the proposed project.

2.2 EXISTING PLANT COMMUNITY ASSOCIATIONS

Vegetation communities were classified according to the CDFG's preliminary vegetation communities source (Holland, 1986 and 1990 update). The San Marcos Highlands property supports seven vegetation communities: Diegan coastal sage scrub, southern willow scrub, mule fat scrub, coyote brush scrub, disturbed, emergent marsh, and eucalyptus grove. Mapping is based upon the Biological Resources Assessment (URS, 2001) and previously completed focused surveys performed by PCR. These surveys are described in more detail in section 2.3. Additional information was obtained from Sawyer and Keeler-Wolfe to clarify the community description if the on-site vegetation communities did not apply to Holland's descriptions. A brief description of each of the vegetation communities observed on-site is provided below and Figure 5, *Vegetation Communities*, on page 10, provides a general depiction of the vegetation on site (Sawyer and Keeler-Wolf, 1995).

Diegan coastal sage scrub (DCSS) is widespread in coastal southern California and occurs from Los Angeles to Baja California. According to Holland, this community is dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), and white sage (*Salvia apiana*). The majority of the San Marcos Highlands property, approximately 175.6 acres, supports very dense Diegan coastal sage scrub. Contrary to Holland, the dominant species on site include California sagebrush, California buckwheat, laurel sumac and black sage (*Salvia mellifera*). White sage

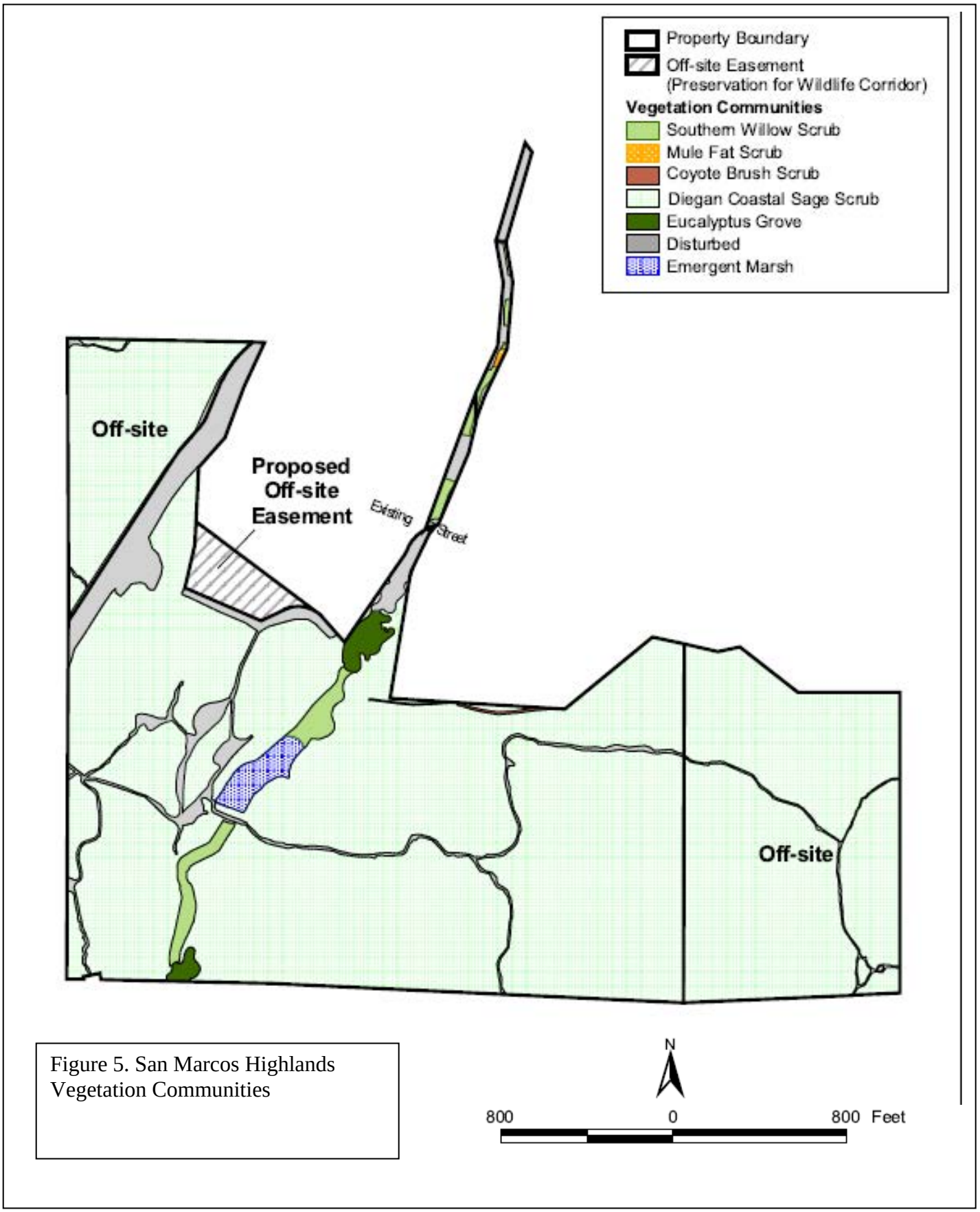

Figure 5. San Marcos Highlands Vegetation Communities

does occur but not as a dominant species. This community best conforms to Sawyer and Keeler-Wolf's mixed sage series. Associated species commonly found on-site but not considered dominant include California bush sunflower (*Encelia californica*), orange-bush monkey flower (*Mimulus aurantiacus*), fuchsia-flowered gooseberry (*Ribes speciosum*), and coyote bush (*Baccharis pilularis*). Additional associated species scattered throughout this community include sugarbush (*Rhus ovata*), bush mallow (*Malacothamnus fasiculatus*), coastal prickly pear (*Opuntia littoralis*), our Lord's candle (*Yucca whipplei*), and white sage.

Southern willow scrub (SWS) habitat equals a total of 4.6 acres along Agua Hedionda Creek, which bisects the property north-to-south. The community is dominated by one or more of several species of willow trees and may contain other riparian woodland species. Common willow scrub dominants include arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*), with lesser amounts of mule fat (*Baccharis salicifolia*) and Mexican elderberry (*Sambucus mexicana*). The understory consists of giant creek nettle (*Urtica dioica* ssp. *holosericea*), yerba mansa (*Anemopsis californica*), water-cress (*Rorippa nasturtium-aquaticum*), and western ragweed (*Ambrosia psilostachya*).

Mule fat scrub is typically a riparian understory community dominated by mule fat (*Baccharis salicifolia*) with less-common, associated species, which can include tree tobacco (*Nicotiana glauca*), sunflower (*Helianthus annuus*), and stinging nettle (*Urtica dioica*). This understory community is an early seral community maintained by frequent flooding within ephemeral and intermittent stream channels. It tends to occupy canyon bottoms, irrigation ditches, and stream channels, at elevations up to 1,250 feet. An isolated patch of this community, measuring 0.13 acre, is found along Agua Hedionda Creek, near its northern terminus on-site.

Coyote brush scrub is dominated by coyote brush (*Baccharis pilularis* ssp. *consanguinea*). It usually occurs on flats and gentle slopes that have been disturbed in the last 20 years. Drainage A4, located along the northern property to the east of Agua Hedionda Creek, supports approximately 0.31 acre of this habitat.

Eucalyptus groves occur within two portions of Agua Hedionda Creek and adjacent uplands. One grove occurs near the center of the Site and the second grove occurs along the southern property boundary. The groves, totaling 2.1 acres, are dominated by eucalyptus (*Eucalyptus* sp.) with an understory consisting most of leaf litter.

Emergent Marsh occurs within the two ponded areas within Agua Hedionda Creek. The large pond, which makes up most of the emergent marsh found on-site supports mostly bulrush (*Scirpus americanus*), cattails (*Typha* spp.), and a few isolated Goodding's black willows (*Salix gooddingii*) on the western bank. The smaller pond is surrounded by mostly exotic vegetation, such as eucalyptus and castor bean (*Ricinus communis*), as well as a palm tree. Native species around this pond include western ragweed, bulrush, cattails, and red willows. On-site, this community totals approximately 2.4 acres.

Disturbed areas are mostly devoid of vegetation due to recent disturbances. The disturbed habitat occurs throughout the Site, equaling a total of approximately 19.5 acres. Types of disturbed areas found on the property include roads and trails, cleared land, and dump sites.

2.3 SENSITIVE WILDLIFE SPECIES

Focused wildlife surveys were conducted by ERC Environmental and Energy Services Company in 1989, and by URS in 1999 for coastal California gnatcatcher (*Polioptila californica californica*) (CAGN), least Bell's vireo (*Vireo bellii pusillus*) (LBV), southwestern willow flycatcher (*Empidonax traillii extimus*) (SWWF), and quino checkerspot butterfly (*Euphydryas editha quino*) (QCB). Additional focused surveys were completed for CAGN, LBV, SWWF, and southwestern pond turtle (*Clemmys marmorata pallida*) (SWPT) by PCR in 2002 as part of this regulatory process. Subsequently in 2004, PCR performed surveys for LBV, SWWF, and SWPT, to update the results. A pair of CAGN was observed on site along the northwest property boundary (PCR, 2002b; URS, 1999). Individual LBV (2004) and SWWF (2002) were observed once during different surveys. However, both LBV and SWWF observed on site were believed to be transient since they were not observed during any other surveys. Nevertheless, Section 7 consultation was initiated mid-December 2004 for both CAGN and LBV. According to the Biological Opinion dated April 8, 2005, the project may affect but is not likely to adversely affect the LBV and the project is not likely to jeopardize the continued existence of the CAGN.

3.0 PROJECT IMPACTS

3.1 IMPACTS TO JURISDICTIONAL WETLANDS, WATERS, AND STREAMBEDS

The proposed project would permanently impact approximately 5,588 linear feet of streambed totaling 0.74 acre of ACOE jurisdictional "waters of the U. S.," including 0.05 acres of jurisdictional wetlands, and 1.22 acres of CDFG jurisdictional riparian habitat. These impacts include the fuel modification zone (generally 150 feet from the edge of structures, but narrower along the wildlife corridor) where proposed houses abut flammable vegetation communities such as DCSS. Temporary, construction-related impacts, which encompass a 20-foot buffer around the limits of grading, would include approximately 0.06 acre of ACOE jurisdictional "waters of the U.S." and 0.16 acre of CDFG jurisdictional streambed and associated riparian habitat (Figure 6, *Proposed Impacts to Biological Resources*, on page 14, Table 3, *Permanent Impacts to Jurisdictional Areas*, on page 15, and Table 4, *Permanent Jurisdictional Impacts by Feature Type*, on page 16).

Impacts to ephemeral drainages on-site are associated with direct fill of drainage ways in order to build housing pads and create fuel modification zones. Three of the four drainage systems on-site, outside of Agua Hedionda Creek, will be impacted. Intermittent drainage A4 is located along the northern property boundary and extends into the open space to the east. It is largely avoided by the project. Impacts associated with Agua Hedionda Creek are due to the extension of Las Posas Road and the removal of the existing earthen dam to improve Street A, a single road crossing over Agua Hedionda Creek connecting the east and west parcels of the proposed development.

3.1.1 Functional Loss

Construction of the San Marcos Highlands project will primarily impact ephemeral drainages. These ephemeral drainages form the headwaters for perennial Agua Hedionda Creek. These drainages collect and funnel water and sediment into higher order stream sections located downstream. Exported materials can help support ecosystem processes in the complex riparian and wetland communities. Organic carbon within riparian systems drives microbial processes in the root zone and helps remove toxics, nitrogen, and other nutrients from runoff thereby improving water quality and reducing potential impacts of non-point source pollution. However, it is important to note that the ephemeral drainages to be impacted are occupied by DCSS vegetation. Productivity and organic contributions of these systems are low relative to true riparian systems. Contributions of readily degradable plant debris may actually increase given the scale of riparian mitigation proposed. Moreover, with the implementation of the

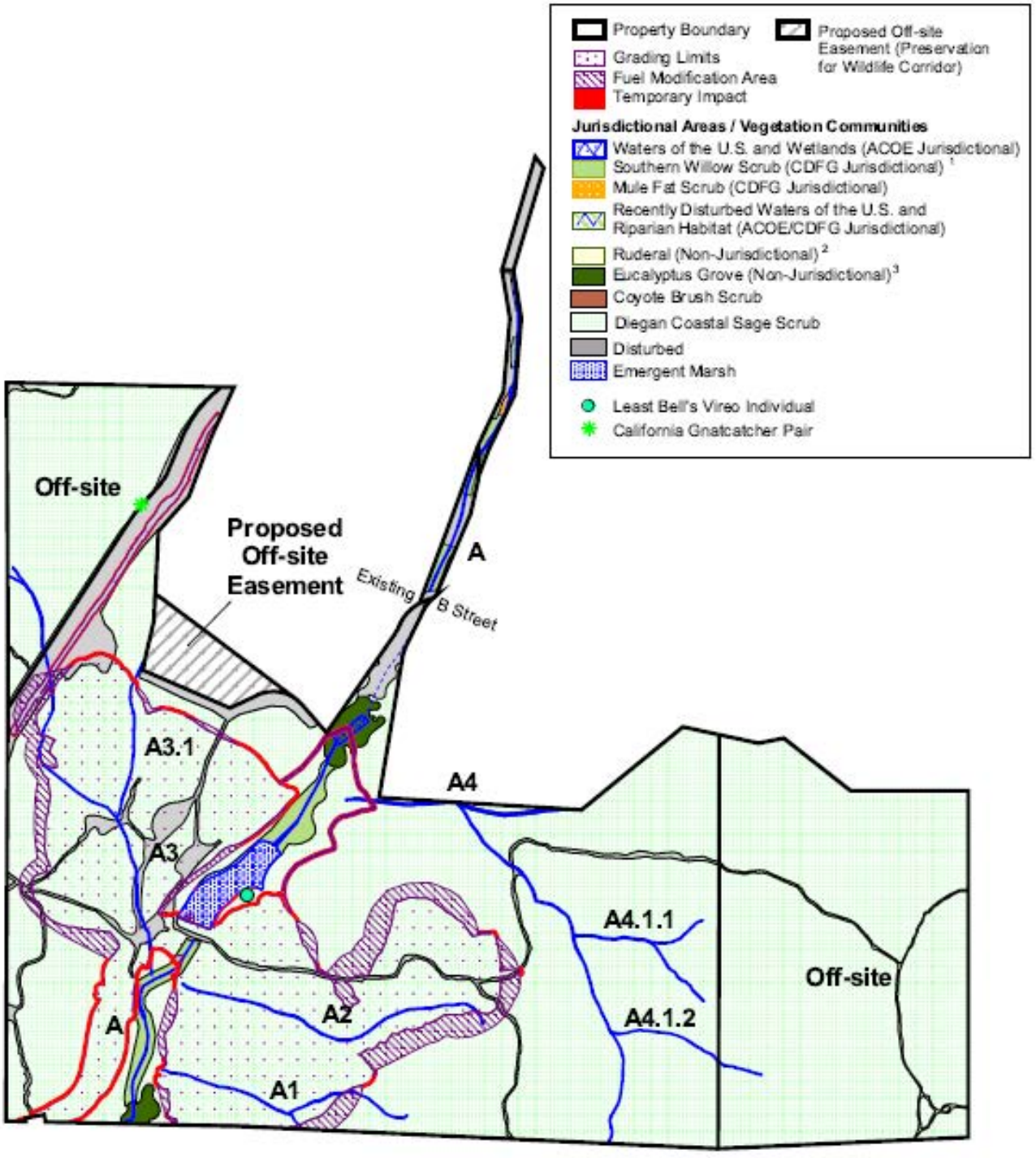

Figure 6. San Marcos Highlands Proposed Impacts to Biological Resources

Table 3

PERMANENT IMPACTS TO JURISDICTIONAL AREAS

Drainage System	Impacts to Linear Feet	Impacts to ACOE/RWQCB (acres)	Impacts to CDFG (acres)
Agua Hedionda Creek	23	0.05 (0.05) [a]	0.33
A1	1,251	0.15	0.35
A2	1,776	0.27	0.27
A3	2,526	0.27	0.27
A4	12	<0.01 [b]	<0.01 [b]
Total	**5,588**	**0.74 (0.05) [c]**	**1.22 [c]**

[a] *Wetland acreage is in parenthesis and are not additive.*

[b] *Numbers represented as < 0.01 were calculated using the actual data collected in the field and are represented in the Total.*

[c] *The various jurisdictional acreages often overlap, i.e., ACOE acreage is typically included in CDFG, and therefore are not additive.*

Source: PCR Services Corporation, July 2005.

