CONCEPTUAL HABITAT MITIGATION AND MONITORING PLAN FOR IMPACTS TO AREAS WITHIN THE JURISDICTION

OF

THE UNITED STATES ARMY CORPS OF ENGINEERS PURSUANT TO SECTION 404 OF THE CLEAN WATER ACT,

THE REGIONAL WATER QUALITY CONTROL BOARD PURSUANT TO SECTION 401 OF THE CLEAN WATER ACT,

THE CALIFORNIA DEPARTMENT OF FISH AND GAME PURSUANT TO SECTION 1600 OF THE FISH AND GAME CODE

AND

THE CALIFORNIA COASTAL COMMISSION PURSUANT TO THE CALIFORNIA COASTAL ACT

SOUTH ORANGE COUNTY TRANSPORTATION INFRASTRUCTURE IMPROVEMENT PROJECT (SOCTIIP) ORANGE AND SAN DIEGO COUNTIES, CALIFORNIA

August 31, 2007

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EXECUTIVE SUMMARY

Implementation of the South Orange County Transportation Infrastructure Improvement Project A7C-FEC-M Alternative (SOCTIIP – Proposed Project) will result in unavoidable permanent impacts to approximately 23.08 acres within the jurisdiction of the California Department of Fish and Game Code (CDFG), approximately 6.27 acres within the jurisdiction of the U.S. Army Corps of Engineers (Corps), approximately 7.95 acres within the jurisdiction of the Regional Water Quality Control Board (RWQCB) and 0.16 acre within the jurisdiction of California Coastal Commission (CCC).

To compensate for unavoidable permanent impacts to areas within the above-named regulatory jurisdictions, this comprehensive Habitat Mitigation and Monitoring Plan (HMMP) proposes to create and/or restore native grassland, wet meadow, mule fat scrub, southern willow woodland, and southern coast live oak/elderberry woodland habitats within approximately 216.4 acres in and adjacent to Chiquita Creek, located within the San Juan Creek watershed and 1.0 acre adjacent to San Mateo Creek in the San Mateo Creek watershed. The primary components of creation involve recontouring uplands that are adjacent to existing wetland/riparian areas in order to promote surface flow of water and restore the floodplain. The recontoured areas will be planted with a variety of wetland/riparian species. The primary components of restoration involve removing the non-native species and replanting the area with native plant species from perennial grassland and southern coast live oak/elderberry woodland communities.

The Proposed Project is an extension of the existing Foothill Transportation Corridor (FTC) State Route (SR) 241 from Oso Parkway to I-5 near the Orange County/San Diego County boundary. The Proposed Project is generally located in the coastal foothills of southern Orange and extreme northwestern San Diego counties and is approximately 16 miles long, with approximately 0.8 mile of improvements on the I-5. Topographically, this region exhibits low-lying ridgelines and mountains interspersed with relatively broad valleys and canyon bottoms. Elevations range from sea level at the coastline to approximately 900 feet above sea level in the interior hills. The region is entirely underlain with marine and non-marine sedimentary rocks with overlaying marine terrace, fan, alluvium, and landslide deposits. The Proposed Project occurs primarily within a largely undeveloped area with scattered areas of active agriculture, sand and gravel mining, a state park on leased land, and Marine Corps military operations. Much of the remaining undeveloped area has supported and/or is being used for livestock grazing. Considerable areas of natural open space also exist. These areas support several major vegetation types including grasslands, scrub, chaparral, oak and riparian woodlands, marshes, and other wetlands. These in turn provide habitat for a wide variety of animals, including many invertebrate, amphibian, reptile, bird, and mammal species.

There are two major drainage basins, the San Juan Creek Watershed and San Mateo Creek Watershed, within the vicinity of the Proposed Project. The San Juan Creek Watershed covers approximately 134 square miles and includes portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano. Its main tributary, San Juan Creek, originates in the Santa Ana Mountains district of the Cleveland National Forest in the easternmost part of Orange County. Other smaller, but still substantial, drainage courses include Bell Canyon, Cañada Gobernadora, and Cañada Chiquita, which are tributaries to

San Juan Creek. The San Mateo Creek Watershed covers approximately 139 square miles. Its drainage area lies within western Riverside and northwestern San Diego counties, with approximately 20 percent in the boundary of southeastern Orange County. Gabino Canyon, Blind Canyon, and Cristianitos Creek are tributaries to San Mateo Creek.

In summary, the goals of this HMMP are to:

- to the maximum extent practicable, establish a watershed-based mitigation approach whereby largely contiguous areas within the same watershed are created and restored in order to improve the quality and success of the mitigation program;
- ensure no-net-loss of wetland and/or riparian acreage;
- increase the functions provided by the existing drainages and associated riparian habitats, and limited areas of wetland;
- establish hydrologic, biogeochemical and wildlife functions currently not associated with drainages to be impacted; and
- increase the habitat values beyond those currently provided by the existing streambeds, wetlands and/or riparian habitats.

SOCTIIP CONCEPTUAL HABITAT MITIGATION AND MONITORING PLAN[1]

I. DESCRIPTION OF THE PROPOSED PROJECT/IMPACT AREA

A. Responsible Parties

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B. Location and Brief Summary of Overall Proposed Project

The Proposed Project is generally located in the coastal foothills of southern Orange and northwestern San Diego counties. [Exhibits 1 and 2]. The site is depicted on U.S. Geological Survey (USGS) topographic maps El Toro, California [dated 1968 and photorevised 1982], Santiago Peak, California [dated 1954 and photorevised 1988], Canada Gobernadora, California [dated 1968 and photorevised 1988], and San Clemente, California [dated 1968 and photorevised in 1975].

The Proposed Project is the construction of a north-south toll road corridor with a cross section providing two general purpose lanes in each direction (with the option to add two high-occupancy vehicle lanes in the future) for the entire length of the corridor from the current terminus of the Foothill Transportation Corridor (FTC, SR-241) at Oso Parkway to Interstate 5 at Basilone Road. The proposed alignment is approximately 16 miles long. The northern boundary of the Proposed Project is located at approximately 33º 35'13"N by 117º 36' 36"W, and the southern boundary is located at approximately 33º 23' 07"N by 117º 34' 59"W.

Topographically, this region exhibits low-lying ridgelines and mountains interspersed with relatively broad valleys and canyon bottoms. Elevations range from sea level at the coastline to approximately 900 feet above sea level in the interior hills. The region is entirely underlain with marine and non-marine sedimentary rocks with overlaying marine terrace, fan, alluvium, and

[1] This mitigation program was prepared in accordance with the following document: Army Corps of Engineers, Los Angeles District: *Special Public Notice: Final Mitigation Guidelines and Monitoring Requirements.* Public Notice 970031200-RRS, April 19, 2004.

landslide deposits. The Proposed Project occurs primarily within a largely undeveloped area with scattered areas of active agriculture, sand and gravel mining, a state park on leased land, and U.S. Marine Corps military operations. Much of the remaining undeveloped area has supported and/or is currently being used for livestock grazing. Considerable areas of natural open space also exist. These areas support several major vegetation types including grasslands, scrub, chaparral, oak and riparian woodlands, marshes, and other wetlands. These in turn provide habitat for a wide variety of animals, including many invertebrate, amphibian, reptile, bird, and mammal species.

There are two major drainage basins, namely the San Juan Creek Watershed and San Mateo Creek Watershed, within the vicinity of the Proposed Project. The San Juan Creek Watershed covers approximately 134 square miles and includes portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano. Its main tributary, San Juan Creek, originates in the Santa Ana Mountains district of the Cleveland National Forest in the easternmost part of Orange County. Other smaller, but still substantial, drainage courses including Bell Canyon, Canada Gobernadora, and Canada Chiquita, are tributary to San Juan Creek. The San Mateo Creek Watershed covers approximately 139 square miles. Its drainage area lies within western Riverside and northwestern San Diego counties, with approximately 20 percent in the boundary of southeastern Orange County. Gabino Canyon, Blind Canyon, and Christianitos Creek are tributaries to San Mateo Creek.

Throughout the San Juan and Mateo Creek watersheds, there are several locations where mitigation programs for other projects have been implemented for a variety of impacts to upland as well as wetland resources. Long term planning for conservation and development of these individual areas and the southern Orange County and northwestern San Diego County region are currently being addressed through the Orange County Southern Subregion Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and resource management programs developed by Marine Corps Base Camp Pendleton (MCBCP).

C. Proposed Project Background

The proposed southern extension of existing SR 241, also referred to as the Foothill Transportation Corridor-South (FTC-S), has been subject to planning efforts for approximately 20 years. Final Environmental Impact Report (EIR) 123, which was certified by the County of Orange in 1981, resulted in a conceptual alignment for a transportation corridor facility being placed on the County's Master Plan of Arterial Highways (MPAH). The MPAH shows the alignment of the existing SR 241 and a conceptual alignment for the FTC-S. Between 1989 and 1991, the TCA prepared TCA EIR 3, pursuant to the California Environmental Quality Act (CEQA), for the selection of a locally preferred road alignment for the FTC-S. TCA EIR 3 addressed the C and BX road alignments, developed as part of the alternatives analysis phase of the project, as the primary build alternatives. On October 10, 1991, the Modified C Alignment was selected by the TCA as the locally preferred alternative. Subsequently, at the request of the United States Fish and Wildlife Service (USFWS), the Modified C Alignment was slightly altered to avoid high quality scrub communities, protect sensitive species and wildlife movement in the Sulfur Canyon area, and minimize impacts to the Pacific pocket mouse (*Perognathus*

longimembris pacificus). As a result of these changes, the Modified C alignment was then renamed the CP Alignment.

In 1996, as a result of the 1994 National Environmental Policy Act (NEPA)/Clean Water Act (CWA) Section 404 Integration Process for Surface Transportation Projects, the Federal Highway Administration (FHWA) initiated coordination to implement the policies of the Memorandum of Understanding for the NEPA and Section 404 Integration Process for Surface Transportation Projects in Arizona, California and Nevada (MOU). The MOU was related to development of the Environmental Impact Statement (EIS) and Section 404 permitting for the FTC-S. The NEPA/Section 404 MOU implements the FHWA, United States Army Corps of Engineers (ACOE), and United States Environmental Protection Agency (EPA) policies of improved interagency coordination and integration of the NEPA and Section 404 procedures. The NEPA/Section 404 MOU applies to all projects needing both FHWA action under NEPA and an ACOE individual permit under Section 404 of the CWA. The signatory agencies to the NEPA/Section 404 MOU include FHWA, EPA, ACOE, USFWS, National Marine Fisheries Service (NMFS), and Caltrans.

In March 1999, pursuant to the NEPA/Section 404 MOU and through collaboration with the NEPA/404 MOU agencies and the TCA, a purpose and need statement was approved for the SOCTIIP. Between August 1999 and November 2000, the NEPA/Section 404 MOU signatory agencies developed a list of project alternatives to be evaluated in the EIS/Supplemental Environmental Impact Report (SEIR). It was during this process that the signatory agencies referred to the project as the South Orange County Transportation Infrastructure Improvement Project or SOCTIIP. The NEPA/404 MOU agencies and the TCA are collectively referred to as the "SOCTIIP Collaborative." In November 2000, the SOCTIIP Collaborative concurred on the alternatives to be evaluated in the technical studies and in August 2003 concurred on the alternatives to be carried forward and evaluated in the EIS/SEIR. These alternatives are described in Section ES.3 of the Executive Summary in the EIS/SEIR and are described in detail in Section 2.0 (Alternatives) of the EIS/SEIR.

Between preparation of the draft and final EIS/SEIR, the SOCTIIP Collaborative identified the Preferred Alternative, which is described in this HMMP as the Proposed Project. The USFWS has preliminarily indicated that the Proposed Project will comply with applicable requirements of the Endangered Species Act. These determinations reflect the evaluations by these agencies in the Collaborative process conducted over the last six years.

The decision to select the A7C-FEC-M alignment represents the collaborative work of the above-named agencies to identify and select an alternative which minimizes environmental and community impacts and complies with the requirements of federal and state law and accomplishes the project's purpose and need. This decision is also based on the comments received from the public on the draft EIS/SEIR, federal and state resource/regulatory agencies, and elected officials.

D. Demonstration of Avoidance and Minimization

Minimization, avoidance and enhancement measures have been incorporated into the design of the Proposed Project to reduce impacts. During the Collaborative process, the alignment was adjusted to avoid much of the biologically sensitive resources within the south Orange County and northwestern San Diego County area. Specifically, direct impacts to both wetlands and non-wetland waters were avoided and/or minimized. Avoidance and minimization measures included refining the grading limits to reduce cut and fill by following natural contours, placement of bridge structures across major high order drainages, and shifting the alignment to avoid sensitive resources, including the Tesoro Wetlands area. Additionally, efforts were made to minimize impacts to jurisdictional waters by reducing the size and number of structural supports and by locating those required structural columns outside of high value jurisdictional resources. In order to reduce the number of structural columns, TCA maximized bridge span by increasing the structural strength of the bridge and increasing the bridge depth.

In addition, the Collaborative adjusted the alignment to avoid, to the greatest extent possible, the current natural open space areas in the eastern and/or central portion of the SOCTIIP action area. The Proposed Project, with its more western location, minimizes impacts on open space areas by being located in proximity to existing development and within the areas approved for development in the Ranch Plan. It allows for retention of large blocks of open space east of the alignment and retains major wildlife movement corridors and allows greater wildlife connectivity between the RMV property and the Cleveland National Forest.

Additional shifts of the alignment have been made to avoid geotechnical hazards, thus reducing remedial grading. Avoidance of existing utilities was also performed to limit relocation impacts. Bridges have been incorporated at the major stream crossings to minimize hydrologic impacts and impacts to wetland habitats. To minimize impacts during construction, features such as cofferdams can be utilized in wetland areas to limit the necessary construction area at the bridge supports. The addition of retaining walls was also incorporated to limit the grading footprint in sensitive areas.

The following description provides detailed information about the Proposed Project, refinements to the Proposed Project since circulation of the Draft EIS/SEIR, and the reasons for selection of the Proposed Project. The A7C-FECM-Intitial Alternative is the Proposed Project but with the following primary modifications:

- *Reduction in Size of Project.* The Proposed Project is reduced in size from eight lanes to a maximum of six general purpose lanes. This modification to the Proposed Project reduces the typical cross-section of the project from 156 feet to 128 feet. Initially, the project will be constructed as a four-lane facility (two lanes in each direction).

- *Consistency with Anticipated NCCP Reserve Design.* The modifications conform to the anticipated reserve design for the Southern Orange County NCCP. In general, the Rancho Mission Viejo (RMV) Ranch Plan concentrates the development property in the western and northern portions of RMV property. The Proposed Project incorporates bridges and wildlife crossings into the design to minimize the effect of habitat

fragmentation. The NCCP/HCP identifies several important linkages connecting these open space habitat block areas. Out of the 20 habitat linkages and wildlife movement areas identified from field surveys in the NCCP/HCP planning area, 15 are applicable to the wildlife corridor existing conditions in the SOCTIIP biological study area. Bridge, arch culverts, and box culverts that provide for wildlife undercrossings of the Preferred Alternative have been incorporated into the project design at locations that are consistent with the linkages identified pursuant to the NCCP/HCP guidelines. It is anticipated that the reserve design for the Southern Orange County NCCP will be consistent with the Ranch Plan.

- *Modifications Regarding RMV Ranch Plan to Maximize Open Space.* The alignment of the Proposed Project is revised to conform as much as is feasible to the areas shown for development and potential development in the RMV Ranch Plan approved by the County of Orange as modified by the Settlement Agreement among RMV, the County and the environmental organizations (the Endangered Habitats League, Natural Resources Defense Council, Sea and Sage Audubon Society, Laguna Greenbelt, Inc., and Sierra Club). The RMV Ranch Plan (as reflected in the Settlement Agreement) contemplates the development of 14,000 units and 3,480,000 square feet of urban activity center uses, 500,000 square feet of neighborhood center uses and 1,220,000 square feet of business park uses in six development areas. By including as much of the Proposed Project within the development areas as is feasible, impacts on open space and habitat areas are minimized.

- *Minimization of Impacts on Wetlands and Other Natural Resources.* The Proposed Project includes a number of adjustments that avoid or minimize impacts to wetlands and other natural resources. For example, the Proposed Project impacts only 0.82 acre of wetlands within the entire 16-mile alignment.

- *Adjustments to Minimize Utility Relocation Impacts.* Disturbance limits associated with utility relocations were minimized based on coordination with utility service providers. These adjustments reduced impacts to the natural environment.

- *Inclusion of Additional Wildlife Crossings.* Fifteen wildlife crossings are included to further facilitate wildlife movement. Wildlife crossings are included within the four large habitat blocks identified in the approved RMV Ranch Plan open space reserves. These large open spaces areas are functionally interconnected through bridge and wildlife crossings incorporated into the design of the Proposed Project and through the project design features associated with the approved RMV Ranch Plan.

- *Minimization of Access Road Impacts.* The design of the connections between the Proposed Project and access roads is modified to further minimize grading and to insure continued access to existing utility and agricultural operations on RMV.

- *Minimization of Cultural Resources Impacts.* The location and design of several Extended Detention Basins have been modified to reduce impacts on cultural and biological resources.

- *Additional Avoidance within Disturbance Footprint*: Grading impacts within the disturbance limits are being further refined where possible. For example, direct impacts to VP3 and VM20 will be avoided and impacts to San Mateo Marsh – East of I-5 will be avoided to the maximum extent practicable.

E. Jurisdictional Areas to be Filled by Habitat Type and Location

The Proposed Project will permanently impact approximately 6.27 acres of Corps jurisdiction, of which 0.82 acres consist of jurisdictional wetland. Temporary impacts to Corps jurisdiction total 9.44 acres, of which 6.73 acres consist of jurisdictional wetland. Permanent impacts to CDFG jurisdiction total 23.08 acres, of which 20.37 acres consist of vegetated riparian habitat. Temporary impacts to CDFG jurisdiction total approximately 14.61 acres, of which 14.58 acres consist of vegetated riparian habitat. Permanent impacts to RWQCB jurisdiction (including isolated waters of the State) total 7.95 acres. Temporary impacts to RWQCB jurisdiction (including isolated waters of the State) total 9.49 acres. Permanent impacts to CCC jurisdiction total 0.16 acre, all of which consists of CCC wetland. Temporary impacts to CCC jurisdiction total 7.70 acres, all of which consists of CCC wetland. Tables 1 through 4 below provide a summary of jurisdictional impacts. Because impacts to Corps, CDFG, RWQCB and CCC listed above occur to the same set of drainage features, the impacts are not additive.

TABLE 1
SUMMARY OF PERMANENT JURISDICTIONAL IMPACTS

		CORPS			CDFG			RWQCB	CCC
Drainage Feature	**Resource Type**	**Wetlands**	**Non-wetland Waters**	**Total**	**Vegetated**	**Unvegetated Streambed**	**Total**	**Total**	**Total**
FE/C/7-Wetland 2	Slope Wetland	0	0	0	0	0	0	0.10	NA
FE/C/7-1	Ephemeral	0	0.02	0.02	0.41	0.01	0.42	0.02	NA
FE/7-1	Ephemeral	NA	NA	NA	0.5	0.01	0.51	0.02	NA
FE/7-2	Intermittent	NA	NA	NA	0.2	0.01	0.21	0.21	NA
FE-1	Ephemeral	NA	NA	NA	0.69	0	0.69	0.04	NA
FE-2A	Ephemeral	NA	NA	NA	0	0.01	0.01	0.01	NA
FE-2B	Ephemeral	0	0.06	0.06	0	0.06	0.06	0.06	NA
7-2	Ephemeral	0	0.02	0.02	0	0.03	0.03	0.03	NA
7-3	Ephemeral	0	0.51	0.51	3.91	0.08	3.99	0.52	NA
7-5	Ephemeral	0	0.01	0.01	0.09	0	0.09	0.01	NA
7-6	Ephemeral	0	0.01	0.01	0.13	0.01	0.14	0.01	NA

TABLE 1
SUMMARY OF PERMANENT JURISDICTIONAL IMPACTS

		CORPS			CDFG			RWQCB	CCC
Drainage Feature	**Resource Type**	**Wetlands**	**Non-wetland Waters**	**Total**	**Vegetated**	**Unvegetated Streambed**	**Total**	**Total**	**Total**
7-San Juan Creek	Intermittent	0	0.01	0.01	0.3	0	0.3	0.01	NA
7-10	Ephemeral	NA	NA	NA	0.09	0.08	0.17	0.08	NA
7-11	Ephemeral	NA	NA	NA	0	0	0.03	0.02	NA
7-12	Ephemeral	0	0.03	0.03	0.51	0	0.51	0.03	NA
7-13	Ephemeral	0	1.92	1.92	1.72	1.19	2.91	1.94	NA
FE/7-3	Ephemeral	0	0.2	0.2	1.94	0	1.94	0.61	NA
FE/7-4	Intermittent	NA	NA	NA	0.82	0	0.82	0.75	NA
FE/7-6	Ephemeral	0	0.1	0.1	0.79	0.05	0.84	0.1	NA
FE/7-7	Ephemeral	0	0.12	0.12	2.06	0	2.06	0.12	NA
FE/7-8	Ephemeral	0	0.19	0.19	2.34	0.08	2.42	0.19	NA
FE/7-9	Ephemeral	0	0.1	0.1	0	0.1	0.1	0.1	NA
Unnamed Tributary to Cristianitos	Ephemeral	0	0	0	0.08	0	0.08	0	NA
FE/7-10	Ephemeral	0	0.05	0.05	0.17	0.04	0.21	0.05	NA
FE/7-11	Perennial	0.12	0.39	0.51	0.77	0	0.77	0.51	NA
FE/7-12	Intermittent	0.35	0	0.35	0.35	0	0.35	0.35	NA
FE/7-12	Ephemeral	0	0.27	0.27	0.57	0.08	0.65	0.27	NA
FE/7-14	Ephemeral	0	0.19	0.19	0.15	0.05	0.2	0.19	NA
FE/7-VM18	Depressional Wetland	0.04	0	0.04	NA	NA	NA	0.04	NA
FE/7-VM19	Depressional Wetland	0.06	0	0.06	NA	NA	NA	0.06	NA
FE/7-15	Ephemeral	0	0.12	0.12	0	0.12	0.12	0.12	NA
FE/7-16	Ephemeral	0	0.09	0.09	0	0.09	0.09	0.09	NA
FE/7-17	Ephemeral	0	0.12	0.12	0	0.12	0.12	0.12	NA
FE/7-18	Ephemeral	0	0.55	0.55	0.89	0.25	1.14	0.55	NA
FE/7-19	Ephemeral	0	0.01	0.01	0	0.01	0.01	0.01	NA
FE/7-20	Ephemeral	0	0.01	0.01	0	0.01	0.01	0.01	NA
FE/7-21	Ephemeral	0	0.07	0.07	0.48	0	0.48	0.07	NA
FE/7-22	Ephemeral	0	0.22	0.22	0.18	0.15	0.33	0.22	NA
FE/7-24	Ephemeral	0	0.03	0.03	0	0.03	0.03	0.03	NA
FE/7-25	Ephemeral	0	0.03	0.03	0	0.03	0.03	0.03	NA

TABLE 1
SUMMARY OF PERMANENT JURISDICTIONAL IMPACTS

		CORPS			CDFG			RWQCB	CCC
Drainage Feature	**Resource Type**	**Wetlands**	**Non-wetland Waters**	**Total**	**Vegetated**	**Unvegetated Streambed**	**Total**	**Total**	**Total**
FE/7-San Mateo Creek	Perennial	0.01	0	0.01	0.01	0	0.01	0.01	0.006
FE/7-San Mateo Marsh- East of I5	Freshwater Forested Wetland	0	0	0	0.21	0	0.21	0	0.147
FE/7-VM203	Depressional Wetland	0.05	0	0.05	NA	NA	NA	0.05	0
FE/7-VP33	Depressional Wetland	0.18	0	0.18	NA	NA	NA	0.18	0
San Onofre Creek	Perennial	0.01	0	0.01	0.01	0	0.01	0.01	0.005
TOTAL	**NA**	**0.82**	**5.45**	**6.27**	**20.37**	**2.71**	**23.08**	**7.95**	**0.158**

TABLE 2
Summary of Temporary Jurisdictional Impacts

		CORPS			CDFG			RWQCB	CCC
Drainage Feature	**Resource Type**	**Wetlands**	**Non-wetland Waters**	**Total**	**Vegetated**	**Unvegetated Streambed**	**Total**	**Total**	
FE/7-1	Ephemeral	NA	NA	NA	1.28	0.03	1.31	0.05	NA
7-San Juan Creek	Intermittent	0.29	2.71	3.00	6.62	0	6.62	3.00	NA
San Mateo Creek	Perennial	5.30	0	5.30	5.69	0	5.69	5.30	5.75
San Mateo Marsh – East of I-5	Freshwater Forested Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89
San Onofre Creek	Perennial	1.14	0	1.14	0.99	0	0.99	1.14	1.06
TOTAL	**NA**	**6.73**	**2.71**	**9.44**	**14.58**	**0.03**	**14.61**	**9.49**	**7.70**

TABLE 3 Impacts to CDFG Jurisdiction by Vegetation Type			
Riparian Vegetation Type	**Permanent Impacts**	**Temporary Impacts**	**Total Impacts**
Alkali Meadow	0.20	0.00	0.20
Coast Live Oak Riparian Woodland	11.88	0.00	11.88
Freshwater Marsh	0.00	0.42	0.42
Mule fat Scrub	3.96	0.00	3.96
Riparian Herb	1.05	0.00	1.05
Southern Willow Scrub	1.51	0.00	1.51
Southern Arroyo Willow Forest	0.41	6.69	7.10
Southern Sycamore Riparian Woodland	1.36	7.47	8.83
Unvegetated Streambed	2.71	0.03	2.74
Total	**23.08**	**14.61**	**37.69**

TABLE 4 Summary Of Impacts To CCC Jurisdictional Wetland			
Vegetation Type	**Temporary Impacts**	**Permanent Impacts**	**Total Impacts**
Coastal Freshwater Marsh	0.42 ac	0.00 ac	0.42 ac
Southern Arroyo Willow Forest	7.28 ac	0.16 ac	7.44 ac
Total	**7.70 ac**	**0.16 ac**	**7.86 ac**

F. Type(s), Functions and Values of Jurisdictional Areas to be Directly and Indirectly Impacted

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of fill material into waters of the U.S. and evaluates the impacts of the placement of proposed fill into such waters. Where the discharge of fill material into jurisdictional waters is permitted by the Corps, mitigation to ensure no-net-loss of wetlands and aquatic functions is required. The Corps emphasizes the value of providing mitigation that maximizes the functions of the compensatory mitigation. The evaluation of functions associated with compensatory mitigation sites relies on a function-based assessment tool such as the Corps' HGM Methodology.[2] Such an approach is set

[2]Smith, R.D., Ammann, A., Bartoldus, C., and Brinson, M.M. 1995. "An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices," Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

forth in a Regulatory Guidance Letter (RGL) published by the Corps on December 24, 2002[3] and in a Special Public Notice published by the Los Angeles District on January 27, 2003.[4] In both documents, the Corps encouraged the utilization of functional assessments for evaluating impacts to aquatic resources and determining appropriate mitigation ratios. On page 2 of the December 24, 2002 RGL, the Corps notes:

> *The Corps has traditionally used acres as a standard measure for determining impacts and required mitigation for wetlands and other aquatic resources, primarily because useful functional assessment methods were not available. However, Districts are encouraged to increase their reliance on functional assessment methods.*

To evaluate wetland functions of the Proposed Project a Hybrid Functional Assessment was prepared. This Hybrid Functional Assessment (HFA) method was developed by combining components of three established functional assessment methods adapted for use at the project site.[5] A total of 21 different metrics were evaluated to determine riparian functions. These metrics are indicators of wetland or riparian function, and were evaluated quantitatively in this assessment. All metrics were scaled with values, or metric scores, between 0 (degraded condition) and 1 (optimal condition) and were used to calculate the HFA scores. This HFA first describes the individual metrics that were incorporated into this HFA. The HFA then, using these metrics, provides a quantitative assessment of the riparian resources within the subject study area in the existing condition or pre-project condition. For the purposes of this analysis, the study area was extended 300 feet beyond the impact limits in order to incorporate potential indirect impacts from project implementation. Functions for all reaches falling within the impact limits were considered to be lost in the post-project condition. Functions for reaches falling outside of the impact limits but within 300 feet were evaluated for potential reduction in function. The sum of this reduction of function is considered an indirect loss of function.

The metrics evaluated describe three categories of function based on the Corps' Hydrogeomorphic Approach (HGM): hydrologic functions, physical process functions (e.g., biogeochemical

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Brinson, M.M., Hauer, F.R., Lee, L.C., Nutter, W.L., Rheinhardt, R.D., and Whigham, D. 1995. "A guidebook for application of hydrogeomorphic assessments to riverine wetlands," Technical Report WRP-DE-11, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

[3] U.S. Army Corps of Engineers. 2002. *Regulatory Guidance Letter No. 02-2: Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.* December 24, 2002, 16pp.

[4] U.S. Army Corps of Engineers, Los Angeles District. 2003. *Special Public Notice: Mitigation and Monitoring Requirements*. January 27, 2003, 41pp.

[5] The concept of combining different functional assessment methodologies has been previously approved by the Corps. Specifically, URS developed a draft *Hybrid Functional Assessment of Wetland ad Riparian Habitats for the Newhall Ranch Habitat Management Plan* in June 2004. The URS HFA was subsequently used by Glenn Lukos Associates to evaluate impacts associated with the Newhall Ranch Riverpark project in Santa Clarita as well as to develop a mitigation program for the Newhall Ranch Santa Clarita Riverpark project. The Corps and CDFG issued authorizations for this project, in part based on the HFA and associated mitigation program developed using the HFA approach.

functions), and biological functions related to habitat. In addition to functions described under the Corps' HGM approach, functions from the California Rapid Assessment Method (CRAM) and Landscape Level Functional Assessment (LLFA) were incorporated, as categorized in each function heading. In summary, four metrics that describe buffer functions, seven metrics related to hydrological functions, three metrics that describe biogeochemical functions, and eight metrics associated with habitat functions were evaluated. These metrics were derived from the three accepted functional assessment methods that were used in developing the HFA and include the following:

Peer Review Draft Guidebook to Hydrogeomorphic Functional Assessment of Riverine Waters/Wetlands in the Santa Margarita Watershed. (Santa Margarita River HGM = SMR HGM) This HGM guidebook was developed for use in Southern California, and the reference domain is located in San Diego County.

Draft California Rapid Assessment Method for Wetlands. (CRAM) This method is currently being developed for use by California Department of Fish and Game (CDFG).

Assessment of Riparian Ecosystem Integrity: San Jacinto and Upper Santa Margarita River Watersheds, Riverside County, California. (Landscape Level Functional Assessment = LLFA) This method was developed for use in Special Area Management Plan (SAMP) projects that are ongoing in Orange and Riverside Counties.

Appendix D includes the detailed Hybrid Functional Assessment.

Metrics Evaluated

Riverine

The function of riverine systems were evaluated for hydrologic function, biogeochemical function and habitat function using 21 metrics including: percentage of assessment area with buffer, average width of buffer, buffer condition, land use/land cover, water source, hydroperiod, floodplain connection, altered hydraulic conveyance, surface water persistence, flood prone area, sediment regime, topographic complexity, substrate condition, vertical biotic structure, interspersion and zonation, ratio of native to non-native, canopy, age distribution, riparian vegetation condition, riparian corridor continuity and invasive plant species.

Depressional Wetlands

The function of depression wetland systems were evaluated for hydrologic function, biogeochemical function and habitat function using 9 metrics including: average width of buffer, buffer condition, water source, hydroperiod, surface water persistence, land use/land cover, substrate condition, ratio of native to non-native, and wetland vegetation condition.

Calculating Functional Capacity

Each metric was provided a score from 0.00 to 1.00 based on the condition of the reach. The Functional Capacity Score was then calculated by summing the scores of the individual metrics. Functional Capacity Units were then calculated by multiplying the Functional Capacity Score of an aquatic reach by the surface area in acres of that reach.

Calculating Loss of Functional Capacity

Quantifying the potential direct impact of the proposed project on aquatic resource function was accomplished by overlaying the Proposed Project grading footprint Geographic Information System (GIS) theme on the Aquatic resource theme. The function of aquatic resources falling within the grading limits was assumed to be entirely lost.

Quantifying the potential indirect impact of the Proposed Project on aquatic resource function was accomplished by simulating the changes that could be expected to occur in each aquatic reach as a result of the construction of the corridor. The sum of the differences between baseline assessment metric scores and metric scores resulting from the simulation represented the change (i.e., loss) in Functional Capacity Score for the aquatic reach being evaluated. The surface area of the reach expected to exhibit decreased function was multiplied by the change in Functional Capacity Score. As described above, indirect impacts were assumed to extend approximately 300 feet from the disturbance limits. This assumption was based upon the most extensive metric assessment area as defined by URS.

Results

Table 5 summarizes the loss of functional capacity expected to occur with implementation of the proposed SOCTIIP project.

TABLE 5
Loss of Functional Capacity Resulting From Proposed Project

Watershed	Direct Loss of Functional Units	Indirect Loss of Functional Units	Total Loss of Functional Units
San Juan	195.6	48.2	243.8
San Mateo	169.1	42.9	212.01
Sum	**364.7**	**91.1**	**455.81**

II. GOALS OF THE COMPENSATORY MITIGATION

This mitigation program is a collaboration of mitigation plans designed by EARTHWORKS Restoration, Inc., Glenn Lukos Associates, and Bonterra Consulting. The following mitigation goals take into account: 1) the obligation of the permittee to offset its impacts to jurisdictional resources pursuant to Sections 401 and 404 of the Clean Water Act, Section 1602 of the California Fish and Game Code, and the California Coastal Act, 2) the objectives of the Watershed Restoration Plan[6] in identifying mitigation sites with sufficient restoration potential and practicable level of effort to offset impacts to the jurisdictional resources.

To that end, the goals of the proposed mitigation program are to: 1) establish (to the maximum extent practicable) a watershed-based mitigation approach whereby largely contiguous areas within the same watershed are created and restored in order to improve the functional quality and success of the mitigation program; 2) ensure no-net-loss of wetland and/or riparian acreage; 3) increase the functions provided by the existing drainages and associated riparian habitats, and limited areas of wetland; 4) establish hydrologic, biogeochemical and wildlife functions currently not associated with drainages to be impacted; and 5) increase the habitat values beyond those currently provided by the existing streambeds, wetlands and/or riparian habitats. In determining the best way to ensure no net-loss of wetland functions in the region, a number of factors were considered, including:

- the design of the mitigation wetlands/riparian areas
- the location of the mitigation wetlands/riparian areas
- the relative acreage for each habitat type within the mitigation wetlands/riparian areas; and
- the connectivity of the proposed mitigation wetland/riparian areas to other proposed or existing mitigation areas.

A. Types and Areas of Habitat to be Created and Restored

Four general areas have been identified as excellent candidate locations for the creation and restoration wetland, riparian and upland watershed habitats. Exhibit 3 depicts the Proposed Project footprint as well as the Mitigation Areas. Exhibits 4, 5, 6, 7 & 8 are more detailed depictions of the Mitigation Areas. Exhibit 9 includes photographs documenting the current conditions of the mitigation sites. These Areas include:

1. **Mitigation Area A**: a 20.80-acre area adjacent to Tesoro High School, located along Chiquita Creek and one of its tributaries; and

2. **Mitigation Area B**: a 195-acre area within several drainages and its watershed in the 1,158-acre Upper Chiquita Canyon Conservation Area.

[6] Smith, R.D. and C.V. Klimas. October 2003 (Draft). Riparian Ecosystem Restoration Plan for San Juan and Western San Mateo Creek Watersheds: General Design Criteria and Site Selection. U.S. Army Engineer Research Development Center, Waterways Experiment Station, Vicksburg, MS. Draft Report to the U.S. Army Corps of Engineers, Los Angeles, Regulatory Branch.

3. **Mitigation Area C**: a 0.6-acre landslide remediation area extending Chiquita Woods to the southeast within the Chiquita watershed.

4. **Mitigation Area D**: a 1.0-acre area adjacent to San Mateo Creek and a proposed Extended Detention Basin within the project footprint.

5. **Temporary Impact Areas**

   In addition, all areas of temporary impact, including the 0.14-acre mitigation site located within the re-aligned Talega Basin at the end of Avenida Pico will be revegetated.

Mitigation Area A

Mitigation Area A consists of 20.80 acres and is adjacent to the alignment of the Proposed Project, south of Oso Parkway. Two principal areas have been identified for habitat restoration and creation along Chiquita Creek, which is bisected by Tesoro High School. These mitigation areas are immediately downstream of the Upper Chiquita Canyon Conservation Area. The mitigation will include the following:

- Restoration and creation of 4.66 acres of southern willow woodland;
- Restoration and creation of 4.90 acres of coastal sage scrub/native perennial grassland ecotone;
- Creation of 3.06 acres of mule fat scrub;
- Creation 6.52 acres of wet meadow;
- Enhancement of 0.79 acre of degraded wet meadow; and
- Creation and restoration of 0.88 acres of oak/elderberry woodland.

Mitigation Area B

Mitigation Area B consists of 195 acres and is situated in the Upper Chiquita Canyon Conservation Area, which is currently managed by the TCA. This site is located south and east of the City of Rancho Santa Margarita and north and west of Oso Parkway. These 195 acres are proposed as part of the amendment to the existing Upper Chiquita Canyon Bank Agreement. The existing conservation bank was established with the TCA, USFWS and CDFG in 1996 when the TCA purchased the conservation easement for Upper Chiquita Canyon from RMV. Under the initial bank agreement, 327 conservation credits were established for the preservation of existing coastal sage scrub habitat within the Conservation Area. These 327 conservation credits were to be used as mitigation for impacts to coastal sage scrub associated with the future FTC-S, which is the Proposed Project. Each conservation credit represented one acre of occupied coastal sage scrub habitat value that could be used toward future TCA projects. The conservation bank agreement establishes the mechanism for additional credits for the restoration and enhancement of appropriate habitats within the Conservation Area.

For the Proposed Project, 13 acres of riparian oak woodland restoration, 3.0 acres of streambed enhancement and 179 acres of native grassland restoration are proposed, for a total of 195 acres

of mitigation in the Upper Chiquita Canyon Conservation Area. The mitigation will include the following:

- restoration of 179 acres of native perennial grassland;
- enhancement of 3.0 acres of existing streambed; and
- restoration of 13 acres of riparian oak woodland.

Mitigation Area C

Mitigation Area C consists of 0.6 acre and is west of the proposed alignment within a landslide remediation area. The area will be re-contoured and revegetated to extend the existing Chiquita Woods to the southwest. The mitigation will include the following:

- Restoration and creation 0.1 acre of native perennial grassland; and
- Creation and restoration of 0.5 acre of oak/elderberry woodland.

Mitigation Area D

Mitigation Area D consists of 1.0 acres and is located immediately east of Proposed Extended Detention Basin #2 within the Coastal Zone and adjacent to San Mateo Creek. The mitigation will include the following:

- Restoration and creation of 1.0 acres of southern willow woodland

Specifically, the mitigation approach will consist of a combination of 1) aquatic habitat restoration and creation within the Chiquita watershed and San Mateo watershed as set forth in this Plan, and 2) upland watershed buffer enhancement, via restoration of native grasslands within the Upper Chiquita Canyon Conservation Area.

This creation and restoration program would increase habitat function, hydrologic function and water quality function of the drainages contributing naturally to the San Juan Creek Watershed. The mitigation programs summarized below shall incorporate the methods and measures, and shall comply with all applicable performance standards and other criteria set forth in this HMMP. The total mitigation acreage, including Corps, CDFG, RWQCB, and CCC jurisdictional areas (33.40 acres) and upland watershed restoration (184 acres) comprises 217.4 acres.

Temporary Impact Areas

With respect to temporary impacts to 9.44 acres of Corps jurisdiction, 9.49 acres of RWQCB jurisdiction, 14.61 acres of CDFG jurisdiction, 7.70 acres of CCC jurisdiction and 0.14 acre of mitigation within the re-aligned Talega Basin, the applicant will re-contour and re-vegetate all temporarily impacted areas at a 1:1 ratio to replace pre-construction aquatic function.

TABLE 6 Proposed Mitigation Ratios For Permanent Impacts				
Proposed Impact		Proposed Mitigation		
Habitat Type	Acres	Habitat Type	Acres	Ratio
Alkali Meadow	0.20	Wet Meadow*	7.31 acres	5.8:1
Riparian Herb	1.05			
Mule Fat Scrub	3.96	Mule Fat Scrub*	3.06	1.5:1
Southern Willow Scrub	1.51	Southern Willow Woodland*	5.66	
Arroyo Willow Forest	0.41			
Sycamore Riparian Woodland	1.36	Oak Riparian Woodland	14.38	1.1
Oak Riparian Woodland	11.88			
Unvegetated Streambed	2.71	Unvegetated Streambed Enhancement	3.0	1.1:1
Total	23.08		33.40	1.5:1

* Habitats expected to meet 1-parameter wetland criteria for CCC

TABLE 7 Proposed Mitigation Ratios For Temporary Impacts				
Proposed Impact		Proposed Mitigation		
Habitat Type	Acres	Habitat Type	Acres	Ratio
Freshwater Marsh	0.42	Freshwater Marsh*	0.42	1:1
Arroyo Willow Forest	7.28	Arroyo Willow Forest*	7.28	1:1
Sycamore Riparian Woodland	7.47	Sycamore Riparian Woodland	7.47	1:1
Unvegetated Streambed	0.03	Unvegetated Streambed	0.03	1:1
Total	15.20		15.20	1:1

* Habitats expected to meet 1-parameter wetland criteria for CCC

B. Specific Functions and Values of Habitat Types to be Created and Restored

This mitigation program compares the functional capacity of the jurisdictional areas to be impacted with the proposed mitigation areas to confirm that the functions of the replacement mitigation equal or exceed those of existing Corps, CDFG, RWQCB and CCC jurisdictional areas to be impacted. Table 8 summarizes the functional capacity expected to be gained through the proposed mitigation program.

TABLE 8 Gain of Functional Capacity Resulting From Proposed Mitigation			
Feature	**Post-Mitigation Score (21 Possible)**	**Acres**	**Functional Units**
MITIGATION AREA A			
TESORO (NORTH) – Creation	15.70	3.97	62.33
TESORO (SOUTH) – Enhancement	3.15	0.79	2.49
TESORO (SOUTH) - Creation	17.35	11.13	193.11
MITIGATION AREA B			
UPPER CHIQUITA CANYON - Enhancement	5.25	3.00	15.75
UPPER CHIQUITA CANYON Creation	19.75	13.00	256.75
MITIGATION AREA C			
CHIQUITA WOODS	20.50	0.5	10.25
MITIGATION AREA D			
EDB 2	15.55	1.0	15.55
GRAND TOTAL	**97.25**	**33.40***	**556.24**
* Discrepancy between depicted grand total and actual total of individual acres is a result of rounding to the nearest hundredth.			

Functions Related to Hydrologic Processes

Riparian ecosystems with high hydrologic integrity exhibit the range of frequency, magnitude, and temporal distribution of stream discharge, and surface and subsurface interaction between the stream channel, floodplain, and terraces, that historically characterized riparian ecosystems in the region (Bedford 1996, Poff et al. 1997, Richter et al. 1997).

Functions related to hydrologic processes that are often associated with riverine wetlands include:

- short-term surface water storage;
- long-term surface water storage;

- energy dissipation;
- subsurface storage of water; and
- moderation of groundwater flow or discharge.

The Mitigation Sites will be created with areas that provide for limited short-term floodwater retention, energy dissipation, and subsurface water storage. The sites will be designed and contoured to provide long-term storage of storm flows, and moderation of groundwater flows, especially following winter and spring rains.

The restoration of a functioning floodplain, as well as low flow channel, will restore the hydrology of Upper Chiquita Canyon, which has been altered due to continuous ranching activities, including grazing, up until 1996. The restoration of the floodplain along Chiquita Creek south of Tesoro High School will allow greater flood flow attenuation, energy dissipation, and storage during storm events. By increasing the surface area by which waters can spread out, velocities are diminished which can reduce downstream flooding. The interception of storm runoff and the detention of storm waters would regulate the sharp runoff peaks and slow discharges over a longer period of time.

Functions Related to Water Quality

Also as described above, high water quality integrity is defined as exhibiting a range of loading in the pollutant categories of nutrients, pesticides, hydrocarbons, and sediments that are similar to those that historically characterized riparian ecosystems in the region.

Functions related to water quality including the biological processes that attenuate poor water quality include:

- nutrient cycling;
- removal of imported elements and compounds;
- retention of particulates; and
- organic carbon export.

The Mitigation Areas will support substantial amounts of vegetation and will provide for an increase in nutrient cycling, removal of imported elements and compounds or retention of particulates. The Mitigation Sites will be designed, contoured and planted to perform as a balanced system in which primary productivity and detrital turnover will be in equilibrium, exhibiting biogeochemical function at an overall higher level.

The creation and restoration of wetland riparian habitat will provide important biogeochemical and water quality functions. Contouring and restoring the floodplain and wet meadow areas will allow for an increase in short-term storage of water, which in turn allows for the capture and storage of sediment and other pollutants. The microbial action in the root zone removes toxic materials, nitrogen and other nutrients from the runoff, thereby improving water quality and helping to reduce the impacts of non-point source pollution.

Functions Related to Habitat Function

Functions related to plant or animal habitat that are often associated with wetlands include:

- habitat for invertebrates;
- habitat for vertebrates; and
- habitat for vascular plants.

The Mitigation Areas will have potential for supporting aquatic invertebrates because they will be influenced by groundwater flows and receive surface flows from very large watersheds during storm events. As noted under hydrogeologic processes, the sites will be contoured to include topographic complexity such that it is anticipated that local areas may pond for a number of weeks.[7]

The restoration and creation of riparian habitat and wetlands will result in the increase of the wildlife habitat functions. The Mitigation Areas are adjacent to existing wetland and riparian areas as well as open space. Thus, the program will maintain and restore the diverse and contiguous riparian corridor in Upper Chiquita Canyon. Wildlife has been observed in the area including mule deer (*Odocoileus hemionus*), raptors, coyote (*Canis latrans*), and a variety of wildlife species. Currently, wildlife use the box culvert under Oso Parkway connecting the Upper Chiquita Conservation Area with the downstream wetland habitat.

The Mitigation Areas will be designed to provide additional wildlife habitat functions. The wetland and riparian habitats are expected to attract a variety of bird species such as common yellowthroat (*Geothylpis trichas*), American goldfinch (*Carduelis tristis*), black phoebe (*Sayornis nigricans*), yellow breasted chat (*Icteria virens*), and song sparrow (*Melospiza melodia*), as well as creating potential habitat for the least Bell's vireo (*Vireo bellii pusillus*). The establishment of riparian vegetation will allow for foraging and nesting of animals as well as establishment of movement paths for wildlife through the site. The establishment of riparian habitat will also provide an expanded source for dispersal and establishment of vegetation in downstream areas.

It is expected that natural recruitment of wetland plant species will occur in the wetter portions of the site. The eradication of non-native plant species will allow native riparian vegetation to reestablish, providing valuable wildlife habitat and cover, as well as providing hydrological regimes within the site. These mitigation activities will result in significant gains in biological, biogeochemical, and hydrological functions. See Table 8 above for quantitative discussion of functional capacity.

[7] Areas that pond more than 30 days provide important habitat for a variety of invertebrates including water fleas (*Cladocera*), copepods (*Copepoda*), leeches (*Hirudinea*), a variety of aquatic beetles (as both larvae and adults) including predaceous diving beetles (*Dytiscidae*), water scavenger beetles (*Hydrophilidae*), and whirligig beetles (*Gyrinidae*). Other aquatic insects include mayfly larvae (*Ephemeroptera*), dragonfly larvae (*Odonates*), mosquito larvae (*Culicidae*), midge larvae (*Chironomidae*), backswimmers (*Notonectidae*), waterboatmen (*Corixidae*), and toe-biters (*Belostomatidae*). Such invertebrates provide an important food source for waterfowl, passarines, as well as a variety of amphibians.

C. Time Lapse Between Jurisdictional Impacts and Expected Compensatory Mitigation Success

Proposed Project grading activities are expected to commence as early as Summer 2008. Mitigation site preparation shall begin in advance of, or concurrent with, initiation of impacts.

Within one year of the completion of mitigation installation it is expected that immature riparian vegetative structure will exist such that insects and birds will utilize the Mitigation Areas for foraging. With anticipated hydrology provided to the mitigation areas, the Mitigation Areas are expected to provide a greater degree of forage and shelter within two years, although woody trees and shrubs will take approximately three to five years to become fully established.

D. Estimated Total Cost

Table 9 below indicates the estimated cost for implementation, maintenance, and monitoring of the mitigation areas for five years.

TABLE 9
Estimated Mitigation Cost for Jurisdictional Areas[1]

Task	Cost
Mobilization	$33,250
Site Preparation	$224,000
Irrigation Installation	$330,000
Installation (includes plants and seeds)	$890,000
Project Maintenance	$332,500
Project Monitoring	$199,500
Total	**$2,009,250.00**

[1]Please note that this estimate reflects the approximate cost to implementing the creation, restoration and enhancement of jurisdictional areas, including temporary impact areas, but does not include costs for upland restoration.

E. Special Aquatic Habitats, Other Waters of the U.S. and Non-Jurisdictional Areas Proposed as Compensatory Mitigation

Portions of Mitigation Areas A and B proposed for creation and restoration currently consist of non-jurisdictional upland areas. However, creation and restoration of jurisdictional habitat will occur within and adjacent to approximately 0.79 acre of existing jurisdictional wetland habitat at Mitigation Area A and within and immediately adjacent to approximately 3.0 acres of ephemeral

watercourses in Mitigation Area B. Mitigation Areas C and D currently consist entirely of non-jurisdictional upland areas.

Although the 184 acres of native grassland restoration will occur entirely on uplands, these areas will serve as a native buffer to the enhanced and restored riparian areas within the Upper Chiquita Conservation Area, Tesoro North and Chiquita Woods mitigation areas. This is consistent with the watershed mitigation approach as discussed above.

III. DESCRIPTION OF THE PROPOSED COMPENSATORY MITIGATION SITES

A. Location and Size of the Compensatory Mitigation Sites

During the process of locating mitigation sites for the Proposed Project, several criteria were evaluated, including: 1) the site(s) must occur within the two major watersheds being impacted, e.g., San Juan Creek and San Mateo Creek watersheds; 2) the site(s) should consist of largely contiguous areas rather than small pockets of habitat in order to maximize the quality and success of mitigation; 3) the site(s) must be available for mitigation, e.g., the site(s) either must be under management by the TCA currently or be eligible for use if not under ownership/management by the TCA; and 4) the site(s) must exhibit appropriate topography and hydrology to support the proposed habitat types. Mitigation Areas A, B, C and D meet all three screening criteria listed above and were selected for the proposed restoration program.[8] Exhibit 10 depicts constraints that limited potential mitigation sites to those described herein.

Within the San Mateo Watershed, areas within Gabino and Cristianitos canyons were also evaluated for potential riparian and wetland habitat creation; however, the local area drainages exhibiting the high groundwater that would be necessary to successfully establish wetland and riparian habitat are characterized within these canyons by either 1) steep topography that would require extensive grading to expand existing wetland areas, 2) existing native vegetation that would require a habitat type conversion, in some cases impacting sensitive or listed species such as the coastal California gnatcatcher (*Polioptila californica californica*), 3) inappropriate soils, or 4) existing populations of listed species such as thread-leaved brodiaea (*Brodiaea filifolia*) or southwestern arroyo toad (*Bufo californicus*).

In evaluating the potential for mitigation opportunities within Gabino and Cristianitos canyons (San Mateo Watershed), these drainages would not meet all screening criteria. Specifically, mitigation within these drainages would be limited to multiple and relatively small patches that would be inconsistent with the watershed-based mitigation approach. Analysis of potential mitigation areas within the Cristianitos and Gabino watersheds shows the watershed as having already high scores for both habitat and water quality indexes. By comparison, creating new habitat and restoring degraded habitats within the Upper Chiquita and Tesoro watersheds would result in a much higher net increase to water quality, habitat, and hydrologic functions.

It is also important to note that all areas outside of development for RMV have already been designated as Open Space in RMV's HCP. RMV's Grazing Management Plan states that cattle grazing operations will continue on lands designated as Open Space. In addition to the mitigation search in Gabino and Cristianitos canyons, an existing cattle pond in Gabino was analyzed for potential mitigation opportunity due to the presence of wetland habitat within the pond. Changes in use of the pond from ranching to mitigation would conflict with RMV's Grazing Management Plan. In essence, any proposed mitigation in areas designated as Open Space by RMV would conflict with the Grazing Management Plan.

[8] Mitigation Area A is currently owned by RMV; however, the TCA will enter into negotiation with RMV for the purchase of this land upon acceptance of this conceptual mitigation plan by the Corps, CDFG, and RWQCB. The TCA has condemnation authority.

1. Mitigation Area A

Approximately 20.80 acres have been identified immediately adjacent to Tesoro High School. This mitigation site receives flows from Chiquita Creek and one of its tributaries. These 20.80 acres occur on two distinct sites adjacent to the high school: the northern reach and the southern reach [Exhibit 5].

Northern Reach

The Northern Reach is directly south of Oso Parkway and east of Tesoro High School along an existing wetland. Water flow from the Upper Chiquita Conservation Area watershed is diverted under Oso Parkway via a large box culvert. The outlet allows for water flow across the flat expanse that currently is vegetated with a mixture of willow (*Salix sp.*), mule fat (*Baccharis salicifolia*), and wet meadow species. Chiquita Creek flows through this wetland to the south, into another concrete box culvert where it traverses below Tesoro High School.

The proposed mitigation areas in the Northern Reach are situated on both sides of the existing wetland habitat between the aforementioned box culverts. One creation area is situated on the western side of the existing habitat. Currently, this area is occupied by upland ruderal habitat and bare soil. An access road runs on the eastern side of the proposed area. The proposed actions are to contour this area and remove the road to promote surface flow of water as well as to allow plants access to the water table. Approximately 0.87 acre of wet meadow and 2.22 acres of southern willow woodland would be created in this area. An additional 0.88 acre of oak/elderberry woodland and 4.90 acres of coastal sage scrub/native perennial grassland ecotone will be restored in the Northern Reach in the two small drainages immediately south of the existing wetland where Chiquita Creek traverses below Tesoro High School.

