

Oak Woodland Habitat Revegetation/Mitigation Program

Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project

**Environmental Impact Report Mitigation Measure
Nos. Bio-D and Bio-E**

**California Department of Fish and Wildlife
Streambed Alteration Agreement
No. 1600-2008-0173-R5**

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SECTION 1.0 INTRODUCTION

The Oak Woodland Habitat Revegetation/Mitigation Program (OWHRMP) described herein provides guidelines for the successful creation of 5.5 acres of oak woodland habitat and 2.5 acres of sage scrub habitat as compensation for impacts associated with the Santa Anita Dam Riser Modification and Sediment Removal Project. The creation of this oak woodland and sage scrub habitat is required by Mitigation Measures BIO-D and BIO-E in the *Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project Final Environmental Impact Report* (LACDPW 2009) and by the California Department of Fish and Wildlife (CDFW) Streambed Alteration Agreement (Agreement) No. 1600-2008-0173-R5. The Environmental Impact Report (EIR) and a copy of the Agreement are provided in PDF format in Appendix A. This OWHRMP document provides guidelines for preliminary mitigation tasks; initial mitigation site preparation and installation; long-term maintenance (ten years); biological monitoring (ten years); final program approval; and contingency measure implementation.

1.1 SEDIMENT REMOVAL PROJECT DESCRIPTION

The Santa Anita Dam Riser Modification and Sediment Removal Project (Sediment Removal Project) involves the removal of approximately 500,000 cubic yards of sediment from the Santa Anita Dam and Reservoir and the construction of a riser on the dam's lowest outlet. The dam and reservoir are located on U.S. Forest Service land (Angeles National Forest) (Exhibit 1). The sediment removal and riser construction is being performed to ensure compliance with the seismic safety requirements of the California Department of Water Resources, Division of Safety of Dams. The removed sediment is being transported via conveyor belt to the Santa Anita Sediment Placement Sites (SPS) located downstream in the City of Arcadia (Exhibit 2). Sediment is being placed on the Middle and Lower SPS locations. Residential development is located west and south of the SPS, and natural open space areas are located north and east of the SPS.

1.2 MITIGATION PROGRAM SUMMARY

1.2.1 SEDIMENT REMOVAL PROJECT IMPACTS

The Sediment Removal Project required the removal of approximately 11 acres of native vegetation on the Middle SPS in preparation for on-site sediment placement activities. The vegetation impacted on the Middle SPS includes California sycamore/coast live oak riparian forest and coastal sage scrub habitat. In addition, approximately 0.5 acre of planted vegetation was removed along the eastern edge of the Lower SPS site. The project impacted a total of 177 coast live oak trees (*Quercus agrifolia*), 1 scrub oak tree (*Quercus berberidifolia*), and 1 Engelmann oak tree (*Quercis engelmannii*). A summary of Project impacts and required mitigation is provided in Table 1.

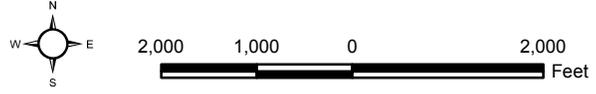


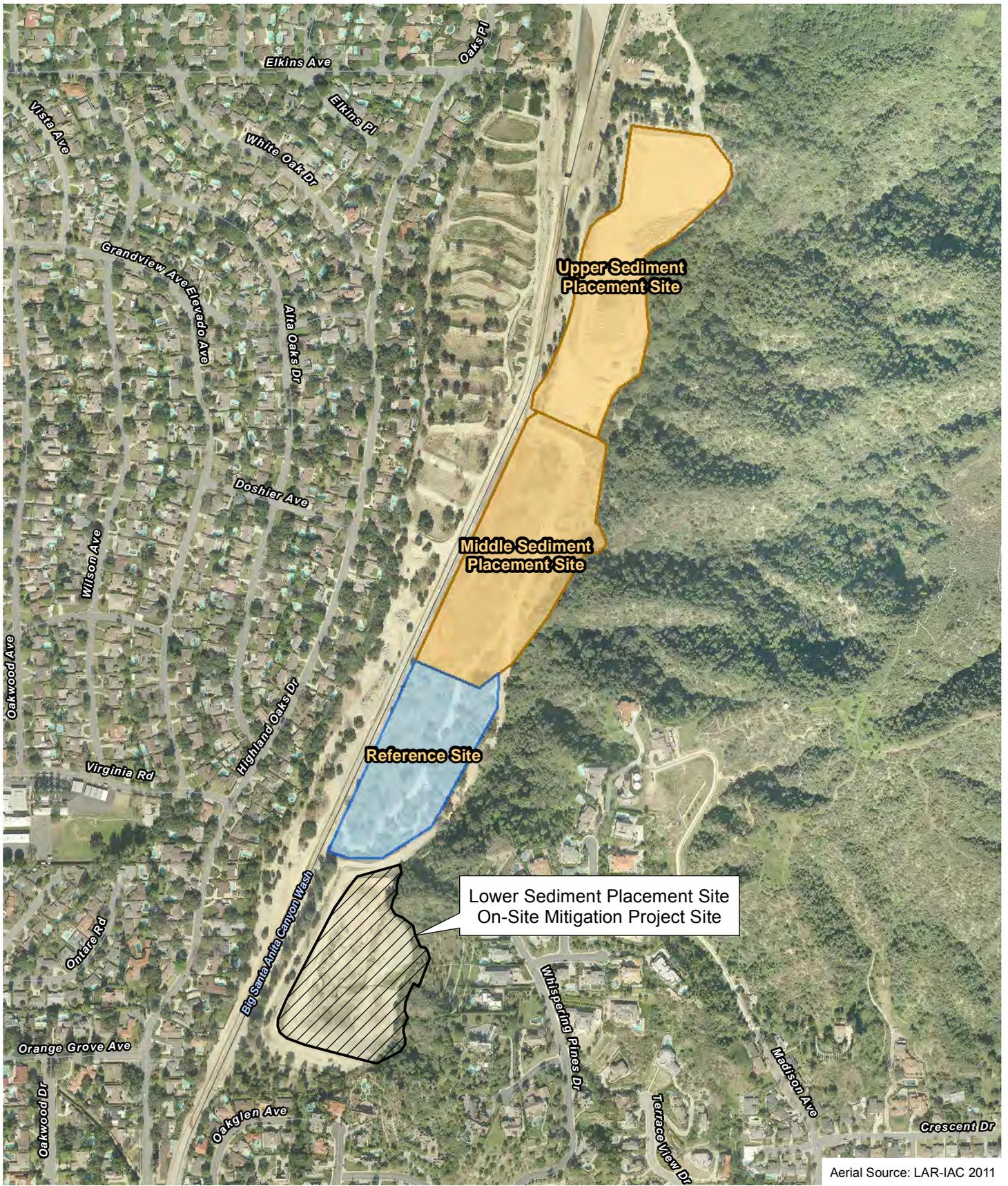
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Project Vicinity

Exhibit 1

Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



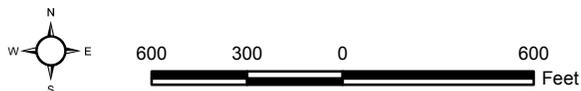


Aerial Source: LAR-IAC 2011

Sediment Placement Site Locations

Exhibit 2

Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



**TABLE 1
SUMMARY OF SEDIMENT REMOVAL PROJECT IMPACTS
AND REQUIRED MITIGATION**

Vegetation Type	Project Impacts	Required Mitigation ^a
Oak woodland and sage scrub	11 acres (approximate)	On-site creation of oak woodland habitat at the current 8.0-acre site of the Santa Anita Lower SPS (including 5.5 acres of oak woodland restoration and 2.5 acres of sage scrub revegetation).
		Permanent protection of 6.9 acres of high-quality, mature sycamore woodland and alluvial scrub habitat located off site at the Big Tujunga Mitigation Bank site. ^b
		Purchase and permanent preservation of 4.9 acres of mature oak woodland habitat located in an adjacent, off-site tributary to the Sediment Removal Project site. ^b
SPS: Sediment Placement Site		
^a Specified in the CDFW Streambed Alteration Agreement No. 16 2008-0173-R5.		
^b The detailed terms and conditions of the off-site components of the mitigation program are not addressed in this OWHRMP.		

1.2.2 PROJECT MITIGATION

Sediment Removal Project mitigation includes the establishment of 5.5 acres of oak woodland and 2.5 acres of sage scrub habitat on site as partial mitigation for Sediment Removal Project impacts. On-site mitigation will be installed at the Lower SPS upon the completion of sediment placement in this location. A total of 5.5 acres of oak woodland mitigation will be installed on the “plateau” portion of the Lower SPS, and a total of 2.5 acres of sage scrub vegetation will be installed on the adjacent slopes of the Lower SPS. The primary goal of the on-site mitigation program is to create a developing, diverse, self-sustaining oak woodland and associated scrub habitat that will result in habitats of similar quality and ecological function to the habitat areas impacted by the Sediment Removal Project.

The planting areas on the Lower SPS will entirely consist of placed fill materials. A compaction analysis performed within the Lower SPS subsurface soils indicates that existing soil compaction ranges from 78 percent to 85 percent within the first 35 feet, and from 89 to 90 percent within the 35- to 53-foot range. A copy of the *Santa Anita Dam Riser Modification and Sediment Removal Project Compaction Analysis at Lower Sediment Replacement Site* (LACDPW 2011) is included in Appendix B. Boring activities also indicate that groundwater is located at approximately 50 feet below the existing ground surface. The Sediment Removal Project included placement of approximately 30 feet of sediment over the pre-existing condition. Sediment was placed with construction equipment, but was not compacted beyond the placement efforts. The final soil surfaces will be machine ‘ripped’ to a minimum depth of 2 feet and left uneven/roughened to improve plant and seed establishment conditions (e.g., ‘micro-habitats’ for seedling germination/growth). Additionally, the site is being graded to optimize the retention and percolation of on-site precipitation and off-site inflows and will direct drainage towards the plateau where the trees will be planted. A cross-section of the final grades on the mitigation site (oak woodland and sage scrub areas) is included in Appendix B.

Mitigation project implementation tasks are summarized in this document and include preliminary mitigation tasks, site preparation, site installation, and long-term maintenance and monitoring tasks. A map of the mitigation site location is provided on Exhibit 3. Photographs of pre-existing conditions on the Middle SPS (impact site) and the Lower SPS (mitigation site) are provided on Exhibit 4.

 Defensible Space Vegetation Requirement*
(Approximate Location)

New Mitigation Areas

 Oak Woodland Mitigation - 5.50 acres

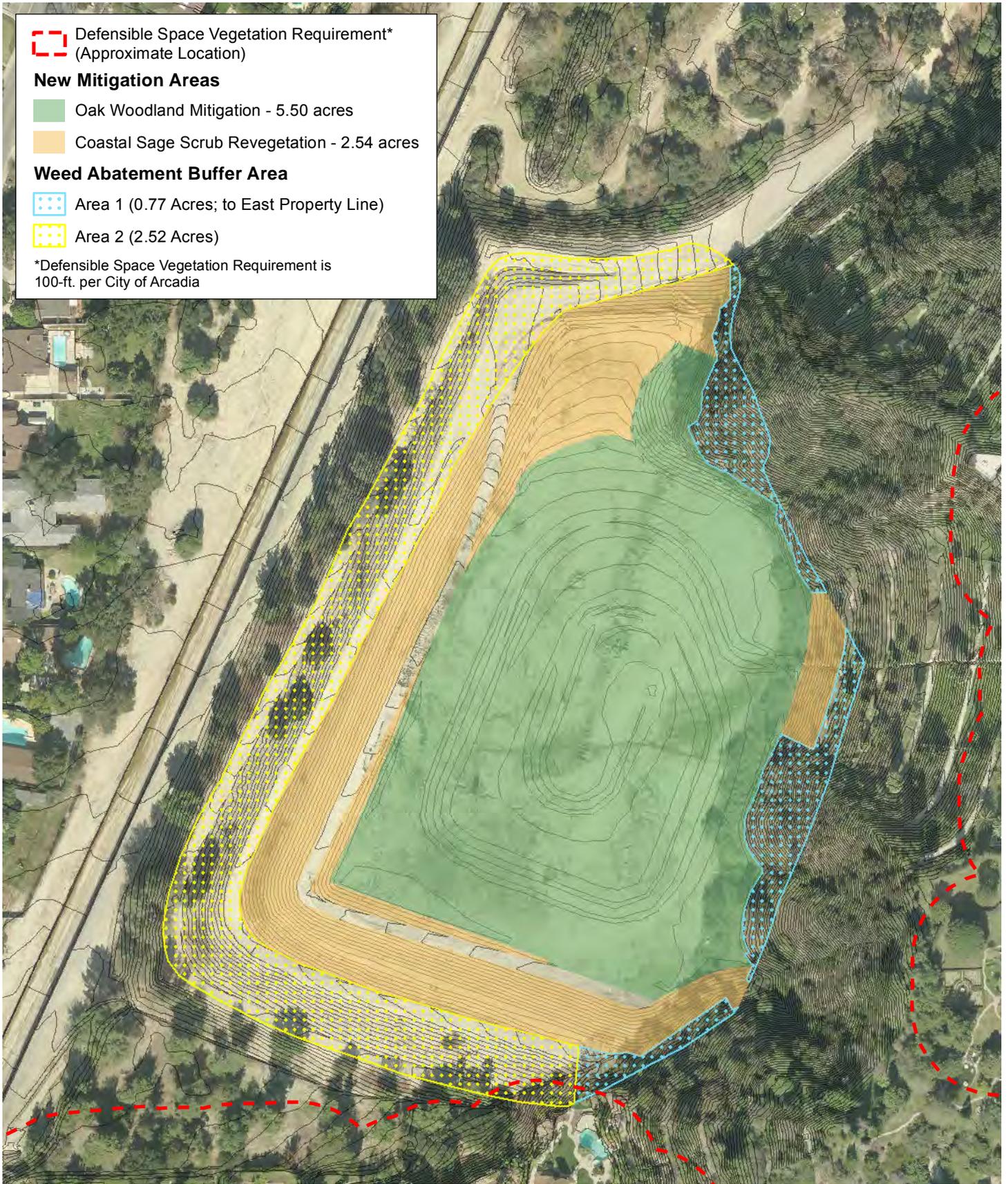
 Coastal Sage Scrub Revegetation - 2.54 acres

Weed Abatement Buffer Area

 Area 1 (0.77 Acres; to East Property Line)

 Area 2 (2.52 Acres)

*Defensible Space Vegetation Requirement is
100-ft. per City of Arcadia

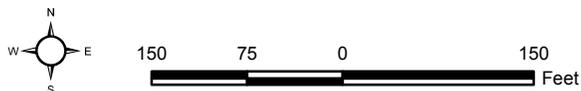


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Mitigation Site Location (Lower Sediment Placement Site)

Exhibit 3

*Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project*



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August 2009. Lower Sediment Placement (Mitigation) Site. Interim fill stockpile conditions in the 'plateau' area to be used for oak mitigation (5.5 acres). Off-site drainage inflow from slopes to the east (left in photo) will enhance on-site hydrology for woodland habitat establishment. A total of 30 feet of additional fill will be placed in this area.



May 2010. Volunteer vegetation growth (including native shrubs) on a slope adjacent to the Middle Sediment Placement (Impact) Site. The slope is composed of transported material from previous sediment removal projects.



August 2009. Lower Sediment Placement (Mitigation) Site. Side slopes will be revegetated with coastal sage scrub species (2.5 acres). Native scrub plant species will not be installed within 100 feet of adjacent residential structures (left in photo) in compliance with the City of Arcadia's defensible space vegetation requirements.

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Site Photographs

*Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project*

Exhibit 4

Bonterra
CONSULTING

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The overall mitigation program also includes (1) the permanent protection of 6.9 acres of high-quality, mature sycamore woodland and alluvial scrub habitat at the Big Tujunga Mitigation Bank site (off site) and (2) the purchase and permanent preservation of 4.9 acres of mature oak woodland habitat located in an adjacent, off-site tributary to the Project site. The detailed terms and conditions of the mitigation program's off-site components are addressed in the CDFW Agreement.

1.2.3 MITIGATION PROJECT SCHEDULE

Salvage of coarse woody debris and duff materials is expected to begin in early 2011 during vegetation clearing activities at the Middle SPS. Preliminary weed abatement on the Lower SPS began in spring 2010. Native plant and/or seed installation is expected to occur between November 1 and December 31, 2013. The CDFW is requiring a ten-year maintenance and monitoring period; however, if the ten-year performance criteria are met after seven years, the mitigation project may be eligible for early sign-off. A tentative mitigation implementation schedule is provided in Table 2.

**TABLE 2
IMPLEMENTATION SCHEDULE (TENTATIVE)**

Task/Milestone	Date
Conduct preliminary weed abatement at the Lower SPS.	Ongoing
Prepare OWHRMP document.	January–February 2011
Initiate site-specific seed collection and salvage of cactus and yucca plants.	Winter 2011 (ongoing)
Clear Middle SPS.	January–February 2011
Salvage and stockpile coarse woody debris and boulders.	January–February 2011
Complete fill placement at the Lower SPS.	Late 2012
Retain Restoration Specialist; initiate mitigation site preparation.	Fall 2013
Install native plants and seeds	Fall/Winter 2013 and 2014
Complete plant materials installation; initiate long-term maintenance period.	Fall 2014
Complete maintenance and monitoring period.	Fall 2023 (or fall 2020 if 10-year criteria are met at the 7-year mark)
SPS: Sediment Placement Site; OWHRMP: Oak Woodland Habitat Revegetation/Mitigation Program	

1.2.4 RESPONSIBLE PARTIES

Successful mitigation program implementation will depend upon the cooperative efforts of the Los Angeles County Department of Public Works (LACDPW), the Landscape Architect, the General Contractor (where feasible), the Restoration Specialist, the Seed Collector, and the Biological Monitor. LACDPW and these individuals will also be coordinating with the California Department of Fish and Wildlife and the City of Arcadia to inform them of the status of mitigation activities and the need for any adaptive management actions. LACDPW may, to maintain quality and continuity, engage the same firm to perform, as primary and through sub-contractors, all site design, site-preparation, installation, seed collection and long-term maintenance and monitoring tasks. In the event that multiple contractors/monitors are involved with this mitigation project over time, supplemental kickoff meetings will be held to ensure that all firms/personnel are familiar with project requirements. The following section outlines the various functions of these entities and individuals. A list of responsible parties is provided in Table 3.

**TABLE 3
RESPONSIBLE PARTIES**

Task/Role	Responsible Parties			
	Entity/Company	Contact	Address/Email	Telephone
Project Manager; Revegetation/Mitigation Program	LACDPW, Water Resources Division	Patricia Wood	900 South Fremont Avenue Alhambra, California 91803 pwood@dpw.lacounty.gov	(626) 458-6131
Advisory	City of Arcadia	Thomas Tait	P. O. Box 60021 Arcadia, California 91066-6021	(626) 305-1386
Mitigation Planning; Restoration Specialist; Biological Monitor	BonTerra Psomas	Joan Patronite Kelly, AICP	225 South Lake Avenue, Suite 1000 Pasadena, California 91101 Joan.Kelly@psomas.com	(626) 351-2000
Section 1600 Permitting	CDFW	Sarah Rains	4949 Viewridge Avenue San Diego, California 92123 srains@dfg.ca.gov	(805) 498-2385
LACDPW: Los Angeles County Department of Public Works; TBD: to be determined; CDFW: California Department of Fish and Wildlife.				

Project Manager

The LACDPW will be responsible for (1) hiring a licensed Landscape Architect to prepare the detailed installation plans; (2) hiring a qualified Restoration Specialist to install and maintain the mitigation site; and (3) retaining qualified Biological Monitor(s) to periodically monitor installation, long-term maintenance, and site performance of the mitigation site. The LACDPW will designate a primary LACDPW staff member (Project Manager) to track the implementation of the mitigation program; review performance documentation; attend site meetings; and perform other necessary duties. The LACDPW will also specify final grading plans for the Lower SPS. The LACDPW will ultimately be responsible for the successful implementation of the program described herein and compliance with required performance standards. LACDPW will engage the following specialists, from in-house resources or through other firms or entities.

Landscape Architect

The LACDPW will retain a qualified Landscape Architect to prepare detailed irrigation plans for the mitigation site. The Landscape Architect will coordinate with the LACDPW, the Restoration Specialist, and the Biological Monitor, on available points of connection; desired temporary irrigation system features (e.g., sprinkler head types and spacing, emergency shut-off features); and site-specific constraints such as potential low source pressure that may require the use of a pump or other methods to obtain proper irrigation coverage for the planting areas.

General Contractor (Sediment Removal)

The LACDPW's General Contractor for the Sediment Removal Project performed vegetation clearing on the Middle SPS in 2011. The General Contractor collected and stockpiled the coarse woody debris, large boulders, and duff materials from the Middle SPS at the time of vegetation clearing, and will move the materials over to the Lower SPS when sediment placement at the site is completed.

Restoration Specialist

The LACDPW will retain a Restoration Specialist with a minimum of five years of experience with (1) the installation and maintenance of native habitat mitigation programs and (2) non-native species control and management in natural habitat areas. The Restoration Specialist must provide documented experience in the installation and long-term maintenance of at least two successful habitat mitigation sites that are at least five acres. The Restoration Specialist will be a licensed Landscaping Contractor and Pesticide (Herbicide) Applicator or be responsible for engaging and supervising licensed Landscaping Contractors and Pesticide (Herbicide) Applicators to perform: (1) all invasive weed species eradication; (2) site-preparation procedures (e.g., irrigation system installation, any needed soil treatment); (3) container plant and acorn installation; (4) seed mix application; and (5) long-term maintenance activities. The Restoration Specialist will also be responsible for performing or engaging the firms qualified to perform the following: collecting and stockpiling boulders of various sizes during mitigation project implementation for later placement on the mitigation site (if additional boulders are required beyond the quantity stockpiled by the General Contractor); and minor grading and machine “ripping” the plateau area soil surface (following final grading) to improve plant establishment conditions. The Restoration Specialist will be responsible for placing the debris/duff/boulder materials on the mitigation site during the restoration installation phase. The Restoration Specialist will provide the LACDPW and the Biological Monitor with a list of the names and contact information (email addresses, cellular telephone numbers, and other information) of its project manager and foremen associated with the mitigation program. To the extent practicable, the Restoration Specialist will assign consistent, long-term maintenance staff to the project site (especially foremen) (1) to reduce the “learning curve” for maintenance issues and other project-specific conditions and (2) to optimize efficiency and site performance. The Restoration Specialist will also be responsible for coordinating with the LACDPW’s Project Manager and the Biological Monitor regarding all site preparation, site installation, and long-term maintenance tasks, and will supervise, in coordination with the Biological Monitor, the Seed and Plant Collector in its seed and plant collection activities.

Seed and Plant Collector

The LACDPW will retain a qualified Seed and Plant Collector to collect native seed and plants at the Middle SPS and/or other local sites (if necessary). The Seed and Plant Collector will be responsible for coordinating with the LACDPW, the Restoration Specialist, and the Biological Monitor regarding all seed and plant materials collection and storage activities.

Biological Monitor

The LACDPW will retain a qualified Biological Monitor experienced in monitoring non-native plant species control and Southern California native habitat restoration implementation. The Biological Monitor will be responsible for coordinating with the Restoration Specialist and monitoring: (1) invasive weed species eradication; (2) site-preparation activities; (3) container plant and acorn installation; (4) native seed mix application; and (5) post-installation site conditions and conformance with success criteria. The Biological Monitor will also be responsible for coordinating with the Restoration Specialist and the Seed Collector in any seed collection activities. The Biological Monitor will also be responsible for coordinating with the LACDPW and the Restoration Specialist regarding the status of the mitigation program.

SECTION 2.0 PRELIMINARY MITIGATION TASKS

2.1 SEED COLLECTION

The LACDPW will retain a qualified Seed and Plant Collector to perform site-specific native seed and plant collection on the Middle SPS and/or other sites in the Santa Anita Wash/Rio Hondo Sub-Watershed. Seed and plant collection started in 2011 and is ongoing. Seed and plant collection will be performed for multiple seasons or until adequate quantities and diversity of native plants/seeds are obtained for mitigation project implementation. The seed and plant collection is being performed by qualified seed and plant collectors (Rancho Santa Ana Botanic Garden, and S&S Seeds, Inc.) and supervised by a qualified biologist with restoration expertise (BonTerra). Native seed and plant materials collection after 2012 will be supervised by the Restoration Specialist, in consultation with the Biological Monitor. Oak acorns will be collected from a minimum of 50 individual trees in the Santa Anita Wash/Rio Hondo Sub -Watershed to provide genetic diversity in the planting stock. The composition of the seed mixes will depend on the species' availability for collection in the Sub-Watershed and the ability to access the source plants. All native plant and seed materials to be installed on the mitigation site will be obtained from within the Santa Anita Wash/Rio Hondo Sub-Watershed. When collection is performed on non-LACDPW properties within the Sub-Watershed (e.g., Arcadia Wilderness Park, Monrovia Hillside Wilderness Preserve), the Seed and Plant Collector and the Restoration Specialist will coordinate in advance with the LACDPW regarding any needed access permits or other documentation to obtain legal entry for collection purposes.

2.2 CACTUS COLLECTION AND PROPAGATION

The LACDPW will retain a qualified Seed and Plant Collector to harvest cuttings (pads) from Mesa prickly pear cactus (*Opuntia x vaseyi*) located in the impact site prior to clearing activities. The quantity of cactus plants to be salvaged will be determined in the field by the Biological Monitor based on plant condition and health. The cactus materials will be delivered to a qualified native plant nursery for propagation in containers for replanting within the mitigation site. The Biological Monitor will also coordinate with the native plant nursery regarding the propagation methods, long-term health, and delivery schedule for the container plants. The Restoration Specialist, in coordination with the Biological Monitor, will also perform periodic inspections of these materials at the nursery facility.

2.3 WOODY DEBRIS, DUFF, AND BOULDER COLLECTION AND STOCKPILING

The General Contractor for the Sediment Removal Project will collect the coarse woody debris, duff materials, and boulders from the cleared Middle SPS area and stockpile this material on the top of the Lower SPS when sediment placement at that site is completed. The collected materials will not be stockpiled in high activity areas; in areas vegetated with native plant species; or in jurisdictional drainage areas. It is important to note that LACDPW retained a separate, non-BonTerra Biological Monitor to monitor this project construction activity, along with sediment removal tasks at the dam site and other tasks associated with the Sediment Removal Project. A list of all biological resource mitigation measures, including biological monitoring requirements, is included in the EIR (Appendix A). Vegetation removal from the Middle SPS was completed in January 2011 (i.e., outside the nesting season) to avoid impacts to nesting birds.

2.3.1 MULCH

The General Contractor will collect mulch material on the Middle SPS and stockpile it for later application to the mitigation site at the Lower SPS. The mulch will be incorporated via machine “ripping” into the upper 2 feet of topsoil to improve soils fertility, including an appropriate amount of applied urea to provide nitrogen balance as the mulch decays.

2.3.2 BOULDERS

The Restoration Specialist will, in coordination with the Landscape Architect and the Biological Monitor, place boulders of various sizes on the oak woodland mitigation site (i.e., on the plateau, not on side slopes) to provide microhabitat for various wildlife species. If necessary, the Restoration Specialist will collect additional boulders beyond what the General Contractor stockpiled from the already developed areas of the Upper SPS and Middle SPS. All boulders will be stockpiled outside operation areas, in a manner that prevents rolling or other hazards. Breakage and other boulder damage will be minimized during collection and transport.

2.4 INTERIM WEED ABATEMENT

LACDPW will perform or engage a firm to perform periodic weed abatement on the mitigation site in the interim between the completion of the Sediment Removal Project and the engagement of the Restoration Specialist. Interim weed abatement tasks will include the use of glyphosate-based herbicides (Aquamaster®, Roundup Pro® or equivalents), mowing, weed-whipping, or other methods. The primary goal of preliminary weed-abatement tasks is to avoid the re-seeding of weed species on site and reduce the accumulation of weed seeds in the future planting/seeding areas. No pre-emergent herbicides will be applied to the future planting/seeding areas.

2.5 INTERIM EROSION CONTROL

The LACDPW will install erosion-control measures, as needed, to maintain soils stability on the mitigation site prior to planting/seeding activities. Erosion-control materials will include only weed-free materials (e.g., fully bio-degradable rice straw wattles). The Restoration Specialist and/or the LACDPW will keep all drainage features free of sediment (e.g., bench drains) to avoid damage to slope areas on the Lower SPS.

SECTION 3.0 MITIGATION SITE PREPARATION

The final configuration of the mitigation site (Lower SPS) has been completed. The fill has reached its final elevation as of December 2012. Final grading on the plateau and slopes was performed by the General Contractor for the Sediment Removal Project. Mitigation site preparation is expected to include the following activities, as described in detail below: (1) kickoff meeting; (2) protection of existing resources; (3) staking, fencing, and signage installation; (4) installation of erosion-control measures; (5) initial non-native plant species removal; (6) placement of coarse woody debris, duff, and boulders; (7) installation of a temporary irrigation system and possible performance of grow-and-kill weed abatement; and (8) soils treatments including de-compaction/scarification. Work shall be performed only during favorable weather and site conditions.

3.1 KICKOFF MEETING

Once the Restoration Specialist has been retained, the LACDPW Project Manager will schedule an on-site kickoff meeting that will include the LACDPW, the City of Arcadia, the Restoration Specialist (Project Manager and Foremen), the Biological Monitor, and any other appropriate entities and individuals. The LACDPW will present all rules and regulations for non-LACDPW entities performing on-site mitigation tasks (e.g., approved points of entry and access roads, approved staging areas, utility connections, hours of operation, fire suppression, health and safety, and other standards). LACDPW may, to maintain quality and continuity, engage the same firm to perform, as primary and through sub-contractors, all site preparation, installation, seed collection and long-term maintenance and monitoring tasks. In the event that multiple contractors/monitors are involved with this mitigation project over time, supplemental kickoff meetings will be held to ensure that all firms/personnel are familiar with project requirements.

3.2 PROTECTION OF EXISTING RESOURCES

3.2.1 BIOLOGICAL RESOURCES

Prior to the start of site preparation tasks, the Biological Monitor will install flagging or other materials to indicate any sensitive habitat areas or other resources (e.g., native vegetation along the eastern edge of the plateau, pre-existing native trees/shrubs in the planting area, and other sensitive areas) to be protected during mitigation project implementation. The flagging materials will be replaced, as needed, during the site preparation period to maximize visibility of protected biological resources. If the Restoration Specialist or its sub-contractors cause damage to a preserved habitat area (e.g., vehicle encroachment), the Restoration Specialist must report the damage to the LACDPW Project Manager within 24 hours, and the damage will be inspected and documented by the Biological Monitor within 1 week. The LACDPW will determine appropriate remedial measures for any damage to preserved habitat areas. The timely completion of remedial measures will be the sole responsibility of the Restoration Specialist at no expense to the LACDPW.

3.2.2 WATER AND SOILS

LACDPW personnel and all non-LACDPW personnel shall ensure that no foreign material and/or liquid such as oil, gasoline, or other petroleum products are deposited: on any soil on the mitigation sites or in off-site staging areas; within the dripline (the outside edge of foliage overhang) of any native plant species; or in existing drainages. Should any such contamination of the soil occur, the responsible party shall remove the affected soil, as directed by the LACDPW Project Manager and the Biological Monitor, and replace it as needed with acceptable

soil. If the Restoration Specialist or its sub-contractors are the responsible party, the Restoration Specialist will be responsible for remediation at no expense to the LACDPW. Detailed water quality requirements are specified in the Sediment Removal Project permits (Appendix A).

3.2.3 FIRE PREVENTION

LACDPW's maintenance routines already incorporate fire prevention for all personnel activities on site. All non-LACDPW on-site personnel activities throughout the site preparation, installation, and maintenance periods will include advanced coordination with the LACDPW and, as needed, the City of Arcadia, regarding fire prevention.

3.3 STAKING, FENCING, AND SIGNAGE INSTALLATION

The LACDPW or the Restoration Specialist will stake the mitigation site boundaries in coordination with the Biological Monitor. The staked boundaries will include the overall mitigation site perimeter, the weed abatement buffer Areas 1 and 2 (see Exhibit 3, and Section 3.5) and, as needed, the boundaries between the oak woodland and sage scrub planting areas. The stakes will consist of angle iron or other durable material that will persist for several years of mitigation project maintenance. The LACDPW Project Manager and the Biological Monitor will determine appropriate locations for fencing and/or signage to provide site protection and to maintain worker safety during project implementation. Fencing materials may include snow/construction fencing, post-and-yellow-rope fencing, or other materials. Signage text, size, and materials for fabrication/posting will be specified by the LACDPW Project Manager and will address sensitive biological resources, safety concerns, and project-specific emergency contact information.

3.4 INSTALLATION OF EROSION-CONTROL MEASURES

The Restoration Specialist will install ecologically suitable erosion-control measures on the mitigation site in accordance with County-approved Best Management Practices (BMPs). Erosion-control methods may include temporary toe-of-slope silt fencing (partially buried to enhance stability), mid-slope straw wattles (fully biodegradable), or other measures. Mid-slope straw wattles shall be placed at a suitable vertical spacing to minimize erosion.

3.5 INITIAL NON-NATIVE PLANT SPECIES REMOVAL

It is anticipated that weed coverage in the mitigation site will be sparse at the beginning of the site preparation phase due to preliminary weed abatement tasks performed by LACDPW personnel or its contractors (see Sections 2.4 and 2.5). The Restoration Specialist will perform initial treatment and removal of any non-native plant species that become established prior to mitigation site installation. Weed removal will also be performed in weed abatement buffer Areas 1 and 2 for the duration of the maintenance period. Methods of initial treatment may include mechanical removal, the cut and paint method of herbicide application, and/or foliar application of herbicide as described below. The Biological Monitor may also specify a subsequent "grow-and-kill" program following the installation of the irrigation system, as described below. Appropriate methods of weed control will be determined through consultation among the LACDPW Project Manager, the Restoration Specialist, and the Biological Monitor, based on site conditions. All applied herbicides will include an agriculturally suitable marker dye to facilitate thorough coverage and to alert personnel in the area of the location of recently treated vegetation. Any use of herbicides shall be coordinated with the Biological Monitor. Herbicide use and other maintenance tasks may be suspended by the Biological Monitor based on sensitive biological resource issues in the mitigation project vicinity (e.g., nesting birds).

3.5.1 MECHANICAL REMOVAL

Weed whips and other mechanical or hand-removal methods will be used, as appropriate, to remove broadleaf weed species and non-native grasses. All green waste resulting from weeding activities will be immediately removed and disposed of at an off-site landfill location (i.e., weeds shall not be stockpiled on site).