HMMP/WQMP, impacts to water quality are expected to be unsubstantial (as detailed in section 4.3.4).

The United States Department of the Interior (USDOI, 1994) estimated that although less than one percent of the western portion of the U.S. is covered by riparian vegetation, between 51 and 82 percent of all species in the southwestern U.S. depend upon riparian areas for survival. Riparian systems have greater availability of water and food, more stable temperature profiles, and soil conditions more conducive to burrowing. Various other explanations for the attractiveness of riparian areas have been proposed (Eng, 1984; Meents *et al.*, 1984; and Knopf *et al*., 1988) and are discussed below:

- The various geomorphic settings within the riparian zone provide a diversity of microhabitats.
- Wetlands generally offer adequate food, cover, and water within close proximity to each other.
- Wetlands and riparian corridors provide a substantial “edge” or boundary between distinct ecosystems where species abundance tends to be greatest.
- The presence of surface water provides essential breeding habitat for amphibians and essential foraging habitat for other vertebrates.
- Wetland areas often provide a unique habitat oasis within an otherwise xeric environment.

Table 4

PERMANENT JURISDICTIONAL IMPACTS BY FEATURE TYPE

Type of Jurisdiction	Total Existing Acreage On-Site	Development Impacts [a]	Fuel Modification Zone Impacts [b]	Total Permanent Impacts
ACOE/RWQCB	**4.32**	**0.69**	**0.046**	**0.74**
Large Pond/Wetland	2.19	0.03	<0.01	0.03
Small Pond/Wetland	0.22	0.01	<0.01	0.01
Other Drainage A (wetland)	0.44	0.01	<0.01	0.01
Drainage A1 – A4 (non-wetland)	1.47	0.64	0.046	0.69
CDFG	**10.01**	**1.17**	**0.045**	**1.22**
Vegetated (SWS) –Agua Hedionda Creek	8.28	0.33	0.00	0.33
Non-vegetated (DCSS) – A1 through A4	1.73	0.84	0.045	0.89

[a] *Lot & Road Development (entire grading limit).*
[b] *Fuel modification zone impacts that extend beyond the grading limits.*

Source: PCR Services Corporation, July 2005.

This discussion demonstrates that the functions and values of greatest ecological concern are those associated with wetland and riparian habitats. This project would permanently impact only 23 linear feet (0.33 acres) of Agua Hedionda Creek riparian habitat. The majority of impacts (0.89 acres) are to non-vegetated or DCSS-dominated drainages. This analysis does not consider impacts to the 2.19-acre pond since this artificial landscape feature is proposed for removal in response to the request of the permitting agencies. As mitigation for impacts to 1.22 acres of CDFG jurisdictional areas, the project would recreate riparian habitat (and potential wetland) across 7.0 acres. This includes 2.3 acres of riparian enhancement that will be excluded from the conservation easement due to the presence of existing easements.

Loss of edge is a valid concern since much of the upland DCSS habitat bordering the riparian zone would be replaced with human residences. However, the mitigation plan expressly calls for the creation of an ecotonal streambank community at the edge of the riparian mitigation zones. This transition would be dominated by sycamore and oak trees which would support raptors and add structural diversity to the vegetation. Negative edge effects due to habitat fragmentation would be mitigated by the measures described in section 5.6. Thus the functional losses due to impacts to jurisdictional features are minor from a biogeochemical or habitat perspective. Rather, the impacts are primarily hydrologic in nature and are discussed in detail in section 2.1.1.

3.2 IMPACTS TO SENSITIVE VEGETATION COMMUNITIES

Three communities on site can be considered sensitive resources: SWS, freshwater marsh, and DCSS. No impacts to freshwater marsh habitat will occur as a result of the proposed project. The proposed conversion of the 2.19-acre pond to SWS is in response to agency requests. Permanent impacts to SWS total 0.33 acre and are also considered as impacts to CDFG jurisdictional streambed and associated habitat. These impacts are associated with the

modernization of an earthen dam into Street A, the proposed road crossing over Agua Hedionda Creek. In addition, a small portion of these impacts are due to the extension of Las Posas Road in one location from the current terminus to the terminus with Street A within the proposed development footprint. A total of 73.1 acres of DCSS will be permanently lost as a result of the proposed development plan. Impacts to SWS and to DCSS communities are shown in Figure 6, *Proposed Impacts to Biological Resources* and summarized below. However, with the implementation of the HMMP/WQMP, impacts are not expected to be substantial. The proposed mitigation for the impacts is discussed under Section 4.0, *Mitigation Measures*.

3.3 IMPACTS TO SENSITIVE ANIMAL OR PLANT SPECIES

3.3.1 Coastal California Gnatcatcher

Direct impacts include loss of approximately 73.1 acres of DCSS, a potential habitat for CAGN. However, much of the DCSS in this area is dominated by black sage (*Salvia mellifera*), a plant that has been negatively correlated with use by the CAGN (Bontrager, 1991). This indicates that the project site may not be ideal habitat for this species. The location where the one CAGN pair was observed will not be disturbed by the proposed project and DCSS mitigation efforts will actually expand habitat in the vicinity of the CAGN sighting by converting disturbed areas to DCSS habitat while restoring and preserving additional off-site lands. CAGN vegetation preferences were among the criteria used in designing a DCSS plant palette for restoration areas. Therefore, direct impacts to the CAGN are believed to be minor.

Indirect impacts would primarily result from "edge effects": either short-term impacts related to construction, or long-term impacts associated with the habitat fragmentation, human and pet intrusion, and invasion by exotic species. Construction and post-construction related mitigation measures, proposed in Section 4.0, *Mitigation Measures*, will be implemented to limit these potential indirect impacts to the CAGN and other biological resources.

3.3.2 Least Bell's Vireo

The riparian area along Agua Hedionda Creek is potential habitat for LBV but does not currently support a breeding population. The individual LBV observed in 2004 was transient and was seen only one time. This species prefers dense areas of riparian vegetation. Direct impacts to its potential habitat would include the short-term loss of 0.33 acres of riparian vegetation along Agua Hedionda Creek. However, once successful restoration of 7.0 acres of riparian vegetation is accomplished (of which 4.7 acres are to be preserved in perpetuity), there could be a long-term habitat gain. This assumes that the surrounding urbanizing landscape continues to support a viable population. Therefore, the direct impacts to this species as a result of this project are minor.

Some indirect impacts to this potential LBV habitat also need to be considered. These include disturbance from nearby construction activities, habitat fragmentation, and long-term edge effects. Disturbance due to construction activities is addressed in section 5.1. The habitat

is already highly fragmented and mitigation will help reverse this fragmentation by creating a continuous corridor of willow scrub habitat and associated ecotones. Steps to minimize edge effects are discussed in section 5.6 and include cowbird trapping, restricting access to sensitive habitats, lighting restrictions, and landscaping restrictions to limit introduction of non-native weeds.

4.0 MITIGATION MEASURES

4.1 GOAL OF THE MITIGATION

The goal of this mitigation is to restore and maintain the functions and values of upland DCSS and riparian habitats while accommodating home construction. Mitigation in the riparian zone is designed to restore connections within a corridor fragmented by exotic species invasions (e.g. remove highly invasive eucalyptus groves and castor bean patches), reduce hydrologic disruptions, and reverse stream channel degradation. In addition, creation of a water quality treatment basin will capture runoff prior to discharge into Agua Hedionda Creek. Mitigation in the upland areas is designed to maintain connections between patches of DCSS and revegetate areas that are either bare or occupied by ruderal vegetation. The actions described in Section 5.0, *Implementation Plan*, will provide biological, hydrological, and biogeochemical functions to compensate for those lost as a result of project implementation. Mitigation specific to water quality will be created to treat nuisance and first flush storm flows. The overall mitigation goal is for the DCSS and riparian mitigation areas to be self-sustaining in perpetuity, contribute to regional biodiversity, maintain ecological function and natural habitat corridors, and provide habitat for the CAGN and LBV.

4.2 RESTORATION TERMS

Restoration is a general term for the rehabilitation of natural systems. More specifically, it has been defined by the Society of Ecological Restoration (SER) as "the process of assisting the recovery and management of ecological integrity." The term "ecological integrity" includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices, according to the SER definition (SER, 1998). For the purpose of this report, environmental restoration, enhancement, creation, and management are terms that will describe the different type of restoration activities to take place.

- ***Restoration*** – the process of reestablishing the site to a defined, indigenous, historical state.
- ***Enhancement*** – the alteration of a site for improvement to a targeted state.
- ***Creation*** – the process of creating a new habitat where one did not exist before,
- ***Management*** – includes actions that ensure the project goals will be met, both in the long- and short-term.

4.3 MITIGATION ACTIVITIES

4.3.1 Habitat Mitigation Measures

Riparian Mitigation

Mitigation acreages for the various agencies are described in Table 5, *Summary of Compensatory Mitigation*, on page 24. KB Home Coastal, Inc. proposes to conduct on-site restoration of degraded portions of the Agua Hedionda Creek riparian corridor. A total of 7.0 acres of riparian willow scrub will be restored. However, only 4.7 acres of the restoration can be used as mitigation for project impacts and placed under a conservation easement. The remaining 2.3 acres lie within an area occupied by several infrastructural easements. While it is likely that the easements may never be executed, their presence precludes the 2.3 acres from being preserved "in perpetuity" and thus must be excluded from the conservation easement (Table 6, *Summary of Restoration within Agua Hedionda Creek*, on page 25). Mitigation ratios are broken down in Table 7, *Summary of Mitigation Ratios for Impacts to Waters of US/State*, on page 26.

In order to enhance habitat diversity and vegetative structure of the landscape, an ecotone between the riparian and upland mitigation areas will be created and planted with a mixture of sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), and coastal live oak (*Quercus agrifolia*) trees. The few oak trees currently at the riparian edge suggest that this ecotone may have originally been more widespread on-site.

The riparian corridor along Agua Hedionda Creek consists of four distinct zones defined by the nature and extent of planned restoration/mitigation activities. These zones are described as: 1) enhancement, 2) eucalyptus removal, 3) restoration, and 4) southern willow scrub preservation. The locations and acreage of these zones are shown in Figure 7, *Proposed Restoration,* on page 27. Included within the eucalyptus removal area is 0.05 acre of wetland creation, a measure needed to ensure "no-net-loss" of wetlands.

Diegan Coastal Sage Scrub Mitigation

KB Home Coastal, Inc. also proposes to restore 7.2 acres of on-site upland area to a DCSS plant community. Three distinct DCSS zones were defined by the nature and extent of restoration activities. These areas are termed as follows: 1) revegetation (both on- and off-site areas), 2) eucalyptus removal, and 3) slope reconstruction zones. These areas will be revegetated in order to maintain natural habitat corridors between the DCSS preservation areas on the east and west sides of the Creek consistent with the goals of the MHCP. Restored areas will be preserved in perpetuity and added to a larger preserve system that includes contiguous patches of various habitats. KB Home Coastal, Inc. will expand the corridor width by also restoring a 4.7-acre off-site easement to a DCSS plant community. A breakdown of each mitigation area is included in Table 8, *Summary of DCSS Mitigation*, on page 28. Specific activities for each restoration zone are described in detail in Section 5.0, *Implementation Plan*.

Table 5

SUMMARY OF COMPENSATORY MITIGATION

Mitigation Type	ACOE Mitigation on-site (acres)	CDFG Mitigation on-site (acres)
Riparian Restoration	2.2	2.6
Riparian Enhancement [a]	0.0	1.0
Eucalyptus Removal	0.2	1.1
Wetland Creation [b]	0.05	0.05
Total Riparian Compensatory Mitigation [c]	**2.4**	**4.7**

[a] *Does not include an additional 2.3 acres of enhancement excluded from conservation easement.*
[b] *Acreage less than 0.1 is not counted in totals*
[c] *The various jurisdictional acreages often overlap, i.e., ACOE acreage is typically included in CDFG, and therefore are not additive.*

Source: PCR Services Corporation, October 19, 2005.

Table 6

SUMMARY OF RESTORATION WITHIN AGUA HEDIONDA CREEK

Mitigation Type	ACOE Mitigation on-site (acres)	CDFG Mitigation on-site (acres)
Riparian Restoration	2.2	2.6
Riparian Enhancement	0.0	1.0
Eucalyptus Removal	0.2	1.1
Wetland Creation [a]	0.05	0.05
Southern Willow Scrub Preservation	0.2	2.9
Total Riparian Mitigation within Conservation Easement	**2.6**	**7.6**
Additional Riparian Enhancement (excluded from Conservation. Esmnt.)	0.2	2.3
Total Riparian Restoration [b]	**2.8**	**9.9**

[a] *Acreage less than 0.1 is not counted in totals*
[b] *The various jurisdictional acreages often overlap, i.e., ACOE acreage is typically included in CDFG, and therefore are not additive.*

Source: PCR Services Corporation, October 19, 2005.

4.3.2 Reduction of Edge Effects

The indirect impacts discussed in Section 3.0, *Project Impacts*, of this document and Volume I, Section 6.0 of the MHCP include increased light and noise levels that disrupt foraging patterns and reproductive success, exotic plant invasions, and humans and pet incursions into natural habitats. Many of these issues can be addressed through restrictions on landscaping, installation of cat-proof fences, protection of sensitive zones through fencing where human incursions are likely, distribution of educational brochures, and restrictions related to design and placement of lights. Detailed guidelines are provided in Section 5.0, *Implementation Plan*.

Table 7

SUMMARY OF MITIGATION RATIOS FOR IMPACTS TO WATERS OF US/STATE

Agency	Permanent Impact areas (acres)	On-site mitigation (acres) [a]	Actual Mitigation ratios	Typical Agency Mitigation ratios
ACOE/RWQCB	0.74	2.4	3.2:1	2:1
CDFG	1.22	4.7	3.8:1	3:1

[a] *includes 0.05 acre of wetland creation*
Source: PCR Services Corporation.

Catch basin inserts will be utilized at all inlets proposed in the development. The inserts will capture sediment and debris before discharging off-site. These inserts will be maintained by an agency-approved entity.

4.3.4 Present and Proposed Uses of Adjacent Areas

The area north of the project site forms the headwaters of the Creek and is rural residential primarily with land used for orchards, nurseries, or equestrian activities. The land east and west of the project site is undeveloped coastal sage scrub. Two adjacent parcels, one to the northwest and the other to the east, will be purchased for long-term preservation. The area south of the Site is dense urban residential development. Shortly downstream of this proposed development, the Creek flows through a culvert for some distance.