Southern Reach

The Southern Reach is located directly south of Tesoro High School. A berm and stream crossing divide the Southern Reach into two distinct segments. The upstream portion of this reach, north of the berm and stream crossing, has a defined low flow channel and a wide floodplain that transitions to upland. The existing riparian habitat consists of mature willows, but lacks a well-developed shrub and herbaceous layer due to cattle grazing. The downstream portion of the Southern Reach, below the berm and stream crossing, loses its floodplain and becomes a narrow incised channel occupied by only emergent vegetation. This portion of the reach may have been cleared sometime in the past since historic photographs from 1938 show the area as already incised. Instability in the downstream portion of this reach has resulted in the undercutting of the creek. The Southern Reach will end at the point where downcutting exceeds 15 feet in depth and where the future proposed extension of Crown Valley Parkway crosses Upper Chiquita Canyon. Approximately 2.43 acres of southern willow woodland, 3.06 acres of mule fat scrub, and 6.44 acres of wet meadow habitat will be restored and created in this area. Additionally, there is a small population of Coulter's saltbush (*Atriplex coulteri*), a sensitive

plant species, adjacent to the existing riparian habitat. This population would be preserved and enhanced with the overall restoration.

The restoration actions for the upstream portion of the Southern Reach are to expand the existing floodplain through grading and to expand and restore the southern willow woodland habitat. This area will be restored through the prevention of grazing activities and by the planting of the understory with native riparian shrubs, herbs and grasses. On the eastern side of the existing habitat, just above the stream crossing, fill has been placed along the edge of the creek. Mitigation activities will also include the removal of the fill as well as the existing berm, and the restoration of wet meadow habitat.

Actions in the downstream portion of the Southern Reach will involve the restoration of the creek to mimic the channel morphology of the upstream portion. The existing stream crossing will be removed, and the channel and floodplain will be restored through recontouring activities. The existing channel will be enhanced through planting of willow trees and shrubs that allow the creek to be shaded. The floodplain will consist of several terraces that will capture different sized storm events. Southern willow woodland, mule fat scrub, and wet meadow habitat will be restored/created within this reach. A series of buried grade control structures will stabilize the transition into the severely undercutted portion of the creek.

The soils in Mitigation Area A are suitable for the proposed wetland and riparian restoration, creation, and enhancement. Soils within Upper Chiquita Canyon along the creek have been mapped as Chino silty clay loam in the *Soil Survey of Orange and Western Part of Riverside Counties, California*. Clay soils have high water holding capacity, which allows for the slow release of moisture, increasing the duration in which water becomes available to plants. The presence of wet meadow habitat along this creek is driven by the soil characteristics and will allow for this type of habitat to be created as well under the restored hydrologic regime.

2. Mitigation Area B

Chiquita Canyon Conservation Area is a 1,158-acre site composed of north-south orientated, narrow to broad valleys between rolling hills. Elevations of the site range between 670 to 1,217 feet above sea level. The Conservation Area currently supports four broad plant communities: annual grasslands, coastal sage scrub, oak woodlands, and perennial grasslands. Additionally, some areas are ecotones that transition from annual grasslands to coastal sage scrub. Within this area, which has been disturbed by dry land farming and grazing practices, 179 acres of native grassland, 3.0 acres of streambed and 13 acres of riparian oak woodland will be restored for this Proposed Project [Exhibit 6].

The Conservation Area has experienced three fires in the last ten years. The site had not burned for at least 50 years prior to these recent fires. In August of 1996, a fire affected approximately 98 acres of annual grasslands, coastal sage scrub, and oak woodland communities. This burn area is located on north and south facing ridgelines in the northern most portion of the Conservation Area between Coto de Caza and upper Tijeras Creek. In May 1997, 114 acres burned and affected coastal sage scrub, annual grasslands, oak woodland communities, and perennial grasslands. This burn area is

located on the eastern side of the Chiquita Canyon Conservation Area, adjacent to Coto de Caza. In May 2002, the southern and central portions of Chiquita Canyon burned totaling 715 acres and affecting all of the plant community types. None of the burn areas overlap. The native habitats are well into recovery with little to no maintenance measures, especially for the 2002 burn area. The Conservation Area now supports vegetation communities of mixed age structure, including mature unburned communities, and communities in various stages of fire recovery.

The Conservation Area contains several soil types that support different vegetation communities. Two soil orders occur in the Conservation Area, Mollisols and Entisols. Mollisols typically support perennial grassland vegetation and the Entisols typically support trees and shrubs. To provide a better understanding of the potential restoration areas, the soils within the Conservation Area were analyzed to determine the correlation between soil type and plant communities. This analysis is necessary to determine appropriate restoration in the areas that had been historically disturbed by dry-land farming and cattle gazing. The results of the soil analysis are contained in the *Draft Upper Chiquita Canyon Conservation Area Comprehensive Habitat Restoration Plan* dated October 2006 and prepared by EARTHWORKS Restoration, Inc., which is attached as Appendix C.

In addition to the mitigation restoration discussed above for the jurisdictional impacts, the *Draft Upper Chiquita Canyon Conservation Area Comprehensive Habitat Restoration Plan* also defines the restoration of an additional 364 acres. These 364 acres consist of coastal sage scrub, CSS/grassland/ecotone and oak woodland habitats to complete a comprehensive restoration of the Chiquita Canyon Conservation Area easement. (See Appendix C.)

3. Mitigation Area C

Mitigation Area C falls entirely within the project disturbance limits. The area will be subject to grading for landslide remediation and will be recontoured to provide aquatic function. The site is immediately downstream of Chiquita Woods (Drainage FE/7-1). As indicated in the jurisdictional delineation, the streambed ends in a broad swale subject to dryland agriculture. The reach of the drainage above the mitigation site is vegetated with sycamore riparian woodland to be bridged and will be restored upon project completion.

4. Mitigation Area D

Mitigation Area D also falls entirely within the project limits. It will be located immediately adjacent to an extended detention basin east of the I-5 and south of San Mateo Creek. The proposed site is currently occupied by an irrigated agricultural field.

B. Ownership Status

The present owners of Mitigation Area A are as follows:

Owner: RMV Middle Chiquita, LLC, a California limited liability company
Authorized Agent & Manager: Rancho Mission Viejo, LLC, a Delaware limited liability company
28811 Ortega Highway
P.O. Box 9
San Juan Capistrano, CA 92693
Attn: Richard Broming
APN: 125-096-61 (16.4 acres)

and

Owner: RMV MC Investment, LLC, a California limited liability company
Authorized Agent & Manager: Rancho Mission Viejo, LLC, a Delaware limited liability company
28811 Ortega Highway
P.O. Box 9
San Juan Capistrano, CA 92693
Attn: Richard Broming
APN: 125-096-31 (16.9 acres)

The present owner of Mitigation Areas B, C, and D is Transportation Corridor Agencies.

Owner: Transportation Corridor Agencies
125 Pacifica
Irvine, CA 92618
Contact: Maria Levario
Telephone: (949) 754-3400

After completion of construction, access to the Mitigation Areas will be provided via private access roads. The Corps, CDFG, RWQCB and CCC may access the Mitigation Areas to ensure that the mitigation efforts have been implemented in a manner consistent with permit/agreement conditions, and are requested to notify the Applicant before entering.

C. Existing Functions and Values of the Wetland/Riparian Creation/Restoration Mitigation Sites

1. Mitigation Area A

Mitigation Area A is located along Chiquita Canyon Creek and will be contiguous with an existing mitigation wetland. This existing mitigation wetland was established as mitigation for construction of Tesoro High School. The mitigation site's proximity to an existing wetland and a major drainage system makes it suitable for substantially enhancing habitat values through habitat expansion plus enhancement of existing wildlife movement. On the western side of the northern reach, this area is bare ground that appears to consist of fill material placed some time in the past. On the eastern side of the northern reach, this area is occupied by upland ruderal habitat and bare soil. An access road runs on the eastern side of this area. Hydrology is to be provided by storm flows, shallow subsurface water during the rainy season and deep groundwater (i.e. 10-15 feet) during the summer and fall, and precipitation.

2. Mitigation Area B

As mentioned above, the Upper Chiquita Canyon Conservation Area was established with the approval of the USFWS and CDFG in 1996 when the TCA purchased the conservation easement for Upper Chiquita Canyon from the RMV. For the past approximately 10 years, the TCA has actively managed this site as a conservation area. Upon purchase of the conservation easement in 1996, the TCA removed all ranch activities, including grazing, from the site.

The Upper Chiquita Canyon Conservation Area currently supports vegetation communities of mixed age structure, including mature unburned communities, and communities in various stages of fire recovery. The site is highly disturbed as a result of historic dry land farming practices, which cleared existing vegetation and disked the soils for cattle grazing purposes. The farming and grazing allowed exotic grasses to invade and dominate the site even after the cessation of these practices.

The Conservation Area is the upper watershed of Chiquita Canyon. Small drainages start in the steeper hillsides containing coastal sage scrub and then merge into larger drainages within the broad valleys. Drainage patterns range from incised channels with depths of approximately 20 feet to flat impoundment areas. The annual runoff in these drainages is highly ephemeral and does not support any native obligate wetland vegetation. The soils are not classified as wetland soils, and, therefore, these drainages are classified as non-wetland watercourses. These drainages vary in the density of native species with sparse mule fat, as well as elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*) and coast live oak (*Quercus agrifolia*) interspersed with coastal sage scrub species and areas of dense annual grasses. Hydrology within the restoration site will be provided by storm flows, precipitation, and ground water.

3. Mitigation Area C

Mitigation Area C is an upland site that will be subject to grading for landslide remediation and will be recontoured to provide aquatic function. The site has been subject to dryland agriculture in the past and currently does not provide any habitat value.

4. Mitigation Area D

Mitigation Area D is an upland site currently occupied by an irrigated agricultural field and does not provide any habitat value.

D. Jurisdictional Delineation

1. Mitigation Area A

This area currently consists of 0.79 acre of degraded wet meadow and riparian habitats with surrounding upland areas vegetated with ruderal species. The proposed mitigation occurs within upland areas with the exception of 0.79 acres of substantial wet meadow restoration in the southern reach that currently falls within Corps and CDFG jurisdiction. These 0.79 acres of degraded wet meadow and riparian habitats would qualify as an existing one-parameter coastal wetland. Based on existing vegetation mapping, the surrounding upland areas are not expected to meet the criteria for coastal wetlands.

2. Mitigation Area B

The entire approximately 1,158-acre area consists mainly of upland areas vegetated with annual grasslands, coastal sage scrub, oak woodlands, and perennial grasslands. Thirty-eight drainage courses totaling approximately 13 acres of which 3.0 acres is proposed for enhancement, none of which consist of jurisdictional wetlands, traverse the Conservation Area. The proposed riparian creation will take place along existing drainages in areas presently dominated by annual grassland, and the 179-acre upland buffer restoration will occur entirely within upland areas, also dominated by annual grassland. Based on existing vegetation mapping, the surrounding upland areas are not expected to meet the criteria for coastal wetlands.

3. Mitigation Area C

Mitigation Area C consists entirely of uplands and does not contain any Corps or CDFG jurisdiction. The proposed riparian creation and native grassland buffer will take place immediately downstream of Chiquita Woods (Drainage FE/7-1), thereby the extending the jurisdictional extent of Chiquita Woods by 0.6 acre. The reach of the drainage above the mitigation site is vegetated with sycamore riparian woodland to be bridged and will be restored upon project completion. Based on existing vegetation mapping, these upland areas are not expected to meet the criteria for coastal wetlands.

4. Mitigation Area D

Similar to Mitigation Area C, Mitigation Area D also consists entirely of uplands and does not contain any Corps or CDFG jurisdiction. The proposed riparian creation will take place adjacent to San Mateo Creek and a proposed Extended Detention Basin, and will increase the jurisdictional extent of San Mateo marsh by 1.0 acre. Based on existing vegetation mapping, these upland areas are not expected to meet the criteria for coastal wetlands.

E. Present and Proposed Uses of Mitigation Areas

Mitigation Area A is currently adjacent to open space, Tesoro High School, and Oso Parkway. The Proposed Project is located to the east of Mitigation Area A. No land use changes surrounding the mitigation areas are anticipated following the restoration.

Mitigation Area B is currently adjacent to open space within Upper Chiquita Canyon. While historically the area has been used for dry land farming by Rancho Mission Viejo, farming operations have been discontinued since TCA purchased the conservation easement over the property in 1996. Prior to TCA's conservation of Upper Chiquita Canyon area was proposed for development as a residential and golf-course community. Following the restoration, no land use changes will occur beyond those existing on the site.

Mitigation Area C is a remnant dryland agriculture site and currently lies within the development footprint of the Proposed Project. No land use changes surrounding the mitigation area are anticipated following the creation of habitat.

Mitigation Area D is an irrigated agricultural field that currently lies within the development footprint of the Proposed Project. The 1.0 acre of habitat proposed for creation will no longer be subject to agricultural uses following implementation of mitigation.

F. Reference Sites

The progress of this mitigation project will be monitored using the following existing habitats as a standard: wetlands and riparian vegetation within existing willow woodland, wet meadow, mule fat scrub and oak riparian habitats within the Upper Chiquita Conservation Area adjacent to Mitigation Area B, and the existing Tesoro mitigation wetland immediately adjacent to the proposed Mitigation Site A. The existing oak woodlands in Chiquita Woods and southern willow woodlands in San Mateo Marsh will be used as reference for progress of Mitigation Areas C & D, respectively.

IV. IMPLEMENTATION PLAN FOR THE COMPENSATORY MITIGATION SITES

A. Rationale for Expecting Implementation Success

Compensatory mitigation will be completed in advance of, or concurrently with, impacts to Corps, CDFG, RWQCB, and CCC jurisdiction. Specific rationale for expecting implementation success of the various components of the mitigation program is provided below.

The proposed Mitigation Areas are good candidates for habitat establishment for several reasons and will result in an increase in wetland functional capacity within the watershed to which the proposed impact site contributes. First, hydrology to support the expanded wetland/riparian areas within the sites is assured from existing sources based on soil boring observations. Second, the proposed plant palettes consist of species that occur on-site and are known to perform well in habitat restoration programs. The mitigation sites are adjacent to or near existing wet meadow, southern willow scrub, southern oak riparian woodland, and mule fat scrub. Each habitat type will be located at the optimal elevation and distance from the main channel with the driest areas supporting oak woodland and the wettest areas supporting willow woodland and wet meadow. Grading of the habitat creation areas will allow water to spread out during periods of high flow, as well as greater access to the water table for deep-rooted species. The tenacious quality of native plants, which allows their continued survival in areas of natural disturbance, also helps to ensure their establishment as part of the proposed mitigation. Natural recruitment and reproduction is expected within the site.

Additionally, the soils in the potential areas are suitable for the proposed wetland and riparian restoration, creation and enhancement. Soils within Upper Chiquita Canyon along the creek have been mapped as Chino silty clay loam (Aquic Haploxerolls). Clay soils have high water holding capacity, which allows for the slow release of moisture, increasing the duration in which water becomes available to plants. The presence of wet meadow habitat along this creek is driven by this soil characteristic and will allow for this type of habitat to be created as well under the restored hydrologic regime.

Finally, the individuals responsible for site selection, site evaluation and plan preparation have extensive experience designing and installing revegetation projects in southern California. This experience provides a strong basis for confidence in the success of the mitigation proposed herein, as well as a valuable resource in the field for ensuring that any necessary changes are implemented should unanticipated site conditions warrant in-field changes to the mitigation plan. A qualified habitat restoration specialist or other individual knowledgeable in native plant revegetation, hereinafter referred to as the Project Biologist, will supervise the implementation, maintenance, and five-year monitoring of the mitigation plan.

B. Responsible Parties

The Applicant will be responsible for the implementation of the HMMP.

Applicant: Transportation Corridor Agencies
Contact: Maria Levario
125 Pacifica
Irvine, CA 92618
Telephone: (949) 754-3400

Plan Prepared by:

EARTHWORKS Restoration, Inc.
2116 Arlington Ave., Suite 301
Los Angeles, CA 90018
Contact: Margot Griswold
Telephone: (323) 735-3225
Fax: (323) 735-0441

Glenn Lukos Associates
29 Orchard
Lake Forest, CA 92630-8300
Contact: Ingrid Chlup or Thienan Ly
Telephone: (949) 837-0404
Fax: (949) 837-5834

BonTerra Consulting
151 Kalmus Dr., Suite E-200
Costa Mesa, CA 92626
Contact: Ann Johnston
Telephone: (714) 444-9199
Fax: (714) 444-9599

C. Implementation Schedule

Site preparation, irrigation installation, and mitigation plantings shall begin during or after initiation of construction activities, which will commence after issuance of all required approvals for the Proposed Project. The timing is described in general terms by season. Exact dates for each phase of implementation and maintenance will depend on the onset and duration of seasonal rainfall as well as other factors such as the temperatures prior to, during and following rain events. Rainfall and temperature will define the type and the density of weed species as well as native species that will germinate in any given year and season. Table 10 below indicates anticipated timing of intended impacts to Corps, RWQCB, CDFG and CCC jurisdiction and mitigation implementation. Any changes to the initiation of impacts schedule will correspondingly modify the schedule for implementation of the mitigation areas.

TABLE 10 Conceptual Implementation Schedule	
Initiation of Impacts to Corps, RWQCB, CDFG, and CCC Jurisdiction	Summer 2010
Initiation of Impacts to CCC Jurisdiction	Summer 2010
Implementation of Mitigation Area A	Spring 2010
Implementation of Mitigation Area B	Spring 2008
Implementation of Mitigation Area C	During Construction
Implementation of Mitigation Area D	During Construction
Restoration of Temporary Impacts to Pre-Existing Contours	Within 120 days following completion of impacts in each area.

D. Site Preparation

Restoration of each specified habitat shall require site preparation that will vary in time, intensity and method. This preparation will consist of weed control and removal as well as soil nutrient and microbial evaluations for potential amendments. Site preparation will require 1 – 2 years depending on particular areas, the type and density of exotic species, and the specific habitat to be restored. Additionally, some areas may need particular soil amendments such as native mulches, mycorrhizal fungi, and algae.

To the extent possible, as the phased restoration proceeds, initial site preparation and weed removal will begin outside of the breeding season of grassland birds to avoid disrupting nesting. Weed control would continue so that no suitable nesting habitat is available prior to seeding/planting.

Weed Removal

All areas to be restored are presently dominated by exotic species. Weed control will be required to thin or remove mainly the annual grasses, exotic mustards (*Brassica nigra, Hirschfeldia incana*), wild radish (*Raphanus sativa*), filaree (*Erodium brachycarpum*), and sow thistle (Sonchus oleraceus). During site preparation, weeds shall be removed before seed production to limit additional weed seed on the site. Weed removal may employ mechanical methods, such as mowing and weed whipping. Native grass straw mulch may be applied to areas after mowing to shade out weed seedlings. In combination with particular seeding methods, such as imprinting which requires ripping the soil, weed seed may be brought to the surface and controlled with a series of "grow and kill' treatments. Areas dominated mainly by annual grasses may be treated with an herbicide specific to control grasses such as flurazifop-p (Fusillade). Selected broadleaf species such as artichoke thistle (*Cynara cardunculus*), mustards and wild radish may require spot application with a glyphosate herbicide. Only herbicides registered for use in wildlands would be used judiciously in the Conservation Area.

The amount of site preparation weeding that is required for each area will vary depending on the soil and soil seed bank as well as the weeds present. The method of seeding for each area will also influence the timing of site preparation. Areas will be evaluated after each weeding event to assess the progress of site preparation and to plan the next step. Areas will be released for seeding/planting depending on seeding method and whether enough progress has been made in management of the weed species.

In summary, the following methods will be employed over the Conservation Area in various combinations based on adaptive management of the specific areas for seeding/planting.

- Mowing
- Specific hand weeding of target weeds
- Mulching with native grass straw
- Specific herbicide application for target weeds
- Ripping and tilling in combination with "grow and kill" herbicide application

Contractor Education
Prior to the commencement of work, the applicant will review all aspects of the Mitigation Plan that concern the contractors including permit requirements, site protection, maintenance inspections, landscape procedures, and monitoring.

The Applicant shall make all contractors, subcontractors, and the project supervisors aware of conditions required in the Corps permit, CDFG agreement, and 401 Certification. Copies of these documents shall be kept on-site at all times during periods of active work and must be presented to any agency personnel upon demand.

E. Planting Plan

Four wetland and/or riparian associations will be established within the proposed Mitigation Areas: wet meadow, mule fat scrub, southern willow woodland and southern oak riparian woodland. As indicated above, mitigation habitat labeled as southern willow woodland indicates that the habitat will be *dominated* by southern willow woodland species, but will also support an understory that includes other vegetation types, such as mule fat scrub and/or alkali marsh and riparian herb. The total mitigation acreage, including creation/restoration and enhancement categories, comprises 217.4 acres. These plant communities were selected based on surveys conducted both during various biological survey visits including vegetation mapping, jurisdictional delineation and functional assessment, and subsequent site visits to further evaluate the sites for suitability. With respect to the riparian woodland habitats, woody plant species were selected to create a mature tree canopy and provide wildlife forage, shelter, and nesting places. Planting shall consist of preparing planting holes, planting container stock, installing plant protection devices, applying mulch, and hydroseeding. No planting shall be done in any area until the area concerned has been prepared in accordance with the plans and presents an appearance satisfactory to the Project Biologist.

Plant Palettes

The Mitigation Areas will be vegetated with plant species native to the foothills of the Santa Ana Mountains. The proposed revegetation plant palettes for the revegetation habitat types are designated below in Tables 11 through 24. The plant palettes define species, spacing, and total quantity of plants required.

Mitigation Area A

Southern Willow Woodland (4.66 Acres)

This plan provides for the establishment of approximately 4.66 acres of southern willow woodland habitat within the northern and southern reach of Mitigation Area A. The planting palette for southern willow woodland is presented in Table 11.

TABLE 11
SOUTHERN WILLOW WOODLAND PLANT PALETTE
4.66 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing*	No. per Acre	Total Plant Qty.
CONTAINER STOCK					
Baccharis salicifolia	Mule fat	Cutting	12' o.c.	349	1,626
Salix goodingii	Black willow	Cutting	20' o.c.	126	587
Salix laevigata	Red willow	Cutting	20' o.c.	126	587
Salix lasiolepis	Arroyo willow	Cutting	8' o.c.	401	1,869
Juncus mexicanus	Mexican rush	D-40	15' o.c.	400	1,864
Juncus xiphioides	Iris-leaved rush	D-40	15' o.c.	400	1,864
Leymus triticoides	Beardless wild rye	Liners	Clusters	503	2,344
Sambucus mexicana	Blue elderberry	1 gal	40' o.c.	63	294
Total Container Stock				**2,368**	**11,035**
SEED MIX		**Stock Type**	**Minimum Purity/Germination**	**Lbs./Acre**	**Total Lbs.**
Ambrosia psilostachya	Western ragweed	Seed	20/30	2.5	11.65
Anemopsis californica	Yerba mansa	Seed	45/60	1	4.66
Artemisia douglasiana	Mugwort	Seed	10/50	2.5	11.65
Hordeum brachyantherum	Meadow barley	Seed	90/80	6	27.96
Juncus mexicanus	Mexican rush	Seed	TBD	2	9.32
Gnathalium palustre	Lowland cudweed	Seed	5/10	0.5	2.33
Pluchea odorata	Marsh fleabane	Seed	90/30	2	9.32
Total Seed Stock				**16.5**	**76.89**

* Plant spacing is approximate and refers to spacing within each vegetation level herbaceous, shrub and tree.

Mule fat Scrub (3.06 Acres)

This plan provides for the establishment of approximately 3.06 acres of mule fat scrub habitat within the southern reach of Mitigation Area A. The planting palette for mule fat scrub is presented in Table 12.

TABLE 12
MULE FAT SCRUB PLANT PALETTE
(3.06 ACRES)

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Plant Qty.
CONTAINER PLANTS					
Baccharis salicifolia	Mule fat	Live stake	10' o.c.	503	1539
Salix lasiolepis	Arroyo willow	Live stake	40' o.c.	63	193
Juncus acutus	Spiney rush	D-40	20' o.c.	126	386
Urtica dioica ssp. *Holosericera*	Hoary nettle	D-40	20' o.c.	126	386
Leymus triticoides	Beardless wild	Liners	Clusters	503	1539
Total Container Stock				**1321**	**4042**
SEED MIX			**Minimum Purity/Germination**	**Lbs./ Acre**	**Total Lbs.**
Ambrosia psilostachya	Western	Seed	20/30	2.5	7.65
Artemisia douglasiana	Mugwort	Seed	10/50	2.5	7.65
Gnathalium palustre	Lowland	Seed	5/10	0.5	1.53
Pluchea odorata	Marsh	Seed	20/40	2	6.12
Hordeum brachyantherum	Meadow	Seed	90/80	6	18.36
Total Seed Stock				**13.5**	**41.31**

Wet Meadow (7.31 Acres)

This plan provides for the establishment of approximately 0.87 acres of wet meadow habitat within the northern reach and 6.44 acres of wet meadow habitat in the southern reach of Mitigation Area A. The planting palette for wet meadow is presented in Table 13.

TABLE 13
WET MEADOW PLANT PALETTE
(7.31 ACRES)

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Plant Qty.
CONTAINER STOCK					
Anemopsis californica	Yerba mansa	Liner	Clusters	503	3,677
Carex praegracilis	Clustered field	Liner	Clusters	126	921
Distichlis spicata	Salt grass	Rhizome plugs	10' o.c.	503	3,677
Eleocharis macrostachya	Spike rush	Liner	10' o.c.	503	3,677
Juncus bufonius	Common toad	Liner	Clusters	126	921
Juncus mexicanus	Mexican rush	Liner	20' o.c.	126	921
Leymus triticoides	Creeping wild rye	Liner	Clusters	503	3,677
Total Container Stock				**2390**	**17,471**
SEED MIX			**Minimum Purity/Germination**	**Lbs./ Acre**	**Total Lbs.**
Ambrosia psilostachya	Western ragweed	seed	20/30	0.5	3.66
Anemopsis californica	Yerba mansa	seed	45/60	1	7.31
Artemisia douglasiana	Mugwort	seed	10/50	1.5	10.97
Hordeum brachyantherum	Meadow barley	seed	90/80	6	43.86
Sisyrinchium bellum	Blue-eyed grass	seed	95/75	2	14.62
Total Seed Stock				**11**	**80.41**

Riparian Oak/Elderberry Woodland (0.88 Acres)

This plan provides for the establishment of approximately 0.88 acres of oak/elderberry woodland in the northern reach of Mitigation Area A. The planting palette for oak/elderberry woodland is provided in Table 14.

TABLE 14
RIPARIAN OAK/ELDERBERRY WOODLAND PLANT PALETTE
(0.88 ACRES)

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Plant
CONTAINER STOCK					
Leymus condensatus	Giant wild rye	D-40	Clusters	250	220
Mulenburghia rigens	Deergrass	D-40	Clusters	126	111
Heteromeles arbutifolia	Toyon	D-40	40' o.c.	63	55
Lonicera subspicata	Honeysuckle	D-40	10' o.c.	63	55
Sambucus mexicanus	Mexican elderberry	1 gal	20' o.c.	126	111
Potentilla glanulosa	Sticky cinquefoil	4-inch	20' o.c.	126	111
Quercus agrifolia	Coast live oak	Deep pot	20' o.c.	126	111
Toxicodendron diversilobum	Poison oak	D-40	20' o.c.	126	111
Total Container Stock				**1006**	**885**
SEED MIX			**Minimum Purity/ Germination**	**Lbs./ Acre**	**Total Lbs.**
Bromus carinatus	California brome	Seed	95/80	3	2.64
Galium aparine	Goose grass	Seed	TBD	0.5	0.44
Mimulus aurantaicus	Bush monkey flower	Seed	50/70	2.5	2.2
Nassella lepida	Foothill needlegrass	Seed	60/60	3.5	3.08
Plantago ovata	Wooly plaintain	Seed	98/75	20	17.6
Quercus agrifolia	Coast live oak	acorns	n/a	200	176
Sisyrinchium bellum	Blue-eyed grass	Seed	95/75	2	1.76
Vulpia microstacyhs	Small fescue	Seed	70/70	6	5.28
Total Seed Stock				**237.5**	**209**

Coastal Sage Scrub/Native Perennial Grassland Ecotone (4.90 Acres)

This plan provides for the establishment of approximately 4.90 acres of coastal sage scrub/native perennial grassland ecotone in the northern reach of Mitigation Area A. The planting palette for coastal sage scrub/native perennial grassland ecotone is provided in Table 15.

TABLE 15
COASTAL SAGE SCRUB/NATIVE PERENNIAL GRASSLAND PLANT PALETTE (4.90 ACRES)

Botanic Name	Common Name	Stock Type	Minimum Purity/ Germination	Lbs./ Acre	Total Lbs.
SEED MIX					
Artemisia californica	California sagebrush	seed	15/50	0.2	0.98
Asclepias fascicularis	narrow-leaf milkweed	seed	TBD	0.2	0.98
Amsinckia menziesii var. *intermedia*	common fiddleneck	seed	30/70	0.5	2.45
Baccharis pilularis	coyote bush	seed	15/60	0.1	0.49
Bromus carinatus	California brome	seed	95/80	2.0	9.80
Cryptantha intermedia	popcorn flower	seed	TBD	0.5	2.45
Datura wrightii	tolugacha	seed	TBD	0.2	0.98
Dichelostemma capitatum	blue dicks	seed	95/50	1.0	4.90
Hazardia squarosa	goldenbush	seed	TBD	0.5	2.45
Hemizonia fasiculata	tarweed	seed	20/70	2.0	9.80
Isocoma menzesii	coast goldenbush	seed	TBD	0.5	2.45
Lasthenia californica	goldfields	seed	50/60	1.5	7.35
Lessingia filaginifolia	California aster	seed	TBD	0.5	2.45
Lotus scoparius	deerweed	seed	90/60	1.0	4.90
Lotus strigosus	strigose lotus	seed	98/70	1.5	7.35
Lupinus bicolor	miniature lupine	seed	98/85	3.0	14.70
Lupinus truncatus	collar lupine	seed	98/70	1.5	7.35
Melica imperfecta	melic grass	seed	90/60	1.5	7.35
Nassella lepida	foothill needlegrass	seed	60/60	3.0	14.70
Nassella pulchra	purple needlegrass	seed	60/60	8.0	39.20
Plantago ovata	wooly plantain	seed	98/75	20.0	98.00
Sisyrinchium bellum	blue-eyed grass	seed	95/75	1.5	7.35
Vulpia microstachys	small fescue	seed	70/70	4.0	19.60
Total Seed Stock				**54.70**	**268.03**

Mitigation Area B – Upper Chiquita Canyon Conservation Area

Native Perennial Grassland (179 Acres)

This plan provides for the establishment of approximately 179 acres of native perennial grassland habitat in Mitigation Area B. The planting palette for this habitat is provided below in Table 16.

TABLE 16
NATIVE PERENNIAL GRASSLAND PLANT PALETTE
(179 ACRES)

Botanic Name	Common Name	Stock Type	Minimum Purity/ Germination	Lbs./ Acre	Total Lbs.
SEED MIX					
Asclepias fascicularis	narrow-leaf milkweed	seed	TBD	0.25	46
Ambrosia psilostachys	western ragweed	seed	20/70	0.25	46
Amsinckia menziesii var. *intermedia*	common fiddleneck	seed	30/70	1.00	182
Bromus carinatus	California brome	seed	95/80	2.00	364
Castilleja exserta	purple owl's clover	seed	50/60	0.50	91
Dichelostemma capitatum	blue dicks	seed	95/50	1.00	182
Ericameria palmeri	grassland goldenbush	seed	TBD	0.25	46
Filago californica	California filago	seed	TBD	0.50	91
Gnaphalium palustre	lowland everlasting	seed	25/10	0.50	91
Hemizonia fasiculata	tarweed	seed	20/70	2.00	364
Lasthenia californica	goldfields	seed	50/60	0.50	91
Layia platyglossa	tidy tips	seed	80/75	0.50	91
Lotus purshianus	Spanish clover	seed	98/70	1.50	273
Lotus strigosus	strigose lotus	seed	98/70	1.50	273
Lupinus bicolor	miniature lupine	seed	98/85	3.00	546
Lupinus succulentus	arroyo lupine	seed	98/85	1.50	273
Lupinus truncatus	collar lupine	seed	98/70	1.50	273
Melica imperfecta	melic grass	seed	90/60	1.50	273
Nassella lepida	foothill needlegrass	seed	60/60	2.00	364
Nassella pulchra	purple needlegrass	seed	60/60	10.00	1820
Nemophila menziesii	baby blue eyes	seed	98/85	0.50	91
Plantago ovata	wooly plantain	seed	98/75	20.00	3640
Poa secunda	bluegrass	seed	60/60	1.50	273
Sisyrinchium bellum	blue-eyed grass	seed	95/75	1.50	273
Vulpia microstachys	small fescue	seed	70/70	4.00	728
Total Seed Stock				**59.25**	**10,785**

Riparian Oak and Elderberry Woodland (13 Acres)

This plan provides for the establishment of approximately 13 acres of oak woodland habitat in Mitigation Area B. The planting palette for this habitat is provided below in Table 17.

TABLE 17
RIPARIAN OAK/ELDERBERRY WOODLAND PLANT PALETTE
(13 ACRES)

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Plant
CONTAINER STOCK					
Baccharis salicifolia	mule fat	Rooted Cuttings	5'	25	325
Heteromeles arbutifolia	toyon	D-40	20'	10	130
Quercus agrifolia	coast live oak	1 gal	25'	190	2470
Rhamnus californica	coffeeberry	D-40	20'	10	130
Rhus integrifolia	lemonadeberry	D-40	15'	20	260
Sambucus mexicana	Mexican elderberry	1 gal	15'	60	780
Total Container Stock				**315**	**4095**
SEED MIX			**Minimum Purity/ Germination**	**Lbs./ Acre**	**Total Lbs.**
Bromus carinatus	California brome	seed	95/80	3	39
Galium aparine	goose grass	seed	10/25	1	13
Nassella lepida	foothill needlegrass	seed	60/60	2	26
Nassella pulchra	purple needlegrass	seed	60/60	5	65
Plantago ovata	wooly plantain	seed	98/75	20	260
Quercus agrifolia	Coast live oak	Acorns	TBD	100	1300
Sisyrinchium bellum	blue-eyed grass	seed	95/75	0.5	15.5
Vulpia microstachys	fescue	seed	70/70	6	186
Artemesia californica	California sagebrush	seed	15/50	2	26
Calystegia macrostegia	morning glory	seed	TBD	0.5	6.5
Eriogonum fasciculatum	California buckwheat	seed	10/65	3	39
Gnaphalium californicum	California everlasting	seed	TBD	1	13
Isocoma menziesii	goldenbush	seed	TBD	0.5	6.5
Lotus scoparius	deerweed	seed	90/60	4	52
Mimulus aurantiacus	monkeybush	seed	5/70	2.5	32.5
Salvia apiana	white sage	seed	70/50	2	26
Salvia mellifera	black sage	seed	70/50	2	26
Verbena lasiostachys	common verbena	seed	70/50	1	13
Total Seed Stock				**156**	**2145**

Mitigation Site C: Chiquita Woods

Riparian Oak and Elderberry Woodland (0.5 Acre)

This plan provides for the establishment of approximately 0.5 acres of oak/elderberry woodland habitat in Mitigation Area C. The planting palette for this habitat is provided below in Table 18.

TABLE 18
RIPARIAN OAK/ELDERBERRY WOODLAND PLANT PALETTE
(0.5 ACRES)

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Plant
CONTAINER STOCK					
Baccharis salicifolia	mule fat	Rooted	5'	25	13
Heteromeles arbutifolia	toyon	D-40	20'	10	5
Quercus agrifolia	coast live oak	1 gal	25'	190	95
Rhamnus californica	coffeeberry	D-40	20'	10	5
Rhus integrifolia	lemonadeberry	D-40	15'	20	10
Sambucus mexicana	Mexican	1 gal	15'	60	30
Total Container Stock				**315**	**158**
SEED MIX			**Minimum Purity/ Germination**	**Lbs./ Acre**	**Total Lbs.**
Bromus carinatus	California brome	seed	95/80	3	1.5
Galium aparine	goose grass	seed	10/25	1	0.5
Nassella lepida	foothill	seed	60/60	2	1
Nassella pulchra	purple	seed	60/60	5	2.5
Plantago ovata	wooly plantain	seed	98/75	20	10
Quercus agrifolia	Coast live oak	Acorns	TBD	100	50
Sisyrinchium bellum	blue-eyed grass	seed	95/75	0.5	0.3
Vulpia microstachys	fescue	seed	70/70	6	3
Artemesia californica	California	seed	15/50	2	1
Calystegia macrostegia	morning glory	seed	TBD	0.5	0.3
Eriogonum fasciculatum	California	seed	10/65	3	1.5
Gnaphalium californicum	California	seed	TBD	1	0.5
Isocoma menziesii	goldenbush	seed	TBD	0.5	0.3
Lotus scoparius	deerweed	seed	90/60	4	2
Mimulus aurantiacus	monkeybush	seed	5/70	2.5	1.3
Salvia apiana	white sage	seed	70/50	2	1
Salvia mellifera	black sage	seed	70/50	2	1
Verbena lasiostachys	common verbena	seed	70/50	1	0.5
Total Seed Stock				**156**	**78.2**

Native Perennial Grassland (0.1 Acre)

This plan provides for the establishment of approximately 0.1 acre of native perennial grassland habitat in Mitigation Area C. The planting palette for this habitat is provided below in Table 19.

TABLE 19
NATIVE PERENNIAL GRASSLAND PLANT PALETTE
(0.1 ACRE)

Botanic Name	Common Name	Stock Type	Minimum Purity/ Germination	Lbs./ Acre	Total Lbs.
SEED MIX					
Asclepias fascicularis	narrow-leaf milkweed	seed	TBD	0.25	0.03
Ambrosia psilostachys	western ragweed	seed	20/70	0.25	0.03
Amsinckia menziesii var. *intermedia*	common fiddleneck	seed	30/70	1.00	0.10
Bromus carinatus	California brome	seed	95/80	2.00	0.20
Castilleja exserta	purple owl's clover	seed	50/60	0.50	0.05
Dichelostemma capitatum	blue dicks	seed	95/50	1.00	0.10
Ericameria palmeri	grassland goldenbush	seed	TBD	0.25	0.03
Filago californica	California filago	seed	TBD	0.50	0.05
Gnaphalium palustre	lowland everlasting	seed	25/10	0.50	0.05
Hemizonia fasiculata	tarweed	seed	20/70	2.00	0.20
Lasthenia californica	goldfields	seed	50/60	0.50	0.05
Layia platyglossa	tidy tips	seed	80/75	0.50	0.05
Lotus purshianus	Spanish clover	seed	98/70	1.50	0.15
Lotus strigosus	strigose lotus	seed	98/70	1.50	0.15
Lupinus bicolor	miniature lupine	seed	98/85	3.00	0.30
Lupinus succulentus	arroyo lupine	seed	98/85	1.50	0.15
Lupinus truncatus	collar lupine	seed	98/70	1.50	0.15
Melica imperfecta	melic grass	seed	90/60	1.50	0.15
Nassella lepida	foothill needlegrass	seed	60/60	2.00	0.20
Nassella pulchra	purple needlegrass	seed	60/60	10.00	1.00
Nemophila menziesii	baby blue eyes	seed	98/85	0.50	0.05
Plantago ovata	wooly plantain	seed	98/75	20.00	2.00
Poa secunda	bluegrass	seed	60/60	1.50	0.15
Sisyrinchium bellum	blue-eyed grass	seed	95/75	1.50	0.15
Vulpia microstachys	small fescue	seed	70/70	4.00	0.40
Total Seed Stock				**59.25**	**5.94**

Mitigation Site D: Extended Detention Basin # 2

Southern Willow Woodland (1.0 Acre)

This plan provides for the establishment of approximately 1.0 acre of southern willow woodland habitat within the northern and southern reach of Mitigation Area D. The planting palette for southern willow woodland is presented in Table 20.

TABLE 20
SOUTHERN WILLOW WOODLAND PLANT PALETTE
1.0 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing*	No. per Acre	Total Plant Qty.
CONTAINER STOCK					
Baccharis salicifolia	Mule fat	Cutting	12' o.c.	349	349
Salix goodingii	Black willow	Cutting	20' o.c.	126	126
Salix laevigata	Red willow	Cutting	20' o.c.	126	126
Salix lasiolepis	Arroyo willow	Cutting	8' o.c.	401	401
Juncus mexicanus	Mexican rush	D-40	15' o.c.	400	400
Juncus xiphioides	Iris-leaved rush	D-40	15' o.c.	400	400
Leymus triticoides	Beardless wild rye	Liners	Clusters	503	503
Sambucus mexicana	Blue elderberry	1 gal	40' o.c.	63	63
Total Container Stock				**2,368**	**2,368**
SEED MIX	**Common Name**	**Stock Type**	**Minimum Purity/Germination**	**Lbs./Acre**	**Total Lbs.**
Ambrosia psilostachya	Western ragweed	Seed	20/30	2.5	2.5
Anemopsis californica	Yerba mansa	Seed	45/60	1	1
Artemisia douglasiana	Mugwort	Seed	10/50	2.5	2.5
Hordeum brachyantherum	Meadow barley	Seed	90/80	6	6
Juncus mexicanus	Mexican rush	Seed	TBD	2	2
Gnathalium palustre	Lowland cudweed	Seed	5/10	0.5	0.5
Pluchea odorata	Marsh fleabane	Seed	90/30	2	2
Total Seed Stock				16.5	16.5

* Plant spacing is approximate and refers to spacing within each vegetation level herbaceous, shrub and tree.

Temporary Impact Areas

With respect to temporary impacts to 9.44 acres of Corps jurisdiction, 9.49 acres of RWQCB jurisdiction, 14.61 acres of CDFG jurisdiction and 7.70 acres of CCC jurisdiction within San Juan Creek, San Mateo Creek, San Onofre Creek, Drainage FE/7-1 and San Mateo Marsh-East of I-5, and 0.14 acre of mitigation within the re-aligned Talega Basin, the applicant will re-contour and re-vegetate all temporarily impacted areas as detailed below.

Re-aligned Talega Basin

This plan provides for the restoration of 0.136 acre of temporarily impacted southern willow scrub planted as mitigation within the re-aligned Talega Basin. The planting palette for southern willow scrub is presented in Table 21.

TABLE 21
SOUTHERN WILLOW SCRUB PLANT PALETTE
0.136 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Percent	Total Plant Qty.
Overstory						
Salix exigua	Sandbar willow	1 gal	10' o.c.	80	6	10
Salix gooddingii	Black willow	1 gal	10’ o.c.	50	4	7
Salix lasiolepis	Arroyo willow	1 gal	10' o.c.	100	7	14
Sambucus mexicana	Blue elderberry	1 gal	15' o.c.	20	1	2
Subtotal				250		33
Understory						
Artemisia californica	Mugwort	1 gal	4' o.c.	200	15	27
Baccharis salicifolia	Mule fat	1 gal	8’ o.c.	200	15	27
Juncus mexicanus	Mexican rush	liner	4' o.c.	200	15	27
Leymus triticoides	Creeping wild rye	liner	4’ o.c.	200	15	27
Eleocharis macrostachya	Creeping spikerush	1 gal	5' o.c.	200	15	27
Rosa californica	California wild rose	1 gal.	4’ o.c.	100	7	14
Subtotal				1,100		149
Total Container Stock				1,350		182

Southern Arroyo Willow Forest (7.28 Acres)

This plan provides for the restoration of 7.28 acres of temporarily impacted southern arroyo willow forest habitat. The planting palette for southern willow woodland is presented in Table 22.

TABLE 22
SOUTHERN ARROYO WILLOW FOREST PLANT PALETTE
7.28 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing*	No. per Acre	Total Plant Qty.
CONTAINER STOCK					
Baccharis salicifolia	Mule fat	Cutting	12' o.c.	349	2,541
Salix goodingii	Black willow	Cutting	20' o.c.	126	918
Salix laevigata	Red willow	Cutting	20' o.c.	126	918
Salix lasiolepis	Arroyo willow	Cutting	8' o.c.	401	2,920
Juncus mexicanus	Mexican rush	D-40	15' o.c.	400	2,912
Juncus xiphioides	Iris-leaved rush	D-40	15' o.c.	400	2,912
Leymus triticoides	Beardless wild rye	Liners	Clusters	503	3,662
Sambucus mexicanus	Mexican Elderberry	1 gal	40' o.c.	63	459
Total Container Stock				**2,368**	**17,242**
SEED MIX		**Stock Type**	**Minimum Purity/Germination**	**Lbs./Acre**	**Total Lbs.**
Ambrosia psilostachya	Western ragweed	Seed	20/30	2.5	18.5
Anemopsis californica	Yerba mansa	Seed	45/60	1	7.5
Artemisia douglasiana	Mugwort	Seed	10/50	2.5	18.5
Hordeum brachyantherum	Meadow barley	Seed	90/80	6	44
Juncus mexicanus	Mexican rush	Seed	TBD	2	14.5
Gnathalium palustre	Lowland cudweed	Seed	5/10	0.5	4
Pluchea odorata	Marsh fleabane	Seed	90/30	2	14.5
Total Seed Stock				**16.5**	**121.5**

* Plant spacing is approximate and refers to spacing within each vegetation level herbaceous, shrub and tree.

Southern Sycamore Riparian Woodland (up to 7.47 Acres)

This plan provides for the restoration of 7.47 acres of temporarily impacted southern sycamore riparian woodland habitat. The planting palette for southern sycamore riparian woodland is presented in Table 23.

TABLE 23
SOUTHERN SYCAMORE RIPARIAN WOODLAND PLANT PALETTE
7.47 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Quantity
Canopy					
Platanus racemosa	Western sycamore	1 gal	20' o.c.	40	299
Quercus agrifolia	Coast live oak	1 gal	20' o.c.	20	150
Sambucus mexicana	Blue elderberry	1 gal	20' o.c.	30	224
Subtotal				**90**	673
Understory					
Baccharis salicifolia	Mule fat	1 gal	8’ o.c.	100	747
Leymus condensatus	Giant wild rye	1 gal	5’ o.c.	100	747
Leymus triticoides	Creeping wild rye	Liner	4’ o.c.	100	747
Rhus Integrifolia	Lemonade berry	1 gal	15' o.c.	50	374
Ribes speciosum	Fushia-flowering gooseberry	Liner	5’ o.c.	50	374
Muhlenbergia rigens	Deergrass	1 gal	5' o.c.	150	1,121
Opuntia littoralis	Coastal prickly pear	1 gal	5’ o.c.	100	747
Rosa californica	California wild rose	1 gal.	5' o.c.	50	374
Artemisia douglasiana	Mugwort	Liner	4’ o.c.	100	747
Juncus textilis	Basket rush	Liner	4’ o.c.	200	1,494
Rubus ursinus	California blackberry	1 gal	5' o.c.	50	374
Subtotal				**1050**	7,846
Total Container Stock					8,519

Freshwater Marsh (0.42 Acre)

This plan provides for the restoration of 0.42 acre of temporarily freshwater marsh habitat. The planting palette for freshwater marsh is presented in Table 24.

TABLE 24
FRESHWATER MARSH PLANT PALETTE
0.42 ACRES

Botanic Name	Common Name	Stock Type	Plant Spacing	No. per Acre	Total Quantity
EMERGENT MARSH					
Eleocharis macrostachya	Creeping spikerush	liner	2' o.c.	400	168
Scirpus americanus	Olney's spikerush	liner	4' o.c.	350	147
Scirpus maritimus	Alkali bulrush	liner	4' o.c.	350	147
Typha domengensis	Southern cattail	1 gal.	4' o.c.	300	126
Total				**1400**	**588**

Source of Plant Materials

It is preferred that the source of all propagules and seed used at the Mitigation Areas be from the site or adjacent riparian areas. If not available, the remainder of propagules and seed required will be from wild sources within Southern Orange County, and collected as close to the Mitigation Areas as possible to preserve regional genetic integrity.

Contract Growing

Contract growing of all container plants shall be by a local experienced native plant nursery. Substitution of plant material at the time of planting depends solely upon the discretion of the Project Biologist. Any substitutions that are approved will be documented in the As-Built Plans.

Container Plants

One-gallon container stock, rosepots, and liners shall be utilized for container stock production in order to develop vertical heterogeneity (strata). All plant materials will be inspected by the Project Biologist and approved as healthy, disease free, and of proper size prior to planting. Overgrown, root-bound container stock will be rejected.

Soil Amendments

Several soil amendments have been shown to be important tools in native habitat restoration while other amendments are still experimental. Most of these amendments are living components of the soil ecosystem. The following sections outline the potential use of soil amendments for restoration within the mitigation areas.

Arbuscular Mycorrhizal (AM) Fungi

Studies are currently underway in 2003/2004 to determine whether native AM fungi inoculum or commercial AM fungi inoculum has a positive effect on the establishment of native grasslands

compared to plots with no inoculum. Earlier studies within the Conservation Easement from 1999 - 2004 on establishment of coastal sage scrub showed no significant difference in establishment of native species between plots treated with and without commercial AM fungi (EARTHWORKS, unpublished data). However, plots treated with AM fungi seemed to have less mustard and wild radish. It is generally known that the Brassicaceae (Mustard) family is not mycorrhizal, and it is believed that AM fungi may have a detrimental effect on members of the family. Baseline tests of AM infectivity for the current 2003/2004 study indicate the soil in the restoration area has more AM potential than in the 1999 study baseline soil tests although data is not directly comparable because methods of infectivity differed. It is possible that when discing in the annual grassland areas was discontinued in 1999, AM fungi have increased because most annual grass species are mycorrhizal. Once the soil disturbance was stopped some species of AM fungi would have increased over the site.

Depending on the results of current studies, soil evaluations, site preparation and seeding method, soils will be amended with AM fungi through incorporation in the seed mix applied for each habitat. If native AM inoculum is used, the inoculum will be developed from sources within the mitigation area or close to the mitigation area, such as Bell Canyon. Native inoculum will be most likely used in restoration of the native grassland areas since there are few, if any, native grasses presently in the soil in these areas and, therefore, it is expected that few species of mycorrhizae associated with native grasses are present. Coastal sage scrub restoration areas are immeditaely down slope of existing scrub, and AM fungi native to this habitat likely will move into the restoration areas. If commercial AM is applied to coastal sage scrub, *Glomus intraradices* will be used. This species is native in most areas of the Western region and has been used on successful scrub restoration sites without inhibiting subsequent colonization by other native mycorrhizae (EARTHWORKS, unpublished data).
The AM fungi used in the Mitigation Areas will be provided by a person or company with experience in AM fungi development. The AM fungi will be applied at the rate of 3,600,000 live propagules per acre, based on the guarantee of the supplier. The AM fungi will be applied with the seed in any seed method that is specified for particular areas, including imprinting, range drill seeding, and hydroseeding.

Algae
Native algae may be applied to the sites to speed the development of soil crusts and diminish the opportunity for weed seed germination. This amendment is still experimental, but it is a potential tool to be used in combination with other microbial amendments and restoration activities.

Fertilizer
Fertilizer most likely will not be necessary since the generally luxuriant growth of the existing exotic species indicates sufficient nutrients for habitat restoration. Soil nutrient tests will include standard agricultural suitability as well as total organic content and organic nitrogen. The long-term success of the restoration will depend on adequate amounts of organic material in the soils (Claussen, 2000). If fertilization should be required, then a slow release, low phosphorous complete fertilizer coated with polyurethane will be used. If soil tests show an over abundance of available nitrogen in the soil, then additional mulch may be applied to the specific sites.

Plant Placement
Container stock will be laid out in such a manner that mimics natural plant distribution (i.e., in clusters and islands) to emulate regional reference sites. The Project Biologist will monitor and confirm that trees and shrubs have been placed at the designed elevation relative to the water source supporting them, such as ground water.

Planting Method for Rose Pot and/or Liner Plant Stock
Rose pot and/or liner plant stock will be placed in a hole measuring at least twice the diameter and depth of the container. The root structure will be examined and excess root material removed. The top of the rootball will be set slightly above finish grade. The planting hole will be backfilled with native soil. Fertilizer, watering basins, and mulch are not required for this planting method.

Planting Method for Container Stock
Container plants consist of either dominant tree species or large shrubs that are difficult to establish from seed, and they will be used in oak woodland areas and non-wetland drainage areas only. The layout for container plants will be determined for each area based on micro topographic features. Spacing of plants within the groups will follow the specifications presented in the tables for container plant palettes. Planting sites will be marked on the site using different colored pin flags under the supervision of the Project Biologist. Groups of container plants will be spaced in a natural looking mosaic in each area. As-built drawings of oak woodland and non-wetland drainage container planting will be prepared.

All container plants are to be planted to the following specifications:

- Planting holes shall be made with the minimum disturbance to accommodate the containers.
- Prior to planting, the planting hole shall be filled with water, and allowed to drain.
- Plants shall be set in the planting hole so that the crown of the root ball is approximately 0.5 inch above finish grade. Under no circumstance should the plant crown be buried.
- A watering basin shall be provided around each plant from 18 – 24 inches in diameter.
- Watering basins shall be filled with water after planting.
- Plant basins shall be mulched with approximately 4 – 6 inches of approved wood mulch after planting.

Planting Method for Seeding
Tests are currently underway to determine the optimum seeding method to use in various areas of the site based on weed densities; however, several physical factors will also determine what method of seeding is used. The following sections define several methods of seeding that will be used over the Conservation Area under particular circumstances. As-built plans will be prepared for each area to document the methods used.

Imprint Seeding

Most areas that have very dense weed species and few native species will be seeded by imprinting the seeds. Areas of shallow soil and the presence of rocks will limit the use of imprinting. Prior to imprinting an area, and as part of site preparation, soil will be ripped or tilled to prepare the seed bed.

Imprinting will apply the specific seed mix and specified AM fungi amendments at the same time through separate gandy boxes:

- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

Range Drill Seeding

Range drill seeding will be implemented where the occurrence of native species is somewhat high, making ripping and tilling undesirable methods for site preparation. Range drill seeding can be accomplished over mowed stubble if the thatch is not too thick. In some case the thatch may be broken down by with a light disc prior to drill seeding. Drill seeding will be accomplished by dividing the seed mix in tow equal parts and applying each half of the seed mix in perpendicular passes with the range drill seeder.

Drill seeding will apply the specific seed mix and specified AM fungi amendments at the same time through separate gandy boxes, and with light seeds and heavy seeds separated into separate gandy boxes:

- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

Hydroseeding

In areas that are not accessible by imprinter or drill seeder, a two-step hydroseeding technique shall be used to the apply seed. In the first step, a hydraulic application of a slurry mixture containing water, cellulose wood fiber, seed, and AM fungi will proceed as follows:

- 500 pounds lbs/ac of virgin cellulose wood fiber,
- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

The second step will consist of the following slurry mixture:

- 1500 pounds/acre of virgin cellulose wood fiber, and
- 160 pounds lbs/ac M-binder.

Pruning and Staking
There will be no pruning or staking of any vegetation. Diseased or insect-damaged foliage, if sufficient to require pruning, will serve as a benchmark for rejection of plant material.