3.5.2 CUT AND PAINT METHOD OF HERBICIDE APPLICATION

A glyphosate-based herbicide (Aquamaster®, Roundup Pro® or equivalent) may be applied to some larger invasive weed species using the cut-and-paint application method. The cut-and-paint method consists of (1) cutting the stem(s) of the shrub to a height of 12 inches or less and removing all aboveground debris from the site; (2) applying glyphosate at a 10 percent rate to the cut stem/stump within 2 minutes of cutting the stem; and (3) performing follow-up foliar applications, as described below, to regrowth every 4 to 6 weeks until all regrowth has been eradicated.

3.5.3 FOLIAR APPLICATION OF HERBICIDE

A glyphosate-based herbicide will be applied to small (i.e., less than three feet tall) broadleaf invasive plant species that are established on the mitigation site. The following removal techniques will be used:

- Aquamaster®, Roundup Pro®, or equivalent herbicides should be applied to each plant at a minimum rate of 1.5 percent to ensure that each plant receives a comprehensive and fully effective treatment and that re-sprouting from root materials is minimal. Application will consist of (1) spot applications to individual plants where broadleaf plant coverage is sparse and (2) broadcast applications to dense patches of weed species. Applications should be on a spray-to-wet basis, and coverage should be uniform and complete. Contact with native shrub and grass species should be avoided as much as possible; in the event of gusty winds or winds in excess of five miles per hour, all work shall be temporarily discontinued to protect applicators and adjacent natural resources. Treatments should also be temporarily discontinued in the event of rainfall since rainfall reduces the effectiveness of the herbicide.
- Sprayed vegetation should be left undisturbed for seven days to allow the herbicide to be distributed throughout the entire plant. Visible effects of herbicide application consist of wilted foliage, brown foliage, and disintegrated root material.
- All treated plant materials should be removed by a string trimmer or other appropriate equipment and disposed of off-site in a landfill.

The steps listed above should be repeated two to three times every two to three weeks following the initial treatment to remove seedling exotic species.

3.5.4 GROW-AND-KILL PROGRAM

If specified by the Biological Monitor, the Restoration Specialist shall implement a preliminary “grow-and-kill” weed abatement program on the mitigation site following the initial eradication methods described above and irrigation system installation described below. The grow-and-kill program will last one to two months or for one year or longer, depending on the mitigation project implementation schedule. The purpose of the grow-and-kill program is to germinate the accumulated weed seeds in the upper soil layer prior to native plant installation, and to

subsequently spray the weed plants with herbicide. The grow-and-kill program will include repeated cycles of overhead irrigation and periodic application of a glyphosate-based herbicide (i.e., Aquamaster® Roundup Pro® or approved equivalent). Herbicide application will be performed only by licensed applicators. During the grow-and-kill period, sufficient moisture (volume and frequency) must be applied on the mitigation site to ensure optimal weed species germination without destabilizing the soil. Overhead irrigation will be suspended for at least three days following herbicide application to maximize weed mortality. The Restoration Specialist shall not allow weed species to set/disperse seed on the mitigation site during the grow-and-kill period. Following initial herbicide treatment, numerous volunteer native plant seedlings may arise in previously weedy areas, requiring greater care in successive applications to avoid damaging the volunteer plants. Native plant species shall be protected throughout the grow-and-kill period, as directed by the Biological Monitor. All herbicide use shall be approved in advance by the LACDPW Project Manager and the Biological Monitor, and all herbicide use shall comply with local codes and regulations. A minimum of two day's advance notice of any herbicide application will be provided to the Biological Monitor. The length of the grow-and-kill program will depend on the interval between site preparation and native plant materials installation. Specific methods of weed control are discussed above and in Section 6.3 below.

3.6 PLACEMENT OF MULCH, BOULDERS, AND WOODY DEBRIS

The final soil surfaces will be machine "ripped" to a minimum depth of 2 feet and left uneven/roughened to improve plant and seed establishment conditions (e.g., 'micro-habitats' for seedling germination/growth).

3.6.1 MULCH PLACEMENT

The Restoration Specialist will apply the stored mulch material (described Section 2.3) to the mitigation site (prior to ripping) and incorporate the mulch into the upper 2 feet of topsoil to improve soil fertility, including an appropriate amount of applied urea to provide nitrogen balance as the mulch decays..

3.6.2 BOULDER PLACEMENT IN OAK WOODLAND MITIGATION AREA

The Restoration Specialist will transport boulders from the already developed areas of the Upper SPS and Middle SPS, or temporary stockpile location(s) approved by the Biological Monitor to the mitigation site under the supervision of the LACDPW and the Biological Monitor. The purpose of the boulders is to provide microhabitat for plant and animal species. The boulders will be placed/positioned in naturalistic groupings, in shallow pits created with a backhoe as needed to ensure stability (i.e., to avoid rolling). The boulders to be relocated should not be painted or otherwise defaced, and breakage/fragmentation should be minimized.

3.6.3 WOODY DEBRIS PLACEMENT IN OAK WOODLAND MITIGATION AREA

The General Contractor for the Sediment Removal Project transported woody debris to the mitigation site and stockpiled it there under the supervision of the LACDPW. The woody debris included (1) pre-cut oak and sycamore trunk sections of various lengths and pre-cut, 15- to 20+ foot oak trunks that are still attached to rootball tissue for planting upright as "snags" and (2) mid- and small-sized oak and sycamore branches. The woody debris placement locations will be pre-flagged in the field by the Restoration Specialist, in coordination with the Biological Monitor, with lath and color-coded flagging tape to indicate the type of material to be placed in these locations. Debris placement will include single-trunk segments to be placed on

their sides; groups of several trunks; the “snags”, which will be planted in excavated holes and secured with compacted backfill; and piles of mid- to small-sized branches.

3.7 INSTALLATION OF A TEMPORARY IRRIGATION SYSTEM AND POSSIBLE PERFORMANCE OF GROW-AND-KILL WEED ABATEMENT

Based on the average annual rainfall in the area, there will be a total of 518,000 cubic feet per year (cf/year) of precipitation falling directly on the leveled area of the Lower SPS site. An additional 570,000 cf/year of water will be available from the tributary that surrounds the slope area (total 7.5 acres). This storm water will be completely captured in the top leveled area of the Lower SPS and will be spread, retained, and percolated into the ground, except for peak rainfall. There will be minor grading on the plateau, associated with decompacting the soil, placing boulders and logs around the site, and modifying the drainage channel to maximize the retention time and improve percolation during small to moderate storms. A temporary irrigation system will be installed to augment natural precipitation. The Landscape Architect shall design and the Restoration Specialist shall install a temporary, aboveground, overhead irrigation system to include all mitigation planting areas. The LACDPW will review and approve the irrigation design prior to installation. The irrigation design shall include heads and risers at a suitable height to maintain proper area coverage as the vegetation increases in size and to minimize wind effects. The system shall include a high-flow detector/shut-off valve and emergency master shut-off valve(s); the LACDPW shall be informed of the location of the valve(s). The system shall be installed prior to the start of the grow-and-kill program (described in Section 3.5.4 above). The Restoration Specialist will coordinate with the LACDPW Project Manager on hours of operation for the irrigation system that are compatible with other site activities and site-wide water needs/line pressures. The mitigation irrigation system shall only be operated when the Restoration Specialist’s foreman is on site to monitor its operation through all valves/cycles to full shut off.

3.8 SOIL TREATMENTS

Oak woodland, sage scrub, and other native plant species require suitable soil microbes and physical elements for long-term success. Fairly loose, aerated soils are required for deep root development and successful plant establishment. Healthy soil structure occurs when soils are loosened and appropriate microbiological elements are present in abundant quantities. Coastal sage scrub habitats especially benefit from soil organisms such as mycorrhizal fungi. When mycorrhizal fungi are present in the soils, a network is formed to link the roots of the native plant species together to provide increased nutrient uptake and to improve soil structure throughout. To allow for the ready movement of water, roots and soil fauna, the fungal hyphae consolidate soil particles into aggregates of different sizes, allowing establishment of beneficial soil bacteria and other soil microbes and improving soil structure. The mycorrhizal network also facilitates the uptake of soluble nutrients such as phosphorous and nitrogen by native plant species, making them unavailable to ruderal weedy species. Weedy species are unable to become established on sites with healthy mycorrhizal networks present within the soil (St. John 1999a, 1999b). Soil organic matter also improves overall soil structure and facilitates water, root, and faunal movement. Soil treatments may include scarification and/or track-walking soils (especially manufactured slopes) to reduce surface compaction. Soil treatments will provide appropriate microhabitats for seed species establishment from the installed seed mixes or natural recruitment. All planting areas will be inoculated with mycorrhizal fungi to facilitate the development of healthy soil conditions, the establishment of native plant species, and the minimization of weed and ruderal species development. This procedure will include the use of a granular form of inoculum material AM-120 (or approved equivalent product) as part of the hydroseed mix and the use of mycorrhizal host container plant species.

SECTION 4.0 PLANT AND SEED INSTALLATION IN OAK WOODLAND MITIGATION AREAS

Native container plants and seed mixes will be installed at the completion of all site preparation activities. The initial/conceptual container plant and seed mix palettes developed for the oak woodland mitigation area are based on the plant species observed during focused plant surveys conducted on the Sediment Removal Project site in 2009 and 2010 (BonTerra 2010c and 2009). Additional container plants and seeds (locally obtained) of other species typical of oak woodland and sage scrub habitats will be added to the mitigation site on an ongoing basis during the establishment period to improve plant species diversity, in coordination with the CDFW. Copies of the 2009 and 2010 focused plant survey reports are included in Appendix C. Lists of the native plant and seed materials installed to-date (between January and March 2014) are provided in Appendix D.

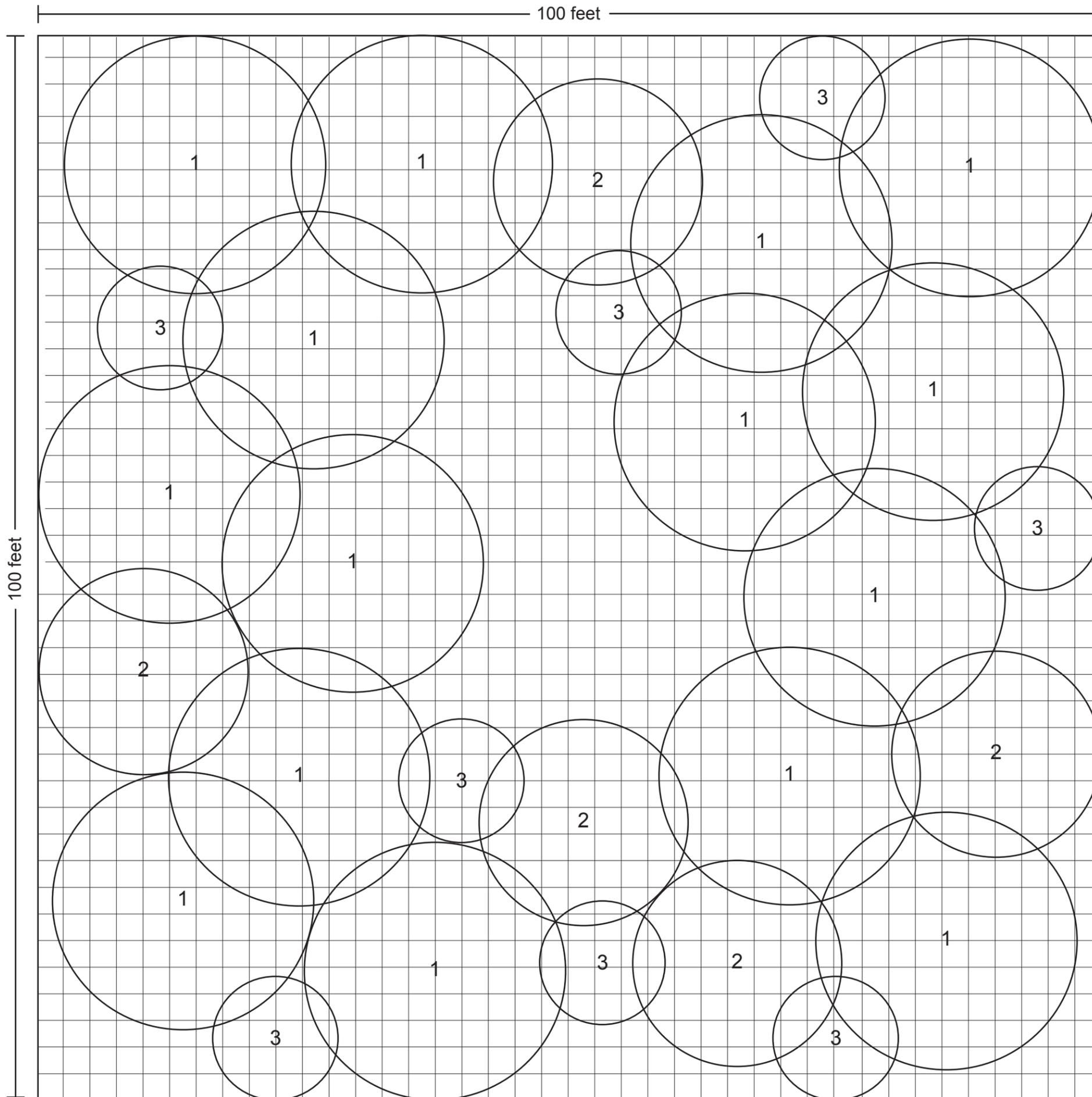
4.1 CONTAINER PLANT MATERIAL

A diversity of native plant species will be installed on the mitigation site at a density of up to 1,115 plants per acre (including a coast live oak planting density of 65 plants per acre). Excluding oak trees, approximately 30 to 40 percent of the total container plants installed will be herbaceous species (e.g., annuals/perennials, grasses, ferns). Using this container planting density will facilitate (1) the rapid establishment of a mix of trees, shrubs, herbs, and grasses at densities and coverages typical of woodland habitats and (2) achievement of the required success criteria for coverage and survival, while allowing for the low level of mortality that typically occurs during native plant establishment programs. This planting density is based on a review of site conditions performed during biological evaluations on the Sediment Removal Project site (BonTerra 2010c and 2009) and on BonTerra's extensive expertise with woodland restoration and establishment throughout Southern California and within the foothill area of the San Gabriel Mountains and adjacent communities (BonTerra 2000, 2005a, 2005b, 2006, 2010a, and 2010b; Michael Brandman Associates 1994).

All container plants will be propagated on a contract basis by a nursery that specializes in native plants. The Restoration Specialist and the Biological Monitor will inspect all plant materials at the nursery and will accept only healthy, vigorous, well-rooted, non-rootbound plant materials upon delivery. Plants determined to have improper genetics (e.g., prostrate cultivars of coyote bush rather than the upright "wild type" form of the shrub) will be rejected. Container plants shall be stored on site in a protected location by the Restoration Specialist, and will not be held on site longer than one week prior to installation. Plants stored on site awaiting installation shall be properly watered by hand with a low-force wand to minimize interim damage/desiccation/decline and shall be kept moist at all times. All appropriate container plant species shall be pre-inoculated with mycorrhizal fungi during nursery propagation.

Container plants shall be installed between November 1 and December 31 and during other periods when weather and soil conditions are suitable and in accordance with locally acceptable practices. The Restoration Specialist shall notify the Biological Monitor and the LACDPW Project Manager one week in advance of scheduled plant deliveries to provide ample opportunity for pre-delivery plant inspections.

A total of 6 to 8 irregular-shaped planting polygons will be delineated on site with permanent staking to include only oak trees and native herbaceous species (1.0 acre total). These sub-areas of oak trees within native grassland/herbland will be managed throughout the maintenance program to avoid invasion by shrub species, thereby facilitating creation of a naturalistic habitat mosaic and structural 'edge' that is beneficial for a range of wildlife species. The Biological Monitor will create at least two demonstration plots in the oak woodland planting areas, delineated by lath-and-flagging, to indicate the container plant distribution (including the shrub-free sub-areas) that will be reproduced throughout the site. The Biological Monitor shall supply the lath, flagging, and color-coded wire flags for the demonstration plot. The Restoration Specialist shall not install any container plants in an unnatural, linear planting pattern. Container plant species that typically grow in denser shade conditions (including fern species) may be planted in later years of the maintenance program as vegetation cover increases, to enhance plant growth and survival. These plant species are also expected to become established on a volunteer basis from adjacent wildland areas. A list of container plant species is provided in Table 4; the actual container plant species and quantities may be modified based on availability of seed to collect from within the Santa Anita Wash/Rio Hondo Sub-Watershed. A list of the native plant materials installed to-date (between January and March 2014) is provided in Appendix D. A typical planting plan for the oak woodland mitigation area is provided on Exhibit 5. Exhibit 5 shows typical plant quantities, spacing, and plant groupings/configurations to be used in a 0.23-acre area (excluding the shrub-free polygons). Any plant species substitution shall be approved in advance by the CDFW.



LEGEND

Species		
①	Coast live oak (<i>Quercus agrifolia</i>)	15
②	Blue elderberry (<i>Sambucus nigra ssp. caerulea</i>)	4-5
③	Large evergreen shrubs	7-8 (total)
	Laurel sumac (<i>Malosma laurina</i>)	
	Toyon (<i>Heteromeles arbutifolia</i>)	
	Sugarbush (<i>Rhus ovata</i>)	
	Shrubs/succulents (scattered: groups of 10-15)	110-120 (total)
	California sagebrush (<i>Artemisia californica</i>)	
	California buckwheat (<i>Eriogonum fasciculatum</i>)	
	Heartleaf penstemon (<i>Keckiella cordifolia</i>)	
	Southern honeysuckle (<i>Lonicera subspicata</i>)	
	Bush monkeyflower (<i>Mimulus aurantiacus</i>)	
	California coffeeberry (<i>Rhamnus californica</i>)	
	Skunkbush (<i>Rhus trilobata</i>)	
	Golden currant (<i>Ribes aureum</i>)	
	White sage (<i>Salvia apiana</i>)	
	Black sage (<i>Salvia mellifera</i>)	
	Chaparral yucca (<i>Yucca whipplei</i>)	
	Perennials/grasses (scattered: groups of 5-10)	70-80 (total)
	Narrow-leaved milkweed (<i>Asclepias fascicularis</i>)	
	California everlasting (<i>Gnaphalium californicum</i>)	
	Giant wild rye (<i>Leymus condensatus</i>)	
	Deerweed (<i>Lotus scoparius</i>)	
	Small-flowered melic grass (<i>Melica imperfecta</i>)	
	Needlegrass (<i>Nassella spp.</i>)	
	Showy penstemon (<i>Penstemon spectabilis</i>)	
	Ferns (scattered: groups of 3-5)	20-25 (total)
	Coffee fern (<i>Pellaea andromedifolia</i>)	
	Bird's foot fern (<i>Pellaea mucronata</i>)	
	Not shown:	
	Acorn planting locations	
	Salvaged/relocated woody debris, boulders, etc.	

Area shown is 10,000 square feet (0.23 acre)
 Overall plant density is approx. 1,100 plants/acre

Proposed Planting Plan: Oak Woodland Exhibit 5

Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



**TABLE 4
INITIAL/CONCEPTUAL CONTAINER PLANT SPECIES
OAK WOODLAND MITIGATION**

Common Name ^{a,b}	Scientific Name	Size	Density (Plants Per Acre)	Total Plants (Per 5.5 Acres)
California sagebrush	<i>Artemisia californica</i>	1 gallon	50	275
narrow-leaved milkweed	<i>Asclepias fascicularis</i>	1 gallon	50	275
California buckwheat	<i>Eriogonum fasciculatum</i>	1 gallon	50	275
California everlasting	<i>Gnaphalium californicum</i>	1 gallon	50	275
toyon	<i>Heteromeles arbutifolia</i>	1 gallon	10	55
heart-leaf penstemon	<i>Keckiella cordifolia</i>	1 gallon	50	275
giant wild rye	<i>Leymus condensatus</i>	1 gallon	50	275
southern honeysuckle	<i>Lonicera subspicata</i>	1 gallon	50	275
deerweed	<i>Lotus scoparius</i>	1 gallon	50	275
laurel sumac	<i>Malosma laurina</i>	1 gallon	10	55
small-flowered melic grass	<i>Melica imperfecta</i>	1 gallon	50	275
bush monkeyflower	<i>Mimulus aurantiacus</i>	1 gallon	50	275
foothill needlegrass	<i>Nassella lepida</i>	1 gallon	50	275
coffee fern	<i>Pellaea andromedifolia</i>	1 gallon	50	275
bird's foot fern	<i>Pellaea mucronata</i>	1 gallon	50	275
showy penstemon	<i>Penstemon spectabilis</i>	1 gallon	50	275
coast live oak	<i>Quercus agrifolia</i>	T4 ^c	65	358
Engelmann oak	<i>Quercus engelmannii</i>	T4 ^c	1	5
California coffeeberry	<i>Rhamnus californica</i>	1 gallon	50	275
skunkbush	<i>Rhus trilobata</i>	1 gallon	50	275
sugar bush	<i>Rhus ovata</i>	1 gallon	10	55
golden currant	<i>Ribes aureum</i>	1 gallon	50	275
white sage	<i>Salvia apiana</i>	1 gallon	50	275
black sage	<i>Salvia mellifera</i>	1 gallon	50	275
blue elderberry	<i>Sambucus nigra</i> ssp. <i>caerulea</i>	1 gallon	20	55
chaparral yucca	<i>Yucca whipplei</i>	1 gallon	50	275
Total			1,116	6,083
^a All container plants will be propagated from seed/cuttings obtained from within the Santa Anita Wash/Rio Hondo Sub-Watershed. ^b Actual container plants to be installed will depend on seed availability for collection in the Santa Anita Wash/Rio Hondo Sub-Watershed. ^c T4 = deep 1-gallon container				

4.1.1 CONTAINER PLANT INSTALLATION

The Restoration Specialist shall follow the specific container plant installation methods described below. Alternate planting methods may be used (e.g., hand digging rather than augering) with the prior approval of the Biological Monitor. No chemical soil amendments or mulch will be used in the container planting holes or basins.

1. Planting holes shall be machine augered to a suitable width and depth prior to container plant installation. The typical planting hole is approximately twice the width and depth of the rootball.
2. Planting holes shall be filled with water immediately prior to plant installation, and the water shall be allowed to percolate fully into the soil prior to planting.

3. Plants shall be removed from the containers in a manner that avoids damage to the rootball. Extended tap root development and minor rootbound conditions will be appropriately treated via pinching and loosening of appropriate portions of the rootball prior to planting.
4. Each plant shall be installed so that the “collar” or soil level is slightly higher than the surrounding finished grade to allow for partial plant settling over time.
5. The excavated soil backfill material shall be placed into the planting hole to the existing grade, and gently compacted around the rootball. A two- to three-inch layer of weed-free mulch (preferably oak leaves) will be used in all oak container planting holes.
6. A temporary watering basin approximately two to three feet in diameter shall be created around each plant to facilitate the initial watering-in of the plants. The exposed upper sides of the rootball shall be covered with backfill material sloping down into the basin.
7. Each plant shall be initially watered-in by hand; the watering basins will be filled using a hose fitted with a low-force wand. The water spray shall be directed to the outer part of the watering basin to avoid damage to the plant roots or crown.

4.2 OAK ACORN PLANTING

In addition to container planting, oak trees will be established through the direct seeding of oak acorns; some acorns will be planted with protective cages, and some will be planted without protective structures (e.g., in association with placed coarse woody debris). Oak seed installation will be performed by the Restoration Specialist under the supervision of the Biological Monitor. The protective structures will be fabricated on site by the Restoration Specialist and will be designed by the Biological Monitor to deter herbivory damage to root and stem tissues. The planting of oaks from acorns will allow for (1) oak establishment during multiple years of variable weather conditions; (2) a portion of the oaks to experience normal taproot formation in the soil; and (3) a small variation in size classes of trees in the mitigation site. Oak acorn planting will be performed each fall in Years One to Five, and will include several experimental methods to assess comparative success. These methods will be documented by the Biological Monitor in each annual report. Potential experimental acorn planting methods will include various protective structure designs, planting depths, acorn pre-treatments (e.g., stratification, pre-germination), “nurse”/companion plants, soil treatments, mulches, and planting schedules, among others. A two- to three-inch layer of weed-free mulch (preferably oak leaves) will typically be used in the oak acorn planting holes. The survival performance criteria will not apply to oak species established via direct sowing (i.e., the criteria only apply to oaks planted from containers); however, surviving oaks of adequate size that are planted from acorns may apply toward the survival criteria for oak trees.

4.3 HYDROSEEDING

The initial/conceptual seed mixes will be installed via hydroseeding and/or hand broadcasting. All native grass species will be installed via hand broadcasting (and/or via container planting); native grasses will not be applied via hydroseeding. Supplemental seed application may occur throughout the maintenance period as directed by the Biological Monitor and may include either hydroseeding or hand-broadcasting.

4.3.1 HYDROSEEDING SCHEDULE

Seeding will preferably be performed between November 1 and December 31 (and during other periods) when weather and soil conditions are suitable. In this way, seasonal rains can be used to facilitate appropriate germination and coverage. The Biological Monitor will coordinate with

the LACDPW Project Manager and provide recommendations on mitigation site conditions prior to hydroseeding; the Biological Monitor will also review the hydroseeding schedule in advance of seed application, and will regularly monitor hydroseeding application throughout the seeding process to ensure that the Restoration Specialist is using the specified seed materials and methodology and that adequate coverage is achieved.

4.3.2 SEED MATERIAL

The initial seed mix for the oak woodland mitigation site is provided in Table 5; the actual seed mix components, potentially including additional shrub and understory species, will be determined by seed availability for collection within the Santa Anita Wash/Rio Hondo Sub-Watershed. A list of the native seed materials installed to-date (between January and March 2014) is provided in Appendix D. All seed used will be clearly labeled showing type of seed; test date; the name of the supplier; and percentage of the pure seed, crop seed, inert matter, weed seed, noxious weeds, and total germination content. All commercial processing or packaging material will be delivered to the site in original, unopened containers bearing the manufacturer's guaranteed analysis. All seed mix labels will be retained by the Restoration Contractor and provided to the Biological Monitor. All seed mixes will be stored in a dark, cool place and not be allowed to become damp. Any seed species substitution shall be approved in advance by the CDFW.

**TABLE 5
INITIAL/CONCEPTUAL SEED MIX SPECIES FOR OAK WOODLAND
MITIGATION**

Common Name^{a,b}	Scientific Name	Per Acre Rate (lbs)	Total Per 5.5 Acres (lbs)
California sagebrush	<i>Artemisia californica</i>	2.00	11.00
primrose	<i>Camissonia bistorta</i>	0.25	1.38
California buckwheat	<i>Eriogonum fasciculatum</i>	10.00	55.00
California everlasting	<i>Gnaphalium californicum</i>	0.25	1.38
heart-leaved penstemon	<i>Keckiella cordifolia</i>	0.25	1.38
giant wild rye	<i>Leymus condensatus</i>	0.50	2.75
southern honeysuckle	<i>Lonicera subspicata</i>	0.50	2.75
deerweed	<i>Lotus scoparius</i>	5.00	27.50
truncate lupine	<i>Lupinus truncatus</i>	0.25	1.38
small-flowered melic grass	<i>Melica imperfecta</i>	2.00	11.00
bush monkeyflower	<i>Mimulus aurantiacus</i>	3.00	16.50
foothill needlegrass	<i>Nassella lepida</i>	3.00	16.50
showy penstemon	<i>Penstemon spectabilis</i>	0.25	1.38
caterpillar phacelia	<i>Phacelia cicutaria</i>	1.00	5.50
California coffeeberry	<i>Rhamnus californica</i>	0.50	2.75
skunkbush	<i>Rhus trilobata</i>	0.50	2.75
golden currant	<i>Ribes aureum</i>	0.50	2.75
chia	<i>Salvia columbariae</i>	0.25	1.38
Total Lbs		30.00	165.03
lbs: pounds			
^a All seed will be obtained from within the Santa Anita Wash/Rio Hondo Sub-Watershed.			
^b Actual seed mix to be installed will depend on availability for collection in the Santa Anita Wash/Rio Hondo Sub-Watershed.			

4.3.3 WATER

Forty-eight hours prior to hydroseeding, all areas to be hydroseeded shall be presoaked via overhead irrigation to a depth of at least three inches. The Restoration Specialist shall coordinate with the LACDPW Project Manager on suitable filling locations for the hydroseeding truck tank. If a metered hydrant is utilized, filling shall occur only during acceptable working hours, and care shall be taken to avoid disturbing residents with noise; use of improper parking locations; spillage of component materials; or other actions.

4.3.4 ADDITIONAL MATERIALS

A granular form of mycorrhizal inoculum (AM-120 or approved equal) shall be added to the hydroseed mixes at a rate of 60 pounds per acre (lbs/acre). An agriculturally suitable marking dye will also be included in the hydroseed mix.

4.3.5 QUALITY OF WORK

Hydroseeding shall be performed by a competently trained and licensed individual or hydroseeding company in accordance with the best standards and practices related to the trade.

4.3.6 EQUIPMENT

Hydroseed mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce a homogenous slurry of materials in the designed unit proportions. It shall be applied using a discharge system that applies the slurry to the areas to be treated at a continuous and uniform rate.

4.3.7 PREPARATION

The slurry preparation shall take place at the work site and shall begin by adding water to the tank when the engine is at half throttle. When the water level has reached the heights of the agitator shaft, good circulation shall be established, and at this time the required materials shall be added depending on the application stage. Spraying shall commence immediately when the tank is full.

4.3.8 TIME LIMIT

The hydromulching slurry components are not to be left in the hydromulch machine for more than four hours. Any slurry components left for more than four hours in the machine shall be rejected and disposed of offsite by the Restoration Contractor at his/her expense.

4.3.9 APPLICATION

The hydroseed operator shall spray the area with a uniform visible coat using the color of the marking dye as a visual guide. The slurry shall be applied in a downward drilling motion via a fan stream nozzle (or other device, as appropriate for specific site conditions) to achieve proper coverage and binding. When hydraulically sprayed onto the soil, the mulch shall not form a blotter-like material. The spray operation shall be directed so that the slurry spray penetrates the soil surface by mixing the slurry components into the soil, thus ensuring maximum impregnation and coverage. Overhead irrigation shall be suspended for 48 hours following the application of hydroseed to allow sufficient time for the fiber/binder material to form a cohesive layer.

4.3.10 NATIVE PLANT PROTECTION

Native container plants and other native plant species on and adjacent to the mitigation sites shall be protected during hydroseed application (i.e., hydroseed material will not be shot directly onto existing plants), and the hose will not be dragged over existing plants. The Restoration Specialist shall provide a sufficient number of crewmen to carry the hose in addition to the operator of the hose nozzle.

4.4 INSTALLATION COMPLETION MEETING

Immediately following the completion of plant materials installation, the LACDPW Project Manager will meet on site with the City of Arcadia, the Restoration Specialist, and the Biological Monitor, to assess mitigation site conditions to ensure they are in compliance with the terms of the OWHMP. The Biological Monitor and the LACDPW will develop a list of any remaining action items and related deadlines. The list will be included in a memorandum to be provided to the LACDPW Project Manager and the Restoration Specialist within three days after the installation completion meeting. A follow-up meeting will be scheduled, if necessary, to assess any completed action items. The seven to ten-year maintenance and monitoring period will commence upon the satisfactory completion of all installation procedures.

SECTION 5.0 PLANT AND SEED INSTALLATION IN SAGE SCRUB MITIGATION AREAS

Native container plants and seed mixes will be installed at the completion of all site-preparation activities. The initial/conceptual container plant and seed mix palettes developed for the sage scrub mitigation area are based on the plant species observed during focused plant surveys conducted on the Sediment Removal Project site in 2009 and 2010 (BonTerra 2010c and 2009). Copies of the 2010 and 2009 focused plant survey reports are included in Appendix C. Native seeds of local origin for many native plant species were unavailable for collection in 2011 and 2012 due to drought conditions in the approved collection area. Therefore, plant and seed installation will be started in Fall/Winter 2013 and completed in Fall/Winter 2014 to allow additional time for seed collection and plant propagation in 2013 and 2014. Lists of the native plant and seed materials installed to-date (between January and March 2014) are provided in Appendix D.

5.1 CONTAINER PLANT MATERIAL

A diversity of native plant species will be installed on the mitigation site at a density of up to 1,020 plants per acre. Approximately 20 to 25 percent of the total container plants installed will be herbaceous species (e.g., annuals/perennials, grasses). Using this container planting density will facilitate (1) the rapid establishment of a mix of shrubs, herbs, and grasses at densities and coverages typical of scrub habitats and (2) the achievement of the required success criteria for coverage and survival, while allowing for the low level of mortality that typically occurs during native plant establishment programs. This planting density is based on a review of site conditions performed during biological evaluations on the Sediment Removal Project site (BonTerra 2010c and 2009) and BonTerra's extensive expertise with sage scrub restoration and establishment throughout Southern California and within foothill areas of the San Gabriel Mountains (BonTerra 2000, 2001, 2005b, 2006, and 2010b). Cactus plants will be installed in groups of at least 20 to 25 plants, approximately 5 feet on-center, to result in several contiguous patches of cactus cover that will be managed to exclude non-succulent shrub species.

All container plants will be propagated on a contract basis by a nursery that specializes in native plants. The Restoration Specialist and the Biological Monitor will inspect all plant materials at the nursery and will accept only healthy, vigorous, well-rooted, non-rootbound plant materials upon delivery. Plants determined to have improper genetics (e.g., prostrate cultivars of coyote bush rather than the upright "wild type" form of the shrub) will be rejected. Container plants shall be stored on site in a protected location by the Restoration Specialist and will not be held on site longer than one week prior to installation. Plants stored on site awaiting installation shall be properly watered by hand with a low-force wand to minimize interim damage/desiccation/decline and shall be kept moist at all times. All appropriate container plant species shall be pre-inoculated with mycorrhizal fungi during nursery propagation.