Expected Functional Gain in the Riparian Mitigation Areas

1. Removal of several ephemeral drainages will result in the loss of upland habitat and in the alteration of hydrologic and biogeochemical processes. The proposed on-site mitigation measures will compensate for these losses by providing the following functional gains:

2. Habitat functions – In place of the currently fragmented and degraded riparian zone along portions of the Creek, mitigation activities will create a continuous riparian corridor. Native riparian vegetation will be established in zones currently occupied by an artificial pond and by large patches of exotic or ruderal vegetation. The combination of a continuous canopy layer with shrub and groundcover plantings will provide nesting and foraging habitat for a variety of wildlife species in the mitigation areas. The deposition of fine and coarse woody debris from SWS vegetation will provide important habitat for amphibians and other wildlife that utilize the riparian area. Various invertebrates will occupy the expanded riparian area and their activities in breaking down leaf litter and other dead vegetation will sustain detritus based food webs, both on site and downstream. Preserving the surrounding DCSS and southern willow scrub (including the 400 foot corridor) will encourage wildlife movement through this area. The existing invasive eucalyptus groves that support limited flora and fauna will be removed and revegetated to increase wildlife habitat function (suitable for CAGN and LBV).

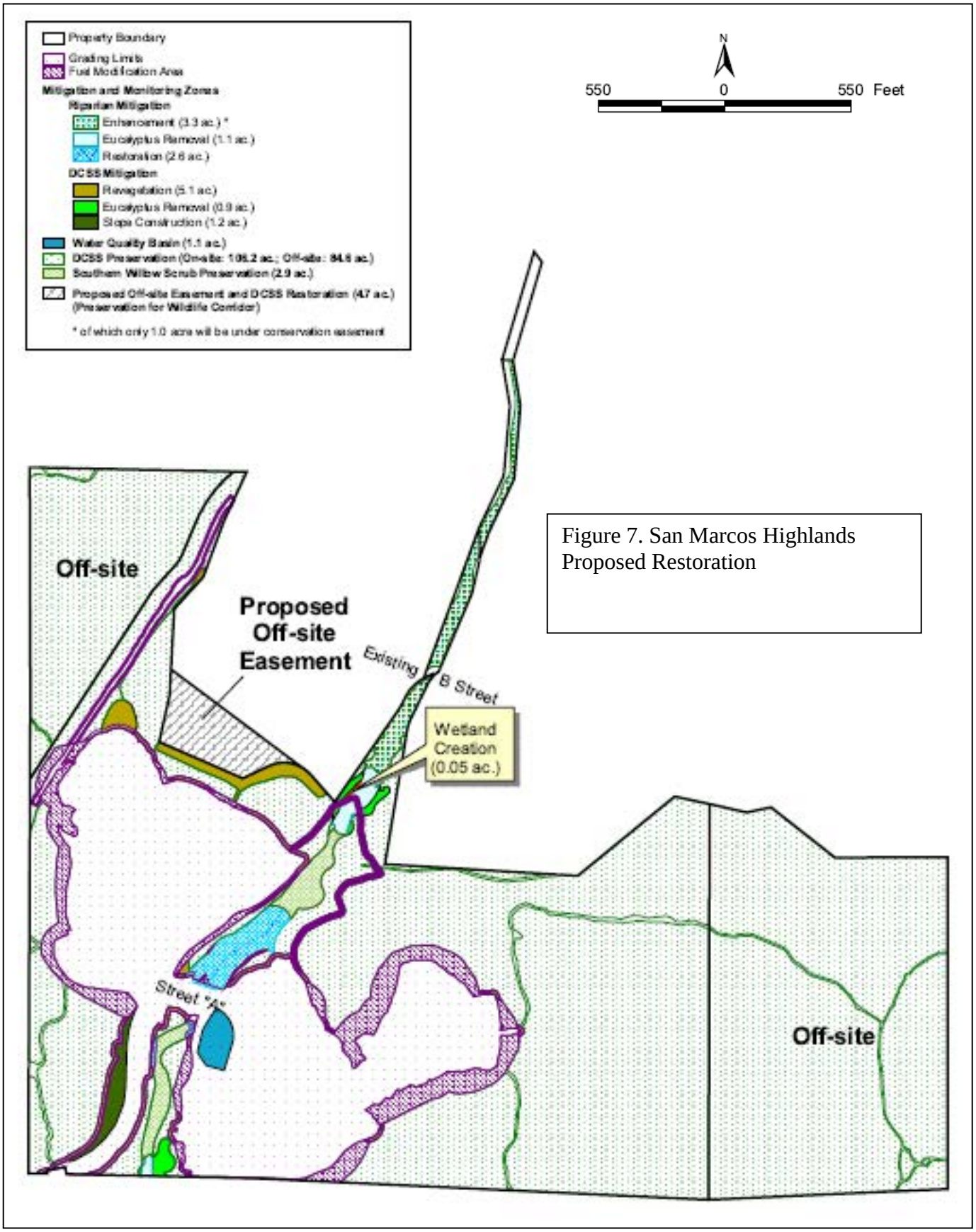

Figure 7. San Marcos Highlands Proposed Restoration

Table 8

SUMMARY OF DCSS MITIGATION

Mitigation Type	On-site (acres)	Off-site (acres)
DCSS Revegetation	5.1	4.7 [a]
DCSS Slope Reconstruction	1.2	
Eucalyptus Removal	0.9	
Total DCSS Restoration	**7.2**	
DCSS Preservation without Restoration [b]	106.2	84.6 [c]
Total DCSS Mitigation	**113.4**	**89.3**

[a] *Off-site easement for wildlife corridor*
[b] *Includes 2.7 acres of dirt trails within DCSS*
[c] *Sum of Parcels D (*61.8 acres*) and NAP (*22.8*)*

Source: PCR Services Corporation, October 19, 2005.

4.3.5 Rationale to Expect Success

The on-site riparian mitigation area is expected to succeed because mitigation activities include not only revegetation but also modifications to the actual stream and floodplain in order to restore the hydrogeomorphic conditions required by the SWS plant community. The DCSS mitigation is expected to succeed because it uses multiple techniques to restore soil and vegetation, particularly by transferring existing biological material from the impacted areas to the mitigation areas. Successful restoration of habitat value is expected because the mitigation areas expand upon existing fragments of natural communities rather than being constructed in isolation. Therefore, opportunities exist for recruitment of organisms from these nearby areas. The water quality basin has been designed for the 100-year, 24-hour storm event and will function as a water quality treatment feature.

4.3.6 Consistency with Multiple Habitat Conservation Program (MHCP)

The Site is within the Multiple Habitat Conservation Program (MHCP) study area which encompasses 175 square miles in northeastern San Diego County and comprises seven incorporated cities (Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista). This comprehensive, multiple jurisdictional planning program, administered by San Diego Association of Governments (SANDAG), is designed to develop an ecosystem preserve system to protect viable populations of key sensitive plant and animal species and their habitats (SANDAG, 2003). The overall goal of the MHCP is to maintain biodiversity and ecosystem health in the region while maintaining quality of life and economic growth opportunities.

This HMMP/WQMP is consistent with the principles of the MHCP in several respects. Mitigation activities are focused on maintaining two corridor systems within the landscape that will allow wildlife to move within and between upland and riparian habitats. These corridors

will enhance habitat value for at least two species covered under the MHCP: the CAGN and LBV. The plan also includes provisions to reduce edge effects from the proposed development as mentioned in the MHCP. Preservation of these areas in perpetuity will allow the persistence of unique species that occur in these areas. Restoration and preserve sites will be added to the MHCP preserve system and managed for biological functions and values.

Mitigation ratios for this project exceed those recommended in Tables 4-6 and 4-7 of Volume 1 of the MHCP. Since the area to be impacted by the proposed development is located outside a focused planning area (see Figure 3-1 in Volume 1 of the MHCP), mitigation guidelines call for DCSS restoration at a 1:1 ratio and wetland/riparian restoration at a 1:1 to 2:1 ratio. DCSS habitat impacts will be mitigated at a ratio of approximately 2.5:1. The proposed on-site mitigation for impacts to jurisdictional waters exceeds the MHCP's 2:1 requirement. Further, mitigation ratios of 3.2:1 for ACOE and RWQCB and 3.8:1 for CDFG exceed the ratios of 2:1 and 3:1 ,respectively, typically approved by these agencies (Table 7, *Summary of Mitigation Ratios for Impacts to Waters of US/State*).

4.5 ESTIMATED COST OF MITIGATION AND MONITORING

KB Home Coastal, Inc. will restore 7.0 acres of riparian habitat and 7.2 acres of DCSS habitat on-site. An additional 4.7 acres of DCSS habitat will be restored off-site. The restoration and DCSS preservation will cover the on-site mitigation. Table 9, *Estimated Costs for On-site Riparian and DCSS Mitigation*, on page 34 provides a cost estimate for the on-site mitigation actions. The estimates include the costs associated with implementation of the proposed on-site mitigation from inception through completion of the monitoring period (i.e., until the final success criteria are met), but do not include the cost of landscape plans.

Table 9

ESTIMATED COSTS FOR ON-SITE RIPARIAN AND DCSS MITIGATION AND MONITORING

Task	Estimated Cost
Micrograding and other earth moving	Included in overall site grading
Site preparation (weed, trash, fill removal)	$10,000
Site preparation (mowing, disking)	$4,700
Eucalyptus and litter removal and disposal	$300,000
Temporary irrigation system	$48,800
Removal of irrigation system	$8,000
Soil fertility tests (7 samples)	$200
Topsoil/Duff salvage, reapplication	$13,000
Installation of 80 oak/sycamore/cottonwood trees	$6,500
Transplanted DCSS vegetation	$8,000
DCSS hydroseeding and container plants	$70,000
Riparian hydroseeding and plantings	$70,000
Fertilizer (2 packets per plant @ $0.20)	$400
Fencing (2400 linear feet)	$12,000
Erosion control	$45,000
Landscape Maintenance (3 years)	$100,000
Biological Monitoring (3 years)	$45,000
Contingency (replanting and remediation @ 20% of total cost)	$148,400
TOTAL	**$890,000**

Source: PCR Services Corporation, 2005

4.6 TIME LAPSE BETWEEN IMPACTS AND ESTABLISHMENT OF MITIGATION

Temporary impacts will be negligible since restoration activities will be conducted concurrently with project grading. During the rough grading phase, the natural drainage and other sensitive habitat will be fenced off and protected. The mitigation planting will establish fairly rapidly due to the use of multiple revegetation techniques and installation of temporary irrigation for two years. Close monitoring and rapid response to any problems will accelerate progress toward meeting success criteria. It is anticipated that the full functioning condition will be reached within 5 years.

4.7 LONG-TERM PROTECTION

All mitigation areas, with the exception of 2.3 acres of riparian enhancement in the upper reaches of Agua Hedionda Creek, will be protected in perpetuity through recordation of a

conservation easement stating that the land shall remain open space in perpetuity. The language of the easement, as well as the name of the proposed land manager, shall be submitted to ACOE, CDFG, USFWS, and RWQCB for approval prior to recordation. In addition, the CCRs of the San Marcos Highlands development will stipulate that all mitigation areas be preserved and managed as natural open space in perpetuity.

4.8 OWNERSHIP AND RESPONSIBLE PARTIES

The current property owner will be responsible for implementation and initial monitoring of the mitigation areas until the success criteria stipulated in this report are achieved. All remedial and/or contingency measures required during the initial monitoring period will be the responsibility of the current owner.

Upon attainment of success criteria, responsibility for management of mitigation areas (including unimproved dirt trails) will be transferred through a conservation easement to the Center for Natural Lands Management or other management entity. However, this conservation easement will not include the 2.3 acres of riparian enhancement in the upper reaches of Agua Hedionda Creek where infrastructure easements have been granted. This area is shown in detail in Figure 9, *Areas within Conservation Easement,* on page 36. KB Home Coastal, Inc. commits to providing endowment funds to cover the long-term costs of maintaining the ecological integrity of the pipeline corridor that Vista Irrigation District (VID) controls within a portion of the Creek not to be covered by the conservation easement. This will only include removal of non-native species and replanting of disturbed vegetation.

Additionally, the one improved trail which extends from northwest side of the development footprint across Agua Hedionda Creek to the southwest side of the development will be excluded from the conservation easement. The HOA or CFD will be responsible for maintaining this trail as well as those within the development footprint of the proposed project.

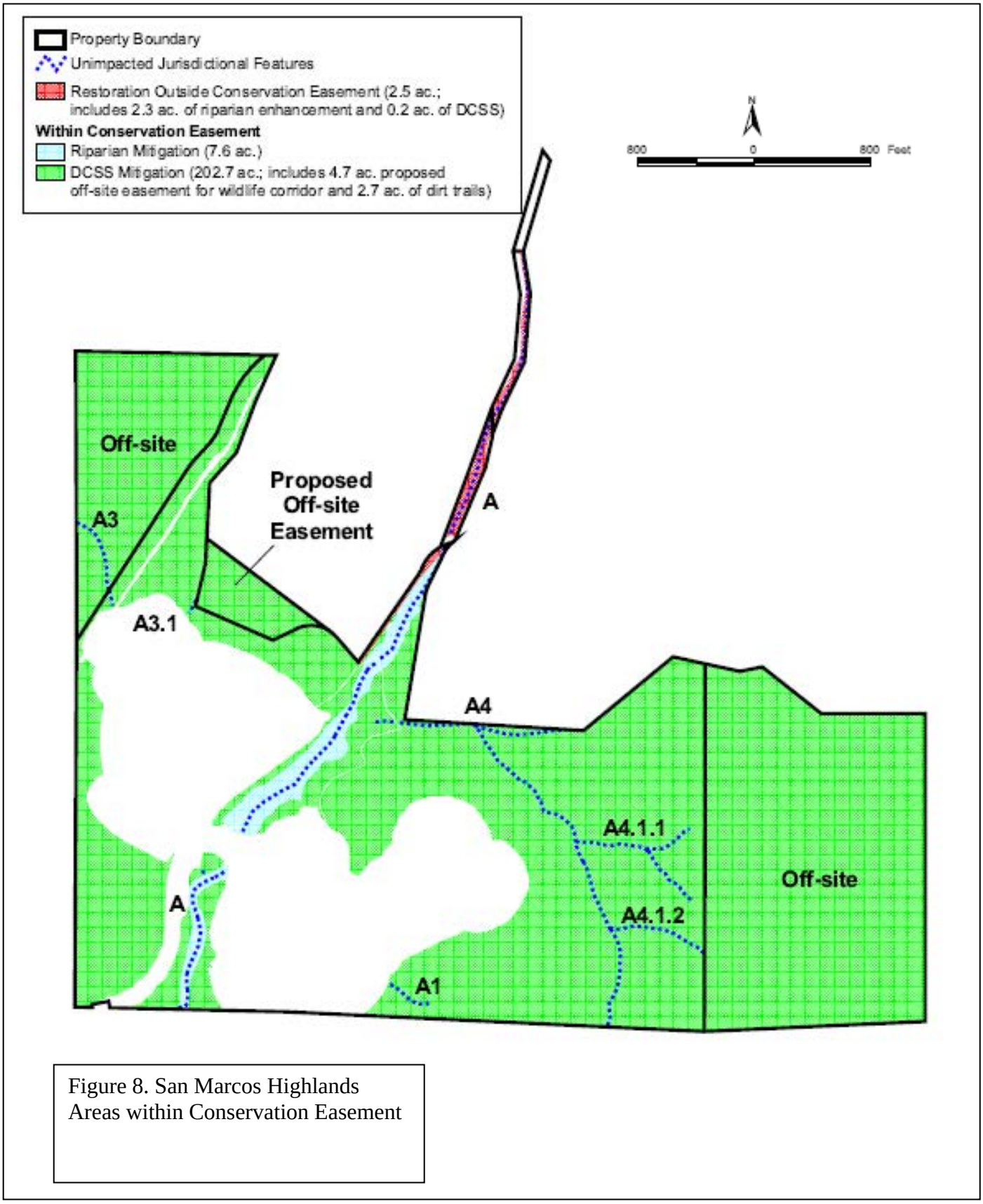

Figure 8. San Marcos Highlands Areas within Conservation Easement

5.0 IMPLEMENTATION PLAN

5.1 BIOLOGICAL SUPERVISION

A Project Restoration Specialist will be retained to coordinate implementation of the mitigation plan. This person will serve as a liaison between the property owner, the restoration contractor, and the resource and regulatory agencies. It will be the responsibility of the Project Restoration Specialist to ensure that the mitigation plan is implemented in a manner that is consistent with the requirements of the agency permits, and in a manner that will maximize the likelihood of success of the mitigation. The Project Restoration Specialist will be empowered to make minor modifications to the implementation of the mitigation plan, based on field conditions and unforeseen circumstances. All deviations from this plan shall be reported to KB Home Coastal, Inc., the ACOE, CDFG, USFWS, and RWQCB.