F. Irrigation Plan

Supplemental irrigation is to be used solely for the purpose of establishing the plants at the Mitigation Site and is of a temporary nature. The goal of the irrigation program is to obtain germination and growth with the least amount of irrigation. Frequent irrigation encourages weed invasion and leaches nutrients from the soil.

The Mitigation Areas will be initially supported by a short-term irrigation system as well as from existing water sources. Drip irrigation may be provided for trees and shrubs planted on the slopes. The container stock will be irrigated as long as necessary to establish the root systems in the native soils, probably two or three summers. The main line will be installed below-grade. All lateral lines will be installed above-grade for ease of removal and inspection.

The critical period for irrigation is during the first winter and early spring following planting. During this time, roots are not well established and an unseasonable drought can cause high mortality. During dry periods after plant installation, the Project Biologist and the maintenance contractor will regularly inspect soil moisture. Watering during the summer dry season will occur as frequently as required.

After the initial plant establishment period, water will be applied infrequently and only as required to prevent the mortality of plants and seedlings. The irrigation methods employed will attempt to mimic wet rainfall years by incorporating evenly spaced, infrequent, deep applications of water.

When the plantings are sufficiently established and no longer require supplemental irrigation, the Project Biologist shall notify the landscape contractor to remove all above-grade irrigation system components from the Mitigation Sites. Irrigation shall be stopped two years prior to achieving the success criteria.

No irrigation will be provided to the restored areas that were temporarily impacted as there was no vegetation in those areas to begin with. Areas undergoing enhancement will also not receive irrigation.

G. As-Built Conditions

Once the implementation of the Mitigation Sites has been completed, the Applicant will submit "As-Built" drawings to the Corps, CDFG and RWQCB within 45 days after completion of construction. The drawings will identify the date installation was completed and if there were any deviations from the approved mitigation plan.

V. MAINTENANCE ACTIVITIES DURING THE MONITORING PERIOD

A. Maintenance Activities

The purpose of this program is to ensure the success of the mitigation plantings. Maintenance will occur over the five-year life of the project. The Project Biologist will monitor all aspects of the revegetation in an effort to detect any problems at an early state. Potential problems could arise from irrigation failure, erosion, vandalism, competition from weeds and invasive species, and unacceptable levels of disease and predation.

These maintenance guidelines are specifically tailored for native plant establishment. The maintenance personnel will be fully informed regarding the habitat establishment program so they understand the goals of the effort and the maintenance requirements. A restoration contractor with experience and knowledge in native plant habitat restoration will supervise all maintenance personnel.

For a period of 120 days following completion of the planting installation, the restoration contractor will be responsible for the care of the plantings. The purpose of the 120-day establishment period is to ensure continuity between the installation of the plant material and its short-term maintenance. The contractor's presence during this period is proven to increase project success. The contractor will control the spread of weed species and identify any efforts necessary to ensure the health and survival of the plantings.

Following the 120-day establishment period the project will be evaluated for health of plant material, and if judged satisfactory by the Project Biologist, the establishment period will be considered concluded and the long-term habitat maintenance program will begin. A different restoration contractor may implement this period of maintenance; however, the Project Biologist will continue to review the project's success.
Damage to plants, irrigation systems, and other facilities occurring as a result of unusual weather or vandalism will be repaired or replaced immediately.

General Maintenance
The Contractor will perform the following tasks as general maintenance duties:

- Plant Inspection
- Weed control
- Irrigation water volume and frequency
- General maintenance of irrigation system
- Trash and debris removal
- Pest control
- Plant replacement

Plant Inspection
After initial planting, the Project Biologist will check the Mitigation Areas on a monthly basis through the 18th month. The plants shall be inspected on a quarterly basis thereafter.

Weed Control
The Mitigation Areas shall be maintained free of weeds during the monitoring period. Weed eradication will minimize competition that could prevent the establishment of native species. All maintenance personnel will be trained to distinguish weed species from native vegetation to ensure only weedy species are removed or sprayed with herbicide.

As weeds become evident, they should be immediately removed by hand or controlled with an appropriate herbicide as determined by a licensed Pest Control Advisor (PCA). Weed debris shall be removed from the project area as accumulated and disposed of as permitted by law.

Weeds shall be manually removed before they can attain a height of 12-inches at intervals of not more than 30 days for the first two years of the project. All portions of the plant will be removed, including the roots. The Project Biologist shall direct the contractor regarding the selection of target weed species, their location, and the timing of weed control operations to ensure that native plants are avoided to the extent possible. Pulled weeds will be placed on a "mantilla" or other type of tarp to prevent the seeds from coming in contact with the ground.

Irrigation Water Volume and Frequency
The contractor shall be responsible for applying sufficient irrigation water to adequately establish new plant materials, and germinate and establish the applied seed. Irrigation water shall be applied in such a way as to encourage deep root growth (periodic deep irrigation versus frequent light irrigation). The contractor will allow soil to dry down to approximately 50- to 60-percent of field capacity (in the top six or 10 inches after germination and during seedling establishment) before the next irrigation cycle. 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 a deep root zone that will support the vegetation in the years after establishment. Systems may need to be on for as long as six to eight hours at a time in order to get complete water penetration to the lower soil horizons to encourage deep root growth. A soil probe or shovel shall be used to examine soil moisture and rooting depth directly.

General Maintenance of Irrigation System
The contractor will be responsible for the regular maintenance and repair of all aspects of the irrigation system. Poorly functioning or non-functioning parts shall be replaced immediately so as to not endanger the plantings.

General system checks shall be conducted no less than weekly for the first month after installation to assure the system is functioning correctly, and monthly thereafter, except during periods when the irrigation system is not in operation as recommended by the Project Biologist.

Any erosion or slippage of soil caused by the contractor’s inadequate maintenance or operation of irrigation facilities shall be repaired by the contractor at his/her expense.

Trash and Debris Removal
The Mitigation Areas shall be well maintained in order to deter vandalism and dumping of trash. The contractor is responsible for avoiding impacts to plantings during trash removal activities.

Contractor shall, during daily routine maintenance, manually remove weeds, liter, trash, and debris from the Mitigation Areas and dispose of off-site as permitted by law. Dead limbs and tree fall shall be left in place in the revegetation areas.

Pest Control
Young trees and shrubs will be monitored for signs of disease, insect and/or predator damage, and treated as necessary. Badly damaged plants will be pruned to prevent spreading of the pestilence or replaced in kind if removed. Excessive foraging by predators may necessitate protective screening around plants. The Project Biologist will be consulted on any pest control measures to be implemented.

Plant Replacement
The installation contractor will be responsible for replacing all container stock plants terminally diseased or dead for 120 days after plant installation. The long-term maintenance contractor will thereafter replace all dead and/or declining plants in the winter months as recommended by the Project Biologist. Replacement plants shall be furnished and planted by the contractor at his/her expense.

Replacement plants shall conform to the species, size requirements, and spacing as specified for the plants being replaced. The replacement plants shall be purchased from inventory at the same native plant nursery as were the contract-grown plant stock.

Fertilization
If nutrient deficiencies are observed during site monitoring, the Project Biologist may specify applications of slow-release pellet fertilizer or soil amendments to speed initial growth or as a remedial measure. These applications shall occur at the onset of the rainy season following the manufacturer's recommendations. Fertilizer will not be applied other than under the direction of the Project Biologist.

Pruning
No pruning is necessary unless otherwise specified by the Project Biologist. Dead wood shall be left on trees or where it has fallen as it plays an important role in habitat creation and soil formation.

B. Responsible Parties

The Applicant will be responsible for financing and carrying out maintenance activities.

Transportation Corridor Agencies
Contact: Maria Levario
125 Pacifica
Irvine, CA 92618
Telephone: (949) 754-3400

C. Maintenance Schedule

The restoration maintenance and monitoring program will begin with the construction process and continue for five years following the completion of plant installation or until performance criteria are met. Table 22 below indicates the schedule of maintenance inspections.

TABLE 25
Maintenance Schedule

Maintenance Task	Year				
	1	2	3	4	5
Plant Inspection	Monthly first 12 months	Monthly through 18th month; quarterly thereafter	Quarterly	Quarterly	Quarterly
Irrigation System Inspection	Monthly, or more frequently if required	Monthly	As Required	N/A	N/A
Trash and Debris Removal	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
Weed Control	Minimum of Monthly	Monthly	Quarterly	Quarterly	Quarterly
Pest Control	Monthly	Bi-monthly	Quarterly	Quarterly	Quarterly
Plant Replacement	Annually	Annually	Annually	Annually	Annually
Fertilization (if necessary)	Annually	Annually	N/A	N/A	N/A

VI. MONITORING PLAN FOR THE COMPENSATORY MITIGATION AREAS

A. Performance Standards for Target Dates and Success Criteria

In order to assure that the mitigation performance standards are met, the mitigation areas shall be qualitatively monitored annually after installation for four years. Photo-documentation at permanent points will be conducted for inclusion in the annual performance monitoring report. In the fifth year, the site shall be monitored quantitatively to determine if each restoration area achieves the performance standards. Monitoring will consist of random transects over each restoration area. The number of samples necessary will be evaluated to ensure statistical confidence based on variation over the site.

Performance Standards are based on the stated goals of the program, the design of the Mitigation Areas, and functional assessment criteria. This mitigation program considers the functions of both the jurisdiction to be impacted and proposed mitigation jurisdiction to confirm that the functions of the replacement mitigation equal or exceed those of existing Corps jurisdiction. These Performance Standards have been developed to assess an increase in functions and values of each habitat. Performance will be assessed as the mitigation areas develop trends in cover, species diversity, as well as soil development so that the habitat quality of the site is restored. Specifically, the restoration will be considered successful when the following criteria are met for each habitat type:

1. Performance Criteria for Wet Meadow, Southern Willow Woodland, Mule fat Scrub, Freshwater Marsh, Arroyo Willow Forest, ,

First-Year Monitoring

Success Standard: A minimum of 35-percent relative coverage by native species;
No greater than 20-percent coverage by non-native species.

Second-Year Monitoring

Success Standard: A minimum of 50-percent relative coverage by native species;
No greater than 20-percent coverage by non-native species.

Third-Year Monitoring

Success Standard: A minimum of 75-percent relative coverage by native species;
No greater than 15-percent coverage by non-native species;
Hybrid Functional Assessment Score for riparian habitats is 60-percent of expected (as referenced in Table 8);
A minimum of six species native to the target habitat types must represent 0.5-percent (each) of the total vegetational composition within the revegetation areas, with no single species representing over 75-percent composition;
Microtopographic complexity is at least 75-percent of reference site;
Habitat heterogeneity is at least 75-percent of reference site

Fourth-Year Monitoring

Success Standard: A minimum of 80-percent relative coverage by native species;
No greater than 15-percent coverage by non-native species.

Fifth-Year Monitoring

Success Standard: A minimum of 90-percent relative coverage by native species;
No greater than 10-percent coverage by non-native species.
Hybrid Functional Assessment Score for riparian habitats is 100-percent of expected (as referenced in Table 8)
At least 0.82 acres exhibit hydric soils, wetland hydrology, and hydrophytic plant community;
A minimum of six species native to the target habitat types must represent 0.5-percent (each) of the total vegetational composition within the revegetation areas, with no single species representing over 75-percent composition;.
Microtopographic complexity is at least 75-percent of reference site;
Habitat heterogeneity is at least 75-percent of reference site

2. Performance Criteria for Native Grassland Buffers

Perennial Grasslands and Grassland/Forbs

Success Standard:

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report;
- The native grasses set seed;
- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of seedlings randomly sampled over the site;
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus*. The relative cover of native plant species is at least 60 percent; and
- The site demonstrates 80 percent of the native species richness found in the reference habitat in the Conservation Area;

3. Performance Criteria for Riparian Oak/Elderberry Woodland and Ephemeral Drainage Enhancement

Riparian Oak/Elderberry Woodland

Success Standard:

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report;
- At least 60 percent of container plants have survived in the site in the fifth year of monitoring based on information from quantitative monitoring;

- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of understory seedlings randomly sampled over the site;
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus* and *Nicotiana glauca*; and
- The relative cover of native plant species is at least 75 percent with at least 5 percent cover from oak saplings and elderberry shrubs.

The Mitigation Areas will be monitored for five years following the completion of mitigation installation unless final success criteria are met prior to that point in time. The monitoring program will consist of the measurement of performance indicators and the assessment of these indicators relative to established performance criteria.

If the cover requirements have not been met, the Applicant is responsible for augmenting the mitigation areas with the appropriate seed and/or plants to achieve these requirements. Replacement plants and seeding shall be monitored with the same survival and growth requirements for five years after planting.

Additional qualitative criteria, listed below, will be considered as indicators of successful revegetation throughout the life of the project.

Survivorship of Container Stock
Many of the species proposed for the mitigation program exhibit vegetative reproduction, making identification of the original container stock problematic. Therefore, survivorship is not considered to be a useful indicator of success. Rather, total cover, habitat patchiness and diversity will be the criteria used to determine success for the vegetation.

Functionality as Wildlife Habitat
While conducting qualitative surveys, the Project Biologist will record wildlife observations within the revegetated habitat. The development of quantitative measures for wildlife use is not necessary for these Mitigation Areas, but general impressions of wildlife usage of any restoration area should be considered among the success criteria.

Native Plant Recruitment
Evidence of native plant recruitment from year to year is another example of the successful creation of a functional, self-sustaining habitat. Noted recruitment would be considered a satisfied success criterion. However, the lack of such recruitment should not detract from the other, more significant criteria listed above.

Probability of Continued Habitat Progression
The qualitative monitoring will provide the Project Biologist with an opportunity to evaluate the progression of the revegetation sites towards maturity. This determination will be used to support a final decision as to whether the revegetation effort has been successful. If several of the above criteria have not been met, but the site is clearly nearing satisfaction of those criteria, the Project

Biologist may suggest that the Corps, CDFG, RWQCB and CCC accept the mitigation as completed based on professional experience and expectations of continuing habitat progression.

B. Target Functions and Values

The Applicant proposes to establish 33.40 acres of wetland/riparian habitat within Mitigation Areas A, B, C and D and restore 184.0 acres of upland buffer in Mitigation Areas A,B and C, for a total of 217.4 acres as compensation for permanent impacts to a total of 6.27 acres of Corps jurisdiction, of which 0.82 acres consist of jurisdictional wetlands, 23.08 acres of CDFG jurisdiction of which 20.37 consists of riparian habitat, 7.95 acres of isolated waters of the State and 0.46 acres of CCC wetlands.

Based on the HFA approach, the Proposed Project will cause the loss of 455.81 Functional Units. Following implementation of this HMMP, the mitigation areas will support 556.24 Functional Units, which results in a net increase of 100.43 Functional Units. Please see Appendix D for a complete description and explanation of the Hybrid Functional Assessment for both pre-project and post-project scores.

Temporary impact areas including 9.44 acres of Corps jurisdiction, 9.49 acres of RWQCB jurisdiction, 14.61 acres of CDFG jurisdiction, 7.70 acres of CCC jurisdiction and 0.14-acre of southern willow scrub mitigation within the re-aligned Talega Basin will be restored at a 1:1 ratio.

C. Target Hydrological Regime

Hydrological contribution to the Mitigation Areas will originate as direct precipitation that will drain directly to the site. Hydrological input is also expected to consist of runoff from bordering areas, groundwater supply, and artificial irrigation. The enhanced hydrology within the Mitigation Areas is expected to provide for dynamic storage of surface water, short-term storage of surface water, dissipation of energy, moderation of groundwater flow, nutrient cycling, removal of imported elements and compounds, retention of particulates, and export of organic carbon.

The mitigation plantings will initially be supported by a temporary irrigation system until gradually weaned. Irrigation water will be supplied via a potable water system piped into the Mitigation Areas.

D. Target Jurisdictional and Non-jurisdictional Acreages to be Established, Restored, Enhanced, and/or Preserved

Target jurisdiction to be established within the proposed Mitigation Areas consists of up to 33.40 acres of southern willow woodland, mule fat scrub, oak/elderberry riparian woodland and wet meadow supported by groundwater, overbank flows from the adjacent drainages portions, and artificial irrigation. Upon completion of this mitigation program, it is anticipated that 15.90 acres of habitat creation within Mitigation Area A will meet the definition of a waters of the U.S. and/or State, and that 17.5 acres of habitat creation/restoration within Mitigation Areas B, C and D will meet the definition of CDFG jurisdictional riparian habitat and streambed enhancement. A

minimum of 0.82 acre will meet wetland criteria (equaling a 1:1 replacement ratio for wetland impacts). Approximately 16.1 acres of the proposed mitigation is expected to meet the criteria for a 1-parameter CCC wetland.

All wet meadow, southern willow woodland, mule fat scrub, and Chiquita Creek enhancement areas are expected to meet the Corps requirement for 90-percent coverage of native species after five years with no single plant species composing more than 75-percent composition of each Mitigation Area, and no more than 10-percent non-native plant species within the Mitigation Areas.

Temporary impact areas including 9.44 acres of Corps jurisdiction, 9.49 acres of RWQCB jurisdiction, 14.61 acres of CDFG jurisdiction, 7.70 acres of CCC jurisdiction and 0.14-acre of southern willow scrub mitigation within the re-aligned Talega Basin will be restored at a 1:1 ratio.

E. Monitoring Methods

Monitoring will assess the attainment of annual and final success criteria and identify the need to implement contingency measures in the event of failure. Monitoring methods include an annual tally of dead and/or declining plant stock, and visual estimates of cover as well as field sampling techniques that are based in accordance with the methodology developed by the California Native Plant Society (CNPS).[9] Please refer to *A Manual of California Vegetation* for further details on this sampling method.

1. Sampling Methods for Wet Meadow, Southern Willow Woodland, Mule Fat Scrub and Chiquita Creek Enhancement

Sampling Techniques For Vegetation Cover and Diversity

Percent canopy cover of the mitigation plantings will be measured by using the point-intercept sampling method centered in a 2-meter by 50-meter plot. At each 0.5-meter interval along each transect (beginning at the 50-cm mark and ending at 50-meter), a point is projected vertically into the vegetation. Each plant species intercepted by a point is recorded, providing a tally of hits for each species in the herbaceous, shrub, and tree canopies, making it possible to record more than 100 hits in any 50-meter transect. Percent cover for each species, according to vegetation layer (herb, shrub, and tree) can be calculated from these data. A list of all additional species within the 250 square-meter belt is subsequently made. Two 2-meter by 50-meter long transects per acre will be used to monitor the development of the revegetation. The various transects will be randomly located for the first sampling event and permanently marked to facilitate their use in subsequent years.

A sample of a proposed transect data sheet is provided in Appendix B.

Sampling Techniques For Microtopographic Complexity

Microtopographic Complexity will be evaluated by direct observation, comparing the reference sites with Mitigation Sites. Microtopographic complexity will be measured during performance of

[9] Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society.

vegetation transects, recording number of hummocks/mounds and depressions along with the change in topographic relief by class.

Sampling Techniques For Habitat Heterogenity
Beginning with year three of the five-year monitoring program, vegetation patchiness will be evaluated by comparison with the reference site. Characterization of habitat heterogeneity or patchiness is greatly dependent upon scale and will be based upon direct visual observations made during performance of quantitative sampling.

Hybrid Functional Assessment
All mitigation sites will be evaluated for hydrologic function, biogeochemical function and habitat function using 21 metrics including: percentage of assessment area with buffer, average width of buffer, buffer condition, land use/land cover, water source, hydroperiod, floodplain connection, altered hydraulic conveyance, surface water persistence, flood prone area, sediment regime, topographic complexity, substrate condition, vertical biotic structure, interspersion and zonation, ratio of native to non-native, canopy, age distribution, riparian vegetation condition, riparian corridor continuity and invasive plant species. Appendix D includes the scoring methodology for each metric.

Photo-Documentation
Locations for photo-documentation will be established during the first annual monitoring event. Photos shall be taken each monitoring period from the same vantage point and in the same direction each year, and shall reflect material discussed in the annual monitoring report.

Jurisdictional Delineation
All mitigation sites will be evaluated for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats will be evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual and Interim 2006 Arid Southwest Supplement[10] (Wetland Manual).

Qualified habitat restoration specialists, biologists, or horticulturists with appropriate credentials and experience in native habitat restoration shall perform monitoring. Continuity within the personnel and methodology of monitoring shall be maintained insofar as possible to ensure comparable assessments.

2. Sampling Methods for Perennial Grassland

Vegetation Sampling
Vegetation sampling in perennial grassland habitats will utilize the point-intercept method to estimate vegetation cover and species diversity. This method is best suited to measure grassland habitats, and it will provide the most efficient and reliable method for estimating cover and species composition over the mitigation site.

[10] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

Locations of the transects will be randomly selected within each restoration area. At each randomly selected site, a 25-meter point intercept transect will be performed with points at every 5 meters. A 25-meter tape will be stretched taut, perpendicular to the main line at the randomly selected locations. At each 5 meter mark, a 1/2 meter quadrat will be placed. Native and non native plant cover will be estimated and entered into a hand-held computer. Data to be recorded will include the species present with quadrats, and native and non native vegetative cover in relative percent.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data.

3. Sampling Methods for Riparian Oak/Elderberry Woodland

Vegetation Sampling

Vegetation sampling in oak woodlands will utilize belt transects to measure vegetation cover. This method is best suited to measure woodland vegetation, and it will provide the most efficient and reliable method for estimating cover and species composition over the sites.

Locations of the belt transects will be randomly selected within each restoration area. At each randomly selected site, a 25-meter x 2 meter belt transect will be performed. A 25-meter tape will be stretched taut, perpendicular to the main line at the randomly selected locations. Data to be recorded will include the species within the belt transect, and estimate of understory cover, and the height and cover of tree species will be recorded. Annual grasses will be grouped together in one measurement and species of annual grasses will be noted.

Cover data will be reported for understory species as an estimate of relative cover. Cover for tree species will be reported as absolute cover based on the volume of sampled trees. Each tree canopy within the belt will be measured from two perpendicular diameter measurements. Frequency data will be reported as the percent of transects a species is reported to occur in. Height data will be reported as the average height of the tree species.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data. The percent survivorship of tree species will be determined from direct counts over the site.

4. Sampling Methods for Ephemeral Drainage Enhancement

Vegetation sampling for non-wetland drainages will utilize belt transects across the drainage to estimate vegetation cover. This method is best suited to measure the swale and bank vegetation, and it will provide the most efficient and reliable method for estimating cover and species composition over the drainages.

Locations of the belt transects will be randomly selected within each restored drainage. At each randomly selected site, a 2 meter belt transect will be performed. A meter tape will be stretched across drainages as a cross section. Data to be recorded will include the species within the belt

transect, and estimate of understory cover, and the height and cover of tree species will be recorded. Annual grasses will be grouped together in one measurement and species of annual grasses will be noted.

Cover data will be reported for understory species as an estimate of relative cover. Cover for tree species will be reported as absolute cover based on the volume of sampled trees. Each tree canopy within the belt will be measured from two perpendicular diameter measurements. Frequency data will be reported as the percent of transects a species is reported to occur in. Height data will be reported as the average height of the tree species.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data.

F. Monitoring Schedule

Qualitative Monitoring
The Project Biologist will conduct qualitative monitoring surveys on a monthly basis for the first 6 months, quarterly for the next twelve months, and annually thereafter for the remainder of the monitoring period. Qualitative surveys, consisting of a general site walkover and habitat characterization, will be completed during each monitoring visit. General observations, such as fitness and health of the planted species, pest problems, weed establishment, mortality, and drought stress, will be noted in each site walkover. Permanent photo monitoring points will be selected to represent each area and habitat within the mitigation sites.

The Project Biologist will also note observations on wildlife use and native plant recruitment for the purpose of later discussion in the annual reports. Records will be kept of mortality and other problems such as insect damage, weed infestation, and soil loss. The Project Biologist will determine remedial measures necessary to facilitate compliance with performance standards. All remedial measures undertaken will be referenced in the annual monitoring report to the Corps, CDFG, RWQCB and CCC.

Quantitative Monitoring
The quantitative vegetation sampling will be conducted annually and will provide sufficient data to determine performance relative to the performance criteria described in Section VI.1 above.

G. Annual Monitoring Reports

At the end of each of the five monitoring period growing seasons, for the duration of the monitoring period, an annual report will be prepared for submittal to the Corps, CDFG, RWQCB and CCC. Since planting may not occur when planned, monitoring shall be tied to the actual implementation date (e.g., the first annual report shall be delivered on January 1st of the year following the first growing season after planting). These reports will assess both attainment of yearly target success criteria and progress toward final success criteria. These reports shall include the survival and/or replacement of tree and shrub container stock, percent cover of native vegetation, overall visual estimates of the heights of both tree and shrub species, and diversity data. These reports will also

include the following:

- a list of names, titles, and companies of all persons who prepared the content of the annual report and participated in monitoring activities for that year;
- a copy of the Corps permit, CDFG agreement, RWQCB 401 Certification and waste discharge requirements (WDR), and any attachments including Special Conditions and subsequent Letters of Modification;
- a vicinity map indicating location of the Mitigation Areas;
- a Mitigation Site map identifying habitat types, transect locations, photo station locations, etc. as appropriate;
- copies of all monitoring photographs;
- copies of all completed field data sheets; and
- and an analysis of all qualitative and quantitative monitoring data

VII. COMPLETION OF COMPENSATORY MITIGATION

A. Notification of Completion

The Applicant should notify the Corps, CDFG, RWQCB and CCC in writing when the monitoring period is complete and the Corps and CDFG-approved success criteria have been met. A formal jurisdictional delineation of established wetlands should be submitted with the report (this delineation shall be accompanied by legible copies of all field data sheets), if applicable. If wetlands are not established, a delineation of non-wetland waters of the U.S. and other areas enhanced, restored, established, or preserved shall be submitted to the Corps, CDFG, and RWQCB.

B. Final Success Criteria Resolution

If the project meets all success criteria at the end of the five-year monitoring period, the revegetation will be considered a success. If not, the maintenance and monitoring program will be extended one full year at a time, and a specific set of remedial measures approved by the Corps will be implemented until the standards are met. Only those areas that fail to meet the success criteria will require additional monitoring. This process will continue until all year-five standards are met or until the Corps, CDFG, RWQCB and CCC determine that other revegetation measures are appropriate.

Final success criteria will not be considered to have been met until a minimum of two years after artificial irrigation has ceased. Should the revegetation effort meet all goals prior to the end of the five-year monitoring period, the Corps, CDFG, RWQCB, and CCC at their discretion, may terminate the monitoring effort. At that time the Applicant will be released from further maintenance and monitoring requirements of the mitigation area.

If, during the monitoring period, a destructive natural occurrence does occur which damages or destroys the mitigation planting, and if the mitigation planting was documented to have been proceeding well toward establishment, then reconstruction and replanting will not be required. However, if the Mitigation Areas fare significantly worse than the surrounding natural communities in this same natural disaster, then the Mitigation Areas would be considered to have not established itself, and reconstruction, replanting, and monitoring would continue.

C. Agency Confirmation

Following receipt of the final annual monitoring report, the Corps, CDFG, RWQCB, and CCC will contact the Applicant as soon as possible to schedule a site visit to confirm the completion of the mitigation effort and any jurisdictional delineation. The mitigation will not be considered complete without an on-site inspection by a Corps, CDFG, RWQCB and CCC project manager and written confirmation that approved success criteria have been achieved.

It is therefore critical that agency staff review annual reports on a timely basis and provide comments throughout the maintenance and monitoring program so that any project deficiencies they note can be addressed prior to the expected end of the program.

VIII. CONTINGENCY MEASURES

A. Initiating Procedures

If a performance standard is not met for all or any portion of the mitigation project in any year, or if the approved success criteria are not met, the Project Biologist will prepare an analysis of the cause(s) of failure and, if determined necessary by the Corps, RWQCB, CDFG and/or CCC, propose remedial actions for approval. If the compensatory mitigation site has not met one or more of the success criteria or performance standards, the responsible party's maintenance and monitoring obligations shall continue until the Corps, RWQCB, CDFG and CCCgive final approval the mitigation obligations have been satisfied. It is therefore incumbent upon the Project Biologist to foresee project deficiencies as part of the monitoring program and take appropriate steps to address the situation.

B. Alternative Locations for Contingency Mitigation

Sufficient acreage for creation of the Mitigation Areas is available so alternative locations would be unnecessary. Although this plan is expected to be successful, other alternative locations may be used in the event that revegetation cannot be achieved.

C. Funding Mechanism

The Applicant will fund planning, implementation, maintenance and monitoring of any contingency measures that may be required to achieve mitigation goals.

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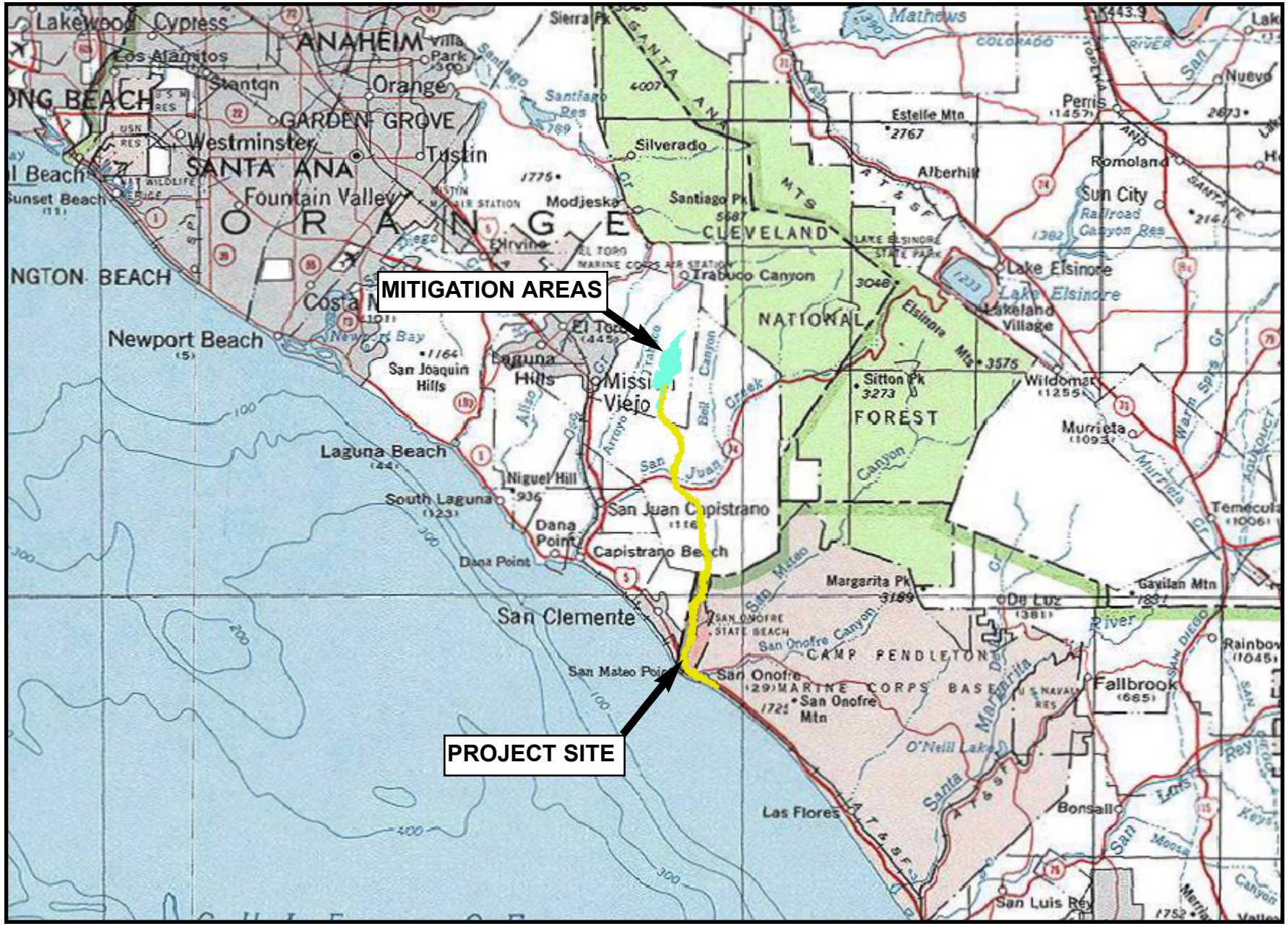


Adapted from USGS Santa Ana quadrangle

SOCTIIP

Regional Map

GLENN LUKOS ASSOCIATES

EXHIBIT 1

SOCTIIP

Vicinity Map

GLENN LUKOS ASSOCIATES

EXHIBIT 2

Upper Chiquita Mitigation Area

Tesoro Mitigation Areas

Extended Detention Basin Mitigation Area 1

San Juan Creek Watershed

NCCP Boundaries

Grading Limits

Extended Detention Basin Mitigation Area 2

Pacific Ocean

0 3,100 6,200 12,400 Feet

SOCTIIP

Mitigation Areas

GLENN LUKOS ASSOCIATES

EXHIBIT 4

X:\00 - 0362 ONLY\0019-9FOOT\0019-09FOOT\mitigation\0019-9MitigationAreas.mxd

Proposed Vegetation

- Riparian Oak Woodland (0.88 Acres)
- Existing Vegetation
- Mulefat Scrub (3.06 Acres)
- Southern Willow Woodland (4.66 Acres)
- Wet Meadow (7.31 Acres)
- CSS/Native Grassland Buffer (4.90 Acres)
- Tesoro Mitigation Area Boundary

Total Tesoro Mitigation - 20.80 Acres
(Previous Plan Totaled 14.40 Acres)

0 200 400 800 Feet

Existing Vegetation

- Annual grassland
- Cleared or graded
- Coast live oak woodland
- Wet meadow
- Dryland field crops
- Southern arroyo willow ripairan forest
- Transportation

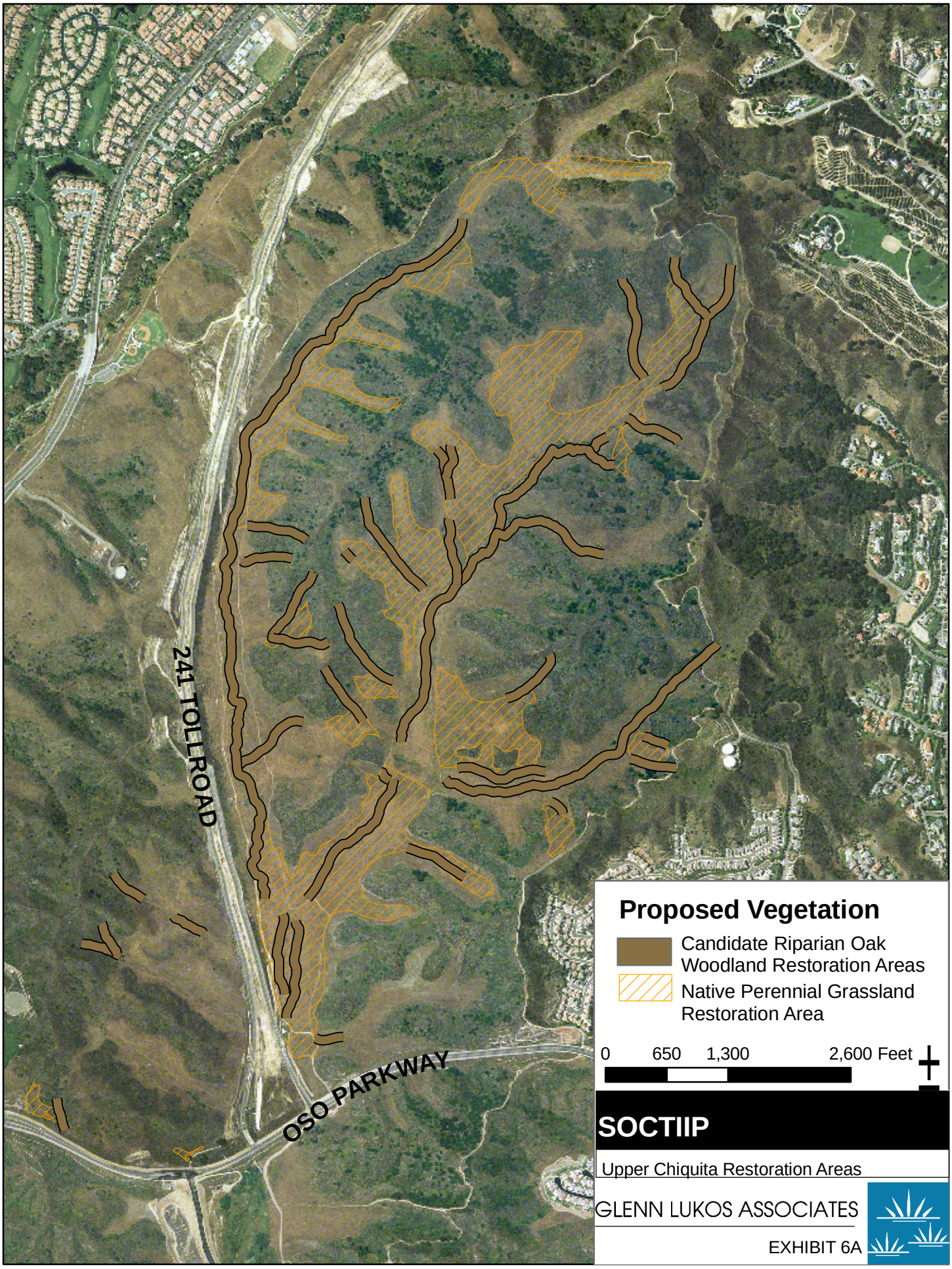
SOCTIIP

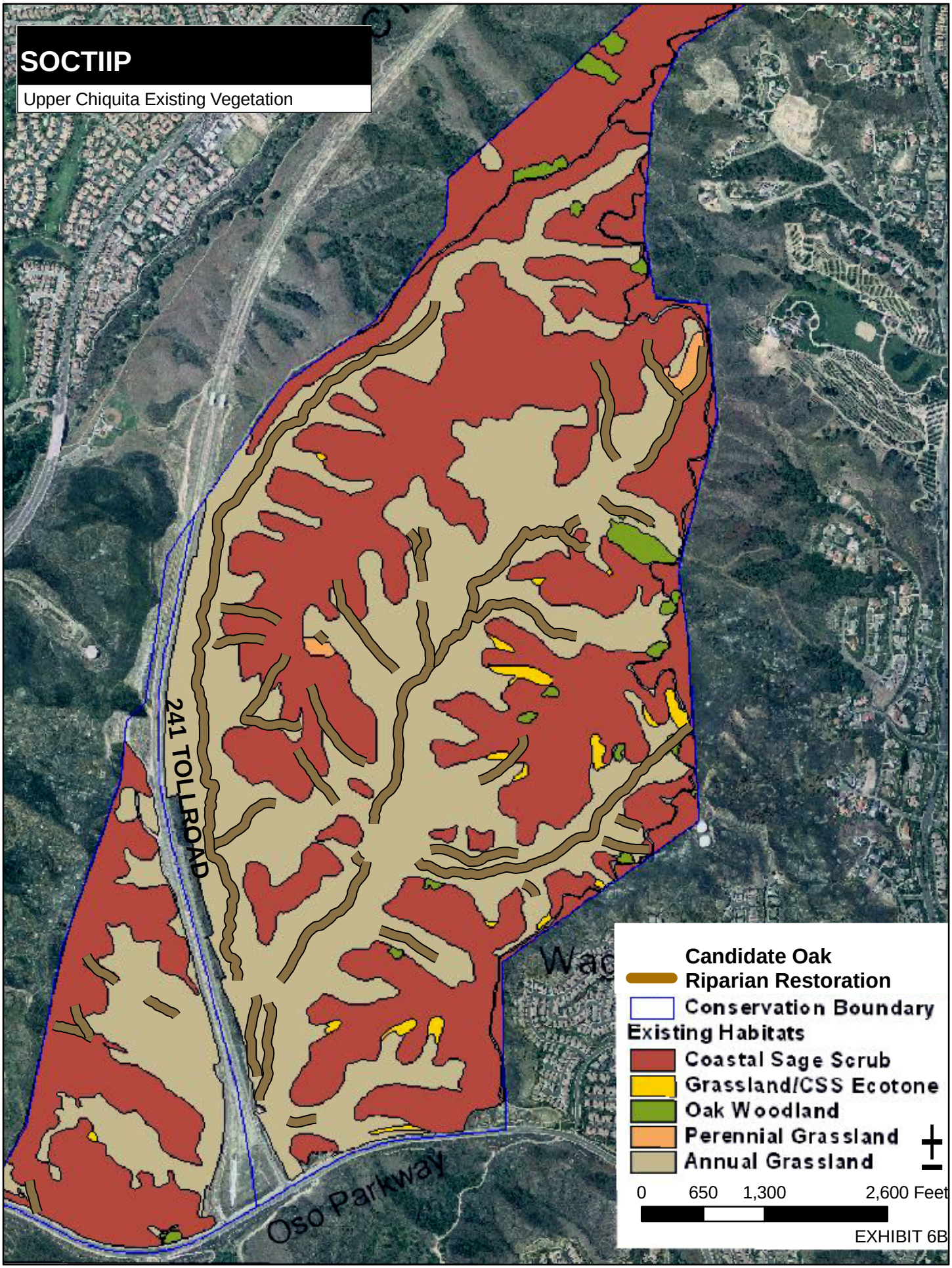
Tesoro Mitigation Plan

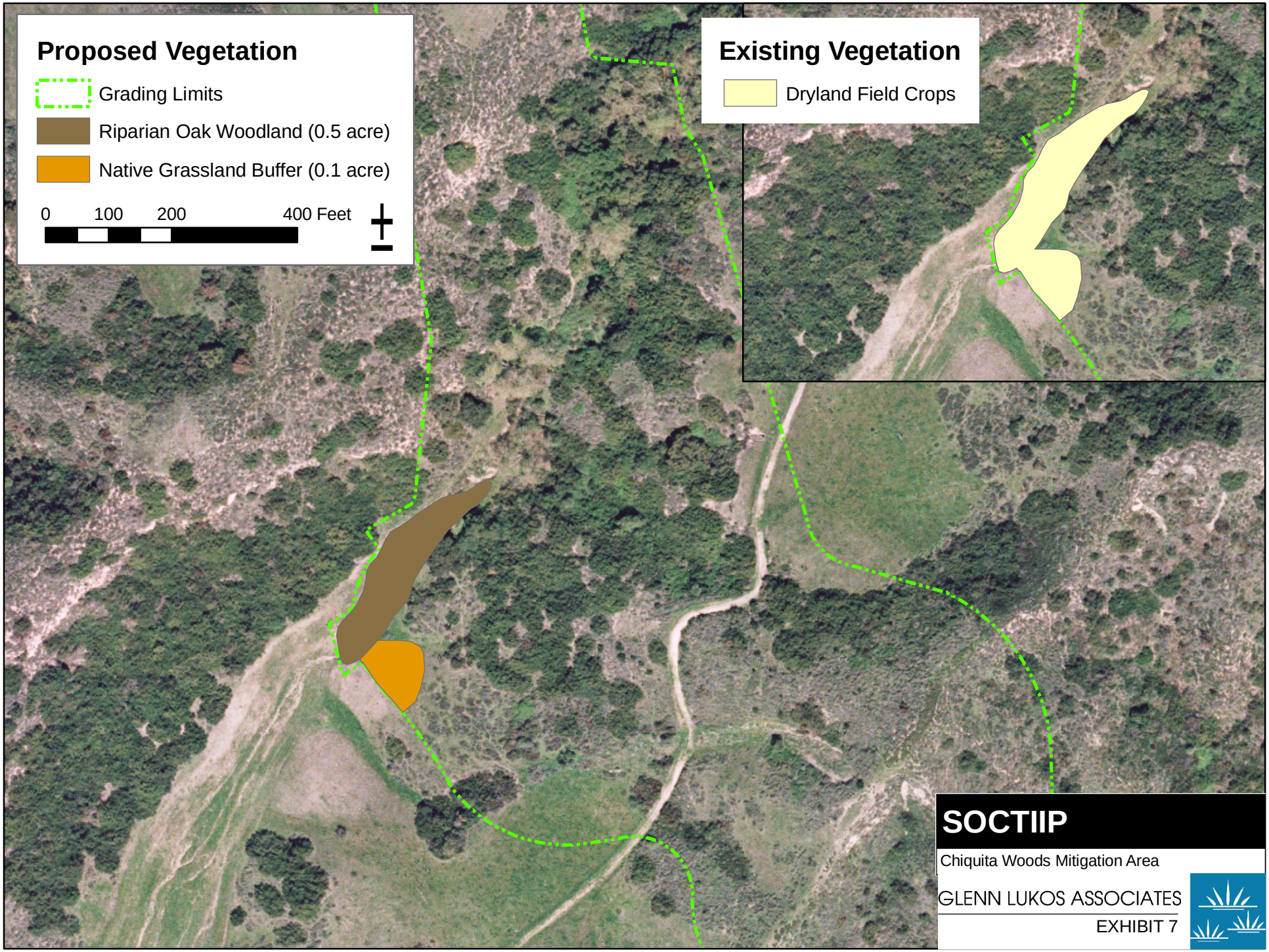
GLENN LUKOS ASSOCIATES

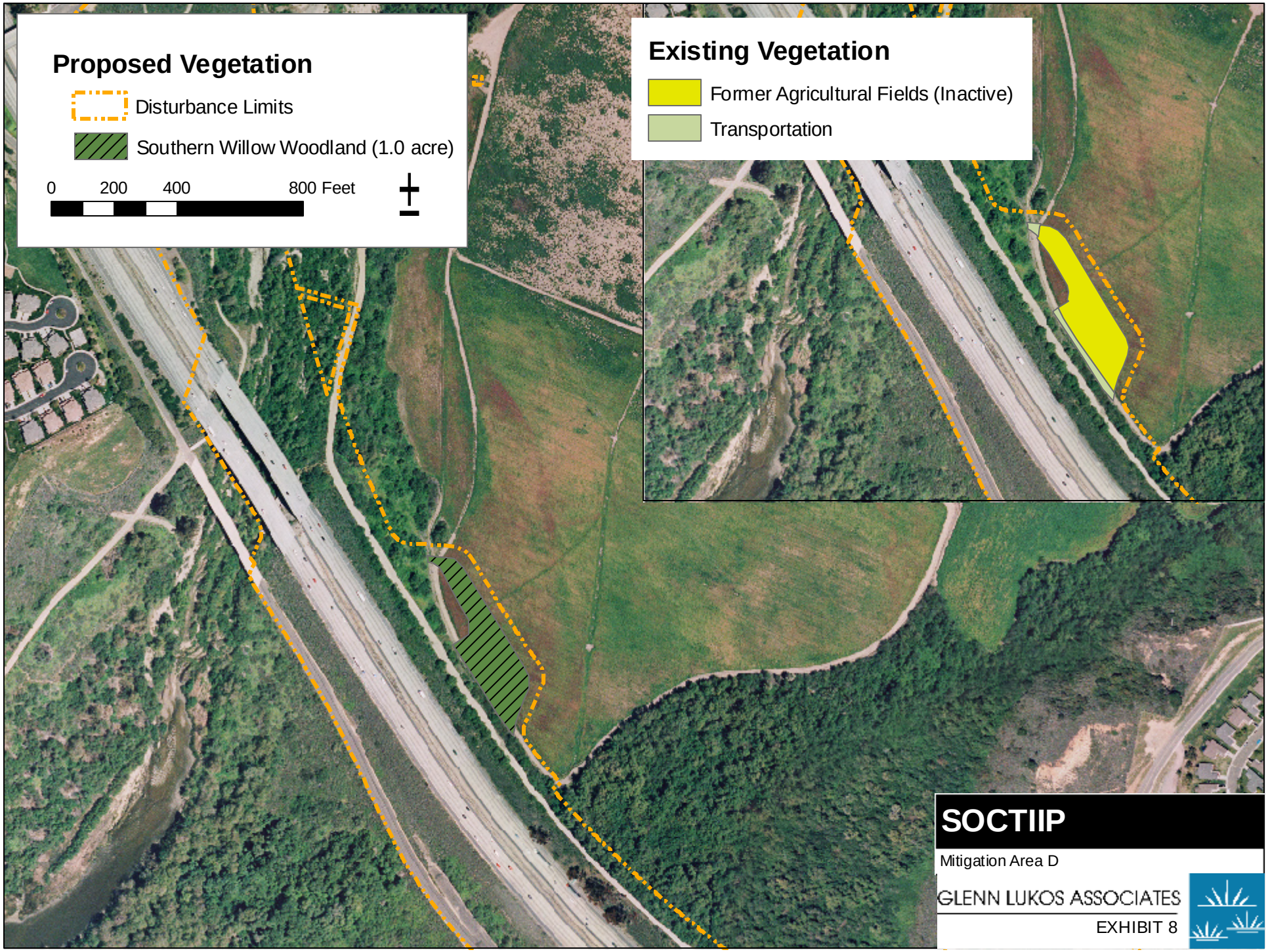
EXHIBIT 5

X:\00 - 0362 ONLY\0019-9FOOT\0019-09FOOT\mitigation\0019-9TesoroMitigation020607.mxd


241 TOLLROAD
OSO PARKWAY
Proposed Vegetation
Candidate Riparian Oak Woodland Restoration Areas
Native Perennial Grassland Restoration Area
0
650
1,300
2,600 Feet
SOCTIIP
Upper Chiquita Restoration Areas
GLENN LUKOS ASSOCIATES
EXHIBIT 6A


SOCTIIP
Upper Chiquita Existing Vegetation
241 TOLL ROAD
Oso Parkway
Candidate Oak
Riparian Restoration
Conservation Boundary
Existing Habitats
Coastal Sage Scrub
Grassland/CSS Ecotone
Oak Woodland
Perennial Grassland
Annual Grassland
0
650
1,300
2,600 Feet
EXHIBIT 6B


Proposed Vegetation
Grading Limits
Riparian Oak Woodland (0.5 acre)
Native Grassland Buffer (0.1 acre)
0
100
200
400 Feet
Existing Vegetation
Dryland Field Crops
SOCTIIP
Chiquita Woods Mitigation Area
GLENN LUKOS ASSOCIATES
EXHIBIT 7


Proposed Vegetation
Disturbance Limits
Southern Willow Woodland (1.0 acre)
0
200
400
800 Feet
Existing Vegetation
Former Agricultural Fields (Inactive)
Transportation
SOCTIIP
Mitigation Area D
GLENN LUKOS ASSOCIATES
EXHIBIT 8

PHOTOGRAPH 1: Representative photo of the native perennial grassland restoration area within the Upper Chiquita Mitigation Area.

PHOTOGRAPH 2: Looking northeast at the drainages proposed for riparian oak woodland restoration in the distance.

GLENN LUKOS ASSOCIATES

EXHIBIT 9A

SOCTIIP

Mitigation Site Photographs

PHOTOGRAPH 3: Representative photo of one the photos proposed for riparian oak woodland restoration.

PHOTOGRAPH 4: Looking southwest at one of the drainages proposed for riparian oak woodland restoration.

GLENN LUKOS ASSOCIATES

EXHIBIT 9B

SOCTIIP

Mitigation Site Photographs

PHOTOGRAPH 5: Representative photo of the Tesoro South Mitigation Area illustrating the existing gap in the riparian canopy proposed for mitigation.

PHOTOGRAPH 6: Looking southwest at the existing riparian vegetation and adjacent non-native, ruderal vegetation proposed for removal within Tesoro South.

GLENN LUKOS ASSOCIATES

EXHIBIT 9C

SOCTIIP

Mitigation Site Photographs

PHOTOGRAPH 7: Representative photo of the Tesoro North Mitigation Area.

PHOTOGRAPH 8: Looking southeast at the area proposed for oak/elderberry woodland restoration within Tesoro North.

GLENN LUKOS ASSOCIATES

EXHIBIT 9D

SOCTIIP

Mitigation Site Photographs

It is also important to note that all areas outside of development for RMV have already been designated as Open Space in RMV's HCP. RMV's Grazing Management Plan states that cattle grazing operations will continue on lands designated as Open Space. In addition to the mitigation search in Gabino and Cristianitos canyons, an existing cattle pond in Gabino was analyzed for potential mitigation opportunity due to the presence of wetland habitat within the pond. Changes in use of the pond from ranching to mitigation would conflict with RMV's Grazing Management Plan. In essence, any proposed mitigation in areas designated as Open Space by RMV would conflict with the Grazing Management Plan.

Upper Cristianitos Creek was examined for potential restoration opportunities. The area exhibits suitable hydrology, however the steep topography restricts potential for expansion of existing wetland and riparian habitats Additionally, the upland areas currently provide suitable habitat for the federally-listed thread-leaved brodiaea and California gnatcatcher.

Areas outside of Development within the RMV Property are already proposed as Open Space in the RMV HCP

SOCTIIP
OFF-SITE MITIGATION ANALYSIS
CONSTRAINTS MAP

EXHIBIT 10

Legend

- EDB Locations
- Coastal Zone Boundary
- Oneil Conservancy Boundary
- RMV Proposed Mitigation
- SOCTIIP Alignment
- Potential RMV Development
- RMV Impact Analysis Areas- Developement
- RMV Impact Analysis Areas- Potential Orchards
- Known Wetlands
- Thread-leaved Brodiaea
- California gnatcatcher
- Arroyo toad
- San Mateo Watershed
- Camp Pendleton
- RMV Boundary

0 2,400 4,800 7,200 9,600 Feet

019-9/019-9gis/mitigation/alternatives.mxd July 29, 2007 (IIC)

Appendix A

Distribution Page of all Persons/Agencies Receiving a Copy of the Mitigation and Monitoring Plan, As-Built Reports, and Annual Reports

Susan Meyer
U.S. Army Corps Of Engineers
Regulatory Branch
P.O. Box 532711
Los Angeles, California 90053-2325

Jeremy Haas
San Diego Regional Water Quality Control Board
9174 Sky Park Court
Suite 100
San Diego, California 92123-4340

Naeem Siddiqui
California Department of Fish and Game
4665 Lampson Avenue
Suite J
Los Alamitos, California 90720

Mark Delaplaine,
Manager, Energy, Ocean Resources and Federal Consistency Division
State of California - California Coastal Commission
45 Fremont, Suites 1900 and 2000
San Francisco, CA 94105-2219

Appendix B

Samples of Monitoring Data Sheets

TRANSECT/PERCENT COVER ESTIMATION
Sheet ___ of ___
Transect Number:
Transect Length:
Readings/Transect:
Distance Between Readings:
Photostation Number:
Comments:

Project Name: _____
Date: _____
Recorders: _____

Bare/Vacant:

"Herb" Layer
0 - 3'
Species Tally

"Shrub" Layer
>3' - 8'
Species Tally

"Tree" Layer
>8'
Species Tally

Additional Species:
(within 1.0 m of transect)

MONITORING SHEET - QUALITATIVE EVALUATION

Project Name: _____
Date: _____
Recorders: _____

Plant Health - General
Are there visible signs of nutrient/water deficiencies? If yes, then describe:

Are there signs of regeneration/reseeding?

Is vandalism harming plant health or project success?