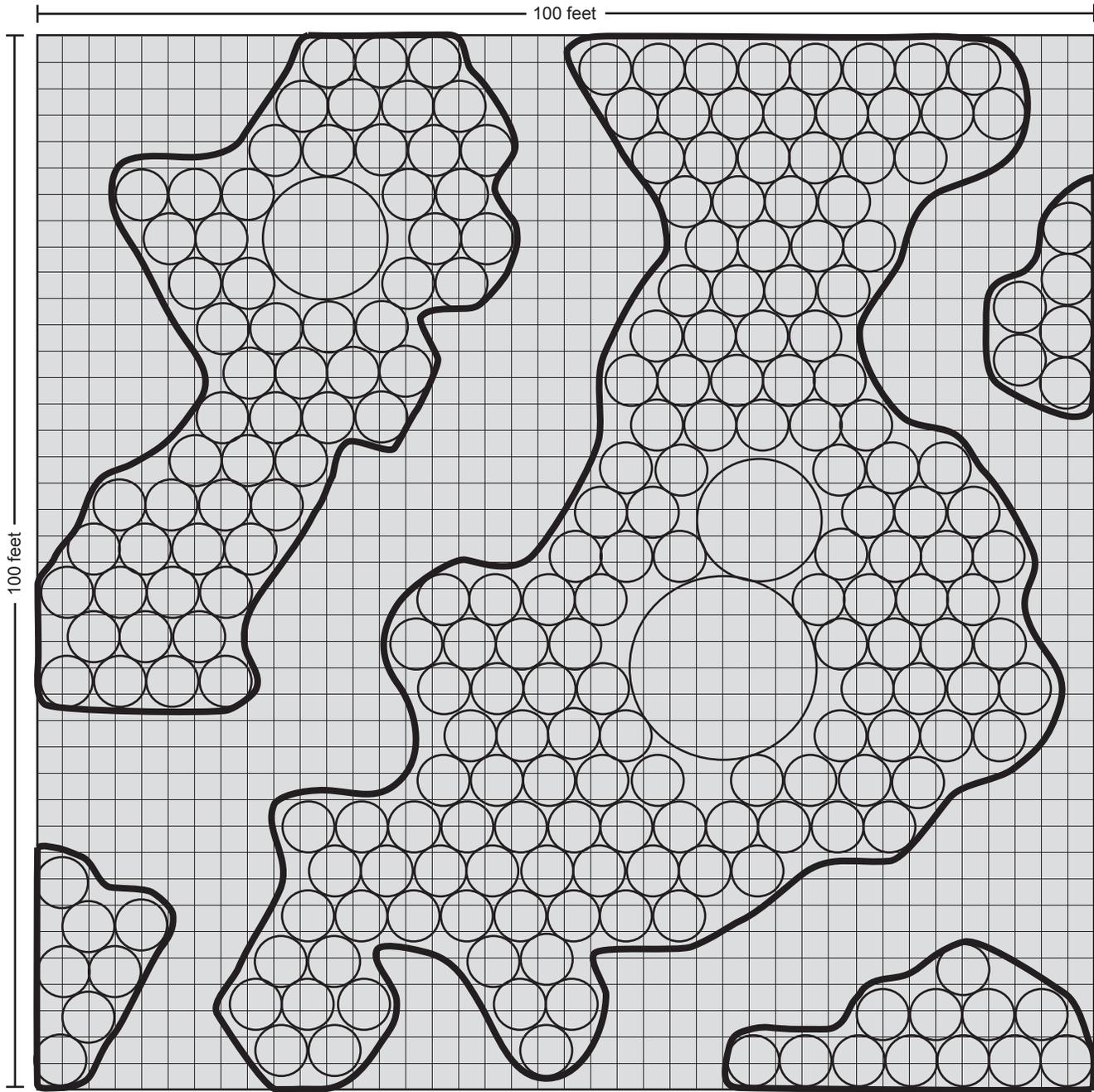
Container plants shall be installed between November 1 and December 31 and during other periods when weather and soil conditions are suitable and in accordance with locally acceptable practices. The Restoration Specialist shall notify the Biological Monitor and the LACDPW Project Manager one week in advance of scheduled plant deliveries to provide ample opportunity for pre-delivery plant inspections.

The Biological Monitor will create at least two 100-foot by 100-foot demonstration plots in the sage scrub planting areas, delineated by lath-and-flagging, to indicate the container plant distribution that will be reproduced throughout the site. The Biological Monitor shall supply the lath, flagging, and color-coded wire flags for the demonstration plot. The Restoration Specialist shall not install container plants in an unnatural, linear planting pattern. The planting pattern will include gaps for herbaceous species only, to create an “edge effect” in the shrub canopy that is considered beneficial for many wildlife species. A list of container plant species is provided in Table 6; the actual container plant species and quantities may be modified based on seed availability for collection in the Santa Anita Wash/Rio Hondo Sub-Watershed. A list of the native plant materials installed to-date (between January and March 2014) is provided in Appendix D. A typical planting plan for the sage scrub mitigation area is provided on Exhibit 6. Exhibit 6 shows typical plant quantities, spacing, and plant groupings/configurations to be used in a 0.23-acre area; this typical 0.23-acre planting scheme would be repeated throughout the entire sage scrub mitigation area. Any plant species substitution shall be approved in advance by the CDFW.

5.1.1 CONTAINER PLANT INSTALLATION

The Restoration Specialist shall follow the specific container plant installation methods described below. Alternate planting methods may be used (e.g., hand digging rather than augering) with the prior approval of the Biological Monitor. No chemical soil amendments or mulch will be used in the container planting holes or basins.

1. Planting holes shall be machine augered to a suitable width and depth prior to container plant installation. The typical planting hole is approximately twice the width and depth of the rootball.
2. Planting holes shall be filled with water immediately prior to plant installation, and the water shall be allowed to percolate fully into the soil prior to planting.
3. Plants shall be removed from the containers in a manner that avoids damage to the rootball. Extended tap root development and minor rootbound conditions will be appropriately treated via pinching and loosening of appropriate portions of the rootball prior to planting.
4. Each plant shall be installed so that the “collar” or soil level is slightly higher than the surrounding finished grade to allow for partial plant settling over time.
5. The excavated soil backfill material shall be placed into the planting hole to the existing grade and gently compacted around the rootball.
6. A temporary watering basin approximately two to three feet in diameter shall be created around each plant to facilitate the initial watering-in of the plants. The exposed upper sides of the rootball shall be covered with backfill material sloping down into the basin.
7. Each plant shall be initially watered-in by hand; the watering basins will be filled using a hose fitted with a low-force wand. The water spray shall be directed to the outer part of the watering basin to avoid damage to the plant roots or crown.



Area shown is 10,000 square feet (0.23 acre)
 Overall container plant density is approximately 1,000 plants/acre
 Actual planting pattern would be random non-linear



Container planting area
 Small symbols represent dominant shrub species, including California sagebrush.
 Large symbols represent large shrubs such as laurel sumac (larger plant spacing).



Hydroseeding area

Proposed Planting Plan: Sage Scrub

Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project

Exhibit 6



**TABLE 6
INITIAL/CONCEPTUAL CONTAINER PLANT SPECIES FOR SAGE SCRUB
MITIGATION**

Common Name ^{a,b}	Scientific Name	Size	Density (Plants Per Acre)	Total Plants (Per 2.5 Acres)
California sagebrush	<i>Artemisia californica</i>	1 gallon	350	875
narrow-leaved milkweed	<i>Asclepias fascicularis</i>	1 gallon	50	125
California buckwheat	<i>Eriogonum fasciculatum</i>	1 gallon	200	500
California everlasting	<i>Gnaphalium californicum</i>	1 gallon	50	125
deerweed	<i>Lotus scoparius</i>	1 gallon	50	125
laurel sumac	<i>Malosma laurina</i>	1 gallon	10	25
foothill needlegrass	<i>Nassella lepida</i>	1 gallon	50	125
Vasey's prickly pear	<i>Opuntia x vaseyi</i>	1 gallon	50	125
showy penstemon	<i>Penstemon spectabilis</i>	1 gallon	50	125
sugar bush	<i>Rhus ovata</i>	1 gallon	10	25
white sage	<i>Salvia apiana</i>	1 gallon	50	125
black sage	<i>Salvia mellifera</i>	1 gallon	50	125
chaparral yucca	<i>Yucca whipplei</i>	1 gallon	50	125
Total			1,020	2,550
^a All container plants will be propagated from seed/cuttings obtained from within the Santa Anita Wash/Rio Hondo Sub-Watershed. ^b Actual container plants to be installed will depend on availability for collection in the Santa Anita Wash/Rio Hondo Sub-Watershed.				

5.2 HYDROSEEDING

The initial/conceptual seed mixes will be installed via hydroseeding and/or hand broadcasting. All native grass species will be installed via hand broadcasting (and/or via container planting); native grasses will not be applied via hydroseeding. Supplemental seed application may occur throughout the maintenance period, as directed by the Biological Monitor, and may include either hydroseeding or hand-broadcasting.

5.2.1 HYDROSEEDING SCHEDULE

Seeding will preferably be performed between November 1 and December 31 and during other periods when weather and soil conditions are suitable. In this way, seasonal rains can be used to facilitate appropriate germination and coverage. The Biological Monitor will coordinate with the LACDPW Project Manager and provide recommendations on mitigation site conditions prior to hydroseeding. The Biological Monitor will also review the hydroseeding schedule in advance of seed application and will regularly monitor hydroseeding application throughout the seeding process to ensure that the Restoration Specialist is using the specified seed materials and methodology and that adequate coverage is achieved.

5.2.2 SEED MATERIAL

The initial/conceptual seed mix for the sage scrub mitigation site is provided in Table 7; the actual seed mix components, potentially including additional shrub and understory species, will be determined by seed availability for collection from within the Santa Anita Wash/Rio Hondo Sub-Watershed. A list of the native seed materials installed to-date (between January and March 2014) is provided in Appendix D. All seed used will be clearly labeled showing type of seed; test date; the name of the supplier; and percentage of the pure seed, crop seed, inert matter, weed seed, noxious weeds, and total germination content. All commercial processing or packaging material will be delivered to the site in original unopened containers bearing the manufacturer's guaranteed analysis. All seed mix labels will be retained by the Restoration Specialist and provided to the Biological Monitor. All seed mixes will be stored in a dark, cool place and not be allowed to become damp.

**TABLE 7
INITIAL/CONCEPTUAL SEED MIX SPECIES FOR SAGE SCRUB MITIGATION**

Common Name ^{a,b}	Scientific Name	Per Acre Rate (lbs)	Total Per 2.5 Acres (lbs)
California sagebrush	<i>Artemisia californica</i>	4.00	10.00
primrose	<i>Camissonia bistorta</i>	0.25	0.63
California buckwheat	<i>Eriogonum fasciculatum</i>	10.00	25.00
California everlasting	<i>Gnaphalium californicum</i>	0.25	0.63
heart-leaved penstemon	<i>Keckiella cordifolia</i>	0.25	0.63
deerweed	<i>Lotus scoparius</i>	5.00	12.50
truncate lupine	<i>Lupinus truncatus</i>	0.25	0.63
foothill needlegrass	<i>Nassella lepida</i>	3.00	7.50
showy penstemon	<i>Penstemon spectabilis</i>	0.25	0.63
caterpillar phacelia	<i>Phacelia cicutaria</i>	1.00	2.50
white sage	<i>Salvia apiana</i>	1.00	2.50
chia	<i>Salvia columbariae</i>	0.25	0.63
black sage	<i>Salvia mellifera</i>	2.00	5.00
chaparral yucca	<i>Yucca whipplei</i>	2.50	6.25
Total Lbs		30.00	75.03
lbs: pounds			
^a All seed will be obtained from within the Santa Anita Wash/Rio Hondo Sub-Watershed.			
^b Actual seed mix to be installed will depend on availability for collection in the Santa Anita Wash/Rio Hondo Sub-Watershed.			

5.2.3 WATER

Forty-eight hours prior to hydroseeding, all areas to be hydroseeded shall be presoaked via overhead irrigation to a depth of at least three inches. The Restoration Specialist shall coordinate with the LACDPW Project Manager on suitable filling locations for the hydroseeding truck tank. If a metered hydrant is utilized, filling shall occur only during acceptable working hours, and care shall be taken to avoid disturbing residents with noise; use of improper parking locations; spillage of component materials; or other actions.

5.2.4 SLOPE STABILIZATION MATERIAL

Slope stabilization will be provided by Flexterra™ Flexible Growth Medium (or another material approved by the LACDPW Project Manager and the Biological Monitor) and be applied at a rate of 3,500 lbs/acre. An alternative will be to use mulch material consisting of fiber produced from virgin wood mulch (applied at the rate of 2,000 lbs/acre); the soil stabilizer shall consist of Aztec M binder (or another approved equal) at a rate of 150 lbs/acre. A granular form of mycorrhizal inoculum (AM-120 or approved equal) shall be added to the hydroseed mix at a rate of 60 lbs/acre or at the manufacturer's specified rate. An agriculturally suitable marking dye will also be included in the hydroseed mix.

5.2.5 QUALITY OF WORK

Hydroseeding shall be performed by a competently trained and licensed individual or hydroseeding company in accordance with the best standards and practices related to the trade.

5.2.6 EQUIPMENT

Hydroseed mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce a homogenous slurry of materials in the designed unit proportions. It shall be applied using a discharge system that applies the slurry to the areas to be treated at a continuous and uniform rate.

5.2.7 PREPARATION

The slurry preparation shall take place at the work site and shall begin by adding water to the tank when the engine is at half throttle. When the water level has reached the heights of the agitator shaft, good circulation shall be established; at this time, the required materials shall be added depending on the application stage. Spraying shall commence immediately when the tank is full.

5.2.8 TIME LIMIT

The hydromulching slurry components are not to be left in the hydromulch machine for more than four hours. Any slurry components left for more than four hours in the machine shall be rejected and disposed of offsite by the Restoration Specialist at his/her expense.

5.2.9 APPLICATION

The hydroseed operator shall spray the area with a uniform visible coat using the color of the marking dye as a visual guide. The slurry shall be applied in a downward drilling motion via a fan stream nozzle or other device, as appropriate for specific site conditions, to achieve proper coverage and binding. When hydraulically sprayed onto the soil, the mulch shall not form a blotter-like material. The spray operation shall be directed so that the slurry spray penetrates the soil surface through mixing the slurry components into the soil, thus ensuring maximum impregnation and coverage. Overhead irrigation shall be suspended for 48 hours following the application of hydroseed to allow sufficient time for the fiber/binder material to form a cohesive layer.

5.2.10 PROTECTION OF NATIVE PLANTS

Native container plants and other native plant species on and adjacent to the mitigation sites shall be protected during hydroseed application (i.e., hydroseed material will not be shot directly onto existing plants), and the hose will not be dragged over existing plants. The Restoration Specialist shall provide a sufficient number of crewmen to carry the hose in addition to the operator of the hose nozzle.

5.3 INSTALLATION COMPLETION MEETING

Immediately following the completion of plant materials installation, the LACDPW Project Manager will meet with the City of Arcadia, the Restoration Specialist, and the Biological Monitor on site to assess mitigation site conditions and in compliance with the terms of the OWRMP. The Biological Monitor and the LACDPW will develop a list of any remaining action items and related deadlines. The list will be included in a memorandum to be provided to the LACDPW Project Manager and the Restoration Specialist within three days after the installation completion meeting. A follow-up meeting will be scheduled, if necessary, to assess any completed action items. The ten-year maintenance and monitoring period will commence upon the satisfactory completion of all installation procedures.

SECTION 6.0 LONG-TERM MAINTENANCE

The maintenance tasks described below will be performed by the Restoration Specialist in coordination with the LACDPW Project Manager and the Biological Monitor. The intent of the maintenance program is to facilitate the successful establishment of self-sustainable oak woodland and sage scrub habitat. It is anticipated that weed removal and other maintenance tasks will be required on a minimum monthly basis for the first two years of the maintenance period. During the first year of the maintenance period, no more than two weeks shall elapse without an on-site inspection performed by the Restoration Specialist's project manager. The LACDPW Project Manager and the Biological Monitor will approve any needed revisions to the specified schedule and methodologies. Maintenance activities will include the tasks listed in Table 8.

**TABLE 8
LONG-TERM MAINTENANCE SCHEDULE**

Work Tasks ^{a, b}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weed Control												
Irrigation System Inspections												
Pest Control												
Plant Protection												
Erosion-control Inspections												
Plant Mortality Identification							X	X	X			
Plant Replacement												
Trash Removal												
	= Ongoing Task											
X	= Task performed one or more times per month.											
^a	Maintenance task schedule and frequency will be adjusted as appropriate depending on site conditions and in coordination with the LACDPW and the Biological Monitor.											
^b	The Restoration Specialist's project manager shall perform inspections every other week (at a minimum) for the first six months following installation, and on a minimum monthly basis thereafter during Year One of the maintenance period.											

6.1 PROTECTION

The Restoration Specialist shall be responsible for providing, as feasible, adequate protection of all seeded and planted areas against herbivores, traffic, vandalism, or other intrusions by erecting fencing, caging, or other acceptable structures, as needed, with the prior approval of the LACDPW Project Manager. Damaged areas shall be repaired within one week or as specified by the LACDPW and the Biological Monitor.

6.2 EROSION CONTROL

The Restoration Specialist shall be responsible for maintaining long-term erosion and sediment control, as appropriate, to prevent damage to the mitigation site and adjacent areas. All materials shall be approved in advance by the LACDPW Project Manager and the Biological Monitor.

6.3 WEED CONTROL

Aggressive weed control will be required throughout the maintenance period. The site will be kept free of weed species to the greatest extent feasible. Weed species will not be allowed to mature; set seed; or otherwise inhibit the germination, growth, and establishment of planted, seeded, and volunteer native plant species at any time during the ten-year maintenance program. Maintenance field crews must be able to distinguish native plant species of all age classes (including seedlings) from non-native plants. If necessary, the LACDPW Project Manager may request the Biological Monitor to conduct an orientation on plant identification for the Restoration Specialist's crew. The orientation will occur before the maintenance period begins. The orientation(s) may also include a discussion of suitable weed-removal methods, herbicide treatment, and other related topics. Long-term maintenance will include weed removal within weed abatement Areas 1 and 2, as shown in Exhibit 3. Weed control will include the methods described below by weed type. The oak woodland and sage scrub mitigation sites must achieve and maintain the required success criteria, including the weed coverage success criteria (a maximum of five percent coverage) for one year without any weed control prior to final approval of the mitigation program.

6.3.1 BROADLEAF PLANTS

Broadleaf plants include castor bean (*Ricinus communis*), black mustard (*Brassica nigra*), sweet fennel (*Foeniculum vulgare*), tree tobacco (*Nicotiana glauca*), and other weed species identified by the Restoration Specialist and the Biological Monitor. The following procedures shall be followed to remove these species:

1. Aquamaster® or Roundup Pro®, (or equivalent products) shall be used at a minimum rate of 2 percent (2.5 ounces/gallon [oz/gal]) to ensure a comprehensive and fully effective treatment and minimal re-sprouting from root tissues. No broadcast herbicide spraying of large areas shall be performed following native plant installation. Methods of application to broadleaf weeds shall be limited to "wicking" application to freshly cut stems for the initial treatments (e.g., castor bean, fennel). Spot spraying of herbicide via "backpack" sprayers may be performed following native plant installation as long as they are consistent with County weed-abatement procedures. Herbicide contact with native shrub and grass species shall be avoided as much as possible. Herbicide application will be performed only in appropriate weather conditions (e.g., winds no greater than five miles per hour). In the event of gusty winds or winds in excess of five miles per hour, all work shall be temporarily discontinued as a means of protecting applicators and adjacent natural resources. Treatments shall also be temporarily discontinued in the event of current or anticipated rainfall (rainfall and irrigation will reduce the effectiveness of the herbicide).
2. Sprayed vegetation shall be left undisturbed for seven days to allow the herbicide to be distributed throughout the entire plant. Visible effects of herbicide application consist of wilted and brown foliage and disintegrated root material.
3. All treated plant materials shall be removed via weed-whips or hand tools approximately one week after treatment and disposed of off-site at an appropriate landfill. No weeds shall be stockpiled on the mitigation project site on a long-term basis. Disturbance of the soil surface will be avoided to the greatest extent practicable to avoid bringing non-germinated weed seeds to the surface.
4. Steps 1 and 3 shall be repeated, as needed, throughout the maintenance program to prevent the production/dispersal of weed seeds and the inhibition of native plant growth on site.

5. All herbicide use shall be performed in accordance with the manufacturer's specifications and relevant codes/ordinances. Care shall be taken to avoid spillage of herbicides at mixing sites or other locations. Any herbicide-contaminated soils shall be removed by the Restoration Specialist and disposed of at a suitable off-site location. Herbicide application will be performed only by Certified Pesticide (Herbicide) Applicators (CPA). Applicators shall wear gloves, masks, and long sleeves at all times as protection from chemical injuries.

6.3.2 NON-NATIVE GRASSES

Non-native grasses will be prevented from reseeding on the mitigation site by frequently performing at least one of the following methods: hand-pulling; weed-whipping; spot spraying with herbicide (such as Aquamaster®, Roundup® Pro, or equivalent product) via "backpack" sprayers; or other methods of grass, plant, or seed head removal. Herbicide contact with native shrub and grass species shall be avoided as much as possible. Herbicide spraying shall be performed only in appropriate weather conditions (e.g., winds no greater than five miles per hour). In the event of gusty winds or winds in excess of five miles per hour, all work shall be temporarily discontinued as a means of protecting applicators and adjacent natural resources. Treatments shall also be temporarily discontinued in the event of current or anticipated rainfall (rainfall and irrigation will reduce the effectiveness of the herbicide). Non-native grasses will not be allowed to form dense patches of "thatch" that would suppress the establishment of native seedlings.

6.3.3 ALTERNATIVE ERADICATION METHODS

Alternative weed eradication methods will be approved in advance by the LACDPW and may include (1) use of approved alternate herbicides and (2) adjustments to treatment frequencies and schedules.

6.4 IRRIGATION

Container plant and seed mix species will be temporarily irrigated to facilitate germination and plant establishment. Plant species will initially be irrigated at a rate of three to five acre-feet per acre per year. The irrigation system will be operated in a manner that encourages deep root growth rather than surface root development (i.e., infrequent deep watering rather than frequent light watering). The frequency of irrigation operation will be decreased over time to adapt the native vegetation to an arid moisture regime and to minimize potential die-back of native plant species due to excessive soil moisture. Regular maintenance will be required to inspect and repair any problems that may develop in the irrigation system; specifically, the Restoration Specialist's project manager shall perform inspections of the irrigation system at least once every two weeks for the first six months following plant and seed installation and as-needed thereafter. Irrigation system checks will consist of the separate operation of each valve and verification that each irrigation head is functional. Remedial measures to correct irrigation system malfunctions shall be performed by the Restoration Specialist immediately upon determination. The irrigation system will remain in place until final mitigation project approval, and the Restoration Specialist will remove all irrigation components from the mitigation site with minimal impacts to surrounding native vegetation. Irrigation system removal shall occur outside the general breeding bird season which, according to EIR Mitigation Measure No. BIO-B, occurs between February 1 and August 31. The mitigation site must be self-sustainable without supplemental water for two years prior to final approval of the mitigation program. LACDPW shall consult with the CDFW prior to the termination of irrigation.

6.5 PEST CONTROL

Insects, plant disease, herbivores, and other pests shall be closely monitored during the maintenance period. Diseased or infected plants shall be immediately disposed of off-site at an approved landfill to prevent infection of on-site resources. If rodents or deer become a problem, the Biological Monitor will recommend caging container plants and oak trees to protect them from herbivory.

The oak woodland and sage scrub mitigation sites must achieve and maintain the required success criteria for one year without any pest control prior to final approval of the mitigation program. If some limited rodent re-location or other control method is necessary for proper habitat establishment, LACDPW will submit a brief, project-specific Rodent Management Plan for CDFW review and approval prior to the use of live traps or other non-lethal measures. Biological controls shall be used instead of pesticides or other similar chemicals for rodent control.

6.6 REPLACEMENT

The Restoration Specialist will replant or reseed using species and quantities specified by the LACDPW Project Manager and the Biological Monitor in order to compensate for widespread plant mortality; non-compliance with coverage standards; mechanical damage to plant species; and/or poor plant health. The Biological Monitor will recommend replanting and reseeding actions to the LACDPW during the course of the monitoring period. Replacement container plants and seed mixes shall be of local geographic origin (i.e., the Santa Anita Wash/Rio Hondo Sub-Watershed) and shall include plant species and application quantities that result in the establishment of oak woodland and sage scrub habitat similar to the preserved habitat areas on site. Fern species will be installed at least 2 years after the initial planting period, when tree and shrub species have grown enough to begin to provide shade for fern species. The Restoration Specialist will coordinate with the Biological Monitor and a qualified native plant nursery on the propagation of any needed replacement container plants. All replanting or reseeding shall occur between November 1 and December 31 or during other periods when weather conditions are appropriate.

6.7 FUEL MODIFICATION ZONES

In compliance with the City of Arcadia's defensible space vegetation requirements, no green waste or other flammable materials will be stored within 100 feet of residential structures located to the south of the Lower SPS.

6.8 TRASH REMOVAL

The Restoration Contractor shall remove all trash and man-made debris from the mitigation site on an ongoing basis.

SECTION 7.0 LONG-TERM MONITORING

Long-term mitigation performance monitoring will be performed by the Biological Monitor. A schedule of biological monitoring tasks is provided in Tables 9 through 11.

**TABLE 9
LONG-TERM MONITORING SCHEDULE
YEARS 0 TO 1.5**

Work Tasks	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site Monitoring												
Qualitative Surveys	X			X			X			X		
Quantitative Surveys ^a					X							
Photo-documentation	X			X	X		X			X		
On-site Meetings ^b	X			X	X		X			X		
Site Status Documentation												
Installation Completion ^c												X
Progress Reports	X			X			X			X		
Annual Status Reports					X							
^a Regardless of the installation completion date, the annual quantitative survey will be performed in May to best assess native plant species coverage, including seasonal growth of native herbs and grasses. ^b On-site meetings will include, as needed, the LACDPW, the Restoration Contractor, the Biological Monitor, and any other appropriate parties, and will occur, as needed, during regularly scheduled site-monitoring visits. ^c Actual date depends on timing of installation completion.												

**TABLE 10
LONG-TERM MONITORING SCHEDULE
YEARS 1.5 TO 5**

Work Tasks	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site Monitoring												
Qualitative Surveys					X						X	
Quantitative Surveys ^a					X							
Photo-documentation					X						X	
On-site Meetings ^b					X						X	
General Wildlife Survey					X							
Site Status Documentation												
Progress Reports					X						X	
Annual Status Reports					X							
^a Regardless of the installation completion date, the annual quantitative survey will be performed in May to best assess native plant species coverage, including seasonal growth of native herbs and grasses. ^b On-site meetings will include, as needed, the LACDPW, the Restoration Contractor, the Biological Monitor, and any other appropriate parties, and will occur, as needed, during regularly scheduled site monitoring visits.												

**TABLE 11
LONG-TERM MONITORING SCHEDULE
YEARS 6 TO 10**

Work Tasks	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site Monitoring												
Qualitative Surveys					X							
Quantitative Surveys ^a					X							
Photo-documentation					X							
On-site Meetings ^b					X							
General Wildlife Survey					X							
Site Status Documentation												
Progress Reports					X							
Annual Status Reports					X							
^a Regardless of the installation completion date, the annual quantitative survey will be performed in May to best assess native plant species coverage, including seasonal growth of native herbs and grasses. ^b On-site meetings will include, as needed, the LACDPW, the Restoration Contractor, the Biological Monitor, and any other appropriate parties, and will occur, as needed, during regularly scheduled site monitoring visits.												

The Biological Monitor will perform regularly scheduled qualitative and quantitative surveys as described below to review site maintenance activities; to evaluate site conditions; and to determine compliance/non-compliance with the performance standards described in Section 7.

7.1 GOALS AND RATIONALE OF THE MONITORING PROGRAM

As stated above, the primary goal of the on-site mitigation program is to create a developing, diverse, self-sustaining oak woodland and associated sage scrub that will result in habitats of similar or better quality and ecological function to the habitat areas impacted by the sediment removal project. The following objectives have guided the development of the monitoring program described below:

- To facilitate the establishment of healthy coast live oak trees within the mitigation site
- To establish native plant species that will form an understory (oak woodland) and scrub habitat (slopes) whose structure and diversity is consistent with the impacted habitat.

7.1.1 OAK TREE ASSESSMENT

Each of the coast live oak trees installed on the mitigation site will be assessed by a qualified Arborist. Criteria for assessing tree health will include visual evidence of vigor, such as the amount of foliage; leaf color and size; presence and length of new shoot growth; presence of branch or twig dieback; severity of insect infestation; the presence of disease, heart rot, fire damage, or mechanical damage; the amount of new growth; the appearance of bark; and the presence of and rate of callous development over wounds. Structural integrity will also be evaluated with respect to branch attachment; branch placement; presence of decay; presence of exposed roots due to soil erosion; and stability. The health of each tree will be recorded on a scale of 1 to 5 based on the criteria presented in Table 12.

**TABLE 12
TREE HEALTH RATING CRITERIA**

Rating	Criteria
5	Tree in excellent health with abundant foliage, new leaf growth and shoot elongation; no signs of herbivory, insect infestation, disease, fungus growth, or limb/trunk damage.
4	Tree in very good health with ample green foliage and new leaf growth; minor signs of drought stress, herbivory, insect infestation, decreased shoot growth, or loss of vigor.
3	Tree in moderate health with limited or uneven new leaf growth; moderate signs of drought stress; noticeable insect activity; decay on branches; noticeable herbivory damage.
2	Tree in poor health with existing leaves yellowing; limited/stunted new leaf growth; decreased shoot growth from previous year; dark-colored cracks or abnormalities on trunk; presence of fungus; observable decay on trunk or major limbs; sap bleeding from trunk; significant insect infestation; extensive herbivory; thinning canopy.
1	Tree in obvious decline with existing leaves yellowing and no new leaf growth; extensive limb or trunk damage; large cracks or other decay on trunk; bleeding sap; dieback of more than 30% of the canopy; a general lack of vigor.

7.1.2 OAK WOODLAND SAMPLING

Coast live oak is a very slow-growing species and the planted trees will not constitute a woodland resource (i.e., produce flowers [catkins]/seeds [acorns], provide arboreal canopy, shading, diverse nesting opportunities, extensive litterfall with associated biota/functions, well-developed 'liana' [vining shrubs], etc.) within the seven to ten year maintenance period or indeed for several decades. Even with optimal growth performance, the oaks will remain small and shrubby for many years; oak coverage is not expected to exceed 2 to 3 percent of the 5.5-acre mitigation site during the maintenance period (see Table 13, below). Therefore, the sampling program is not designed to assess mature woodland functions as described above (e.g., oak seedling recruitment) but is rather designed (1) to assess individual oak tree survival and condition and (2) to determine the quality of the upland scrub/herbaceous habitat mosaic in which the oaks are becoming established and where they will eventually develop into mature trees. Moreover, the sampling program is intended to assess whether the mitigation site is poised to achieve extended, long-term success after the completion of the seven to ten year maintenance and monitoring period.

**TABLE 13
POTENTIAL OAK TREE GROWTH PERFORMANCE**

Oak Tree Mean Canopy Diameter (sf) ¹	Oak Tree Mean Canopy Area (sf)	Total Quantity of Planted Oak Trees	80% of Planted Oak Trees	Total Oak Canopy Area	
				290 Surviving Trees (sf)	290 Trees As Percentage of 5.5-Acre Site (239,580 sf)(%)
3	7.07	363	290	2,053	0.86
4	12.57	363	290	3,649	1.52
5	19.63	363	290	5,702	2.38
6	28.27	363	290	8,211	3.43
7	38.48	363	290	11,176	4.66

sf: square feet

¹ Examples for immature tree sizes up to 7-ft diameter only; mature coast live oak trees substantially exceed this size.

7.1.3 REFERENCE SITE SURVEYS

Reference site surveys were conducted in California sycamore/coast live oak riparian forest and sage scrub habitats in fall 2013 in woodland portions of the non-impacted part of the Middle SPS, located immediately south of the impacted habitat area (Exhibit 2). The reference site was surveyed using the same sampling methodology and intensity (e.g., number of transects, quadrats) to be used in the oak woodland and sage scrub mitigation sites, as described in Section 7.3 below. The Middle SPS contains numerous mature coast live oak trees with patches of native and non-native understory vegetation, as well as sage scrub habitat and patches of ruderal vegetation. Because the non-impacted Middle SPS habitats exhibit similar vegetation composition and structure to the adjacent, impacted habitat areas, it is considered a suitable reference site for this mitigation program. By contrast, the planted oak trees will not provide arboreal canopy within the mitigation site during the maintenance period; therefore, the reference site tree canopy data will not be a useful measure of relative site performance. Hence, the reference site data (vegetation percent coverage, plant species density/diversity) will be used to evaluate non-oak tree vegetation performance (i.e., under- and midstory) in the mitigation site. The reference site will be quantitatively sampled (quadrats and transects) at the end of Years 3, 5, 7, and 10 for comparison to mitigation site performance. The reference site survey methodology and results (report) are provided in Appendix E, and a summary of mitigation performance standards derived from these results is provided in Tables 14 and 16.

7.2 MONTHLY/QUARTERLY QUALITATIVE SURVEYS

Quarterly qualitative surveys shall be performed for the first 1.5 years, qualitative surveys will be performed twice per year from Year 1.5 to Year 5, and annual qualitative surveys will be performed for the remainder of the 10-year period following implementation. The qualitative surveys will include an assessment of native plant species' percent coverage and diversity; native species recruitment and reproduction; plant mortality and germination failure; plant health; pest problems; irrigation system performance; invasive weed species establishment; and wildlife species use. Qualitative surveys will include an evaluation of wildlife species use, including active searches for amphibians and reptiles by lifting, overturning, and carefully replacing rocks and debris. Birds will be identified by the use of standard visual and auditory recognition. The presence of nests or other evidence of breeding activity will also be noted. Searches for mammals will include searching for and identifying diagnostic sign, including scat, footprints, scratch-outs, dusting bowls, burrows, and trails of various mammal species. The Biological Monitor shall estimate container plant mortality in late summer of every year, and will recommend appropriate fall plant replacement to maintain required native container plant survival levels.

7.3 ANNUAL QUANTITATIVE SURVEYS

Annual quantitative surveys (annual surveys) shall be performed on the mitigation sites, and in the designated reference site (the non-impacted portion of the Middle SPS) in the first two weeks of May of each year. Geographic Information System (GIS)-generated and Global Positioning System (GPS)-located random point-intercept transects and vegetation quadrats shall be used during the quantitative survey to more precisely measure native vegetation performance (coverage and diversity). The oak woodland mitigation site will be divided into a total of 6 approximate 0.9-acre sub-areas (using GIS) and the sage scrub mitigation site will be divided into 6 approximate 0.4-acre sub-areas for long-term monitoring purposes. A detailed discussion of the required sampling methodology is provided in the Reference Site Survey Report (Appendix E). A total of six 100-foot point-intercept transects (1.0-foot intercepts) will be performed in the oak woodland mitigation site (one transect per sub-area) and a total of

six 50-foot point-intercept transects (1.0-foot intercepts) will be performed in the sage scrub mitigation site (one transect per sub-area). A linear sample of 100 feet within each 0.9-acre area is considered adequate to determine the woodland/scrub vegetation coverage and diversity, in combination with areal (quadrat) sampling as described below. Species coverage will be listed by native and non-native species, and ground cover will be recorded at each intercept as coarse woody debris, fine woody debris, leaf litter, rock/cobble/gravel, and bare ground, among others. The measured native species coverage will be sub-classified by trees, large shrubs, medium shrubs, sub-shrubs, succulents, and herbaceous species, as shown in Tables 14 and 16.

At 6 locations in the oak woodland mitigation site (one per sub-area), and 3 locations in the sage scrub mitigation site (one per 2 sub-areas), GIS-generated and GPS-located 20x40-foot quadrats (0.02 acre) will be performed to assess plant species density and diversity. Quadrats will be created using constructible, pre-measured polyvinylchloride (PVC) pipe and fittings, or using wire flags, flagging tape, or other suitable material depending on field conditions. Sample data sheets for quantitative sampling and a discussion of data compilation and interpretation are provided in Appendix F. The transects and quadrats will be performed by a team of two biologists including (1) a qualified Botanist for accurate plant identification and (2) a Biologist qualified to detect nesting bird species. Individual transects or quadrats will be moved to alternate random locations as needed to avoid impacts to nesting birds.