If clearing activities take place during the nesting season (February 15 – September 15 for all birds except LBV which may breed from February 15 – September 30, according to the USFWS Biological Opinion), then a biologist with a valid section 10 (a)(1)(A) CAGN recovery permit from the USFWS and experience with LBV surveys, will be present to monitor all habitat clearing and salvage activities. The biologist shall conduct a nesting bird survey at least three days prior to commencing clearing activities, as per the USFWS Biological Opinion report.

5.2 SITE PREPARATION

Mitigation related grading activities will take place in conjunction with on-site grading for the residential development. Grading within the mitigation area will follow the approved grading plan for coarse grading. Fine grading will be completed through direction of the Restoration Specialist in the field. Fine grading should immediately follow rough grading. Depending on the water availability at that time, at least one grow-and-kill cycle should be followed prior to seeding. Should there be a lag time between the time an area is graded to when it is planted, or if restoration efforts will occur in ungraded areas, weeds must be removed before the Site is ready to plant.

Protection of Existing Habitat

Prior to any clearing, grubbing or grading activities, the limits of the natural areas not to be disturbed shall be clearly marked in the field to ensure that no incidental, un-permitted take of CAGN or LBV habitat or individuals occurs. Blaze orange fencing, or other equivalent exclusionary devices, shall be installed.

Transplantation of Existing DCSS Vegetation

Certain DCSS plant species transplant readily, particularly seedlings and shallow-rooted species such as California sagebrush and white sage (Bowler, 2000). These plants occur extensively at the project site and offer several advantages over containerized plants. The plants are locally adapted ecotypes and are likely to do well on site. Transplanted stock typically produces heavy seed set in the year following transplantation. This should promote rapid spread of the transplanted species. The transplanted roots are a source of mycorhizae for the receiving site that may thereby enhance growth of surrounding DCSS seedlings. The larger size of these plants creates the vegetation structure important to support CAGN and other wildlife. All areas and individual plants to be salvaged shall be delineated and clearly marked by a qualified biologist.

Other on-site resources to be used in the restoration are some patches of prickly pear cactus (*Opuntia littoralis*) and yucca (*Yucca whipplei*). These will be flagged prior to grading and transferred directly to those receiving sites having a southern slope aspect. Large patches (at least 10 feet by 6 feet) will be salvaged with a back-hoe or a front-end loader by scooping out both the plants and a significant amount of roots and soil. The contractor shall also collect and store on-site significant pieces of prickly pear which have broken off the original stand. In the event that receiving sites are not ready for planting at the time of site grading, the salvaged plants will be stored on site with their root balls covered in a trench deep enough so that the roots can be covered loosely with soil. The restoration contractor will determine the locations for storage and relocation after project grading schedules are available. Salvaged plants in the holding area will be watered on an as-needed basis.

Topsoil/duff salvage

Stockpiled topsoil/duff will be transferred to all DCSS mitigation sites in order to enhance the seed bank and microbial community of the restoration site. Salvage of crushed duff and topsoil from within the development footprint will require a backhoe or bulldozer to scrape a thin (3-6") soil layer and attendant vegetation from the areas to be impacted. The depth of topsoil to be collected shall be determined in the field. This material will then be crushed, cut, or shredded by the grading contractor. If possible, this material will be transported directly to the restoration sites unless receiving sites are not yet ready. In that case, the material may be stockpiled for later application. The optimal time to salvage plants and topsoil is when the soil is dry long after the winter rains when plants, seeds, and soil microorganisms are dormant and more resistant to disturbance.

Topsoil/duff shall be stockpiled in hedgerows approximately 1 ft. high and 1 ft. wide and shall be left uncovered. Stockpiled areas shall be clearly marked with stakes and yellow caution tape and left undisturbed. Stockpiles shall be located away from exotic trees and weedy vegetation should be scraped from the site prior to stockpiling. The location should be selected so as to not impact sensitive habitat. Erosion of stockpiles during rainy season will be prevented by hydromulching the piles with a mix of the following materials: 2000 lbs/acre of virgin

cellulose wood fiber, 160 lbs/acre of organic soil stabilizer, and 43 lbs/acre of seed mix consisting of 40 lbs of *Plantago ovata* and 3 lbs of *Deinandra fasciculata*.

Application of the soil/duff material to 7.2 acres of on-site mitigation and 4.7 acres of off-site mitigation will require salvaged material from approximately 5 acres. An additional 2.6 acres of topsoil will need to be salvaged for use in the riparian restoration zone. The Restoration Specialist will identify and flag the suitable source areas for topsoil/duff. This material will be spread on the receiving site to a thickness of approximately 2 inches. Following application, one pass with a cultipacker or sheepsfoot roller shall be made to ensure contact with the underlying soil material.

5.3 RIPARIAN MITIGATION

5.3.1 Enhancement zone

The upper reach of the Creek above the large eucalyptus grove is a mosaic of disturbed and intact riparian vegetation. Disturbed areas with exotic/ruderal vegetation occupy approximately half the riparian zone. The stream channel through much of this reach is visibly incised and in places filled with trash and other materials.

In the area north and immediately south of existing “B” Street, several road right of ways, utility, and other infrastructure easements occupy the enhancement zone. A total of 2.3 areas of the enhancement area are within these easements. The future integrity of these 2.3 acres cannot be guaranteed and it is not possible to place them in a conservation easement for long-term management. Thus, this portion of the enhancement area is not counted as mitigation for project impacts. Nonetheless, restoration measures will still be implemented within these 2.3 acres and the entire 3.3 acre enhancement area will be managed as a single unit until it meets success criteria. Long-term maintenance of the ecological integrity of the VID pipeline corridor is provided for.

The following restoration activities will be performed:

- Areas of intact riparian vegetation will be flagged by the Restoration Specialist and left undisturbed.

- Patches of non-native vegetation will be removed. For large patches of weeds, herbicide spraying and mowing will be necessary. Appropriate precautions will be taken to prevent drift or injury to non-target areas. Individual exotic shrubs surrounded by native vegetation will be removed by hand. In the case of woody exotic plants, individuals will be cut at the base and the stump immediately treated with a concentrated solution of roundup.

- Trash will be removed from the stream channel and floodplain and disposed of off-site. Any obvious areas of fill will also be removed from the floodplain in order to reestablish correct elevations relative to of the surrounding areas.

- The seed mix described in Table 10, *Seed Materials for Riparian Mitigation,* on page 41 will be broadcast or hydroseeded on the exposed topsoil.

- Install container plants of shrub species shown in Table 11, *Shrub Plantings for Riparian Mitigation*, on page 42.

- Stake bare areas with live cuttings at a spacing of 8 ft. on center. Stakes shall be obtained from nearby willow and mule fat plants.

- 40 coastal live oak (*Quercus agrifolia*), 20 sycamore (*Platanus racemosa*), and 20 cottonwood (*Populus fremontii*) trees shall be planted at approximately 50 ft. spacing near the base of the slopes transitioning to the upland habitat. Sycamore and cottonwood will be planted at the toe of the slope while oaks will be planted further upslope. Tree size should be a minimum of 4 to 6 ft. in height, generally 15-gallon container size.

5.3.2 Restoration zone

Based on water quality and habitat concerns, an agency consensus was reached in 2002 that the artificial pond upstream of Street "A" be removed and that the site be restored to a willow scrub community. Extensive effort is required to reestablish riparian and streambank habitat on the former pond site. The pond will require draining and the dam will be reconstructed with a single culvert to allow unimpeded flow of water downstream and movement of wildlife along the riparian corridor. Accumulated silt and debris will be removed from the pond bottom to expose the original surface. Due to concerns regarding potential contamination of this material, the accumulated material will not be reused on-site. Instead, it will be disposed of off-site after it has dewatered sufficiently. KB Home Coastal, Inc. proposes to place rock fragments derived from the excavation and crushing of weathered granite rock into the former pond site. The rock material will be covered with a 2' layer of screened rock fines of gravel-sized (or finer) soil material, also derived from crushed rock. This material will be capped with a 12" layer of topsoil removed from on-site upland areas where grading is planned. This topsoil is a necessary soil amendment to establish vegetation. The final elevation grade is shown in Figure 10, *Proposed Profile Cross-Section and Plan View of Former Pond Site*, on page 43. Rip-rap will be placed at either end of the drainage culvert. Upon completion of grading, a stream channel will be excavated through the site and will connect to the channel in the preservation area located immediately upstream of the site. All work shall be done during the dry season. Mitigation activities shall be conducted in the following sequence:

Table 10

SEED MATERIALS FOR RIPARIAN MITIGATION

Scientific Name	Common Name	Minimum Purity/Germination	Application Rate lbs/acre
Ambrosia psilostachya	western ragweed	20/30	15
Anemopsis californica	yerba mansa	50/70	2
Artemisia douglasiana	mugwort	10/50	2
Leymus condensatus	giant wildrye	80/80	0.25
Mimulus guttatus	monkeyflower	10/60	0.8
Muhlenbergia rigens	deergrass	80/70	0.25
Plantago erecta	western plantain	90/80	10
Rorippa nasturtium-aquaticum	water cress	90/60	0.5
Sisyrinchium bellum	blue-eyed grass	95/75	0.25
Urtica dioica holocericea	stinging nettle	60/60	0.5
Vulpia microstachys	small fescue	90/80	6
On-site species TBD			

TBD = To be determined
Source: PCR Services Corporation, 2002.

Table 11

SHRUB PLANTINGS FOR RIPARIAN MITIGATION

Scientific Name	Common Name	# required/size	Density (shrubs/acre)
Baccharis pilularis	coyote brush	412/one gallon	75
Rhus ovata[a]	sugarberry	138/one gallon	25
Rosa californica	California rose	138/one gallon	25
Sambucus mexicana	Mexican elderberry	412/one gallon	75
	Total	**1100**	**200**

[a] *Install sugarberry at riparian edge where it transitions to DCSS habitat.*
Source: PCR Services Corporation.

- Final connection with the upstream channel will be done with hand tools to prevent disturbance to the preserve area.
- The seed mix described in Table 10, *Seed Materials for Riparian Mitigation,* will be broadcast or hydroseeded on the exposed topsoil.
- An erosion control netting will be laid down across the site to stabilize exposed soil.
- Willow and mule fat cuttings from trees in the adjacent preserve area will be staked at an approximate spacing of 6 feet on center.
- Container plants of shrub species shown in Table 11, *Shrub Plantings for Riparian Mitigation,* will be installed at appropriate sites.
- Sloping land at the edge of the former pond will be vegetated with streambank plantings dominated by sycamore near the toe slope and coastal live oak further up

the slope. The groundcover will be vegetated using the same seed mix described for the other riparian areas. The application of straw wattles spaced at 15' intervals will be an additional erosion control measure.

5.3.3 Eucalyptus removal zone

The two eucalyptus groves on the property present unique restoration challenges. There is a complete absence of native vegetation and it is likely that the soil chemistry has been altered due to the accumulation of allelopathic eucalyptus litter. This material inhibits native plant establishment. The following restoration activities are planned:

- Cut down all eucalyptus trees, as near the base as possible, and immediately treat stumps with a concentrated systemic herbicide such as Roundup or Rodeo (see Section 5.7, *Weed Control*, for acceptable uses and practices with respect to herbicides).

- Remove litter layer from soil using light earthmoving equipment or hand raking. Dispose of litter material off site

- Hydroseed or broadcast riparian seed mix to promote development of groundcover.

- Stake willow cuttings taken from nearby trees in a random pattern, spacing the stakes 6 to 8 feet on center.

- Install container plants of shrub species shown in Table 11, *Shrub Plantings for Riparian Mitigation*.

- At the transition between the riparian and upland habitats, a combined total of 20 coastal live oak and sycamore trees will be planted at a spacing of approximately 50 feet.

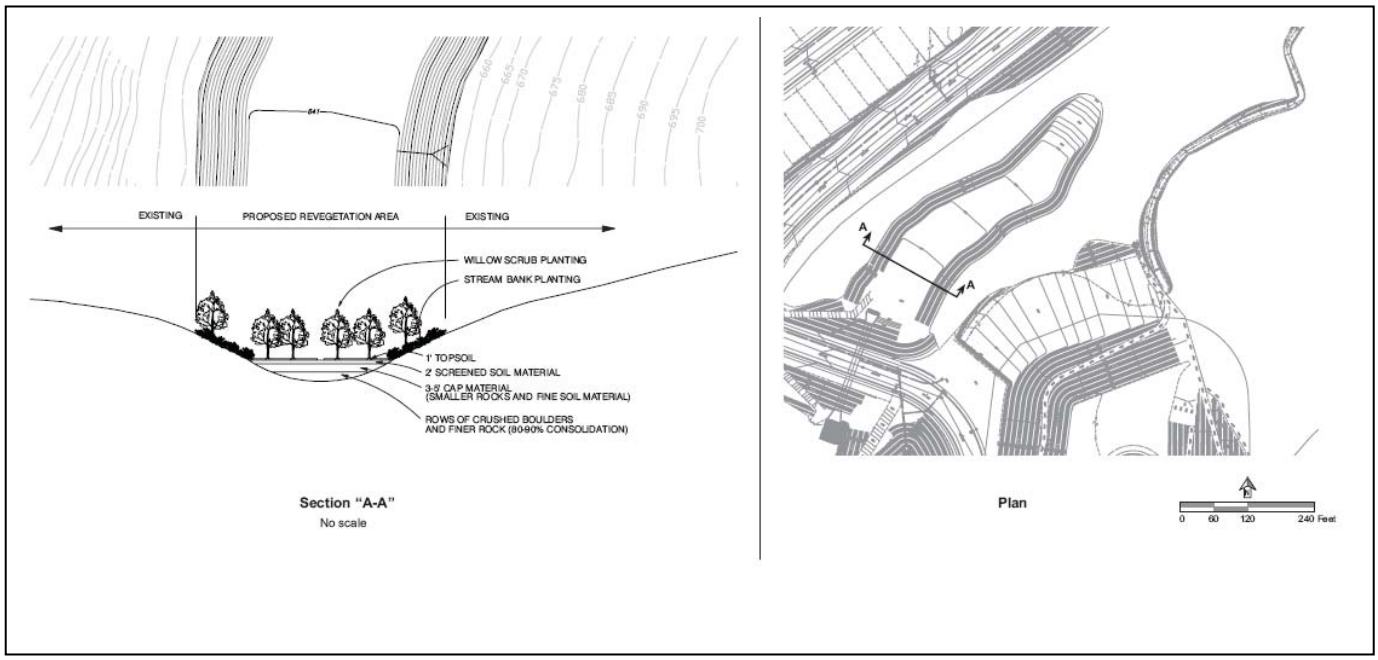

Figure 9. San Marcos Highlands. Proposed Profile Cross-Section and Plan View for Former Pond Site

5.3.4 Wetland Creation area

A small (0.05 acre) wetland will be created within the upland eucalyptus removal zone as a measure to ensure "no-net-loss" of wetlands. Although it will be located adjacent to the floodplain of Agua Hedionda Creek, it qualifies as wetland "creation" since the site lacks all three criteria that define a wetland (hydric soil, hydrophytic vegetation, and wetland hydrology). The placement of the wetland has been chosen such that it satisfies the ACOE, RWQCB, and CDFG "wetland creation" definitions.[1] Wetland hydrology will be achieved by grading this upland area down to a level ranging from approximately 1 to 2 feet below the surface of the adjacent (non-wetland) floodplain. Lowering the ground elevation will increase the hydroperiod by intercepting the seasonal high water table. Additional hydrology sources include potential seepage from the adjacent uplands and retention of floodwaters from Agua Hedionda Creek. The dimensions of this wetland swale will be approximately 18' wide by 120' long. The target plant community will initially be an emergent marsh dominated by California bulrush (*Scirpus californicus*), San Diego Sedge (*Carex spissa*), and (*Juncus acutus* spp. *leopoldii*). However, it is anticipated that over time additional hydrophytic vegetation from the adjoining SWS community will recruit into the wetland swale. Planting of California bulrush (*Scirpus californicus*) will be conducted on 1-foot centers in a 4-foot wide swath along the lowest part of the swale. Surrounding the bulrush on either side will be 4-foot wide zones dominated by San Diego Sedge (*Carex spissa*) and spiney rush (*Juncus acutus* spp. *leopoldii*), also planted on 1-foot centers. The outer edges of the wetland will be seeded with the riparian restoration seed mix.