Are there any signs of herbivory?:

Other:

Container Stock
Provide visual estimation percent survival of container stock:

Are watering basins intact?:

Is mulch from original installation still present? Is there litter development?:

Seeded Species
Are all intended native species present? If not, then what is missing?:

Are there any occurrences of volunteer native species?:

Are there any unvegetated areas? Should these be remediated?:

Weeds
Is excessive competition from weeds affecting desired species?:

Is there adequate maintenance/weed clearing?:

Other:

Soils
Are there any signs of soil development?:

Other:

Irrigation System
Are irrigation heads functioning properly?:

Are there any signs of rodent damage to irrigation system?:

Are there any signs of vandalism to the irrigation system/controller box?:

Are there any signs of excessive runoff?:

Does irrigation frequency and volume require adjustment?

Other:

Is there any indication that wildlife is using the site?:

Recommendations for Remediation:

Draft
Upper Chiquita Canyon Conservation Area
Comprehensive Habitat Restoration Plan

Prepared for:

TRANSPORTATION CORRIDOR AGENCIES
125 Pacifica
Irvine, California, 92618
Contact: Maria Levario
(949) 754-3482

Prepared by:

EARTHWORKS Restoration, Inc.
2116 Arlington Avenue, Suite 301
Los Angeles, CA 90018
Contact: Margot Griswold
(323) 735-3225

October 2006

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LIST OF FIGURES

SECTION 1 – OVERVIEW AND EXISTING CONDITIONS

1.1 OVERVIEW

This plan documents the rationale, methods and performance standards for the comprehensive restoration of the Upper Chiquita Canyon Conservation Area (Conservation Area). The restoration of the Conservation Area, located in southern Orange County, California, is proposed as part of the amendment to the existing Upper Chiquita Canyon Bank Agreement. The existing conservation bank was established when the Transportation Corridor Agencies (TCA) purchased the conservation easement for Upper Chiquita Canyon. The Conservation Area, located in southern Orange County, California is shown in Figure 1. Under the initial bank agreement, 327 conservation credits were established for existing coastal sage scrub habitat within the Conservation Area. Each conservation credit represents one acre of occupied coastal sage scrub habitat value and can be used toward future TCA projects. The amendment to the conservation bank Agreement establishes additional credits for the restoration and enhancement of appropriate habitats within the Conservation Area. These restored habitats include, coastal sage scrub, native grassland/coastal sage scrub ecotone, native perennial grassland, oak woodland/oak savannah, native forb and native forb/perennial grassland, riparian non-wetland watercourses, and rare plant transplantation.

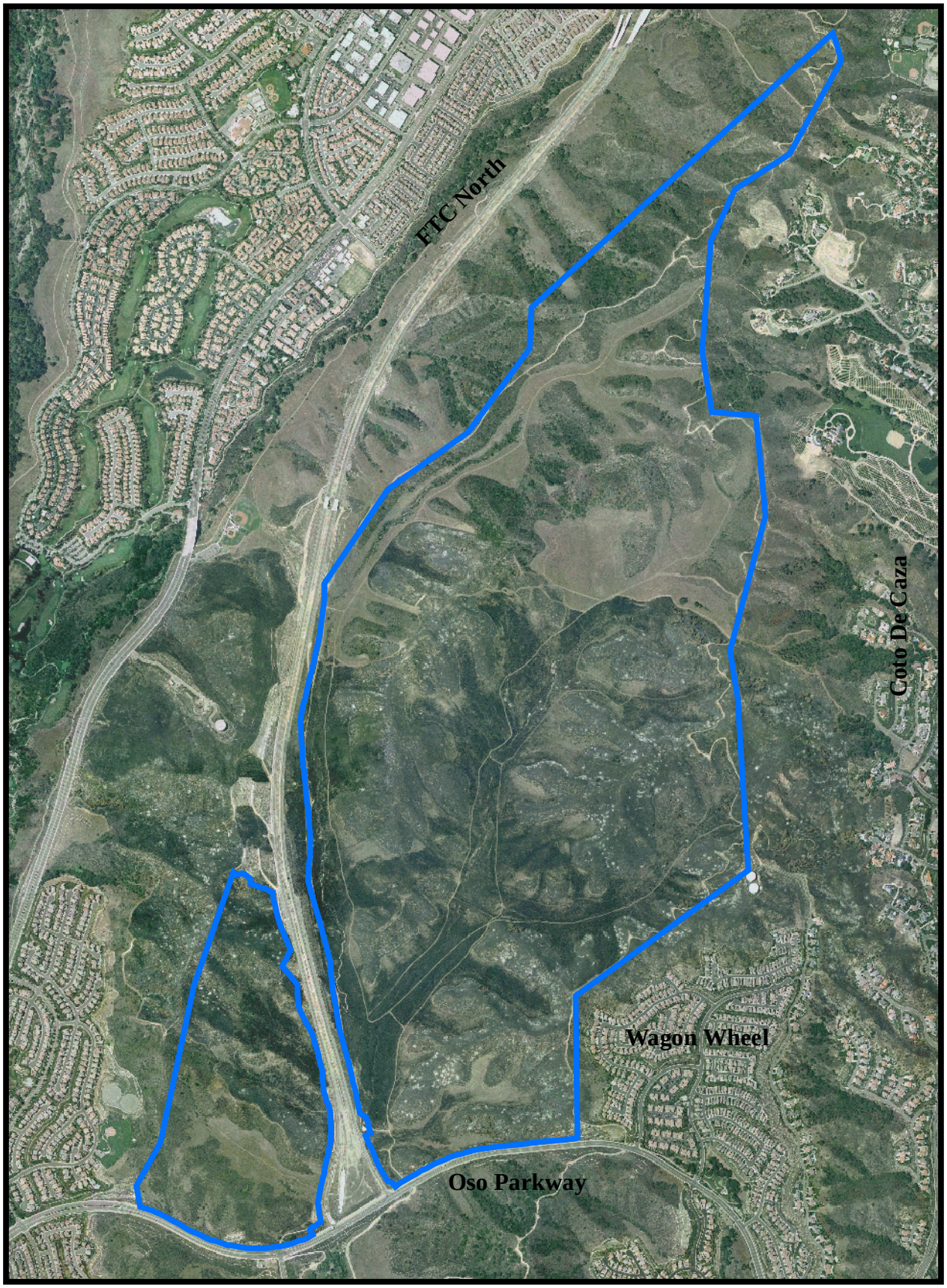
This section documents the existing vegetation within the Conservation Area. Sections 2 and 3 provide an analysis of soil conditions across the Conservation Area, define the specific locations of proposed habitat restoration, and outline the specifications for the habitat restoration. Performance standards are provided for each restored habitat. Conservation credits for each restored habitat will be certified once the habitats achieve the defined performance standards.

1.2 EXISTING VEGETATION

Chiquita Canyon Conservation Area is a 1,158 acre site made up of north-south orientated narrow to broad valleys between rolling hills. Elevations of the site range between 670 to 1,217 feet above sea level. The Conservation Area currently supports four different plant communities: annual grasslands, coastal sage scrub, oak woodlands, and perennial grasslands. Additionally, some areas are ecotones that transition from annual grasslands to coastal sage scrub. Figure 2 shows the existing vegetation.

The Conservation Area has experienced three fires in the last ten years. The site had not burned for at least 50 years prior to these recent fires. In August of 1996, a fire affected approximately 98 acres of annual grasslands, coastal sage scrub, and oak woodland communities. This burn area is located on north and south facing ridgelines in the far northern part of the site between Coto de Caza and upper Tijeras Creek. In May 1997, 114 acres burned and affected coastal sage scrub, annual grasslands, oak woodland communities, and perennial grasslands. This burn area is located on the eastern side of the Chiquita Canyon Conservation Area, adjacent to Coto de Caza. In May 2002, the southern and central portions of Chiquita Canyon burned totaling 715 acres and affecting all of the plant community types. None of the burn areas overlap.

The native habitats are well into recovery with little to no maintenance measures, especially for the 2002 burn area. The Conservation Area now supports vegetation communities of mixed age structure, including mature unburned communities, and communities in various stages of fire recovery.

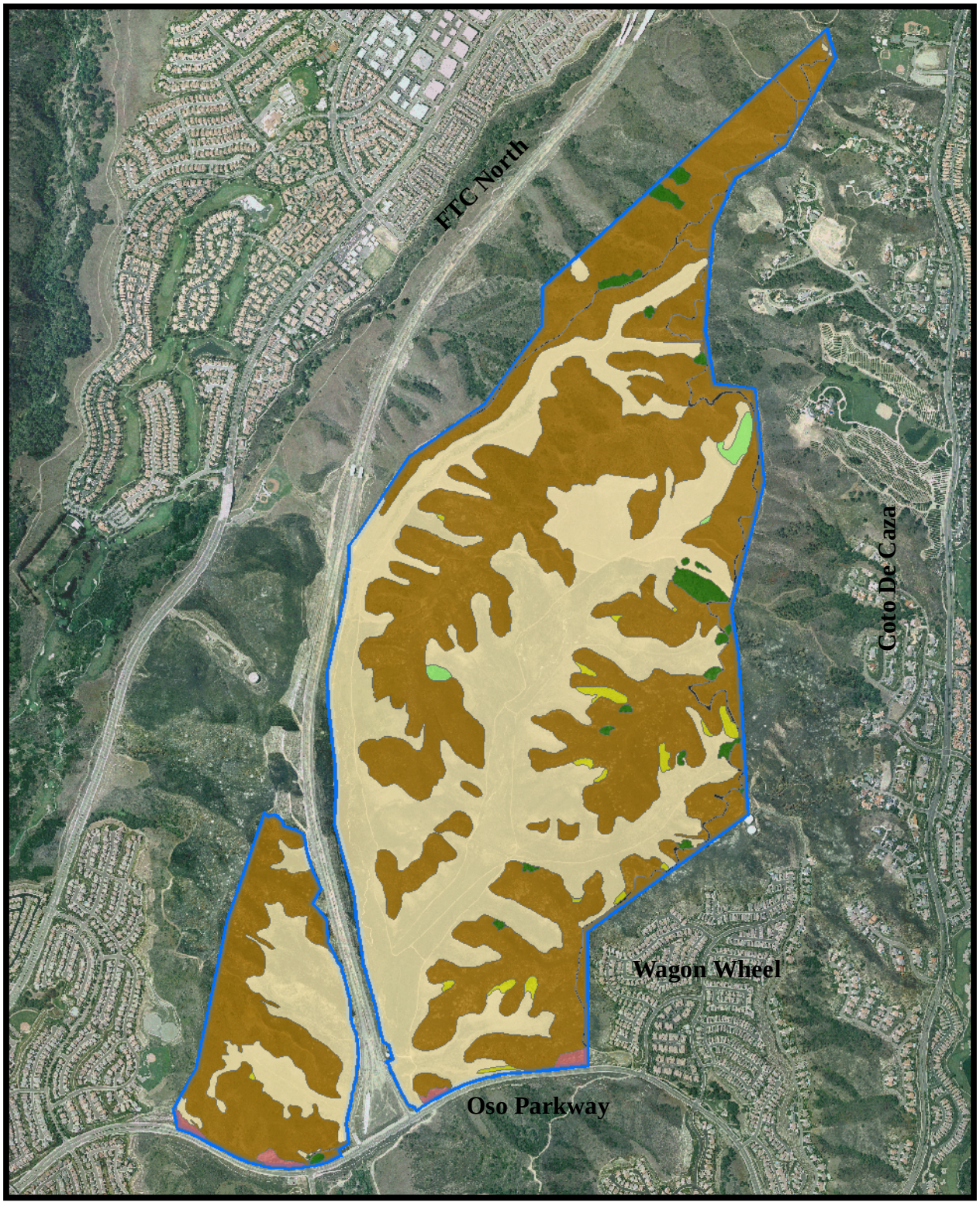


Chiquita Canyon Conservation Area
Figure 1

Conservation Boundary

0 1,000 2,000 4,000

Feet



Chiquita Canyon Conservation Area
Existing Habitats

Figure 2

Existing Habitats

- Oak Woodland
- Perennial Grassland
- Graded Slope
- Annual Grassland
- Coastal Sage Scrub
- Ecotone

Conservation Boundary

0 1,000 2,000 4,000 Feet

1.2.1 Annual Grasslands

Annual grasslands cover approximately 547 acres in the Conservation Area (See Figure 2). They occur because of historic disturbance from dry land farming, which cleared existing vegetation and disked the soils for cattle grazing purposes. The farming and grazing allowed the exotic grasses to invade and dominate the site even after the cessation of these practices. The annual grasslands are located in the valley and lower slopes of Chiquita Canyon on flat to gently sloping areas.

Annual grasslands are dominated by exotic annual grasses primarily from the Mediterranean region. This plant community is recognized as non-native grasslands (Holland 1986) or as California annual grassland series (Sawyer et al. 1995). Common grasses in this grassland include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordaceus*), red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena barbata* and *A. fatua*), fescue (*Vulpia myuros*), and in heavier soils or moister areas, Italian ryegrass (*Lolium multiflorum*). Other exotic and annual forb species that occur in the annual grasslands within the Conservation Area include wild radish (*Raphanus sativus*), burclover (*Medicago polymorpha*), filaree (*Erodium cicutarium*), smooth cat's ear (*Hypochaeris glabra*), mustard (*Hirshfeldia incana*), and prickly lettuce (*Lactuca serriola*). Native forbs are also found in these annual grasslands and include dove weed (*Eremocarpus setigerus*), fiddleneck (*Amsinckia menziesii* var. *intermedia*), wire lettuce (*Stephanomeria virgata*), ragweed (*Ambrosia psilostachya*) and telegraph weed (*Heterotheca grandiflora*).

Because this plant community is mainly at the lowest elevations, it also supports drainage patterns that range from incised channels with depths of approximately 20 feet to flat impoundment areas. These drainages are described separately in the next section. The annual runoff in these drainages are highly ephemeral and do not support any native obligate wetland vegetation. The soils are not classified as wetland soils. Therefore, these drainages are classified as non-wetland watercourses. These drainages vary in the density of native species with sparse mulefat (*Baccharis salicifolia*), as well as elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*) and coast live oak (*Quercus agrifolia*) interspersed with coastal sage scrub species and areas of dense annual grasses.

Burned Annual Grasslands

In August of 1996, approximately 0.2 acre of annual grasslands was burned. On May 29, 1997, 34.4 acres of annual grasslands burned in Chiquita Canyon Conservation area. The May 2002 burn affected 382.8 acres of annual grasslands. Post 2002-fire assessments were conducted in June-July 2002. No live vegetation survived the fire (Harmsworth 2003). By mid-August 2002, exotic and native species reflective of pre-fire taxa colonized the site. In March of 2004, these areas had re-established as annual grasslands as described above.

1.2.2 Coastal Sage Scrub

Coastal sage scrub is a rare plant community in southern California (O'Leary 1989). In the Chiquita Canyon area, coastal sage scrub is identified as Diegan Coastal Sage Scrub (Westman 1983a) or Venturan Coastal Sage Scrub (Axelrod 1978). Holland (1986) classifies this community as Diegan Coastal Scrub. Sawyer et al (1995) classifies

different series of coastal scrub and series found on the Conservation Area, based on transect data (Harmsworth 2000; 2003), include California sagebrush – California buckwheat series, mixed sage series, and California buckwheat series. Common shrub species include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), coast prickly-pear cactus (*Opuntia littoralis*), monkeyflower (*Mimulus aurantiacus*), lemonadeberry (*Rhus integrifolia*), poison oak (*Toxicodendron diversilobum*), and white and black sages (*Salvia apiana* and *S. mellifera*). Within the mature coastal sage scrub in the Conservation Area, the occurrence of herbaceous species (native or exotics) varies according to rainfall in given years. Exotic annual brome grasses, including soft chess and red brome, and mustard occur at higher cover levels in wetter years and low cover levels in dry years. Appendix I shows the results of transect data in relatively wet and dry years. Native needlegrass bunch grasses (*Nassella lepida* and *N. pulchra*) also occur between the shrubs at low cover levels.

The coastal sage scrub community is located on the ridgelines and steeper slopes of the Conservation Area. This community covers approximately 631 acres. Figure 2 shows the distribution of the coastal sage scrub community across the site.

Burned Coastal Sage Scrub

Because of the various burn in the Conservation Area, changes in the coastal sage scrub community have been documented. In August of 1996, approximately 16 of coastal sage scrub were burned. In May 1997, 75.3 acres of coastal sage scrub burned. The May 2002 burn affected 324.2 acres of coastal sage scrub.

The most recent data were collected in 2003 on species composition of coastal sage scrub in the 1996, 1997 and 2002 burn areas (Harmsworth 2004). In the 1996 burn areas, over half of the vegetative cover was exotic species including red brome (29.6%), mustard (14.6%), and soft chess (8.2%). California sagebrush was the most dominant cover of native shrub (17.1%), while laurel sumac (*Malosma laurina*) had 13.7% cover and black sage had 7.1% cover. Three native species are now present in this area that were not detected in the 1998 transects. These species include the perennial giant wild rye (*Leymus condensatus*), and two annual species, Artemisia-leaved pincushion (*Chaenactis artemisifolia*) and littleseed muhly (*Muhlenbergia microsperma*).

The 1997 burned area also has over half of the cover vegetated by exotics including red brome (34.8%) mustard (11.9%), and ripgut (8.5%). California sagebrush was the most dominant cover of native shrub (34.6%), while California buckwheat had 22.7% cover and black sage had 11.5% cover. Two native and one exotic species are now present in this area that were not detected in the 1998 transects. The native species include the one perennial species, rattlesnake weed (*Chamaesyce albomarginata*) and one annual species, wire lettuce (*Stephanomeria virgata*). The exotic species is Italian thistle (*Carduus pycnocephalus*).

The 2002 burn area is still in mid burn recovery, and is dominated by deerweed and wild morning-glory with typical sage scrub shrubs beginning to make up more of the cover, including California sagebush, sticky monkeybush, black and white sage, and California buckwheat. Exotic species cover is lower in the 2002 burn area than in the 1996 and 1997 areas. Two native species are now present in the area, that were previously undetected. They are jimson weed (*Datura wrightii*) and California brickelbush *(Brickellia californica*).

The coastal sage scrub is in different phases of succession from burns. Therefore, the coastal sage scrub plant community in the Chiquita Canyon Conservation Area is a mosaic of at least four age stands, including mature unburned and three in successional phases of fire recovery.

1.2.3 Oak Woodland

Oak woodlands at Chiquita Canyon Conservation Area are the only community dominated by arboreal species. They are dominated by coast live oaks (*Quercus agrifolia*). This type of community is recognized as Coast Live Oak Woodland (Holland 1986) or as Coast Live Oak Series (Sawyer et al 1995). Some locations of oaks could be classified as oak savannah, because the tree canopies are distinct and do not form a contiguous overhead canopy. In other areas, the oaks form the contiguous canopy of oak woodlands. In areas where the oak woodlands are adjacent to coastal sage scrub, a shrub layer is present as an understory. The shrub layer shares many of the same species as coastal sage scrub, including California sagebrush, deerweed (*Lotus scoparius*), monkeyflower, laurel sumac and California buckwheat. Additionally, Mexican elderberry (*Sambucus mexicana*) is also often present amongst the oaks. Herbaceous species are also present and often include exotic brome grasses, miner's lettuce (*Claytonia perfoliata*) and chickweed (*Stellaria media*). Where oak woodlands are adjacent to annual grasslands, the shrub layer is depauperate, and the understory is primarily herbaceous, and often dominated by annual grasses.

The oak woodland areas are patchily distributed throughout the Chiquita Canyon Conservation Area at eighteen distinct sites, covering a total of 14.7 acres. These sites are located on the slopes of hills adjacent to coastal scrub, annual grasslands or ecotones, primarily on north-facing slopes and narrow canyons (Figure 2).

Burned Oak Woodland

The August 1996 burn came up to, but did not substantially impact any oak woodlands. On May 29, 1997, 0.6 acre of oak woodlands burned in Chiquita Canyon Conservation area. The May 13, 2002 burn affected 8.2 acres of oak woodlands and an estimated 297 mature and sapling trees were burned to varying degrees. Fire effects on oaks were assessed in June-July 2002. At that time, 75 mature and sapling trees exhibited resprouting (Harmsworth 2002). Seedling oaks were not censused, because moderate to intense fire is known to severely effect oaks less than 3 inches in diameter DBH. Additionally, no assessment of the oak woodland understory species was made. The fire likely reduced shrub species and the herbaceous cover (see coastal sage scrub). The post-fire succession in the understory of the oak woodland is likely to reflect the post-fire succession in the coastal sage scrub and annual grassland, based on the pre-fire understory.

1.2.4 Perennial Grasslands

Two types of perennial native grasslands are located in Chiquita Canyon Conservation Area and both are considered rare by the State of California (CDFG 2003). Holland (1986) combines these grassland types into a single plant community, Valley needlegrass grassland, that includes many types of needlegrass grasslands.

The perennial native grassland at the northeastern part of the site may be categorized as Coyote Brush/Purple Needlegrass series (Wolf et al 2001). This grassland is dominated by Purple needlegrass (*Nassella pulchra*) with coyote brush (*Baccharis pilularis*) also present, along with non-native grasses. This grassland series covers 3.1 acres.

Two other grasslands areas also occur in the Chiquita Canyon Conservation Area. They both share similar species, and are therefore categorized as the same series - Purple Needlegrass Grassland Series. Italian ryegrass (Lolium multiflorum) is also a common species in this series. These grasslands do not conform to the soils description for the Italian ryegrass/purple needlegrass association described in Sawyer et al. 1995, as they occur on heavy clay not serpentine soils. The Purple Needlegrass Grassland Series contains a number of forb species including Pacific sanicle (*Sanicula crassicaulis*), blue dicks (*Dichelostemma pulchellum*) and golden stars (*Bloomeria crocea*) as well as other annual exotic grasses including bromes. These two grasslands cover a total of 1.3 acres. The southern Purple Needlegrass grassland is larger, covering 1.1 acres, while the smaller Purple Needlegrass grassland is quite small, covering 0.2 acres. Figure 2 shows the locations all of these grassland areas.

Burned Perennial Grasslands

The August 1996 fire did not impact any of the perennial grasslands. The May 29, 1997, 1.1 acres of perennial grasslands burned in Chiquita Canyon Conservation area, including the Coyote Brush/Purple Needlegrass series and the small Purple Needlegrass grassland series. The May 13, 2002 burn affected 0.2 acre of perennial grassland. Both of these grasslands recovered from these spring burns within the next growing season.

1.2.5 Ecotone

Within the Chiquita Canyon Conservation Area are areas where shrubs are establishing on the edges of the annual grasslands. These areas have been identified as ecotones and occur in the upper elevations of annual grass-dominated valleys along the eastern ridges as well as in narrow bands along the coastal sage scrub edge in many areas. Some of these ecotone areas have been the focus of vegetation manipulation. The ecotone areas cover 9.3 acres of the Chiquita Canyon Conservation Area.

Burned Ecotones

Neither the August 1996 nor the May 29, 1997 fires occurred in areas where ecotones are present. The May 13, 2002 burn affected 9.1 acres of ecotones. Post-fire succession will reflect similar trends occurring in the adjacent coastal sage scrub and annual grasslands.

1.2.6 Non Wetland Drainages

The conservation Easement is the upper watershed of Chiquita Canyon. Small drainages start in the steeper coastal sage scrub which merge into larger drainages in the broad valleys. Drainage patterns range from incised channels with depths of approximately 20 feet to flat impoundment areas. The annual runoff in these drainages are highly ephemeral and do not support any native obligate wetland vegetation. The soils are not classified as wetland soils. Therefore, these drainages are classified as non-wetland watercourses. These drainages vary in the density of native species with sparse mulefat (*Baccharis salicifolia*), as well as elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*) and coast live oak (*Quercus agrifolia*) interspersed with coastal sage scrub species and areas of dense annual grasses. Appendix II contains a map of all drainages and evaluations for functional features, including native and exotic cover.

1.2.7 Sensitive Plant Species

While no federally or state-listed threatened or endangered plant species occur in the Conservation Area, six sensitive plant species have been located on the site (Harmsworth 2004). These species and an overview of their status and occurrence in the Conservation Area are included in Table 1.

Table 1. Sensitive Plant Species Within the Conservation Area

Common Name (*Scientific Name*)	Status: Fed/State/ CNPS/Other*	Location within the Conservation Area	Number of individuals / Locations
California Copperleaf *(Acalypha californica)*	--/--/--/LR	Occurs within coastal sage scrub. Plants were located on the west side of the project site on a southeast-facing slope.	60 / 1
Catalina mariopsa lily *(Calochortus catalinae)*	--/--/List 4/--	Occurs in coastal sage scrub, native and annual grassland. Generally found throughout the study area but more prevalent in recently burned areas, especially on the center ridgeline.	6638 / 25
Intermediate Mariposa Lily *(Calochortus weedii* var. *intermedius)*	FSC/--/List 1B/--	Occurs in openings of coastal sage scrub and native grasslands, often on a sandy rocky substrate. Generally most abundant in recently burned coastal sage scrub area on the eastern ridgeline.	590 / 23
Western Dichondra *(Dichondra occidentalis)*	--/--/List 4/--	Occurs in openings of coastal sage scrub. Recorded in recently burned area of coastal sage scrub habitat in rocky sandy soil.	845 / 2

Common Name (*Scientific Name*)	Status: Fed/State/ CNPS/Other*	Location within the Conservation Area	Number of individuals / Locations
California chocolate lily *(Fritillaria biflora)*	--/--/--/LR	Occurs within coastal sage scrub/ native perennial in clay soils. Recorded on the north ridge.	25 / 1
Coulter's matilija poppy *(Romneya coulteri)*	--/--/List 4/--	Occurs in coastal sage scrub. Recorded from one area in the northern portion of the center ridge.	500 / 1

* Rare Plant Status Categories:

Federal:

FSC = Federal Special Concern Species

California Native Plant Society (CNPS)

- List 1B = PLANTS RARE, THREATENED, OR ENDANGERED IN CALIFORNIA AND ELSEWHERE. Plants meet definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 (California Endangered Species Act) and are eligible for state listing. CEQA consideration is mandatory.
- 4 = PLANTS OF LIMITED DISTRIBUTION; A WATCH LIST. CEQA consideration is being recommended by CNPS.

LR -Locally rare, Rare in Orange County (Dames & Moore and Bramlet 1994)

SECTION 2 – SOIL TAXONOMY AND ANALYSIS

The Conservation Area contains several soil types that support different vegetation communities. To provide a better understanding of the potential restoration areas, the soils within the Conservation Area were analyzed to determine the correlation between soil type and plant communities. This analysis is necessary to determine appropriate restoration in the areas that had been historically disturbed by dry-land farming and cattle gazing. Restoration and future management will be based on the soil analysis information. Soil/plant community relations will provide managers with the necessary insight on the proper habitat restoration of the disturbed land.

Analysis of the soils occurring in the Conservation Area began with a review of the Natural Resources Conservation Soil Taxonomy of 1999 and Soil Survey of 1978. See Figure 3 for the map of the Soil Survey. The Soil Survey was verified in the field first through a walkover and examination of surface soil characteristics. Based on the review of the Soil Survey, detailed soil characterization was undertaken in each of the different soil types. Seventeen soil pits were examined within Conservation Area. Figure 4 shows the location of the soil pits. Determination of soil pit locations was based on soil type, existing vegetation, and landscape position. Several pits were dug in each soil series to determine the soil plant community relationships. The soil pits were located in valleys, on alluvial fans, and slopes. The soil pits were dug by backhoe to a depth of 3 to 5.5 feet depending on the depth to the parent material. Detailed field notes of the soil profile were documented with key features being the soil horizon depth, color, texture, moisture, presence of roots, pores, and other noteworthy observations. The detailed data sheets are presented in Appendix III. The following sections summarize the taxonomy and soil analysis in relation to existing vegetation and appropriate habitat restoration.

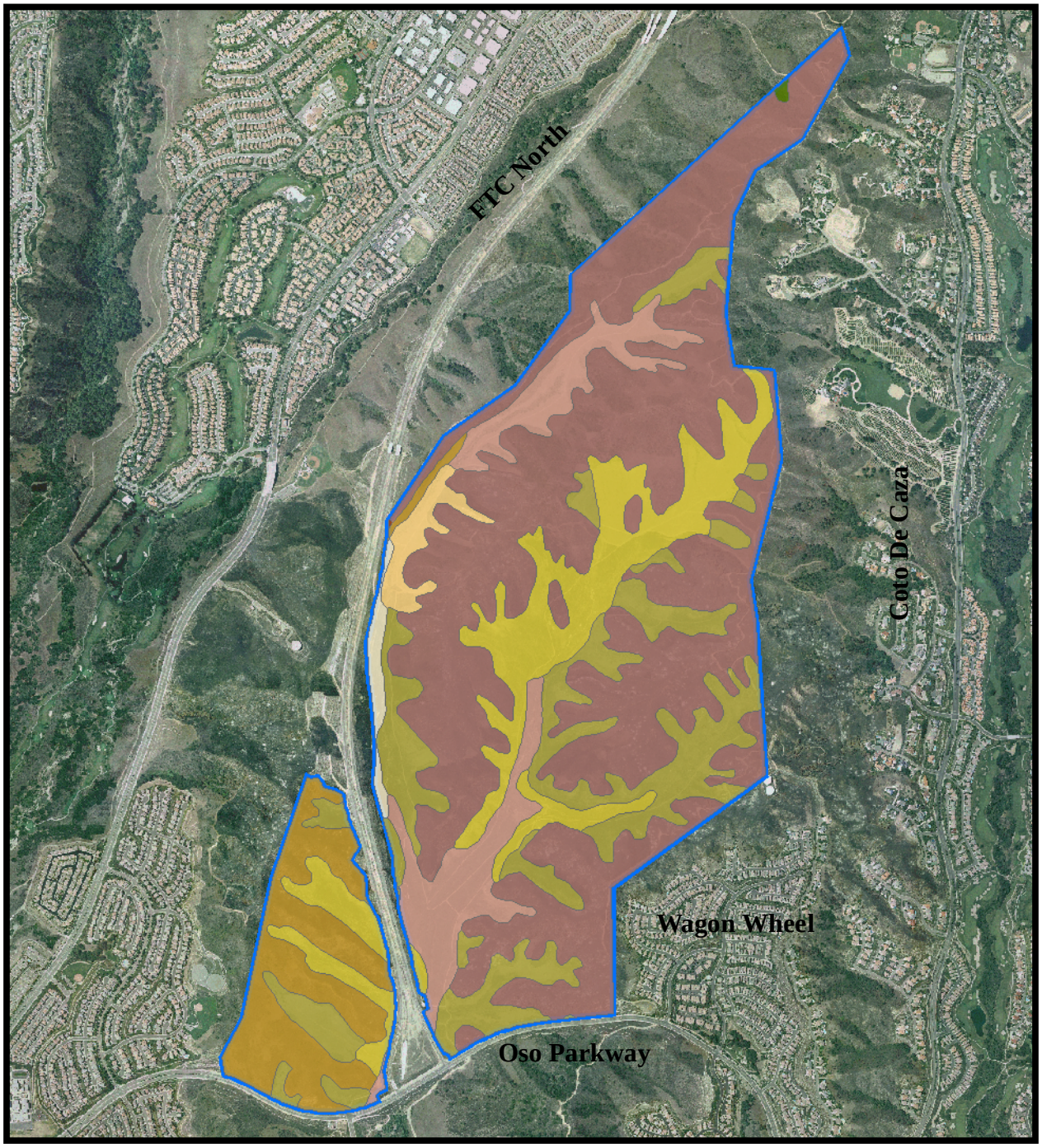
2.1 SOIL ORDERS

Two soil orders occur in Conservation Area, Mollisols and Entisols. See Figure 5 for locations of the soil Orders within Conservation Area. Mollisols typically support perennial grassland vegetation and the Entisols typically support trees and shrubs. Diagnostic characteristics of Mollisols are, they are mineral soils with a mollic epipedon. A mollic epipedon is dark in color, relatively thick and contains at least 5.8 g kg^{-1} of organic carbon. Entisols are characterized by the lack of discernable diagnostic horizons. Since Entisols form on recent erosional surfaces, they are not in place long enough for pedegonic processes to form distinct horizons (NRCS, 1999).

2.1.1 Mollisols

Suborder

Xerolls is the one suborder of Mollisols occurring in Conservation Area. Xerolls occur in xeric moisture regimes of a Mediterranean climate characterized by moist cool winters and warm dry summers. Diagnostic characteristics of Xerolls are soils with a relatively thick mollic epipedon, a cambic or argillic horizon, and an accumulation of carbonates in the lower part of the B-horizon. The epipedon is dark in color and contains a high



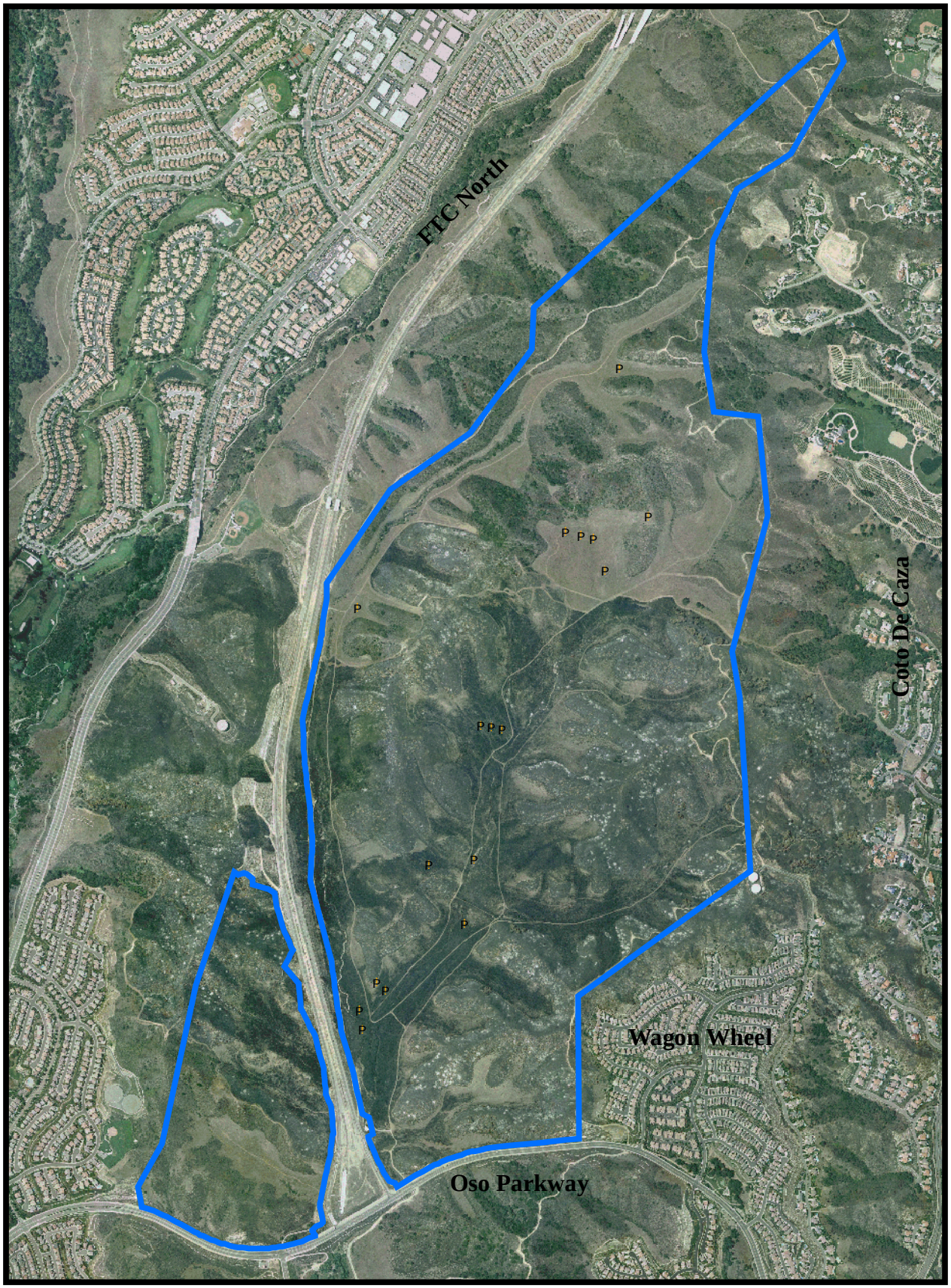
Chiquita Canyon Conservation Area
Soil Phases
Figure 3

Soil Phase

- Bosanko-Balcom Complex, 15 to 30% slopes
- Botella Clay Loam, 2 to 9% slopes
- Botella Clay Loam, 9 to 15% slopes
- Botella Loam, 2 to 9% slopes
- Calleguas Clay Loam, 50 to 75% slopes
- Capistrano Sandy Loam, 2 to 9% slopes
- Capistrano Sandy Loam, 9 to 15% slopes
- Cieneba Sandy Loam, 30 to 75% slopes
- Myford Sandy Loam, 15 to 30% slopes

Conservation Boundary

0 1,000 2,000 4,000
Feet



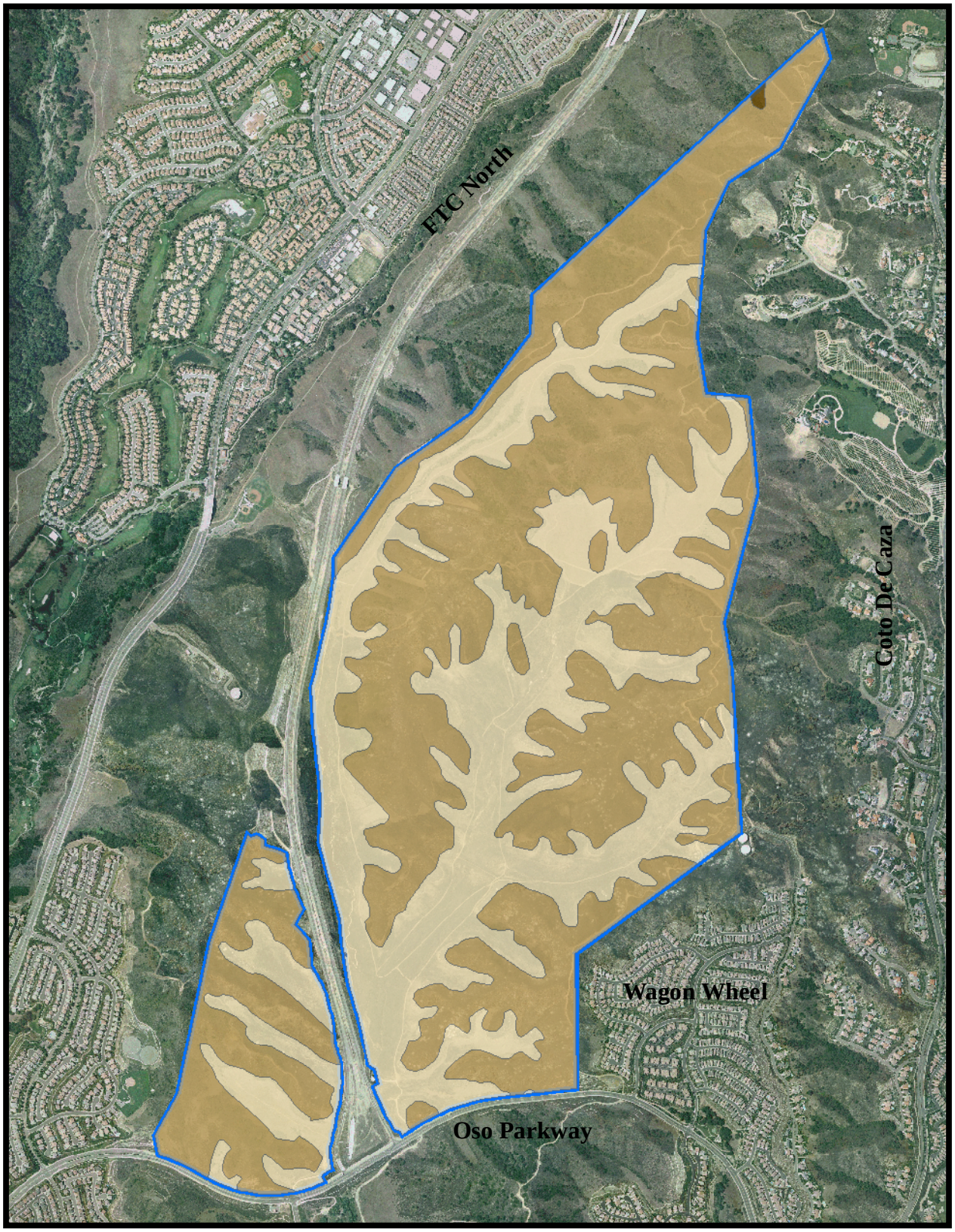
Chiquita Canyon Conservation Area
Soil Pit Locations

Figure 4

Conservation Boundary

0 1,000 2,000 4,000 Feet

P Soil Pits



Soil Orders

- Alfisols
- Entisols
- Mollisols

Conservation Boundary

0 1,000 2,000 4,000 Feet

Chiquita Canyon Conservation Area
Soil Orders
Figure 5

amount of carbon. The dominant vegetation supported by Xerolls generally is bunchgrass (NRCS, 1999).

Great Groups

Two great groups of Xerolls occur in the Conservation Area. The first great group of Xerolls is Argixerolls. The subgroup is Pachic Argixerolls that are characterized by having an argillic horizon and no natric horizon (NRCS, 1999). The soil does contain clay in the upper layers and the clay rapidly decreases, by more than 20%, with increasing depth within a depth of less than 150 cm from the surface of the soil (NRCS, 1999). Argixerolls of the Conservation Area are found on the valley floors in the larger valleys. Habitat conversion to exotic species has occurred on the Argixerolls of the Conservation Area.

The second great group is Haploxeroll. The subgroup is Entic Haploxerolls that are typically recently formed soils, have little development in the subsoil and some have unaltered recent parent materials below the mollic epipedon (NRCS, 1999). Haploxerolls commonly have a cambic horizon below the mollic epipedon and do not have an argillic or natric horizon (NRCS, 1999). The Haploxerolls of the Conservation Area occur in valleys and on alluvial fans. Within the Conservation Easement, native habitats supported by Haploxerolls have been converted to exotic plant communities from land uses including dryland farming and cattle grazing. Dominant exotic species are non-native grasses, mustards, wild radish, storksbill, and tocalote.

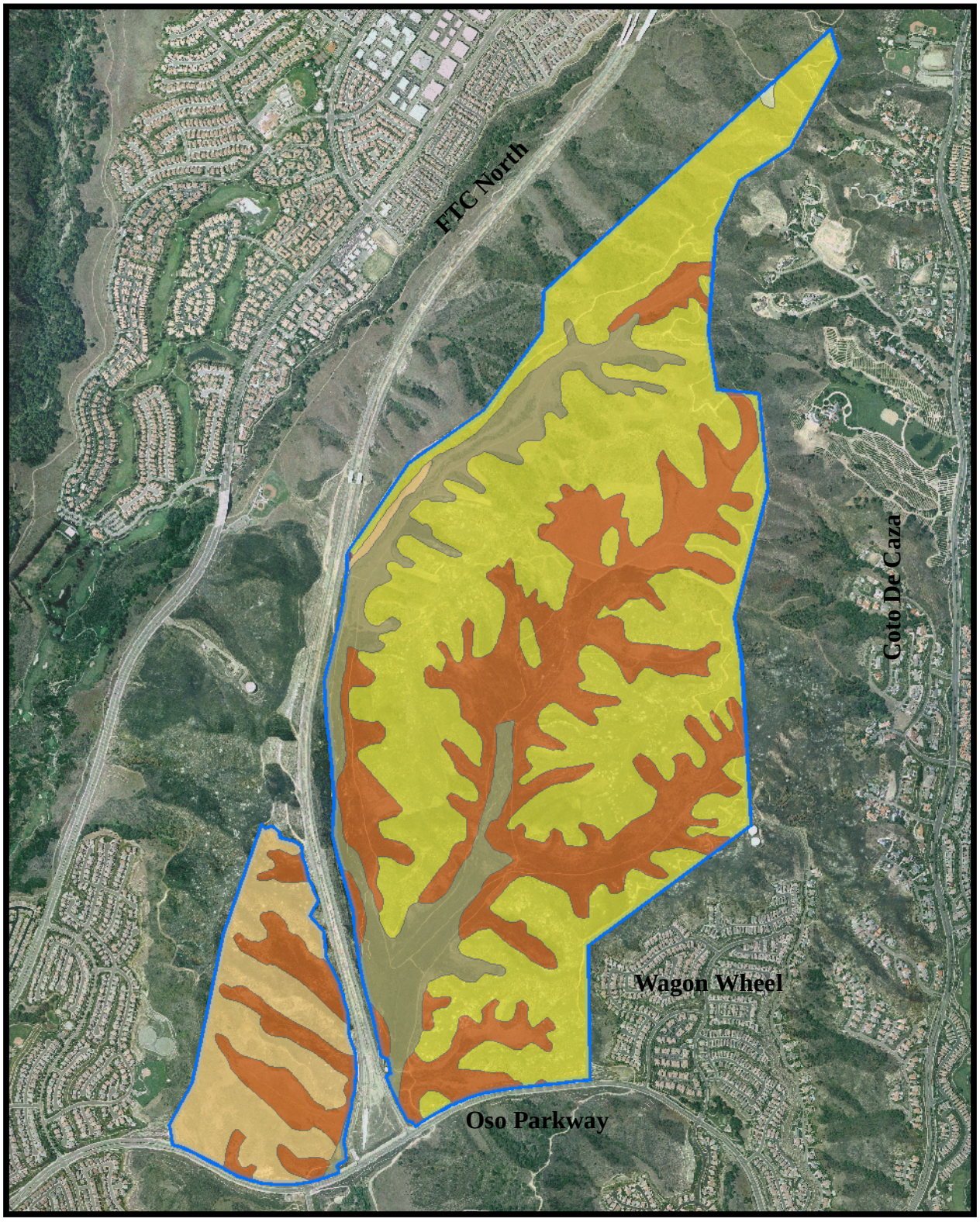
Soil Series and Analysis

Of the four dominant Soil Series that occur in the Conservation Area, the Botella Series and Capistrano Series are classified in the Xerolls and Haploxeroll great groups, respectively. The Botella Series and Capistrano Series occur in the valleys and on alluvial fans. Figure 6 shows the locations of the soil series within Conservation Area.

<u>Botella Series</u>

The Botella series are Mollisols of the Pachic Argixerolls subgroup. Soils of the Botella series typically form in sedimentary alluvium and occur on alluvial fans. Soils are well drained and are moderately slowly permeable. They occur on slopes ranging from 2 to 15 percent and elevations ranging from 25 to 1500 feet. The available water holding capacity of the Botella soils ranges from 9.5 to 11.5 inches with an effective rooting depth of 60 inches or greater. Typical vegetation of Botella soils are annual grasses, forbs, and some oaks and brush (NRCS, 1978).

A typical soil profile for the Botella series is described by the NRCS (1978) as follows. The A horizon is 5 to 18 inches with a texture of very fine sandy loam, loam, sandy clay loam, or clay loam. Moist soil color of the horizon is in the 10YR hue and ranges from gray to dark gray. Soil structure can vary between granular to subangular blocky. The B-horizon is 11 to 30 inches with a texture of sandy clay loam, clay loam, or silty clay loam. Moist soil color of the horizon is in the 10YR hue and ranges from grayish brown to dark grayish brown. Soil structure for the horizon is prismatic or subangular blocky. The C-horizon has a texture of sandy loam, fine sandy loam, sandy clay loam, or clay loam.



Chiquita Canyon Conservation Area
Soil Series
Figure 6

Soil Series

- Bosanko Series
- Botella Series
- Calleguas Series
- Capistrano Series
- Cieneba Series
- Myford Series

Conservation Boundary

0 1,000 2,000 4,000 Feet

Botella soils occur in the valleys and lowest points of Conservation Area. Dominant vegetation at present time supported by the Botella soils are the exotic species wild radish, mustard, non-native grasses, and erodium and the native species ragweed, doveweed, tarweed, and telegraph weed.

Over the Conservation Area, six soil profiles were described from soil pits in the Botella Series, five in the Botella Loam 2 to 9 percent slopes and one in the Botella Clay Loam 2 to 9 percent slopes. One soil profile was described from a soil pit at the interface between Botella Loam and the Capistrano Sandy Loam. See Appendix II for Field Sheets and for soil pit photos.

The average depth of the soil profiles in the Botella Series was 50 to 60 inches. Soil color was typically dark throughout the profiles, particularly in the lower horizons. On average, a 15 to 20 inch horizon of clay accumulation was present with clay to sandy clay texture. In addition, clay was present in all horizons with a predominance of soil textures being a loam or clay texture. Few to common fine roots and pores were found to depth in all of the profiles.

The proposed habitat restoration in the Botella soils is native perennial grassland. This conclusion is based on the high clay content, dark color, deep soil profile, and high nutrient content of the soils. The high clay content indicates a higher available water capacity. The thickness and dark color of the profiles indicates a high nutrient content. Grassland species thrive on soils that are deep with a higher nutrient load and higher moisture content. Shrub communities, particularly coastal sage scrub, thrive on low nutrient, shallow soils. Coastal sage scrub species are also drought tolerant and tend to grow on drier soils than would support grassland species. In addition, the low landscape position of the Botella series is indicative of grassland habitat. Grasslands tend to occur in valleys, flat plains, or gentle rolling hills.

Capistrano Series

The Capistrano Series soils are Mollisols within the Entic Haploxerolls subgroup. Soils of the Capistrano Series, occurring on alluvial fans and plains in small valleys, formed in granitic alluvium. Slopes where the soil occurs range from 2 to 15 percent at elevations ranging from 25 to 2500 feet. Typical vegetation supported by Capistrano soils is mostly grasses and a few oaks in some places. Capistrano soils are well drained and moderately rapidly permeable. Available water holding capacity is 5.5 to 7.5 inches and effective rooting depth of 60 inches or more. Throughout, the soil is medium acid (NRCS, 1978).

The NRCS (1978) describes the typical soil profile of the Capistrano series as consisting of an A and C horizon only. The A horizon ranges in thickness from 20 to 40 inches. Granular, subangular blocky, or massive is the soil structure. Texture of the A horizon is fine sandy loam, sandy loam, or coarse sandy loam and gravels may be present. In the 10YR hue, moist color of the horizon ranges from brown to dark grayish brown. The C-horizon has a texture of sandy loam, coarse sandy loam, or fine sandy loam and may be gravelly. In the 10YR hue, the color ranges from brown and light yellowish brown to brownish yellow or grayish brown. Places of the horizon may be mottled.

Capistrano sandy loam, 2 to 9 percent soil occurs in the valleys and on alluvial fans in Conservation Area. Exotic species are dominant. Dominant exotics are non-native

grasses, wild radish, mustard, erodium, and tocalote. The native species that persists in these soils are doveweed, vinegar weed, lupinus bicolor, and grassland golden bush.

The Capistrano sandy loam, 9 to 15 percent slopes soils occur mostly on alluvial fans of the narrower valleys on the east side of Conservation Area. Dominant vegetation on this soil series is mostly exotic species such as non-native grasses, erodium, mustard, tocalote, and wild radish. The dominant native species that persist are stephanomeria, tarweed, and telegraph weed.

Six soil profiles were described from soil pits in the Capistrano Series. Five soil pits were analyzed In the Capistrano Sandy Loam 2 to 9 percent slopes, and one soil pit was described in the Capistrano Sandy Loam 9 to 15 percent. See Appendix III for Field Sheets and soil pit photos.

The average depth of the soil profiles in the Capistrano Series was 50 to 65 inches. Soil color was typically dark in the upper 40 to 50 inches with the lower horizons being slightly lighter in color relative to the Botellas Series. On average, a 35-inch clay accumulation layer having a sandy clay or loamy clay texture was present. Clay was present in all horizons of the profiles with a predominance of soil textures being sandy clay and sandy clay loam. Few to common fine roots, especially along ped faces, and a few fine to coarse pores were found to depth in all profiles. Small Gravels were common to occasional throughout most profiles and cobbles were present in half of the profiles, typically below 35 inches.

Native perennial grassland is proposed to be restored on the Capistrano Sandy Loam 2 to 9 percent slopes is native perennial grassland. The conclusion is based on the high clay content, dark color, deeper soil profile, and higher nutrient content of the soils. Grassland species tend to thrive on more moist, higher nutrient holding soils. Characteristics of the profile suggesting the Capistrano series would support grasslands are the high clay content that indicates a higher available water capacity and the thick dark color of the profiles that indicates a high nutrient content. In addition, the low, relatively flat landscape position of the Capistrano series is indicative of grassland habitat rather than shrub land.

The proposed habitat type of the Capistrano Sandy Loams 9 to 15 percent is perennial grassland/shrub land ecotone and shrub land. Native habitat appropriate for this soil is primarily indicated by its landscape position on alluvial fans. The soil profile incorporates characteristics of both typical grassland and shrub land soils of Chiquita. Grassland soil characteristics of the profile are the presence of clay in all of the layers and the thickness of the profile. Shrub land soil characteristics of the profile are the presence of gravels in all of the layers and the light color of the lower horizons indicating a loss of organic matter. Species of both habitat types are currently supported by the soils. Exotic species at present time dominate these soils but a few native shrubs, such as deerweed and California sagebrush, are found on these alluvial fans.

2.1.2 ORDER ENTISOLS

Suborder

Within the Conservation Area, the suborder Orthents is classified under Entisols. Orthents are Entisols that developed recently and developed on erosional surfaces. Orthents generally occur on slopes twenty-five percent or more (NRCS, 1999).

Great Group

Orthents within the Conservation Easement are classified in Xerorthents Great Group. Xerorthents occur in Mediterranean climates and have a xeric moisture regime. Vegetation supported by Xerorthents is typically shrubs and trees. The subgroup is Typic Xerorthents. Diagnostic characteristics of the soils generally tend to be moderately deep to deep and typically do not have ground water within the upper 150 centimeters. The epipedon is thin and ochric due to the young age of the soil (NRCS, 1999).

Soil Series and Analysis

Two of the dominant Soil Series within the Conservation Area are Xerorthents. These Xerorthents are the Calleguas Series on the slopes of the smaller western ridges of the Conservation area, and the Cieneba Series in the larger central and eastern ridges of the Conservation Area. See Figure 6 for Soil Series locations within Conservation Area.

Calleguas Series

Soils of the Calleguas series typically formed from weathered lime coated shale or lime coated sandstone material or a both. The soil occurs in the uplands on very steep, generally south facing, slopes ranging from 50 to 75 percent and elevation ranging from 200 to 2,500 feet. Calleguas soil is well drained and moderately permeable. The available water capacity is 1.5 to 3.5 inches and effective rooting depth in the soil ranges from 10 to 19 inches. Typical vegetation supported by Calleguas soil is mustard and brush (NRCS, 1978).