The transect and quadrat data will facilitate the yearly determination of compliance/non-compliance with the percent plant coverage and diversity performance standards listed in Tables 14 and 16. Additionally, a qualitative evaluation using the form included in Appendix G will be performed by a Certified Arborist for all planted oaks (via containers) to assess tree survival and health, and to assign a performance score. This score will help to assess the site's progress towards meeting its performance standards and will provide data to support recommendations related to potential issues related to tree health. The oak tree evaluations will include a visual estimate of tree height and canopy width. The Shannon Diversity Index ('H') will be computed for the mitigation sites (and for the reference sites in Years 3, 5, 7, and 10) based on the collected survey data. As described in Appendix E, the reference site value of 'H' sampled in 2013 ranged from 1.82 to 1.97 within the California Sycamore/Coast Live Oak Riparian Forest area and 1.81 to 2.26 in the Coastal Sage Scrub areas; the mitigation sites shall exhibit values of 'H' within or exceeding these ranges at project completion. .

The annual survey will also include qualitative evaluations of site conditions, as described above. All wildlife and plant species observed on the mitigation sites will be recorded throughout the year, and a compendium of all species will be appended to the Annual Monitoring Report. Permanent photo-documentation stations shall be established with GPS coordinates; panorama photographs will be obtained at each photo-documentation station prior to native plant installation and during each annual quantitative survey. Recommended remedial measures shall be based on site observations and survey results, and shall follow the guidelines provided in Tables 15 and 17.

**TABLE 14
OAK WOODLAND MITIGATION PERFORMANCE STANDARDS**

Year	Vegetation Percent Coverage							Native Vegetation Diversity (Richness): No. of Plant Species ^f	Oak Tree Survival (Percent)	
	Native (Minimum)						Non- Native ^b			
	Trees ^a	Shrubs ^a			Succulents ^a	Herbs/Grasses ^a				Total ^b
	Large ^c	Medium ^d	Sub-shrubs ^e							
1							25	< 5		80
2							40	< 5		80
3	0.5	3.0	14.0	3.0	0.5	25.0	55	< 5	15	80
4							65	< 5		80
5	1.0	4.0	16.0	4.0	1.0	30.0	75	< 5	18	80
6							75	< 5		80
7	1.5	5.0	18.0	5.0	2.0	30.0	75	< 5	20	80
8							75	< 5		80
9							75	< 5		80
10	2.0	5.0	18.0	5.0	2.0	30.0	75	< 5	24	80

^a Absolute Coverage
^b Class Coverage
^c Large evergreen shrubs such as toyon and sugarbush.
^d Includes medium shrubs (evergreen or deciduous) such as California buckwheat and golden currant.
^e Includes sub-shrubs and vining shrubs (evergreen or deciduous) such as California blackberry.
^f The mitigation sites shall also exhibit Shannon Diversity Index values ('H') within or exceeding the range of 1.82 to 1.97 at project completion.

**TABLE 15
OAK WOODLAND MITIGATION REMEDIAL PROCEDURES**

Performance Standard	Non-Compliance	Potential Remedial Measures
25%, 40%, 55%, 65%, and 75% coverage of native species at Years 1, 2, 3, 4, and 5, respectively, and 75% for Years 6 to 10, and native plant coverage goals for growth forms as listed in Table 14.	>5% deviation below specified coverage throughout 10% or more of the entire site (i.e., if 10% or more of the site is 5% below the coverage standard, the entire site will be considered non-compliant).	Reseeding and replanting with appropriate plant species and quantities, irrigation system adjustments, and/or additional weed control shall be recommended, as needed, to facilitate <5% deviation below specified coverage throughout 10% or more of the entire site, and 5% maximum weed coverage.
5% maximum coverage of non-native plant species.		
80% survival of oak trees	Less than 80% survival.	Replanting, irrigation system adjustments, and/or additional weed control shall be recommended, as needed, to facilitate 80% survival of oak trees.
Minimum native plant species diversity of 15, 18, 20, and 24 species at Years, 3, 5, 7, and 10, respectively.	Plant diversity below the established minimum number of species for Years 3, 5, 7, and 10.	Planting and/or seeding with additional native plant species of local origin.

**TABLE 16
SAGE SCRUB MITIGATION PERFORMANCE STANDARDS**

Year	Vegetation Percent Coverage							Native Vegetation Diversity (Richness): No. of Plant Species ^f
	Native (Minimum)						Non-Native ^b	
	Shrubs ^a			Succulents ^a	Herbs/ Grasses ^a	Total ^b		
	Large ^c	Medium ^d	Sub-shrubs ^e					
1						25	< 5	
2						40	< 5	
3	2.0	24.0	2.0	0.5	8.0	55	< 5	10
4						65	< 5	
5	3.0	28.0	3.0	1.0	10.0	75	< 5	12
6						75	< 5	
7	4.0	35.0	4.0	2.0	15.0	75	< 5	15
8						75	< 5	
9						75	< 5	
10	5.0	50.0	5.0	2.0	15.0	75	< 5	18

^a Absolute Coverage
^b Class Coverage
^c Large evergreen shrubs such as laurel sumac and sugarbush.
^d Includes medium shrubs (evergreen or deciduous) such as California sagebrush and California buckwheat
^e Includes sub-shrubs and vining shrubs (evergreen or deciduous) such as chaparral clematis (*Clematis lasiantha*).
^f The mitigation sites shall also exhibit Shannon Diversity Index values ('H') within or exceeding the range of 1.81 to 2.26 at project completion.

**TABLE 17
SAGE SCRUB MITIGATION REMEDIAL PROCEDURES**

Performance Standard	Non-Compliance	Potential Remedial Measures
25%, 40%, 55%, 65%, and 75% coverage of native species at Years 1, 2, 3, 4, and 5, respectively, and 75% for Years 6 to 10, and native plant coverage goals for growth forms as listed in Table 16..	>5% deviation below specified coverage throughout 10% or more of the entire site (i.e., if 10% or more of the site is 5% below the coverage standard, the entire site will be considered non-compliant).	Reseeding and replanting with appropriate plant species and quantities, irrigation system adjustments, and/or additional weed control shall be recommended, as needed, to facilitate <5% deviation below specified coverage throughout 10% or more of the entire site, and 5% maximum weed coverage.
5% maximum coverage of non-native plant species.		
Minimum native plant species diversity of 10, 12, 15, and 18 species at Years, 3, 5, 7, and 10, respectively.	Plant diversity below the established minimum number of species for Years 3, 5, 7, and 10.	Planting and/or seeding with additional native plant species of local origin.

7.4 PROTECTION

In the event of herbivore damage, pedestrian damage, vandalism, or other types of damage to the planting areas, the Biological Monitor shall recommend supplemental protection measures to minimize future damage to the site (e.g., additional fencing, caging, live traps, signage, or other measures) with the prior LACDPW Project Manager approval. The Restoration Specialist shall be responsible for implementing these protection measures.

7.5 EROSION CONTROL

The LACDPW Project manager and the Biological Monitor shall approve, in advance, any erosion-control measures and materials to be used on site. The Restoration Specialist shall be solely responsible for the adequacy of existing or proposed measures to comply with County Best Management Practices and storm water pollution standards. Some erosion-control measures (e.g., fully bio-degradable straw wattles) may remain in place following mitigation project completion, whereas some (e.g., silt fencing) may require removal for ecological or aesthetic reasons. The Restoration Specialist will remove erosion-control measures from the mitigation site upon project completion, on an as-needed basis, under LACDPW direction. The removal of erosion-control measures shall be conducted outside the bird breeding season, as discussed in EIR Mitigation Measure No. BIO-B.

7.6 WEED CONTROL

The Biological Monitor shall educate Restoration Specialist crews regarding the differences between invasive weed species and native plant species on an as-needed basis (frequency will be based on field personnel changes and field conditions). The Biological Monitor shall coordinate with the LACDPW Project Manager and the Restoration Specialist on an ongoing basis regarding weed-control measures to facilitate the successful control of weed species and the establishment of native habitat.

7.7 IRRIGATION

The Biological Monitor shall coordinate with the Restoration Specialist regarding the irrigation schedule to ensure that successful plant establishment is achieved and that irrigation is discontinued as soon as possible without adverse impacts to native plant growth and survival.

7.8 PEST CONTROL

Insects, plant disease, herbivores, and other pests shall be closely monitored during the maintenance period. Diseased or infected plants shall be immediately disposed of off-site at an approved landfill to prevent infection of on-site resources. If rodents or deer become a problem, the Biological Monitor will recommend caging container plants and oak trees to protect them from herbivory.

The oak woodland and sage scrub mitigation sites must achieve and maintain the required success criteria for one year without any pest control prior to final approval of the mitigation program. If some limited rodent re-location is necessary for proper habitat establishment, LACDPW will submit a brief, project-specific Rodent Management Plan for CDFW review and approval prior to the use of live traps or other non-lethal measures. Biological controls shall be used instead of pesticides or other similar chemicals for rodent control.

7.9 REPLACEMENT PLANTING

The LACDPW shall coordinate with the Biological Monitor and the Restoration Specialist regarding appropriate replacement planting measures in the event of widespread plant failure and non-compliance with performance standards. Replacement container plants and seed mixes shall be of local geographic origin (i.e., the Santa Anita Wash/Rio Hondo Sub-Watershed), and shall include plant species and application quantities that result in the establishment of oak woodland and sage scrub habitat similar to the preserved habitat areas on site. The Biological Monitor will coordinate with the Restoration Specialist and a qualified native plant nursery on the propagation of any needed replacement container plants.

7.10 FUEL MODIFICATION ZONES

The LACDPW will coordinate with the Restoration Specialist regarding compliance with the City of Arcadia's defensible space vegetation requirements.

7.11 TRASH REMOVAL

The Biological Monitor will note the presence of any trash and man-made debris within the mitigation site on an ongoing basis. The Restoration Contractor will be responsible for removing trash and man-made debris from the mitigation project site.

7.12 SITE PERFORMANCE DOCUMENTATION

The Biological Monitor will prepare the documentation described below following mitigation site inspections.

7.12.1 PROGRESS REPORTS

The Biological Monitor will prepare quarterly reports from Years 0 to 1.5, twice per year progress reports from Years 1.5 to 5, and annual progress reports from Years 6 to 10 to summarize site conditions as observed during the ongoing maintenance and monitoring period. The progress reports will be submitted to the LACDPW and the Restoration Specialist. Each progress report shall list native plant species health and estimated percent coverage; the establishment of volunteer native plant species; problem weed species; wildlife species' use of the site; significant drought stress; and any recommended remedial measures necessary for compliance with performance standards. The progress reports will include maps and photo-documentation, as needed, to illustrate site conditions. The progress reports will reference the various sub-areas (e.g., a weed problem in 'Area 3') as described above in Section 7.3.

7.12.2 ANNUAL MONITORING REPORTS

The Biological Monitor shall prepare annual monitoring reports (annual report) that summarize year-end site performance. The Biological Monitor shall send the annual reports to the LACDPW Project Manager and the Restoration Specialist within six weeks of the completion of the annual quantitative survey. The annual reports will include the native and non-native plant species percent coverage and diversity measured during the annual quantitative surveys; compliance/ non-compliance with required performance standards; native plant species health; the establishment of volunteer native species; and wildlife species' use of the site. The detection of any special status plant or animal species on the mitigation site will be described in detail. In the event of substantial non-compliance with the required performance standards, the reports will include recommended remedial measures to facilitate future compliance. The annual reports will include (1) photo-documentation of site progress (i.e., before-and-after photographs) recorded at designated photo-documentation stations and (2) exhibit(s) that include the mitigation site boundaries displayed on an aerial photograph, the photo-documentation stations, and the transect locations. The annual reports will include a table of annually updated contact information for all responsible parties. The Biological Monitor shall provide the annual reports in both hard copy and digital (.pdf) formats, and LACDPW will send copies of the annual reports to CDFW and the City of Arcadia.

SECTION 8.0 MITIGATION PERFORMANCE STANDARDS

The Biological Monitor shall use the performance standards listed in this section to evaluate the successful establishment of oak woodland (developing) and sage scrub habitat.

8.1 OAK WOODLAND MITIGATION

The oak woodland mitigation shall be considered successful when planted and seeded native species achieve the coverage and survival goals listed in Table 14 at the end of the ten-year maintenance program. Additional success criteria include the following:

- In order for the oak woodland mitigation program to be considered successful, the following site conditions will be documented within the mitigation areas: evidence of wildlife species use and evidence of native species recruitment (with the exception of oak trees). Note that the planted oak trees will not be mature enough at the end of ten years to produce viable acorns; however, planted oak trees should display a level of health and vigor at the end of the ten-year program (or at the time that monitoring and maintenance is discontinued) that would indicate that successful reproduction is likely to occur once trees have sufficiently matured.
- The oak woodland mitigation site must achieve and maintain the required success criteria, including the weed coverage success criteria (a maximum of five percent coverage), for one year without any weed control prior to final approval of the mitigation program.
- The oak woodland mitigation site must achieve and maintain the required success criteria for one year without any pest control prior to final approval of the mitigation program.
- The mitigation site must be self-sufficient for a period of two years without supplemental irrigation in order to be eligible for sign-off (CDFW Streambed Alteration Agreement No. 1600-2008-0173-R5). LACDPW shall consult with the CDFW prior to the termination of irrigation.

If, after seven years of monitoring, the oak woodland mitigation site meets the success criteria described above (including a minimum of two years without supplemental irrigation) and listed in Table 14, and upon receiving written approval of mitigation program success from the CDFW, the LACDPW may consider the sites to have been successful and may cease monitoring thereafter.

Table 15 provides definitions of non-compliance with the performance standards listed in Table 14 and potential remedial measures. The Biological Monitor shall evaluate compliance and non-compliance with specified performance standards using the methods described below. The use of the mitigation sites by wildlife species detected during regular monitoring visits will aid in the overall determination of mitigation success and appropriate remedial measures.

8.2 SAGE SCRUB MITIGATION

The site shall be considered successful when planted and seeded native species achieve the coverage listed in Table 16 at the end of the ten-year maintenance program. Additional success criteria include the following:

- In order for the sage scrub mitigation program to be considered successful, the following site conditions will be documented in the mitigation areas: evidence of wildlife species use and evidence of native species recruitment.
- The sage scrub mitigation site must achieve and maintain the required success criteria, including the weed coverage success criteria (a maximum of five percent coverage), for one year without any weed control prior to final approval of the mitigation program.
- The sage scrub mitigation site must achieve and maintain the required success criteria for one year without any pest control prior to final approval of the mitigation program.
- The mitigation site must be self-sufficient for a period of two years without supplemental irrigation in order to be eligible for sign-off. LACDPW shall consult with the CDFW prior to the termination of irrigation.

If, after seven years of monitoring, the sage scrub mitigation site meets the success criteria described above (including a minimum of two years without supplemental irrigation) and listed in Table 16, and upon receiving written approval of mitigation program success from the CDFW, the LACDPW may consider the sites to have been successful and may cease monitoring thereafter.

Table 17 provides definitions of non-compliance with the performance standards listed in Table 16 and potential remedial measures. The Biological Monitor shall evaluate compliance and non-compliance with specified performance standards using the methods described below. The use of the mitigation sites by wildlife species detected during regular monitoring visits will aid in the overall determination of mitigation success and appropriate remedial measures.

SECTION 9.0 FINAL PROGRAM APPROVAL

The Biological Monitor will notify the LACDPW Project Manager when the ten-year performance criteria have been achieved. If at least seven years of maintenance have been completed, the LACDPW will meet on site with the CDFW, the Restoration Specialist, the City of Arcadia, and the Biological Monitor to verify the successful establishment of oak woodland (developing) and sage scrub habitats. Upon its approval of the mitigation program, CDFW will prepare a memorandum to confirm the completion of the program and the cessation of required maintenance and monitoring tasks.

SECTION 10.0 ALTERNATE MITIGATION

If the mitigation project does not meet performance criteria in a timely manner and there are no feasible remedial measures to achieve project compliance, an alternate mitigation program shall be identified by the LACDPW in coordination with the CDFW and the City of Arcadia. Alternate mitigation measures may include habitat creation/restoration at an alternate site(s); participation in an approved mitigation bank; or any other appropriate measure approved by the LACDPW. The selection of an alternate mitigation site will include the evaluation of geographic location (e.g., the Santa Anita Canyon vicinity); land ownership; elevation; slope steepness; aspect; soils, proximity to existing preserved native habitat; weed conditions; and other ecological and logistical factors. The planning and implementation of the alternate mitigation program will be the responsibility of the LACDPW.

SECTION 11.0 REFERENCES

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- . 2010c. (September 10, as revised October 27). *Results of Special Status Plant Surveys for the Santa Anita Reservoir Middle Sediment Placement Site, Los Angeles County, California* (a Letter Report sent to the County of Los Angeles Department of Public Works, Water Resources Division). Pasadena, CA: BonTerra Consulting.
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APPENDIX A

BACKGROUND ENVIRONMENTAL DOCUMENTATION

**FINAL ENVIRONMENTAL IMPACT REPORT AND TECHNICAL APPENDICES: SANTA ANITA DAM RISER MODIFICATION AND RESERVOIR SEDIMENT REMOVAL PROJECT
(COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS, 2009)**

**CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG) STREAMBED ALTERATION
AGREEMENT (AGREEMENT) NO. 1600-2008-0173-R5**

**CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION
(CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, NOVEMBER 22, 2009)**

**DEPARTMENT OF THE ARMY PERMIT (PERMIT) NO. SPL-2008-00370-VEN
(LOS ANGELES DISTRICT U.S. ARMY CORPS OF ENGINEERS)**

FINAL

SCH No. 2007061093

Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project

ENVIRONMENTAL IMPACT REPORT



prepared for:
Los Angeles County Department of Public Works
900 South Fremont Avenue
Alhambra, CA 91803

SANTA ANITA DAM RISER MODIFICATION AND RESERVOIR SEDIMENT REMOVAL PROJECT

Final Environmental Impact Report

State Clearinghouse No. 2007061093

Prepared For:
County of Los Angeles
Department of Public Works
900 South Fremont Avenue
Alhambra, California 91803

Prepared By:
EDAW, Inc.
515 South Flower Street, 9th Floor
Los Angeles, California 90071

May 2009

the excavation. Before an excavation is backfilled, it must be checked to ensure that there are no live individuals inside. Backfilling shall not occur until the excavation is clear of all live individuals.

- Personnel involved in project implementation shall receive a briefing from a qualified biologist to identify and describe sensitive resources that may be encountered in the project area. Wildlife of any kind that is encountered during the course of project implementation shall either be moved or provided the opportunity to vacate the site.
- Personnel shall be reminded that harassment, handling, or removal of wildlife from the project site shall not be permitted.

BIO-D

LACDPW shall mitigate for impacts to 6.7 acres of coast live oak woodlands through a combination of on-site creation of coast live oak woodland and/or by permanently protecting comparable habitat in the watershed or by establishing a conservation easement at the Big Tujunga Mitigation Bank. The combined total of onsite creation and/or permanent protection at the Big Tujunga Mitigation Bank shall be a minimum of 6.7 acres.

Oak woodland restoration shall occur within the Lower SPS, which includes approximately 8 acres available for such restoration activities.

Establishment of a conservation easement shall permanently protect comparable habitat at the Big Tujunga Mitigation Bank, which includes land purchased by the LACDPW.

The final size of a conservation easement and the number of trees planted for mitigation shall be determined through consultation with CDFG. City of Arcadia will be consulted regarding restoration activities on the Lower SPS.

Mitigation for impacts to coast live oak individuals shall be negotiated in conjunction with mitigation for impacts to coast live oak woodland. A conceptual restoration plan shall be provided once mitigation ratios are negotiated. The restoration plan shall include detailed methodology for how the site will be prepared, planted, and maintained and quantitative performance criteria such as minimum percent cover by native species, maximum percent cover by non-native species, and minimum species diversity levels.

Details of planting for mitigation shall be described in both a conceptual restoration plan and a mitigation and monitoring plan for oak woodland, which shall be submitted and approved by CDFG prior to implementation of the project.

BIO-E Mitigation for impacts to 3.8 acres of Riversidean alluvial fan sage scrub and 0.08 acre of disturbed Riversidean alluvial fan sage scrub will be accomplished through a combination of restoration of a suitable area on-site and/or by permanently protecting comparable habitat by establishing a conservation easement at the Big Tujunga Mitigation Bank. The combined total of onsite restoration and/or permanent protection at the Big Tujunga Mitigation Bank shall be a minimum of 3.88 acres.

The Lower SPS includes approximately 8 acres available for restoration. Mitigation for impacts to Riversidean alluvial fan sage scrub shall be negotiated with CDFG. A conceptual restoration plan shall be provided once mitigation ratios are negotiated. The restoration plan shall include detailed methodology for how the site will be prepared, planted, and maintained and quantitative performance criteria such as minimum percent cover by native species, maximum percent cover by non-native species, and minimum species diversity levels. Details of planting for mitigation shall be described in a mitigation and monitoring plan approved by CDFG.

Establishment of a conservation easement shall permanently protect comparable habitat at the Big Tujunga Mitigation Bank, which includes land purchased by the LACDPW.

BIO-F Clean Water Act Section 404 (b)(1) guidelines shall be followed as a framework for compensatory mitigation. Through 404(b)(1) negotiations with the USACE and negotiations with CDFG under Fish and Game Code Sections 1600-1616, a determination of the functions and values of impacted jurisdictional waters shall result in the coordination of appropriate mitigation measures for sediment removal and the impacted ephemeral wash and riparian habitat in the excavation area of the reservoir and Middle SPS. Compensatory mitigation of permanently protecting a minimum of 0.15 acres of comparable habitat shall occur at the Big Tujunga Mitigation Bank or through restoration and permanent protection on Mountains Recreation Conservation Authority (MRCA) land.

3.3.5 SIGNIFICANCE AFTER MITIGATION

Implementation of mitigation measures BIO-A through BIO-F would reduce impacts to biological resources to a less than significant level and would promote restoration of native habitat. No significant unavoidable adverse impacts to biological resources would occur as a result of the proposed project.

APPENDIX B

COMPACTION ANALYSIS AND CROSS-SECTION

**SANTA ANITA DAM RISER MODIFICATION AND SEDIMENT REMOVAL PROJECT
COMPACTION ANALYSIS AT LOWER SEDIMENT PLACEMENT SITE**

SANTA ANITA SEDIMENT PLACEMENT SITE AERIAL VIEW AND FILL CROSS SECTIONS

January 3, 2011

TO: Christopher Stone
Water Resources Division

Attention Keith Lilley

FROM: Greg Kelley *Greg Kelley*
Geotechnical and Materials Engineering Division

**SANTA ANITA DAM RISER MODIFICATION AND SEDIMENT REMOVAL PROJECT
COMPACTION ANALYSIS AT LOWER SEDIMENT PLACEMENT SITE
PROJECT ID NO. WRD0000016**

In response to your December 20, 2010, request, we conducted a geotechnical investigation for the subject project. Our findings are included in the attached report.

If you have any questions regarding this matter, please contact Erick Del Bosque or Brian Smith at Extension 4925. To provide feedback on our services, please access <http://dpw.lacounty.gov/go/gmedsurvey> to complete a Customer Service Survey.

EDB:ss

P:\GMEPUB\SEC\SOILSIN\VSANTA ANITA DAM SPS

Attach.

**SANTA ANITA DAM RISER MODIFICATION
AND SEDIMENT REMOVAL PROJECT**

**COMPACTION ANALYSIS
AT LOWER SEDIMENT PLACEMENT SITE
ARCADIA, CALIFORNIA**

Prepared for

County of Los Angeles
Department of Public Works
Water Resources Division

Prepared by

County of Los Angeles
Department of Public Works
Geotechnical and Materials Engineering Division
Soils Investigation Unit

January 3, 2011



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APPENDICES

Appendix A – Boring Log

Appendix B – Summary of Laboratory and Field Test Results

Appendix C – Relative Density Descriptors



INTRODUCTION

On December 20, 2010, Water Resources Division requested Geotechnical and Materials Engineering Division to determine the location of the groundwater table and perform a compaction analysis of subsurface soils at the Santa Anita Lower Sediment Placement Site. The project area is located in Arcadia, California (see Figure 1). This report presents our findings.

SUBSURFACE EXPLORATION

To evaluate the site and determine the onsite soil conditions, one exploratory boring was drilled to a maximum depth of 53 feet below ground surface with a hollow-stem rig using a 6.5-inch-outside-diameter auger. Selected soil samples were collected for classification and testing purposes. In addition, six nuclear gage tests were performed to determine the degree of relative compaction within a foot of the ground surface (see Figure 2 for boring and nuclear gage tests locations). The boring log is presented in Appendix A and a summary of laboratory and field test results is presented in Appendix B.

FINDINGS

1. The soil types encountered at the project site consist predominantly of silty sand in a loose condition, clayey sand in a medium dense condition, poorly graded sand with and without gravel in a medium dense condition, and poorly graded sand with clay and gravel in a medium dense condition.
2. The following table provides relative compaction and a relative density descriptor for the soils encountered in the boring during the subsurface exploration. The N_{60} blow counts include correction factor for the larger-diameter Modified California Sampler have been corrected from Standard Penetration Test to Modified California Sampler.



Soil Type	Depth (ft)	N ₆₀ Blow Counts	Relative Compaction (%)	Relative Density Descriptor
SM	0 - 8	11	78*	medium dense
SC	8 - 15	25	82	medium dense
SP	15 - 21	45 and 20	81 – 87	medium dense to dense
SC	21 - 25	20	81	medium dense
SP	25 - 32	36 and 32	85	dense
SP-SC	32 – 35.5	45	85	dense
SP	35.5 - 53	45	89 – 90	dense

* Relative compaction of sample may be low due to sample disturbance from gravel in sampler. For shallow relative compaction values use results of nuclear gage tests.

Relative compaction was obtained by comparing dry densities from ring samples at different depths to the laboratory maximum dry densities obtained from bulk samples at shallower depths. Relative density descriptor was obtained by N₆₀ blow count ranges (see Appendix C).

3. Relative compaction of soils adjacent to the boring within a foot of the ground surface was found to be between 82 and 90 percent of the laboratory maximum density.
4. Bedrock was not encountered in the boring.
5. Groundwater was encountered at a depth of 50 feet below the ground surface.

LIMITATIONS

This report has been prepared for the exclusive use of Public Works for the specific site discussed herein and should not be considered transferable to other sites or projects. In the event that any modification to the configuration of the site is implemented, the findings contained in this report are no longer valid. This study was conducted according to generally accepted geotechnical engineering practice for projects of this magnitude.

The findings in this report are based on the field and laboratory investigations combined with an extrapolation of soil conditions beyond the boring location. Our findings are not meant to be a control of nature; therefore, no warranty is herein expressed or implied.



If you have questions regarding this matter, please contact Erick Del Bosque or Brian Smith at (626) 458-4925.

Prepared by:

Reviewed by:

ER 

Erick Del Bosque, P.E.
Senior Civil Engineering Assistant


Brian Smith
Associate Civil Engineer



EDB:ss
P:\GMEPUB\SEC\SOILSIN\VISANTA ANITA DAM SPS

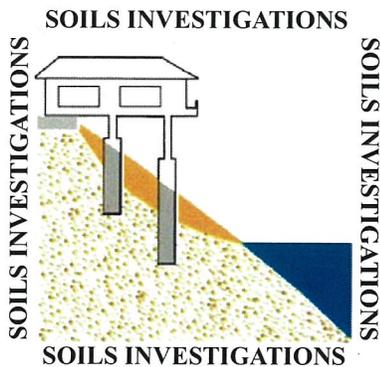
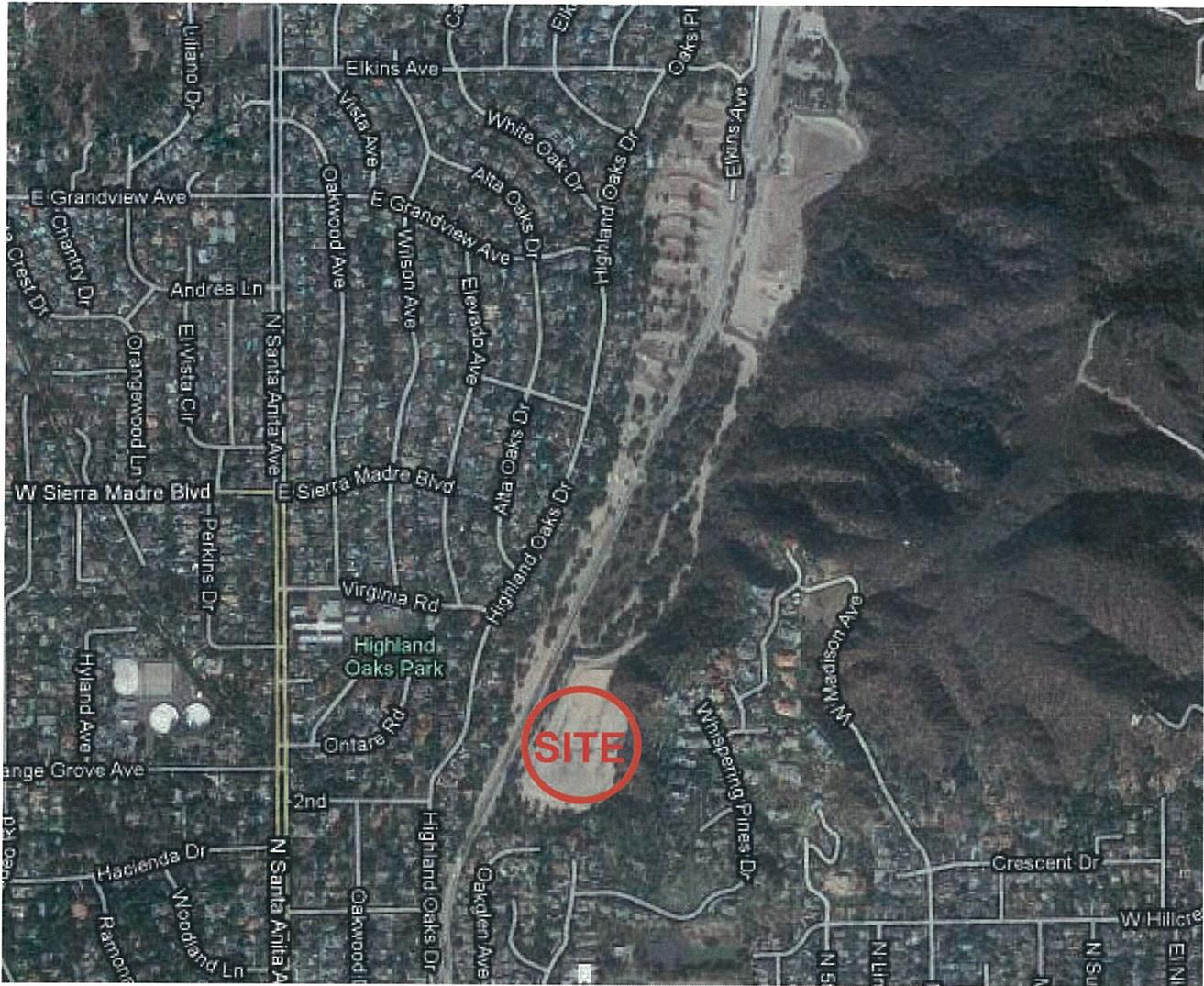


REFERENCES

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FIGURES



COUNTY OF LOS ANGELES
 DEPARTMENT OF PUBLIC WORKS
 Geotechnical and Materials Engineering Division

Geotechnical Engineering Section

**SANTA ANITA DAM RISER MODIFICATION
 AND SEDIMENT REMOVAL PROJECT**
LOWER SEDIMENT PLACEMENT SITE
 LOCATION MAP

DATE:
 12-21-2010

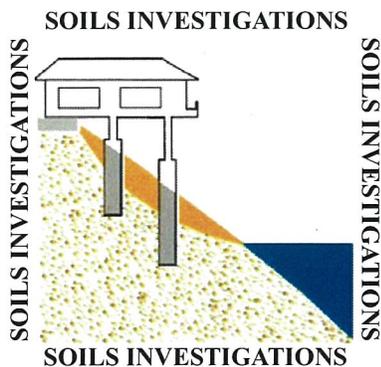
PREPARED BY:
 Erick Del Bosque

FIGURE 1



 Boring location

 Nuclear gage test location



COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
Geotechnical and Materials Engineering Division

Geotechnical Engineering Section

**SANTA ANITA DAM RISER MODIFICATION
AND SEDIMENT REMOVAL PROJECT**
BORING AND NUCLEAR GAGE TEST LOCATIONS
AT LOWER SEDIMENT PLACEMENT SITE

DATE:
12-27-2010

PREPARED BY:
Erick Del Bosque

FIGURE 2

APPENDIX A
BORING LOG

SUMMARY LOG OF BORING B1

Geotechnical and Materials Engineering Division - Los Angeles County Department of Public Works

PROJECT Santa Anita Lower SPS CLIENT Water Resources Division PAGE 1 OF 3
 PROJECT ID WRD000016 DRILLER LADPW LOGGED BY Erick Del Bosque TOTAL DEPTH 53 feet
 TYPE/DIAMETER OF BORING 6.5" O.D. Hollow-Stem Auger ELEVATION N/A
 DATE(S) 12/27/10 MONITORING WELL INSTALLED? No HAMMER WEIGHT (LBS.) N/A DROP HEIGHT (IN.) N/A
 LOCATION Santa Anita Lower SPS 70' N of Inlet Tower

Note: This log contains observations and interpretations that are valid only for the specific date and location of the boring. Subsurface conditions vary between borings and with time. Material descriptions are derived using visual classification methods and may vary from descriptions/classifications based on laboratory testing.