5.4 DIEGAN COASTAL SAGE SCRUB MITIGATION

5.4.1 On-Site Revegetation Zone

This 5.1-acre zone is located in the northwest portion of the property and is part of the corridor linking the two patches of preserved DCSS located on either side of the Creek. The vegetation of the zone is currently dominated by exotic/ruderal species or bare ground. Most of the zone occupies a narrow strip bordering the off-site easement. There are also three smaller patches occurring on the west side of the Creek. Restoration activities are summarized as follows:

- Flag any remnant patches of native vegetation for preservation, where possible.
- Remove patches of ruderal or exotic vegetation. This may involve a combination of mowing, weed whipping, herbicide spraying, stump cutting and treating woody vegetation. In preparation of seeding, disk bare ground and rip any obviously compacted areas.

[1] *"Wetland creation" definitions were discussed during a San Marcos Highlands all-agency meeting on September 30, 2005 meeting at the San Diego RWQCB office.*

- Complete two grow and kill cycles in order to deplete the weed seed bank.
- Apply salvaged topsoil/duff material to the surface.
- Broadcast bare areas with seed mix shown in Table 10, *Seed Materials for Riparian Mitigation*. Use cultipacker or sheepsfoot roller to ensure good seed to soil contact.
- If installation of containerized and transplanted plants will occur during the dry season, install irrigation equipment.
- Transplant any available patches of cactus and yucca to south facing slopes.
- Transplant sagebrush and sage species throughout the Site at densities shown in Table 12, *Transplanted Species to be Obtained On-site*, on page 46. Plants will be randomly spaced 4r to 6 ft. in groups.
- Randomly install container plants throughout the Site at densities shown in Table 13, *Container Plants for DCSS Restoration,* on page 46. Plants will be randomly spaced 4 to 6 ft. in groups.
- Install erosion control straw wattles on areas with slopes exceeding 5 percent.
- For the small revegetation area alongside the utility road near the northern edge of the property, restoration practices will be limited to removal of invasive woody shrubs (e.g. tree tobacco, castor bean).

5.4.2 Eucalyptus removal zone

The portions of the two eucalyptus groves located in upland areas will be revegetated to DCSS. This restoration zone comprises 0.9 acre. Removal of that plant community is necessary in order to maintain the integrity of the adjacent riparian restoration zones and provide a natural upland buffer between the riparian zone and the proposed residential development. The following activities are proposed:

- Cut eucalyptus trees as near the base as possible and treat stumps with systemic herbicide. Dispose of logs off-site.
- Scrap eucalyptus litter from restoration area and dispose of off-site.

Table 12

TRANSPLANTED SPECIES TO BE OBTAINED ON-SITE

Scientific name	Common name	# recommended	Density (shrubs/acre)
Artemisia californica	California sagebrush	400	50
Salvia apiana	white sage	240	30
Salvia mellifera	black sage	160	20
	Total	**800**	**100**

[a] *For use in Revegetation, Eucalyptus removal zones, and Off-site Easement only (8.0 acres total).*
Source: PCR Services Corporation.

Table 13

CONTAINER PLANTS FOR DCSS RESTORATION

Scientific name	Common name	# recommended/size	Density (shrubs/acre)
Baccharis pilularis ssp. *consenguinea*	coyote brush	145/one gallon	15
Eriogonum fasciculatum	California buckwheat	290/one gallon	30
Malacothamnus fasiculatus	bush mallow	145/one gallon	15
Malosma laurina	laurel sumac	145/one gallon	15
Rhus ovata	sugar bush	145/one gallon	15
Ribes speciosa	fuchsia flowered gooseberry	100/one gallon	10
	Total	**970**	**100**

[a] *For use in all restoration zones (5.0 acres on-site + 4.7 acres off-site = 9.7 acres total)*
Source: PCR Services Corporation.

- Apply salvaged topsoil/duff mixture
- Broadcast bare areas with seed mix shown in Table 14, *Seed Mix for DCSS Restoration*, on page 47. Use cultipacker or sheepsfoot roller to ensure good seed to soil contact.
- If planting will occur in the dry season, install irrigation equipment.
- Install container and transplanted plants at a combined density of 200 shrubs/acre as shown in Table 13, *Container Plants for DCSS Restoration*, and Table 12, *Transplanted Species to be Obtained*.
- Install erosion control mesh on slopes exceeding 5 percent.

5.4.3 Slope Reconstruction Zone

This zone is located in the southwest part of the property and comprises 1.2 acres. Recontouring of the slope will be necessary in order to accommodate Las Posas Road. Steepness

Table 14

SEED MIX FOR DCSS RESTORATION

Scientific name	Common name	Germination/Purity	Bulk lbs/Acre
Encelia californica	California bush sunflower	40/60	2
Salvia apiana	white sage	70/50	1
Mimulus aurantiacus	orange bush monkey-flower	5/70	2
Baccharis pilularis ssp. *consenguinea*	coyote brush	2/40	2
Nassella lepida [a]	foothill needlegrass	90/60	1.5
Sisyrinchium bellum	blue-eyed grass	95/75	1
Plantago erecta	plantain	98/75	7
Lasthenia californica	coast goldfields	90/85	10
Lupinus bicolor	pigmy-leaf lupine	98/80	0.25
Lotus scoparius	deerweed	90/60	3
Artemisia californica	California sagebrush	15/50	11
Eriogonum fasciculatum	California buckwheat	10/65	4
Phacelia minor	California wild blue bells	95/70	0.25
Bromus carinatus	California brome	95/80	1.5
Vulpia microstachys	small fescue	90/80	3

[a] *Seed of Nassella lepida shall be de-awned prior to sowing.*
Source: PCR Services Corporation.

and absence of native soil will present unique restoration challenges in this zone. Container shrubs rather than transplanted shrubs will be used since restoration activities will necessarily be delayed until construction is completed. The following sequence of restoration activities is proposed following re-grading:

- Apply topsoil/duff mixture.
- Broadcast seed mix.
- Install temporary irrigation.
- Install container plants at a density of 200 shrubs/acre. The backfill of the planting holes shall be amended with compost and slow release fertilizer at the time of planting.
- Apply any available patches of salvaged prickly pear cacti and yucca to south facing slopes.
- Install straw wattles along slope contour at intervals of 12 feet.

5.4.4 Off-site Easement Area

Part of this area is developed and will require removal of existing fences, numerous fruit trees, and various vehicles and structures. The driveway that currently crosses the site will be

left in place to allow the owner to access the adjacent homesite. A 3-strand barbed wire fence will be constructed along either side of the driveway to restrict access to the easement area yet still allow for movement of wildlife across the corridor. Since the vegetation is nearly entirely non-native, multiple strategies will have to be employed to restore a native plant community. Close proximity of the easement to developed areas means that edge effects will need to be managed for by fencing off the easement, and controlling for runoff and spread of weeds.

- Remove infrastructure previously mentioned.
- Remove gravel patches and rip compacted soil where necessary.
- Eliminate all vegetation, including fruit trees. This may involve a combination of moving trees, mowing, weed whipping, and herbicide spraying. In preparation of seeding, disk bare ground.
- Complete two grow and kill cycles in order to deplete the weed seed bank.
- Apply salvaged topsoil/duff material to surface.
- Broadcast bare areas with seed mix shown in Table 10, *Seed Materials for Riparian Mitigation*. Use cultipacker or sheepsfoot roller to ensure good seed to soil contact.
- Install erosion control measures.
- If installation of containerized and transplanted plants occurs during the dry season, then install irrigation equipment prior to planting shrubs shown in Table 12, *Transplanted Species to be Obtained On-site*, and Table 13, *Container Plants for DCSS Restoration*.
- Install fencing along border with residential area to prevent incursions humans and domestic animals.

5.5 REDUCTION OF EDGE EFFECTS

The following activities will be conducted in order to minimize edge effects:

- All sensitive habitats areas will be fenced to limit entry into these zones. In particular, cat-proof fences shall be installed at the interface of the fuel modification zones and natural habitats (natural habitats include DCSS and Riparian restoration and preserve areas). Fencing should meet standards described in Appendix A, *Fencing Material*.
- Cowbird trapping will be conducted on an annual basis for three years.

Table 15

SEED MATERIALS AND PLUGS FOR SLOPES OF WATER QUALITY BASIN

Scientific Name	Common Name	Minimum Purity/Germination	Application Rate lbs/acre
Artemisia douglasiana	mugwort	10/50	2
Encelia californica	California bush sunflower	40/60	2
Leymus condensatus	giant wild rye	80/80	0.25
Plantago erecta	western plantain	98/75	8
Sisyrinchium bellum	blue-eyed grass	95/75	0.25
Vulpia microstachys	small fescue	90/80	6

Source: PCR Services Corporation, 2002.

- A system of trails and fences will be constructed to direct walkers to designated areas while discouraging entry into other wildlife areas.

- All shrubs and trees used in street and public area landscaping will be native to southern California.

- Public lighting shall be designed to direct light downward, rather than upward and shall be placed or directed away from natural habitats.

- Educational brochures distributed to property owners will include information about reduction of impacts to sensitive habitats and wildlife in the surrounding natural areas.

- Permanent signage adjacent to preserved areas (conservation areas) will be posted.

5.6 WEED CONTROL

All sites will be managed to remove weed populations prior to other restoration activities. Eradication will target exotic species listed by CA-IPC in categories A-1, A-2, B, Red Alert, and Annual Grasses shown in Appendix B, *Exotic Plant Species Targeted for Removal*. Additional exotic species will be targeted for removal at the discretion of the Restoration Specialist if they appear to be invasive and a threat to success of restoration.

Of particular importance is the timing of control of annual weeds. Since seed set generally occurs in mid to late spring, weed control during this period is vital to success. Hand weeding is an effective strategy for small infestations, however, larger areas may require a combination of mowing/weed whipping and herbicide application. Grass selective herbicides such as Fusilade (Fluazifop-P-butyl) or Poast (sethoxydim) may be applied as a post-emergent control technique in areas where the desirable vegetation consists of broadleaved plants (e.g. DCSS sites). Herbicide control of grasses is most effective when the plants are young and

actively growing, generally less than 4 inches in height. All exotic plant material and associated humus shall be disposed of at an off-site location.

For nonselective weed control, the following glyphosate concentrations shall be used according to the type of application required:

- Foliar spray application – a minimum of two percent solution
- Foliar wick application – a 33 percent solution
- Cut stump treatment – a 100 percent solution

For control of broadleaved weeds, the following triclopyr concentrations shall be used according to the type of application required as per the product label:

- Foliar spray application – 15 percent solution
- Cut stump treatment – a 100 percent solution

Other herbicide options include Fusilade (Fluazifop-P-butyl) or Poast (Sethoxydim) for control of annual grasses. Osprey (Mesosulfuron-methyl) is a recently registered herbicide for control of wild oats, Italian ryegrass, and various brome species.

The site maintenance contractor must have a pest control business license which requires that at least one individual employed by the business be in possession of a qualified applicator's license. All licenses must be issued by the State of California and be of current status. If a qualified applicator is not present during the herbicide treatment, all applicators must have undergone documented herbicide application training. Personnel must wear all protective clothing required by law and follow all label directions and precautions. All re-entry times specified on an herbicide label shall be observed and posted. Herbicide preparation shall be allowed only in approved staging areas more than 100 feet from a stream course or body of water. EPA-approved glyphosate base, systemic herbicides (e.g. Rodeo) shall be allowed when applying within 100 feet of a natural water system.

A brightly colored dye shall be used in all herbicide applications to aid the applicator in achieving good coverage of the target species. The material shall be a non-toxic material such as Blazon, Turfmark, or equivalent. The dye shall be mixed with the herbicide at no more than half the rate specified on the label.

Herbicide treatment shall be conducted only when weather conditions are conducive to effective uptake of the herbicide by the target species (e.g., sunny, dry with ambient temperatures 65 degrees Fahrenheit, and when plants are at the specified growing stage), and when wind conditions are such that herbicide drift is minimized (five mph or less). Treated plants or stumps

shall not be disturbed until the applied herbicide has had time to take effect per the manufacturer's instruction.

5.7 SOIL FERTILITY TESTING AND AMENDMENTS

Soil samples shall be collected from the three DCSS zones (slope construction, revegetation, eucalyptus removal), the off-site easement, and from the three riparian restoration zones (enhancement, restoration, eucalyptus removal). The soil samples will be composites of 10 sub-samples randomly collected from each zone. Soil samples shall be taken to a depth of 6 in. The samples shall be sent to the state agricultural laboratory or a recognized commercial laboratory for testing of pH, salinity, macro-nutrient levels, including Ca, Mg, and S. The Restoration Specialist shall work with the landscape contractor to address soil deficiencies based on the soil test results.

Packets or tablets of slow release fertilizer shall be placed in the bottom of the planting holes prior to installation of container plants at all restoration sites. The fertilizer shall be covered with approximately ½ in. of soil prior to placement of the root ball in planting hole. Fertilizer meeting slow release specifications is available from Reforestation Technologies International (RTI).

Legume seeds, as indicated in the plant palette, to include those of the genus *Lotus*, shall be inoculated with Rhizobium bacteria prior to seeding. Inoculant shall be added at a minimum rate of 2 lbs of inoculant bacteria per 100 lbs of legume seed.