The NRCS (1978) describes the typical soil profile for the Calleguas series consisting of an A and a C-horizon. The A horizon ranges in thickness from 10 to 19 inches with 5 to 35 percent of the volume consisting of small rock fragments. Soil structure for the layer is granular or massive. Moist soil color is grayish brown in either the 10YR or the 2.5YR hue. Clay loam or loam is the texture of the horizon. Ranging from highly weathered to hard rock, the C-horizon is comprised of lime coated sandstone or calcareous shale or both (NRCS, 1978).

Calleguas soils occur on slopes of the west canyon of Conservation Area. No soil profiles were taken in this soil type. The vegetation supported by the soils is mostly high quality coastal sage scrub. Dominant native species are California sagebrush, white and black sage, monkey bush, and prickly pear cactus. Some areas of the Calleguas soils on the less steep slopes are impacted by exotic species due to historic dry-land farming and cattle grazing within the Conservation Area. Dominant exotic species that have invaded the area are non-native grasses and mustard. Restoration of these soil areas will be as coastal sage scrub.

Cieneba Series

The Cieneba Series occurs on slopes ranging from 9 to 75 percent at elevations of 200 to 4000 feet. Formation of the soil is from weathering of granitic rocks of the Santa Ana Mountains. The soils are somewhat excessively drained and are moderately rapidly permeable. Vegetation supported by the soil is mostly shrub species. Available water holding capacity of the soils ranges from 0.75 to 2.5 inches with an effective rooting depth of 5 to 15 inches (NRCS, 1978).

The NRCS (1978) describes the typical Cieneba soil profile consisting of an A and C-horizon. Depth of the A horizon is 5 to 19 inches. Soil texture is fine gravelly sandy loam, coarse sandy loam, or sandy loam with a structure of generally granular or massive. Moist color is in the 10YR hue and ranges from pale brown to yellowish brown. The C-horizon is comprised of weathered granodiorite.

The Cieneba soils in the Conservation Area occur on the slopes of the main canyon and support primarily coastal sage scrub. Generally, these slope areas were not tilled for dry-land farming. Dominant species are California sagebrush, black and white sage, buckwheat, monkey bush, and on some slopes toyon. Few areas are impacted by exotic species such as non-native grasses, mustard and artichoke thistle. Cieneba soils that were near the slope break at the interface with the valley appear to have been dry-farmed. It is these area that are dominated by exotic species.

Three soil profiles were described from soil pits in the Cieneba Series. One soil pit location was chosen to define the soil in the coastal sage scrub habitat type currently found most often in this soil series. The objective was to compare this profile with the other two profiles within this series where dry-land farming had occurred. An additional soil profile was described at the interface of the Cieneba and Botella Series. See Appendix III for Field Sheets and soil pit photos.

The average depth of the soil profiles in the Cieneba Series was 36 inches. Soil color of the upper horizons, approximately 7-10 inches, was comparable to the Botella and Capistrano Series, with the Cieneba soils being slightly lighter. The soils became significantly lighter with increasing depth. No layer of clay accumulation is evident in the profiles. Soil texture was predominantly sandy loam or loamy sand. Few fine roots were found to depth along ped faces and in fracture zones. Pores were found in the upper layers and not to depth. Gravels and cobbles were present in the profiles throughout the horizons.

Proposed habitat restoration for the Cieneba series soils is coastal sage scrub. The soils are indicative of supporting shrub species due to their shallow nature, lack of thick dark upper horizons, sandy texture, and presence of cobbles and gravels. The light colors of the horizons indicate a low nutrient content of the soil. Typically, coastal sage scrub species are supported by low nutrient soils. Coastal sage scrub species are also drought tolerant and tend to grow on drier soils than would support grassland species. The steep sloping landscape position points to the series supporting shrubs as well.

A few clay inclusions occur in the Cieneba series that suggest grassland/forbland habitats rather than shrub land. Soil Pit 5 is located in one such clay inclusion (see Figure 4). The clay inclusion has a clay texture and dark color throughout the profile. In addition, the profile is deep. All of the indications point to grassland as opposed to shrub land habitat. Presently, Italian rye grass dominates this clay inclusion and other similar areas within slopes. A remnant grassland/forbland area exists within the Cieneba series

on a similar clay inclusion. Dominant species of this native remnant patch are bunchgrass, blue-eyed grass, blue dicks, and golden stars. In areas of clay inclusions on slopes, perennial grasslands will be restored.

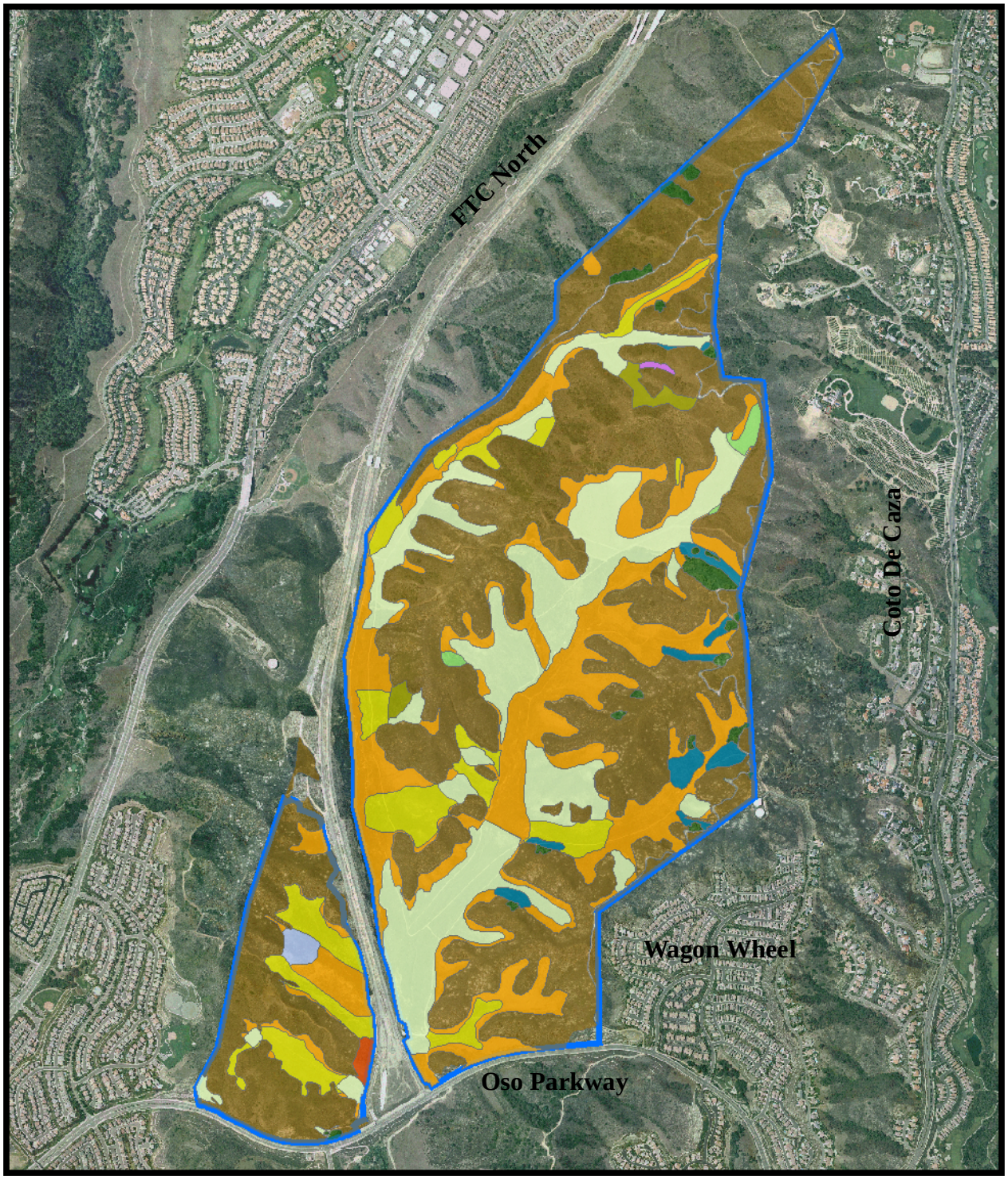
2.2 Summary of Restoration Areas

Restoration of each habitat will depend on the soils and existing vegetation as described in the preceding sections. Table 2 presents the estimated acreage of each restored habitat. Figure 7 shows the proposed habitat restoration areas based on soils, slope, and existing vegetation. The acreage for restoration of non-wetland water courses is based on the areas of each drainage dominated by exotic species as Described in Appendix II.

Opportunities for salvage and relocation of rare plant species have also been identified based on the preceding soil analysis. Specific salvage and relocation for thread-leaved brodiaea (*Brodiaea filifolia*) is presented in Appendix IV.

Table 2. Acreage of Proposed Habitat Restoration in the Conservation Area

Habitat Type	Acres
Coastal Sage Scrub	241
Coastal Sage Scrub/Perennial Grassland Ecotone	92
Perennial Grassland	182
Oak Woodland/Oak Savannah	31
Native Forb /Native Forb/Perennial Grassland	6
Non-Wetland Water Courses	13



Chiquita Canyon Conservation Area
Proposed Habitat Restoration Areas
Figure 7

Existing Habitats

- Oak Woodland Enhancement
- Existing Perennial Grassland
- Existing Coastal Sage Scrub
- Conservation Boundary

0 1,000 2,000 4,000 Feet

Habitat Restoration Areas

- Coastal Sage Scrub
- Ecotone
- Ecotone/Grassland
- Forbland
- Grassland
- Grassland/Forbland
- Oak Woodland
- Oak Woodland/Grassland

SECTION 3 – RESTORATION SPECIFICATIONS

The restoration within the Conservation Area is designated mainly within areas that have been historically disturbed by dry land farming. As discussed in the previous section, specific habitats will be restored on particular soil series. Restoration generally will proceed under the following specifications which will be adaptively managed for specific habitats and areas based on several factors, including the level of historic disturbance, density and type of exotic species, soil series, and distance from existing native habitats. Therefore, methods outlined in the following section will be used, or adapted, as necessary and in various combinations based on specific existing field conditions, including prevailing weather conditions each year.

Restoration will be phased so that there will be minimum impact to the overall ecology of the Conservation Area. Restoration generally can be divided into four phases: 1) site preparation, 2) seeding/planting, 3) establishment maintenance, and 4) post-establishment, long-term management. Under this restoration model, there will be approximately two years when each restoration area is under very active restoration, followed by approximately three years of establishment activities such as weeding. It is envisioned that restoration would begin with approximately 75 -100 acres in the first year, and would proceed in subsequent years until all the specified areas are restored. Therefore, in any one year there will be from between 75 - 200 acres in active restoration activities of site preparation and seeding/planting. Restoration will begin with coastal sage scrub areas as these are adjacent to existing habitat and will require the use of all the existing roads. Native grassland restoration will proceed from the north end of the site to take advantage of the prevailing winds out of the northwest. Oak woodlands and non-wetland drainages will be restored as adjacent coastal sage scrub and native grassland areas are scheduled for restoration.

3.1 SITE PREPARATION

Restoration of each specified habitat shall require site preparation that will vary in time, intensity and method. This preparation will consist of weed control and removal as well as soil nutrient and microbial evaluations for potential amendments. Site preparation will require 1 – 2 years depending on particular areas, the type and density of exotic species, and the specific habitat to be restored. Additionally, some areas may need particular soil amendments such as native mulches, mycorrhizal fungi, and algae.

As the phased restoration proceeds, initial site preparation and weed removal of will begin outside of the breeding season of grassland birds to avoid disrupting nesting. Weed control would continue so that no suitable nesting habitat is available prior to seeding/planting.

3.1.1 Weed Removal

All areas to be restored are presently dominated by exotic species. Weed control will be required to thin or remove mainly the annual grasses, exotic mustards, wild radish, filaree, and sow thistle (*Sonchus oleraceus*). During site preparation, weeds shall be removed before seed production to limit additional weed seed on the site. Weed removal

may employ mechanical methods, such as mowing and weed whipping. Native grass straw mulch may be applied to areas after mowing to shade out weed seedlings. In combination with particular seeding methods, such as imprinting which requires ripping the soil, weed seed may be brought to the surface and controlled with a series of "grow and kill' treatments. Areas dominated mainly by annual grasses may be treated with an herbicide specific to control grasses such as flurazifop-p (Fusillade). Selected broadleaf species such as artichoke thistle, mustards and wild radish may require spot application with a glyphosate herbicide. Only herbicides registered for use in wildlands would be used judiciously in the Conservation Area.

The amount of site preparation weeding that is required for each area will vary depending on the soil and soil seed bank as well as the weeds present. The method of seeding for each area will also influence the timing of site preparation. Areas will be evaluated after each weeding event to assess the progress of site preparation and to plan the next step. Areas will be released for seeding/planting depending on seeding method and whether enough progress has been made in management of the weed species.

In summary, the following methods will be employed over the Conservation Area in various combinations based on adaptive management of the specific areas for seeding/planting.

- Mowing
- Specific hand weeding of target weeds
- Mulching with native grass straw
- Specific herbicide application for target weeds
- Ripping and tilling in combination with "grow and kill" herbicide application

3.1.2 Soil Amendments

Several soil amendments have been shown to be important tools in native habitat restoration while other amendments are still experimental. Most of these amendments are living components of the soil ecosystem. The following sections outline the potential use of soil amendments for restoration within the Conservation Area.

Arbuscular Mycorrhizal (AM) Fungi

Studies are currently underway in 2003/2004 to determine whether native AM fungi inoculum or commercial AM fungi inoculum has a positive effect on the establishment of native grasslands compared to plots with no inoculum. Earlier studies within the Conservation Easement from 1999 - 2004 on establishment of coastal sage scrub showed no significant difference in establishment of native species between plots treated with and without commercial AM fungi (EARTHWORKS, unpublished data). However, plots treated with AM fungi seemed to have less mustard and wild radish. It is generally known that the Brassicaceae (Mustard) family is not mycorrhizal, and it is believed that AM fungi may have a detrimental effect on members of the family. Baseline tests of AM infectivity for the current 2003/2004 study indicate the soil in the restoration area has more AM potential than in the 1999 study baseline soil tests although data is not directly comparable because methods of infectivity differed. It is possible that when discing in the annual grassland areas was discontinued in 1999, AM fungi have

increased because most annual grass species are mycorrhizal., and once the soil disturbance was stopped some species of AM fungi would have increased over the site.

Depending on the results of current studies, soil evaluations, site preparation and seeding method, soils will be amended with AM fungi through incorporation in the seed mix applied for each habitat. If native AM inoculum is used, the inoculum will be developed from sources within the Conservation Area or close to the Conservation Area, such as Bell Canyon. Native inoculum will be most likely used in restoration of the native grassland areas since there are few, if any, native grasses presently in the soil in these areas, and therefore, we expect few species of mycorrhizae associated with native grasses to be present. Coastal sage scrub restoration areas are immeditaely down slope of existing scrub, and AM fungi native to this habitat likely will move into the restoration areas. If commercial AM is applied to coastal sage scrub, *Glomus intraradices* will be used. This species is native in most areas of the Western region and has been used on successful scrub restoration sites without inhibiting subsequent colonization by other native mycorrhizae (EARTHWORKS, unpublished data).

The AM fungi used for the project will be provided by a person or company with experience in AM fungi development. The AM fungi supplied for the project will be applied at the rate of 3,600,000 live propagules per acre, based on the guarantee of the supplier. The AM fungi will be applied with the seed in any seed method that is specified for particular areas, including imprinting, range drill seeding, and hydroseeding.

Algae

Native algae may be applied to the sites to speed the development of soil crusts and diminish the opportunity for weed seed germination. This amendment is still experimental, but it is a potential tool to be used in combination with other microbial amendments and restoration activities.

Fertilizer

Fertilizer most likely will not be necessary since the generally luxuriant growth of the existing exotic species indicates sufficient nutrients for habitat restoration. Soil nutrient tests will include standard agricultural suitability as well as total organic content and organic nitrogen. The long-term success of the restoration will depend on adequate amounts of organic material in the soils (Claussen, 2000). If fertilization should be required, then a slow release, low phosphorous complete fertilizer coated with polyurethane will be used. If soil tests show an over abundance of available nitrogen in the soil, then additional mulch may be applied to the specific sites.

3.2 Plant Sources and Species

To the extent possible, all plant material for the restoration shall be obtained from native plant communities growing within the western edge of the Santa Ana Mountains to the coastal hills. For those species that function as erosion control (small fescue and wooly plantain) or do not exist in large enough quantities within the specified area, it will be necessary to either use seed that is commercially grown or extend the collection area on a species by species basis. TCA will contract with a seed collection contractor specializing in native seed to ensure that seed material will be collected from the

Conservation Area and other sites as close as possible to the Conservation Area. The following sections list the species to be used in each specific habitat.

3.2.1 Coastal Sage

The coastal sage scrub seed mixes are designed to model species occurring on the corresponding aspects in the mature coastal sage scrub in the Conservation Area. The species selected for the restoration represent the more common and abundant species observed in the existing habitat as well as species that are early colonizers in scrub habitats after disturbance such as fires. Some less common species also have been included. Plant species shown in Tables 1 and 2 were determined from direct observation at the Conservation Area from 2002 – 2004. Additionally, line-intercept transect data in mature coastal sage scrub recorded in 1998 and 2002 were analyzed to determine approximate cover targets for species in the restoration areas. Appendix II shows the percent cover of all species recorded in coastal sage scrub transects in 1998, a relatively wet year, and from 2002, a historic dry year. Slopes with northerly and easterly aspects will be seeded with the species listed in Table 3. Slopes with southerly and westerly aspects will be seeded with the species listed in Table 4. Additional species have been included in the seed mix as a nurse crop and for erosion control until the coastal sage scrub species establish on the slopes.

As the coastal sage scrub restoration establishes, it will be possible to add less common species to these restoration areas by hand seeding in selected microhabitats. This hand seeding will reduce wasting seed of these less common species and will increase the likelihood that these species will be planted in the proper microhabitats.

3.2.2 Perennial Grassland

The species selected for the native grassland restoration are based on species noted in perennial grasslands within the region as well as the three small remnant native grasslands within the Conservation Easement. As previously discussed, native grasslands differ in species composition based on the amount of clay in the soil and the slope of the site. Table 5 lists the species to be used on slope sites with clay soils. Table 6 lists the species to be used in the lower valleys with sandy clay loam to clay loam soils.

3.2.3 Coastal Sage Scrub/Perennial Grassland Ecotone

The species selected for the ecotone area between coastal sage scrub and native grassland areas are based on species noted in such areas within the region as well as the ecotone area adjacent to the remnant native grasslands within the Conservation Easement. Table 7 lists the species to be seeded in the ecotone areas. This lists contains species that are found on the previous coastal sage scrub and native grassland species lists. Ultimately, the ecotone area will likely contain other species from both habitats.

3.2.4 Oak Woodland/Oak Savannah

The species selected for the oak woodland and oak savannah area are presented Tables 8 and 9. These same species will be used to restore the extent of existing oak woodlands and to enhance the understory area of the existing woodlands.

3.2.5 Non-Wetland Drainages

The species selected for the non-wetland drainages mirror drainages with intact vegetation. The drainage swales will be seeded with a grassland mix. The banks will be planted with larger shrub species from containers with smaller shrubs and bunch grasses seeded between the container. Tables 10, 11, and 12 present the species to be used to restore the drainages.

Table 3. Coastal Sage Scrub Seed Mix Northerly- and Easterly-Facing Slopes

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of seed per acre[2]
Artemisia californica	California sagebrush	15/50	2.0
Brickellia californica	California brickellbush	TBD	0.25
Encelia californica	California encelia	40/60	1.0
Eriogonum fasciculatum	California buckwheat	10/65	3.0
Eriophyllum confertiflorum	golden yarrow	30/60	2.5
Gnaphalium californicum	California everlasting	TBD	0.5
Hazardia squarrosa	saw-toothed goldenbush	TBD	0.5
Hemizonia fasciculata	fascicled tarweed	10/25	0.5
Heteromeles arbutifolia	toyon	TBD	0.1
Leymus condensatus	giant wild rye	70/80	0.4
Lotus scoparius	deerweed	90/60	3.0
Lupinus bicolor	miniature lupine	98/80	3.0
Lupinus truncatus	collar lupine	80/80	1.5
Malosma laurina	laurel sumac	TBD	0.1
Melica imperfecta	melic grass	90/60	2.0
Mimulus aurantiacus	sticky monkey flower	TBD	1.5
Mimulus brevipes	slope semaphore	TBD	0.2
Mirabilis californica	California wishbone	TBD	0.5
Nassella lepida[3]	foothill needlegrass	70/60	1.5
Nassella pulchra[3]	purple needlegrass	70/60	1.5
Phacelia distans	common phacelia	98/75	0.4
Plantago insularis[4]	wooly plantain	98/75	20.0
Rhus integrifolia	lemonadeberry	TBD	0.1
Salvia apiana	white sage	70/50	1.5
Sanicle arguta	sharped-tooth sanicle	TBD	0.2
Sisyrinchium bellum	blue-eyed grass	90/70	0.5
Vulpia microstachys[4]	Small fescue	90/80	6.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.
[4] Erosion control and nurse crop species.

Table 4. Coastal Sage Scrub Seed Mix Southerly- and Westerly-Facing Slopes

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of seed per acre[2]
Artemisia californica	California sagebrush	15/50	1.5
Brickellia californica	California brickellbush	TBD	0.5
Castilleja exserta	purple owl's clover	50/60	0.2
Encelia californica	California encelia	40/60	1.5
Eriogonum fasciculatum	California buckwheat	10/65	5.0
Gnaphalium californicum	California everlasting	TBD	0.5
Hazardia squarrosa	saw-toothed goldenbush	TBD	0.5
Hemizonia fasciculata	fascicled tarweed	10/25	2.0
Lotus scoparius	deerweed	90/60	6.0
Lupinus bicolor	miniature lupine	98/80	4.0
Lupinus truncatus	collar lupine	80/80	1.5
Malosma laurina	laurel sumac	TBD	0.1
Melica imperfecta	melic grass	90/60	2.5
Mimulus aurantiacus	sticky monkey flower	5/70	0.5
Mimulus brevipes	slope semaphore	TBD	0.2
Mirabilis californica	California wishbone	TBD	0.5
Nassella lepida[3]	foothill needlegrass	70/60	2.5
Opuntia littoralis [4]	coast prickly pear	pads	30-60 pads
Phacelia distans	common phacelia	98/75	0.2
Phacelia ramosissima	branching phacelia	80/70	0.2
Plantago insularis [5]	wooly plantain	98/75	20.0
Rhus integrifolia	lemonadeberry	TBD	0.2
Salvia mellifera	black sage	70/50	1.0
Sisyrinchium bellum	blue-eyed grass	90/70	0.5
Solanum douglasii	Douglas' nightshade	TBD	0.1
Vulpia microstachys [5]	Small fescue	90/80	6.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.
[4] Planted as pads in groups of 30 for total of 90 pads/acre.
[5] Erosion control and nurse crop species.

Table 5. Native Perennial Grassland Seed Mix For Slopes with Clay Soils

Scientific Name	Common Name	Minimum Purity/Germination [1]	Pounds of Seed Per Acre [2]
Bloomeria crocea	golden stars	TBD	0.2
Dichelostemma capitatum	blue dicks	95/50	1.0
Filago californica	California filago	TBD	0.5
Gnaphalium palustre	lowland everlasting	10/25	0.5
Hemizonia fasiculata	tarweed	20/70	2.0
Nassella pulchra [3]	purple needlegrass	60/60	10.0
Nemophila menziesii	baby blue eyes	98/85	0.5
Plantago ovata [4]	wooly plantain	98/75	20.0
Poa secunda	bluegrass	60/60	1.5
Orthocarpus purpurascens	owl's clover	50/50	0.5
Sanicle crassicaulis	Pacific sanicle	TBD	0.5
Sisyrinchium bellum	blue-eyed grass	95/75	1.5
Vulpia microstachys [4]	small fescue	70/70	6.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.
[4] Erosion control and nurse crop species.

Table 6. Native Perennial Grassland Seed Mix for Valleys and Slopes with Sandy Clay Loam to Clay Loam Soils

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of Seed Per Acre [2]
Asclepias fascicularis	narrow-leaf milkweed	TBD	0.25
Ambrosia psilostachys	western ragweed	20/70	0.25
Amsinckia menziesii var. *intermedia*	common fiddleneck	30/70	1.0
Bromus carinatus	California brome	95/80	2.0
Castilleja exserta	purple owl's clover	50/60	0.5
Dichelostemma capitatum	blue dicks	95/50	1.0
Ericameria palmeri	grassland goldenbush	TBD	0.25
Filago californica	California filago	TBD	0.5
Gnaphalium palustre	lowland everlasting	10/25	0.5
Hemizonia fasiculata	tarweed	20/70	2.0
Lasthenia californica	goldfields	50/60	0.5
Layia platyglossa	tidy tips	80/75	0.5
Lotus purshianus	Spanish clover	98/70	1.5
Lotus strigosus	strigose lotus	98/70	1.5
Lupinus bicolor	miniature lupine	98/85	3.0
Lupinus succulentus	arroyo lupine	98/85	1.5
Lupinus truncatus	collar lupine	98/70	1.5
Melica imperfecta	melic grass	90/60	1.5
Nassella lepida [3]	foothill needlegrass	60/60	2.0
Nassella pulchra [3]	purple needlegrass	60/60	10.0
Nemophila menziesii	baby blue eyes	98/85	0.5
Plantago ovata [4]	wooly plantain	98/75	20.0
Poa secunda	bluegrass	60/60	1.5
Sisyrinchium bellum	blue-eyed grass	95/75	1.5
Vulpia microstachys [4]	small fescue	70/70	4.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.
[4] Erosion control and nurse crop species.

Table 7. Ecotone Seed Mix

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of Seed Per Acre [2]
Artemisia californica	California sagebrush	15/50	0.2
Asclepias fascicularis	narrow-leaf milkweed	TBD	0.2
Amsinckia menziesii var. *intermedia*	common fiddleneck	30/70	0.5
Baccharis pilularis	coyote bush	15/60	0.1
Bromus carinatus	California brome	95/80	2.0
Cryptantha intermedia	popcorn flower	TBD	0.5
Datura wrightii	tolugacha	TBD	0.2
Dichelostemma capitatum	blue dicks	95/50	1.0
Hazardia squarosa	goldenbush	TBD	0.5
Hemizonia fasiculata	tarweed	20/70	2.0
Isocoma menzesii	coast goldenbush	TBD	0.5
Lasthenia californica	goldfields	50/60	1.5
Lessingia filaginifolia	California aster	TBD	0.5
Lotus scoparius	deerweed	90/60	1.0
Lotus strigosus	strigose lotus	98/70	1.5
Lupinus bicolor	miniature lupine	98/85	3.0
Lupinus truncatus	collar lupine	98/70	1.5
Melica imperfecta	melic grass	90/60	1.5
Nassella lepida [3]	foothill needlegrass	60/60	3.0
Nassella pulchra [3]	purple needlegrass	60/60	8.0
Plantago ovata [4]	wooly plantain	98/75	20.0
Sisyrinchium bellum	blue-eyed grass	95/75	1.5
Vulpia microstachys [4]	small fescue	70/70	4.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.
[4] Erosion control and nurse crop species.

Table 8. Oak Woodland Seed Mix

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of seed per acre[2]
Bromus carinatus	California brome	95/80	3.0
Galium aparine	goose grass	10/25	1.0
Nassella lepida	foothill needlegrass	60/60	2.0
Nassella pulchra	purple needlegrass	60/60	5.0
Plantago ovata	wooly plantain	98/75	20
Sisyrinchium bellum	blue-eyed grass	95/75	0.5
Vulpia microstachys	fescue	70/70	6.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.

Table 9. Oak Woodland Container Plant Species

Scientific Name	Common Name	Spacing [1]	Plants per Acre
Heteromeles arbutifolia	toyon	20’	10
Quercus agrifolia	coast live oak (acorns)	5’	100
Quercus agrifolia	coast live oak	25’	190
Rhamnus californica	coffeeberry	20’	25
Rhus integrifolia	lemonadeberry	15’	10
Sambucus mexicana	Mexican elderberry	15’	25

[1] Spacing = on-center distance from other container planted shrub/tree species.

Table 10. Non-Wetland Drainage Swale Seed Mix

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of seed per acre[2]
Amsinckia menziesii	common fiddleneck		1.0
Bromus carinatus	California brome		3.0
Gnaphalium palustre	lowland everlasting	10/25	1.0
Nassella lepida	foothill needlegrass		1.0
Nassella pulchra	purple needlegrass		3.0
Vulpia microstachys	fescue		6.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.

Table 11. Non-Wetland Drainage Banks Seed Mix

Scientific Name	Common Name	Minimum Purity/Germination[1]	Pounds of seed per acre[2]
Artemisia californica	California sagebrush	15/50	2.0
Calystegia macrostegia	morning glory	TBD	0.5
Erigonium fasciculatum	California buckwheat	10/65	3.0
Gnaphalium californicum	California everlasting	TBD	1.0
Isocoma menziesii	goldenbush	TBD	0.5
Lotus scoparius	deerweed	90/60	4.0
Mimulus aurantiacus	monkeybush	5/70	2.5
Nassella lepida[3]	foothill needlegrass	60/60	2.0
Nassella pulchra	purple needlegrass	60/60	2.0
Salvia apiana	white sage	70/50	2.0
Salivia mellifera	black sage	70/50	2.0
Verbena lasiostachys	common verbena		1.0

[1] Minimum germination may be adjusted after germination tests on special local collection.
[2] Bulk seed rate may be adjusted depending on results of tests for germination.
[3] Seed of *Nassella* spp. shall be de-awned.

Table 12. Non-Wetland Drainage Banks Container Plant Species

Scientific Name	Common Name	Spacing [1]	Plants per Acre
Baccharis salicifolia	mulefat	5’	25
Heteromeles arbutifolia	toyon	20’	5
Malosma laurina	laurel sumac	20’	5
Platanus racemosa	sycamore	40’	2
Quercus agrifolia	coast live oak	25’	5
Rhamnus californica	coffeeberry	20’	10
Rhus integrifolia	lemonadeberry	15’	10
Sambucus mexicana	Mexican elderberry	15’	15

[1] Spacing = on-center distance from other container planted tree/shrub species.

3.3 SEEDING AND PLANTING SPECIFICATIONS

The following methods will be used to seed and plant during the restoration of varios habitats within the Conservation Area. As site preparation of each area proceeds, the specific methods that best suit an area based on the density and type of weeds will be determined and implemented. Thus, the methods presented here will be used to adapt to site conditions and weather patterns and predictions for each year.

3.3.1 Seeding

Tests are currently underway to determine the optimum seeding method to use in various areas of the site based on weed densities; however, several physical factors will also determine what method of seeding is used. The following sections define several methods of seeding that will be used over the Conservation Area under particular circumstances. As-built plans will be prepared for each area to document the methods used.

Imprint Seeding

Most areas that have very dense weed species and few native species will be seeded by imprinting the seeds. Areas of shallow soil and the presence of rocks will limit the use of imprinting. Prior to imprinting an area, and as part of site preparation, soil will be ripped or tilled to prepare the seed bed.

Imprinting will apply the specific seed mix and specified AM fungi amendments at the same time through separate gandy boxes:

- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

Range Drill Seeding

Range drill seeding will be implemented where the occurrence of native species is somewhat high, making ripping and tilling undesirable methods for site preparation. Range drill seeding can be accomplished over mowed stubble if the thatch is not too thick. In some case the thatch may be broken down by with a light disc prior to drill seeding. Drill seeding will be accomplished by dividing the seed mix in tow equal parts and applying each half of the seed mix in perpendicular passes with the range drill seeder.

Drill seeding will apply the specific seed mix and specified AM fungi amendments at the same time through separate gandy boxes, and with light seeds and heavy seeds separated into separate gandy boxes:

- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

Hydroseeding

In areas that are not accessible by imprinter or drill seeder, a two-step hydroseeding technique shall be used to the apply seed. In the first step, a hydraulic application of a slurry mixture containing water, cellulose wood fiber, seed, and AM fungi will proceed as follows:

- 500 pounds lbs/ac of virgin cellulose wood fiber,
- 60 liters L/ac of AM fungi,
- specified seed mix for each area.

The second step will consist of the following slurry mixture:

- 1500 pounds/acre of virgin cellulose wood fiber, and
- 160 pounds lbs/ac M-binder.

3.3.2 Planting Technique

Container plants consist of either dominant tree species or large shrubs that are difficult to establish from seed, and they will be used in oak woodland areas and non-wetland drainage areas only. The layout for container plants will be determined for each area based on micro topographic features. Spacing of plants within the groups will follow the specifications presented in the tables for container plant palettes. Planting sites will be marked on the site using different colored pin flags under the supervision of the

restoration specialist. Groups of container plants will be spaced in a natural looking mosaic in each area. As-built drawings of oak woodland and non-wetland drainage container planting will be prepared.

All container plants are to be planted to the following specifications:

- Planting holes shall be made with the minimum disturbance to accommodate the containers.
- Prior to planting, the planting hole shall be filled with water, and allowed to drain.
- Plants shall be set in the planting hole so that the crown of the root ball is approximately 0.5 inch above finish grade. Under no circumstance should the plant crown be buried.
- A watering basin shall be provided around each plant from 18 – 24 inches in diameter.
- Watering basins shall be filled with water after planting.
- Plant basins shall be mulched with approximately 4 – 6 inches of approved wood mulch after planting.

3.4 SITE MAINTENANCE

One of the goals for the restoration is to provide self-sustaining habitats. However, initially, maintenance of the restoration area will be necessary to establish the new seeding/planting. Maintenance will include any activities required to meet the performance standards set forth in this plan, in the estimation of the restoration specialist. These include, but are not limited to, the following:

- Weed control,
- Site irrigation,
- Erosion control repair,
- Pest and disease control,
- Replacement planting/seeding.

The establishment maintenance period is generally three to five years duration with the most intense maintenance in the first and second years, and only seasonal weeding activities in the third through fifth years. The amount of maintenance each year will depend on weather conditions and how well the site develops. The following specifications for maintenance may require adjustments as determined by the restoration specialist over the five-year maintenance period.

3.4.1 Weed Control

During the active maintenance period, the target cover from exotic weed species will be five percent or less. Weeds will be removed on a regular basis, as necessary, before they set seed and/or before they reach approximately 12 inches in height. Weeds will be removed from the site if seeds have set prior to removal. Otherwise, weeded material may be left on site to provide organic material for soil development.

Weed control will mainly employ hand and mechanical methods. Spot spraying of herbicides will be used for certain species such as artichoke thistle.

3.4.2 Irrigation of Container Plants

Temporary irrigation will only be used in the oak woodland and non-wetland drainage areas where container planting will be used. Irrigation will occur be used in the first several years of planting to extend the rainy season and establish the trees and shrubs, as necessary. The timing of irrigation events will depend on evapotranspiration between irrigation events and soil moisture. The following management scheme is anticipated as a guideline for water management of native trees and shrubs:

- Irrigate soil to full field capacity to the desired depth (approximately 18 inches after planting; and 18–24 inches during plant establishment).
- Allow soil to dry down to approximately 50-60 percent of field capacity in the top 6-12 inches before the next irrigation cycle. Depth of soil dry down between irrigation events will depend on development of container plants.

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 a 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.

3.4.3 Seeding and Plant Replacement

Target values for relative cover of the native vegetation, including nurse and erosion control species, will be as follows with at least 30 percent in Year 1, 50 percent in Year 2, and 70 percent in Years 3, 4, and 5. Actual cover values will depend mainly on weather conditions (seasonal rainfall and temperature) during the establishment period.

Areas of significant erosion shall be repaired and re-seeded in the first fall season after damage. Re-seeding will occur in areas if coverage is less than 20 percent in any area of 25 square feet.

Survival of container plants will only be an issue in the oak woodland and non-wetland drainages. Survival of plants within the first growing season should be 80 percent. Plants shall be replaced if survivorship falls below 80 percent in the first and second season. Replacements will be planted as previously specified and maintained for one growing season with hand-irrigation, as necessary. As sites develop, it is impractical to implement direct counts of all the container plants. Replacement planting after the second season shall only be specified if the visual estimate indicates substantial mortality and the function of these species has not been replaced by natural recruitment.

3.4.4 Pest Management

Local wildlife such as rabbits, pocket gophers and ground squirrels may be expected to browse on the plantings. If the restoration specialist determines that the plantings are being jeopardized by wildlife, corrective measures such as organic, nontoxic deterrents and fencing/plant cages maybe used. Invertebrate pests are rarely a serious problem in coastal sage scrub restoration.

3.5 SUMMARY OF IMPLEMENTATION, MAINTENANCE, AND MONITORING

The Table 13 summarizes the timing and activities for the implementation, maintenance, and monitoring of the habitat restoration. The timing is described in general terms by season. Exact dates for each phase of implementation and maintenance will depend on the onset and duration of seasonal rainfall as well as other factors such as the temperatures prior to, during and following rain events. Rainfall and temperature will define the type and the density of weed species as well as native species that will germinate in any given year and season.

Horticultural monitoring will take place daily during seeding and planting, bimonthly in the first six months after implementation, monthly during year two, and quarterly after that for the through the fifth year. Horticultural monitoring will guide weeding and irrigation schedules for the project.

Table 13
Summary of Restoration Time Table

Restoration Tasks	Year 1 Year 2				Year 3 Year4				Year 4 Year 5				Year 6 Year 7				Year 8 Year9				Year 10 Year 11				Year 12 Year 13			
	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S	F	W	S	S
Seed Collection	X X	X X	X X	X X	X X	X X	X X	X X	*	*	*	*																
Site Preparation Weeding	X X	X X	X X	X X	X X	X X	X X	X X	*	*	*	*																
Plant Container Plants	X				X																							
Container Plant Irrigation	X	X	X	X	X X	X X	X X	X X	X X	X X	X X	X X	*	*	*	*												
Seed	X	X			X X	X X			X	X																		
Maintenance Weeding	X	X	X	X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X *	X *	X *	X *	*	*	*	*				
Remedial Planting/Seeding					* *				* *				* *				*											
Horticultural Monitoring	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X				
Performance Monitoring				X			X X				X X				X X				X X				X X				X X	

SECTION 4 - PERFORMANCE MONITORING

In order to assure that the revegetation performance standards are met, the revegetation shall be qualitatively monitored annually after installation for four years. Photo-documentation at permanent points will be conducted for inclusion in the annual performance monitoring report. In the fifth year, the site shall be monitored quantitatively to determine if each restoration area achieves the performance standards. Monitoring will consist of random transects over each restoration area. The number of samples necessary will be evaluated to ensure statistical confidence based on variation over the site.

Annual performance monitoring will take place each year in mid-spring or as close to mid-spring as each year's rainy season permits. Results from the annual performance monitoring will be used to evaluate the progress of the mitigation habitat toward the ultimate standards of the project. Performance monitoring shall be conducted by qualified plant ecologists. The annual monitoring report will be submitted to the TCA. It is the responsibility of TCA to submit the annual report to USFWS by November 30 of each year.

4.1 PERFORMANCE STANDARDS

Performance standards have been developed to assess an increase in functions and values of each habitat. Performance will be assessed as the restoration areas develop trends in cover, species diversity, as well as soil development so that the habitat quality of the site is restored. Specifically, the restoration will be considered successful when the following criteria are met for each habitat type:

Coastal Sage Scrub

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report.
- The majority of plant species set seed, and seedlings of at least five coastal sage scrub species demonstrate recruitment in the site in the fifth year of monitoring based on information from quantitative monitoring.
- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of seedlings randomly sampled over the site.
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. (Note: The 25 percent cover standard for these species is based on the percent exotic species in the adjacent reference sites within the Conservation Area [see Appendix I]). There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus* and *Nicotiana glauca*.
- The relative cover of native plant species is at least 80 percent.
- The site demonstrates 80 percent of the native species richness found in the reference habitat in the Conservation Area.

Perennial Grasslands and Grassland/Forbs

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report.
- The native grasses set seed.
- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of seedlings randomly sampled over the site.
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus*. The relative cover of native plant species is at least 60 percent.
- The site demonstrates 80 percent of the native species richness found in the reference habitat in the Conservation Area.

Grassland.Scrub Ecotone

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report.
- The majority of plant species set seed, and seedlings of at least three coastal sage scrub species demonstrate recruitment in the site in the fifth year of monitoring based on information from quantitative monitoring.
- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of seedlings randomly sampled over the site.
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus* and *Nicotiana glauca*.
- The relative cover of native plant species is at least 70 percent with approximately 10 – 30 percent cover from shrub species.

Oak Woodland

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report.
- At least 60 percent of container plants have survived in the site in the fifth year of monitoring based on information from quantitative monitoring.
- AM fungi establishment on the site is demonstrated by root colonization of 90 percent of understory seedlings randomly sampled over the site.
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus* and *Nicotiana glauca*.
- The relative cover of native plant species is at least 75 percent with at least 5 percent cover from oak saplings and elderberry shrubs.

Non-Wetland Drainages

- The site does not require significant maintenance measures during the last two years of the establishment period as documented by the restoration specialist's annual monitoring report.
- The habitat resists invasion by exotic plant species as demonstrated by less than 25 percent cover of annual grass species and less aggressive exotic forbs. There shall be no aggressive, invasive exotic species, such as *Cynara cardunculus* and *Nicotiana glauca*.
- The relative cover of native plant species is at least 80 percent.
- The site demonstrates 80 percent of the native species richness found in the reference habitat in the Conservation Area.

4.2 MONITORING METHODOLOGY

The selection of variables measured for the performance monitoring will be based on the goals of the restoration program, development characteristics of each plant community, and the performance standards outlined above. Variables will include native species cover, exotic species cover, percent bare ground and litter, as well as species frequency and seedling frequency in monitoring transects and quadrats. Where applicable, shrub height will also be measured to provide an additional parameter to assess habitat suitability. The number of sampling units in each habitat will be determined by areas to ensure statistical confidence based on the variation over the site.

4.2.1 Coastal Sage Scrub and Ecotone Vegetation Sampling

Vegetation sampling in coastal sage scrub will utilize the line-intercept method to measure vegetation cover. This method is best suited to measure scrub vegetation and will provide the most efficient and reliable method for estimating cover and species composition over the mitigation site.

Locations of the transects will be randomly selected within each restoration area. At each randomly selected site, a 25-meter line intercept transect will be performed in shrub and ecotone communities. A 25-meter tape will be stretched taut, perpendicular to the main line at the randomly selected locations. Length of vegetative cover for each plant that comes into contact with the transect tape and vertical plane under the tape will be measured and entered into a hand-held computer. Data to be recorded will include the species, length of vegetative cover in meters, plant number (if a continuous segment of tape consisted of more than one of the same species), and the developmental stage of the plant (seedling, juvenile, or adult). Annual grasses will be grouped together in one measurement and species of annual grasses will be noted.

Seedlings will be identified for shrubs and sub-shrubs and will be determined by being small in size, having a non-woody base, and usually the result of germination during the same year as the transect reading. Juveniles and adults will be identified as definitely woody at the base of the stem. Bare ground will be recorded as areas with no vegetative cover and litter will be recorded in areas of no vegetative cover but with dead vegetative matter covering the ground. Data on the height of the shrubs will also be recorded for all woody shrubs along the transect.

Cover data will be reported as actual linear measurements and absolute percent cover as well as relative cover. Frequency data will be reported as the percent of transects a species is reported to occur in. Height data will be reported as the average height of the shrub species.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data.

4.2.2 Perennial Grassland Vegetation Sampling

Vegetation sampling in perennial grassland habitats will utilize the point-intercept method to estimate vegetation cover and species diversity. This method is best suited to measure grassland habitats, and it will provide the most efficient and reliable method for estimating cover and species composition over the mitigation site.

Locations of the transects will be randomly selected within each restoration area. At each randomly selected site, a 25-meter point intercept transect will be performed with points at every 5 meters. A 25-meter tape will be stretched taut, perpendicular to the main line at the randomly selected locations. At each 5 meter mark, a 1/2 meter quadrat will be placed. Native and non native plant cover will be estimated and entered into a hand-held computer. Data to be recorded will include the species present with quadrats, and native and non native vegetative cover in relative percent.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data.

4.2.3 Oak Woodland Vegetation Sampling

Vegetation sampling in oak woodlands will utilize belt transects to measure vegetation cover. This method is best suited to measure woodland vegetation, and it will provide the most efficient and reliable method for estimating cover and species composition over the sites.

Locations of the belt transects will be randomly selected within each restoration area. At each randomly selected site, a 25-meter x 2 meter belt transect will be performed. A 25-meter tape will be stretched taut, perpendicular to the main line at the randomly selected locations. Data to be recorded will include the species within the belt transect, and estimate of understory cover, and the height and cover of tree species will be recorded. Annual grasses will be grouped together in one measurement and species of annual grasses will be noted.

Cover data will be reported for understory species as an estimate of relative cover. Cover for tree species will be reported as absolute cover based on the volume of sampled trees. Each tree canopy within the belt will be measured from two perpendicular diameter measurements. Frequency data will be reported as the percent of transects a species is reported to occur in. Height data will be reported as the average height of the tree species.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data. The percent survivorship of tree species will be determined from direct counts over the site.

4.2.4 Non-Wetland Drainages

Vegetation sampling for non-wetland drainages will utilize belt transects across the drainage to estimate vegetation cover. This method is best suited to measure the swale and bank vegetation, and it will provide the most efficient and reliable method for estimating cover and species composition over the drainages.

Locations of the belt transects will be randomly selected within each restored drainage. At each randomly selected site, a 2 meter belt transect will be performed. A meter tape will be stretched across drainages as a cross section. Data to be recorded will include the species within the belt transect, and estimate of understory cover, and the height and cover of tree species will be recorded. Annual grasses will be grouped together in one measurement and species of annual grasses will be noted.

Cover data will be reported for understory species as an estimate of relative cover. Cover for tree species will be reported as absolute cover based on the volume of sampled trees. Each tree canopy within the belt will be measured from two perpendicular diameter measurements. Frequency data will be reported as the percent of transects a species is reported to occur in. Height data will be reported as the average height of the tree species.

Additionally, the restoration area will be walked and a list prepared of all species observed. This species list will be reported in the annual report in addition to the transect data.

4.3 ARBUSCULAR MYCORRHIZAL FUNGI SAMPLING

To determine if AM is persistent throughout restoration site, roots of seedling species known to have a symbiotic relationship with AM will be sampled and analyzed for AM fungi. Locations for root samples will be randomly selected on each discrete slope. Soil will be collected at each random site in three locations in close proximity to plant species known to be mycorrhizal symbionts. Samples will be collected at a depth of approximately 2-3 inches.

Roots will be washed and stained with 0.05 percent of Trypan Blue Stain. Roots will then be mounted on slides and analyzed using a compound microscope. Data will be recorded on the presence or absence of AM fungi in the roots.

Alternatively, soil from each site may be collected and used to determine an mycorrhizal infectivity index, or MIP, of the soil. In this case, soil would be used from the site to grow test plants. These test plants would then be harvested and root infectivity would be determined as above. Baseline data is presently under investigation and would be used to measure the success of the restoration sites.

4.4 WILDLIFE SAMPLING

Wildlife sampling within the restored areas would be incorporated in the annual Management Plan Report for the Conservation Area. Under this existing report, particular avian surveys are performed every two years, mainly for the California gnatcatcher and the Coastal cactus wren. General wildlife observations are also included for the Conservation Area.

SECTION – 5 REFERENCES

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APPENDIX I

Vegetation Transect Data

The following vegetation data was collected in the Conservation Easement Area in 1998 and 2002 by Harmsworth Associates. The data was collected in coastal sage scrub. These data are used for this restoration plan to identify target dominant species and rarer species, and to set relevant performance standards for native plants and exotic species.