LABORATORY TESTING				FIELD DATA				USCS	Interpretations Attitudes Comments PID - PPM	Graphic Log	LITHOLOGIC DESCRIPTION
In-situ		Sieve % Passing		DEPTH (feet)	Drive Bulk	Sample No.	Blow Count per ASTM 1586				
γ_d (pcf)	MC (%)	No. 4	No. 200								
	10.4			0		1B		SM	Max. Density Test		
				1							
				2							
				3							
				4							
103.7	14.8			5		2R	3 5 7			@5', Changes to very moist.	
				6							
				7							
	12.1			8		3B		SC	Max. Density Test		
				9							
				10		4R	6 13 14				
110.5	12.4			11							
				12							
	116.8	6.9		15		5R	6 20 23	SP		Poorly Graded Sand, medium dense, moist, grey, small amounts of quartz	
				16							
				17							
				18							
				19							
108.8	7.6			20		6R	7			@20', No quartz.	
				21		ZB	8 9				
				22				SC		Clayey Sand, medium dense, moist, grey	
				23							
				24							
				25							

SUMMARY LOG OF BORING B1

Geotechnical and Materials Engineering Division - Los Angeles County Department of Public Works

PROJECT Santa Anita Lower SPS CLIENT Water Resources Division PAGE 2 OF 3
 PROJECT ID WRD0000016 DRILLER LADPW LOGGED BY Erick Del Bosque TOTAL DEPTH 53 feet
 TYPE/DIAMETER OF BORING 6.5" O.D. Hollow-Stem Auger ELEVATION N/A
 DATE(S) 12/27/10 MONITORING WELL INSTALLED? No HAMMER WEIGHT (LBS.) N/A DROP HEIGHT (IN.) N/A
 LOCATION Santa Anita Lower SPS, 70' N of Inlet Tower

Note: This log contains observations and interpretations that are valid only for the specific date and location of the boring. Subsurface conditions vary between borings and with time. Material descriptions are derived using visual classification methods and may vary from descriptions/classifications based on laboratory testing.

LABORATORY TESTING				DEPTH (feet)	FIELD DATA				USCS	Interpretations Attitudes Comments PID - PPM	Graphic Log	LITHOLOGIC DESCRIPTION	
In-situ		Sieve % Passing			Drive	Bulk	Sample No.	Blow Count per ASTM 1586					Attitudes Comments PID - PPM
Y _d (pcf)	MC (%)	No. 4	No. 200										
114.2	9.9			25		8R	8	SP		▽	Poorly Graded Sand, medium dense, moist, grey		
				26			12						
				27			19						
95.8	19.4			28		9R	7			▽	@ 30', Increase to very moist.		
				29			12						
				30			14						
120.8 119.6	3.3 11.7			31		11R	17	SP-SC		▨	Poorly Graded Sand W/ Clay, medium dense, moist, grey		
				32			18						
				33			19						
121.9	3.5			34		13R	22	SP	Refusal after 12 inches.	▽	@40', Changes to dry.		
				35			78-6"						
				36									
121.9	3.5			37		15R	25		Refusal after 12 inches.	▽	@45', Small amounts of quartz.		
				38			65-6"						
				39									
				40									
				41									
				42									
				43									
				44									
				45									
				46									
				47									
				48									
				49									
				50					▽	▽			

**APPENDIX B
SUMMARY OF LABORATORY
AND FIELD TEST RESULTS**

APPENDIX C
RELATIVE DENSITY DESCRIPTORS

Relative Density of Sands According to Results of Standard Penetration Test

No. of Blows, N_{60}	Relative Density
0 – 4	Very Loose
4 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Over 50	Very Dense

Table 12.1 from *Soil Mechanics in Engineering Practice*, page 60

APPENDIX C

2009 AND 2010 FOCUSED PLANT SURVEYS

NOVEMBER 2009 RESULTS OF SPECIAL STATUS PLANT SURVEYS FOR THE SANTA ANITA RESERVOIR SEDIMENT PLACEMENT SITE

SEPTEMBER 2010 RESULTS OF SPECIAL STATUS PLANT SURVEYS FOR THE SANTA ANITA RESERVOIR SEDIMENT PLACEMENT SITE

November 2, 2009

Ms. Valerie De La Cruz
Water Resources Division
Department of Public Works
County of Los Angeles
900 South Fremont Avenue
Alhambra, CA 91803

VIA EMAIL AND U.S. MAIL
vdelacruz@dpw.lacounty.gov

Subject: Results of Special Status Plant Surveys for the Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Dear Ms. De La Cruz:

This letter report presents the findings of special status plant surveys conducted for the Santa Anita Reservoir Sediment Placement Site (SPS) located within the City of Arcadia, Los Angeles County, California (Exhibits 1 and 2). The site is located immediately east of Santa Anita wash (adjacent to the channel), and is bordered by residential development further to the west and by open space in all other directions. The 12-acre survey area is located on the Mount Wilson U.S. Geological Survey (USGS) 7.5-minute quadrangle map, with an elevation of about 660 feet above mean sea level (msl).

METHODS

Prior to the field surveys, a literature review was conducted to identify special status plants known from the general vicinity. This included a review of Mt. Wilson, Azusa, El Monte, and Baldwin Park USGS 7.5-minute quadrangles in the California Department of Fish and Game's (CDFG) California Natural Diversity Database (CDFG 2009) and the California Native Plant Society's Inventory (CNPS 2009). Table 2 below lists all the special status plant species known to occur in the vicinity of the survey area. However, surveys were only conducted for those plant species shown in Table 2 below that have potential to occur within the survey area due to the presence of suitable habitat.

Reference populations were visited for the highest priority special status plant species with potential to occur within the survey area to confirm that they were blooming during the surveys (see Table 1 below).



TABLE 1
SPECIAL STATUS PLANT SPECIES REFERENCE POPULATIONS

Date Checked	Species	Vegetative Status	General Location
April 1 and 30, 2009	<i>Astragalus brauntonii</i> Braunton's milk-vetch	Flowering	West of San Fernando Valley
April 14, 2009	<i>Chorizanthe parryi</i> var. <i>fernandina</i> San Fernando Valley spineflower	Flowering	West of San Fernando Valley
April 17, 2009	<i>Imperata brevifolia</i> California satintail	Fruiting	Big Tujunga Canyon
April 25, 2009	<i>Dodecagema leptoceras</i> slender-horned spineflower	Flowering	Soledad Canyon
April 25, 2009	<i>Calochortus clavatus</i> var. <i>gracilis</i> slender mariposa lily	Flowering	Santa Clarita
May 19, 2009	<i>Calochortus plummerae</i> Plummer's mariposa lily	Flowering	Sylmar
July 9 and 13, 2009	<i>Centromadia parryi</i> ssp. <i>australis</i> southern tarplant	Flowering	Newport Beach and Carson
September 24, 2009	<i>Pseudognaphalium leucocephalum</i> white rabbit-tobacco	Flowering	San Juan Capistrano

According to the National Weather Service, Burbank (located about 18 miles south of the survey area) has received 10.6 inches of precipitation over the past year (since July 1, 2008), which is about 61 percent of the normal 17.5 inches based on 1971-2000 averages (National Weather Service 2009).

Special status plant surveys were conducted on May 4, 2009 by BonTerra Consulting Botanists Andrea Edwards and Jeff Crain; on May 21, 2009 by Ms. Edwards and BonTerra Consulting Biologist Kim Oldehoeft; on July 17, 2009 by Ms. Edwards and BonTerra Consulting Ecologist Dave Hughes; and on September 28, 2009 by Ms. Edwards. Meandering transects were used to search the survey area. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for subsequent identification using keys in Hickman (1993) and Munz (1974). Taxonomy follows Hickman (1993) and current scientific data (e.g., scientific journals) for scientific and common names.

SITE DESCRIPTION

Vegetation types within the survey area include coastal sage scrub and California sycamore - coast live oak riparian forest (Exhibit 3). Disturbed areas include dirt roads and other mechanically disturbed areas that are generally devoid of vegetation. Soil types in and around the survey area generally consist of the Vista-Amargosa association, which occurs in steep mountainous areas, is well to excessively drained, and contains a coarse sandy loam surface layer and gravelly to coarse sandy loam subsoil above granitic rock (USDA 1969).

SURVEY RESULTS

No special status plant species were observed during the surveys. A list of all plants observed within the survey area during focused botanical surveys can be found in Attachment A.

TABLE 2
SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR
IN THE SURVEY AREA VICINITY

Species	Status			Habitat Suitability Within the Survey Area and Survey Results
	USFWS	CDFG	CNPS	
<i>Astragalus brauntonii</i> Braunton's milk-vetch	FE	—	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Calochortus clavatus</i> var. <i>gracilis</i> slender mariposa lily	—	—	1B.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Calochortus plummerae</i> Plummer's mariposa lily	—	—	1B.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Centromadia parryi</i> ssp. <i>australis</i> southern tarplant	—	—	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Chorizanthe parryi</i> var. <i>fernandina</i> San Fernando Valley spineflower	FC	SE	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Chorizanthe parryi</i> var. <i>parryi</i> Parry's spineflower	—	—	1B.1	Limited marginally suitable habitat present; not observed during focused surveys.
<i>Cladium californicum</i> California saw-grass	—	—	2.2	No suitable habitat present; not observed during focused surveys.
<i>Dodecahema leptoceras</i> slender-horned spineflower	FE	SE	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Dudleya cymosa</i> ssp. <i>crebrifolia</i> San Gabriel River dudleya	—	—	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Dudleya densiflora</i> San Gabriel Mountains dudleya	—	—	1B.1	No suitable habitat present; not observed during focused surveys.
<i>Dudleya multicaulis</i> many-stemmed dudleya	—	—	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Galium grande</i> San Gabriel bedstraw	—	—	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Hordeum intercedens</i> vernal barley	—	—	3.2	Limited marginally suitable habitat present; not observed during focused surveys.
<i>Horkelia cuneata</i> ssp. <i>puberula</i> mesa horkelia	—	—	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Imperata brevifolia</i> California satintail	—	—	2.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	—	—	1B.1	No suitable habitat present; not observed during focused surveys.
<i>Lepidium virginicum</i> var. <i>robinsonii</i> Robinson's pepper-grass	—	—	1B.2	Limited marginally suitable habitat present; not observed during focused surveys.
<i>Linanthus concinnus</i> San Gabriel linanthus	—	—	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Linanthus orcuttii</i> Orcutt's linanthus	—	—	1B.3	No suitable habitat present; not observed during focused surveys.
<i>Muhlenbergia californica</i> California muhly	—	—	4.3	Potentially suitable habitat present; not observed during focused surveys.
<i>Phacelia stellaris</i> Brand's star phacelia	FC	—	1B.1	Limited marginally suitable habitat present; not observed during focused surveys.
<i>Pseudognaphalium leucocephalum</i> white rabbit-tobacco	—	—	2.2	Potentially suitable habitat present; not observed during focused surveys.

**TABLE 2 (Continued)
 SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR
 IN THE SURVEY AREA VICINITY**

Species	Status			Habitat Suitability Within the Survey Area and Survey Results
	USFWS	CDFG	CNPS	
<i>Ribes divaricatum</i> var. <i>parishii</i> Parish's gooseberry	—	—	1A	Species presumed extinct; potentially suitable habitat present; not observed during focused surveys.
<i>Scutellaria bolanderi</i> ssp. <i>austromontana</i> southern mountains skullcap	—	—	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Symphotrichum</i> [<i>Aster</i>] <i>greatae</i> Greata's aster	—	—	1B.3	Potentially suitable habitat present; not observed during focused surveys.
<i>Thelypteris puberula</i> var. <i>sonorensis</i> Sonoran maiden fern	—	—	2.2	No suitable habitat present; not observed during focused surveys.
LEGEND:				
Federal (USFWS)		State (CDFG)		
FE	Endangered	SE	Endangered	
FC	Candidate			
California Native Plant Society (CNPS) List Categories				
List 1A	Plants Presumed Extinct in California			
List 1B	Plants Rare, Threatened, or Endangered in California and Elsewhere			
List 2	Plants Rare, Threatened, or Endangered in California But More Common Elsewhere			
List 3	Plants About Which We Need More Information - A Review List			
List 4	Plants of Limited Distribution - A Watch List			
California Native Plant Society (CNPS) Threat Rank Extensions				
.1	Seriously threatened in California (high degree/immediacy of threat)			
.2	Fairly threatened in California (moderate degree/immediacy of threat)			
.3	Not very threatened in California (low degree/immediacy of threat or no current threats known)			

If you have any comments or questions, please call Marc Blain at (626) 351-2000.

Sincerely,

BONTERRA CONSULTING



Marc T. Blain
 Biological Resources Manager/Associate



Andrea D. Edwards
 Botanist

Enclosures: Exhibit 1 – Regional Location
 Exhibit 2 – Local Vicinity
 Exhibit 3 – Vegetation Types
 Attachment A – Plant Compendium

REFERENCES

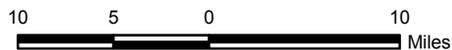
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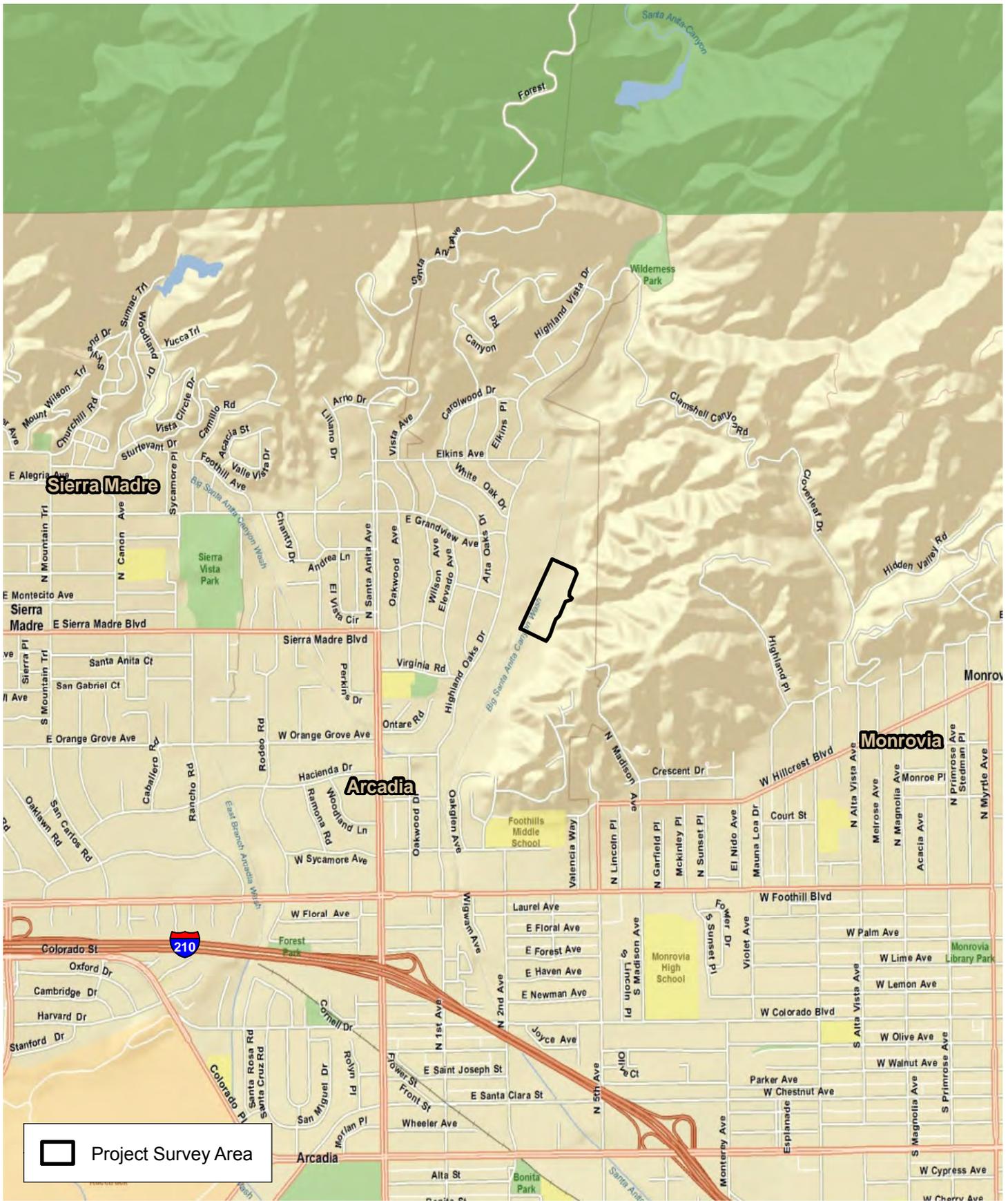


Regional Location

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Exhibit 1



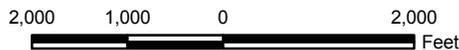


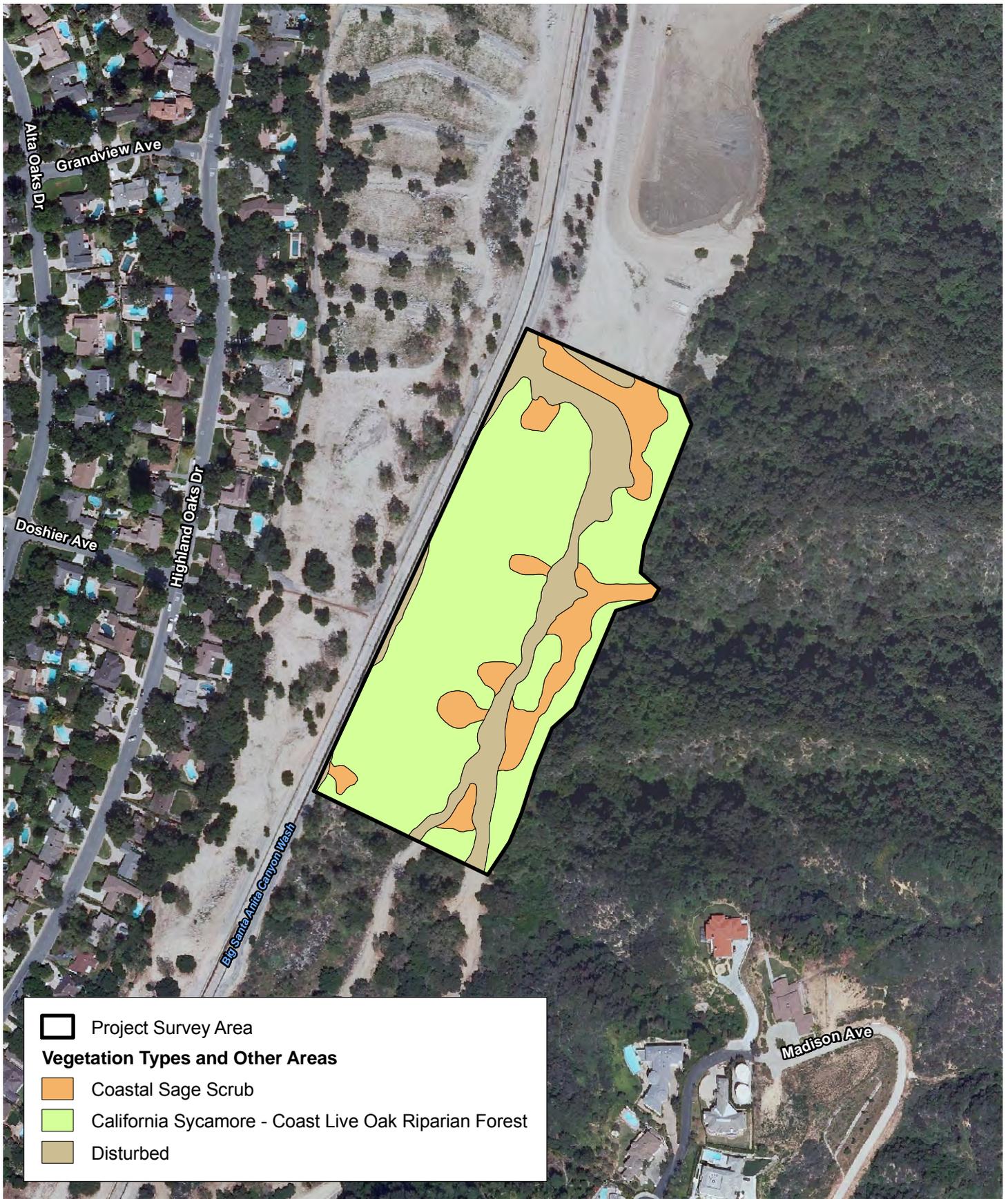
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Local Vicinity

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Exhibit 2

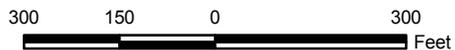




Vegetation Types

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Exhibit 3



ATTACHMENT A PLANT COMPENDIUM

Plant Species
FERNS AND FERN ALLIES
<i>PTERIDACEAE</i> - BRAKE FAMILY
<i>Pellaea mucronata</i> bird's foot fern
<i>SELAGINELLACEAE</i> - SPIKE-MOSS FAMILY
<i>Selaginella bigelovii</i> Bigelow's spike-moss / bushy spike-moss
GYMNOSPERMS
<i>PINACEAE</i> - PINE FAMILY
<i>Pinus</i> sp.* ornamental pine
FLOWERING PLANTS
CLASS DICOTYLEDONES (DICOTS)
<i>ANACARDIACEAE</i> - SUMAC FAMILY
<i>Malosma laurina</i> laurel sumac
<i>Rhus ovata</i> sugar bush
<i>Rhus trilobata</i> skunkbush
<i>Toxicodendron diversilobum</i> western poison oak
<i>APIACEAE (UMBELLIFERAE)</i> - CARROT FAMILY
<i>Anthriscus caucalis</i> * bur-chervil
<i>Daucus pusillus</i> rattlesnake weed
<i>ASCLEPIADACEAE</i> - MILKWEED FAMILY
<i>Asclepias fascicularis</i> narrow-leaved milkweed
<i>ASTERACEAE (COMPOSITAE)</i> - SUNFLOWER FAMILY
<i>Ambrosia acanthicarpa</i> annual bursage
<i>Artemisia californica</i> California sagebrush
<i>Artemisia douglasiana</i> mugwort
<i>Baccharis salicifolia</i> mule fat
<i>Carduus pycnocephalus</i> * Italian thistle
<i>Centaurea melitensis</i> * tocalote
<i>Chaenactis glabriuscula</i> yellow pincushion
<i>Conyza canadensis</i> common horseweed

**PLANT COMPENDIUM
(Continued)**

Plant Species
<i>Encelia farinosa</i> brittlebush
<i>Gnaphalium bicolor</i> bicolored everlasting / Bioletti's cudweed
<i>Gnaphalium californicum</i> California everlasting
<i>Gnaphalium canescens</i> everlasting
<i>Gnaphalium luteo-album</i> * weedy cudweed
<i>Heterotheca grandiflora</i> telegraph weed
<i>Hypochaeris glabra</i> * smooth cat's ear
<i>Lactuca serriola</i> * prickly lettuce
<i>Lepidospartum squamatum</i> scale-broom
<i>Malacothrix saxatilis</i> cliff malacothrix
<i>Senecio mikanioides</i> * German ivy
<i>Senecio vulgaris</i> * common groundsel
<i>Silybum marianum</i> * milk thistle
<i>Sonchus oleraceus</i> * common sow-thistle
BORAGINACEAE - BORAGE FAMILY
<i>Cryptantha</i> or <i>Plagiobothrys</i> sp. popcornflower
BRASSICACEAE (CRUCIFERAE) - MUSTARD FAMILY
<i>Hirschfeldia incana</i> * shortpod mustard
<i>Raphanus sativus</i> * wild radish
CACTACEAE - CACTUS FAMILY
<i>Opuntia basilaris</i> var. <i>basilaris</i> beavertail
<i>Opuntia littoralis</i> x <i>vaseyi</i> Mesa prickly pear
CAPRIFOLIACEAE - HONEYSUCKLE FAMILY
<i>Lonicera subspicata</i> var. <i>denudata</i> southern honeysuckle
<i>Sambucus mexicana</i> blue elderberry
CARYOPHYLLACEAE - PINK FAMILY
<i>Silene gallica</i> * windmill pink / common catchfly

**PLANT COMPENDIUM
(Continued)**

Plant Species
<i>Stellaria media</i> * common chickweed
CHENOPODIACEAE - GOOSEFOOT FAMILY
<i>Chenopodium album</i> * lamb's quarters
CONVOLVULACEAE - MORNING-GLORY FAMILY
<i>Calystegia macrostegia</i> morning-glory
CUCURBITACEAE - GOURD FAMILY
<i>Marah macrocarpus</i> wild cucumber / man-root
CUSCUTACEAE - DODDER FAMILY
<i>Cuscuta californica</i> California dodder
EUPHORBIACEAE - SPURGE FAMILY
<i>Chamaesyce</i> sp. spurge
<i>Eremocarpus setigerus</i> doveweed / turkey mullein
<i>Euphorbia peplus</i> * petty spurge
<i>Ricinus communis</i> * castor bean
FABACEAE (LEGUMINOSAE) - LEGUME FAMILY
<i>Lotus salsuginosus</i> ssp. <i>salsuginosus</i> alkali lotus
<i>Lotus scoparius</i> deerweed / California broom
<i>Lupinus truncatus</i> truncate lupine / collar lupine
<i>Melilotus indica</i> * sourclover
<i>Trifolium hirtum</i> * rose clover
FAGACEAE - OAK / BEECH FAMILY
<i>Quercus agrifolia</i> coast live oak
GERANIACEAE - GERANIUM FAMILY
<i>Erodium cicutarium</i> * red-stemmed filaree
<i>Geranium molle</i> * dovefoot geranium
GROSSULARIACEAE - GOOSEBERRY FAMILY
<i>Ribes aureum</i> golden currant
HYDROPHYLLACEAE - WATERLEAF FAMILY
<i>Eucrypta chrysanthemifolia</i> common eucrypta

**PLANT COMPENDIUM
(Continued)**

Plant Species
<i>Phacelia cicutaria</i> caterpillar phacelia
<i>Phacelia distans</i> common phacelia
<i>LAMIACEAE (LABIATAE) - MINT FAMILY</i>
<i>Salvia apiana</i> white sage
<i>Salvia columbariae</i> chia
<i>Salvia mellifera</i> black sage
<i>ONAGRACEAE - EVENING PRIMROSE FAMILY</i>
<i>Camissonia bistorta</i> California sun cup
<i>Camissonia californica</i> mustard-like evening primrose
<i>Camissonia intermedia</i> intermediate primrose
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i> four-spot clarkia
<i>Epilobium ciliatum</i> willow-herb
<i>PLATANACEAE - SYCAMORE FAMILY</i>
<i>Platanus racemosa</i> western sycamore
<i>POLYGONACEAE - BUCKWHEAT FAMILY</i>
<i>Eriogonum fasciculatum</i> California buckwheat
<i>PORTULACACEAE - PURSLANE FAMILY</i>
<i>Claytonia</i> sp. miner's-lettuce
<i>PRIMULACEAE - PRIMROSE FAMILY</i>
<i>Anagallis arvensis</i> * scarlet pimpernel
<i>RHAMNACEAE - BUCKTHORN FAMILY</i>
<i>Rhamnus californica</i> California coffeeberry
<i>ROSACEAE - ROSE FAMILY</i>
<i>Heteromeles arbutifolia</i> toyon / christmas berry
<i>Rubus ursinus</i> California blackberry
<i>RUBIACEAE - MADDER FAMILY</i>
<i>Galium aparine</i> goosegrass
<i>SALICACEAE - WILLOW FAMILY</i>
<i>Salix laevigata</i> red willow

**PLANT COMPENDIUM
(Continued)**

Plant Species
SCROPHULARIACEAE - FIGWORT FAMILY
<i>Keckiella cordifolia</i> heart-leaved bush-penstemon
<i>Mimulus aurantiacus</i> bush monkeyflower
<i>Penstemon spectabilis</i> royal penstemon
SOLANACEAE - NIGHTSHADE FAMILY
<i>Solanum douglasii</i> Douglas' nightshade
CLASS MONOCOTYLEDONES (MONOCOTS)
LILIACEAE - LILY FAMILY
<i>Yucca whipplei</i> Our Lord's candle
POACEAE [GRAMINEAE] - GRASS FAMILY
<i>Avena barbata</i> * slender wild oat
<i>Bromus diandrus</i> * ripgut grass
<i>Bromus hordeaceus</i> * soft chess
<i>Bromus madritensis</i> ssp. <i>rubens</i> * foxtail chess
<i>Leymus condensatus</i> giant wild rye
<i>Melica imperfecta</i> small-flowered melic grass
<i>Pennisetum setaceum</i> * African fountain grass
<i>Piptatherum miliaceum</i> * smilo grass / millett ricegrass
<i>Vulpia microstachys</i> fescue
<i>Vulpia myuros</i> * foxtail fescue
* indicates non-native species

September 10, 2010 (Revised October 27, 2010)

Ms. Valerie De La Cruz
Water Resources Division
Department of Public Works
County of Los Angeles
900 South Fremont Avenue
Alhambra, California 91803

VIA EMAIL AND U.S. MAIL
vdelacruz@dpw.lacounty.gov

Subject: Results of Special Status Plant Surveys for the Santa Anita Reservoir Middle Sediment Placement Site, Los Angeles County, California

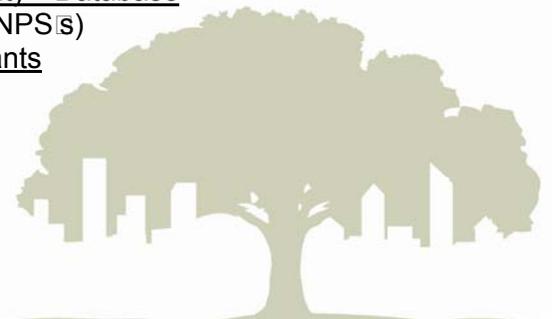
Dear Ms. De La Cruz:

This Letter Report presents the findings of special status plant surveys conducted for the Santa Anita Reservoir Middle Sediment Placement Site (SPS) located within the City of Arcadia in Los Angeles County, California (Exhibits 1 and 2). The site is located immediately east of Santa Anita wash (adjacent to the channel), and is bordered by residential development farther to the west and by open space in all other directions. The 12-acre project survey area is located on the U.S. Geological Survey (USGS) Mount Wilson 7.5-minute quadrangle map, with an elevation of about 660 feet above mean sea level.

Land use history for the project survey area consists of open space and flood maintenance. The proposed project involves the removal of sediment from the Santa Anita Reservoir and the construction of a riser on the dam's lowest outlet. The dam and reservoir are located on U.S. Forest Service land (Angeles National Forest). The sediment removal and riser construction will be performed to ensure compliance with the seismic safety requirements of the California Department of Water Resources, Division of Safety of Dams. The sediment removed from the reservoir will be transported via conveyor belt downstream to the Middle (survey area) and Lower SPS locations. The Upper and Lower SPS locations are already disturbed, but the Middle SPS supports native vegetation, and therefore special status plant surveys were conducted for this area in 2009 and 2010. In 2009, no special status species were observed in the Middle SPS survey area (BonTerra Consulting 2009).

METHODS

Botanical surveys were floristic in nature and consistent with the current protocols created by the California Department of Fish and Game (CDFG) (CDFG 2009). Prior to the field survey, a literature review was conducted to identify special status plants known from the general vicinity. This included a review of the USGS Mt. Wilson, Azusa, El Monte, and Baldwin Park 7.5-minute quadrangles in the CDFG's California Natural Diversity Database (CDFG 2010) and the California Native Plant Society's (CNPS's) Electronic Inventory of Rare and Endangered Vascular Plants of California (CNPS 2010).



According to the National Weather Service, downtown Los Angeles (located about 15 miles from the survey area) has received 16.3 inches of precipitation for Water Year 2010 (October 1, 2009 through Spring 2010), which is about 114 percent of the normal average (National Weather Service 2010). Where available, reference populations were monitored for annual and difficult-to-detect target species to ensure that the scheduled surveys were comprehensive, as shown in Table 1.

**TABLE 1
 SPECIAL STATUS PLANT SPECIES REFERENCE POPULATIONS**

Date Checked	Species	Status	General Location
April 14, 2010	<i>Astragalus brauntonii</i> Braunton's milk-vetch	Flowering	Monrovia
April 15, 2010	<i>Chorizanthe parryi</i> var. <i>parryi</i> Parry's spineflower	Flowering	Fontana
April 22, 2010	<i>Chorizanthe parryi</i> var. <i>fernandina</i> San Fernando Valley spineflower	Flowering	West of San Fernando Valley
April 22, 2010	<i>Imperata brevifolia</i> California satintail	Fruiting	Big Tujunga Canyon
April 22, 2010	<i>Dodecahema leptoceras</i> slender-horned spineflower	Flowering	Soledad Canyon
May 2, 2010	<i>Calochortus clavatus</i> var. <i>gracilis</i> slender mariposa lily	Flowering	Bouquet Canyon
June 7, 2010	<i>Calochortus weedii</i> var. <i>intermedius</i> intermediate mariposa lily	Flowering	Corona
June 8, 2010	<i>Calochortus plummerae</i> Plummer's mariposa lily	Flowering	Monrovia
July 8, 2010	<i>Centromadia parryi</i> ssp. <i>australis</i> southern tarplant	Flowering	Newport Beach
August 17, 2010	<i>Pseudognaphalium leucocephalum</i> white rabbit-tobacco	Flowering	San Juan Capistrano
August 18, 2010	<i>Symphotrichum</i> [Aster] <i>greatae</i> Greata's aster	Flowering	Angeles National Forest near Hidden Springs/Singing Springs

BonTerra Consulting Biologist Andrea Edwards and Restoration Ecologist David Hughes conducted special status plant surveys on April 15 and May 6, 2010, and Ms. Edwards conducted special status plant surveys on June 14, July 9, and August 24, 2010. Survey efforts included 15 total person-hours. The project survey area was systematically surveyed during the site visits. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for subsequent identification using keys in Hickman (1993) and Munz (1974). Taxonomy follows Hickman (1993) and/or current scientific data (e.g., scientific journals) for scientific and common names.

SITE DESCRIPTION

Vegetation types within the project survey area include coastal sage scrub and California sycamore - coast live oak woodland (Exhibit 3). Disturbed areas include dirt roads and other mechanically disturbed areas that are generally devoid of vegetation. Soil types in and around the project survey area generally consist of the Vista-Amargosa association, which occurs in steep mountainous areas, is well to excessively drained, and contains a coarse sandy loam surface layer and gravelly to coarse sandy loam subsoil above granitic rock (USDA 1969). Exhibit 3 includes a map of vegetation types.

SURVEY RESULTS

No special status plant species were observed during the surveys. A list of all plants observed within the project survey area during focused surveys can be found in Attachment A. Table 2 lists the special status plant species known to occur in the vicinity of the project survey area, habitat suitability within the survey area, and survey results. Focused surveys were conducted for those plant species shown in Table 2 (below) that have potential to occur within the project survey area.