5.8 SOIL EROSION CONTROL

Long- and short-term erosion control measures should be used on slopes to retain soil and prevent runoff. Straw wattles used together with erosion control species are a viable means of long-term erosion control. Straw wattles are placed perpendicular to the slope in order to slow runoff and trap silt. The wattles will be installed along the contours of the slope construction and DCSS eucalyptus removal zones at 15' intervals. The steeper the slope is, the closer the wattles need to be placed together. Wattle locations should be staked out prior to plant installation and the installation shall proceed from top of slope to bottom of slope. The wattles should be trenched along the slope contour and should be placed end to end and secured using wooden stakes, according to manufacturers instructions. Wattles are commercially available through California Straw Works. See Appendix C, *Straw Wattle Installation*. To stabilize the area between the wattles, the slope should be planted with an erosion control mix (Table 16, *Erosion Control Seed Mix for DCSS Restoration*, on page 53) or a seed mix containing such soil binding species such as small fescue (*Vulpia microstachys*), plantain (*Plantago erecta*), and California brome (*Bromus carinatus*).

Table 16

EROSION CONTROL SEED MIX FOR DCSS RESTORATION

Scientific name	Common name	Application rate (lbs/acre)
Vulpia microstachys	small fescue	8
Deinandra fasciculata	clustered tarweed	2
Lasthenia glabrata	goldfields	0.75
Plantago erecta	plantain	20
Trifolium tridentatum	tomcat clover	2
Bromus carinatus	California brome	1.5

Source: PCR Services Corporation.

Graded sites will be seeded as soon as possible after completion of grading. In the event that locally collected seed mix and topsoil/duff are not applied prior to the onset of the rainy season, and short-term erosion control measures are needed, then bare soil will be hydroseeded with the erosion control mix shown in Table 16, *Erosion Control Seed Mix for DCSS Restoration*. The hydroseed mix should include 2000 lbs/acre of virgin cellulose wood fiber and 160 lbs/acre of organic soil stabilizer. Another option for temporary slope stabilization is to secure the slope with black plastic (visquene) and sand bags.

Erosion control blankets may be used in some cases. Where erosion has already occurred and the slope is no steeper than 2:1, an erosion control blanket may be used. The blankets come in various strengths. One example is the North American Green product SC150BN, a double net blanket using straw and coconut fiber, which is biodegradable. A similar product is manufactured by SI Geo Solutions. (Both are distributed by Pacific Soil Stabilization 1-800-473-1965). A drainage that will be vegetated, with flows no faster than 15 feet per second, could be secured with SC250, a blanket made of 3 stable UV nets and a straw and matrix material. (Triumph Geo-Synthetics (714) 237-1550 is a distributor). Some applications may require a turf reinforcement mat such as Pyramat, a three dimensional woven geotextile (distributed by Contech (909) 885-8800). These mats are examples only. More information can be obtained through the distributor. Proper installation, such as using the appropriate staple pattern, is essential to the success of these products. Each of these products should be used in conjunction with seed. The mat must be vegetated to achieve maximum use and aesthetic. In most cases, the seed should be placed on the soil and then covered with the mat because germination is dependent on seed to soil contact.

All exposed areas shall be stabilized to prevent erosion by using straw wattles and erosion control species, hydroseed with tackifier, erosion control blankets, or a combination of the above. Substitutions for these methods must be demonstrated to be effective to be considered an acceptable alternative. If erosion has begun, the area should be regraded (with machinery or hand tools, depending on the situation), before seed and erosion control fabric are applied.

5.9 SCHEDULE

1. Hire a landscape contractor experienced in restoration work.

2. Conduct a pre-construction meeting of all involved parties in order to coordinate timing of activities.

3. Drainage and restoration of pond site shall be initiated, including dewatering and disposal of dredged material.

4. At the initiation of site grading, a sufficient quantity of DCSS topsoil will be salvaged and stockpiled on-site. Site preparation of mitigation sites will be conducted concurrently with project construction.

5. A qualified biologist will monitor the construction of on-site mitigation activities to ensure compliance with this mitigation plan, engineering drawings, and the landscape plan.

6. A post construction report shall be submitted to ACOE, CDFG, and RWQCB within 90 days after completion of mitigation related work.

7. Monitoring inspections by the Restoration Specialist will be done on a monthly basis for the first three months after completing the mitigation installation, quarterly for the remainder of the first year, semi-annually for years 2 and 3, and annually thereafter.

8. Quantitative monitoring will be done on a yearly cycle beginning 12 months after completion of all planting and continuing until all sites meet success criteria and are released from regulatory oversight. Reports shall be submitted to agencies within 30 days of field monitoring.

9. A conservation easement shall be recorded within 1 year of permit issuance and prior to ground disturbance.

5.10 PLANTING

The selected plant palettes contain species indigenous to the local riparian and upland areas. As restoration activities are being conducted, consideration will be given to typical precipitation patterns, soil moisture holding capacity, and plant and weed growth cycles. A successful restoration project will encourage diversity of plant species, habitat patches, and vegetative structure. A variety of planting schemes are proposed including broadcast and hydroseeding, installation of containerized plants, transplantation of selected shrubs from nearby areas, staking of live cuttings, and seed bank recruitment from transferred topsoil.

Specific planting techniques are discussed below:

5.10.1 Live Staking

Live staking, also known as willow staking or sprigging, is the planting of living wood into soil. Many riparian woody species will readily develop roots from cut stems placed into moist soil. Under the right conditions, this kind of planting is a quick and inexpensive way to provide vegetation cover for wildlife habitat.

It is highly recommended to use native riparian species that are indigenous to the area to be planted. Willows (*Salix* sp.) and mule fat (*Baccharis salicifolia*) are used extensively due to their high survival rates and commonness. Collect cuttings for planting from healthy plants in or near the planting site within the same drainage area. Make sure that cuttings come from several plant sources to ensure reproduction and genetic diversity. Although willows and mule fat can withstand extensive pruning, minimize the impact to individual donor plants and the plant community.

Cuttings should be done when the plants are dormant during the winter season, before the leaves develop the food reserves stored in the stem. When planted at this time, those food reserves will go into the development of a root system if the stem is in contact with moisture. If the root growth can maintain contact with moisture through the dry summer then the survival of the plant is nearly assured, barring other disturbance such as herbivore damage or vandalism.

Cuttings should be made as straight as possible to facilitate planting. The diameter can be as small as 3/4 inch to as large as 2 inches. The usual optimum diameter is 1 inch. The minimum length is 18 inches. They can be 4 to 6 ft long if they need to be planted deeply in order to reach year-round moisture. Make clean cuts so there are no split ends or torn bark. After the cutting is removed from the tree, cut off the side branches as close to the stem as possible. Cut the stem to the chosen length and remove any leaves. Place the cuttings in such a manner that the tops can be identified from the bottoms. This is very important because cuttings that are planted upside down will not grow. The bottom of the cuttings should be sharpened at this time, identifying which end is up. It will also allow the cuttings to be driven into the soil with more ease. Do not allow the cuttings to dry out. Place them immediately into water or cover them with a wet fabric until they are planted. They can be stored for long periods if they are kept damp and cool.

If the soil is fine, moist, and soft enough to drive the cutting into place without damage then no preparation is necessary. If the soil is course, hard, and the depth to year-round moisture is deep it will be necessary to pre-punch a hole for the cutting. A soil auger can be used to remove a column of soil and the resulting hole is an easy space for the cutting to be driven into.

The cutting should be damp (at least the bottom end), straight, without side branches or leaves and with a sharpened bottom end. Place it into the pre-punched hole and drive it in until 75 percent to 80 percent of the length is in the ground. If the upper end is damaged while driving

it in with a wooden mallet, cut off the damaged portion with scissor-type loppers (anvil-types tend to crush one side of the stem) leaving 15 percent to 20 percent of the cutting length above the surface. The placement of the cutting with about 80 percent of it in the ground minimizes water loss and helps prevent root damage caused by relative movement between the cutting and the ground.

Soil to sprig contact should be maximized by tamping the soil around the sprig. It must be firmly in the ground so it cannot be easily moved or pulled up. If there is a space between the pre-punched hole and the sprig, a small amount of water can be poured into the space to help collapse the soil into contact with the cutting. A small amount of tree sealant on the exposed end will help prevent desiccation and repair any tears in the bark.

Along stream banks, appropriate spacing is as close as 12 inches on center. In more stable areas, cuttings can be placed 2 feet apart. Because cuttings may be vulnerable to creature damage, wire cones or heavy netting may be used to protect them.

5.10.2 Seeding Technique

The seed mixes for the SWS habitat will be applied by broadcasting or hydroseeding. The seed mix for the DCSS habitat will be broadcast since hydroseeding is not compatible with the prior duff/topsoil application. Seeds shall be supplied on the basis of bulk weight, percent purity, and percent germination, following the recommendations in Table 10, *Seed Materials for Riparian Mitigation* and Table 14, *Seeding Mix for DCSS*. Seed shall be less than two years old. Seed shall be obtained from a certified California native plant supplier and all seed shall be of Southern California origin. Any deviation in the seed mix must be approved by the project Restoration Specialist prior to application. The native seed mix, shall be applied directly to the soil prior to the installation of the erosion control blanket to ensure contact with the soil. If hydroseeding, then apply the seed mix with a ¼ inch soil tackifier as an erosion control measure. One soil tackifier often used in restoration projects is J-tac, available from Reclamare Co (phone: (206) 824-2385). Confer with Restoration Specialist before using soil tackifier or fertilizer.

5.10.3 Container Planting Technique

1. Cut an “X” into the erosion control fabric. Dig a hole twice as deep and twice as wide as plant container. Break up large clods and try to avoid the smooth-sided “bathtub” effect in the hole.

2. Amendment.

    a) The native soil should be soft and friable. Eliminate large rocks and clods from the backfill soil.

b) For landscape soils requiring amendment, use approximately ⅓ composted or nitrolized forest humus to ⅔ native soil, blending them in a pile outside the hole. This is used as the backfill mix.

c) Slow release fertilizer granules with polyurethane coating shall be incorporated with the backfill, or placed in the bottom or back of the hole. If tabs are used, make sure they do not touch the root ball. Most native plants are able to find nutrients even in poor soils.

3. Fill planting hole with water and allow percolation into subsoil.

4. Spill some backfill material into the bottom of hole, moisten and tamp, mound slightly.

5. Set plant root ball atop the moistened backfill so that plant collar is 1 inch higher than finished grade.

6. With water flowing slowly from a hose into the hole, replace backfill material up to about ⅔ the height of the root ball; moistening, tamping and settling all around.

7. Fill remaining portion surrounding the top of root ball with more backfill. Collar should be still higher than grade.

8. Create an irrigation basin berm, considerably outside the dimension of the hole using remaining backfill and native soil.

9. Cover the planting hole with the erosion control material flaps. Staple the flaps down.

10. Irrigate from the top, filling the basin with water and sprinkling around to settle backfill and berm. Allow to soak in and repeat.

5.10.4 Salvaged Material Planting Technique

1. If possible, plant salvaged plant directly after removing from the ground

2. Plant during the winter months (November- mid March)

3. Plantings are in groups along the south-facing slopes

4. Cactus pads shall be planted such that soil is covering 1/2 to 1/3 of the pad.

5. Planting techniques shall follow container planting techniques

5.10.5 Initial Maintenance

Like all nursery stock, container-grown California native plants and transported individuals need careful attention during their establishment period in the landscape. It is important that the root ball does not dry out during the first two or three months. Irrigate about

once each week, trying not to oversoak the surrounding soil. After two months, be sure to water deeply. Do not allow ground to remain soggy for long periods of time, as this encourages disease, especially during the dry season. Native plants need deep moisture and cool roots. They also need air spaces in the surrounding soil for the roots to find oxygen. Usually, one deep watering every two or three weeks is sufficient in summer and fall. Less frequent irrigations are required in the spring. During the winter, rainfall alone may be adequate for most plantings. Avoid overhead watering during the hot part of the day in the warm season. Organic mulch should be used in late spring and fall to retain moisture, cool roots, discourage weeds and strengthen plants.

5.11 IRRIGATION PLAN

The mitigation area requires temporary irrigation to establish the young riparian and DCSS plants. The irrigation system should be installed such that it maximizes infiltration, avoids runoff, and includes an automatic controller. The irrigated planting area must retain the water and should allow very little runoff. For this reason, it is important that the landscape contractor install quality spray heads, such as Rainbird 1800 SAM-PRS series spray nozzles which include automatically sealing pop up spray heads and pressure regulating seals, with appropriate spacing and well programmed timing on an automatic timer. Proper irrigation on the ornamental landscape will ensure a minimal runoff to the mitigation area. The mitigation area receives enough water through the high groundwater table and the temporary irrigation. The temporary irrigation will help establish early season erosion control vegetation and supplement the annual rainfall during dry periods in the rainy season.

Water used for irrigation must be of good quality with total dissolved solids (salts) at no greater concentration than 500 ppm. Individual chemical constituents should be evaluated against the site soil tests to avoid salt build-ups in the soils.

The above ground irrigation shall have the following design:

- A mainline with lateral lines and gate-valves to separately manage different parts of the slopes and created drainage, as necessary.
- Separate valves used for mitigation from valves used for commercial landscape.
- In sloping conditions, lateral lines shall be laid out along the slope contour so that the top of the slope can be managed separately from the lower slope.
- Sprinkler heads shall be sized to accommodate the infiltration rate of the particular soils, as well as the compaction of these slopes.
- The system shall be laid out so that the wetted area from each sprinkler head has no more than a two-to three-foot overlap with adjacent sprinkler heads (based on the infiltration rate of the soil).

- All sprinkler stems shall be fitted with on/off ball valves to allow for hose connections and hand watering of container plants at installation and during establishment, as necessary. These valves will also allow particular areas to be shut-off, as necessary.

Properly utilized overhead irrigation has been used successfully to establish native grassland vegetation on slopes. However, improper installation and/or management of the irrigation system can cause problems for germination and root development of native vegetation. Operation of the system will require management by a person with demonstrated previous experience irrigating native vegetation.

The system's operation will depend on soil's infiltration rate, the application rate, and weather conditions. However, the engineered slopes' percentage of compaction will slow the infiltration on these slopes. The size of the sprinkler heads and water application rate will be determined after infiltration is evaluated in each area.

Wetting of the full root zone and drying of the soil between irrigation events is essential to the maintenance of the plants and the promotion of the deep root zone that will support the vegetation in the years after establishment. A soil probe or shovel shall be used to examine soil moisture and rooting depth directly.

The timing of irrigation events will depend on evapotranspiration between events and soil moisture. The following guidelines should be followed:

- Irrigate soil to field capacity to the desired depth (approximately 18 inches during germination and seeding establishment and 18 to 24 inches during plant establishment).

- Keep hydromulched areas moist until seeds have germinated.

- Allow soil to dry down to approximately 50 to 60 percent of field capacity (in the top 6 to 10 inches after germination and during seedling establishment and 8 to 12 inches during plant establishment) before the next irrigation cycle.

- The automatic controller will be equipped with a rain sensor such that irrigation does not take place during rain events.

5.12 AS-BUILT REPORT

Within 90 days of completing Site grading and restoration activities, an As-Built Report will be submitted to ACOE, CDFG, USFWS, and RWQCB. The landscape contractor will provide the data for the As-Built report and the Restoration Specialist will compile this material and submit the report to the agencies. This report will include elevations of graded areas,

photographs, sampling plot locations, a list of plant species, and density of planted species for each habitat type.

6.0 MAINTENANCE

6.1 WEED ERADICATION

Invasion of exotic weeds is one of the greatest threats to the success of mitigation projects. Exotic species quickly colonize newly graded areas and out-compete native species. Once established, the competitive exclusion of light, water, and nutrients by exotic plants makes it difficult for native species to re-establish and grow. A comprehensive weed eradication program shall be implemented to minimize the adverse effects of weed invasion.