Coastal Sage Scrub Transect Data (Harmsworth 1999)

species	css1	css2	css3	css4	css5	css6	css7	css8	css9	c
agrpal Tota	0	0	0	0	0	0	0	0	0.0344	
amamen Tc	0	0	0	0	0	0	0	0	0	
anearv Tot	0.0196	0	0	0	0.0624	0	0	0.01	0.0288	
artcal Total	0.3352	0.1288	0.3952	0.2004	0.5592	0.478	0.1776	0.1324	0.2744	
avebar Tot	0	0	0	0	0	0	0	0.0152	0	
avefat Tota	0	0	0	0	0	0 0016	0.0004	0	0	
bacpil Total	0	0	0	0	0	0	0	0	0	
bg Total	0	0.0644	0.0652	0.0116	0.072	0.042	0.0112	0.0032	0	
blocro Tota	0	0	0	0	0	0	0	0	0.0216	
branig Tota	0	0	0	0.2372	0	0	0	0.0048	0.0096	
brodia Tota	0	0	0	0.0032	0	0.0056	0	0.0464	0.0696	
brohor Tota	0	0	0	0	0	0	0	0	0.1304	
bromad Tot	0.0372	0.0052	0.002	0.486	0.0172	0	0.0572	0.2664	0.0012	
calmac Tot	0	0	0	0	0	0	0	0	0	
calspi Total	0	0	0	0	0	0	0	0	0.0004	
cenmel Tot	0	0.064	0	0.516	0.002	0.0248	0	0.1968	0.02	
cirocc Total	0	0	0	0	0	0	0	0	0	
cirvul Total	0.0052	0	0	0.0964	0	0	0	0	0	
conarv Tota	0	0	0	0	0	0	0	0	0.0024	
crymen Tot	0	0	0.0476	0	0 2808	0.0216	0.044	0	0	
crymic Tota	0	0	0	0	0	0.002	0	0	0	
cuscal Tota	0.214	0.1168	0.032	0	0	0	0.0128	0	0	
daupus Tot	0	0	0	0	0	0	0.0024	0	0.01	
dicsap Tota	0	0	0	0	0	0	0	0	0	
dudlan Tota	0	0	0	0.002	0	0	0	0	0	
enccal Tota	0	0	0.0216	0	0	0	0	0	0	
epican Tota	0	0	0	0	0	0	0	0	0.02	
erifas Total	0.6812	0.3236	0.3356	0.072	0.1644	0.4248	0.612	0.104	0.1412	
erifol Total	0	0	0	0	0	0	0	0	0.0248	
fesaru Tota	0	0	0	0	0	0	0	0	0	
filgal Total	0	0	0	0	0	0	0	0	0	
galarg Tota	0	0	0	0	0	0.0064	0.06	0.036	0.1472	
galapa Tota	0	0	0	0	0	0	0	0	0.0104	
gasven Tot	0	0	0	0	0	0	0	0	0.0008	
gnacal Tota	0	0	0	0	0	0	0	0	0.0008	
gnapal Tota	0	0	0	0	0	0	0	0	0.0012	
gnasp Tota	0.0024	0.0044	0.0072	0.0036	0.0028	0.0808	0	0	0	
hazaqu Tot	0	0	0	0.0028	0.0008	0.022	0	0	0	
hirinc Total	0.1592	0.1424	0	0.0196	0	0	0	0.0692	0.0308	
hypgla Tota	0	0	0	0	0.0044	0	0	0.0028	0.0272	
juniruf Tota	0	0	0	0	0	0	0	0	0.0148	
lesfil Total	0	0	0	0	0.002	0	0	0	0.0016	
litter Total	0	0.1576	0.0364	0.0172	0.0716	0.0472	0.0192	0	0.0156	
lolmul Total	0	0	0	0	0	0	0	0	0	
lotsco Total	0.062	0.0032	0.0332	0	0.0784	0.0028	0.0488	0.0712	0	
mailau Tota	0	0	0	0	0	0	0	0	0	
malsax Tot	0	0	0	0	0	0	0	0	0	
marmac To	0	0	0	0	0	0	0	0	0	
marvul Tota	0	0.0492	0	0	0	0	0	0	0	
mellmp Tot	0.2496	0	0.0024	0.0224	0.014	0.0004	0.0116	0.0168	0.078	

ss10	css11	css12	css13	css14	css15	css16	css17	css18	css19	css20
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.0044	0	0	0	0	0
0	0	0	0.1028	0.0004	0.016	0	0	0	0	0
0.31	0.3596	0	0.4604	0.5712	0.4396	0.3604	0.5096	0.2676	0.342	0.2964
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0.1296	0	0.0324	0	0	0	0	0
0	0.0468	0	0	0.1008	0	0.084	0	0.0316	0.0468	0
0	0	0	0.0456	0	0	0	0	0	0	0.026
0	0	0	0.0004	0	0.01	0	0	0	0	0
0.006	0.0156	0	0.056	0.0008	0.0016	0	0	0	0.002	0.0068
0	0	0	0.2	0	0	0	0	0	0	0.1008
0.0284	0.0184	0.0268	0	0.0304	0.1052	0	0.0024	0.0008	0.0724	0.332
0	0	0	0	0	0	0.0024	0	0	0	0.0008
0	0	0	0	0	0	0	0	0	0	0
0	0.0044	0.0096	0.4136	0.0136	0.0228	0	0	0	0	0
0	0.004	0	0	0	0	0.0084	0	0	0.0006	0
0	0	0	0.0172	0	0	0	0.1432	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.0432	0	0	0.0004	0.0468	0.0144	0.0036	0.0004	0.0304	0.0128
0	0	0	0	0.0068	0	0	0	0	0	0
0	0.0248	0	0	0.0008	0	0.0504	0	0.0792	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.0004
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.428	0	0.0292	0.1068	0	0.4228	0.4164	0.2372	0.0468	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.048	0
0	0.0012	0	0	0	0	0	0	0	0	0.0012
0	0.0052	0	0	0	0	0	0	0	0	0.054
0	0	0	0	0	0.1176	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.0068	0.002	0.0348	0.012	0.0072	0.0056	0	0	0.0204	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.002	0.0904	0.0112	0.036	0	0.3528	0	0.0076	0.0308	0.2596	0.214
0	0.002	0	0.0008	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0.132	0	0	0	0	0	0	0.05
0.022	0.0588	0.0984	0.0736	0.1788	0.016	0.1004	0	0.0856	0.3196	0.0588
0	0	0	0.0004	0	0	0	0	0.0016	0	0
0	0.0528	0	0	0	0	0.0312	0	0.0012	0.0048	0
0	0	0	0	0	0	0	0	0.3836	0	0
0	0.0048	0	0	0	0	0	0	0	0	0
0	0	0.0944	0	0	0	0	0	0	0.0492	0
0	0	0.1512	0	0	0	0	0	0	0	0
0.008	0.2644	0	0.0632	0	0.0364	0	0	0	0	0.346

mimaur Tot	0.0736	0.014	0.0744	0	0	0	0	0	0.2032
mircal Total	0	0	0	0.0404	0	0.0072	0	0.032	0
naalep Tote	0.4192	0.0096	0.1136	0.2232	0.0068	0.068	0.6016	0.582	0.0924
naapul Tota	0	0	0	0	0.02	0	0	0	0.1024
nicgla Total	0	0.002	0	0	0	0	0	0	0
opurit Total	0.0224	0.234	0.2572	0	0.0624	0.1012	0.1652	0.1676	0.028
oxacor Tote	0	0	0	0	0	0	0	0	0.0012
paecal Tote	0	0	0	0	0	0	0	0	0
paland Tote	0	0	0	0	0	0	0	0	0.002
picech Tota	0	0	0	0	0	0	0	0	0
pentri Total	0	0	0	0	0	0	0	0	0.0096
quearg Tote	0	0	0	0	0	0	0	0	0
ralcal Total	0	0	0	0	0	0	0	0	0.0008
rhuint Total	0	0	0	0.0776	0	0	0	0	0
rock Total	0	0	0	0	0.0036	0	0	0	0
salapi Total	0	0	0	0.2544	0	0	0	0.052	0.1388
salmel Tota	0	0	0	0	0	0	0	0	0
sammex Tc	0.002	0	0	0	0	0	0	0	0
sancra Tote	0	0	0	0	0	0	0	0	0.0036
siebel Total	0	0	0	0	0	0	0	0	0.002
solidou Tote	0	0	0	0.0028	0	0	0	0	0
sonasp Tot	0.0024	0	0	0	0	0	0	0	0.0096
toxdiv Total	0	0	0	0	0	0	0	0	0
verlas Total	0	0	0	0	0	0	0	0	0.01
vulmyu Tote	0	0	0	0	0.0008	0	0	0	0.182
water Total	0	0	0	0	0	0	0	0	0.0152
grand total	2.2852	1.3192	1.4236	2.2688	1.4456	1.3264	1.854	1.8588	1.9152

CSS

Plot #s	Grid Numbe	Compass E	Location	Comments
1	66	106		
2	144	172		
3	148	20	ne of lotus swath	
4	276	250	bottom at rhus	
5	338	100	1st finger n of dike	
6	375	164		
7	379	150	nw of fire/fire deer road	
8	387	128	nw burn ridge	
9	394	56	sw of platanus	
10	406	288	se of dike	
11	448	268	s of dendritic drainage	
12	502	128	cnr of finger and 3 intersection	
13	607	290	n edge of baccharis dom slope	
14	654	338	tween rhus	
15	679	82	in salvia dom	
16	690	232	w of oaks	
17	707	190	se of other transect	
18	707	132		
19	757	196	from rocky gulterrezia	
20	782	270	5m off road near oaks	

0.6736	0	0.2624	0.114	0.004	0.004	0.0132	0	0.026	0	0
0	0.0064	0	0	0	0	0	0	0.036	0	0
0.122	0.0768	0	0.1748	0	0.6204	0.0668	0.65	0.2408	0	0.1444
0	0	0	0.0264	0.2156	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.0404	0	0	0	0.0628	0.1392	0.0052	0.2484	0	0
0	0	0	0	0	0	0	0	0	0	0
0.0328	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.0016	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.0036	0	0	0	0
0	0	0	0.0032	0.006	0.01	0.0008	0.0016	0	0	0.006
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0.0036	0	0	0	0	0	0
0.1964	0.044	0.0012	0	0.0972	0.078	0	0	0	0.0164	0.052
0	0	0.5728	0	0	0	0	0	0	0	0
0	0	0.2172	0	0	0	0	0	0	0	0
0.0168	0	0	0	0.0028	0.0036	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.004	0	0	0.0028	0.0488	0	0	0	0.006	0.0056
0	0	0	0	0	0	0	0.0232	0	0	0
0	0	0	0.0568	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0.0092	0	0.1372	0	0.0112	0	0	0	0	0.0376
0	0	0	0	0	0	0	0	0	0	0
1.416	1.814	1.4472	2.312	1.3568	2.0776	1.3036	1.9644	1.6708	1.2652	1.8376

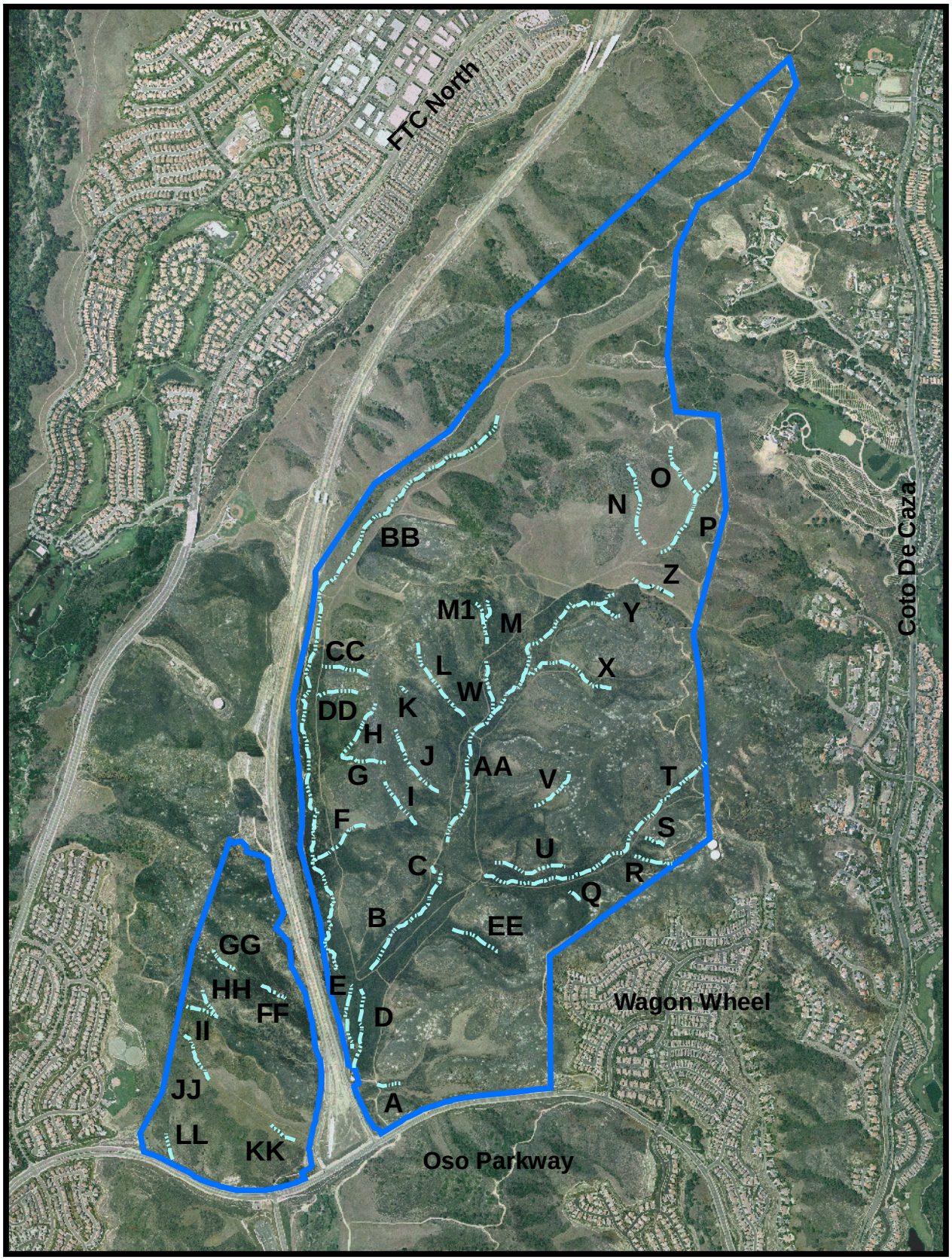
Appendix II

Description of Non-Wetland Drainages

Chiquita Canyon Conservation Area contains 38 incised channels. Thirty-one incised channels occur in the Main Canyon and the remaining seven occur in the West Canyon. Total length of all channels is approximately 11,827 meters. Average channel length is 311 meters with the longest channel being 2,371 meters and the shortest 30 meters. Average channel width is 400 cm and average channel depth is 130 cm. Channel vegetation ranges from native tree/shrub overstory, native shrub understory to segments of nonnative grasses and herbaceous species. Native overstory trees and shrubs are *Sambucus mexicana, Rhus integrifolia, Quercus agrifolia* and a few individuals of *Rhamnus californica*. Dominant native coastal sage scrub species occupying the channels understory are *Artemisia californica, Eriogonum fasciculatum, Salvia apiana, Mimulus aurantiacus,* and *Opuntia littoralis*. The nonnative grasses *Bromus diandrus, Hordeum leporinum, Lolium multiflorum, Avena* sp., and *Bromus hordeaceus* and the nonnative herbaceous species *Raphanus sativus*, *Brassica nigra,* and *Marrubium vulgare* are invasive species dominating segments of a majority of the channels. Total linear coverage by nonnative vegetation on both sides of all channels is 10,395 meters.

Landscape location, vegetative cover and morphology of the 38 incised channels varies. Three channels occurring on slopes dominated by native coastal sage scrub species are stable with no evidence of erosion, bank slumping, or sediment filling. Vegetative cover for eight of the channels occurring in valleys is entirely nonnative annual grasses and herbaceous species. The eight incised channels are beginning to fill in with sediment and some of the channels are subject to erosion and bank sloughing. Fifteen channels occurring on slopes are dominated by native coastal sage scrub species for at least half of the reach and by nonnative species as the channels enter the valley. The channels are stable for the section of the reach dominated by native species but are beginning to fill in with sediment and in some channels erosion is occurring in segments of the reach. Twelve channels, eight of which occur in valleys and four on slopes, are surrounded by nonnative grassland but do still have remnant coastal sage scrub species in parts of the reach. The channels occurring in the valleys appear to be subject to more bank cutting, erosion deep incision and head cutting. Bank slumping is also occurring in some of the larger channels.

Four incised channels seem to be negatively effected by a berm located at the Southern end of the Main Canyon. Three of the four channels are occupied solely by nonnative grasses and herbaceous species and the fourth channel has only 50 feet of the 1,450 foot reach covered by native vegetation while the remainder is covered by nonnative grasses and herbaceous species. Upstream the channels are subject to erosion, slumping and head cutting and downstream the channels are filling in with sediment.

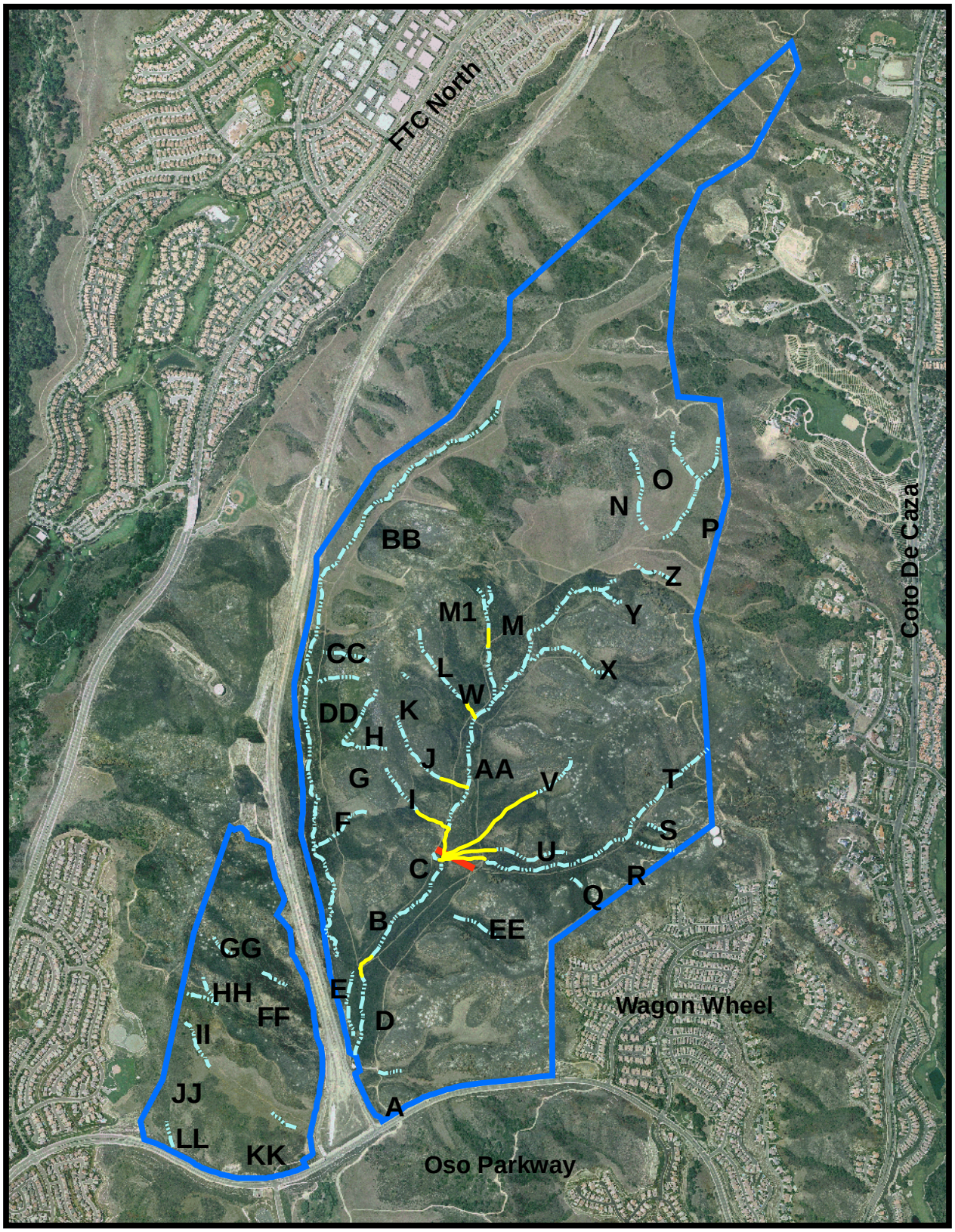


Chiquita Canyon Conservation Area
Drainages

Conservation Boundary

0 1,000 2,000 4,000 Feet

Drainages



Chiquita Canyon Conservation Area
Berm Removal

Conservation Boundary

Drainages

Berm Removal

Re-established Drainage Connections

0 1,000 2,000 4,000 Feet

Based on the analysis of existing conditions, it is possible to restore the vegetation of the non-wetland drainages in conjunction with the restoration of the surrounding annual grasslands to perennial grasslands as described in Section 3 of the comprehensive habitat restoration plan. Based on Smith and Klimas (2004), the general design criteria for riparian ecosystem restoration for the non-wetland drainages within the Upper Chiquita Canyon Conservation Area, restoration of the drainages and surrounding annual grassland areas would follow the "Natural Template" restoration model. This restoration model would result in an increase in habitat integrity indices for the Upper Chiquita Canyon local drainage area.

The following table documents the specific areas of restoration potential within the drainages. See Section 3 of the plan for specifications for planting and seeding within the non-wetland drainages and for seeding for restoration of the surrounding annual grasslands.

UPPER CHIQUITA CONSERVATION AREA NON-WETLAND DRAINAGE RESTORATION POTENTIAL

MAIN CANYON DRAINAGES

DRAINAGE	LINEAR METERS	LINEAR M EXOTICS *	LINEAR M CSS *	LINEAR M RIPARIAN *
A	215	430	0	0
B	440	850	0	30
C	30	60	0	0
D	320	640	0	0
E	195	390	0	0
F	351	504	30	168
G	87	0	60	114
H	180	16	172	172
I	170	162	130	48
J	415	170	460	200
K	82	74	50	40
L	390	400	300	80
M	200	400	0	0
N	380	90	440	230
O	182	0	214	150
P	613	371	680	175
Q	116	74	108	50
R	150	120	60	120
S	67	24	30	80
T	959	1,176	442	300
U	272	242	302	0
V	246	184	308	0
W	205	230	120	60
X	321	112	450	80
Y	74	108	40	0
Z	115	110	80	40
AA	1,283	818	1,460	288

BB	2,371	2,258	2,100	384
CC	147	102	152	40
DD	119	58	100	80
EE	120	240	0	0
TOTAL M	10,815	10,413	8,288	2,929
* Includes both sides of drainage				

WEST CANYON DRAINAGES

DRAINAGE	LINEAR METERS	LINEAR M EXOTICS *	LINEAR M CSS *	LINEAR M RIPARIAN *
FF	155	310	0	0
GG	170	50	210	80
HH	70	0	140	0
II	124	28	160	60
JJ	250	250	180	70
KK	153	146	160	0
LL	90	0	140	40
TOTAL M	1,012	784	990	250
* Includes both sides of drainage				

TOTALS FOR MAIN AND WEST CANYON

CANYON	LINEAR METERS	LINEAR M EXOTICS	LINEAR M CSS	LINEAR M RIPARIAN
MAIN CYN	10,815	10,413	8,288	2,929
WEST CYN	1,012	784	990	250
TOTAL M	11,827	11,197	9,278	3,179

TOTAL RESTORATION POTENTIAL

	LINEAR M EXOTICS	LINEAR M CSS	TOTAL M
MAIN CYN	10,413	8,288	18,701
WEST CYN	784	990	1,774
		GRAND TOTAL	**20,475**

Functions and Values Analysis

Hydrogeomorphic Method (HGM) was utilized at Upper Chiquita Canyon Conservation Area to assess riparian functions of the non-wetland drainages. The HGM is a scientific method based rapid assessment tool for evaluating water/wetland functions (Lee *et al* 1997). Emphasis is placed on the hydrologic and geomorphic functions prevalent to the water/wetland being assessed (Lee *et al* 1997).

The major components of the HGM consist of classification of the water/wetland and its comparison to a reference site (Lee *et al* 1997). Classification and the use of a reference site is necessary because not all water/wetlands are the same and certain functions may not be present in all types of fully functioning water/wetlands. Scoring of the HGM variables for the water/wetland is accomplished by comparing the water/wetland to an intensively studied reference site that is in the same subclass and in the same geographic region (Lee *et al* 1997). Reference sites define the relevant functions for the class and the range of functioning for each function in the water/wetland class (Lee *et al* 1997). Upper Chiquita Canyon drainages are in the riparian class and the 1st and 2nd stream order subclass. The reference site is the Santa Margarita Watershed.

The assessment of the 38 channels within the Upper Chiquita Canyon Conservation Easement began with determing the floodprone area which would constitute the assessment area. Since the channels are intermittent and no clear bankfull characteristics were present in the channels, such as shelving, soil characteristic changes or destruction of terrestrial vegetation, the assessor used their best professional judgment to determine the floodprone and subsequently the assessment area. Several HGM defined variables of the channel were then observed and scored according to data interpreted from the reference site. Scores for all variables are 0.0, 0.1, 0.25, 0.5, 0.75, or 1.0 with 0.0 being function non-existent and not recoverable under current conditions and 1.0 being function fully functioning under current conditions. A summary of variables is provided below.

Alterations of Hydroregime

Alterations of the hydroregime affecting the assessment area are observed. Alterations can occur through cultural processes such as damming or diverting water flow for water harvesting or for farming purposes etc. The alteration of the hyrdroregime can cause changes to the channel in the discharge, bedload, morphology of the channel etc.

Floodprone Area

The floodprone area is defined as a horizontal plane projected at a level that is twice the bankfull thalweg depth of the stream. The variable scores the extent of the area that has been modified by cultural processes such as concrete bottom, culvert, entrenchment etc.

Sediment Delivery to Water/Wetland

Sediment delivery to the water/wetland is observed to see if it is increased due to culturally accelerated processes such as citrus orchards, grazing, road crossings etc. An increase in sediment delivery can result in aggradation of the channel and floodprone area.

Trees

Trees are defined as having a dbh $\geq$ 5" and $\geq$ 20' in height. Trees, when located in the bankfull channel, can provide bank stabilization, are a source of woody debris for the channel, and can reduce the hydrologic energy of the stream during high flows.

Saplings

Saplings are defined as single stem woody species < 5" dbh and ≥ 3' in height. Saplings located in the bankfull channel can provide bank stabilization, are a source of woody debris for the channel, and can reduce the hydrologic energy of the stream during high flows.

Shrubs

Shrubs are defined as multiple stem woody species. Shrubs can dissipate hydrologic energy by providing surface roughness in the stream and provide storage for surface water.

Macro/Micro Topographic Complexity

Topographic complexity is defined as the micro and macrotopographic relief of the assessment area. Macrotopographic relief is generally large-scale features that include secondary channels, in channel ponds etc. Microtopographic relief is generally small-scale features that include such features as pit and mound and hummock and hollow patterns. Topographic relief features dissipate hydrologic energy by providing surface roughness in the stream and provide storage for surface water.

Soil Pore Space

Soil pore space is defined as the space between the soil particles and is the space in soil that is available for subsurface water storage. Ability of the soil to hold subsurface water is related to the texture of the soil and permeability. The variable considers the ease at which subsurface water can access the subsurface storage space.

Subsurface flow into the Water/Wetland

Subsurface flow into the water/wetland is defined as flow into the water/wetland by means of interflow and return flow. The variable considers flow into the water/wetland that can be stored in the system.

Litter

Litter is defined as leaf litter and other detrital matter in the assessment area. Litter and detrital layers provide short-term sources of nutrients and organic carbon. Annual grasses are considered as litter since they will provide organic carbon and nutrients at some point in the year.

Soil Organic Matter

Soil organic matter is observed in the A horizon layer in the assessment area of the channel. Organic matter provides the channel with a source of nutrients and organic carbon for a short term.

Fine Woody Debris

Fine woody debris is defined as woody material that is dead and down in the assessment area. An accumulation of fine woody debris in the channel provides storage for surface water and can also dissipate hydrologic energy.

Ratio of Native to Non-Native Vegetation

The ratio of native to non-native vegetation for each stratum is observed within the stream channel. A healthy plant community will have a high percentage of natives over non-natives while a system that has been disturbed will have a higher percentage of non-native invasive plants.

Contiguous Vegetation Cover

The vegetation extending from upstream and downstream in the channel to the uplands is observed and scored. A contiguous cover of native vegetation will provide connectivity throughout the riverine system both horizontally and vertically.

APPENDIX III

SOIL PROFILES

The following descriptions summarize the information from soil pits within each of the major soil types in the Upper Chiquita Conservation Area. Field sheets and photographs of the soil pits follow the summary of specific soil types.

Kellie/
Riedel-Larche
12/2/03

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 1

Soil Series Bakella [illegible] 131 Phase ______

Location [illegible] Chambers Co.

Geographical Landscape Valley floor [illegible]

Elevation ______ Slope 2% Aspect SW / Flat Erosion ______

Groundwater ______ Drainage [illegible] Saline/Sodic Class ______

Parent Rock/Material [illegible]

Climate: [illegible] MAP ____ MAT ____ MAST ____ MSST ____ MWST ____

Natural Cover [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0		duff, leaves, seeds		X				[illegible]
	0-3"	10YR 4/2 Dry; 10YR 3/2 moist	Sandy loam	Platy (compacted)	↓				common fine [illegible] roots; common fine [illegible] pores; [illegible] small [illegible] (to 2%) slightly [illegible]
	wavy 3-11"	10YR 5/2 - D; 10YR 4/2 M	Sandy loam	platy, subang.	↓				common fine [illegible] roots; common fine [illegible] pores, roots along ped faces; [illegible]
	abrupt 11-25 smooth	10YR 4/2 D; 10YR 4/1 M	loamy sand	Slightly platy (to massive)	↓				[illegible] of plow pan; com fine roots; com. fine pores
	25-31 gradual	10YR 4/3 - D; 10YR 4/2 - M	loamy coarse sand with thin silt lenses	massive	↓				[illegible] charcoal flecks; [illegible]
	31-37 abrupt	10YR 4/2 - D; 10YR 4/2 - M	Clayey coarse sand	granular		X			[illegible] gravel; com. fine roots; few fine roots
	37-40 grad	10YR 4/3 - M	Sand	granular		X			

Natural Land Division ______

Soil Rating (Storie Index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow / [illegible]

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks [illegible] disturbed [illegible] plow plan / [illegible]

Kelley
Riddell-Laine
12-12-03

2

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. B+2

Soil Series (3) Batello loam 2-9% slopes ______ Phase ______

Location [illegible] Ch. [illegible] Soil Map [illegible] Near Pit 2 near Toll Road 241

Geographical Landscape Valley floor, stream terrace (distal edge of fan)

Elevation ______ Slope 4-5% ______ Aspect SW ______ Erosion ______

Groundwater ______ Drainage [illegible] drainage Saline/Sodic Class ______

Parent Rock/Material Dep. Sands/Silts few gravels

Climate: Med. ______ MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUC-TURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REAC-TION	MISC: Roots, Pores, Clay films, Etc.
	2-0		duff - leaves, stems, seeds		X				[illegible]
	0-8" abrupt	10YR 4/4 - D 10YR 3/1 - W	Sandy loam (slightly [illegible])	platy	X				Com fine to coarse roots Com fine to coarse pores
	8-22 gradual	10YR 4/2 - D 10YR 3/2 - W	Sandy clay loam (loamy sand)	blocky [illegible]		Slightly [illegible]			Com fine roots Com fine pores [illegible] gravel
	22-36" wavy	10YR 4/2 - D 10YR 4/2 - W	Silty sand ([illegible])	Massive		X			Stones [illegible] Com [illegible] roots
	36-45" gradual	10YR 3/1 - W	Sandy clay	Massive		X			Com [illegible] gravels Few fine roots
	45-60"	10YR 1/2 - W	Sandy clay	Massive		X			[illegible] fine roots [illegible] gravels

Natural Land Division ______

Soil Rating (Storie index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use Fallow

Suitability: Irrigated Crops ______ Range ______

Non-irrigated Crops ______ Timber ______

Soil Management ______

Remarks Grazed or past cultivated

Soil Pit 1 Botella Loam, 2 to 9% Slopes

Soil Pit 2 Botella Loam, 2 to 9% Slopes

Kirry(?) Riedelbehrs(?)
12/2/03

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

17

No. R13(?)

Soil Series: Bobils(?) loam / [illegible] 131 142 30-45% slopes — Phase:

Location: 11S0443423 3717298 Chigata(?) [illegible] Main [illegible] East of 241 Toll Road

Geographical Landscape: Hillslope [illegible]

Elevation: — Slope: 20-35% — Aspect: SE — Erosion:

Groundwater: — Drainage: [illegible] — Saline/Sodic Class:

Parent Rock/Material: Sandstone

Climate: [illegible] — MAP — MAT — MAST — MSST — MWST

Natural Cover: [illegible] — Soil Region — Profile Group

Higher Categories: [illegible]

Competing Soil Series:

Associated Soil Series:

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	Moist	Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	0-6 abrupt	10YR 4/3-D 10YR 2/3-W	Fine sandy loam	platy [illegible]	X				common fine [illegible] roots [illegible]
	6-12 abrupt wavy	10YR 3/3-D 10YR 3/3-W	Sandy loam	blocky [illegible]	X				[illegible] gravels [illegible] roots [illegible] flecks
[illegible]	12-17 (C) abrupt [illegible]	10YR 7/3-D 10YR 4/4 W	Loam(?)	[illegible]	X				decomposing sandstone; common fine roots; [illegible] roots; many roots along fractures
	17-22 abrupt	White [illegible]	Coarse		X				[illegible]
	22 to depth		Coarse		X				Sandstone [illegible] layers [illegible]

Natural Land Division

Soil Rating (Storie index) — Soil Grade

Land Use Capability Unit

Present Use: Fallow(?)

Suitability, Irrigated Crops — Range

Nonirrigated Crops — Timber

Soil Management

Remarks: [illegible] burned

Valley [illegible] 12/2/03

3

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. [illegible]

Soil Series 131 Botella loam 2-9% slopes Phase

Location [illegible] Chiquita Cyn. San [illegible] Cyn. [illegible] 241 toll road

Geographical Landscape Valley floor or low terrace

Elevation ______ Slope 2% Aspect SSW Erosion ______

Groundwater ______ Drainage [illegible] Drained Saline/Sodic Class ______

Parent Rock/Material Dep. Sands/Silts

Climate: Medit. MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC. Roots, Pores, Clay films, Etc.
	1-0		duff - leaves, stems, seeds						Burned forest
	0-8 [illegible]	10YR 4/2-D 10YR 3/2-W	Sandy loam	platy (compacted)	X				com fine to coarse roots; com cobbles (to 4"); com fine pores
	8-14 abrupt wavy	10YR 4/2-D 10YR 3/2-W	loamy sand	slightly blky (subang.)	X				occ charcoal flecks; com. gravels & cobbles; com fine to coarse roots; frequent crotovina
	14-20 [illegible] smooth	10YR [illegible]-D 10YR 4/2-W	Sandy (strat. silts)	grainy (stratified)		slightly			strat silts & sands; com. gravels; occ gravels & cobbles; com fine roots
	20-38 [illegible]	10YR 3/2-W	Clay	Massive		X			Com fine roots
	38-53"	10YR 3/2-W	loamy sand	grainy		X			Com fine roots

Natural Land Division ______

Soil Rating (Storie Index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow / plowed in past

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks Poss. ditch / plow pan / hard pan

Kelly
Rodriguez
12/2/07

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 5

Soil Series 142 Genola Sandy Loam 30-75% Phase ____

Location [illegible] Arquilla Co. [illegible]

Geographical Landscape toe slope 40' South of small drainage pass slip

Elevation ____ Slope 30-35% Aspect NE Erosion ____

Groundwater ____ Drainage 40' South of Small drainage Saline/Sodic Class ____

Parent Rock/Material poss Clay body formed from [illegible] Mat. Vertisol poss

Climate: Moist ____ MAP ____ MAT ____ MAST ____ MSST ____ MWST ____

Natural Cover Lots of [illegible] [illegible] Soil Region ____ Profile Group ____

Higher Categories ____

Competing Soil Series ____

Associated Soil Series ____

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0		duff [illegible]						Burned open
	0-15 abrupt smooth	10YR 3/1 wet	Clay or Clay loam	platy	Dry	moist			occ. [illegible] gravels 6" com [illegible] esp on ped [illegible] few charcoal com [illegible]
	15-45 gradual	10YR 3/1 wet	clay	blky angular		slightly			occ charcoal few cracks [illegible] com fine to coarse roots disseminated carbonate
	45-60	10YR 3/2 wet	clay	blky angular	X				occ. cobbles (to 6") occ. cobbles (to 6") com. fine [illegible] ped faces com fine [illegible] peds Stringers of carbonate throughout

Natural Land Division ____

Soil Rating (Stone index) ____ Soil Grade ____

Land Use Capability Unit ____

Present Use Cattle grazing

Suitability: Irrigated Crops ____ Range ____

Nonirrigated Crops ____ Timber ____

Soil Management ____

Remarks Poss dist. [illegible] / dry faces / [illegible] / poss. vertisol w/ deep [illegible]

Soil Pit 3 Interface Between Cieneba Sandy Loam 30 to 75% Slopes and Botella Loam 2 to 9% Slopes

Soil Pit 5 Cieneba Sandy Loam 30 to 75% Slopes

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. [illegible]

Soil Series 131 Botella loam 2 to 9% slopes Phase

Location [illegible]

Geographical Landscape [illegible]

Elevation Slope 2% Aspect [illegible] Erosion

Groundwater Drainage [illegible] Saline/Sodic Class

Parent Rock/Material [illegible]

Climate: [illegible] MAP MAT MAST MSST MWST

Natural Cover [illegible] Soil Region Profile Group

Higher Categories

Competing Soil Series

Associated Soil Series

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0		[illegible]						[illegible]
	0-3 gradual	10YR 4/2 D 10YR 3/2 W	sand	granular (not compacted)	X				com. fine [illegible]
	3-12 gradual	10YR 4/2 D 10YR 3/2 W	sand	granular (slightly [illegible])	X				com. fine [illegible] roots; com. sm gravels [illegible]
	12-30 abrupt	10YR 4/2 D 10YR 3/2 W	silt sand, some very coarse sand	granular	X				com. sm gravels [illegible]; com. [illegible] roots
	30-41 gradual	OM 10YR 2/1 W; clay 10YR 2/1 W	clay stratified w/ silt & decomp OM	[illegible]		X			com. fine [illegible] roots; com. fine pores
	41-60	10YR 3/2 W	fine to coarse sands (strat) [illegible]	granular		X			[illegible] fine [illegible] roots; few [illegible]; few sm gravels

Natural Land Division

Soil Rating (Storie index)

Land Use Capability Unit Soil Grade

Present Use fallow / [illegible]

Suitability: Irrigated Crops Range

Nonirrigated Crops Timber

Soil Management

Remarks [illegible] sands deposited [illegible]

Soil Pit 4 Botella Loam 2 to 9% Slopes

Soil Pit 6 Botella Loam 2 to 9% Slopes

Kelley / Riedel-Lewis
12/2/03

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. R17

Soil Series 135 Cuyamaca Sandy loam 2 to 9% slopes Phase

Location 1150443654 / 3718359 Chiquito Cyn Mid canyon old test plots

Geographical Landscape gentle slope alluvial fan

Elevation ______ Slope 3-5% Aspect S Erosion ______

Groundwater ______ Drainage [illegible] Saline/Sodic Class ______

Parent Rock/Material hillslope colluvium

Climate: Mediterranean MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover Annual / Ruderal / [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	Moist	Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	4-0		duff leaves stems		X				Burnover
	0-3	10YR 4/2-D 10YR 3/1-W	Sandy loam (compacted)	platy (compacted)	X				Com fine to co. roots
	3-9	10YR 4/2-D 10YR 3/1-W	Sandy ~~loam~~	sub angular blocky		slight			com fine roots
	9-50	10YR 3/2 D 10YR 2/2-W	Sandy clay	ang blocky		slight			com fine roots [illegible]

Natural Land Division ______

Soil Rating (Storie Index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow / previously farmed

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks [illegible] cobbles throughout. [illegible] hard pan disseminated calcium carbonate [illegible] throughout (mostly [illegible] carbonate)

D. Kelly
M. Riedel-Lehrke
12/3/03

pcs 17-19
75 pcs

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. 1218

Soil Series: Edge of 131 / 135 Capistrano Sandy loam 2 to 9% / Botella loam 2/9% Phase

Location: [illegible] Soapsite Cyn Main [illegible] south of [illegible]

Geographical Landscape: Valley floor Stream terrace (high?)

Elevation ______ Slope 2% Aspect W Erosion ______

Groundwater ______ Drainage [illegible] Saline/Sodic Class ______

Parent Rock/Material: Mixed fine to coarse sediments few gravels

Climate: Arid MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover: [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0		[illegible]		X				
	0-5 wavy abrupt	10YR 4/1 D / 10YR 4/2 W	Silty clay loam	Fine / Compact	X				Burned A [illegible] com fine [illegible] roots, com fine to [illegible] pores
	5-12 gradual	10YR 5/2 D / 10YR 3/1 W	Sandy loam	weak platy weak compact		X			com fine to coarse roots, [illegible] com fine to [illegible] pores
	12-25 gradual	10YR 4/2 W	Sandy clay loam	weak blocky subang		X			com fine [illegible] roots, com fine to [illegible] pores, [illegible] gravels
	25-46 gradual	10YR 4/2 W	Sandy clay loam	Massive		X			[illegible] com fine roots
	46-62	10YR 4/2 W	loamy clay	Massive		X		- -	slight [illegible] few fine pores, few fine roots, [illegible] few fine pores

Natural Land Division ______

Soil Rating (Storie index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use: Fallow [illegible] stock [illegible]

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks: [illegible] [illegible] VGY [illegible] increasing clay [illegible] w/ depth from 2nd horizon

D Kelly
K-Riedel-Lehrke
12/3/07

p20 p21
2 bulk
pics

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 9

Soil Series 135 Capistrano Sandy loam 2 to 9% Phase

Location 11SMS 3784 / 3746 ... Chiquito Cyn [illegible] old ex plots most Northern

Geographical Landscape hillslope alluvial fan

Elevation ______ Slope 5-10% Aspect SE Erosion ______

Groundwater ______ Drainage well drained Saline/Sodic Class ______

Parent Rock/Material hillslope colluvium

Climate: ______ MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover [illegible] / Mustard / [illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	2-0		duff leaves sticks		X				Duff layer
	0-7 clear wavy	10YR 3/2-D 10YR 2/1-W	Clay loam	platy (compacted)	X				com fine to coarse roots; com mycor fungi hyphae; com fine to coarse pores
	7-30 grad	10YR 3/2-D 10YR 2/2-W	loamy clay	Strong blky subang	X				deep cracks to 45"; com fine roots exp ped faces; few dis. carbonate flecks; com coarse roots; com fine to coarse pores
	30-50 grad	10YR [illegible]-D 10YR 3/2-W	loamy clay	wk blocky subang	X				com fine to coarse roots exp ped faces
	50-60	10YR 5/3-D 10YR 4/3-W	clayey coarse sand	massive	X				few dis. carbonate flecks throughout; com fine to coarse pores; few roots; few pores; com cobbles (to 4")

Natural Land Division ______

Soil Rating (Stone index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallowed previous dryland farm

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks dist. claypan / hardpan. Sm stones + gravel throughout [illegible] (to 2") possible vertisol

Soil Pit 7 Capistrano Sandy Loam 2 to 9% Slopes

Soil Pit 9 Capistrano Sandy Loam 2 to 9% Slopes

Kelly
Rindofi... note
12/3/03

22-23
2pics
2P-Seedling
24/25

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. * P.1 10

Soil Series: 125 Capistrano Sandy loam 2-9% Phase ______

Location: 115 044 36 29 / 37 18 39 1 Chiquita Cyn Marcyn old test plots middle one

Geographical Landscape: Gentle hillslope alluvial fan

Elevation ______ Slope 5-10% Aspect SE Erosion ______

Groundwater ______ Drainage 125' Ebf drainage Saline/Sodic Class ______

Parent Rock/Material: hillslope colluvium

Climate: Medit MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover: must/ forage forest / step Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	Moist	Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	½-0		duff leaves, stems, seeds		X				burned area
	0-4 clear wavy	10YR 3/2-D 10YR 2/2-W	Sandy clay loam	plat / compacted	X				Myc ? many fine to coarse roots; Com fine gravel (to 1"); Com fine to coarse pores
	4-16 gradual	10YR 3/2-D 10YR 2/2-W	Sandy clay loam	blocky subang.		v. f / Sandy			Com gravels (to 2"); Com fine to coarse roots; com large cracks; com fine pores
	16-38 grad.	10YR 4/2-D 10YR 3/2-W	Sandy clay loam	blky subang		X			Com gravels (to 2"); Com fine to coarse roots esp on ped faces; Com fine pores; Com diss. carbonate flecks
	38-54 grad	10YR 5/3-D 10YR 3/3-W	Coarse sandy clay	Massive		X			Com gravels or cobble (to 2"); few fine to coarse roots; few fine to coarse pores; few finely diss. carbonate flecks
	54-?	10YR 5/4-D 10YR 4/4-W	Clayey sand	grainy	X				few roots; Com. large cobbles (to 6"); Com gravels; few pores

Natural Land Division ______

Soil Rating (Stone index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use: fallow / dryland farming past

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks: duff plowpan / hardpan. Clay crack increasing w/ depth from 2nd horizon

D. Lilley
M. Riedelbehrke
12/3/03

5 25-29 4pcs

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. P411

Soil Series 131 Botella loam 2 to 9% Phase

Location 115 Sound 324 / 3919665 Chiquito Cyn main cyn 2nd to Lost Valley in northwest end

Geographical Landscape Narrow valley floor

Elevation Slope 4% Aspect SW Erosion

Groundwater Drainage Saline/Sodic Class

Parent Rock/Material alluvial fill / alluvial fan materials

Climate: Medit. MAP MAT MAST MSST MWST

Natural Cover Annual grass / ... Soil Region Profile Group

Higher Categories

Competing Soil Series

Associated Soil Series

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0		duff - leaves stems seeds						
	0-10 abrupt wavy	10YR 4/2-D 10YR 3/2-W	sandy clay loam	weak platy weakly compacted	X				com fine to coarse roots com fine to coarse pores
	10-48 clear wavy	10YR 3/2-D 10YR 2/2-W	sandy clay loam	weak subang blocky structure		slightly			com fine to coarse roots/pores com coarse gravels scatt. throughout roots on ped faces + in peds
	48-60	10YR 4/3-D 10YR 3/2-W	loamy sand	granular		slightly			com fine discontinuous stringers com fine to coarse roots/pores

Natural Land Division

Soil Rating (Stone index) Soil Grade

Land Use Capability Unit

Present Use fallow past dryland farming

Suitability Irrigated Crops Range

Nonirrigated Crops Timber

Soil Management

Remarks dist plowpan / hardpan Small rounded gravels throughout
[illegible]

Soil Pit 11 Botella Loam 2 to 9%

Soil Pit 8 Interface Between Botella Loam 2 to 9% Slopes and Capistrano Sandy Loam 2 to 9%

30-32
3p:5

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

Valley
Riedel-Gharle

No. R112

Soil Series 132 Bottle Clay loam 2 to 9% Phase

12/4/03

Location 1150445336 / 3918362 Craig Cyn Main Cyn West Valley Across from drive crossing

Geographical Landscape alluvial fan

Elevation ______ Slope 5% Aspect W Erosion ______

Groundwater ______ Drainage 150' E of 1a/ox Saline/Sodic Class ______

Parent Rock/Material hillslope colluvium / alluvial fan materials (gravel)

Climate: ______ MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover Range / mustard / Rept thistle / bermuda grass Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1-0	- - -	O.M. leaves stems seeds		X				
	0-7 abrupt wavy	10YR 7/2-D 10YR 2/2-W	Clay loam	platy (compacted)	X				Com fine to coarse roots/pores, com gravels (to 2"), many roots on ped faces, fungal hyphae?
	7-17 clear	10YR 5/1-D 10YR 2/1-W	Sandy clay	blky ang		X			Com fine to coarse roots/pores, to (1½") many roots on ped faces, coarse roots along ped faces
	17-33 grad	10YR 3/2-W	Sandy clay	weak blky subang		X			com sm gravels, com sm carbonate flecks
	33-63	10YR 3/2-W	Coarse Sandy clay	massive		X			Com fine to coarse roots/pores, com sm gravels; few c/w roots, com sm gravels, com fine pores

Natural Land Division ______

Soil Rating (Storie index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow / prev dry farm ag

Suitability Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks dist plow pan / hoof pan. Carbonate flecks. fizzy dis throughout except for 0-7"

Soil Pit 12 Botella Clay Loam 2 to 9%

D. Kelly & M. Nickel 12/13/05

33 + 34
2pits

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit-13

Soil Series 142 Cieneba Sandy loam 30-75% Phase

Location 11S 0444264 3719928 Chiquito Cyn. Myra Cyn. bumpy, oak + pine

Geographical Landscape top of small hill (knoll)

Elevation ____ Slope 0-2% Aspect SE Erosion ____

Groundwater ____ Drainage ____ Saline/Sodic Class ____

Parent Rock/Material Sandstone weathered rock regolith

Climate: Medit MAP ____ MAT ____ MAST ____ MSST ____ MWST ____

Natural Cover Quercus / Salvia / Artemisia / Erigeron Soil Region ____ Profile Group ____

Higher Categories ____

Competing Soil Series ____

Associated Soil Series ____

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1/2-0		Duff, leaves, needles, sticks		X				
	0-2 abrupt wavy	10YR5/2-D 10YR3/2-W	loamy sand	platy compacted	X				com fine to coarse roots; com gravels & cobbles; com fine to coarse pores
	2-7 abrupt	10YR3/2-D 10YR3/1-W	loamy sand	blky angular		Slight			com fine roots in ped faces; com gravels & cobbles; com fine to coarse pores
	7 IS		clayey sand	vertical fracture zones					highly weathered regolith (C horizon); clayey w/ depth of soil profile; vertical fracture zone w/ organic infill; roots along ped faces; com gravels & cobbles
	grad	10YR4/4W				Slight			
	15-30+ grad	10YR/4/4-W	coarse sandstone	some vertical fracture zones		Slight			partially weath. sandstone; cracks fractured (vert.-oriented); com gravels & cobbles

Natural Land Division ____

Soil Rating (Storie index) ____ Soil Grade ____

Land Use Capability Unit ____

Present Use fallowed prev. dryland ag

Suitability: Irrigated Crops ____ Range ____

Nonirrigated Crops ____ Timber ____

Soil Management ____

Remarks residual soil; app. lag surface of large cobbles (to 12-14") Stable position 5-30" to regolith (sandstone) with rock fractures visible in regolith (shrd. w/ rms) dist. pl. w/ per / hard pan

Kelley Biel Lenke 12/3/03

57-58
2 pcs

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 14

Soil Series 142 Cienaba Sandy Loam 30-75% phase

Location 1504446432 / 371313 Chiquita Cyn on a ridge East of test plots on a degraded [illegible]

Geographical Landscape Ridgetop, [illegible]

Elevation ______ Slope 22 Aspect SW Erosion ______

Groundwater ______ Drainage ______ Saline/Sodic Class ______

Parent Rock/Material Sandstone

Climate: ______ MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover Chaparral/moist forest/[illegible] Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	1/2-0		Duff, leaves, grass, seed						
	0-2 clear	10YR4/2-D 10YR3/2-W	loam sandy	platy weak cmp.	X			—	common fine to coarse roots; common fine to coarse pores
	2-10 grad	10YR5/2-D 10YR4/3-W	loamy sand	blocky angular	X				common large burrows (krotovina); common fine to coarse roots/pores (krotovina juxtaposure regolith (C horizon))
	10-14 grad	10YR 6/3-D 10YR 5/3-W	coarse sandstone NA	regolith NA	X				weathering sandstone regolith; sandstone regolith w/OM in fracture zones; common roots w/in fracture zones; few pores; carb acc on fracture faces
	14-50	10YR6/2-D 10YR4/2-W	coarse sandstone NA	regolith NA	X				weathered sandstone; carb acc on fract faces; acc gravel or stone lines; roots along fract faces

Natural Land Division ______

Soil Rating (Storie index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow/dry land farm

Suitability: Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks thin soil over sandstone regolith, few cobbles and gravels

Soil Pit 13 Cieneba Sandy Loam 30 to 75% Slopes

Soil Pit 14 Cieneba Sandy Loam 30 to 75% Slopes

D. Lillet
M. Tredelleholn
12/3/03

35-3 6
2 pics

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 15

Soil Series 135 Capistrano Sandy Loam 2-9% Phase

Location 115041/4R2-34193 Chiquita Cyn main Cyn North of Pit 13 by culvert planting and test plots

Geographical Landscape Alluvial fan

Elevation ______ Slope 4% Aspect S Erosion ______

Groundwater ______ Drainage ______ Saline/Sodic Class ______

Parent Rock/Material Colluvial / Alluvial materials

Climate: ______ MAP ______ MAT ______ MAST ______ MSST ______ MWST ______

Natural Cover Annuals/mustard/Everlast/Rapist Soil Region ______ Profile Group ______

Higher Categories ______

Competing Soil Series ______

Associated Soil Series ______

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC. Roots, Pores, Clay films, Etc.
	2-0		dead leaves, seeds, stems		X				
	0-3 abrupt	10YR4/2-D 10YR2/2-W	Sandy loam	platy comp	X				com fine to coarse roots pores
	3-12 clear wavy	10YR3/2-D 10YR2/2-W	Sandy clay loam	weak platy slightly comp.		slight			occ sm gravels, occ cobbles (to 2") com fine roots esp ped faces occ sm gravels + cobbles com fine to coarse pores
	12-21 grad	10YR3/2-W	Sandy clay	weak blky subang		X			occ charcoal com coarse to fine pores roots along ped faces com fine roots
	21-35 grad	10YR4/3-W	Sandy clay	weak blky subang		X			com gravels + cobbles few fine roots com fine to coarse pores
	35-60	10YR4/3-W	clayey sand	Massive		X			com cobbles + sm gravels few fine roots com fine to coarse pores

Natural Land Division ______

Soil Rating (Stone Index) ______ Soil Grade ______

Land Use Capability Unit ______

Present Use fallow / prev. dry land farm

Suitability Irrigated Crops ______ Range ______

Nonirrigated Crops ______ Timber ______

Soil Management ______

Remarks dust plow pan / hard pan Vehicular access here

Soil Pit 10 Capistrano Sandy Loam 2 to 9% Slopes

Soil Pit 15 Capistrano Sandy Loam 2 to 9% Slopes

Kelley Riedel - Ichirke

12

39-40 pics

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. Pit 16

12/3/07 Soil Series 135 Capistrano Sandy loam 2-9% Phase

Location 11SMH1105 3718494 Chiquita Cyn Main cyn new test pits East

Geographical Landscape Interfan junction

Elevation ____ Slope 2% Aspect SE Erosion ____

Groundwater ____ Drainage ____ Saline/Sodic Class ____

Parent Rock/Material Colluvial / alluvial materials

Climate: Mediterranean MAP ____ MAT ____ MAST ____ MSST ____ MWST ____

Natural Cover Range/woodland/mixed .... Soil Region ____ Profile Group ____

Higher Categories ____

Competing Soil Series ____

Associated Soil Series ____

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	LD		Duff		X				
	0-6 clear wavy	10YR 4/2-D 10YR 2/2 W	Sandy Clay loam	weak platy/ slight comp	X				few fine to coarse roots; occ sm gravels; com fine to coarse pores
	6-13 gscl	10YR 3/2 D 10YR 2/2 W	Sandy clay	weak blky subang		slight			com fine to coarse roots; roots along ped faces & in peds; com fine to coarse pores
	13-35 gscl	10YR 2/2 W	Sandy clay	weak blky subang		X			com fine to coarse roots; com fine to coarse pores; occ sm gravels; finely dis carbonate flecks; vert cracks throughout
	35-51 gscl	10YR 3/2 W	Sandy clay	massive		X			finely dis carbonates; few fine to coarse pores; com coarse roots; esp ped faces
	51-65	10YR 3/3 W	Sandy clay	massive		X			com gravels; sm cobbles (to 3"); few roots along ped faces; few fine to coarse pores

Natural Land Division ____

Soil Rating (Storie index) ____ Soil Grade ____

Land Use Capability Unit ____

Present Use fallow / dry land ag

Suitability: Irrigated Crops ____ Range ____

Nonirrigated Crops ____ Timber ____

Soil Management ____

Remarks dist plow pan / hoof pan

Kelley Jed 12/3/03

FIELD SHEET FOR RECORDING SOIL CHARACTERISTICS

No. 17

Soil Series [illegible] Sandy loam 9-15 Phase

Location [illegible] Counties

Geographical Landscape [illegible]

Elevation ____ Slope 15-30% Aspect SE Erosion

Groundwater ____ Drainage ____ Saline/Sodic Class

Parent Rock/Material [illegible]

Climate: [illegible] MAP ____ MAT ____ MAST ____ MSST ____ MWST ____

Natural Cover [illegible] Soil Region ____ Profile Group

Higher Categories

Competing Soil Series

Associated Soil Series

PROFILE SKETCH	BDY	COLOR	TEXTURE	STRUCTURE	CONSISTENCE Dry	CONSISTENCE Moist	CONSISTENCE Wet	REACTION	MISC: Roots, Pores, Clay films, Etc.
	0-0		Duff						
	0-7 clear	10YR 3/2 dry 10YR 3/2 moist	Sandy clay loam	weak platy	X				[illegible]
	7-34 gradual	10YR 3/2 dry 10YR 3/2 moist	Sandy clay loam	weak medium [illegible]		X slightly			[illegible]
	34-48 gradual	10YR 3/3 moist	Sandy clay	weak medium [illegible]		X			[illegible]
	48-68	10YR 3/4 moist	Sandy clay	[illegible]		X			[illegible]

Natural Land Division

Soil Rating (Storie Index) Soil Grade

Land Use Capability Unit

Present Use fallow / Dry land

Suitability: Irrigated Crops Range

Nonirrigated Crops Timber

Soil Management

Remarks Working completed [illegible]

Soil Pit 16 Capistrano Sandy Loam 2 to 9% Slopes

Soil Pit 17 Capistrano Sandy Loam 9 to 15%

APPENDIX IV

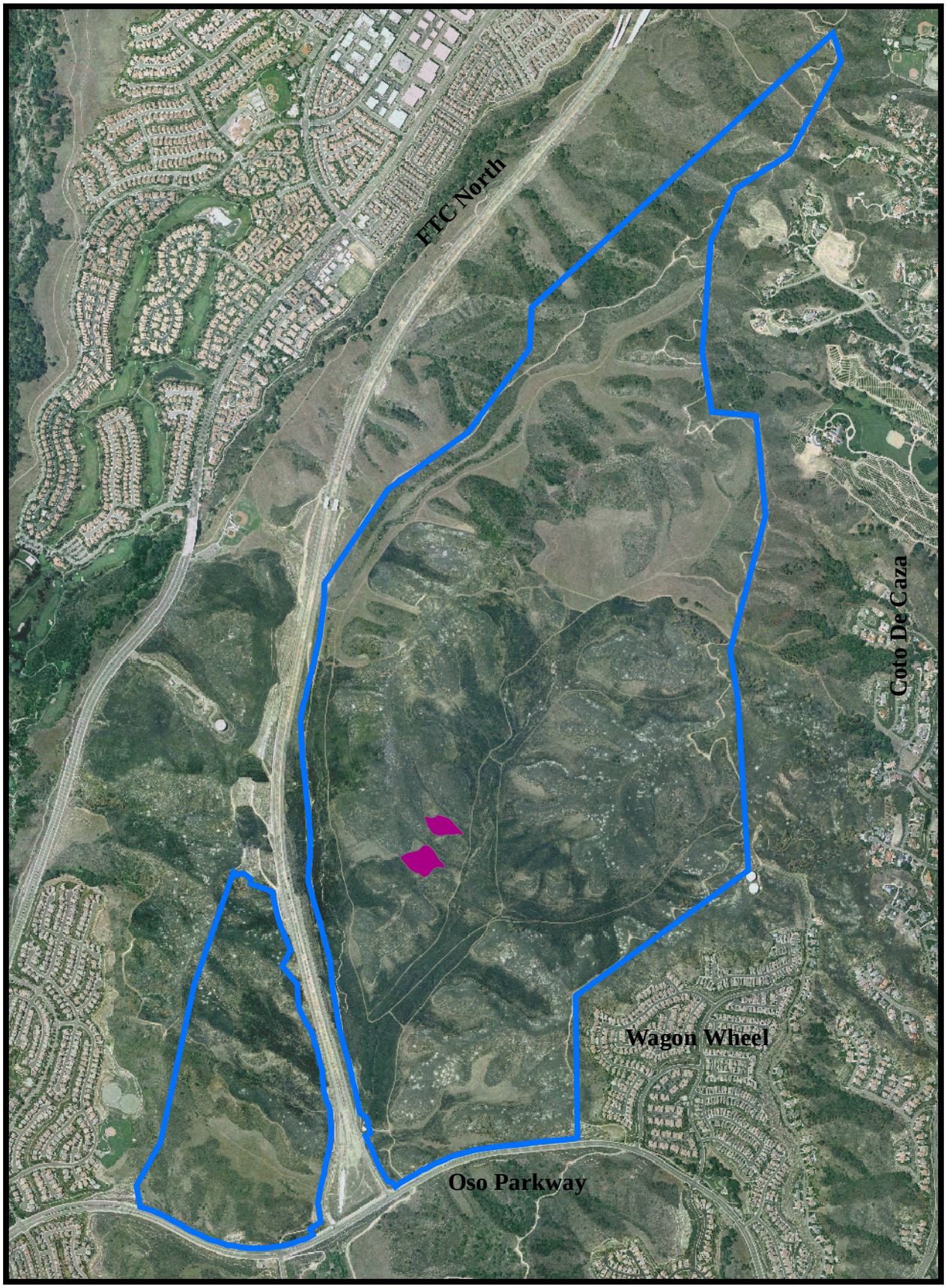
THREAD-LEAVED BRODIAEA (*BRODIAEA FILIFOLIA*) TRANSPLANTATION

The Upper Chiquita Canyon Conservation Area contains appropriate soils for relocation of thread-leaved brodiaea, and currently provides physical and biological features, which are essential for the conservation of this species, and include:

- vegetation types (native needlegrass grasslands and coastal sage scrub), pollinator assemblages and insect floral visitors, and faunal components that provide pollen and seed dispersal for new seedling establishment;
- clay soil areas that promote growth and maintenance of individuals and belowground corm populations, including soil-landform-vegetation associations suitable for sexual (seed) and asexual (cormlet) production, and long-term maintenance of seed banks;
- intervening habitat corridors suitable to facilitate gene flow and connectivity to other known occurrences of brodiaea in Orange County;
- self-sustaining functions associated with diverse native habitat areas that provide basic requirements for growth and reproduction of the species, such as water, light, nutrients, and minerals, and

Appropriate areas at the Conservation Area contain clay and clay loam substrates that currently support identified vegetation types, and additional lands designated for restoration of native grassland communities, and native pollinator assemblages essential to the conservation of the species (See map of Brodiaea Relocation sites). The Conservation Area lands are not used for recreational activities and are specifically identified and managed as preserved open space. Implementation of the Upper Chiquita Canyon Conservation Area RMP and Draft Restoration Program would implement policies and actions that would minimize disturbance to the soil surface, including fuel management activities and management practices that prohibit discing, permanently exclude grazing livestock, would control invasive plant species that could out compete native species for important resources, and would restore exotic annual grasslands to native forb and needlegrass grassland communities that are essential to the conservation of thread-leaved brodiaea.