**TABLE 2
 SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR
 IN THE SURVEY AREA VICINITY**

Species	Status			Habitat Suitability Within the Survey Area and Survey Results
	USFWS	CDFG	CNPS	
<i>Astragalus brauntonii</i> Braunton's milk-vetch	FE	☐	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Berberis nevinii</i> Nevin's barberry	FE	SE	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Calochortus clavatus</i> var. <i>gracilis</i> slender mariposa lily	☐	☐	1B.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Calochortus plummerae</i> Plummer's mariposa lily	☐	☐	1B.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Calochortus weedii</i> var. <i>intermedius</i> intermediate mariposa lily	☐	☐	1B.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Centromadia parryi</i> ssp. <i>australis</i> southern tarplant	☐	☐	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Chorizanthe parryi</i> var. <i>fernandina</i> San Fernando Valley spineflower	FC	SE	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Chorizanthe parryi</i> var. <i>parryi</i> Parry's spineflower	☐	☐	1B.1	Marginally suitable habitat present; not observed during focused surveys.
<i>Cladium californicum</i> California saw-grass	☐	☐	2.2	No suitable habitat present; not observed during focused surveys.
<i>Dodecahema leptoceras</i> slender-horned spineflower	FE	SE	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Dudleya cymosa</i> ssp. <i>crebrifolia</i> San Gabriel River dudleya	☐	☐	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Dudleya densiflora</i> San Gabriel Mountains dudleya	☐	☐	1B.1	No suitable habitat present; not observed during focused surveys.
<i>Dudleya multicaulis</i> many-stemmed dudleya	☐	☐	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Galium grande</i> San Gabriel bedstraw	☐	☐	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Hordeum intercedens</i> vernal barley	☐	☐	3.2	Marginally suitable habitat present; not observed during focused surveys.
<i>Horkelia cuneata</i> ssp. <i>puberula</i> mesa horkelia	☐	☐	1B.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Imperata brevifolia</i> California satintail	☐	☐	2.1	Potentially suitable habitat present; not observed during focused surveys.
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	☐	☐	1B.1	No suitable habitat present; not observed during focused surveys.

**TABLE 2 (Continued)
 SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR
 IN THE SURVEY AREA VICINITY**

Species	Status			Habitat Suitability Within the Survey Area and Survey Results
	USFWS	CDFG	CNPS	
<i>Lepidium virginicum</i> var. <i>robinsonii</i> Robinson's pepper-grass	□	□	1B.2	Marginally suitable habitat present; not observed during focused surveys.
<i>Linanthus concinnus</i> San Gabriel linanthus	□	□	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Linanthus orcuttii</i> Orcutt's linanthus	□	□	1B.3	No suitable habitat present; not observed during focused surveys.
<i>Muhlenbergia californica</i> California muhly	□	□	4.3	Potentially suitable habitat present; not observed during focused surveys.
<i>Phacelia stellaris</i> Brand's star phacelia	FC	□	1B.1	Marginally suitable habitat present; not observed during focused surveys.
<i>Pseudognaphalium leucocephalum</i> white rabbit-tobacco	□	□	2.2	Potentially suitable habitat present; not observed during focused surveys.
<i>Ribes divaricatum</i> var. <i>parishii</i> Parish's gooseberry	□	□	1A	Species presumed extinct; potentially suitable habitat present; not observed during focused surveys.
<i>Scutellaria bolanderi</i> ssp. <i>austromontana</i> southern mountains skullcap	□	□	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Symphotrichum defoliatum</i> San Bernardino aster	□	□	1B.2	No suitable habitat present; not observed during focused surveys.
<i>Symphotrichum</i> [<i>Aster</i>] <i>greatae</i> Greata's aster	□	□	1B.3	Potentially suitable habitat present; not observed during focused surveys.
<i>Thelypteris puberula</i> var. <i>sonorensis</i> Sonoran maiden fern	□	□	2.2	No suitable habitat present; not observed during focused surveys.
LEGEND:				
Federal (USFWS)		State (CDFG)		
FE Endangered		SE Endangered		
FC Candidate				
California Native Plant Society (CNPS) List Categories				
List 1A Plants Presumed Extinct in California				
List 1B Plants Rare, Threatened, or Endangered in California and Elsewhere				
List 2 Plants Rare, Threatened, or Endangered in California But More Common Elsewhere				
List 3 Plants About Which We Need More Information - A Review List				
List 4 Plants of Limited Distribution – A Watch List				
California Native Plant Society (CNPS) Threat Rank Extensions				
.1 Seriously threatened in California (high degree immediacy of threat)				
.2 Fairly threatened in California (moderate degree immediacy of threat)				
.3 Not very threatened in California (low degree immediacy of threat or no current threats known)				

Based on the negative survey findings, no potential threats or impacts to special status plant species are expected, and no avoidance or mitigation measures are recommended. Although reference populations and regional rainfall amounts were monitored to ensure the scientific adequacy of these focused surveys, there is always a minimal potential for false negative survey results as species could possibly be present on a site but may not be detectable at the time of survey.

If you have any comments or questions, please call Andrea Edwards at (626) 351-2000.

Sincerely,

BONTERRA CONSULTING



for Amber S. Oneal
Associate, Senior Project Manager



Andrea D. Edwards
Biologist

Enclosures: Exhibit 1 – Regional Location
Exhibit 2 – Local Vicinity
Exhibit 3 – Vegetation Types
Attachment A – Plant Species Observed in the Santa Anita Reservoir Middle
Sediment Placement Site Survey Area (2009 – 2010)

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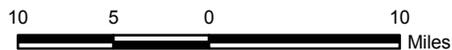
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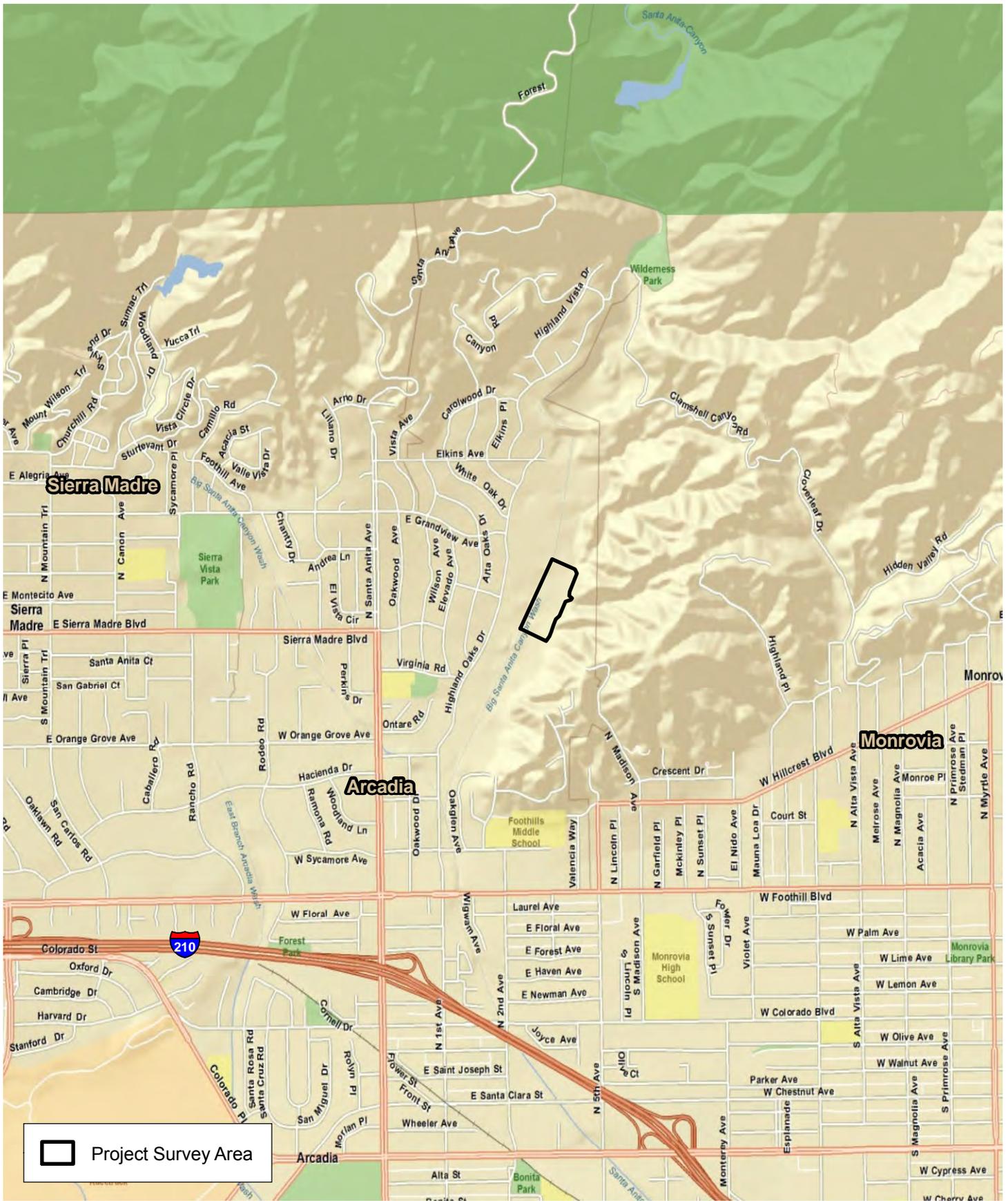


Regional Location

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Exhibit 1





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Local Vicinity

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

Exhibit 2





Project Survey Area
Vegetation Types and Other Areas
 Coastal Sage Scrub
 California Sycamore - Coast Live Oak Woodland¹
 Disturbed

¹Note: In the existing Streambed Alteration Agreement, this vegetation type is referred to as oak woodland habitat.

Vegetation Types

Santa Anita Reservoir Sediment Placement Site, Los Angeles County, California

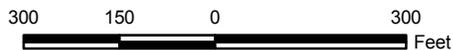


Exhibit 3



ATTACHMENT A

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

PLANT COMPENDIUM

PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA (2009 □ 2010)

Species
FERNS AND FERN ALLIES
<i>PTERIDACEAE</i> - BRAKE FAMILY
<i>Pellaea andromedifolia</i> coffee fern
<i>Pellaea mucronata</i> ** bird's foot fern
<i>SELAGINELLACEAE</i> - SPIKE-MOSS FAMILY
<i>Selaginella bigelovii</i> Bigelow's spike-moss □ bushy spike-moss
GYMNOSPERMS
<i>PINACEAE</i> - PINE FAMILY
<i>Pinus sp.*</i> ornamental pine
FLOWERING PLANTS
CLASS DICOTYLEDONES (DICOTS)
<i>ANACARDIACEAE</i> - SUMAC FAMILY
<i>Malosma laurina</i> laurel sumac
<i>Rhus ovata</i> sugar bush
<i>Rhus trilobata</i> skunkbush
<i>Toxicodendron diversilobum</i> western poison oak
<i>APIACEAE (UMBELLIFERAE)</i> - CARROT FAMILY
<i>Anthriscus caucalis</i> * bur-chervil
<i>Conium maculatum</i> * poison hemlock
<i>Daucus pusillus</i> rattlesnake weed
<i>ASCLEPIADACEAE</i> - MILKWEED FAMILY
<i>Asclepias fascicularis</i> ** narrow-leaved milkweed
<i>ASTERACEAE (COMPOSITAE)</i> - SUNFLOWER FAMILY
<i>Ambrosia acanthicarpa</i> ** annual bursage
<i>Artemisia californica</i> California sagebrush
<i>Artemisia douglasiana</i> mugwort
<i>Baccharis salicifolia</i> mule fat
<i>Carduus pycnocephalus</i> * Italian thistle
<i>Centaurea melitensis</i> * tocalote

PLANT COMPENDIUM (Continued)

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

Species
<i>Chaenactis glabriuscula</i> yellow pincushion
<i>Conyza canadensis</i> common horseweed
<i>Encelia farinosa</i> brittlebush
<i>Gnaphalium bicolor</i> bicolored everlasting □ Bioletti's cudweed
<i>Gnaphalium californicum</i> California everlasting
<i>Gnaphalium canescens</i> everlasting
<i>Gnaphalium luteo-album</i> * weedy cudweed
<i>Heterotheca grandiflora</i> telegraph weed
<i>Hypochaeris glabra</i> * smooth cat's ear
<i>Lactuca serriola</i> * prickly lettuce
<i>Lepidospartum squamatum</i> scale-broom
<i>Malacothrix saxatilis</i> cliff malacothrix
<i>Senecio mikanioides</i> * German ivy
<i>Senecio vulgaris</i> * common groundsel
<i>Silybum marianum</i> * milk thistle
<i>Sonchus oleraceus</i> * common sow-thistle
<i>BORAGINACEAE - BORAGE FAMILY</i>
<i>Cryptantha</i> or <i>Plagiobothrys</i> sp. popcornflower
<i>BRASSICACEAE (CRUCIFERAE) - MUSTARD FAMILY</i>
<i>Hirschfeldia incana</i> * shortpod mustard
<i>Lepidium virginicum</i> var. <i>virginicum</i> * peppergrass
<i>Raphanus sativus</i> * wild radish
<i>Sisymbrium orientale</i> * hare's ear cabbage

PLANT COMPENDIUM (Continued)

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

Species
<i>CACTACEAE</i> - CACTUS FAMILY
<i>Opuntia basilaris</i> var. <i>basilaris</i> beavertail
<i>Opuntia littoralis</i> x <i>vaseyi</i> Mesa prickly pear
<i>CAPRIFOLIACEAE</i> - HONEYSUCKLE FAMILY
<i>Lonicera subspicata</i> var. <i>denudata</i> southern honeysuckle
<i>Sambucus mexicana</i> blue elderberry
<i>CARYOPHYLLACEAE</i> - PINK FAMILY
<i>Cerastium glomeratum</i> * mouse ear chickweed
<i>Silene gallica</i> * ** windmill pink □ common catchfly
<i>Stellaria media</i> * common chickweed
<i>CHENOPODIACEAE</i> - GOOSEFOOT FAMILY
<i>Chenopodium album</i> * lamb's quarters
<i>CONVOLVULACEAE</i> - MORNING-GLORY FAMILY
<i>Calystegia macrostegia</i> morning-glory
<i>CRASSULACEAE</i> - STONECROP FAMILY
<i>Dudleya lanceolata</i> lance-leaved dudleya □ coastal live-forever
<i>CUCURBITACEAE</i> - GOURD FAMILY
<i>Marah macrocarpus</i> wild cucumber □ man-root
<i>CUSCUTACEAE</i> - DODDER FAMILY
<i>Cuscuta californica</i> California dodder
<i>EUPHORBIACEAE</i> - SPURGE FAMILY
<i>Chamaesyce</i> sp.** spurge
<i>Eremocarpus setigerus</i> ** doveweed □ turkey mullein
<i>Euphorbia peplus</i> * petty spurge
<i>Ricinus communis</i> * castor bean
<i>FABACEAE (LEGUMINOSAE)</i> - LEGUME FAMILY
<i>Lathyrus vestitus</i> ssp. <i>vestitus</i> chaparral sweet pea
<i>Lotus salsuginosus</i> ssp. <i>salsuginosus</i> alkali lotus

PLANT COMPENDIUM (Continued)

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

Species
<i>Lotus scoparius</i> deerweed □ California broom
<i>Lupinus sparsiflorus</i> Coulter's lupine
<i>Lupinus truncatus</i> truncate lupine □ collar lupine
<i>Medicago polymorpha</i> * California burclover
<i>Melilotus indica</i> * sourclover
<i>Trifolium hirtum</i> * rose clover
FAGACEAE - OAK □ BEECH FAMILY
<i>Quercus agrifolia</i> coast live oak
<i>Quercus berberidifolia</i> scrub oak □ California scrub oak
GERANIACEAE - GERANIUM FAMILY
<i>Erodium cicutarium</i> * red-stemmed filaree
<i>Geranium molle</i> * dovefoot geranium
GROSSULARIACEAE - GOOSEBERRY FAMILY
<i>Ribes aureum</i> golden currant
HYDROPHYLLACEAE - WATERLEAF FAMILY
<i>Eucrypta chrysanthemifolia</i> common eucrypta
<i>Phacelia cicutaria</i> caterpillar phacelia
<i>Phacelia distans</i> common phacelia
LAMIACEAE (LABIATAE) - MINT FAMILY
<i>Salvia apiana</i> white sage
<i>Salvia columbariae</i> chia
<i>Salvia mellifera</i> black sage
ONAGRACEAE - EVENING PRIMROSE FAMILY
<i>Camissonia bistorta</i> California sun cup
<i>Camissonia californica</i> mustard-like evening primrose
<i>Camissonia intermedia</i> intermediate primrose

PLANT COMPENDIUM (Continued)

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

Species
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i> four-spot clarkia
<i>Epilobium ciliatum</i> willow-herb
PLATANACEAE - SYCAMORE FAMILY
<i>Platanus racemosa</i> western sycamore
POLEMONIACEAE - PHLOX FAMILY
<i>Allophyllum divaricatum</i> pink false-gilia
POLYGONACEAE - BUCKWHEAT FAMILY
<i>Eriogonum fasciculatum</i> California buckwheat
<i>Pterostegia drymarioides</i> pterostegia □ notch leaf
PORTULACACEAE - PURSLANE FAMILY
<i>Claytonia</i> sp. miner's-lettuce
PRIMULACEAE - PRIMROSE FAMILY
<i>Anagallis arvensis</i> * ** scarlet pimpernel
RHAMNACEAE - BUCKTHORN FAMILY
<i>Rhamnus californica</i> California coffeeberry
<i>Rhamnus crocea</i> spiny redberry
ROSACEAE - ROSE FAMILY
<i>Cercocarpus betuloides</i> mountain mahogany
<i>Heteromeles arbutifolia</i> toyon □ christmas berry
<i>Rubus ursinus</i> ** California blackberry
RUBIACEAE - MADDER FAMILY
<i>Galium aparine</i> goosegrass
SALICACEAE - WILLOW FAMILY
<i>Salix laevigata</i> red willow
SCROPHULARIACEAE - FIGWORT FAMILY
<i>Keckiella cordifolia</i> heart-leaved bush-penstemon
<i>Mimulus aurantiacus</i> bush monkeyflower
<i>Penstemon spectabilis</i> royal penstemon

PLANT COMPENDIUM (Continued)

**PLANT SPECIES OBSERVED IN THE SANTA ANITA RESERVOIR
MIDDLE SEDIMENT PLACEMENT SITE SURVEY AREA
(2009 □ 2010)**

Species
<i>SOLANACEAE</i> - NIGHTSHADE FAMILY
<i>Nicotiana glauca</i> * tree tobacco
<i>Solanum douglasii</i> Douglas' nightshade
<i>URTICACEAE</i> - NETTLE FAMILY
<i>Urtica urens</i> * dwarf nettle
CLASS MONOCOTYLEDONES (MONOCOTS)
<i>ARECACEAE (PALMAE)</i> - PALM FAMILY
<i>Washingtonia robusta</i> * Mexican fan palm
<i>LILIACEAE</i> - LILY FAMILY
<i>Chlorogalum parviflorum</i> miniature soap plant
<i>Yucca whipplei</i> Our Lord's candle
<i>POACEAE [GRAMINEAE]</i> - GRASS FAMILY
<i>Avena barbata</i> * slender wild oat
<i>Avena fatua</i> * wild oat
<i>Brachypodium distachyon</i> purple false brome
<i>Bromus diandrus</i> * ripgut grass
<i>Bromus hordeaceus</i> * soft chess
<i>Bromus madritensis</i> ssp. <i>rubens</i> * foxtail chess
<i>Leymus condensatus</i> giant wild rye
<i>Melica imperfecta</i> small-flowered melic grass
<i>Pennisetum setaceum</i> * ** African fountain grass
<i>Piptatherum miliaceum</i> * smilo grass □ millett ricegrass
<i>Vulpia microstachys</i> fescue
<i>Vulpia myuros</i> * foxtail fescue
* indicates non-native species ** denotes species observed in 2009 but not in 2010

APPENDIX D

INSTALLED PLANT PALETTES TO-DATE (JANUARY – MARCH, 2014)

APPENDIX D-1
CONTAINER PLANT SPECIES INSTALLED TO-DATE
(JANUARY – MARCH 2014)

TABLE D-1
CONTAINER PLANT SPECIES INSTALLED TO-DATE

Container Plant Species (2014)	Size ¹	Habitat Type/Quantity Installed in 2014				Total Qty 2014	Notes
		CSS ²	OW ²	Total: January to March	Fall (Projected)		
<i>Asclepias fascicularis</i>	1g	0	0	0	300	300	To be propagated if local seed is available in 2014.
<i>Acmispon glaber</i>	RP	0	335	335	0	335	
	1g	65	0	65	0	65	
<i>Artemisia californica</i>	1g	750	300	1,050	0	1,050	
<i>Artemisia douglasiana</i>	1g	0	0	0	100	100	
<i>Ceanothus leucodermis</i>	1g	0	0	0	50	50	
<i>Cercocarpus betuloides</i>	1g	0	0	0	50	50	
<i>Clematis lasiantha</i>	1g	0	0	0	50	50	
<i>Elymus condensatus</i>	1g	0	0	0	125	125	
<i>Eriogonum fasciculatum</i>	1g	450	300	750	0	750	
<i>Frangula californica</i>	1g	0	0	0	100	100	
<i>Hesperoyucca whipplei</i>	1g	125	25	150	275	425	
<i>Heteromeles arbutifolia</i>	1g	0	55	55	0	55	
<i>Keckiella cordifolia</i>	1g	0	0	0	275	275	
<i>Lonicera subspicata</i>	1g	0	0	0	175	175	
<i>Malosma laurina</i>	1g	25	15	40	0	40	
<i>Melica imperfecta</i>	RP	0	150	150	0	150	
	1g	0	0	0	275	275	
<i>Mimulus aurantiacus</i>	1g	75	288	363	0	363	
<i>Nassella lepida</i>	1g	0	0	0	400	400	To be propagated if local seed is available in 2014.
<i>Opuntia x vaseyi</i>	1g	125	75	200	0	200	
<i>Penstemon spectabilis</i>	RP	0	75	75	0	75	
	1g	0	0	0	350	350	
<i>Prunus ilicifolia</i>	1g	0	0	0	50	50	
<i>Pseudognaphalium californicum</i>	1g	235	225	460	0	460	
<i>Quercus agrifolia</i>	RP	200	175	375	0	375	
	T4	0	0	0	537	537	
<i>Rhamnus ilicifolia</i>	1g	0	0	0	150	150	
<i>Rhus aromatica</i>	1g	0	0	0	100	100	To be propagated if local seed is available in 2014.
<i>Rhus ovata</i>	1g	25	30	55	0	55	
<i>Ribes aureum</i>	RP	0	100	100	0	100	
	1g	0	0	0	275	275	
<i>Salvia apiana</i>	RP	250		250	0	250	
	1g	0	0	0	125	125	
<i>Salvia mellifera</i>	1g	125	275	400	0	400	
<i>Sambucus nigra ssp. caerulea</i>	1g	0	0	0	55	55	
Total		2,450	2,423	4,873	3,817	8,690	

¹ RP = rose pots; 1g = one gallon; T4 = deep one gallon
² CSS = coastal sage scrub; OW = oak woodland

APPENDIX D-2

SEED MIX AND CUTTINGS PLANT SPECIES INSTALLED TO-DATE

(JANUARY – MARCH 2014)

TABLE D-2

SEED MIX AND CUTTINGS PLANT SPECIES INSTALLED TO-DATE

Scientific Name	Common Name	Lbs Collected	Seed Quantities				Total Lbs
			CSS Seed Mixes/Aspect		Hand Seeding		
			South/West (2.0 ac)	North (0.54 ac)	Oak Woodland	CSS	
Initial/Conceptual OWRMP Seed Species Collected by S&S Seeds in Santa Anita Wash - Rio Hondo Sub-Watershed and Used for Initial Hydroseeding and Hand Seeding in January 2014.							
<i>Acmispon glaber</i>	deerweed	43.82	12.00	2.00	8.00	2.40	24.40
<i>Artemisia californica</i>	California sagebrush	81.78	8.00	2.00			10.00
<i>Camissonia hirtella</i>	hairy sun cups	0.20		0.10	0.05	0.05	0.20
<i>Eriogonum fasciculatum</i>	California buckwheat	81.30	20.00	5.00			25.00
<i>Hesperoyucca whipplei</i>	chaparral yucca	42.34	1.00			2.00	3.00
<i>Mimulus aurantiacus</i>	bush monkey flower	19.88	0.50	2.00	2.00	1.00	5.50
<i>Phacelia cicutaria</i>	caterpillar phacelia	0.56	0.26	0.10	0.10	0.10	0.56
<i>Pseudognaphalium californicum</i>	ladies' tobacco	5.34	1.00	1.00	2.00	1.34	5.34
<i>Quercus agrifolia</i>	coast live oak	16.92			1.92		1.92
<i>Salvia mellifera</i>	black sage	12.89	1.00	1.00	1.00		3.00
<i>Sambucus nigra ssp. caerulea [S. mexicana]</i>	blue elderberry	6.07			1.00	0.50	1.50
Other Seed Species Collected To-Date by S&S Seeds in Santa Anita Wash - Rio Hondo Sub-Watershed:							
<i>Acer macrophyllum</i>	big leaf maple						
<i>Artemisia douglasiana</i>	mugwort	8.64			3.00		3.00
<i>Ceanothus leucodermis</i>	chaparral whitethorn	0.52	0.20	0.10			0.30
<i>Cercocarpus betuloides</i>	birch-leaf mountain-mahogany	4.92	1.00	0.50			1.50
<i>Chaenactis glabruiscula</i>	yellow pincushion	0.92	0.25	0.10	0.10	0.47	0.92
<i>Clarkia purpurea</i>	purple clarkia	0.20	0.05	0.05	0.05	0.05	0.20
<i>Clematis lasiantha</i>	chaparral clematis	4.30	0.80	0.20	1.00		2.00
<i>Datura wrightii</i>	jimson weed	0.56	0.20	0.16	0.10	0.10	0.56
<i>Lepidospartum squamatum</i>	scale broom	14.56			1.00		1.00
<i>Oenothera elata hookeri</i>	Hooker's evening primrose	0.04			0.04		0.04
<i>Phacelia ramosissima</i>	branching phacelia	2.40			2.40		2.40
<i>Prunus ilicifolia</i>	hollyleaf cherry	9.20			3.00		3.00
<i>Rhamnus ilicifolia</i>	hollyleaf redberry	2.64			1.50	0.50	2.00
<i>Pseudognaphalium stramineum</i>	cottonbatting plant	3.20	1.00	0.20	1.00	1.00	3.20
<i>Solanum douglasii</i>	white nightshade	0.02			0.02		0.02
<i>Stachys bullata</i>	California hedgenettle	0.01			0.01		0.01
<i>Umbellularia californica</i>	California laurel bay	4.44			2.00		2.00
Subtotal		367.67	47.26	14.51	31.29	9.51	102.57
Seed/cuttings Species Collected To-Date by BonTerra Psomas in Santa Anita Wash - Rio Hondo Sub-Watershed (Small quantities, <1.0 lb collected; Used for Hand Seeding [Only] or as Indicated):							
<i>Acer macrophyllum</i>	big leaf maple						
<i>Artemisia douglasiana</i>	mugwort		Rooted cuttings (direct planting) and hand seeding.				
<i>Acourtia microcephala</i>	sacapellote						
<i>Adenostoma fasciculatum</i>	chamise						
<i>Brickellia californica</i>	California brickellbush						
<i>Ceanothus leucodermis</i>	chaparral whitethorn						
<i>Cercocarpus betuloides</i>	birch-leaf mountain-mahogany						

Seed/cuttings Species Collected To-Date by BonTerra Psomas in Santa Anita Wash - Rio Hondo Sub-Watershed (Small quantities, <1.0 lb collected; Used for Hand Seeding [Only] or as Indicated):		
<i>Clematis lasiantha</i>	chaparral clematis	
<i>Corethrogyne filaginifolia</i> [Lessingia f.]	common sandaster	
<i>Datura wrightii</i>	jimson weed	
<i>Delphinium cardinale</i>	scarlet larkspur	
<i>Dudleya lanceolata</i>	lanceleaf liveforever	
<i>Elymus condensatus</i> [Leymus c.]	giant wild rye	Container plant propagation (only).
<i>Eriodictyon crassifolium</i>	thick-leaf yerba santa	
<i>Eriogonum elongatum</i>	longstem buckwheat	
<i>Eriophyllum confertiflorum</i>	golden yarrow	
<i>Frangula californica</i> [Rhamnus californica]	California coffeeberry	Container plant propagation (only).
<i>Galium angustifolium</i>	narrow leaved bedstraw	
<i>Hesperoyucca whipplei</i> [Yucca w.]	chaparral yucca	
<i>Heteromeles arbutifolia</i>	toyon	Container plant propagation (only).
<i>Heterotheca grandiflora</i>	telegraph weed	
<i>Juncus rugulosus</i>	wrinkled rush	
<i>Juncus textilis</i>	basket rush	
<i>Keckiella cordifolia</i>	heart-leaved keckiella	
<i>Lathyrus vestitus</i>	chaparral sweet pea	
<i>Lepidospartum squamatum</i>	scale broom	
<i>Lonicera subspicata</i>	southern honeysuckle	Container plant propagation (only).
<i>Lupinus truncatus</i>	blunt leaved lupine	
<i>Marah macrocarpus</i>	wild cucumber	
<i>Melica imperfecta</i>	California melic	Container plant propagation (only).
<i>Mimulus aurantiacus</i>	bush monkeyflower	
<i>Opuntia x vaseyi</i>	Vasey's prickly pear	Cuttings (pads).
<i>Paeonia californica</i>	California peony	
<i>Pellaea andromedifolia</i>	coffee fern	Rhizome cuttings (direct planting).
<i>Penstemon spectabilis</i>	showy penstemon	Container plant propagation (only).
<i>Phacelia cicutaria</i>	caterpillar phacelia	
<i>Phacelia ramosissima</i>	branching phacelia	
<i>Polypodium californicum</i>	California polypody	Rhizome cuttings (direct planting).
<i>Pseudognaphalium bioletti</i> [Gnaphalium bicolor]	two-color rabbit tobacco	
<i>Pseudognaphalium californicum</i> [Gnaphalium c.]	ladies' tobacco	
<i>Pseudognaphalium canescens</i> [Gnaphalium c.]	Wright's cudweed	
<i>Quercus agrifolia</i>	coast live oak	
<i>Quercus chrysolepis</i>	canyon live oak	
<i>Rhus aromatica</i>	fragrant sumac	Rooted cuttings (direct planting).
<i>Rhus ovata</i>	sugar bush	
<i>Ribes aureum</i>	golden currant	
<i>Rubus ursinus</i>	California blackberry	Rooted cuttings (direct planting).
<i>Salvia apiana</i>	white sage	
<i>Salvia mellifera</i>	black sage	
<i>Selaginella bigelovii</i>	Bigelow's moss fern	Rooted cuttings (direct planting).
<i>Senecio flaccidus</i> var. <i>douglasii</i>	Douglas' threadleaf ragwort	

Seed/cuttings Species Collected To-Date by BonTerra Psomas in Santa Anita Wash - Rio Hondo Sub-Watershed (Small quantities, <1.0 lb collected; Used for Hand Seeding [Only] or as Indicated):		
<i>Stipa coronata [Achnatherum coronatum]</i>	giant needlegrass	
<i>Umbellularia californica</i>	California laurel bay	
Seed/Cuttings Species Collected To-Date by Rancho Santa Ana Botanic Garden in Santa Anita Wash - Rio Hondo Sub-Watershed (for Container Plant Propagation):		
<i>Dryopteris arguta</i>	California wood fern	Rhizome cuttings for container plant propagation (only).
<i>Pellaea andromedifolia</i>	coffee fern	Rhizome cuttings for container plant propagation (only).
<i>Pellaea mucronata</i>	birdfoot cliffbrake	Rhizome cuttings for container plant propagation (only).
<i>Polypodium californicum</i>	California polypody	Rhizome cuttings for container plant propagation (only).
<i>Quercus durata var. gabrielensis</i>	San Gabriel Mountains leather oak	Container plant propagation (only).
<i>Quercus engelmannii</i>	Engelmann oak	Container plant propagation (only).

APPENDIX E

REFERENCE SITE SURVEY REPORT (BONTERRA, 2013)

October 10, 2013

Ms. Grace Yu. P.E., LEED AP
Water Resources Division
Department of Public Works
County of Los Angeles
900 South Fremont Avenue
Alhambra, California 91803

VIA EMAIL
gyu@dpw.lacounty.gov

Subject: 2013 Reference Site Survey Report – Oak Woodland Habitat
Revegetation/Mitigation Program for the Santa Anita Dam Riser Modification and
Reservoir Sediment Removal Project, Los Angeles County, California

Dear Ms. Yu:

This Report presents the results of the initial reference site survey (prior to mitigation implementation) that was performed on the Middle Sediment Placement Site (SPS) in association with the County of Los Angeles Department of Public Works' (LACDPW) *Amended Final Oak Woodland Habitat Mitigation Program for the Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project* (OWHMP)(BonTerra Consulting, December 2012).

The reference site consists of 7.81 acres of natural habitat areas (California sycamore/coast live oak riparian forest [CS/CLORF] and coastal sage scrub [CSS]) located to the north of the Lower SPS (mitigation site)(Exhibits 1 through 3). The reference site is similar in vegetation composition, soils, hydrology, topography, elevation, aspect, etc., to the northern portion of the Middle SPS that was cleared for sediment placement in January 2011; therefore, the reference site provides a useful model for comparative mitigation site performance toward replacement of the lost functions/values of the cleared habitat area. The purpose of the reference site analysis is to establish specific, numerical performance standards for the pending revegetation/mitigation of the Lower SPS. It is important to note that all Southern California oak woodland and sage scrub habitats exhibit some degree of invasion by exotic plant species, and the reference site exhibits a degree of invasion that is within a typical range for regional habitat areas.

The reference site is bordered on the north by the cleared portion of the Middle SPS, on the west by Santa Anita Wash (concrete box channel), on the south by the Lower SPS, and on the east by slopes with natural vegetation and—at the top of the eastern slope—residential properties.

SURVEY METHODOLOGY

The reference site survey methodology was prepared in coordination with the California Department of Fish and Wildlife (CDFW) and is described in detail in the OWHMP; e.g., the quadrat sampling area constitutes at least 2.0 areal percent of the combined CSLORF/CSS-vegetated habitat areas on the reference site (future quadrats on the mitigation site must also comprise a minimum of 2.0 percent areal sampling).



Vegetation Mapping

BonTerra Consulting Senior Botanist Dr. Kai Palenscar performed vegetation mapping of the reference site on July 1, 2013. The reference site includes a total of 4.38 acres of CS/CLORF habitat and 3.43 acres of CSS habitat, associated with 0.33 acre of ruderal vegetation, and 0.73 acre of disturbed ground (Exhibit 3). A compendium of the plant species that were observed on the reference site on July 1, 2013, is provided in Appendix A. It is important to note that the vegetation surveys were performed in a year of marked drought (i.e., 2012–2013), and in early summer following the typical blooming/growth season of several plant species; therefore, it is assumed that additional plant species are present on the reference site (e.g., desiccated herbs, unexpressed seed bank, dormant bulbs, etc.) that were not observed on July 1, 2013.

Quantitative Vegetation Surveys

Based on the results of the vegetation mapping, a Geographic Information System (GIS) was used to generate random, point-intercept transect locations, and random vegetation quadrat locations, for the measurement of native vegetation conditions (foliar coverage, and species diversity [richness] in CS/CLORF and CSS habitat). Dr. Palenscar, assisted by BonTerra Consulting Biologists Trevor Bristle and Jonas Winbolt, performed the quantitative surveys July 15 and July 18, 2013. Mr. Bristle and Mr. Winbolt are qualified to perform nesting bird surveys, as described in the OWHMP; i.e., individual transects or quadrats would be moved to alternate random locations as needed to avoid impacts to nesting birds (quantitative surveys were performed during the nesting bird season which is February 15 to September 15). Global Positioning System (GPS) equipment was used to locate transect and quadrat positions in the field. The collected survey data are discussed in the Results section, below.