Weed densities and control demands will depend on the seasonal rains and temperatures each year of project implementation. The timing of weed control may be different for each of the mitigation areas based on soil moisture and the growth and development of the desired native plant species. It should be anticipated that frequent (twice-monthly to monthly) monitoring of the restoration areas will be required for weed management in the first 1 to 3 years. Monitoring will be effective for early identification of seedling weed species and to schedule control methods according to the phenology of each weed species. See Appendix B, *Exotic Plant Species Targeted for Removal*, for an initial list of weed species.

For efficient control of exotic species, specified weeds must be controlled before they produce viable seed. Methods of control will depend on the species, the density of weeds, the area of infestation, and the ecological sensitivity of the habitat. Hand or mechanical means are preferred methods for control of weed species. Some species may be controlled by a combination of cutting and removal, followed by spot foliar herbicide spray application on re-growth.

Herbicides that are registered for use in California for natural areas are specified for particular weed species at specific rates noted on the labels. For this weed management plan, recommended herbicides include glyphosate (e.g., Round-up Pro or Rodeo), Fusilade or Poast. Only EPA and RWQCB approved, glyphosate base, systemic herbicides (e.g., Rodeo) will be allowed when applying herbicides within 100 feet of a natural water course or body of water. Some recommended rates may be found in Section 5.7, *Weed Control*.

6.2 PROTECTION FROM HERBIVORY

Herbivory of new planting can be a problem at restoration sites. Rodents and various mammalian species may be responsible for damage to newly established plants. Following initial planting, the Site will be monitored for signs of herbivory. Wire cages, enclosure fences, or other plant sheltering devices will be used on an as-needed basis. Tubex® or equivalent tree shelters are effective at curtailing herbivory. Any signs of herbivory will be noted in the monitoring reports.

6.3 GENERAL MAINTENANCE

Maintenance within the mitigation zone will be for the sole purpose of removing non-native vegetation and pruning for diseased plant material. No pruning for aesthetics will be permitted. However, vegetation pruning will be allowed within existing easements (i.e. utility, poles, pipelines, infrastructure, etc.). In some cases, this may require trimming or removing vegetation. During each maintenance visit the mitigation areas shall be inspected for trash, vandalism, disease and pest infestation that may threaten the long-term health of the riparian and/or DCSS communities. Trash will be removed, vandalism will be repaired, and appropriate pest control techniques will be employed as necessary. In addition, any signs of distress or mortality will be noted and rectified if the cause is apparent. If there are reoccurring or persistent indicators of distress or mortality and/or the cause of these problems is not apparent, ACOE, CDFG, USFWS, and RWQCB will be notified and consulted regarding appropriate remedial actions.

A monitoring program is necessary to document progress of the mitigation areas relative to the ultimate success criteria. Regular, repeated measurements and field observations allow the monitor to assess the extent of habitat improvements and to suggest solutions to problems. Early detection of problems or other unforeseen issues allows for adaptive management and mid-course adjustments to the mitigation program that will maximize the likelihood of success. Thorough documentation of habitat development also becomes a basis for refining restoration strategies.

7.0 SUCCESS CRITERIA AND CONTINGENCY MEASURES

Both general site characteristics and the functional condition of the mitigation areas will be used as success criteria to determine the extent to which the aquatic and upland resource functions will be restored as suitable habitat for the LBV and CAGN, respectively. Mitigation monitoring will continue until the Site has achieved the ultimate success criteria (typically 5 years) and the ACOE, CDFG, USFWS, and RWQCB determine that monitoring is no longer necessary.

7.1 GENERAL SUCCESS CRITERIA

Successful mitigation areas will have evidence of:

- Wildlife use for two consecutive monitoring periods. These are not focused surveys for particular wildlife species and may include observations of common or rare species. Records can be based on bird vocalizations, sightings of wildlife, scat, and animal tracks.
- Recruitment of native species as indicated by flower/fruit production or presence of seedlings.
- Sustainability (no significant maintenance[2] required for two consecutive years prior to release).

7.2 RIPARIAN MITIGATION

This set of functional evaluation criteria is based on one described in an ACOE publication (Stein, 1999). It uses qualitative observations and quantitative measurements to compare indicators of habitat, hydrology, and biogeochemistry at the mitigation site to a series of reference descriptions scaled from 0.0 (total failure) to 1.0 (complete success). Mitigation will be judged successful if the site achieves a score of 0.8 or greater in six out of the following seven categories. All quantitative values must be verified using the monitoring protocol described in Section 8.0, *Monitoring*. Hydrology must be one of the successful categories. Interim success criteria provide target goals for mitigation during the first three years following implementation (Table 17, *Functional Indicator Targets for Agua Hedionda Riparian Mitigation,* on page 65).

[2] *Significant maintenance includes, but is not limited to, the need to reseed or replant due to disease or mortality; erosion control failure; significant weeding; and continual dependence of the vegetation upon irrigation.*

Hydrology - stream geomorphology

0.0 = Water supply is only from precipitation. Site is not supplied by any surface or subsurface inflow (a flat, upland site).

0.2 = Water supply includes runoff from surrounding areas which may produce irregular erosion or deposition features but a defined channel is absent.

0.4 = A defined stream channel is present but transmits water only during or immediately after storms. Rapid urban runoff may cause incision of channel below floodplain.

0.6 = Stream channel transmits water for a few days after a storm event and there is no evidence of channel incision.

0.8 = Stream channel carries water for extended periods (1-2 weeks after a rainfall event) during a typical rainy season. The floodplain also has evidence of groundwater discharge (seepage) from uplands or there are microtopographic surface features (small pools, depressions) within the floodplain or channel that retain water for extended periods after rain.

1.0 = Stream channel carries water for extended periods (1-2 weeks after a rainfall event) during a typical rainy season. The floodplain has evidence of groundwater discharge (seepage) from uplands and there are microtopographic surface features (small pools, depressions) within the channel or floodplain that retain water for extended periods.

Characteristics of Flood-Prone Area

0.0 = Channel is contained in a concrete-lined channel, culvert etc.

0.2 = Channel has an earthen bottom; however, it is structurally confined (e.g., riprap or concrete sideslopes) such that there is no opportunity for overbank flow into the flood-prone area.

0.4 = Channel has an earthen bottom and earthen sideslopes; however, it is incised or confined such that there is no opportunity for overbank flow into the flood-prone area.

Table 17

FUNCTIONAL INDICATOR TARGETS FOR AGUA HEDIONDA RIPARIAN MITIGATION

Evaluation Criterion	Interim Target	Ultimate Target
Hydrology- stream geomorphology	0.8	0.8
Flood-prone area	0.8	0.8
Habitat – Vegetative Structure	0.6	0.8
Habitat – Vegetative Cover	0.6	0.8
Habitat – Vegetative Diversity	0.6	0.8
Exotic, Invasive Vegetation	0.8	1.0
Biogeochemistry- detritus cover	0.6	0.8

Source: PCR Services Corporation. 2004.

0.6 = Site is part of a floodplain which provides an opportunity for overbank flow during moderate flow events (i.e., during a two- to ten-year flood event). However, the Site is moderately confined by obstructions or barriers such that the area available for overbank flow is less than twice the width of the channel at bankfull conditions.

0.8 = Site is part of a floodplain which provides an opportunity for overbank flow during moderate flow events (i.e., during a two- to ten-year flood event). The Site is slightly or moderately confined by obstructions or barriers; however the area available for overbank flow is equal to or greater than twice the width of the channel at bankfull conditions.

1.0 = Site is part of an unconfined natural floodplain at least twice the width of the channel at bankfull conditions and there is evidence of overbank flow.

Habitat – Vegetative Structure

A successful riparian forest will have more than one strata. While some zones may be dominated by a single strata, there should also be patches of greater structural diversity. Strata are defined as herb (annual or perennial), shrub (multi-stemmed woody plants), sapling (tree species < 3" dbh), and tree species (> 3" dbh).

0.0 = No existing riparian vegetation.

0.2 = Few, scattered individuals of native riparian vegetation (< 20% of cover) representing a single strata.

0.4 = Native riparian vegetation covers 20 to 50% of the site, is regularly spaced, and consists of 1 to 2 strata.

0.6 = Native riparian vegetation covers >50% of the site and there are at least 2 strata present with each contributing at least 20% cover.

0.8 = At least two strata are represented with each contributing at least 30% cover. Patches of unvegetated ground (other than stream channel) are smaller than 400 ft^2.

1.0 = At least three strata are represented, each contributing at least 20% cover. Vegetation is a mosaic of structurally distinct patches of vegetation with different densities and species composition.

Habitat – Vegetative Cover

0 = cover of native riparian vegetation is < 10%.

0.2 = cover of native riparian vegetation is 10-30%.

0.4 = cover of native riparian vegetation is 30-50%.

0.6 = cover of native riparian vegetation is 50-70%.

0.8 = cover of native riparian vegetation is 70-90%.

1.0 = cover of native riparian vegetation is >90%.

Habitat - Vegetative Diversity

Native riparian plant species must occupy a minimum of 1% relative cover at the mitigation site in order to satisfy diversity requirements.

0.0 = No native riparian plant species present

0.2 = There are 1-3 native riparian plant species.

0.4 = There are 3-6 native riparian plant species.

0.6 = There are 6-9 native riparian plant species.

0.8 = There are 9-12 native riparian plant species.

1.0 = There are > 12 native riparian plant species.

Percent Exotic, Invasive Vegetation

Exotic, invasive plant species are defined in the A-1, A-2, B, Annual Grasses lists compiled by CA-IPC, 1999. Exotic, invasive cover refers to relative cover.

0.0 = > 90 percent cover of exotic vegetation.

0.2 = 60 to 90 percent cover of exotic vegetation.

0.4 = 40 to 59 percent cover of exotic vegetation.

0.6 = 20 to 39 percent cover of exotic vegetation.

0.8 = 5 to 19 percent cover of exotic vegetation.

1.0 = less than 5 percent cover of exotic vegetation.

Biogeochemistry – Detritus cover

Production of detritus indicates that nutrients are being recycled within the system and that a suite of microorganisms and invertebrate decomposers are being supported.

0.0 = Channel is contained in a concrete-lined channel, culvert, etc., with little to no production of vegetation and detritus.

0.2 = Ground cover has trace amounts (<2%) woody debris, leaf litter, or detritus.

0.4 = Cover of woody debris, leaf litter, or detritus is between 2 and 10 percent.

0.6 = Cover of woody debris, leaf litter, or detritus is between 10 and 30 percent.

0.8 = Cover of woody debris, leaf litter, or detritus is between 30 and 50 percent.

1.0 = Cover of woody debris, leaf litter, or detritus is greater than 50 percent.

7.2.1 Success Criteria for Created Wetland

An alternative set of hydrologic criteria is appropriate for the created wetland swale and will be based on duration of saturation and hydrologic support, as described below. Attainment of a score of 0.6 for both categories will be considered successful.

Hydrologic Support

0 = No regular supply of water to the site. Site not associated with any water source, surface drainage, impoundment, or groundwater discharge.

0.2 = Water supply to the site is solely from artificial irrigation (e.g., sprinklers, drip irrigation). No natural surface drainage, natural impoundment, groundwater discharge or other natural hydrologic regime.

0.6 = Site is sustained by natural or consistent source of water (e.g., flooding, seepage, runoff), but is dry for some portion of the year during an average rainfall year.

1.0 = Site is sustained by natural or consistent source of water (e.g., rainfall, urban runoff), year-round. Site may dry out during drought conditions.

Duration of Saturation

0 = No soil saturation or standing water observed.

0.2 = Soil is saturated within 12 inches of the surface for only brief periods after a storm event and standing water is seldom observed.

0.4 = Soil is saturated within 12 inches of the surface for less than two months and standing water is evident for only a few days after a storm event.

0.6 = Soil is saturated within 12 inches of the surface for two to four months during an average year. Standing water is evident for one to two weeks after a storm event.

0.8 = The soil is saturated to within 12 inches of the surface for four to six months. Standing water is evident for several weeks.

1.0 = Standing water is evident for at least six months.

7.3 DIEGAN COASTAL SAGE SCRUB

- At least 65 percent absolute cover of native vegetation.
- Richness of native species shall be at least 75% that of a nearby DCSS reference area of similar size. Species contributing to richness shall comprise at least 1% relative cover.
- Less than 10% absolute cover of exotic, invasive vegetation as defined by Ca-IPC, 1999 lists A-1, A-2, B, and Annual Grasses.

- Absence of all woody, invasive vegetation as defined by Ca-IPC, 1999 lists A-1, A-2, and B.

7.4 ADAPTIVE MANAGEMENT AND CONTINGENCY MEASURES

An integral part of a successful mitigation program is the ability to detect problems with the mitigation early in the process, determine the cause of the problem, and attempt to modify the mitigation program to accommodate emerging issues or situations. Problems, such as trash, vandalism, soil erosion, isolated instances of plant mortality, or small-scale weed or pest infestations will be rectified as they are discovered during routine site monitoring.

7.5 FORCE MAJEURE

KB Home Coastal, Inc. shall be responsible to maintain and remediate the mitigation areas except on the occurrence of certain Catastrophic Events or Unlawful Acts, as defined below.

A "Catastrophic Event" is defined as an event, such as a spill of hazardous or toxic substance, the impact of a vehicle or failing aircraft, or a fire, which has a material and detrimental impact on the quality of native vegetation, soils, or wildlife of the mitigation areas and over which the property owner had no reasonable control.

An "Unlawful Act" is defined as the unlawful act of another and shall include, an event or series of events, such as the intentional dumping within the mitigation area or its watershed of a hazardous or toxic substance, or the discharge of such a substance by any person or entity other then the property owner in violation of a statute, ordinance, regulation or permit, which event or series of events has a material and detrimental impact on the water quality, native vegetation, soils or wildlife of the mitigation area, and which event or series of events could not reasonably have been prevented by property owner.

If a catastrophic flood, fire, or outbreak of disease or pestilence occurs prior to the on-site mitigation areas achieving the interim success criteria, the property owner shall be responsible for fully remediating the mitigation areas. If such a catastrophic event occurs at a time when the on-site mitigation areas have achieved the interim success criteria, but not yet achieved the ultimate success criteria AND the catastrophic event destroys less than 75 percent of the areal extent of the mitigation area, KB Home Coastal, Inc. shall be responsible for fully remediating the mitigation areas. In all other situations, KB Home Coastal, Inc. shall not be responsible for remediating the effects of catastrophic flood, fire, disease, or pestilence. In cases where site remediation is necessary, the property owner shall contact ACOE, CDFG and RWQCB to discuss the most appropriate course of action to achieve the required remediation.

7.6 CERTIFICATION OF SUCCESS

When the mitigation areas have achieved the ultimate success criteria, ACOE, CDFG, USFWS, and RWQCB, will be notified in writing. The notification will be accompanied by the most recent annual monitoring report and any supplemental information necessary to document attainment of the success criteria. A site visit with ACOE, CDFG, USFWS, and RWQCB may be scheduled to verify the results of the mitigation program. ACOE, CDFG, USFWS, and RWQCB will have the discretion to declare each mitigation site successful or unsuccessful independent of the other sites on the property.

8.0 MONITORING

It is important to monitor both the physical and the biological aspects of the mitigation areas, as both are indicative of the functional condition of an area. The routine monitoring will include evaluation of site hydrology, plant establishment and vigor, indications of faunal utilization, development of soils, indications of biogeochemical processes, and collection of site photographs. A qualified biologist or restoration specialist will conduct the monitoring and report any problems to both the owner and the maintenance contractor. Vegetation monitoring will be conducted in transects which will be established during the first annual monitoring. The endpoints of each transect will be marked with rebar stakes to ensure consistency between monitoring periods.