In addition, the geographic location of the Conservation Area would also provide gene flow to proposed Criticial Habitats designated by U.S. Fish and Wildlife Service (2004) at Canada Gobernadora/Chiquita Ridgeline subunit, Forster Ranch subunit, Casper's Regional Park subunit, and the Arroyo Trabuco subunit.



Chiquita Canyon Conservation Area
***Brodiaea filifolia* Relocation Areas**

Conservation Boundary

0 1,000 2,000 4,000 Feet

Brodiaea filifolia

HYBRID FUNCTIONAL ASSESSMENT

FOR AREAS WITHIN THE JURISDICTION OF

THE UNITED STATES ARMY CORPS OF ENGINEERS
PURSUANT TO SECTION 404 OF THE CLEAN WATER ACT

AND

THE CALIFORNIA DEPARTMENT OF FISH AND GAME
PURSUANT TO SECTION 1600 OF THE
CALIFORNIA DEPARTMENT OF FISH AND GAME CODE

SOUTH ORANGE COUNTY TRANSPORATION
INFRASTRUCTURE IMPROVEMENT PROJECT
ORANGE COUNTY, CALIFORNIA

August 8, 2007

Prepared for:

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OBJECTIVE OF FUNCTIONAL ASSESSMENT

The purpose of this functional assessment is to characterize and evaluate the functions of riparian habitats associated with the South Orange County Transportation Infrastructure Improvement Project (SOCTIIP). Specifically, this functional assessment provides for the ability to compare pre- and post-project aquatic functions relative to the requirements of the U.S. Army Corps of Engineers (Corps) Section 404 Regulatory Program.

U.S. Army Corps of Engineers Section 404 Regulatory Program

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of fill material into waters of the U.S. and evaluates the impacts of the placement of proposed fill into such waters. Where the discharge of fill material into jurisdictional waters is permitted by the Corps, mitigation to ensure no-net-loss of wetlands and aquatic functions is required. The Corps emphasizes the value of providing mitigation that maximizes the functions of the compensatory mitigation. The evaluation of functions associated with compensatory mitigation sites relies on a function-based assessment tool such as the Corps' HGM Methodology.[1] Such an approach is set forth in a Regulatory Guidance Letter (RGL) published by the Corps on December 24, 2002[2] and in a Special Public Notice published by the Los Angeles District on January 27, 2003.[3] In both documents, the Corps encouraged the utilization of functional assessments for evaluating impacts to aquatic resources and determining appropriate mitigation ratios. On page 2 of the December 24, 2002 RGL, the Corps notes:

> *The Corps has traditionally used acres as a standard measure for determining impacts and required mitigation for wetlands and other aquatic resources, primarily because useful functional assessment methods were not available. However, Districts are encouraged to increase their reliance on functional assessment methods.*

This Hybrid Functional Assessment (HFA) method was developed by combining components of three established functional assessment methods adapted for use at the project site.[4]

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[1] Smith, R.D., Ammann, A., Bartoldus, C., and Brinson, M.M. 1995. "An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices," Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
Brinson, M.M., Hauer, F.R., Lee, L.C., Nutter, W.L., Rheinhardt, R.D., and Whigham, D. 1995. "A guidebook for application of hydrogeomorphic assessments to riverine wetlands," Technical Report WRP-DE-11, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

[2] U.S. Army Corps of Engineers. 2002. *Regulatory Guidance Letter No. 02-2: Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.* December 24, 2002, 16pp.

[3] U.S. Army Corps of Engineers, Los Angeles District. 2003. *Special Public Notice: Mitigation and Monitoring Requirements*. January 27, 2003, 41pp.

[4] The concept of combining different functional assessment methodologies has been previously approved by the Corps. Specifically, URS developed a draft *Hybrid Functional Assessment of Wetland ad Riparian Habitats for the Newhall Ranch Habitat Management Plan* in June 2004. The URS HFA was subsequently used by Glenn Lukos Associates to evaluate impacts associated with the Newhall Ranch Riverpark project in Santa Clarita as well as to

A total of 21 different metrics were evaluated to determine riparian functions. These metrics are indicators of wetland or riparian function and were evaluated quantitatively in this assessment. All metrics were scaled with values, or metric scores, between 0 (degraded condition) and 1 (optimal condition) and were used to calculate the HFA scores. This HFA first describes the individual metrics that were incorporated into this HFA. The HFA then, using these metrics, provides a quantitative assessment of the riparian resources within the subject study area in the existing condition or pre-project condition. For the purposes of this analysis, the study area was extended 300 feet beyond the impact limits in order to incorporate potential indirect impacts from project implementation. Functions for all reaches falling within the impact limits were considered to be lost in the post-project condition. Functions for reaches falling outside of the impact limits but within 300 feet were evaluated for potential reduction in function. The sum of this reduction of function is considered an indirect loss of function. .

The metrics evaluated describe three categories of function based on the Corps' Hydrogeomorphic Approach (HGM): hydrologic functions, physical process functions (e.g., biogeochemical functions), and biological functions related to habitat. In addition to functions described under the Corps' HGM approach, functions from the California Rapid Assessment Method (CRAM) and Landscape Level Functional Assessment (LLFA) were incorporated, as categorized in each function heading. In summary, four metrics that describe buffer functions, seven metrics related to hydrological functions, three metrics that describe biogeochemical functions, and eight metrics associated with habitat functions were evaluated. These metrics were derived from the three accepted functional assessment methods that were used in developing the HFA and include the following:

Peer Review Draft Guidebook to Hydrogeomorphic Functional Assessment of Riverine Waters/Wetlands in the Santa Margarita Watershed. (Santa Margarita River HGM = SMR HGM) This HGM guidebook was developed for use in Southern California, and the reference domain is located in San Diego County.

Draft California Rapid Assessment Method for Wetlands. (CRAM) This method is currently being developed for use by California Department of Fish and Game (CDFG).

Assessment of Riparian Ecosystem Integrity: San Jacinto and Upper Santa Margarita River Watersheds, Riverside County, California. (Landscape Level Functional Assessment = LLFA) This method was developed for use in Special Area Management Plan (SAMP) projects that are ongoing in Orange and Riverside Counties.

Acronyms in this document (e.g., CRAM) refer to the source methodology from which the metric is based. For most metrics, modification was necessary from the original text.

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develop a mitigation program for the Newhall Ranch Santa Clarita Riverpark project. The Corps and CDFG issued authorizations for this project, in part based on the HFA and associated mitigation program developed using the

METRICS EVALUATED

RIVERINE

The function of riverine systems were evaluated for hydrologic function, biogeochemical function and habitat function using 21 metrics including: percentage of assessment area with buffer, average width of buffer, buffer condition, land use/land cover, water source, hydroperiod, floodplain connection, altered hydraulic conveyance, surface water persistence, flood prone area, sediment regime, topographic complexity, substrate condition, vertical biotic structure, interspersion and zonation, ratio of native to non-native, canopy, age distribution, riparian vegetation condition, riparian corridor continuity and invasive plant species.

DEPRESSIONAL WETLANDS

The function of depressional wetland systems were evaluated for hydrologic function, biogeochemical function and habitat function using 9 metrics including: average width of buffer, buffer condition, water source, hydroperiod, surface water persistence, land use/land cover, substrate condition, ratio of native to non-native, and wetland vegetation condition.

Calculating Functional Capacity

The reaches were scored from 0.00 to 1.00 for each metric based on the condition of the reach. The Functional Capacity Score was then calculated by summing the scores of the individual metrics for each reach. Functional Capacity Units were then calculated by multiplying the Functional Capacity Score of an aquatic reach by the surface area in acres of that reach.

Calculating Loss of Functional Capacity

Quantifying the potential direct impact of the proposed project on aquatic resource function was accomplished by overlaying the Proposed Project grading footprint Geographic Information System (GIS) theme on the Aquatic resource theme. The function of aquatic resources falling within the grading limits was assumed to be entirely lost.

Quantifying the potential indirect impact of the Proposed Project on aquatic resource function was accomplished by simulating the changes that could be expected to occur in each aquatic reach as a result of the construction of the corridor. The sum of the differences between baseline assessment metric scores and metric scores resulting from the simulation represented the change (i.e., loss) in Functional Capacity Score for the aquatic reach being evaluated. The surface area of the reach expected to exhibit decreased function was multiplied by the change in Functional Capacity Score. As described above, indirect impacts were assumed to extend approximately 300 feet from the disturbance limits. This assumption was based upon the most extensive metric assessment area as defined by URS.

I. METRICS EVALUATED FOR RIVERINE SYSTEMS

I. BUFFER

A. PERCENTAGE OF ASSESSMENT AREA WITH BUFFER [CRAM]

Definition: The buffer is the upland area extending at least 10 meters (m) horizontally from the immediate edge of the Assessment Area that is in a natural or semi-natural state and currently not dedicated to anthropogenic uses. The buffer can include adjacent wetlands of the same or different class, stream channels, open water, or other aquatic habitats. For the riverine wetland class, the upstream and downstream reaches should be scored as part of the buffer. The height to which the buffer extends above or below the wetland is not considered as part of a horizontal buffer.

Intensive land uses are not buffers (e.g., plowed, agricultural cropland; paved areas; some dirt roads; housing developments, unfenced pastures; landscaped parks; etc.). Mowed areas are considered buffers, but deep-ripped agricultural fields are not considered buffers.

The assessment of this attribute is the same across all wetland classes. Assessment should be conducted first in the office with aerial photographs, then verified in the field.

Table 1.

Metric	Score
< 75 - 100%	1.0
50 - 75%	0.75
25 - 50%	0.50
< 25%	0.10
None	0.0

B. AVERAGE WIDTH OF BUFFER [CRAM]

Definition: Buffer width is measured in meters of distance away from the wetland along lines-of-sight that are perpendicular to the wetland boundary.

Step 1: Divide the perimeter of the Assessment Area into four sections

Step 2: Estimate the width of the buffer in each of the four sections; maximum value of 100 meters per side.

Step 3: Average the four estimated widths

The assessment of this attribute is the same across all wetland classes. It should be initiated in the office and verified in the field.

Table 2.

Metric	Score
> 100 m	1.0
60 - 100 m	0.75
30 - 60 m	0.50
<30 m	0.10
None	0.0

C. BUFFER CONDITION [CRAM] / ADJACENT AREA TO CORPS/CDFG JURISDICTION

Definition: Buffer condition is assessed according to its vegetative cover, substrate condition, and based on indicators of disturbance. These conditions are assessed only for the portion of the wetland border that has already been identified or defined as buffer. For two sides with different buffers, score each side and average score. The value closest to the average would then be chosen.

Table 3.

Metric	Score
Area is characterized by natural, undisturbed upland with native vegetation and lack of invasive plants, lack of substrate disturbance, and lack of trash)	1.0
Buffer appears to have been moderately disturbed and may be characterized by presence of invasive plants, etc, minor to moderate amounts of trash or debris visible); abandoned field; shrubland or Buffer recently burned, but recoverable; or dirt road crossing; or mowed, non-native ruderal	0.75
Disced ruderal; dry-land farming; active agriculture	0.50
Dirt road, not recoverable; residential; pastureland; landscaped park	0.25
Buffer is highly disturbed, barren ground visible with highly compacted soils, moderate to high amounts of trash and other large debris); urban or industrial	0.10
No buffer present.	0.0

D. LAND USE/LAND COVER (LULC) [LLFA]

Four sub-indicators were used to measure the LULC indicator. Each of the sub-indices were measured as the percent of the drainage basin of a riparian reach with LULC types having the potential to increase the nutrient, pesticide, hydrocarbon, or sediment loading in downstream surface waters. The reference standard condition was defined as <5% of the watershed and surrounding landscape area with LULC types with the potential to increase nutrient, pesticide, hydrocarbon, or sediment loading in surface waters downstream. This metric was assessed at the tributary scale (e.g., Potrero Canyon sub-watershed), and refers to areas adjacent to and upstream from a particular reach. For tributaries, all LULC within the sub-basin that drains into a particular reach was considered. For the Santa Clara River (SCR) reaches, all LULC within 300 meters was considered.

Example stressors include active oil production platforms, septic tanks, unpaved roads, etc. Indicator scores were assigned based on the range of indicator values in the table below.

Table 4.

Metric	Score
<5% of watershed/landscape with LULC types that increase N/P/H/S	1.0
>5 and <15% of watershed/landscape with LULC types that increase N/P/H/S; or recently burned open space	0.75
>15 and <30% of watershed/landscape with LULC types that increase N/P/H/S	0.50
>30 and <50% of watershed/landscape with LULC types that N/P/H/S	0.25
>50% of watershed/landscape with LULC types that increase N/P/H/S	0.10

II. HYDROLOGY

A. WATER SOURCE [CRAM]

Definition: Source of water describes the primary origin of water input to the wetland and the degree to which water input has been affected or is controlled by anthropogenic activities or land use changes. This metric is assessed at the reach scale, and is influenced by upstream activities. Example stressors are septic tanks, culverts, riprap, etc.

Table 5.

Metric	Score
Water source derived from precipitation, groundwater and/or natural overland or tributary flow from catchment. No indications of artificial water sources.	1.0
Source of water is primarily natural; however, may receive occasional or small amounts of inflow from anthropogenic sources, such as urban runoff, seepage, agriculture or POTW discharge. Natural flow regime.	0.75
Source of water is primarily anthropogenic, and receives inflow from anthropogenic sources, such as urban runoff, seepage, agriculture or POTW discharge. Non-natural flow regime.	0.50
Primarily supported by direct irrigation, pumped water, artificially impounded water, or other artificial hydrology; may be perennialized flow; channel incision present.	0.25
No natural or non-natural flows occur at the present time.	0.0

B. HYDROPERIOD [CRAM]

Definition: Hydroperiod is the seasonal and (in some wetlands) daily pattern of water level fluctuation. Hydroperiod defines regular changes in the duration, frequency, timing, and extent or depth of inundation or saturation in a wetland.

Office and Field Indicators: This metric evaluates changes in the hydroperiod of a wetland and the degree to which these changes affect the structure and composition of the wetland plant community. Field indicators focus on evaluating changes to the plant community. Office

indicators focus on evaluating the physical properties such as slope, flow augmentation or diversion, upstream impoundments, etc.

It is assumed that changes either peak flow or baseflow can affect riverine wetland form and function. However, changes in peak flow will have a more profound effect because of changes to channel slope, hydraulic radius, and width to depth ratio. Decreases in base flow, especially during the dry season, can influence the availability of water for wildlife.

This metric is assessed initially in the office using the site imaging, and then scores are confirmed or adjusted based on the field indicators. Hydroperiod should be evaluated in the office by reviewing maps or aerials of the surrounding watershed for evidence of diversions, flow augmentations, or upstream constrictions. Dams and other upstream impoundments should be considered an alteration if they control more than 25% drainage area upstream of the assessment area or if they are close enough to the assessment area to substantially affect the magnitude or timing of inflows. Diversions should be considered an alteration if they routinely reduce either baseflow or stormflow to the assessment area by more than 15%. Constrictions of the active channel within 1 km (upstream) of the Assessment Area should be considered as hydrologic alterations. The preliminary office assessment is scored using the following:

Table 6.

Metric	Score
Subject to natural peak flows and baseflow.	1.0
Peak flow relatively natural, but baseflows altered either by augmentation or reduction; or Reach has recently burned, but is recoverable- temporary peak flows are anticipated.	0.75
Peak flows altered by upstream activities (augmentation or reduction), but baseflows are relatively natural.	0.50
Assessment area is subject to alteration of both peak flow and baseflow. Recoverable.	0.25
Assessment area is subject to alteration of both peak flow and baseflow. Not recoverable.	0.10

C. FLOODPLAIN CONNECTION [CRAM]

Definition: Floodplain connection describes the relationship between riverine wetlands and the adjacent floodplain that influences the ability of water to flow into or out of the wetland or to inundate adjacent uplands during high water periods.

Field Indicators: Scoring of this metric is based solely on field indicators. No office work is required.

Indicators for floodplain connection in riverine, estuarine, and lagoon wetlands are based on evidence of overbank flow, such as wrack, debris, fine sediment deposits, and evidence of ponding on benches adjacent to the stream or tidal channel. The extent and vigor of adjacent riparian or hydric vegetation can also provide an indicator for this attribute. Finally, structural conditions, such as depth, presence of levees, and condition of the bank can be used to score this attribute.

Table 7.

Metric	Score
Adjacent to an unrestricted floodplain that is comprised of natural or open space lands or agricultural lands	1.0
On most years, storm flows or storm surges can escape the active channel or tidal channels and access adjacent benches, riparian areas, or the marsh plain. However, unnatural levees, berms or adjacent land uses restricts the extent of overbank inundation; or naturally confined channel	0.75
Moderate channel constriction, incision or bank armoring precludes water from accessing adjacent benches, riparian areas or marsh plain, except in very high flows; however, access is still possible; or Agricultural constraint; or adjacent road	0.50
All overbank flow beyond the bankfull channel is contained within a defined conveyance or channel and cannot access adjacent riparian areas, benches or marsh plain	0.25
Channel is channelized and contains concrete or rip-rap slopes/bottom.	0.0

D. ALTERED HYDRAULIC CONVEYANCE – [LLFA]

This indicator was measured as the percent of the main stem channel through the riparian reach with altered hydraulic conveyance. At the riparian reach and riparian reach tributary scale, aerial photography and field observations were used to estimate the value of the metric. This metric was assessed within a particular reach, and assesses the extent of linear modification of the channel. Stressors within a reach may include road crossings, rip-rap, etc.

The reference condition was defined as <5% of the main stem channel in the riparian reach, or major tributaries to the riparian reach, with altered hydraulic conveyance. Indicator scores were assigned based on the range of indicator values in the table below.

Table 8.

Metric	Score
<5% of riparian reach main stem with AHC	1.0
>5 and <15% of riparian reach main stem with AHC	0.75
>15 and <30% of riparian reach main stem with AHC	0.50
>30 and <50% of riparian reach main stem with AHC	0.25
>50% of riparian reach main stem with AHC	0.1

E. SURFACE WATER PERSISTENCE / RECHARGE [SMR HGM]

Table 9.

Measurement	Score
Evidence of surface water ponding/storage on floodplain for greater than one day (intermittent). Substrate porosity is such that runoff persists; floodplain has complex microtopographic relief; or perennially flowing/ saturated; or adjacent wetlands	1.0
Evidence of surface water ponding/storage on floodplain for greater than one day (intermittent). Floodplain has simple microtopographic relief. (Non-wetland floodplain)	0.75
Evidence of surface water ponding/storage for less than one day (ephemeral).	0.50
Assessment area provides no features for ponding/storing water. Variable is recoverable and sustainable through natural processes.	0.25
Assessment area provides no features for ponding/storing water. Variable is not recoverable and sustainable through natural processes under current conditions.	0.0

F. FLOOD PRONE AREA [SMR HGM]

This metric assesses the extent to which flood flows are impeded. Slope (non-riverine) wetlands would not be subject to the width requirements.

Table 10.

Measurement	Score
Floodprone area not modified by cultural processes. FPA > 2.0x bankfull width.	1.0
Floodprone area confined by artificial structure(s) or culturally accelerated channel incision is minimal; FPA > 2.0x bankfull width; disturbance affects one side of drainage; or naturally v-shaped channels for small drainages	0.75
Floodprone area is artificially confined or culturally accelerated channel incision is present; FPA > 1.5x bankfull width; disturbance affects one side of drainage	0.50
Floodprone area is artificially confined or culturally accelerated channel incision is present; FPA < 1.5x bankfull width; disturbance affects both sides of drainage; variable is recoverable through natural processes under current conditions.	0.25
Floodprone area is artificially confined or culturally accelerated channel incision is present; FPA < 1.5x bankfull width; disturbance affects both sides of drainage Variable is not recoverable through natural processes under current conditions.	0.10
Floodprone area is completely modified by concrete and/or rip-rap; disturbance affects both sides of drainage; variable is not recoverable through natural processes under current conditions.	0.0

III. STRUCTURE – ABIOTIC

A. SEDIMENT REGIME – [LLFA]

This indicator was assigned a score by matching field observations to the descriptions in the table below. The reference condition was defined as exhibiting a sediment regime in equilibrium with respect to supply, erosion, and deposition processes, and not affected by cultural alteration.

Table A-11.

Metric: Description of Conditions	Score
Movement of sediment in the channel is in equilibrium in terms of supply, erosion, and deposition processes that reflect the culturally unaltered condition. On higher-order streams there are alternating point bars; bank erosion occurs, but is stabilized and moderated by vegetation; and channel width, form, and floodplain area is consistent through the reach. In low-order streams with bedrock control, some of these indicators may not be apparent, but overall bank and hillslope erosion is moderated by vegetation, and there are no apparent culturally induced catastrophic failures.	1.0
Movement of sediment in the channel is in equilibrium with the current hydrologic regime, as opposed to a culturally unaltered condition, and exhibits an overall balance in terms of erosion and deposition processes. On higher-order streams there are alternating point bars; bank erosion occurs, but is stabilized and moderated by vegetation; and channel width, form, and floodplain area are consistent through the reach. In low-order streams with bedrock control, some of these indicators may not be apparent, but overall bank and hillslope erosion is moderated by vegetation, and no culturally induced catastrophic failures are apparent; OR recent fires has temporarily altered (or are expected to alter) sediment regime; less than 15-percent of the watershed exhibits altered hydraulic conveyance where no significant sediment storage or recruitment occurs	0.75
Sediment disequilibrium is minor and localized within the reach. This includes small, localized areas of bank protection, slumping, or encroachment on the floodplain and channel. This condition class also includes previously disrupted reaches on a recovery trajectory, such as deeply entrenched streams where downcutting has been arrested by structural grade control, and there is sufficient room for lateral channel migration and establishment of a functional floodplain within the incised channel; less than30-percent of the watershed exhibits altered hydraulic conveyance where no significant sediment storage or recruitment occurs	0.50
Sediment erosion and deposition out of equilibrium. Water inflow is sediment rich or poor, or accelerated bank erosion exists. Channel not actively incising, but extensive disequilibrium is evident. Typical indicators include extensive bank slumping (erosion events that exceed any moderating influence of native vegetation), active gullies feeding into the reach from adjacent hillslopes, shoaling of sediments rather than deposition in sorted lateral and mid-channel bars. Apparently stable channels should be placed in this category if there is evidence of regular mechanical disruption, such as bulldozing of the channel bottom and clearing of riparian vegetation to improve flood conveyance; less than 50-percent of the watershed exhibits altered hydraulic conveyance where no significant sediment storage or recruitment occurs	0.25
Sediment dynamics within most of the reach are seriously disrupted. It also includes reaches that are either actively incising or functioning as sediment traps (e.g., sediment basins). This also includes reaches that have been subject to recent changes likely to induce severe disequilibrium, such as extensive floodplain filling, change in slope, channel straightening, or other changes that are likely to cause channel downcutting during future high-flow events ; greater than 50-percent of the watershed exhibits altered hydraulic conveyance where no significant sediment storage or recruitment occurs	0.10

B. TOPOGRAPHIC COMPLEXITY [CRAM]

Definition: Topographic complexity is the presence or absence of a variety of elevation or depth zones within a wetland that provide niches for fauna, surfaces for growth of a variety of plant species, areas that modify flow/hydrology, and zones that promote biogeochemical processes. This metric is different than abiotic patch richness in that it evaluates the relative abundance or distribution of physical zones within the assessment area, whereas abiotic patch richness addresses solely the number of different habitat types.

Field Indicators: The typical indicators are usually habitat elements or habit features within a wetland class. Care must be taken to distinguish indicators of topographic complexity or habitat features within a wetland from different kinds of wetlands.

Topographic complexity in higher order riverine wetlands can be evaluated by counting the number of features that affect elevation or influence the path of water flow along a transect cross the assessment area. Trampling, filling, burying or other alteration of topographic features will indicate a reduced condition. Lower order riverine wetlands have inherently less topographic complexity (hence less categories) and will have more subtle indicators of topographic complexity, such as large rocks, middens, or accumulations of woody debris. In higher gradient streams, plunge pool sequences may be present.

Table A-12.

Metric	Score
Assessment area is dominated by a complex arrangement of micro and macro topographic features, such as meanders, bars, benches, secondary channels, backwaters, roots, pits, and ponds. Higher gradient systems may contain plunge-pool sequences.	1.0
Some macrotopographic features present, such as secondary channels; however, the complexity and interspersion of such features has been reduced by substrate alteration, flooding, grazing, trampling, or placement of fill material; or naturally v-shaped channel is small drainage.	0.75
Assessment area consists of a single channel without macrotopographic features such as benches or secondary channels; however, the channel has microtopographic features such as bars, braiding, and presence of woody debris.	0.50
Assessment area consists of a single channel without macrotopographic features such as benches or secondary channels; however, the channel has microtopographic features such as bars, braiding, and presence of woody debris. Features may be the result of anthropogenic disturbance.	0.25
Assessment area consists of a uniform, straight channel with no substantive topographic features.	0.10

C. SUBSTRATE CONDITION [CRAM]

Definition: Substrate Condition describes the presence of intact (unaltered) soil that is subject to regular saturation or inundation and exhibits an accumulation of organic matter or coarse litter. Coarse litter consists of the fallen stems, leaves, and other small parts of plants that accumulate on the wetland surface and that can be taxonomically identified.

Field Indicators:

Substrate condition in riverine wetlands is evaluated by observing evidence of redoximorphic features, ponding, or organic matter accumulation on the surface or within the top 30 cm of substrate. Special attention should be paid to pits, ponds, or backwaters as well as portion of the floodplain that is within the Assessment Area. Evidence may include leaf litter accumulation, coarse woody debris, dried algal mats, algal coating on sand grains in the channel bed, or organic streaking in the soil horizon. Excessive sediment deposition, filling, downcutting, trampling, or compaction may reduce substrate condition.

Table 13.

Metric	Score
Soils in the assessment area or adjacent to the active channel are relatively intact, show evidence of surficial organic matter accumulation, fallen trees, branches, and twigs or other course woody debris, decayed leaf litter, and fine detrital organic matter. Redoximorphic features may be visible within 30 cm of	1.0

the surface; organic or clay layers may be present within the soil column (top 30cm).	
Channel and adjacent benches are dominated by unconsolidated sand or other poorly formed native soils and/or bedrock outcrops. Substrate may exhibit moderate embeddedness or compaction; lack of organic layers in column; cattle may have had minor to moderate effects on sandy substrates.	0.75
Soils may exhibit some evidence of sparse organic litter or coarse woody debris. However, the assessment areas is mainly characterized by disturbed conditions, such as substantial filling, compaction, tilling, grazing, or similar activity, but appear recoverable with minimal intervention	0.50
Soils are extremely compacted, dominated by imported fill or other predominantly upland (non-native) soils or have been deeply ripped, disced, or drained	0.25
Channel is lined with concrete or rip-rap.	0.0

IV. STRUCTURE - BIOTIC

A. VERTICAL BIOTIC STRUCTURE

Definition: The vertical component of biotic structure consists of the distribution of vegetation among categories of height above the wetland substrate or with depth below the water surface.

Field Indicators: Vertical structure must be assessed in the field. The vertical component of biotic structure is commonly recognized as the overall number and spatial extent of the expected number of typical plant height classes. For some wetlands (e.g., forested riverine and lacustrine wetlands), the height classes are often arranged as overlapping layers or plant strata. In other wetlands, the plant height classes are represented by dispersed and non-overlapping plant patches. Standing live and dead vegetation is considered in the assessment. The length of prostrate stems or shoots, and the horizontal extent of canopies is not considered. Only the vertical aspect of structure is considered in this metric. Use the rules given in the table below to estimate the number of height classes for the assessment area, and the draft scores given below to determine the amount of the Assessment Area that has these height classes.

Table 14a. Rules for Determining Vegetation Height Classes for Each Wetland System

Wetland System	Height Class		
	Tall	Medium	Short
Riverine/Alluvial Scrub	> 3 m	1-3 m	< 1
Depressional, Slope and Seep	>1 (e.g. saplings)	0.3 – 1 m (e.g. Scripus)	< 0.3 m (e.g., Distichlis)

Use the draft scores given below to determine the amount of the Assessment Area that has these height classes.

Table A-14b.

Metric	Score
Most of the Assessment Area supports 3 height classes of vegetation; T/S/H; may also include vines	1.0
About half of the Assessment Area supports 3 vegetative strata and/or most is covered by at least 2 height classes.	0.75
Between one quarter and half of the assessment areas supports 3 vegetative height classes and/or at least half of the site support 2 height classes.	0.50
Less than one quarter of the AA support 3 height classes or < ½ supports 2 height classes or less OR 0-1 height class is present only.	0.25

B. INTERSPERSION AND ZONATION

Definition: Horizontal biotic structure is commonly recognized as plant zonation and its interspersion. Interspersion is essentially a measure of the amount of edge between plant zones.

Field Indicators: The distribution and abundance of horizontal plant zones plus their interspersion are combined into a single indicator. The zones are usually apparent as different plant patches that signify different elevations or distances away from the usual high water contour of a wetland, such as the shoreline of a lake, bank of a channel, or the transition from the wetland to the adjacent upland. For large wetlands, the prominent zonation is evident in aerial photographs of scale 1:24,000 or smaller. For small wetlands, the zonation is only apparent in the field. The zones may be discontinuous and they can vary in number within a wetland. Plant zones often consist of more than one plant species, but some zones may be mono-specific. In most cases, one plant species dominates each zone.

The following table should be used to score wetlands in these classes:

Table A-15.

Metric	Score
Riparian canopy	1.0
Undisturbed chaparral/coastal sage scrub occurring along drainage greater than 75%	0.75
2 or more plant zones are apparent along about one quarter to half of the main active channel or shoreline.	0.50
2 or more plant zones are apparent along less than one quarter.; OR sparse shrubs in confined/ incised channel.	0.25
Unvegetated channel.	0.10

C. RATIO N:NN [SMR HGM]

This metric is based on data collected in 10 m X 50 m plots assessed within reaches. The 50/20 Rule (Environmental Laboratory 1987) was utilized to determine dominant vegetation.

Table A-16.

Measurement	Score
75 – 100% of the plant species are native and no stratum is dominated by non-native species.	1.0
50 - < 75% of species are native and/or up to 50% of the strata present are dominated by non-native species.	0.75
25 - < 50% of species are native and/or up to 50% of the strata present are dominated by non-native species.	0.50
10 – < 25 %of species are native and/or up to 50% of the strata present are dominated by non-native species.	0.25
0 - < 10 % of species are native and/or up to 100% of the strata present are dominated by non-native species.	0.10
No vegetation present. Variable is not recoverable and sustainable through natural processes under current conditions.	0.0

D. CANOPY [SMR HGM]

For SCR reaches, percent cover was averaged among the total number of plots.

Table A-17.

Measurement	Score
Percent cover of tree layer is > or = 50%	1.0
Percent cover of tree layer is 25% - <50%	0.75
Percent cover of tree layer is < 25%; OR Seep/Slope H layer 100%	0.50
If no trees, percent cover of shrub layer is >50%	0.25
If no trees, percent cover of shrub layer is <25%	0.10
No vegetation present. Variable is not recoverable and sustainable through natural processes under current conditions.	0.0

E. AGE DISTRIBUTION [SMR HGM]

This metric assesses the extent of recruitment at a site. Trees were not required for slope (non-riverine) wetlands, and thus the presence of saplings and seedlings would be the high score. This metric applies to wetland indicator species only (e.g., *Salix* sp., *Baccharis* sp., *Populus* sp., *Platanus* sp., etc.). In some cases, *Quercus* sp. may also be included if in multiple layers.

Table A-18.

Measurement	Score
Assessment area supports trees, saplings, and seedlings.	1.0
Assessment area supports trees, mature shrubs, saplings or seedlings.	0.75
Assessment area has no trees but does support saplings and/or seedlings; OR S/H for same indicator species.	0.50
Assessment area supports trees/shrubs but no saplings or seedlings are present; Seep/Slope with H layer 100% but no saplings or seedlings.	0.25
Assessment area does not support trees/shrubs, saplings, or seedlings. Variable is recoverable and sustainable through natural processes under current conditions.	0.10
Assessment area does not support trees/shrubs, saplings, or seedlings. Variable is not recoverable and sustainable through natural processes under current conditions.	0.0

F. RIPARIAN VEGETATION CONDITION – [LLFA]

Under culturally unaltered conditions, a complex interaction of many factors such as the size of the watershed, discharge, channel geometry, substrate type, and slope determine the size of the area that typically supports riparian vegetation. In general, as stream orders increase, the width of the bankfull channel increases, and the size of the area supporting riparian vegetation increases. Floodprone area represents a scaled metric that can be applied consistently in different stream orders throughout a watershed. Floodprone area was determined in the field by projecting the elevation corresponding to two times the maximum depth of the bankfull channel until it intersected the surface of the adjacent floodplain/terrace on both sides of the main stem channel.

This indicator was assigned a score by observing the condition of vegetation along the riparian reach and matching these field observations to the descriptions in Table A-21. In inaccessible reaches, field observations were supplemented with aerial photography and riparian vegetation community maps developed by URS (2003b). The reference standard condition was defined as vegetation represents reference condition with no chronic disturbance or recovered from historical disturbance.

Table A-19.

Description of Conditions	Score
Vegetation represents reference condition with no chronic disturbance or recovered from historical disturbance. Presence of areas disturbed through natural processes (i.e., fire and flood) okay.	1.0
Native vegetation recovering with minor chronic disturbance (i.e., grazing). Presence of areas disturbed through natural processes (i.e., fire and flood) okay. Invasive, exotic species may be present.	0.75
Native vegetation common and widespread with moderate grazing pressure. Presence of areas disturbed through natural processes (i.e., fire and flood) okay. Invasive, exotic species may be present.	0.50
Native vegetation localized with heavy grazing pressure. Presence of areas disturbed through natural processes (i.e., fire and flood) okay.	0.25
Native vegetation absent, area hardened (i.e., paved, urban, etc.) or graded. Restoration impractical and unlikely for economic or political reasons.	0.0

G. RIPARIAN CORRIDOR CONTINUITY [LLFA]

This indicator was measured at the riparian reach scale as the percent of floodprone area along the main stem channel of the riparian reach occupied by native and non-native vegetation communities with adequate height and structure to allow faunal movement. For example, annual grassland with no shrub or tree component was considered to represent a corridor gap. The difference between this indicator and Area of Native Riparian Vegetation was that for the RCC indicator, the vegetation corridor could be composed of native or non-native riparian species, whereas for the NRV indicator, only native riparian vegetation communities were considered. The reference condition was defined as <5% of the floodplain of the main stem channel of the riparian reach occupied with riparian vegetation communities. Indicator scores were assigned based on the range of indicator values in the table below.

Table A-20. Range of Indicator Values for Scaling the Riparian Corridor Continuity Indicators

Indicator Value Range	Score
<5% of riparian reach with gaps/breaks in vegetation due to cultural alteration	1.0
>5 and <15% of riparian reach with gaps/breaks in vegetation due to cultural alteration	0.75
>15 and <30% of riparian reach with gaps/breaks in vegetation due to cultural alteration	0.50
>30 and <50% of riparian reach with gaps/breaks in vegetation due to cultural alteration	0.25
>50% of riparian reach with gaps/breaks in vegetation due to cultural alteration	0.10

H. INVASIVE, EXOTIC PLANT SPECIES - [LLFA]

Plants would be required to be on the Cal-IPC list of invasive species (List A1, A2, B). Percent cover measurements are based on plot data within a given reach. Average cover for each included species was determined per T-S-H layer(s), and then summed to give the total cover per given plot. This indicator was assigned an index by matching field observations to the description of condition in Table A-23. The reference standard condition was defined as exotic plant species absent or rare composing ≤5% total vegetation.

Table A-21. Description of Condition and Index for Invasive Plant Species Indicator

Description of Condition	Index
Invasive plant species absent or rare composing ≤5% total vegetation	1.0
Invasive plant species present but localized and composing >5 and ≤20% of vegetation	0.75
Invasive plant species common and composing >20 and ≤50% of vegetation	0.50
Invasive plant species widespread and composing >50 and ≤75% of vegetation	0.25
Invasive plant species dominant and composing >75% of vegetation; recoverable	0.10
Invasive plant species dominant and composing >75% of vegetation; not recoverable.	0.0
*If invasive plant species are dominant outside of plots but within reach, score may be reduced by one level.	-x

XI. METRICS EVALUATED FOR ISOLATED SLOPE WETLAND, SEASONAL PONDS AND STOCK PONDS

The HFA developed by URS and cited in footnote 4 above, addressed Riverine Wetlands as well as Depressional, Lacustrine, and Slope/Seep Wetlands. Seasonal pools and ponds were not specifically addressed and only four metrics, Hydroperiod, Topographic Complexity, Substrate Condition, and Vertical Biotic Structure, were included as metrics in the URS HFA, with no distinction between Depressional, Lacustrine, and the Slope/Seep Wetlands. As such, modification of the approach to more accurately address slope wetlands, seasonal ponds and perennial ponds associated with the proposed project was necessary. Therefore, where applicable for this HFA, the methods for assessing each metric have included modification to address the hydrologic, biogeochemical, and habitat functions associated with slope wetland, seasonal pools and perennial ponds as set forth below (with the corresponding HFA function italicized in parenthesis):

Hydrology

- Surface Water Storage in Pool (*Hydroperiod* and *Surface Water Persistence*)
- Subsurface Water Exchange (*Not Applicable*)[5]
- Surface Water Conveyance (*Source*)

Biogeochemical *(Generally addressed under Land Use/Land Cover and Substrate Condition)*

- Element Cycling
- Element Removal

Habitat Support

- Maintains Characteristic Vegetation (*Ratio Native to Non-Native* and *Wetland Vegetation Condition*)
- Maintains Characteristic Aquatic Invertebrates
- Maintains Amphibian and Avian Populations
- Maintains Populations of Special-Status Plants (*Special Status Plants*)
- Maintains Habitat Interspersion and Connectivity (*Buffer Width and Condition*)

Each of these functions is addressed in or described by the metrics as set forth below.

[5] Exclusion of "Subsurface Water Exchange" is due to the nature of the soils in the study area. Specifically, the clays throughout much of the study area are classed as vertisols, which typically exhibit an epiaquic moisture regime meaning that they rapidly seal at the surface, precluding saturation below the upper few inches of the soil surface which in turn limits that potential for subsurface exchange between or among pools.

I. BUFFER-RELATED FUNCTIONS

A. AVERAGE WIDTH OF BUFFER

Definition: Buffer width is measured around the perimeter of the slope wetland, seasonal pool or stock pond.

This metric should be initially assessed using GIS and verified in the field as needed.

Table 22 - Average Width of Buffer

Metric	Score
300 feet or greater	1.0
90 to 300 feet	0.75
45 to 90 feet	0.25
10 to 45 feet	0.10
Less than 10 feet	0.0

B. BUFFER CONDITION [CRAM] / AREA ADJACENT TO AQUATIC FEATURE

Definition: Buffer condition is assessed according to vegetative cover, substrate condition, and indicators of disturbance. These conditions are assessed only for areas adjacent to the seasonal pool or stock identified or defined as buffer. Where more than one buffer condition occurs adjacent to the pool OR SEEP, the score was calculated proportionally based on the buffer conditions with score closest to the Metric Value chosen.

Table 23 – Buffer Condition

Metric	Score
Area is characterized by natural, undisturbed upland with native vegetation and lack of invasive plants, lack of substrate disturbance, and lack of trash)	1.0
Buffer appears to have been moderately disturbed and may be characterized by presence of invasive plants, etc, minor to moderate amounts of trash or debris visible); abandoned field; shrubland or Buffer recently burned, but recoverable; or dirt road crossing; or mowed, non-native ruderal	0.75
Disced ruderal; dry-land farming; active agriculture	0.50
Dirt road, not recoverable; residential; pastureland; landscaped park	0.25
Buffer is highly disturbed, barren ground visible with highly compacted soils, moderate to high amounts of trash and other large debris); urban or industrial	0.10
No buffer present.	0.0

II. HYDROLOGIC FUNCTIONS

A. WATER SOURCE [CRAM]

For slope wetlands, seasonal pools or stock ponds, each feature and its associated watershed is considered individually. For purposes of this HFA, the necessary watershed to support a pool was generally assumed to total seven times the pool area (basin area included in the calculation). For example, a basin that covers one acre would require a watershed of seven acres or six additional acres including the one acre of basin area.

Table 24 – Water Source

Metric	Score
Watershed intact and water source derived from direct precipitation and/or natural overland or tributary flow from immediate watershed. No indications of artificial water sources, including dry-weather flows.	1.0
Watershed intact; however source of water is primarily natural; however, may receive occasional or small amounts of inflow from anthropogenic sources, such as urban runoff, agricultural discharge.	0.75
Watershed reduced by 25-50 percent. Water source derived from direct precipitation with occasional input from urban or agricultural sources during rainy season. No dry-weather nuisance flows.	0.50
Regardless of watershed size, source of water is primarily anthropogenic, and receives inflow from anthropogenic sources, such as urban runoff or agriculture. Non-natural flow regime including storm runoff.	0.10

B. HYDROPERIOD [CRAM] - RIVERINE AND FLOODPLAIN

Hydroperiod for slope wetlands and depressional wetlands were evaluated based on a review of surrounding land uses and evidence of any diversions or augmentations of flow to the vernal pool. To the extent available, historic aerial photographs and direct observations of ponding were used to inform the scores. Some of the features being evalauted may only pond a few times each decade; however, this is their "natural" hydroperiod. While many of the pools associated with the floodplain have been subject to direct hydrological observations or historic aerial photographic analysis, the plant community of each basin remains the best tool for assessing this function.

Table 25 – Hydroperiod

Metric	Score
Subject to natural hydroperiod; the "natural flow regime."	1.0
Hydroperiod minimally altered; however alteration has little to no effect on plant community as evidenced by a lack of indicators.	0.75
Hydroperiod moderately altered such that it affects the plant community.	0.50
Hydroperiod severely altered such that plant community is substantially modified. Variable is recoverable.	0.25
Hydroperiod severely altered such that plant community is substantially modified. Variable is not recoverable.	0.10

C. SURFACE WATER PERSISTENCE [SMR HGM]

For slope wetlands, seasonal pools or stock ponds this indicator measures persistence of surface water at each feature. This indicator was measured using a combination of aerial photographs specifically obtained for the site during the 2004/2005 storm season in conjunction with direct observations of ponded water/surface water persistence and/or by the predominance of wetland vegetation.

Table 26– Surface Water Persistence

Measurement	Score
Evidence of surface water ponding/storage within vernal pools for very long duration (greater than 30 days) during average rainfall years. Substrate porosity is such that precipitation and local runoff persists; depressional feature supports a predominance of hydrophytes.	1.0
Evidence of surface water ponding/storage within vernal pools for long duration (greater than 7 days) during average rainfall years. Substrate porosity is such that precipitation and local runoff persists; depressional feature supports a predominance of hydrophytes.	0.75
Evidence of surface water ponding/storage for less than seven days during normal rainfall years (ephemeral).	0.50
Assessment area provides no features for ponding/storing water. Variable is recoverable and sustainable through natural processes.	0.25
Assessment area provides no features for ponding/storing water. Variable is not recoverable and sustainable through natural processes under current conditions.	0.0

III. BIOGEOCHEMICAL FUNCTIONS

A. LAND USE/LAND COVER (LULC) [LLFA]

As applied to slope wetlands, seasonal pools and stock ponds, this metric refers to areas adjacent to and upstream/upgradient from the seep, pool or pond within the 100-year floodplain.

Example stressors include dryland and agriculture fields with varying degrees of fertilization and pesticide control. Indicator scores were assigned based on the range of indicator values in the table below.

Table 27 – Land Use/Land Cover

Metric	Score
<5% of watershed/landscape with LULC types that increase N/P/F	1.0
>5 and <25% of watershed/landscape with LULC types that increase N/P/F	0.75
>25 and <50% of watershed/landscape with LULC types that increase N/P/F	0.50
>50 and <75% of watershed/landscape with LULC types that N/P/F	0.25
>75% of watershed/landscape with LULC types that increase N/P/F/H/S	0.10

B. SUBSTRATE CONDITION [CRAM]

Definition: Substrate Condition describes the presence of intact (unaltered) soil that is subject to regular saturation or inundation and exhibits an accumulation of organic matter or coarse litter. Coarse litter consists of the fallen stems, leaves, and other small parts of plants that accumulate on the wetland surface.

Substrate condition in slope wetlands, seasonal pools or stock ponds were typically evaluated by observing evidence of redoximorphic features, ponding, or organic matter accumulation on the surface or within the top 30 cm of substrate. Evidence may include dried algal mats, soil cracking, or salt accumulation. Excessive discing, fertilization, agricultural activities, trampling, or compaction from off road vehicle use generally reduce substrate condition.

Table 28 – Substrate Condition

Metric	Score
Soils in the assessment area are relatively intact, show no evidence of past agricultural or grazing activities including discing, irrigation, dry-land farming or fertilization of any sort. Redoximorphic features may be visible within 30 cm of the surface.	1.0
Soils in the assessment area are relatively intact with some evidence of past dry-land agriculture, grazing or occasional discing. Evidence of recent fertilization is lacking.	0.75
Soils in the assessment area subject to regular discing and dryland farming with no permanent irrigation for crops such as alfalfa or turfgrass. Fertilization has been light or sporadic.	0.50
Soils in the assessment area are subject to intensive agriculture including fertilization, irrigation, and intensive crop production such as alfalfa, turfgrass etc.	0.25

IV. HABITAT FUNCTIONS

A. RATIO N:NN [SMR HGM]

This metric is based on vegetation data collected during the jurisdictional delineation. The 50/20 Rule (Environmental Laboratory 1987) was utilized to determine dominant vegetation. In addition, based on field observations, relative cover of non-native species such as sharp-leave timothy or curly dock was evaluated and considered for purposes of scoring this metric.

Table 29 – Ratio N:NN

Measurement	Score
75 – 100% of the plant species are native based on predominance and less than 10% of relative cover consists of non-native species.	1.0
50 - < 75% of species are native based on predominance and less than 25% of relative cover consists of non-native species.	0.75
25 - < 50% of species are native based on predominance and less than 50% of relative cover consists of non-native species.	0.50
10 – < 25 %of species are native based on predominance and 50-75% of relative cover consists of non-native species.	0.25
0 - < 10 % of species are native based on predominance and greater than 75%.	0.10
No native vegetation present.	0.0

B. WETLAND VEGETATION CONDITION – [LLFA]

This indicator was assigned a score by observing the condition of vegetation in the assessment area and matching these field observations to the descriptions in Table 6-9. The reference standard condition is defined as expcted vegetation condition with no measurable disturbance.

Table 30 - Wetland Vegetation Condition

Description of Conditions	Score
Vegetation represents reference condition with no measurable disturbance or recovered from historical disturbance.	1.0
Native vegetation recovering with minor disturbance (i.e., grazing). Ongoing disturbance from agriculture or other ground-disturbing practices absent.	0.75
Native vegetation common and widespread with moderate grazing pressure or agricultural practices. Non-native species common. Invasive, exotic species may be present.	0.50
Native vegetation localized with conversion to agricultural uses including fertilization. Non-native species predominate. Invasive, exotic species may be present.	0.25
Native vegetation absent, variable not recoverable.	0.0

ASSUMPTIONS FOR PRE- AND POST-PROJECT SCORES

I. PRE- AND POST-PROJECT CONDITIONS

A total of 39 drainage systems, defined as 42 separate riparian reaches, occur within the footprint of the SOCTIIP A7C-FEM-M proposed project alternative. In addition to those drainages directly impacted by the proposed project, seven drainage systems occur within the indirect impact zone within 300 linear feet of the direct impact boundary. The functionality of these 46 drainage systems varies widely across the sixteen-mile extent of the proposed project footprint. Drainage scores ranged from 10.40 to 20.00 out of 21. In addition to these drainage systems, six depressional wetlands, including five vernal marshes and one vernal pool, will be impacted by the proposed project. Two of the vernal marshes are only impacted indirectly, while the other four depressional wetlands are impacted directly by the proposed project.

The majority of the proposed project will occur within undeveloped areas primarily existing as grazing lands or natural open space. Although many of the on-site drainage features and depressional wetlands are subjected to anthropogenic disturbances in the form of upstream residential developments, agriculture, and mining, the drainages exhibit medium to high functionality compared to the reference condition.

Impacts to the post-project functionality of the on-site drainage features and depressional wetlands occur largely as a result of a loss in acreage. Much of the surrounding land will continue to exist as open space in the post-project condition. In addition, many of the drainage features that traverse the project footprint will be culverted to allow for connectivity of flows on both sides of the toll road corridor. Only one drainage, Drainage 7-11, a small ephemeral drainage course that empties onto Ortega Highway from the south, will be completely impacted resulting in a score of 0.00 in the post-project condition. Four depressional wetlands, VM-18, VM-19, VM-20, and VP-3, will be completely impacted resulting in a score of 0.00 in the post-project condition. As project mitigation will occur off-site to the north (Upper Chiquita Canyon Mitigation Area) and west (Tesoro High School Mitigation Area) of the project site, the mitigation areas were scored separately.

II. FUNCTIONAL UNIT AND JURISDICTION SUMMARY

Functional units (FUs) are quantified by multiplication of the drainage score (*x* out of 21 total points) and the total jurisdictional acreage of the defined assessment area. In the post project condition, excluding off-site mitigation, the proposed project results in the loss of 455.81 FUs. Of this loss in functionality, 364.70 FUs will be lost as a result of direct impacts, and 91.10 FUs will be lost as a result of indirect impacts. The direct and indirect loss in on-site functional units will be mitigated through restoration, creation, and enhancement of 4.66 acres of southern willow woodland; creation of 3.06 acres of mulefat scrub; creation and substantial restoration of 7.31 acres of wet meadow; creation and restoration of 0.88 acres of oak/elderberry woodland; restoration and creation of 4.90 acres of coastal sage scrub/native perennial grassland ecotone; and restoration of 182 acres of native perennial grassland; and restoration of 13 acres of sycamore and oak riparian woodland. This mitigation will result in a functional gain of 514.67 FUs, thereby ensuring a net increase in functionality in the post-project condition.

I. BUFFER

A. PERCENTAGE OF ASSESSMENT AREA WITH BUFFER [CRAM]

The vast majority (74.4%) of drainage features exhibit an undisturbed/undeveloped 10-meter buffer, as required for the maximum score of 1.00 in the pre-project condition. Those drainages that scored less than 1.00 in the pre-project condition were adjacent to existing agricultural cropland, grazing areas, and access roads. Most of the drainage features perpendicularly traverse the project site, and as such, functional capacity in the post-project condition was predominantly lost as a function of the loss of total acreage. Those drainage features that run parallel to the corridor for a portion of the assessment area, such as Canada Chiquita, FE/7-2, 7-3, and San Juan

Creek, lost buffer functionality as a result of the proposed project. This metric was evaluated in the field and verified in the office using aerial photography and vegetation maps.

B. AVERAGE WIDTH OF BUFFER [CRAM]

In the pre-project condition, on average, the drainage features exhibit a buffer width between 60 and 100 meters. Only two drainages in the pre-project condition, Canada Chiquita and FE/7-1 adjacent to Tesoro High School, exhibited an average buffer of less than thirty feet. As with the 10-meter buffer metric, those drainages that occur parallel to the corridor lost buffer width in the post-project condition. All other drainages lost functionality as a result of a loss in total acreage. This metric was evaluated in the field and verified in the office using aerial photography and vegetation maps.

C. BUFFER CONDITION [CRAM] / ADJACENT AREA TO CORPS/CDFG JURISDICITON

The 100-meter buffer used in the "Average Width of Buffer" metric was analyzed to determine buffer condition. Most drainages received a score of 0.75 in the pre-project condition primarily as a result of the presence of invasive species and adjacent non-native ruderal vegetation. Drainages FE/7-21, FE/7-22, and FE/7-23 received a score of 0.50 as a result of their proximity to active agriculture and dry-land farming. As with the previously mentioned buffer functions, those drainages running parallel to the proposed project corridor, specifically 7-3 and FE/7-3, were subject to lowered buffer conditions in the post-project condition. This metric was evaluated in the field and verified in the office using aerial photography and vegetation maps.

D. LAND USE / LAND COVER (LULC) [LLFA]

In the pre-project condition, functionality of drainages was reduced by land use activities in the watershed including residential development (FE-1, FE/7-7, FE/7-10, FE/7-11, FE/7-12, FE/7-24, FE/7-25, FE/7-San Onofre Creek), gravel mining (7-13, FE/7-3, FE/7-4, FE/7-6), and agriculture (FE/7-2, FE-1, FE/7-21, FE/7-22, and FE/7-23). In the post-project condition, consideration was given to a potential increase in pesticide, hydrocarbon and/or sediment loading from the proposed corridor roadways. As such, drainages downstream of the corridor received lower scores. This metric was evaluated in the field and verified in the office using aerial photography.