Transects

A total of six 100-foot point-intercept transects (1.0-foot intercepts) were performed in CS/CLORF-vegetated portions of the reference site, and a total of six 50-foot point-intercept transects (1.0-foot intercepts) were performed in the CSS-vegetated portions of the reference site. Species incidence was recorded at each transect intercept as either native or non-native species, “both”, or “no plant”, and ground cover was recorded at each intercept as either bare soil, rock/cobble, leaf litter, fine woody debris, coarse woody debris, or living trunk. The transect data were compiled to yield the percent native and non-native class coverage, and ground cover percent coverage (by category).

Quadrats

A total of 9 20x40-foot quadrats were performed to assess plant species density and diversity: this included 6 locations in CS/CLORF-vegetated portions of the reference site and 3 locations in the CSS-vegetated portions of the reference site. The total quadrat sampling areas were 4,800 square feet (sf) in the CS/CLORF areas, and 2,400 sf in the CSS areas, for a total quadrat sampling area of 7,200 sf. The quadrats were created using measuring tapes, wire flags, and flagging tape. The location of all transects and quadrats are shown on Exhibit 3. Reference site photographs are provided in Appendix B. Vegetation characteristics were independently evaluated via quadrats for the two native habitat types present on site (i.e., CS/CLORF, CSS) using the following characteristics (metrics): plant species richness (number of species present), density of native trees (all spp.); density of native shrubs (all spp.); density, relative density, coverage, relative coverage, frequency, and relative frequency, of each plant species; and the Shannon Diversity Index (see Appendix G, References) was computed to yield

the species diversity for each habitat type. This index accounts for both species abundance and evenness in a habitat area. The metrics, equations, and variables used to derive these values are provided in Table 1.

The vegetation diversity values are discussed in the Results section, below.

**TABLE 1
 VEGETATION DIVERSITY METRICS**

Metric	Equation	Variables
Density of Species 'i' (D_i)	$D_i = n_i / A$	n_i = total individuals of species 'i' A = total area sampled
Relative Density for Species 'i' (RD_i)	$RD_i = N_i / \sum n$	n_i = number of individuals of species 'i' $\sum n$ = total number of individuals of all species (plots)
Coverage for Species 'i' (C_i)	$C_i = a_i / A$	a_i = total area covered for species 'i' A = total area sampled
Relative Coverage of Species 'i' (RC_i)	$RC_i = C_i / \sum C$	C_i = coverage for species 'i' $\sum C$ = sum of coverage for all species
Frequency of Species 'i' (f_i)	$f_i = j_i / k$	j_i = number of plots containing species 'i' k = total number of plots
Relative Frequency of Species 'i' (RF_i)	$RF_i = f_i / \sum f$	f_i = frequency of species 'i' $\sum f$ = sum of frequencies of all species
Shannon Diversity Index (H')	R	R = total number of species encountered
	$H = -\sum_{i=1} p_i \log p_i$	p_i = species 'i' as a proportion of R
	$i=1$	

Oak Tree Assessment

BonTerra Consulting Certified Arborist David Hughes (International Society of Arboriculture Certificate Number WE-7752A) and Mr. Bristle surveyed the project site on July 3 and 5, 2013, to determine the quantity of oak trees (*Quercus* sp.) present and to characterize their general health. All oak trees within the project site boundaries with a trunk diameter at breast height (dbh) of at least 2 inches were mapped in the field on a 125-scale (1 inch = 125 feet) aerial photograph. The minimum size threshold of two inches for the tree survey was used to ensure that all trees potentially regulated by the City of Arcadia municipal code and the *California Fish and Game Code* were included in this study. Several tree locations were also recorded using a hand-held global positioning system (GPS) device to refine the field mapping (trees in dense groups were not mapped with the GPS as a reliable signal could not be attained). During the survey, each tree was marked with a pre-numbered metal tag and the following data were collected: dbh, tree height, and canopy width. The overall health of each tree was rated on a scale of 1 to 5 as described in Table 2 (per the OWHMP).

The tree assessment ratings are discussed in the Results section, below.

**TABLE 2
 TREE HEALTH RATING CRITERIA**

Rating	Criteria
5	Tree in excellent health with abundant foliage, new leaf growth, and shoot elongation; no signs of herbivory, insect infestation, disease, fungus growth, or limb/trunk damage.
4	Tree in very good health with ample green foliage and new leaf growth; minor signs of drought stress, herbivory, insect infestation, decreased shoot growth, or loss of vigor.
3	Tree in moderate health with limited or uneven new leaf growth; moderate signs of drought stress; noticeable insect activity; decay on branches; noticeable herbivory damage.
2	Tree in poor health with existing leaves yellowing; limited/stunted new leaf growth; decreased shoot growth from previous year; dark-colored cracks or abnormalities on trunk; presence of fungus; observable decay on trunk or major limbs; sap bleeding from trunk; significant insect infestation; extensive herbivory; thinning canopy.
1	Tree in obvious decline with existing leaves yellowing and no new leaf growth; extensive limb or trunk damage; large cracks or other decay on trunk; bleeding sap; dieback of more than 30% of the canopy; a general lack of vigor.

General Wildlife Survey

BonTerra Consulting Senior Biologist Marc Blain and Biologist Nathan Moffett, performed general wildlife surveys on the reference site on June 12 and June 13, 2013 (Mr. Blain) and on August 15, 2013. (Mr. Moffett). Wildlife species observed by Mr. Bristle, Mr. Hughes, and Mr. Winbolt, during the vegetation mapping, quantitative vegetation surveys, and oak tree assessments (June/July/August 2013), are also included in the wildlife compendium which is provided in Appendix C.

RESULTS

Vegetation Percent Coverage

A total of 76 native plant species and 34 non-native plant species, were observed on the site during the initial reference site surveys, including two special status plant species: Fish’s milkwort (*Polygala cornuta* var. *fishiae*), California Rare Plant Rank (CRPR) List 4.3 – “Plants of Limited Distribution”; and Robinson’s peppergrass (*Lepidium virginicum* var. *robinsonii*), CNPR List 1B.2 – “Rare or Endangered in California and Elsewhere”. The preceding name for this plant species is no longer recognized; the new name is *Lepidium virginicum* ssp. *menziesii*, and it is no longer categorized as rare. However, CRPR and the California Natural Diversity Database (CNDDDB) still track the species by the previous name. Therefore, the species is included as rare for the current assessment, to indicate that this occurrence would be relevant for California Environmental Quality Act (CEQA) purposes. Coast live oak (*Quercus agrifolia*) is protected under the Los Angeles County Oak Tree Ordinance and the City of Arcadia Oak Tree Regulations.

Transect Results

A summary of transect results is provided in Table 3, and a spreadsheet containing all transect data is provided in Appendix D. Photos of all transect locations are provided in Appendix C.

A total of 20 native plant species, and 10 non-native plant species, were sampled by transects performed within CS/CLORF and CSS habitat areas. The mean native class coverage is 85.33 percent in the CS/CLORF areas and 74.67 percent in the CSS areas. The mean non-native class coverage is 61.00 percent in the CS/CLORF areas and 61.33 percent in the CSS areas. A high degree of leaf litter, fine woody debris, and coarse woody debris (combined) was observed in the CS/CLORF areas (97.00 percent) and in the CSS areas (84.67 percent).

A high degree of absolute native species coverage (164.17 percent) was measured in the CS/CLORF areas; this value reflects the extensive and inter-grown canopies of mature coast live oak and Western sycamore (*Platanus racemosa*) trees, which constitute a combined total of 115.33 percent absolute coverage. Blue elderberry (*Sambucus nigra* ssp. *caerulea*) a native tree (or large shrub) species, was measured at 3.50 percent coverage in the CS/CLORF areas. The measured absolute native species coverage in the CSS areas is 68.67 percent.

The measured absolute coverage of native shrub species (12 species, combined) is 33.68 in the CS/CLORF areas and 53.33 percent in the CSS areas. The shrubs category above includes large evergreen species such as laurel sumac (*Malosma laurina*); moderate-sized species such as golden currant (*Ribes aureum*); ground cover or sub-shrubs such as snowberry (*Symphoricarpos mollis*); and vining shrubs such as California blackberry (*Rubus ursinus*) and poison oak (*Toxicodendron diversilobum*). The measured absolute coverage of native succulent species (combined) is 3.17 percent in the CS/CLORF areas and 2.00 percent in the CSS areas. The succulent category above includes Vasey's prickly pear (*Opuntia x vaseyi*) and chaparral yucca (*Hesperoyucca whipplei*).

The measured absolute coverage of native herbaceous species (forbs and grasses combined) is 8.50 percent in the CS/CLORF areas and 1.00 percent in the CSS areas. The native herbaceous category above includes a total of 3 species: deerweed (*Acmispon glaber* var. *glaber*), wild cucumber (*Marah macrocarpus*), and coast range melic grass (*Melica imperfecta*).

The measured absolute coverage of non-native plant species (all herbaceous) is 68.67 percent in the CS/CLORF areas and 79.33 percent in the CSS areas. Fox-tail brome [*Bromus diandrus*] constitutes a substantial percentage of the herbaceous understory in both the CS/CLORF areas (59.83 percent) and CSS areas (60.33 percent). It is typical for southern California oak woodland and savanna habitats to exhibit primarily non-native understory vegetation due to long-term human impacts (especially post-European-settlement) including ground disturbance, grazing by domestic livestock, clearing, altered fire frequency, introduced invasive plant species, or other factors. Therefore, the reference site exhibits a degree of exotic plant species invasion that is within a typical range for regional habitat areas.

**TABLE 3
 TRANSECT DATA SUMMARY**

Plant Species	Percent Vegetation Coverage (Mean)	
	CS/CLORF ^a	CSS ^b
	(6 x 100-ft) ^c	(6 x 50-ft) ^c
Native Trees		
<i>Platanus racemosa</i>	49.33	12.33
<i>Quercus agrifolia</i>	66.00	0.00
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]	3.50	0.00
Absolute Coverage: Native Trees (All)	118.83	12.33
Native Shrubs		
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>]	0.00	6.33
<i>Clematis lasiantha</i>	1.17	0.00
<i>Eriogonum fasciculatum</i>	0.00	21.33
<i>Lepidospartum squamatum</i>	0.67	0.00
<i>Lonicera subspicata</i> var. <i>denudata</i>	1.33	0.00
<i>Malosma laurina</i>	1.83	23.67
<i>Rhamnus crocea</i>	2.67	0.00
<i>Ribes aureum</i>	1.67	2.00
<i>Rubus ursinus</i>	2.17	0.00
<i>Salvia mellifera</i>	0.67	0.00
<i>Symphoricarpos mollis</i>	1.17	0.00
<i>Toxicodendron diversilobum</i>	20.33	0.00
Absolute Coverage: Native Shrubs (All)	33.68	53.33
Native Succulents (Cactus, Yucca, etc.)		
<i>Hesperoyucca whipplei</i> [<i>Yucca w.</i>]	1.17	0.00
<i>Opuntia x vaseyi</i>	2.00	2.00
Absolute Coverage: Native Succulents (All)	3.17	2.00
Native Herbs/Grasses		
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	0.00	1.00
<i>Marah macrocarpus</i>	6.83	0.00
<i>Melica imperfecta</i>	1.67	0.00
Absolute Coverage: Native Herbs/Grasses (All)	8.50	1.00
Non-native		
<i>Avena barbata</i>	1.17	0.00
<i>Bromus diandrus</i>	59.83	60.33
<i>Bromus madritensis</i> ssp. <i>rubens</i>	0.00	14.67
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	3.33	0.00
<i>Centaurea melitensis</i>	0.00	0.67
<i>Conium maculatum</i>	0.17	1.33
<i>Festuca myuros</i> [<i>Vulpia m.</i> var. <i>myuros</i>]	0.00	0.67
<i>Nicotiana glauca</i>	0.00	1.67
<i>Silybum marianum</i>	3.50	0.00
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]	0.67	0.00

**TABLE 3
 TRANSECT DATA SUMMARY**

Plant Species	Percent Vegetation Coverage (Mean)	
	CS/CLORF ^a	CSS ^b
	(6 x 100-ft) ^c	(6 x 50-ft) ^c
Absolute Percent Coverage		
Total Absolute Native Species Coverage	164.17	68.67
Total Absolute Non-Native Species Coverage	68.67	79.33
Total Absolute Coverage (All)	232.83	148.00
Class Percent Coverage		
Native	38.83	38.67
Non-Native	14.50	25.33
Both	46.50	36.00
No Plant	0.17	0.00
Summary		
Total Native Class Coverage	85.33	74.67
Total Non-Native Class Coverage	61.00	61.33
Total Unvegetated	0.17	0.00
Ground Cover		
Bare Soil	0.67	8.00
Rock/Cobble	0.67	7.33
Leaf Litter	87.17	66.33
Fine Woody Debris	7.33	17.67
Coarse Woody Debris	2.50	0.67
Living Trunk	1.67	0.00
^a CS/CLORF = California Sycamore/Coast Live Oak Riparian Forest ^b CSS = Coastal Sage Scrub ^c Point-intercept transect dimensions		

Quadrat Results

A summary of quadrat results is provided in Table 4, and spreadsheets containing all quadrat results are provided in Appendix E. Photos of all quadrat locations are provided in Appendix C.

A total of 27 native plant species and 14 non-native plant species, were sampled by quadrats performed within CS/CLORF and CSS habitat areas (combined); the native plant species “richness” value (i.e., number of species) for the quadrats is higher than the transect results (20 native species). This result is expected for areal versus linear sampling because areal sampling allows the capture of rare plant species that occur sparsely in the landscape. A high degree of leaf litter, fine woody debris, and coarse woody debris (combined) was estimated to occur in the CS/CLORF quadrat areas (94.63 percent) and in the CSS quadrat areas (90.31 percent); these estimated values are consistent with the transect results.

An absolute native species coverage of 116.69 percent was estimated to occur in the CS/CLORF areas and 51.74 percent in the CSS areas; the CS/CLORF quadrat value is substantially lower than the transect results (164.17 percent), primarily due to the lower incidence of western sycamore trees (21.33 percent coverage) inter-growing with coast live oaks in the quadrats, relative to the transects (49.33 percent coverage) based on randomized locations. Coast live oak coverage was estimated to be 60.50 percent in the CS/CLORF

quadrats, which is fairly consistent with the transect results (66.00 percent). The CSS absolute native species coverage value (51.74 percent) is substantially lower than the transect results (68.67 percent), primarily due to the higher incidence of California buckwheat (*Eriogonum fasciculatum*) and laurel sumac on project transects (21.33 percent and 23.67 percent, respectively) relative to the quadrats (5.00 percent and 10.00 percent, respectively).

An absolute native shrub coverage (mean) of 24.44 percent was estimated to occur in the CS/CLORF areas (10 species) and 38.67 percent in the CSS areas (7 species). The CS/CLORF value is substantially lower than the transect results (33.67 percent), primarily due to the lower incidence of poison oak in the quadrats (7.50 percent) relative to the transects (20.33 percent). Two of the CS/CLORF quadrats did not contain any poison oak, whereas this shrub species was intercepted by each of the six CS/CLORF transects, based on randomized locations. The CSS quadrat absolute native shrub coverage value (38.67 percent) is substantially lower than the transect results (53.33 percent) primarily due to the higher incidence of California buckwheat and laurel sumac on the transects, as described above. No non-native shrub species were sampled on the quadrats. An absolute native succulent species coverage (one species) of 0.25 percent was estimated to occur in the CS/CLORF areas and 1.00 percent in the CSS areas. The succulent category above includes chaparral yucca (*Hesperoyucca whipplei*). The quadrats did not contain Vasey's prickly pear (*Opuntia x vaseyi*).

An absolute coverage of native herbaceous species (forbs and grasses, combined) of 7.49 percent (mean) was estimated to occur in the CS/CLORF areas (4 species) and 6.73 percent in the CSS areas (7 species); the CS/CLORF value is fairly consistent with the transect results (8.50 percent). The CSS value is substantially higher than the transect results (1.00 percent), primarily due to the occurrence of 12 percent coverage of mugwort (*Artemisia douglasiana*) in one of the 3 CSS quadrats. A larger number of native herbaceous species occurred in the quadrats (8) relative to the transects (3 species), including deerweed, mugwort, *Clarkia* sp., giant wild rye (*Elymus condensatus*), California everlasting (*Pseudognaphalium californicum*), *Lupinus* sp., wild cucumber, and caterpillar phacelia (*Phacelia cicutaria*). Native herbaceous coverage is low due to the dominance of invasive herbs and grasses, as described below.

An absolute coverage of non-native plant species (all herbaceous except for one tree species) of 67.72 percent was estimated to occur in the CS/CLORF areas and 55.60 percent in the CSS areas; the CS/CLORF quadrat value is consistent with the transect results (68.67 percent). The CSS value is substantially lower than the transect results (79.33 percent) primarily due to the low incidence of fox-tail brome in 2 of the 3 CSS quadrats (relative to the third quadrat), and relative to the transect results for this non-native species. Red brome (*Bromus madritensis* ssp. *rubens*) did not occur in any CSS quadrat, whereas it constituted 14.7 percent of CSS transect coverage. Conversely, short podded mustard (*Hirschfeldia incana*) did not occur on any CSS transect, whereas it constituted 18.33 percent of estimated quadrat coverage. These results reflect the sometimes patchy occurrence of non-native species in a natural habitat area that exhibits human impacts. As noted above, the reference site exhibits a degree of exotic plant species invasion that is within a typical range for regional habitat areas.

**TABLE 4
 QUADRAT DATA SUMMARY**

Plant Species	Percent Vegetation Coverage (Mean) ^a	
	CS/CLORF ^b	CSS ^c
	(6 x 800-sf)	(3 x 800-sf)
Native Trees		
<i>Platanus racemosa</i>	21.33	2.00
<i>Quercus agrifolia</i>	60.50	0.00
<i>Salix lasiolepis</i>	0.00	0.67
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]	2.67	1.67
<i>Umbellularia californica</i>	0.00	1.00
Absolute Coverage: Native Trees (All)	84.50	5.33
Native Shrubs		
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>]	7.50	1.67
<i>Ceanothus leucodermis</i>	0.00	3.33
<i>Eriogonum fasciculatum</i>	0.50	5.00
<i>Lepidospartum squamatum</i>	0.00	0.33
<i>Polygala cornuta</i> ssp. <i>fishiae</i>	0.67	0.00
<i>Malosma laurina</i>	4.17	10.00
<i>Rhamnus crocea</i>	0.20	0.00
<i>Rhus aromatica</i> [<i>R. trilobata</i>]	1.33	0.00
<i>Rhus ovata</i>	0.03	0.00
<i>Ribes aureum</i>	1.37	16.67
<i>Rubus ursinus</i>	1.17	0.00
<i>Salvia mellifera</i>	0.00	1.67
<i>Toxicodendron diversilobum</i>	7.50	0.00
Absolute Coverage: Native Shrubs (All)	24.44	38.67
Native Succulents (Cactus, Yucca, etc.)		
<i>Hesperoyucca whipplei</i> [<i>Yucca w.</i>]	0.25	1.00
Absolute Coverage: Native Succulents (All)	0.25	1.00
Native Herbs/Grasses		
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	0.00	0.33
<i>Artemisia douglasiana</i>	0.83	4.00
<i>Clarkia</i> sp.	0.00	0.07
<i>Elymus condensatus</i> [<i>Leymus c.</i>]	5.83	0.00
<i>Lupinus</i> sp.	0.00	0.17
<i>Marah macrocarpus</i>	0.83	1.17
<i>Phacelia cicutaria</i>	0.00	1.00
<i>Solanum douglasii</i>	0.002	0.00
Absolute Coverage: Native Herbs/Grasses (All)	7.49	6.73

**TABLE 4
 QUADRAT DATA SUMMARY**

Plant Species	Percent Vegetation Coverage (Mean) ^a	
	CS/CLORF ^b	CSS ^c
	(6 x 800-sf)	(3 x 800-sf)
Non-Native		
<i>Araujia sericifera</i>	0.002	0.00
<i>Avena barbata</i>	0.02	0.00
<i>Bromus diandrus</i>	63.83	31.93
<i>Carduus pycnocephalus ssp. pycnocephalus</i>	0.42	0.00
<i>Ceratonia siliqua</i>	0.17	0.00
<i>Conium maculatum</i>	1.03	1.00
<i>Dysaphania pumilio</i> { <i>Chenopodium pumilio</i> }	0.002	0.00
<i>Erodium cicutarium</i>	0.002	0.00
<i>Hirschfeldia incana</i>	0.50	18.33
<i>Nicotiana glauca</i>	0.00	4.00
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium l.</i>]	0.17	0.003
<i>Silybum marianum</i>	1.59	0.00
<i>Sonchus oleraceus</i>	0.00	0.003
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]	0.00	0.33
Absolute Percent Coverage		
Total Absolute Native Species Coverage	116.68	51.74
Total Absolute Non-Native Species Coverage	67.72	55.61
Total Absolute Coverage (All)	184.41	107.34
Ground Cover		
Bare Soil	2.50	4.00
Rock/Cobble/Gravel	2.00	5.67
Leaf Litter	85.30	63.97
Fine Woody Debris	7.33	12.67
Coarse Woody Debris	2.00	13.67
Living Trunk	0.83	0.03
Trash	0.03	0.00
^a Quadrat values represent visual estimates of plant species coverage ^b CS/CLORF = California Sycamore/Coast Live Oak Riparian Forest ^c CSS = Coastal Sage Scrub		

Vegetation Density and Diversity

The plant species density and diversity results (e.g., richness, abundance) based on survey quadrats are discussed below, and a detailed table of density and diversity data and computations is provided in Appendix E.

Density of Native Shrubs

A total of 10 native shrub species were sampled on quadrats in the CS/CLORF areas (4,800 sf, total), and 7 native shrub species were sampled on quadrats in the CSS areas (2,400 sf, total). The computations of density (all species, and individual species) and relative

density (individual species) of native shrubs per Table 1 are provided in Appendix E. A simplified computation of shrub density, expressed in terms of the number of individual shrubs per 1.0 acre (via extrapolation), is provided below. The overall density of native herbs and grasses is very low due to the dominance of invasive herbs and grasses, as described above.

Density of all native shrubs in the CS/CLORF areas:

- 47 native shrub individuals / 4,800 sf = 1 individual per 102 sf; or,
- 426 individuals per 1.0 acre.

Density of all native shrubs in the CSS areas:

- 33 native shrub individuals / 2,400 sf = 1 individual per 73 sf; or,
- 599 individuals per 1.0 acre.

Southern California oak woodland habitats can exhibit a mosaic of understory vegetation types including shrubs and herbs/grasses, and unvegetated ground cover (e.g., boulders, coarse woody debris, creek beds/alluvium, among others). The reference site CS-CLORF habitat exhibits such a mosaic, with a moderate density of shrubs; however, the herb/grass patches are dominated by invasive species. The reference site CSS habitat exhibits a higher density of shrubs than the CS/CLORF habitat, but the shrub understory and the gaps in shrub patches are similarly weedy.

Coverage/Relative Coverage of Plant Species

The computations of plant species coverage and relative coverage (individual species) per Table 1 are provided in Appendix E, and a discussion of plant species coverage results is provided in the Quadrat Results section above.

Frequency/Relative Frequency of Plant Species

The computations of plant species frequency and relative frequency (individual species) per Table 1 are provided in Appendix E, and a summary of simplified native plant species frequency results is provided below. For example, a frequency [f_i] value of 0.67 indicates that a plant species occurred in two-thirds of the quadrats for a habitat type.

Species occurring in CS/CLORF quadrats:

- 6 of 6 quadrats (frequency [f_i] = 1): coast live oak.
- 4 of 6 quadrats (frequency [f_i] = 0.67): Western sycamore, poison oak.
- 2 of 6 quadrats (frequency [f_i] = 0.33): redberry (*Rhamnus crocea*), golden currant, blue elderberry.
- 1 of 6 quadrats (frequency [f_i] = 0.17): mugwort, mule fat (*Baccharis salicifolia*), giant wild rye (*Elymus condensatus*), California buckwheat (*Eriogonum fasciculatum*), chaparral yucca, laurel sumac, wild cucumber, Fish's milkwort, fragrant sumac (*Rhus aromatica*), sugarbush (*Rhus ovata*), California blackberry (*Rubus ursinus*), and white nightshade (*Solanum douglasii*).

Species occurring in CSS quadrats:

- 2 of 3 quadrats (frequency $[f_i] = 0.67$): laurel sumac
- 1 of 3 quadrats (frequency $[f_i] = 0.33$): deerweed, mugwort, mule fat, chaparral whitethorn (*Ceanothus leucodermis*), clarkia (*Clarkia* sp.), California buckwheat, chaparral yucca, scale broom (*Lepidospartum squamatum*), lupine (*Lupinus* sp.), wild cucumber, caterpillar phacelia (*Phacelia cicutaria*), Western sycamore, California everlasting (*Pseudognaphalium californicum*), golden currant, arroyo willow (*Salix lasiolepis*), black sage (*Salvia mellifera*), blue elderberry, and California bay (*Umbellularia californica*).

Most of the native plant species have low frequency values, indicating that they are rare or occur as patches in the sampling areas, potentially related to the dominance of invasive herbs and grasses in the woodland/scrub understory layer. Many of the 76 plant species that were observed during the reference site surveys were not captured by either transects or quadrats, and a qualitative assessment indicated that these plant species are relatively rare on the site; e.g., only one individual of hillside gooseberry (*Ribes californicum*), a shrub species, was observed on the reference site.

Shannon Diversity Index

A diversity index provides a more comprehensive indication of the vegetative composition beyond 'richness', which is simply the number of plant species observed to be present (either via quantitative surveys [transects, quadrats, etc.] or qualitative observation) in a habitat area. As stated above, the Shannon Diversity Index accounts for plant species' relative abundance (i.e., commonness or scarcity) and 'evenness' (i.e., how evenly the individuals in the plant community are distributed over the landscape) in a habitat area, as expressed in the following equation (H = the Shannon Diversity Index).

$$H = -\sum_{i=1}^R (p_i \log p_i)$$

For the present application, p_i = the proportion of individuals of species 'i' relative to the total number of all individual plants (all species); 'R' = the numbers of plant species encountered; and \sum = the sum from species 1 to species R. The highest potential value of 'H' (for a particular study area with 'R' number of species) occurs when all species are equally abundant in the sampling area; (e.g., Species 1: 10 individuals; Species 2: 10 individuals...Species R: 10 individuals).

Higher values of 'H' represent more diverse biological communities. To illustrate: a weed-free orange grove with no other types of fruit trees present would have an 'H' value of zero, as ' p_i ' would equal one (one type of fruit tree) and would be multiplied by 'log 1' which equals zero. Whatever method of sampling/counting the grove's composition, whatever numbers of samples are obtained, or in whatever locations, the same value (zero) of 'H' would result due to the singularity of fruit tree type throughout the grove. By contrast, if there are numerous different kinds of fruit trees—evenly distributed throughout the grove—then the 'H' value would be high, because each sample (in every location) would contain a diversity of fruit tree types, and the sum of the ' $p_i \log p_i$ ' values would increase with each new species of fruit tree uniformly added to the grove's mix of trees.

The values of 'H' were computed based on transect and quadrat results, as summarized in Table 5. Because these computations of 'H' include both native and non-native plant species on the reference site, this measure of species diversity does not reflect the ecological quality of the reference site vegetation in terms of non-native plant species establishment. Under the terms of the OWHMP, the mitigation site cannot have more than five percent coverage of non-native vegetation. The OWHMP also includes the establishment of a diverse, native understory/mosaic on the proposed mitigation site that will have a substantially higher functional value than the weedy understory of the reference site. The values of 'H' to be determined on an annual basis on the reference site will be useful for interpretive comparison with the annual 'H' values obtained for the proposed mitigation sites (e.g., impacts of annual precipitation volume/frequency/timing on plant growth, annual temperature patterns, among others), but should not be used as numerical performance criteria for the mitigation program.

**TABLE 5
 SHANNON DIVERSITY INDEX**

Habitat Type	Sampling Method	Number of Plant Species		Shannon Diversity Index = H	
		Native	Non-Native	Result	Potential ^c
CS/CLORF ^a	Transects	17	6	1.97	3.34
	Quadrats	18	11	1.82	3.37
CSS ^b	Transects	7	6	1.81	2.57
	Quadrats	19	6	2.26	3.22

^a CS/CLORF = California Sycamore/Coast Live Oak Riparian Forest
^b CSS = Coastal Sage Scrub
^c Based on the number of plant species (native + non-native) sampled by each method.

Wildlife Survey Results

No special status wildlife species, and no nesting birds, were detected on site during the June/July/August 2013 reference site surveys. A total of 7 reptile species, 37 bird species (native), and 5 mammal species (or sign) were detected on site.

Although the reference site is constrained by surrounding residential development and a flood control channel, the connectivity with the open space of the National Forest to the northeast is sufficient in allowing the site to remain utilized by a diverse group of wildlife species. The ability for a site to support a diverse suite of wildlife species is related to various factors including food and water availability, native habitat for nesting locations, and connectivity to natural open space. The study area is comprised primarily of native habitats and provides suitable habitat for many wildlife species. The species observed during field surveys are typically expected to be encountered in nearby open spaces, and are representative of a site with a fairly high utilization. Connectivity to natural open space in the northeastern portion of the reference site is vital to the site's utilization. While the site does have some prior disturbances (e.g., dirt roads) and non-native vegetation (i.e. exotic grasses), it appears to support a high enough proportion of native vegetation types and cover that wildlife coming down from the slopes are moving into the site and foraging and/or nesting. Wildlife species observed or expected to occur on site are discussed below.

Due to the dominant non-native herbaceous understory on the reference site, the density and diversity of arthropods (e.g., insects) and other wildlife species that depend on native herbs and grasses for food, nectar, and host plants (e.g., caterpillars), and other species that prey upon

these animals, is substantially lower than would occur in a “pristine” upland woodland/scrub habitat area with predominantly native herbaceous understory vegetation (remnants of such habitats are rare in southern California). The reference site supports an abundance and diversity of arthropods and other wildlife species that is similar to the adjacent impacted portion of the Middle SPS. The reference site contains coarse woody debris (CWD, e.g., dead/fallen trees, branches, brush piles) and boulder/cobble piles. The rock and dead vegetative materials provide important niche habitats for wildlife species, and the CWD undergoes decay processes that support detritivores/decomposers (e.g., fungi) that enhance the ecological functions of the site.

Fish and amphibians are dependent on water for at least part of their lifetime. Due to the lack of natural water sources on site or in the immediate vicinity, neither is expected to occur. Reptilian diversity and abundance typically vary with vegetation type. Some species prefer only one or two vegetation types, while others forage in a variety of habitats. Most reptile species that occur in open areas use rodent burrows for cover, protection from predators, and refuge during extreme weather conditions. Reptile species observed or expected to occur in the study area include western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), southern alligator lizard (*Elgaria multicarinata*), gopher snake (*Pituophis catenifer*), and southern pacific rattlesnake (*Crotalus oreganus [helleri]*).

Scrub vegetation types in the reference site support bird species adapted to the dense, low vegetation that typifies these areas. Common residents of this habitat observed or expected to occur on site include California quail (*Callipepla californica*), Anna’s hummingbird (*Calypte anna*), Bewick’s wren (*Thryomanes bewickii*), wrenit (*Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), spotted towhee (*Pipilo maculatus*), California towhee (*Pipilo crissalis*), and house finch (*Carpodacus mexicanus*). Hermit thrush (*Catharus guttatus*) and white-crowned sparrow (*Zonotrichia leucophrys*) are also expected to be common winter residents in this vegetation in the reference site. Mature oak woodlands are extremely important to wildlife for their high food value in acorns and abundant insect populations. They also offer cavities (either created by woodpeckers or naturally occurring) and dense foliage for nesting locations. Oak woodlands in the reference site provide potential resources for a wide variety of resident and migratory birds including raptors. Resident species observed or expected to occur include the red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), Cooper’s hawk (*Accipiter cooperi*), sharp-shinned hawk (*Accipiter striatus*), western scrub-jay (*Aphelocoma californica*), Nuttall’s woodpecker (*Picoides nuttallii*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), ash-throated flycatcher (*Myiarchus cinerascens*), black-headed grosbeak (*Pheucticus melanocephalus*), oak titmouse (*Baeolophus inornatus*), and bushtit (*Psaltriparus minimus*). In March, migratory birds such as warblers and vireos returning from wintering grounds begin to appear in region and may utilize both vegetation types.

Mammals are expected to utilize the site for breeding and foraging and are expected to be fairly diverse. Small mammals observed or expected to occur include the deer mouse (*Peromyscus maniculatus*), California ground squirrel (*Spermophilus beecheyi*), and woodrats (*Neotoma* sp.). Carnivores were observed on the reference site and include predatory and omnivorous species. Coyote (*Canis latrans*) sign was observed. The bobcat (*Felis rufus*) and gray fox (*Urocyon cinereoargenteus*) may occur in the vicinity of the site. Other carnivores that are expected to occur include the raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*). Sign of larger mammals such as the mule deer (*Odocoileus hemionus*) and black bear (*Ursus americanus*), was observed. Mountain lions (*Felis concolor*) frequent the foothills above the site and are expected to occasionally forage at lower elevations, possibly within the reference site, during

the winter months. Several tree trunks on the reference site exhibit characteristic scratch marks made by American black bear (*Ursus americanus*). BonTerra Consulting Biologists observed black bears (e.g., mature males; a mother and two cubs) on multiple occasions in nearby portions of Santa Anita Wash in May/June 2013. The understory of scrub and woodland vegetation types provide foraging opportunities for herbivorous mammals. Common herbivores expected to occur include the desert cottontail (*Sylvilagus audubonii*) and mule deer. Bats occur throughout most of southern California and may use portions of the site to forage. Common bat species that may forage or roost on the site include the big brown bat (*Eptesicus fuscus*), Mexican free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), western pipistrelle (*Pipistrellus hesperus*), and hoary bat (*Lasiurus cinereus*).

Oak Tree Assessment Results

The only oak species present on the reference site is coast live oak (*Quercus agrifolia*). A total of 129 trees (tag numbers 101 through 229) are present in the survey area with a dbh of at least two inches. A summary of the size distribution of the assessed oak species on the reference site is provided in Table 6. BonTerra Consulting's Biologists observed very few oak seedlings, saplings, or oak trees smaller than 2 inches dbh, on the reference site. A summary of all collected tree data is provided in Appendix F.