8.1 RIPARIAN MONITORING ZONES

The proposed riparian mitigation is composed of three zones defined by the type and extent of restoration activities needed as described in Section 5.0, *Implementation Plan*. Although the same set of criteria will be used to evaluate success of the three areas, it is anticipated that the rate of progress toward success will differ between them thus warranting separate monitoring. Monitoring transects will be aligned perpendicular to water flow and will extend the entire width of the riparian zone. The following monitoring zones are proposed:

1. **Enhancement zone**: Vegetation will be monitored with a minimum of six short transects. Transects will be selectively located in those areas where streambed modifications, exotic plant removal, and planting have been done.

2. **Eucalyptus removal zone**: Monitoring in this zone will consist of one transect through each of the former groves. Cover and species composition of the wetland creation area will be assessed by making an ocular estimate (releve procedure).

3. **Restoration zone**: A minimum of three transects will traverse the former pond site.

The remaining portion of the riparian system consists of areas designated for preservation with only minor enhancements such as spot removal of exotic plants. Since the vegetation in this zone is largely intact, no quantitative monitoring is proposed and monitoring will consist of annual inspections of spots treated for invasive plant removal.

8.2 DIEGAN COASTAL SAGE SCRUB MONITORING ZONES

Diegan Coastal Sage Scrub mitigation areas are located in several parcels as shown in Figure 7, *Proposed Restoration*. Progress of these mitigation areas will be monitored in three general zones broken out as follows.

1. **Revegetation zone:** Vegetation monitoring will be conducted in a minimum of three transects traversing the narrow dimension of the main restoration zone. Generally, transects should be set at evenly spaced intervals and run perpendicular to the slope contour. One additional transect will traverse the smaller revegetation zone near the west side of the Site.

2. **Off-site easement Revegetation Zone:** At least three transects will traverse the narrow dimension of the off site easement area and will be continuous with transects in the adjacent on-site revegetation zone.

3. **Slope construction zone:** Two vegetation monitoring transects will be aligned perpendicular to the slope contour.

4. **Eucalyptus removal zone**: At least one transect will be aligned perpendicular to the slope contour in each patch.

8.3 MONITORING PROTOCOL

8.3.1 Hydrology

During inspections of the riparian sites, the biological monitor will estimate the percent area covered by water. An estimate of the range of water depth will also be made with the goal being to determine if there is adequate water to support the target habitat, to provide conditions for biogeochemical transformations, and to create the hydrodynamic processes necessary to sustain a riparian system. Soil borings will be made to a depth of 12 inches to determine hydrologic status of the created wetland. Hydrologic assessments will be made along the same transects designated for vegetation monitoring.

8.3.2 Biogeochemistry

The soil in the riparian restoration and wetland creation areas will be assessed for development of hydric soil indicators as described in guidelines of the ACOE Wetland Delineation Manual (1987) or NRCS Field Indicators of Hydric Soils (1998). All riparian mitigation zones will be assessed for other indicators of biogeochemical function such as depth of organic matter and percent cover of detritus. Topographic complexity will be observed in order to assess the presence of aerobic and anaerobic zones.

8.3.3 Vegetation

Percent cover by individual species will be presented in tables as both relative and absolute cover. Relative cover is a measure of the proportional contribution of all plant species to total vegetative cover and therefore always equals 100%. Absolute cover includes estimates of bare ground and canopy overlap and the total may therefore exceed 100%.

Absolute cover estimates by species will be combined to form the following vegetative categories: total, native, invasive/exotic, bare ground, and detritus. Vegetative cover will be measured along transects using the point intercept method and will include estimates of groundcover, shrub and canopy cover at each point. In order to limit trampling of vegetation during the establishment phase, the first annual monitoring may be limited to qualitative observations of plant cover, vegetative structure, species richness, plant health, and mortality.

8.3.4 Wildlife

During each site visit, evidence of wildlife usage will be recorded. These sightings will be compiled by species and presented in the annual monitoring report in tabular format.

8.3.5 Photography

Permanent photograph stations will be established at each mitigation site during site preparation. A map showing the locations of photo stations will be included in annual monitoring reports. Photographs will be taken from the same station during each annual monitoring event. Photograph stations will be permanently marked with stakes and located with GPS to within five meters of the actual location. There will be sufficient stations to clearly show the progress of the vegetation establishment and site development.

8.4 MONITORING SCHEDULE

The mitigation sites shall be monitored monthly during the first three months after planting. During the remainder of the first year the sites will be monitored quarterly. During the second and third years monitoring will be semi-annually, and annually thereafter for two more years or until mitigation is deemed successful by regulatory agencies. Data collection for annual monitoring reports will begin one year after the end of the first major planting period and will be repeated at yearly intervals until either: 1) the mitigation areas have met the final success criteria and the ACOE, CDFG, and RWQCB determine that monitoring is no longer required; or 2) alternative mitigation sites or strategies are adopted (and approved by the ACOE, CDFG, RWQCB). If there are reoccurring or persistent indicators of distress or mortality or the cause of these problems is not apparent, the agencies will be notified and consulted regarding appropriate remedial actions.

8.5 MONITORING REPORTS

Annual reports shall be submitted to the ACOE, CDFG, RWQCB, and USFWS beginning one year after planting and continuing throughout the monitoring period. The monitoring reports will include site information, names and affiliations of persons contributing to the report, a map showing transect locations and photo stations, copies of the ACOE, CDFG, and RWQCB permit conditions, results of field data collection, summary of site data relative to success criteria, maintenance and remedial activities performed during the previous year, and photographs.

If substantial corrective or remedial actions are required, additional monitoring reports will be prepared. These supplemental reports will describe the problem, the identified cause of the problem, the recommended corrective action, the schedule for corrective actions, and any modification of the maintenance, monitoring, or success criteria resulting from the problem. Supplemental reports will be submitted to the ACOE, CDFG, and RWQCB within 60 days of the date when the need for the corrective action was identified.

8.6 POINT OF CONTACT FOR MONITORING PHASE

Within 90 days of initiation of the mitigation installation, the property owner will provide ACOE, RWQCB, and CDFG with the name, address, phone number, and email address of the appropriate point of contact(s) for the maintenance and monitoring phase of the mitigation program.

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APPENDIX A: FENCING MATERIALS

Fencing and Other Measures to Mitigate Indirect Effects to Adjacent Open Space

- Fencing will be placed along the back of lots and roads that are located adjacent to natural areas. Ex. Construct a 6-foot chain link fence along the eastern and southeastern school boundary up to the existing housing.

- Erosion and siltation will be minimized. An erosion control plan will be prepared and included in the storm water pollution prevention plan for the site. Erosion control measures may include the installation of silt fencing and/or sandbags downslope of any clearing and/or grading activity.

- Outdoor lighting shall be directed away from the off-site habitat. Lighting in residential areas and along roadways will be designed to prevent artificial lighting from reflecting into adjacent natural areas. Specific lighting designs will be required in the development plans to achieve this result. The conditions, covenants and restrictions (CC&Rs) for the development will also require any subsequently installed lighting to meet this result. This condition also applies to street lighting within 500 feet of occupied gnatcatcher habitat.

- The CC&Rs will contain wording that addresses potential impacts of domestic animals on wildlife. In particular, the CC&Rs will either require fencing that restricts domestic cats from entering the open space or require that homeowners keep cats indoors. In some cases, residents will be restricted from owning domestic cats.

- Owners manuals for the residences will provide a discussion of the impacts of domestic animals on the gnatcatcher and other sensitive species and the impacts of wildlife on domestic animals. Residents will be reminded that the development is adjacent to natural open space. Encounters with wildlife are highly probable.

- Caution should be taken that landscaping zones are properly weeded to prevent non-native species from entering high-quality coastal sage scrub adjacent to the project site. Landscaping palettes will be reviewed by the regulatory agencies and plants identified by the California Exotic Pest Plant Council as an invasive risk in southern California will not be approved. Non-aggressive/invasive drought tolerant landscaping will be used within the housing site.

APPENDIX B: EXOTIC PLANT SPECIES TARGETED FOR REMOVAL

LIST A:1 MOST INVASIVE WILDLAND PEST PLANTS, WIDESPREAD

Species Name	Common Name
Ammophila arenaria	European beach grass
Arundo donax	Giant reed, arundo
Bromus tectorum	Cheat grass, downy brome
Carpobrotus edulis	Iceplant, sea fig
Centaurea solstitalis	Yellow starthistle
Cortaderia jubata	Andean pampas grass, jubata grass
Cortaderia selloana	Pampas grass
Cynara cardunculus	Artichoke thistle
Cytisus scoparius	Scotch broom
Eucalyptus globulus	Tasmanian blue gum
Foeniculum vulgare	Wild fennel
Genista monspessulana	French broom
Lepidium latifolium	Perennial pepperweed tall whitetop
Myriophyllum spicatum	Eurasian watermilfoil
Pennisetum setaceum	Fountain grass
Rubus discolor	Himalayan blackberry
Senecio mikaniodes (=delairea odorata)	Cape ivy, German ivy
Taeniatherum caput-medusae	Medusa-head
Tamarix chinensis, T. gallica, T. parviflora and T. ramosissima	Tamarisk, salt cedar
Ulex europaeus	gorse

LIST A:2 MOST INVASIVE WILDLAND PEST PLANTS, REGIONAL

Species Name	Common Name
Ailanthus altissima	Tree of heaven
Atriplex semibaccata	Australian saltbush
Brassica tournefortii	Moroccan or African mustard
Bromus madritensis ssp. rubens	Red brome
Cardaria draba	White-top, hoary cress
Conicosia pugioniformis	Narrow-leaved iceplant, roundleaf iceplant
Cotoneaster pannosus, c. lacteus	cotoneaster
Cytisus striatus	Striated broom
Egeria densa	Brazilian waterweed
Ehrharta calycina	veldtgrass
Eichhornia crassipes	Water hyacinth
Elaeagnus angustifolia	Russian olive
Euphorbia esula	Leafy spurge
Ficus carica	Edible fig
Lupinus arboreus	Bush lupine
Mentha pulegium	pennyroyal
Myoporum laetum	Myoporum
Saponaria officinalis	Bouncing bet
Spartina alterniflora	Atlandtic or smooth cordgrass

List B: Wildland Pest Plants of Lesser Invasiveness

Species Name	Common Name
Ageratina adenophora	Eupatory
Bassia hyssopifolia	Bassia
Bellardia trixago	bellardia
Brassica nigra	Black mustard
Cardaria chalepensis	Lens-podded white-top
Carduus pycnocephalus	Italian thistle
Centaurea calcitrapa	Purple starthistle
Centaurea melitensis	Tocalote, malta starthistle
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Crataegus monogyna	hawthorn
Ehrharta erecta	Veldt grass
Erechtites glomerata, e. minima	Australian fireweed
Festuca arundinacea	Tall fescue
Hedera helix	English ivy
Holcus lanatus	Velvet grass
Hypericum perforatum	Klamathweed, St. John's wort
Ilex aquifolium	English holly
Iris pseudacorus	Yellow water iris, yellow flag
Leucanthemum vulgare	Ox-eye daisy
Mesembryanthemum crystallinum	Crystalline iceplant
Myriophyllum aquaticum	Parrot's feather
Olea europaea	olive
Phalaris aquatica	Harding grass
Potamogeton crispus	Curlyleaf pondweed
Ricinus communis	Castor bean
Robinia pseudoacacia	Black locust
Schinus molle	Peruvian pepper tree
Schinus terebinthifolius	Brazilian pepper
Senecio jacobaea	Tansy ragwort
Spartium junceum	Spanish broom
Verbascum thapus	Woolly or common mullein
Vinca major	periwinkle

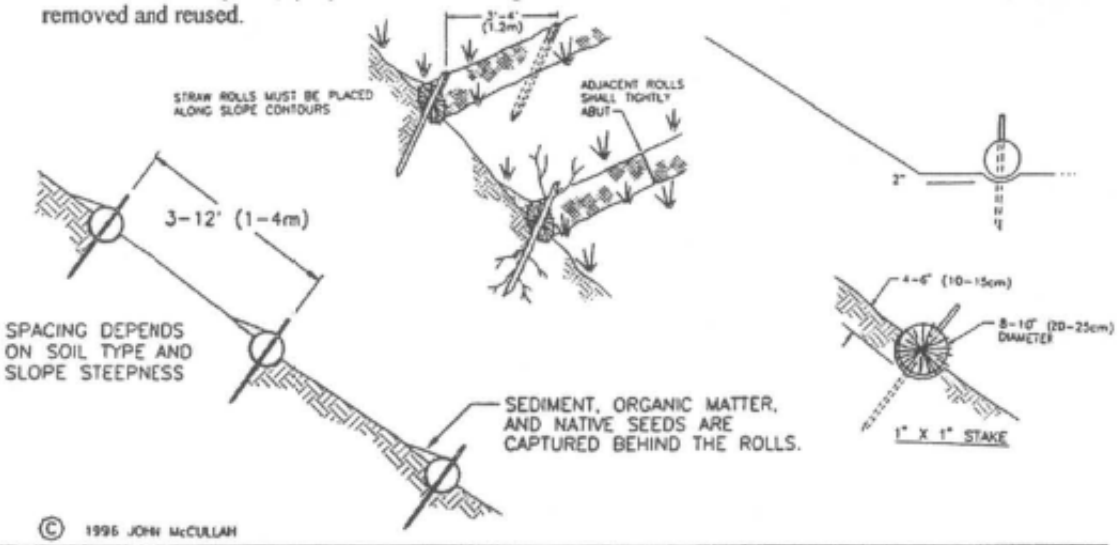
APPENDIX C: STRAW WATTLE INSTALLATION

Rice Straw Native Grass Straw

STRAW WATTLES:
Fiber Rolls, Filter Barriers, Mulch Rows

This sediment barrier is designed for low surface flows not to exceed 1 cfs for small areas, slopes flatter than 3:1 or short slopes, and where silt fences are not practicable. Straw Wattles can also be installed on contour on steeper slopes to reduce surface, spread water flow and capture sediment. The following is a brief description of the Straw Wattles, their uses and proper installation.

- The height of a Straw Wattle is 9 inches. The installed height is approximately 5 - 7 inches. The standard length of Straw Wattles is 25 feet, however other lengths will be made upon request.
- Straw Wattles can be installed on contour of slopes, with a slight downslope angle at the end of each row to allow for slow drainage during heavy precipitation. They can also be sued at the top of slopes to prevent sheeting over the edge, and they can be used at the toe of slopes. Straw Wattles can also be used along sidewalks and curbs and around storm drains and inlets to prevent sediment pollution.
- Straw Wattles can be used to replace silt fences, straw bale dikes and sand bag barriers. They can also be placed in drainage swales to slow flows and capture sediment; they can be used as level spreaders to prevent concentrated flows, and in place of earthen berms or dikes.
- Straw Wattles should be installed in shallow trenches, 2 - 4 inches deep, depending on soil type and slope steepness. Dig the deeper trench for soft, loamy soils and steepest slopes; dig the shallower trench for hard, rocky soils and gentler slopes. Use maddox and shovel to dig the trench, throwing excavated soil to the uphill side to prevent run off from undercutting the Wattle.
- Lay the Wattle in the trench and stake with 3/4" X 3/4" X 18" or 24" wood stakes at each end and 4-foot on center. When installing running lengths, Straw Wattle ends should be butted firmly together to prevent leakage, and securely staked together. **DO NOT OVERLAP**.
- When used on slopes, Straw Wattles do not require removal and can be abandoned in place. However, when used for temporary purposes such as along sidewalks and curbs, or around storm drains, they can be removed and reused.



For more detailed information about the STRAW WATTLES, including installation instructions, contact:

California Straw Works Phone/FAX: (916) 453-1456
E-mail: strawwattles@worldnet.att.net Web Site: www.strawwattle.com

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