II. HYDROLOGY

A. WATER SOURCE [CRAM]

Upstream stressors that can reduce aquatic functions include, but are not limited to culverts, riprap, dry-weather discharge, and flows generated by hardscape associated with upstream development. In the pre-project condition, the water source for most on-site drainages is primarily natural, however these drainages may receive occasional or small amounts of inflow from anthropogenic sources, such as urban/storm runoff from development within the cities of Coto de Caza and San Clemente, thereby resulting in scores of 0.75. A small minority of the drainages received water primarily from anthropogenic sources including gravel mining (7-13, FE/7-3), the Talega development in San Clemente (FE/7-11), the Pacific Golf and Country Club (FE/7-12), and southeastern portions of the City of San Clemente (FE/7-21, FE/7-22, FE/7-23). Post-project scores were only affected by the loss of functional acreage. The presence of post-project culverts was not enough in and of itself to negatively impact the water source from primarily natural to primarily anthropogenic when considering the overall watershed and upstream activities. This metric was evaluated in the field and verified in the office using aerial photography.

B. HYDROPERIOD [CRAM]

In the pre-project condition, most of the on-site drainages are subject to natural peak flows and base flows, resulting in scores of 1.00. There are no diversions, upstream impoundments, or reductions in flow associated with the proposed project. There are, however, augmentations to the natural flow regime via gravel mining operations (7-13, FE/7-3, FE/7-4, FE/7-6, FE/7-7), residential development (FE/7-10, FE/7-11, FE/7-21, FE/7-22, FE/7-23, FE/7-24, FE/7-25), and golf courses (FE/7-12). In many of these cases, both peak flows and base flows are subject to alteration. In the post-project condition, culverted crossings will affect the physical properties, such as slope and width to depth ratios, and, in turn, plant communities associated with the on-site drainages. As such, the post-project hydroperiod functionality will be subject to significant negative impacts. This metric was evaluated in the field and verified in the office using aerial photography and project engineering data.

C. FLOODPLAIN CONNECTION [CRAM]

With only a few exceptions, on-site drainages exhibit a naturally confined channel with access to an adjacent floodplain, thereby earning a score of 0.75. A few drainages (FE/C/7-1, 7-11, 7-13, FE/7-3, FE/7-23) exhibit adjacent road restrictions to the floodplain and received scores of 0.50 or less, while several drainage systems (San Juan Creek, FE/7-4, FE/7-7, FE/7-10, FE/7-11, FE/7-12, FE/7-21, FE/7-22, FE/7-24, San Mateo Creek) were adjacent to unrestricted floodplains

comprised of natural or open space, thereby earning a score of 1.00. Since the project is a linear transportation corridor and most on-site drainages perpendicularly traverse the project footprint, post-project reductions in functionality were primarily a result of the loss in total acreage. This metric was evaluated in the field and verified in the office using aerial photography.

D. ALTERED HYDRAULIC CONVEYANCE [LLFA]

Example stressors for altered hydraulic conveyance include, but are not limited to, road crossings, culverts, and rip-rap. In the pre-project condition, all of the on-site drainage features scored a 0.75 or above for this metric, indicating that less than fifteen percent of the riparian reach main stem is subjected to altered hydraulic conveyance. In the post-project condition, for those drainages that are not completely impacted or impeded by the proposed project, the hydraulic conveyance is altered by either bridge crossings with bank stabilization or culverted crossings. A total of 35 culverts affecting 17 drainage systems will be installed within the proposed project footprint. As a result of the corridor road crossings and culverts, the altered hydraulic conveyance scores exhibit the largest gap between pre- and post-project scores for any of the twenty-two metrics in this assessment. This metric was evaluated in the field and verified in the office using aerial photography.

E. SURFACE WATER PERSISTENCE / RECHARGE [SMR HGM]

Scores for surface water persistence varied depending on whether the drainage is perennial, intermittent or ephemeral. The vast majority (80%) of the on-site drainage features were ephemeral drainages earning a score of 0.50. A few drainages (FE/7-2, FE-2B, FE/7-4, FE/7-7, FE/7-11) exhibited signs of intermittent surface water ponding or storage including the presence of hydrophytic vegetation and, thereby, earned a score of 0.75. Post-project surface water persistence and recharge functions were not substantially affected outside of the project impact footprint, and, therefore, the reduction in functional units was a result of the loss in total acreage. This metric was evaluated in the field.

F. FLOOD PRONE AREA [SMR HGM]

This metric assesses the extent to which flood flows are impeded. The majority of the on-site drainages exhibit naturally v-shaped channels and scored 0.75. In the post-project condition, only those drainages (e.g. 7-3) that run parallel with the corridor will experience a reduction in flood prone area function as a result of the project footprint. All other drainage features are subject to a loss in functionality as a result of the loss in total acreage. This metric was evaluated in the field and verified in the office using aerial photography.

III. STRUCTURE - ABIOTIC

A. SEDIMENT REGIME [LLFA]

In the pre-project condition, all of the drainages exhibit equilibrium with respect to a culturally altered sediment regime, except for drainage FE/7-7. In the post-project condition, those drainages modified by culverts will result in no significant storage or recruitment of sediment and, therefore, received a score of 0.10. This metric was evaluated in the field.

B. TOPOGRAPHIC COMPLEXITY [CRAM]

As the vast majority of on-site drainage features are ephemeral, lower order drainages exhibiting a naturally v-shaped channel, most of these features received a score of 0.75. Several features (FE/7-1, 7-3, San Juan Creek, 7-13, FE/7-3, San Mateo Creek, and San Onofre Creek) exhibited a more complex micro- and macro-topographic landscape including meanders, bars, benches, and secondary channels, and, as such, these features received a score of 1.0. In the post-project condition, reductions in total functionality were exclusively a result of loss in total acreage.

C. SUBSTRATE CONDITION [CRAM]

A wide variety of substrate conditions occur within on-site drainage features in the pre-project condition. Many drainages are negatively impacted by disturbed conditions including non-native grasses and grazing, but all of the drainages scored a 0.50 or above in the pre-project condition. In the post-project condition, reductions in total functionality were exclusively a result of loss in total acreage.

IV. STRUCTURE - BIOTIC

A. VERTICAL BIOTIC STRUCTURE

Vertical structure was assessed in the field. The plant height classes are represented by dispersed and non-overlapping plant patches. Standing live and dead vegetation is considered in the assessment. The length of prostrate stems or shoots, and the horizontal extent of canopies is not considered. Only the vertical aspect of structure is considered in this metric. Pre-project drainage scores ranged from 0.25 to1.00 for this metric, as some drainages supported more height classes than others. Post-project reductions in vertical biotic structure functions were a result of loss in total acreage and proportionate losses in height classes, specifically the tree layer, as a result of project impacts.

B. INTERSPERSION AND ZONATION

Interspersion and zonation is measured as the distribution and abundance of horizontal plant zones. Drainages with riparian canopy scored the maximum of 1.0. No drainages scored less than 0.50 in the pre-project condition suggesting that two or more plant zones are apparent along at least one quarter of the active channel. In the post-project condition, reductions in total functionality were exclusively a result of loss in total acreage.

C. RATIO N : NN [SMR HGM]

This metric is based on vegetation data collected during the jurisdictional delineation. The 50/20 Rule (Environmental Laboratory 1987) was utilized to determine dominant vegetation. While the majority of the riparian reaches exhibit between 50 and 75% areal cover of native species, three assessment areas exhibited a predominance (>50%) of non-native vegetation. In the post-project condition, reductions in total functionality were exclusively a result of loss in total acreage. This metric was assessed in the field at the time of the vegetation mapping and jurisdictional delineation.

D. CANOPY [SMR HGM]

Canopy is a measure of the percent cover of tree layer. The drainages varied from having a tree layer greater than 50% to having no trees but a greater than 50% shrub layer in the pre-project condition. A minor negative impact is anticipated in the post-project condition as a result of proportional changes in the canopy as a result of project impacts. However, reductions in total functionality were primarily a result of loss in total acreage.

E. AGE DISTRIBUTION [SMR HGM]

Age Distribution assesses the extent of recruitment within the drainages. The age distribution varies widely across the drainages, but, in general, those areas that support trees also support saplings. Those assessment areas without tree cover generally support herb and shrub layers. Post-project reductions in age distribution were a result of direct loss in total acreage and proportionate losses in age classes, specifically the tree layer, as a result of project impacts. This metric was assessed in the field at the time of the vegetation mapping and jurisdictional delineation.

F. RIPARIAN VEGETATION CONDITION [LLFA]

Throughout the site, most of the drainages consist of primarily native vegetation with minor chronic disturbance by grazing, thereby earning a score of 0.75. Many drainages, which otherwise exhibited a lack of disturbance and a predominance of native vegetation, were prevented from earning a score of 1.00 by the presence of exotic or invasive species including tree tobacco (*Nicotiana glauca*), black mustard (*Brassica nigra*), pampas grass (*Cortaderia selloana*), rabbitsfoot grass (*Polypogon monspeliensis*), cardoon (*Cynara cardunculus*), and Italian thistle (*Carduus pycnocephalus*). In the post-project condition, reductions in functional units will result from a loss in total acreage. This metric was evaluated in the field.

G. RIPARIAN CORRIDOR CONTINUITY [LLFA]

In the post-project condition, fourteen riparian reach assessment areas exhibited a reach with less than five percent of the total area exhibiting gaps or breaks in vegetation as a result of cultural alteration, thereby earning a score of 1.00. A wide range in levels of cultural alteration is apparent across the project site. Much of the cultural alteration in the pre-project condition is a result of road crossings and agricultural activities. In the post-project condition, losses in functionality are primarily a result of losses in total acreage. Reductions in scores for this metric in the post-project condition were dependent on the proportion of gaps in vegetation within the project footprint and whether the drainage feature exists on both sides of the corridor. This metric was evaluated in the field and verified in the office using aerial photography.

H. INVASIVE, EXOTIC PLANT SPECIES [LLFA]

In the pre-project condition, several drainage features support invasive exotic species listed by Cal-IPC including the following: tree tobacco (*Nicotiana glauca*), black mustard (*Brassica nigra*), pampas grass (*Cortaderia selloana*), prickly lettuce (*Lactuca serriola*), tocalote (*Centaurea miletensis*), salt cedar (*Tamarix ramosissima*), ripgut brome (*Bromus diandrus*), wild oats (*Avena fatua*), bristly ox-tongue (*Picris echioides*), iceplant (*Carpobrotus* sp.), rabbitsfoot grass (*Polypogon monspeliensis*), cardoon (*Cynara cardunculus*), and Italian thistle (*Carduus pycnocephalus*). This metric was assessed in the field at the time of the vegetation mapping and jurisdictional delineation.

RESULTS

Table 31 summarizes the loss of functional capacity expected to occur with implementation of the proposed SOCTIIP project. Table 32 summarizes the functional capacity expected to be created through the proposed mitigation program.

Table 31: Post-Project Loss of Functional Capacity

Watershed	Direct Loss of Functional Capacity*	Indirect Loss of Functional Capacity*	Total Watershed Loss of functional Capacity
San Juan	195.6	48.2	243.8
San Mateo	169.1	42.9	212.01
Sum	**364.7**	**91.1**	**455.81**

Table 32: Gains in Functional Capacity as a Result of Mitigation

Feature	Post-Mitigation Score (21 Possible)	Acres	Acres* Points
UPPER CHIQUITA CANYON - Enhancement	5.25	3.00	15.75
UPPER CHIQUITA CANYON Creation	19.75	13.00	256.75
TESORO (NORTH)	15.70	3.97	62.33
Tesoro South - Enhancement	3.15	0.79	2.49
TESORO (SOUTH) Creation	17.35	11.13	193.11
CHIQUITA WOODS	20.50	0.5	10.25
EDB 2	15.55	1.0	15.55
GRAND TOTAL	97.25	33.40	556.24

Conclusions

Implementation of the proposed project will result in a loss of 455.81 functional units. The loss of function is largely a result of the loss in total acreage. In addition to the loss in acreage, stressors in the post-project condition primarily include the installation of 35 culverts within the project footprint. However, these culverts are essential to retaining a semblance of the existing flow patterns and connectivity across the project footprint. Without the installation of culverts additional downstream functions would have been lost. On-site loss of function will be mitigated through habitat establishment and restoration in four mitigation areas as outlined in the

Final Habitat Mitigation and Monitoring Plan. The proposed mitigation will result in a gain of 556.24 functional units, thereby ensuring a net gain in functionality in the post-project condition.

SOCTIIP Functional Assessment
Direct Impact

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (22)	Acres	Acres* Points
SAN JUAN CREEK WATERSHED	Canada Chiquita	0.50	0.10	0.50	0.10	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	0.75	0.50	0.50	0.75	14	0.00	0.00
	FE/C/7-Wetland 1	0.50	0.25	0.50	0.10	0.75	0.75	0.25	0.50	1.00	0.25	0.75	0.50	1.00	0.75	0.50	1.00	0.50	0.50	0.75	0.50	1.00	13	0.00	0.0
	FE/C/7-1	0.50	0.10	0.75	0.75	0.75	0.75	0.50	1.00	0.50	0.75	0.75	0.75	0.50	1.00	0.50	0.75	1.00	0.75	0.50	0.25	1.00	14	0.42	5.9
	FE/C/7-2	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	16	0.00	0.00
	FE/C/7-4	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	16	0.00	0.00
	FE/7-1	0.10	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	1.00	0.50	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	18	0.51	9.1
	FE/7-2	1.00	0.50	1.00	0.50	1.00	1.00	0.75	1.00	0.75	0.75	0.75	0.75	0.50	0.50	0.75	1.00	0.75	0.10	0.75	1.00	1.00	16	0.21	3.4
	FE-1	0.75	0.50	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.50	1.00	0.75	1.00	1.00	1.00	0.75	1.00	1.00	17	0.69	11.6
	FE-2A	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	0.50	1.00	0.50	0.75	0.50	1.00	1.00	17	0.01	0.2
	FE-2B	1.00	1.00	1.00	1.00	0.75	1.00	0.75	1.00	0.75	0.75	0.75	0.75	1.00	0.50	0.75	0.75	0.50	0.10	0.75	1.00	1.00	17	0.06	1.0
	7-2	1.00	0.50	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.10	0.75	1.00	1.00	16	0.03	0.5
	7-3(A)	0.50	0.50	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	1.00	0.75	0.75	0.25	0.10	0.75	0.25	1.00	15	2.00	29.7
	7-3(B)	0.75	0.50	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.75	0.75	1.00	0.75	1.00	1.00	0.75	0.75	0.75	0.75	0.25	1.00	17	2.00	34.5
	7-4	0.50	0.10	0.50	0.25	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	1.00	0.75	1.00	0.75	0.75	0.75	0.75	15	0.00	0.00
	7-5	0.75	0.50	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	17	0.09	1.55
	7-6	1.00	0.50	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	18	0.14	2.49
	SAN JUAN CREEK	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	0.75	0.75	19	0.30	5.8
	7-10	1.00	0.75	0.75	1.00	1.00	1.00	0.50	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75	0.75	0.75	0.50	0.75	0.75	1.00	17	0.17	2.8
	7-11	1.00	0.75	0.75	1.00	1.00	1.00	0.50	0.75	0.50	0.75	0.75	0.75	0.75	0.25	0.50	0.75	1.00	0.10	0.75	0.50	1.00	15	0.03	0.5
	7-12	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.25	0.50	0.50	1.00	0.10	0.75	1.00	1.00	16	0.51	8.2
	7-13(A)	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.25	0.75	1.00	1.00	0.50	0.50	1.00	1.00	0.10	0.75	0.75	1.00	17	1.16	19.6
	7-13(B)	0.50	0.75	0.75	0.10	0.50	0.25	0.50	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.10	0.10	0.50	0.25	1.00	11	1.75	19.3
	FE/7-3(A)	0.75	0.50	0.75	0.10	0.50	0.25	0.50	0.75	0.50	0.75	0.75	0.75	0.50	0.75	0.50	1.00	0.75	1.00	0.50	0.10	1.00	13	1.55	20.1
	FE/7-3(B)	1.00	0.75	1.00	0.25	0.50	0.25	0.75	1.00	0.50	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	1.00	0.75	0.25	1.00	15	0.39	5.8
	FE/7-4	1.00	1.00	1.00	0.10	0.75	0.25	1.00	1.00	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	0.75	1.00	1.00	17	0.82	13.6
	SAN JUAN CREEK WATERSHED SUBTOTALS																						381	12.84	195.55

SOCTIIP Functional Assessment
Direct Impact

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (22)	Acres	Acres* Points
San Mateo Creek Watershed	FE/7-6	1.00	1.00	1.00	0.25	0.75	0.50	0.75	1.00	0.50	0.50	0.75	0.75	1.00	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	**17**	**0.84**	**14.5**
	FE/7-7	1.00	1.00	1.00	0.75	0.75	0.50	1.00	1.00	0.75	0.75	0.50	0.75	0.75	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	**18**	**2.06**	**37.1**
	FE/7-8	1.00	1.00	1.00	1.00	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	**19**	**2.42**	**46.0**
	FE/7-9	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	1.00	**19**	**0.10**	**1.9**
	FE/7-10	1.00	0.75	0.75	0.50	0.75	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.75	0.50	0.75	1.00	0.75	0.75	0.10	1.00	**15**	**0.21**	**3.1**
	FE/7-11	1.00	0.50	0.75	0.10	0.50	0.10	1.00	0.75	0.75	0.75	0.75	0.75	0.50	0.25	0.50	0.75	0.25	1.00	0.75	0.10	0.75	**13**	**0.77**	**9.7**
	FE/7-12	1.00	1.00	0.75	0.10	0.50	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.25	0.75	0.50	0.25	0.10	0.75	0.25	0.75	**12**	**0.35**	**4.3**
	FE/7-13	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	0.50	0.75	0.25	0.10	0.75	1.00	0.75	**16**	**0.65**	**10.14**
	FE/7-14	1.00	1.00	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.25	0.75	0.75	0.25	0.50	0.75	0.10	0.75	**14**	**0.20**	**2.8**
	FE/7-15	1.00	1.00	1.00	0.75	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.25	0.75	1.00	1.00	0.10	0.75	0.75	1.00	**16**	**0.12**	**2.0**
	FE/7-16	1.00	1.00	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.75	0.75	1.00	1.00	0.25	0.75	0.75	0.75	**16**	**0.09**	**1.5**
	FE/7-17	1.00	1.00	0.75	0.75	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.50	0.75	1.00	0.25	0.25	0.75	0.50	1.00	**16**	**0.12**	**1.9**
	FE/7-18	1.00	1.00	0.75	0.75	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.75	0.75	1.00	0.50	0.75	0.75	0.10	0.75	**16**	**1.14**	**18.4**
	FE/7-19	1.00	1.00	0.75	0.75	1.00	1.00	0.75	0.75	0.50	0.75	0.75	0.75	0.75	0.25	0.75	1.00	0.50	0.10	0.75	0.10	1.00	**15**	**0.01**	**0.1**
	FE/7-20	1.00	1.00	0.75	0.75	1.00	1.00	0.75	0.75	0.50	0.75	0.75	0.75	0.75	0.50	0.75	1.00	0.50	0.10	0.75	0.10	1.00	**15**	**0.01**	**0.2**
	FE/7-21	0.75	0.50	0.50	0.25	0.50	0.50	1.00	0.75	0.50	0.75	0.75	0.75	0.75	0.50	0.75	0.75	0.75	0.50	0.75	0.10	1.00	**13**	**0.48**	**6.4**
	FE/7-22	0.75	0.50	0.50	0.25	0.50	0.10	1.00	0.75	0.50	0.75	0.75	0.75	0.75	0.50	1.00	0.75	0.50	0.10	0.75	0.10	0.75	**12**	**0.33**	**4.1**
	FE/7-23	1.00	0.75	0.50	0.25	0.50	0.10	0.25	0.10	0.50	0.75	0.75	0.75	0.50	0.25	0.75	0.75	0.25	0.10	0.50	0.10	1.00	**10**	**0.00**	**0.0**
	FE/7-24	1.00	0.75	0.75	0.25	0.75	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.75	0.75	0.25	0.10	0.50	0.75	1.00	**13**	**0.03**	**0.4**
	FE/7-25	1.00	0.75	1.00	0.25	0.75	0.10	0.75	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**14**	**0.03**	**0.4**
	FE/7-SAN MATEO CREEK	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	**20**	**0.01**	**0.2**
	FE/7 SAN MATEO MARSH	1.00	0.75	0.75	0.75	0.75	1.00	0.75	0.75	1.00	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19**	**0.00**	**0.00**
	FE/7 SAN MATEO MARSH EAST OF I-5	0.75	0.75	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19**	**0.21**	**4.04**
	FE/7-SAN ONOFRE CREEK	0.75	0.75	0.75	0.25	0.75	0.50	0.75	0.75	1.00	0.50	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	1.00	**17**	**0.01**	**0.2**
	SAN MATEO CREEK WATERSHED SUBTOTALS																						**376**	**10.19**	**169.11**
	GRAND TOTAL																						**757**	**23.03**	**364.66**

SOCTIIP Functional Assessment
Indirect Impact

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points Lost	Acres	Acres* Points
SAN JUAN CREEK WATERSHED	Canada Chiquita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**	**0.24**	**0**
	FE/C/7-Wetland 1	-0.40	-0.15	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.80**	**5.26**	**4.21**
	FE/C/7-1	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	**1.50**	**0.30**	**0.45**
	FE/C/7-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
	FE/C/7-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
	FE/7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.50**	**2.79**	**4.19**
	FE/7-2	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	**1.50**	**0.17**	**0.26**
	FE-1	0.00	0.00	0.00	-0.25	0.00	-0.25	0.00	-0.75	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.50**	**0.44**	**0.66**
	FE-2A	0.00	0.00	0.00	-0.90	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.15**	**0.12**	**0.14**
	FE-2B	0.00	0.00	0.00	-0.90	0.00	-0.25	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.40**	**0.03**	**0.04**
	7-2	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.25**	**0.03**	**0.01**
	7-3(A)	-0.25	-0.25	-0.65	-0.90	0.00	0.00	-0.25	-0.90	0.00	-0.25	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	0.00	**4.10**	**0.99**	**4.06**
	7-3(B)	-0.25	0.00	-0.25	-0.90	0.00	0.00	-0.50	-0.90	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3.05**	**0.99**	**3.02**
	7-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.10**	**0.00**
	7-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.21**	**0.00**
	7-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.22**	**0.00**
	SAN JUAN CREEK	0.00	0.00	-0.25	0.00	0.00	-0.25	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.75**	**27.30**	**20.48**
	7-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.04**	**0.00**
	7-11	-1.00	0.00	0.00	-0.25	0.00	0.00	0.00	-0.75	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.75**	**0.00**	**0.00**
	7-12	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	-0.75	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	**2.00**	**1.07**	**2.14**
	7-13(A)	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	-0.75	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	**1.75**	**1.96**	**3.43**
	7-13(B)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.75**	**1.31**	**0.98**
	FE/7-3(A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.25**	**2.11**	**0.53**
	FE/7-3(B)	-0.90	-0.65	-0.90	-0.15	0.00	0.00	0.00	-1.00	0.00	-0.65	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**5.00**	**0.53**	**2.64**
	FE/7-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	**1.25**	**0.76**	**0.95**
	SAN JUAN CREEK WATERSHED SUBTOTALS																						**31.25**	**46.73**	**48.17**

SOCTIIP Functional Assessment
Indirect Impact

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points Lost	Acres	Acres* Points
San Mateo Creek Watershed	FE/7-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.90	0.00	**1.65**	**1.26**	**2.1**
	FE/7-7	0.00	0.00	-0.25	-0.25	0.00	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	**1.75**	**1.72**	**3.0**
	FE/7-8	0.00	0.00	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.65**	**0.04**	**0.1**
	FE/7-9	0.00	0.00	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	0.00	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.80**	**0.03**	**0.1**
	FE/7-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.63**	**0.0**
	FE/7-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.65**	**0.56**	**0.4**
	FE/7-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.90	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	0.00	**1.55**	**1.59**	**2.5**
	FE/7-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**	**0.0**
	FE/7-14	0.00	0.00	0.00	-0.25	0.00	-0.25	0.00	-0.90	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.90**	**0.15**	**0.3**
	FE/7-15	0.00	0.00	0.00	-0.25	0.00	-0.25	0.00	-0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.40**	**0.49**	**0.7**
	FE/7-16	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	-0.90	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.30**	**0.09**	**0.2**
	FE/7-17	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	-0.90	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.30**	**0.08**	**0.2**
	FE/7-18	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	-0.90	0.00	0.00	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.70**	**0.24**	**0.6**
	FE/7-19	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.80**	**0.01**	**0.0**
	FE/7-20	0.00	0.00	0.00	-0.25	0.00	-0.90	0.00	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.80**	**0.01**	**0.0**
	FE/7-21	0.00	0.00	0.00	-0.25	0.00	-0.40	0.00	-0.50	0.00	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.40**	**0.70**	**1.0**
	FE/7-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.25	0.00	0.00	0.00	0.00	**0.25**	**0.58**	**0.1**
	FE/7-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**	**0.0**
	FE/7-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.90**	**0.01**	**0.0**
	FE/7-25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.90**	**0.02**	**0.0**
	FE/7-SAN MATEO CREEK	-0.25	0.00	-0.25	-0.25	0.00	0.00	-0.25	-0.25	0.00	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.50**	**20.26**	**30.4**
	FE/7 SAN MATEO MARSH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**16.02**	**0.0**
	FE/7 SAN MATEO MARSH EAST OF I-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**8.36**	**0.0**
	FE/7-SAN ONOFRE CREEK	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.50**	**2.48**	**1.2**
	SAN MATEO CREEK WATERSHED SUBTOTALS																						**28.70**	**55.35**	**42.87**
	GRAND TOTAL																						**59.95**	**102.08**	**91.04**

SOCTIIP Functional Assessment
Pre-Project

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (22)	Acres	Acres* Points
	Canada Chiquita	0.50	0.10	0.50	0.10	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	0.75	0.50	0.50	0.75	**14.20**	**0.00**	**0.00**
	FE/C/7-Wetland 1	0.50	0.25	0.50	0.10	0.75	0.75	0.25	0.50	1.00	0.25	0.75	0.50	1.00	0.75	0.50	1.00	0.50	0.50	0.75	0.50	1.00	**12.60**		**0.00**
	FE/C/7-1	0.50	0.10	0.75	0.75	0.75	0.75	0.50	1.00	0.50	0.75	0.75	0.75	0.50	1.00	0.50	0.75	1.00	0.75	0.50	0.25	1.00	**14.10**	**0.00**	**0.00**
	FE/C/7-2	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**16.35**	**0.00**	**0.00**
	FE/C/7-4	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**16.35**	**0.00**	**0.00**
	FE/7-1	0.10	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	1.00	0.50	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	**17.85**	**0.00**	**0.00**
	FE/7-2	1.00	0.50	1.00	0.50	1.00	1.00	0.75	1.00	0.75	0.75	0.75	0.75	0.50	0.50	0.75	1.00	0.75	0.10	0.75	1.00	1.00	**16.10**	**0.00**	**0.00**
	FE-1	0.75	0.50	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.50	1.00	0.75	1.00	1.00	1.00	0.75	1.00	1.00	**16.75**	**0.00**	**0.00**
	FE-2A	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	0.50	1.00	0.50	0.75	0.50	1.00	1.00	**17.00**	**0.00**	**0.00**
	FE-2B	1.00	1.00	1.00	1.00	0.75	1.00	0.75	1.00	0.75	0.75	0.75	0.75	1.00	0.50	0.75	0.75	0.50	0.10	0.75	1.00	1.00	**16.85**	**0.00**	**0.00**
	7-2	1.00	0.50	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.10	0.75	1.00	1.00	**16.35**	**0.00**	**0.00**
	7-3(A)	0.50	0.50	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	1.00	0.75	0.75	0.25	0.10	0.75	0.25	1.00	**14.85**	**0.00**	**0.00**
	7-3(B)	0.75	0.50	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.75	0.75	1.00	0.75	1.00	1.00	0.75	0.75	0.75	0.75	0.25	1.00	**17.25**	**0.00**	**0.00**
	7-4	0.50	0.10	0.50	0.25	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	1.00	0.75	1.00	0.75	0.75	0.75	0.75	**14.60**	**0.00**	**0.00**
	7-5	0.75	0.50	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	**17.25**	**0.00**	**0.00**
	7-6	1.00	0.50	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	**17.75**	**0.00**	**0.00**
	SAN JUAN CREEK	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	0.75	0.75	**19.25**	**0.00**	**0.00**
	7-10	1.00	0.75	0.75	1.00	1.00	1.00	0.50	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75	0.75	0.75	0.50	0.75	0.75	1.00	**16.50**	**0.00**	**0.00**
	7-11	1.00	0.75	0.75	1.00	1.00	1.00	0.50	0.75	0.50	0.75	0.75	0.75	0.75	0.25	0.50	0.75	1.00	0.10	0.75	0.50	1.00	**15.10**	**0.00**	**0.00**
	7-12	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.25	0.50	0.50	1.00	0.10	0.75	1.00	1.00	**16.10**	**0.00**	**0.00**
	7-13(A)	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.25	0.75	1.00	1.00	0.50	0.50	1.00	1.00	0.10	0.75	0.75	1.00	**16.85**	**0.00**	**0.00**
	7-13(B)	0.50	0.75	0.75	0.10	0.50	0.25	0.50	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.10	0.10	0.50	0.25	1.00	**11.05**	**0.00**	**0.00**
	FE/7-3(A)	0.75	0.50	0.75	0.10	0.50	0.25	0.50	0.75	0.50	0.75	0.75	0.75	0.50	0.75	0.50	1.00	0.75	1.00	0.50	0.10	1.00	**12.95**	**0.00**	**0.00**
	FE/7-3(B)	1.00	0.75	1.00	0.25	0.50	0.25	0.75	1.00	0.50	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	1.00	0.75	0.25	1.00	**15.00**	**0.00**	**0.00**
	FE/7-4	1.00	1.00	1.00	0.10	0.75	0.25	1.00	1.00	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	0.75	1.00	1.00	**16.60**	**0.00**	**0.00**
	SAN JUAN CREEK WATERSHED SUBTOTALS	**19.60**	**16.20**	**19.75**	**16.90**	**20.25**	**20.50**	**17.00**	**23.00**	**13.75**	**16.50**	**18.50**	**19.00**	**18.00**	**17.50**	**17.25**	**20.25**	**17.10**	**13.00**	**17.00**	**17.35**	**23.00**	**381.40**	**0.00**	**0.00**
	FE/7-6	1.00	1.00	1.00	0.25	0.75	0.50	0.75	1.00	0.50	0.50	0.75	0.75	1.00	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	**17.25**	**0.00**	**0.00**
	FE/7-7	1.00	1.00	1.00	0.75	0.75	0.50	1.00	1.00	0.75	0.75	0.50	0.75	0.75	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	**18.00**	**0.00**	**0.00**
	FE/7-8	1.00	1.00	1.00	1.00	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	**19.00**	**0.00**	**0.00**
	FE/7-9	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	1.00	**19.00**	**0.00**	**0.00**
	FE/7-10	1.00	0.75	0.75	0.50	0.75	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.75	0.50	0.75	1.00	0.75	0.75	0.10	1.00	**14.70**	**0.00**	**0.00**
	FE/7-11	1.00	0.50	0.75	0.10	0.50	0.10	1.00	0.75	0.75	0.75	0.75	0.75	0.50	0.25	0.50	0.75	0.25	1.00	0.75	0.10	0.75	**12.55**	**0.00**	**0.00**
	FE/7-12	1.00	1.00	0.75	0.10	0.50	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.25	0.75	0.50	0.25	0.10	0.75	0.25	0.75	**12.30**	**0.00**	**0.00**
	FE/7-13	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	0.50	0.75	0.25	0.10	0.75	1.00	0.75	**15.60**	**0.00**	**0.00**
	FE/7-14	1.00	1.00	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.25	0.75	0.75	0.25	0.50	0.75	0.10	0.75	**14.10**	**0.00**	**0.00**
	FE/7-15	1.00	1.00	1.00	0.75	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.25	0.75	1.00	1.00	0.10	0.75	0.75	1.00	**16.35**	**0.00**	**0.00**
	FE/7-16	1.00	1.00	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.75	0.75	1.00	1.00	0.25	0.75	0.75	0.75	**16.25**	**0.00**	**0.00**
	FE/7-17	1.00	1.00	0.75	0.75	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	0.50	0.75	1.00	0.25	0.25	0.75	0.50	1.00	**15.50**	**0.00**	**0.00**
	FE/7-18	1.00	1.00	0.75	0.75	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.75	0.75	1.00	0.50	0.75	0.75	0.10	0.75	**16.10**	**0.00**	**0.00**

SOCTIIP Functional Assessment
Pre-Project

		Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
	Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (22)	Acres	Acres* Points
	FE/7-19	1.00	1.00	0.75	0.75	1.00	1.00	0.75	0.75	0.50	0.75	0.75	0.75	0.75	0.25	0.75	1.00	0.50	0.10	0.75	0.10	1.00	**14.95**	**0.00**	**0.00**
	FE/7-20	1.00	1.00	0.75	0.75	1.00	1.00	0.75	0.75	0.50	0.75	0.75	0.75	0.75	0.50	0.75	1.00	0.50	0.10	0.75	0.10	1.00	**15.20**	**0.00**	**0.00**
	FE/7-21	0.75	0.50	0.50	0.25	0.50	0.50	1.00	0.75	0.50	0.75	0.75	0.75	0.75	0.50	0.75	0.75	0.75	0.50	0.75	0.10	1.00	**13.35**	**0.00**	**0.00**
	FE/7-22	0.75	0.50	0.50	0.25	0.50	0.10	1.00	0.75	0.50	0.75	0.75	0.75	0.75	0.50	1.00	0.75	0.50	0.10	0.75	0.10	0.75	**12.30**	**0.00**	**0.00**
	FE/7-23	1.00	0.75	0.50	0.25	0.50	0.10	0.25	0.10	0.50	0.75	0.75	0.75	0.50	0.25	0.75	0.75	0.25	0.10	0.50	0.10	1.00	**10.40**	**0.02**	**0.2**
	FE/7-24	1.00	0.75	0.75	0.25	0.75	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.75	0.75	0.25	0.10	0.50	0.75	1.00	**13.45**	**0.00**	**0.00**
	FE/7-25	1.00	0.75	1.00	0.25	0.75	0.10	0.75	1.00	0.50	0.75	0.75	0.75	0.50	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**13.95**	**0.00**	**0.00**
	FE/7-SAN MATEO CREEK	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	**20.00**	**0.00**	**0.00**
	FE/7 SAN MATEO MARSH	1.00	0.75	0.75	0.75	0.75	1.00	0.75	0.75	1.00	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19.00**	**0.00**	**0.00**
	FE/7 SAN MATEO MARSH EAST OF I-5	0.75	0.75	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19.25**	**0.00**	**0.00**
	FE/7-SAN ONOFRE CREEK	0.75	0.75	0.75	0.25	0.75	0.50	0.75	0.75	1.00	0.50	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	1.00	**17.00**	**0.00**	**0.00**
	SAN MATEO CREEK WATERSHED SUBTOTALS	**23.00**	**20.50**	**18.75**	**13.70**	**18.25**	**15.70**	**19.75**	**21.35**	**14.50**	**17.25**	**17.75**	**19.00**	**18.25**	**15.25**	**19.25**	**20.75**	**15.75**	**12.90**	**18.00**	**13.65**	**22.25**	**375.55**	**0.00**	**0.00**
	GRAND TOTAL	**42.60**	**36.70**	**38.50**	**30.60**	**38.50**	**36.20**	**36.75**	**44.35**	**28.25**	**33.75**	**36.25**	**38.00**	**36.25**	**32.75**	**36.50**	**41.00**	**32.85**	**25.90**	**35.00**	**31.00**	**45.25**	**756.95**	**0.00**	**0.00**

SOCTIIP Functional Assessment
Post-Project

	Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals			
Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (21)	Acres	Acres* Points	Normalized Score
Canada Chiquita	0.50	0.10	0.50	0.10	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	0.75	0.50	0.50	0.75	14.20			
FE/C/7-Wetland 1	0.50	0.25	0.50	0.10	0.75	0.75	0.25	0.50	1.00	0.25	0.75	0.50	1.00	0.75	0.50	1.00	0.50	0.50	0.75	0.50	1.00	12.60			
FE/C/7-1	0.50	0.10	0.75	0.50	0.75	0.75	0.50	0.50	0.50	0.75	0.75	0.75	0.50	0.50	0.50		0.75		0.50	0.25		**10.10**	**0.31**	**3.1**	**0.48**
FE/C/7-2	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**16.35**	**0.00**	**0.00**	**0.78**
FE/C/7-4	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.25	0.10	0.75	1.00	1.00	**16.35**	**0.00**	**0.00**	**0.78**
FE/7-1	0.10	1.00	0.75	1.00	1.00	1.00	0.75	0.50	0.50	0.75	0.75	1.00	0.50	1.00	1.00		1.00		0.75	1.00		**14.35**	**2.76**	**39.6**	**0.68**
FE/7-2	0.75	0.50	1.00	0.50	1.00	1.00	0.75	0.25	0.75	0.75	0.50	0.75	0.50	0.50	0.75		0.50		0.75	1.00		**12.50**	**0.36**	**4.5**	**0.60**
FE-1	0.75	0.50	0.75	0.25	0.75	0.75	0.75	0.25	0.50	0.75	0.50	0.75	0.50	1.00	0.75		1.00		0.75	1.00		**12.25**	**1.07**	**13.1**	**0.58**
FE-2A	1.00	1.00	1.00	0.10	1.00	1.00	0.75	0.75	0.50	0.75	0.75	0.75	0.75	0.50	0.50		0.50		0.50	1.00		**13.10**	**1.47**	**19.3**	**0.62**
FE-2B	1.00	1.00	1.00	0.10	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	0.50	0.75		0.50		0.75	1.00		**13.60**	**0.06**	**0.8**	**0.65**
7-2	1.00	0.50	0.75	0.75	1.00	1.00	0.75	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75		0.50		0.75	1.00		**14.00**	**0.03**	**0.4**	**0.67**
7-3(A)	0.25	0.25	0.10	0.10	1.00	1.00	0.50	0.10	0.50	0.50	0.25	0.75	0.75	1.00	0.75		0.25		0.75	0.10		**8.90**	**2.02**	**18.0**	**0.42**
7-3(B)	0.50	0.50	0.75	0.10	1.00	1.00	0.50	0.10	0.50	0.50	0.75	1.00	0.75	1.00	1.00		0.75		0.75	0.25		**11.70**	**0.02**	**0.2**	**0.56**
7-4	0.50	0.10	0.50	0.25	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	1.00	0.75	1.00	0.75	0.75	0.75	0.75	**14.60**	**0.00**	**0.00**	**0.70**
7-5	0.75	0.50	0.75	0.50	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	**17.25**	**0.00**	**0.00**	**0.82**
7-6	1.00	0.50	0.75	0.75	0.75	1.00	0.75	1.00	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.75	**17.75**	**0.00**	**0.00**	**0.85**
SAN JUAN CREEK	1.00	0.75	0.75	1.00	0.75	0.75	0.75	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75		0.75	0.75		**15.75**	**69.76**	**1098.7**	**0.75**
7-10	1.00	0.75	0.75	1.00	1.00	1.00	0.50	1.00	0.50	0.50	0.75	0.75	0.75	1.00	0.75		0.75		0.75	0.75		**14.25**	**0.11**	**1.6**	**0.68**
7-11	0.00	0.75	0.75	0.75	1.00	1.00	0.50	0.00	0.50	0.75	0.00	0.75	0.75	0.25	0.50		1.00		0.75	0.50		**10.50**	**0.00**	**0.0**	**0.50**
7-12	1.00	1.00	1.00	0.75	1.00	1.00	0.75	0.25	0.50	0.50	0.50	0.75	0.75	0.25	0.50		1.00		0.75	0.25		**12.50**	**1.43**	**17.9**	**0.60**
7-13(A)	1.00	1.00	1.00	0.75	1.00	1.00	0.75	0.25	0.50	0.25	0.50	1.00	1.00	0.50	0.50		1.00		0.75	0.25		**13.00**	**2.51**	**32.6**	**0.62**
7-13(B)	0.50	0.75	0.75	0.10	0.50	0.25	0.50	0.25	0.50	0.75	0.75	0.75	0.50	0.50	0.50		0.10		0.50	0.25		**8.70**	**5.84**	**50.8**	**0.41**
FE/7-3(A)	0.75	0.50	0.75	0.10	0.50	0.25	0.50	0.50	0.50	0.75	0.75	0.75	0.50	0.75	0.50		0.75		0.50	0.10		**9.70**	**8.94**	**86.7**	**0.46**
FE/7-3(B)	0.10	0.10	0.10	0.10	0.50	0.25	0.75	0.00	0.50	0.10	0.00	1.00	0.75	0.75	0.50		0.75		0.75	0.25		**7.25**	**0.10**	**0.7**	**0.35**
FE/7-4	1.00	1.00	1.00	0.10	0.75	0.25	1.00	0.50	0.75	0.75	0.75	0.75	0.75	0.75	0.75		0.75		0.75	0.25		**12.60**	**1.65**	**20.8**	**0.60**
SAN JUAN CREEK WATERSHED SUBTOTAL	**15.85**	**14.20**	**16.60**	**11.45**	**19.00**	**19.25**	**14.25**	**12.95**	**12.50**	**14.50**	**14.75**	**17.25**	**16.50**	**15.50**	**16.00**	**5.25**	**15.10**	**3.45**	**15.50**	**14.70**	**5.25**	**289.80**	**96.69**	**1387.37**	**13.20**
FE/7-6	1.00	1.00	1.00	0.25	0.75	0.50	0.75	0.25	0.50	0.50	0.75	0.75	1.00	1.00	1.00		1.00		0.75	0.10		**12.85**	**1.33**	**17.1**	**0.61**
FE/7-7	1.00	1.00	0.75	0.50	0.75	0.50	1.00	0.25	0.75	0.75	0.50	0.75	0.75	1.00	1.00		1.00		0.75	0.50		**13.50**	**9.49**	**128.1**	**0.64**
FE/7-8	1.00	1.00	1.00	1.00	0.75	0.75	0.75	0.10	0.50	0.75	0.25	0.75	1.00	1.00	1.00		1.00		0.75	1.00		**14.35**	**0.49**	**7.0**	**0.68**
FE/7-8B	1.00	1.00	1.00	1.00	1.00	0.75	0.75	0.10	0.50	0.75	0.10	0.75	1.00	1.00	0.75		1.00		0.75	1.00		**14.20**	**0.08**	**1.1**	**0.68**
FE/7-10	1.00	0.75	0.75	0.50	0.75	0.10	1.00	1.00	0.50	0.75	0.75	0.75	0.50	0.75	0.50		1.00		0.75	0.10		**12.20**	**2.69**	**32.8**	**0.58**
FE/7-11	1.00	0.50	0.75	0.10	0.50	0.10	1.00	0.10	0.75	0.75	0.75	0.75	0.50	0.25	0.50		0.25		0.75	0.10		**9.40**	**0.58**	**5.5**	**0.45**
FE/7-12	1.00	1.00	0.75	0.10	0.50	0.10	1.00	0.10	0.50	0.75	0.25	0.75	0.50	0.25	0.75		0.25		0.75	0.10		**9.40**	**2.06**	**19.4**	**0.45**
FE/7-13	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	0.75	0.75	0.75	0.75	0.50	0.50	0.75	0.25	0.10	0.75	1.00	0.75	**15.60**	**0.00**	**0.00**	**0.74**
FE/7-14	1.00	1.00	0.75	0.25	0.75	0.75	0.75	0.10	0.50	0.50	0.25	0.75	0.75	0.25	0.75		0.25		0.75	0.10		**10.20**	**0.18**	**1.8**	**0.49**
FE/7-15	1.00	1.00	1.00	0.50	0.75	0.75	0.75	0.10	0.50	0.75	0.75	0.75	0.75	0.25	0.75		1.00		0.75	0.75		**12.85**	**0.77**	**9.9**	**0.61**
FE/7-16	1.00	1.00	0.75	0.50	0.75	0.10	0.75	0.10	0.50	0.50	0.50	0.75	0.75	0.75	0.75		1.00		0.75	0.75		**11.95**	**0.14**	**1.7**	**0.57**
FE/7-17	1.00	1.00	0.75	0.50	1.00	0.10	0.75	0.10	0.50	0.50	0.50	0.75	0.75	0.50	0.75		0.25		0.75	0.50		**10.95**	**0.09**	**1.0**	**0.52**
FE/7-18	1.00	1.00	0.75	0.50	1.00	0.10	0.75	0.10	0.50	0.75	0.10	0.75	0.75	0.75	0.75		0.50		0.75	0.10		**10.90**	**0.58**	**6.3**	**0.52**
FE/7-19	1.00	1.00	0.75	0.50	1.00	0.10	0.75	0.10	0.50	0.75	0.75	0.75	0.75	0.25	0.75		0.50		0.75	0.10		**11.05**	**0.02**	**0.2**	**0.53**
FE/7-20	1.00	1.00	0.75	0.50	1.00	0.10	0.75	0.10	0.50	0.75	0.75	0.75	0.75	0.50	0.75		0.50		0.75	0.10		**11.30**	**0.02**	**0.2**	**0.54**
FE/7-21	0.75	0.50	0.50	0.50	0.50	0.10	1.00	0.25	0.50	0.75	0.50	0.75	0.75	0.50	0.75		0.75		0.75	0.10		**10.20**	**1.20**	**12.2**	**0.49**
FE/7-22	0.75	0.50	0.50	0.25	0.50	0.10	1.00	0.25	0.50	0.75	0.75	0.75	0.75	1.00	1.00		0.75		0.75	0.10		**10.95**	**1.05**	**11.5**	**0.52**

SOCTIIP Functional Assessment
Post-Project

	Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals			
Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (21)	Acres	Acres* Points	Normalized Score
FE/7-23	1.00	0.75	0.50	0.25	0.50	0.10	0.25	0.10	0.50	0.75	0.75	0.75	0.50	0.25	0.75		0.25		0.50	0.10		**8.55**	**0.02**	**0.2**	**0.41**
FE/7-24	1.00	0.75	0.75	0.25	0.75	0.10	1.00	0.10	0.50	0.75	0.75	0.75	0.50	0.50	0.75		0.25		0.50	0.75		**10.70**	**0.01**	**0.1**	**0.51**
FE/7-25	1.00	0.75	1.00	0.25	0.75	0.10	0.75	0.10	0.50	0.75	0.75	0.75	0.50	0.50	0.75		0.25		0.75	1.00		**11.20**	**0.02**	**0.2**	**0.53**
FE/7-SAN MATEO CREEK	0.75	0.75	0.75	0.75	0.75	1.00	0.75	0.75	1.00	0.75	0.75	1.00	1.00	1.00	1.00		1.00		0.75	1.00		**15.50**	**47.70**	**739.4**	**0.74**
FE/7 SAN MATEO MARSH	1.00	0.75	0.75	0.75	0.75	1.00	0.75	0.75	1.00	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19.00**	**0.00**	**0.00**	**0.90**
FE/7 SAN MATEO MARSH EAST OF I-5	0.75	0.75	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19.25**	**0.00**	**0.00**	**0.92**
FE/7-SAN ONOFRE CREEK	0.75	0.25	0.75	0.25	0.75	0.50	0.75	0.75	1.00	0.50	0.75	1.00	1.00	1.00	1.00		1.00		0.75	0.75		**13.50**	**5.29**	**71.4**	**0.64**
SAN MATEO CREEK WATERSHED SUBTOTAL	**39.70**	**35.30**	**35.95**	**23.35**	**38.50**	**29.55**	**35.50**	**21.10**	**28.25**	**32.35**	**29.70**	**38.00**	**36.25**	**32.75**	**36.50**	**8.00**	**32.60**	**5.55**	**35.00**	**27.30**	**8.00**	**609.20**	**172.25**	**2476.05**	**28.41**
GRAND TOTAL	**55.55**	**49.50**	**52.55**	**34.80**	**57.50**	**48.80**	**49.75**	**34.05**	**40.75**	**46.85**	**44.45**	**55.25**	**52.75**	**48.25**	**52.50**	**13.25**	**47.70**	**9.00**	**50.50**	**42.00**	**13.25**	**899.00**	**268.94**	**3863.42**	**41.61**

SOCTIIP FUNCTIONAL ASSESSMENT
Pre-Project - Depressional Wetlands

	Buffer Functions		Hydrologic Functions			Biogeochemical Functions		Habitat Functions		Totals			
Feature	Buffer Width	Buffer Condition	Source	Hydro period	Surface Water Persistence	LULC	Substrate	Native	Wetland Vegetation Condition	Total Points (9)	Acres	Acres* Points	Normalized Score
FE/7-VM16	1.00	0.75	0.75	1.00	1.00	1.00	1.00	1.00	0.25	7.75	0.05	**0.39**	**0.86**
FE/7-VM17	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.75	0.25	7.75	0.05	**0.39**	**0.86**
FE/7-VM18	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.50	0.25	7.50	0.04	**0.30**	**0.83**
FE/7-VM19	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.50	0.25	7.50	0.06	**0.45**	**0.83**
FE/7-VM20	0.75	0.50	0.75	1.00	0.75	0.25	1.00	1.00	1.00	7.00	0.05	**0.35**	**0.78**
FE/7 VP3	0.75	0.50	0.75	1.00	1.00	0.25	1.00	1.00	1.00	7.25	0.18	**1.31**	**0.81**
SUM										44.75	0.43	**3.18**	

SOCTIIP FUNCTIONAL ASSESSMENT
Post-Project Direct Impacts - Depressional Wetlands

	Buffer Functions		Hydrologic Functions			Biogeochemical Functions		Habitat Functions		Totals		
Feature	Buffer Width	Buffer Condition	Source	Hydro period	Surface Water Persistence	LULC	Substrate	Native	Wetland Vegetation Condition	Total Points (9)	Acres	Acres* Points
FE/7-VM18	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.50	0.25	**7.50**	**0.04**	**0.30**
FE/7-VM19	1.00	0.75	1.00	1.00	1.00	1.00	1.00	0.50	0.25	**7.50**	**0.06**	**0.45**
FE/7-VM20	0.75	0.50	0.75	1.00	0.75	0.25	1.00	1.00	1.00	**7.00**	**0.05**	**0.35**
FE/7 VP3	0.75	0.50	0.75	1.00	1.00	0.25	1.00	1.00	1.00	**7.25**	**0.18**	**1.31**
									Total	**29.25**	**0.33**	**2.41**

SOCTIIP FUNCTIONAL ASSESSMENT
Post-Project Indirect Impacts - Depressional Wetlands

	Buffer Functions		Hydrologic Functions			Biogeochemical Functions		Habitat Functions		Totals		
Feature	Buffer Width	Buffer Condition	Source	Hydro period	Surface Water Persistence	LULC	Substrate	Native	Wetland Vegetation Condition	Total Points (9)	Acres	Acres* Points
FE/7-VM16	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.25**	**0.05**	**0.01**
FE/7-VM17	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.25**	**0.05**	**0.01**
									Total	**0.50**	**0.10**	**0.03**

SOCTIIP FUNCTIONAL ASSESSMENT
Pre-Project - Mitigation Areas

	Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (21)	Acres	Acres* Points
UPPER CHIQUITA CANYON	1.00	1.00	0.75	1.00	1.00	1.00	0.75	1.00	0.50	1.00	1.00	0.50	0.50	0.25	0.50	0.50	0.50	0.25	0.50	0.50	0.50	**14.50**	**0.00**	**0.00**
TESORO (NORTH)	0.50	0.25	0.50	0.10	0.75	0.75	0.25	0.50	1.00	0.25	0.75	0.50	1.00	0.75	0.50	1.00	0.50	0.50	0.75	0.50	1.00	**12.60**	**0.00**	**0.00**
TESORO (SOUTH)	0.50	0.10	0.50	0.10	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	0.75	1.00	1.00	0.75	1.00	0.75	0.50	0.50	0.75	**14.20**	**0.00**	**0.00**
GRAND TOTAL	**2.00**	**1.35**	**1.75**	**1.20**	**2.50**	**2.50**	**2.00**	**2.25**	**2.25**	**1.75**	**2.50**	**1.75**	**2.25**	**2.00**	**2.00**	**2.25**	**2.00**	**1.50**	**1.75**	**1.50**	**2.25**	**41.30**	**0.00**	**0.00**

SOCTIIP FUNCTIONAL ASSESSMENT
Increase in Function - Mitigation Areas

	Buffer Functions				Hydrologic Functions						Biogeochemical Functions			Habitat Functions								Totals		
Feature	Percent Buffer	Buffer Width	Buffer Condition	LULC	Source	Hydro period	Floodplain Connection	Altered Hydraulic Conveyance	Surface Water Persistence	Flood prone Area	Sediment Regime	Topographic Complexity	Substrate	Vertical Structure	Zonation	Native	Canopy	Age	Riparian Condition	Riparian Corridor	Invasive Plants	Total Points (21)	Acres	Acres* Points
UPPER CHIQUITA CANYON (Enhancement)	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.75	0.50	0.50	0.50	0.75	0.50	0.50	0.50	**5.25**	**3.00**	**15.75**
UPPER CHIQUITA CANYON	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	1.00	1.00	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**19.75**	**13.00**	**256.75**
TESORO (NORTH)	1.00	0.10	1.00	0.10	0.75	0.75	0.25	0.50	1.00	0.25	0.75	0.50	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	**15.70**	**3.97**	**62.33**
Tesoro South - Enhancement	0.00	0.00	0.50	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.25	0.50	0.50	0.25	**3.15**	**0.79**	**2.49**
TESORO (SOUTH) Creation	0.50	0.10	1.00	0.75	0.75	0.75	1.00	0.75	0.75	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**17.35**	**11.13**	**193.11**
EDB 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**20.50**	**0.50**	**10.25**
EDB 2	0.10	0.10	0.25	0.10	0.50	0.50	1.00	1.00	0.75	1.00	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	**15.55**	**1.00**	**15.55**
GRAND TOTAL	**3.50**	**2.20**	**4.50**	**3.50**	**3.50**	**3.50**	**3.00**	**3.25**	**3.00**	**2.75**	**3.50**	**2.50**	**4.25**	**4.00**	**4.00**	**4.25**	**3.75**	**4.25**	**4.50**	**4.50**	**4.25**	**76.45**	**33.39**	**556.22**

	Watershed	Direct Loss of Fus*	Indirect Loss of Fus*	Watershed Loss (FUs)
San Juan Creek Watershed	San Juan	195.6	48.2	243.8
San Mateo Creek Watershed	San Mateo	169.1	42.9	212.01
Project Totals	**0**	**364.7**	**91.1**	**455.81**

* Includes Seasonal Pools