**TABLE 6
 SUMMARY OF OAK SIZE DISTRIBUTION**

Species		Tree Size (dbh)					Total
Common Name	Scientific Name	2"-8"	8"-12"	12"-24"	24"-36"	>36"	
Coast live oak	<i>Quercus agrifolia</i>	33	16	40	24	16	129
dbh: diameter at breast height							

The survey area is located in an historic alluvial floodplain. In addition to the coast live oaks, western sycamore trees are common on the site. The sycamore trees on the reference site were not counted/tagged/evaluated because sycamore is not a component of the OWHMP and this plant species is not relevant for comparative mitigation site performance. The western half of the survey area contains scattered oaks and sycamores, while the eastern half of the site contains a more dense population of oak trees. Common understory species in the western portion of the survey area include California buckwheat, chaparral yucca, mule fat, sugar bush, and extensive coverage of non-native herbs and grasses. Common understory species in the eastern portion of the survey area include poison oak and non-native grasses.

The hydrology on the reference site has been markedly altered by concrete channelization to the immediate west, which has removed the influence of flooding from Santa Anita Wash, and dirt service roads border portions of the woodland habitat area. Nevertheless, the health of almost all oak trees is excellent. The oaks are growing in soils that do not exhibit any recent marked disturbance, and any vehicle activity on service roads largely avoids the root zones of the on-site oak trees. Abundant new growth was observed on most oak trees; new shoots on the branches range from 2 to 6 inches in length. A few trees received health ratings that were less than the maximum due to minor to moderate decay on their trunks. However, it appeared that trunk decay was not damaging the overall functioning of any of the trees, as all tree canopies were dense with no yellowing leaves observed.

MITIGATION PERFORMANCE CRITERIA

Based on the results of the reference site surveys, a summary of recommended mitigation performance criteria is provided in Table 7. These criteria are discussed below.

**TABLE 6
 RECOMMENDED MITIGATION PERFORMANCE CRITERIA**

Year/Habitat Type	Vegetation Percent Coverage					Native Vegetation Diversity (Richness): No. of Plant Species	Oak Tree Survival (Percent)
	Native (Minimum)				Non-Native ^c		
	Trees ^{a,b}	Shrubs/Succulents ^a	Herbs/Grasses ^a	Total ^c			
Oak Woodland							
1				25	< 5		80
2				40	< 5		80
3	0.50	20.0	25.0	55	< 5	15	80
4				65	< 5		80
5	1.00	25.0	30.0	75	< 5	18	80
6				75	< 5		80
7	1.50	30.0	30.0	75	< 5	20	80
8				75	< 5		80
9				75	< 5		80
10	2.00	30.0	30.0	75	< 5	24	80
Sage Scrub							
1				25	< 5		80
2				40	< 5		80
3		30.0	8.0	55	< 5	10	80
4				65	< 5		80
5		35.0	10.0	75	< 5	12	80
6				75	< 5		80
7		45.0	15.0	75	< 5	15	80
8				75	< 5		80
9				75	< 5		80
10		60.0	15.0	75	< 5	18	80
^a Absolute Coverage ^b Dependent on precipitation amounts during the 10-year maintenance and monitoring period. ^c Class Coverage							

Native Vegetation Percent Coverage

The recommended overall native class coverage performance criterion is 75 percent for both mitigation habitat types (CS/CLORF and CSS) at the 10-year mark, based on the reference site transect results of 85.33 percent for the CS/CLORF areas, and 74.67 percent for the CSS areas. As noted above, the extensive canopy of mature oak and sycamore trees constitutes a large portion of the native coverage on the CS/CLORF portions of the reference site; therefore, an overall native coverage of 75 percent—comprised primarily of a mosaic of shrub and herbaceous habitat in which young oak trees are becoming established—is a suitable 10-year criterion for both mitigation habitat types.

Tree Species (Oak Woodland Mitigation)

The CS/CLORF portion of the reference site contains numerous mature trees, and it exhibits a high percent coverage of tree species. The mitigation site will not approach this percent coverage of tree species within the 10-year maintenance and monitoring period (or, indeed, for many decades) due to the slow growth of coast live oak trees; therefore, the reference site does not provide a useful comparison for setting tree coverage criteria. However, it is reasonable to expect that planted coast live oak trees could constitute 2.0 percent vegetation coverage at the 10-year mark, based on a mean canopy diameter of approximately 4.5 feet for 290 oak trees onsite (assuming 80 percent survival of the initial planting quantity of 363 oak trees). In the event that precipitation amounts during the 10-year period are lower than average for the region, a reduced final percent coverage criterion for oak trees should be used (combined with the certified arborist's assessment of the health of all individual oak trees).

Shrub and Succulent Species (Oak Woodland and Sage Scrub Mitigation)

The CS/CLORF portion of the reference site contains patchy native shrub and succulent coverage in the overall range of approximately 25 to 35 percent. The mitigation site will include several designated sub-areas to be maintained long-term as herbaceous/grasses understory (only) sans shrub species. It is therefore recommended that native shrub coverage constitute a minimum of 30 percent at the 10-year mark, as listed in Table 6, to provide similar understory structural diversity to the reference site.

The CSS portion of the reference site exhibits patchy shrub coverage (approximately 38 to 53 percent), and is a disturbed mosaic of shrubs and weedy grasses. The OWHMP calls for native vegetation coverage of 75 percent (all species) for the CSS mitigation site; of this total, it is recommended that native shrubs constitute a minimum of 60 percent coverage at the 10-year mark, to provide similar shrub coverage to the reference site.

Herbaceous and Grass Species (Oak Woodland and Sage Scrub Mitigation)

As stated above, coverage of native herbaceous and grass species is low (less than 10 percent) in both the CS/CLORF and CSS portions of the reference site, due to the high percent coverage of weedy herbs and grasses (approximately 55 to 80 percent) that must constitute less than five percent coverage on the mitigation sites.

Because of the herbaceous-only sub-areas to be created on the oak woodland mitigation site, it is recommended that native herbs and grasses constitute a minimum of 30 percent coverage at the 10-year mark on the CS/CLORF mitigation site.

The CSS mitigation site will be a shrub-dominated habitat with patches of herbaceous cover in gaps in the shrub canopy; therefore, it is recommended that native herbs and grasses constitute a minimum of 15 percent coverage at the 10-year mark on the CSS mitigation site.

Native Vegetation Diversity

The reference site includes a minimum of 76 native plant species, based on a qualitative botanical assessment performed in July 2013. A total of 33 native plant species were sampled on the survey transects and quadrats (combined, CS/CLORF and CSS areas), which is approximately 43 percent of all native plant species qualitatively observed on the site. As discussed above, most of the native plant species have low frequency values and many species

were not captured by either quadrats or transects, presumably related to the dominance of invasive herbs and grasses in the woodland/scrub understory layer.

A total of 24 native plant species were sampled in the CS/CLORF areas (transects and quadrats combined), and this is the recommended minimum diversity (richness) criterion for the CS/CLORF mitigation site at the 10-year mark.

A total of 18 native plant species were sampled in the CSS areas (transects and quadrats combined), and this is the recommended minimum diversity (richness) criterion for the CS/CLORF mitigation site at the 10-year mark.

The Shannon Diversity Index values ('H') currently range from 1.82 to 1.97 for the CS/CLORF portions of the reference site, and from 1.81 to 2.26 for the CSS portions of the reference site. It is recommended that the reference site be quantitatively sampled (quadrats and transects) at the 3, 5, 7, and 10-year marks (only) for comparison to mitigation site performance. If the values of 'H' for the mitigation site are found to be outside the range of values of 'H' found on the reference sites (CS/CLORF and CSS) in a given survey year, it is recommended that the LACDPW implement enhancement measures to improve mitigation site vegetative diversity (e.g., supplemental native plant and seed installation) to achieve values of 'H' that equal or exceed the values of 'H' on the reference site.

A summary of the results of the reference site surveys, including the recommended performance criteria, will be included in the final OWHMP.

If you have any questions or need any additional information, please contact Tom Smith or Richard Lewis at (626) 351-2000.

Respectfully submitted,

BONTERRA CONSULTING



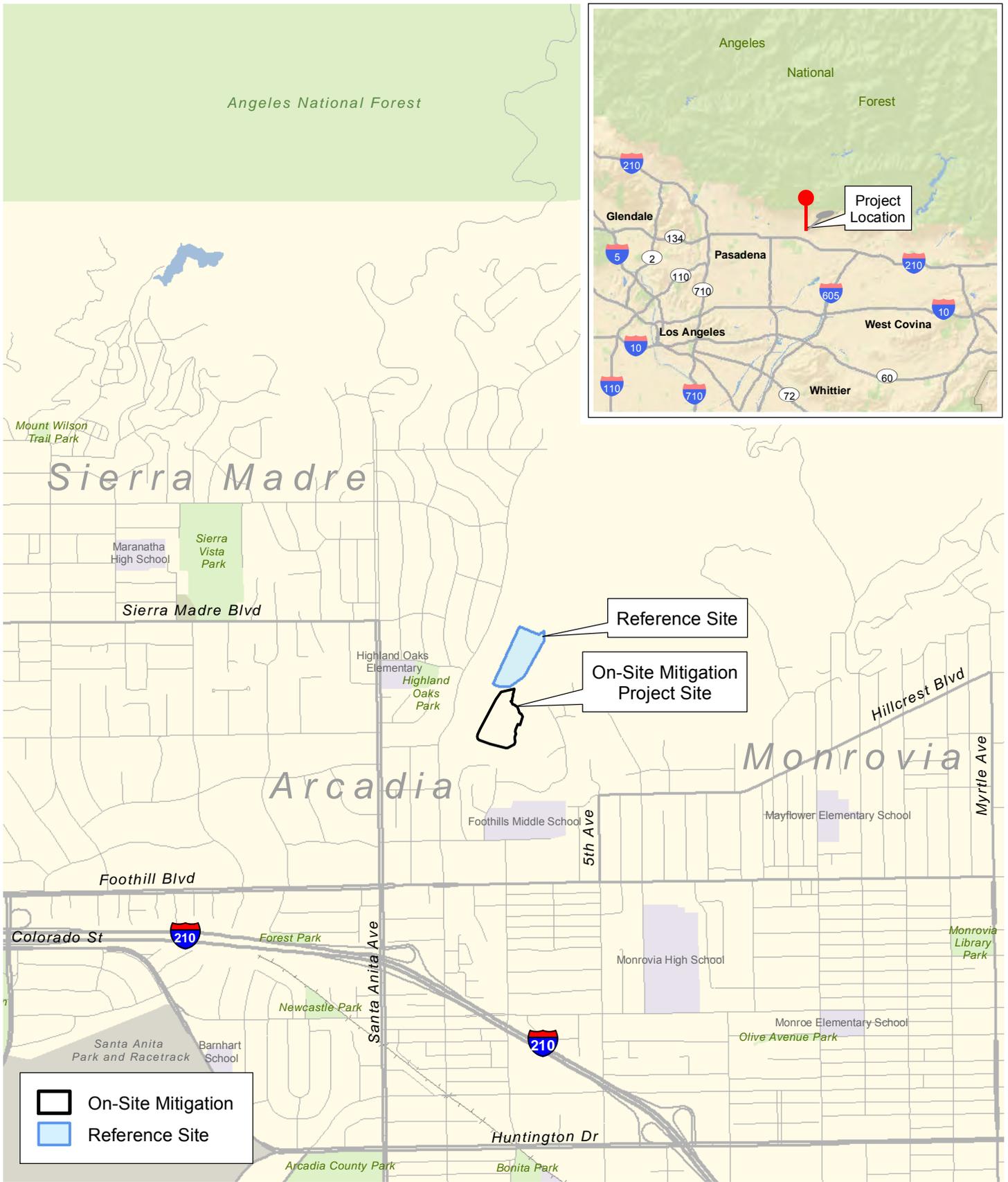
Thomas E. Smith, Jr., AICP
Principal



Richard B. Lewis, III
Senior Project Manager

Enclosures: Exhibits 1–3
A – Floral Compendium
B – Site Photographs
C – Faunal Compendium
D – Transect Data and Computations
E – Quadrat Data and Computations
F – Oak Tree Assessment Data
G – References

cc: Pat Wood, (PWood@dpw.lacounty.gov)
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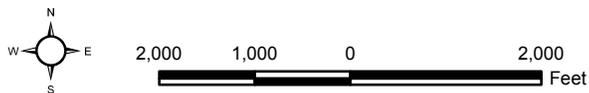


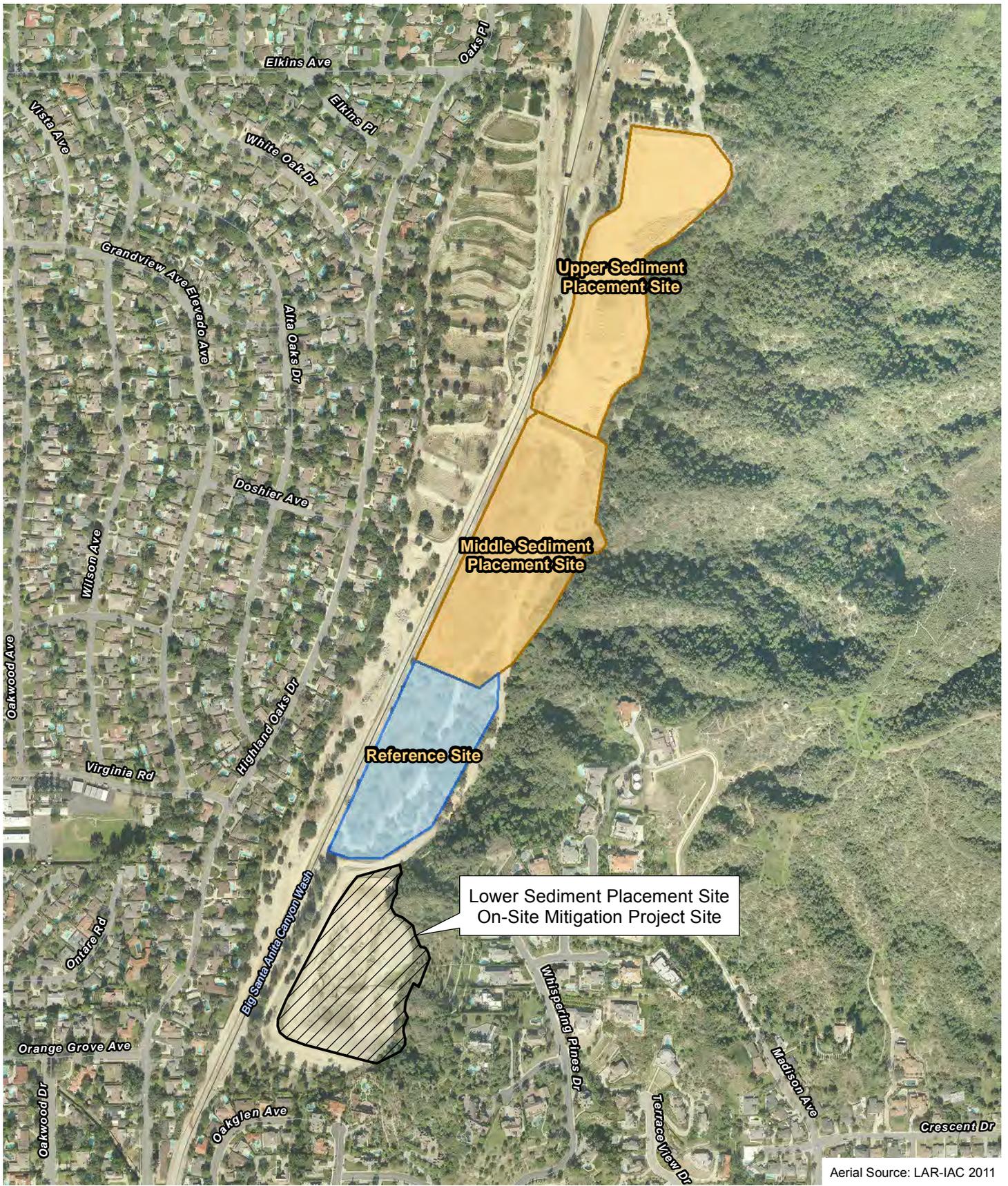
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Project Vicinity

Exhibit 1

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



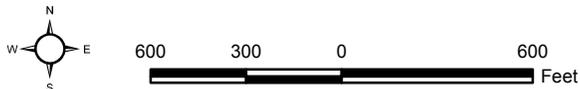


Aerial Source: LAR-IAC 2011

Sediment Placement Site Locations

Exhibit 2

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
 Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



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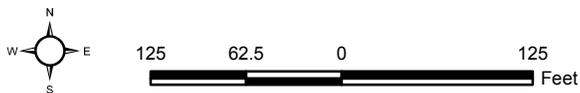


Aerial Source: LAR-IAC 2011

Reference Site Vegetation Types and Sampling Locations

Exhibit 3

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



APPENDIX A
FLORAL COMPENDIUM

APPENDIX A
FLORAL COMPENDIUM

Species	
PTERIDOPHYTES – FERNS AND ALLIES	
<i>SELAGINELLACEAE – SPIKE-MOSS FAMILY</i>	
<i>Selaginella bigelovii</i>	Bigelow's or bushy spike-moss
ANGIOSPERMAE – FLOWERING PLANTS	
MAGNOLIIDS	
<i>LAURACEAE – LAUREL FAMILY</i>	
<i>Umbellularia californica</i>	California bay
EUDICOTS	
<i>ADOXACEAE – MUSKROOT FAMILY</i>	
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]	blue elderberry
<i>ANACARDIACEAE – SUMAC FAMILY</i>	
<i>Malosma laurina</i>	laurel sumac
<i>Rhus aromatica</i> [<i>R. trilobata</i>]	skunk bush
<i>Rhus ovata</i>	sugar bush
<i>Toxicodendron diversilobum</i>	western poison oak
<i>APIACEAE – CARROT FAMILY</i>	
<i>Conium maculatum</i> *	poison hemlock
<i>Daucus pusillus</i>	rattlesnake weed
<i>ASTERACEAE – SUNFLOWER FAMILY</i>	
<i>Ambrosia acanthicarpa</i>	annual bur-sage
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	mugwort
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>]	mule fat
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i> *	Italian thistle
<i>Centaurea melitensis</i> *	tochalote, Malta star-thistle
<i>Chaenactis glabriuscula</i>	yellow pincushion
<i>Deinandra fasciculata</i> [<i>Hemizonia</i> f.]	fascicled tarweed
<i>Erigeron canadensis</i> [<i>Conyza</i> c.]	common horseweed
<i>Helianthus annuus</i>	western sunflower
<i>Heterotheca grandiflora</i>	telegraph weed
<i>Lactuca serriola</i> *	prickly lettuce
<i>Lepidospartum squamatum</i>	scale-broom
<i>Pseudognaphalium biolettii</i> [<i>Gnaphalium bicolor</i>]	bicolored everlasting, Bioletti's cudweed
<i>Pseudognaphalium californicum</i> [<i>Gnaphalium</i> c.]	California everlasting
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium</i> l.]*	weedy cudweed
<i>Rafinesquia californica</i>	California chicory
<i>Senecio vulgaris</i> *	common groundsel
<i>Silybum marianum</i> *	milk thistle
<i>Sonchus oleraceus</i> *	common sow thistle

APPENDIX A

FLORAL COMPENDIUM

Species	
BORAGINACEAE – BORAGE FAMILY	
<i>Amsinckia intermedia</i> [<i>Amsinckia menziesii</i> var. <i>i.</i>]	common fiddleneck
<i>Cryptantha</i> sp.	cryptantha
<i>Eucrypta chrysanthemifolia</i>	common eucrypta
<i>Phacelia cicutaria</i>	caterpillar phacelia
<i>Phacelia grandiflora</i>	large-flowered phacelia
<i>Phacelia ramosissima</i>	branching phacelia
<i>Plagiobothrys</i> sp.	popcornflower
BRASSICACEAE – MUSTARD FAMILY	
<i>Hirschfeldia incana</i> *	shortpod mustard
<i>Lepidium virginicum</i> ssp. <i>menziesii</i> [<i>L.v.</i> var. <i>robinsonii</i>]	Robinson's peppergrass**
CACTACEAE – CACTUS FAMILY	
<i>Opuntia littoralis</i>	coastal prickly-pear
<i>Opuntia x vaseyi</i>	mesa prickly-pear
CAPRIFOLIACEAE – HONEYSUCKLE FAMILY	
<i>Lonicera subspicata</i> var. <i>denudata</i>	southern honeysuckle
<i>Symphoricarpos mollis</i>	creeping snowberry
CARYOPHYLLACEAE – PINK FAMILY	
<i>Polycarpon tetraphyllum</i> ssp. <i>tetraphyllum</i> *	four-leaved allseed
CHENOPODIACEAE – GOOSEFOOT FAMILY	
<i>Chenopodium album</i> *	lamb's quarters
<i>Chenopodium berlandieri</i>	pitseed goosefoot
<i>Dysphania ambrosioides</i> [<i>Chenopodium a.</i>]*	Mexican tea
<i>Dysphania botrys</i> [<i>Chenopodium b.</i>]*	Jerusalem oak
<i>Dysphania pumilio</i> [<i>Chenopodium p.</i>]*	Tasmanian goosefoot
CONVOLVULACEAE – MORNING-GLORY FAMILY	
<i>Calystegia macrostegia</i>	large-bracted morning-glory
<i>Cuscuta californica</i>	chaparral dodder
CUCURBITACEAE – GOURD FAMILY	
<i>Marah macrocarpus</i>	wild cucumber / chilicothe
EUPHORBIACEAE – SPURGE FAMILY	
<i>Croton californicus</i>	California croton
<i>Croton setigerus</i> [<i>Eremocarpus s.</i>]	doveweed / turkey mullein
<i>Euphorbia peplus</i> *	petty spurge
<i>Ricinus communis</i> *	castor bean
FABACEAE – LEGUME FAMILY	
<i>Acmispon americanus</i> [<i>Lotus purshianus</i>]	American lotus
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	coastal deerweed
<i>Ceratonia siliqua</i> *	carob tree
<i>Lathyrus vestitus</i> ssp. <i>vestitus</i>	chaparral sweet pea
<i>Lupinus</i> sp.	lupine
<i>Melilotus indicus</i> *	sourclover

APPENDIX A

FLORAL COMPENDIUM

Species	
<i>FAGACEAE – OAK / BEECH FAMILY</i>	
<i>Quercus agrifolia</i>	coast live oak
<i>GERANIACEAE – GERANIUM FAMILY</i>	
<i>Erodium botrys</i> *	long-beaked filaree
<i>Erodium cicutarium</i> *	red-stemmed filaree
<i>GROSSULARIACEAE – GOOSEBERRY FAMILY</i>	
<i>Ribes aureum</i>	golden currant
<i>Ribes californicum</i>	hillside gooseberry
<i>LAMIACEAE – MINT FAMILY</i>	
<i>Marrubium vulgare</i> *	common horehound
<i>Salvia columbariae</i>	chia
<i>Salvia mellifera</i>	black sage
<i>MYRSINACEAE – MYRSINE FAMILY</i>	
<i>Anagallis arvensis</i> *	scarlet pimpernel
<i>ONAGRACEAE – EVENING-PRIMROSE FAMILY</i>	
<i>Camissoniopsis bistorta</i> [<i>Camissonia b.</i>]	California sun cup
<i>Clarkia</i> sp.	clarkia
<i>Clarkia purpurea</i>	winecup clarkia
<i>Epilobium canum</i>	California fuchsia
<i>Eulobus californicus</i> [<i>Camissonia californica</i>]	mustard-like evening primrose
<i>PHRYMACEAE – LOPSEED FAMILY</i>	
<i>Mimulus aurantiacus</i>	bush monkeyflower
<i>PLANTAGINACEAE – PLANTAIN FAMILY</i>	
<i>Keckiella cordifolia</i>	heart-leaved bush-penstemon
<i>Penstemon spectabilis</i>	royal penstemon
<i>PLATANACEAE – SYCAMORE FAMILY</i>	
<i>Platanus racemosa</i>	western sycamore
<i>POLYGALACEAE – MILKWORT FAMILY</i>	
<i>Polygala cornuta</i> var. <i>fishiae</i>	Fish's milkwort ***
<i>POLYGONACEAE – BUCKWHEAT FAMILY</i>	
<i>Eriogonum fasciculatum</i> var. <i>fasciculatum</i>	coastal California buckwheat
<i>RANUNCULACEAE – CROWFOOT FAMILY</i>	
<i>Clematis lasiantha</i>	chaparral clematis, pipestem clematis
<i>RHAMNACEAE – BUCKTHORN FAMILY</i>	
<i>Ceanothus leucodermis</i>	chaparral whitethorn
<i>Frangula californica</i> [<i>Rhamnus c.</i>]	California coffee berry
<i>Rhamnus crocea</i>	spiny redberry
<i>Rhamnus ilicifolia</i>	hollyleaf redberry
<i>ROSACEAE – ROSE FAMILY</i>	
<i>Cercocarpus betuloides</i> var. <i>betuloides</i>	birch-leaf mountain-mahogany
<i>Heteromeles arbutifolia</i>	toyon / Christmas berry
<i>Prunus ilicifolia</i>	holly-leaved cherry
<i>Rubus ursinus</i>	California blackberry

APPENDIX A
FLORAL COMPENDIUM

Species	
<i>RUBIACEAE</i> – Madder Family	
<i>Galium angustifolium</i>	narrowly leaved bedstraw
<i>SOLANACEAE</i> – NIGHTSHADE FAMILY	
<i>Cestrum nocturnum</i> *	night jessamine
<i>Datura wrightii</i>	jimson weed
<i>Lantana montevidensis</i> *	trailing lantana
<i>Nicotiana glauca</i> *	tree tobacco
<i>Solanum douglasii</i>	Douglas' nightshade
<i>ZYGOPHYLLACEAE</i> – CALTROP FAMILY	
<i>Tribulus terrestris</i> *	puncture vine
MONOCOTYLEDONES – MONOCOTS	
<i>AGAVACEAE</i> – CENTURY PLANT FAMILY	
<i>Hesperoyucca whipplei</i> [<i>Yucca w.</i>]	chaparral yucca
<i>ARECACEAE</i> – PALM FAMILY	
<i>Washingtonia robusta</i> *	Mexican fan palm
<i>ASPARAGACEAE</i> – ASPARAGUS FAMILY	
<i>Asparagus officinalis</i> ssp. <i>officinalis</i> *	garden asparagus
<i>JUNCACEAE</i> – RUSH FAMILY	
<i>Juncus textilis</i>	basket rush
<i>POACEAE</i> – GRASS FAMILY	
<i>Avena barbata</i> *	slender wild oat
<i>Bromus carinatus</i>	California brome
<i>Bromus diandrus</i> *	ripgut grass
<i>Bromus madritensis</i> ssp. <i>rubens</i> *	red brome
<i>Elymus condensatus</i> [<i>Leymus c.</i>]	giant wild rye
<i>Festuca myuros</i> [<i>Vulpia m. var. myuros</i>]*	rattail fescue
<i>Hordeum murinum</i> var. <i>leporinum</i> *	hare barley
<i>Melica imperfecta</i>	little California melic grass
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]*	smilo grass
<p>* non-native to the region in which it was found ** California Rare Plant Rank (CRPR) List 1B.2 – “Rare or Endangered in California and Elsewhere” *** CRPR 4.3 – Plants of Limited Distribution</p>	

APPENDIX B
SITE PHOTOGRAPHS



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 1.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 2.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 3.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 4.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 5.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 6.

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Transect Photographs – California Sycamore/Coast Live Oak Riparian Forest

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project





July 2013. California Sycamore-Coast Live Oak Riparian Forest - Quadrat No. 1.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Quadrat No. 2.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Quadrat No. 3.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Quadrat No. 4.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Quadrat No. 5.



July 2013. California Sycamore-Coast Live Oak Riparian Forest - Transect No. 6.

Quadrat Photographs – California Sycamore/Coast Live Oak Riparian Forest

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



July 2013. Coastal Sage Scrub - Transect No. 1.



July 2013. Coastal Sage Scrub - Transect No. 2.



July 2013. Coastal Sage Scrub - Transect No. 3.



July 2013. Coastal Sage Scrub - Transect No. 4.



July 2013. Coastal Sage Scrub - Transect No. 5.



July 2013. Coastal Sage Scrub - Transect No. 6.

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Transect Photographs – Coastal Sage Scrub

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project



July 2013. Coastal Sage Scrub - Quadrat No. 1.



July 2013. Coastal Sage Scrub - Quadrat No. 2.



July 2013. Coastal Sage Scrub - Quadrat No. 3.

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Quadrat Photographs – Coastal Sage Scrub

2013 Reference Site Survey Report - Oak Woodland Habitat Revegetation/Mitigation Program
Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project

Appendix B-4

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CONSULTING

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APPENDIX C
FAUNAL COMPENDIUM

APPENDIX C

FAUNAL COMPENDIUM

Species	
REPTILES	
LEPIDOSAURIA – LIZARDS AND SNAKES	
<i>PHRYNOSOMATIDAE</i> – ZEBRA-TAILED, FRINGE-TOED, SPINY, TREE, SIDE-BLOTCHED, AND HORNED LIZARDS	
<i>Sceloporus occidentalis</i>	western fence lizard
<i>Uta stansburiana</i>	side-blotched lizard
<i>TEIIDAE</i> – WHIPTAIL LIZARDS	
<i>Aspidoscelis [Cnemidophorus] tigris stejnegeri</i>	coastal western whiptail
<i>COLUBRIDAE</i> – COLUBRID SNAKES	
<i>Pituophis catenifer</i>	gopher snake
<i>Coluber [Masticophis] flagellum piceus</i>	red coachwhip [red racer]
<i>Coluber [Masticophis] lateralis lateralis</i>	California striped racer
<i>VIPERIDAE</i> – VIPERS	
<i>Crotalus oreganus (helleri)</i>	southern Pacific rattlesnake
BIRDS	
AVES – BIRDS	
<i>ODONTOPHORIDAE</i> – QUAILS	
<i>Callipepla californica</i>	California quail
<i>CATHARTIDAE</i> – NEW WORLD VULTURES	
<i>Cathartes aura</i>	turkey vulture
<i>ACCIPITRIDAE</i> – HAWKS, KITES, EAGLES, AND ALLIES	
<i>Buteo jamaicensis</i>	red-tailed hawk
<i>CHARADRIIDAE</i> – PLOVERS	
<i>Charadrius vociferus</i>	killdeer
<i>COLUMBIDAE</i> – PIGEONS AND DOVES	
<i>Patagioenas fasciata</i>	band-tailed pigeon
<i>Zenaida macroura</i>	mourning dove
<i>PSITTACIDEA</i> – TRUE PARROTS	
<i>Amazona sp*</i>	
<i>APODIDAE</i> – SWIFTS	
<i>Aeronautes saxatalis</i>	white-throated swift
<i>TROCHILIDAE</i> – HUMMINGBIRDS	
<i>Calypte anna</i>	Anna's hummingbird
<i>Selasphorus sasin</i>	Allen's hummingbird
<i>Selasphorus rufus</i>	Rufous hummingbird
<i>Calypte costae</i>	Costa's hummingbird
<i>PICIDAE</i> – WOODPECKERS	
<i>Melanerpes formicivorus</i>	acorn woodpecker
<i>Picoides nuttallii</i>	Nuttall's woodpecker

APPENDIX C

FAUNAL COMPENDIUM

Species	
<i>TYRANNIDAE – TYRANT FLYCATCHERS</i>	
<i>Empidonax difficilis</i>	Pacific-slope flycatcher
<i>Sayornis nigricans</i>	black phoebe
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>CORVIDAE – CROWS AND JAYS</i>	
<i>Aphelocoma californica</i>	western scrub-jay
<i>Corvus brachyrhynchos</i>	American crow
<i>Corvus corax</i>	common raven
<i>HIRUNDINIDAE – SWALLOWS</i>	
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow
<i>AEGITHALIDAE – BUSHTITS</i>	
<i>Psaltriparus minimus</i>	bushtit
<i>TROGLODYTIDAE – WRENS</i>	
<i>Thryomanes bewickii</i>	Bewick's wren
<i>Troglodytes aedon</i>	house wren
<i>SYLVIIDAE – SYLVIID WARBLERS</i>	
<i>Chamaea fasciata</i>	wrentit
<i>MIMIDAE – THRASHERS</i>	
<i>Mimus polyglottos</i>	northern mockingbird
<i>Toxostoma redivivum</i>	California thrasher
<i>STURNIDAE – STARLINGS</i>	
<i>Sturnus vulgaris</i> *	European starling
<i>PTILOGONATIDAE – SILKY-FLYCATCHERS</i>	
<i>Phainopepla nitens</i>	phainopepla
<i>EMBERIZIDAE – SPARROWS AND JUNCOS</i>	
<i>Pipilo maculatus</i>	spotted towhee
<i>Melospiza [Pipilo] crissalis</i>	California towhee
<i>Melospiza melodia</i>	song sparrow
<i>Junco hyemalis</i>	dark-eyed junco
<i>CARDINALIDAE – CARDINALS AND ALLIES</i>	
<i>Pheucticus melanocephalus</i>	black-headed grosbeak
<i>Piranga ludoviciana</i>	western tanager
<i>ICTERIDAE – BLACKBIRDS</i>	
<i>Icterus bullockii</i>	Bullock's oriole
<i>PARIDAE – CHICKADEES AND TITMICE</i>	
<i>Baeolophus inornatus</i>	oak titmouse
<i>FRINGILLIDAE – FINCHES</i>	
<i>Carpodacus mexicanus</i>	house finch
<i>Spinus [Carduelis] psaltria</i>	lesser goldfinch
<i>PASSERIDAE – OLD WORLD SPARROWS</i>	
<i>Passer domesticus</i> *	house sparrow

APPENDIX C

FAUNAL COMPENDIUM

Species	
MAMMALS	
MAMMALIA – MAMMALS	
SCIURIDAE – SQUIRRELS	
<i>Spermophilus beecheyi</i>	California ground squirrel
MURIDAE – MICE, RATS, AND VOLES	
<i>Neotoma sp.</i>	woodrat
CANIDAE – WOLVES AND FOXES	
<i>Canis latrans</i>	coyote
URSIDAE – BEARS	
<i>Ursus americanus</i>	American black bear
CERVIDAE – DEER	
<i>Odocoileus hemionus</i>	mule deer
* introduced species	
<p>Note: This species compendium is composed of the cumulative observations from multiple field surveys. Surveys were conducted by BonTerra Consulting Biologists Marc Blain on June 18, 2013, and June 19, 2013; Trevor Bristle on July 3, 2013, July 5, 2013, and July 18, 2013; Jonas Winbolt on July 15, 2013; and Nathan Moffett on August 5, 2013.</p>	

APPENDIX D

TRANSECT DATA AND COMPUTATIONS

APPENDIX D-1

TRANSECT DATA AND COMPUTATIONS
CALIFORNIA SYCAMORE/COAST LIVE OAK RIPARIAN FOREST (CS/CLORF)

Plant Species ^a	Transect Number (100-ft Transects; Hits = Percent Coverage)							Sycamore-Coast Live Oak Forest Statistics ^b				
	T-O1	T-O2	T-O3	T-O4	T-O5	T-O6	Mean % Covg	D _i	RD _i	p _i	H'	Potential H' (# sp. = 23)
Native												
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000	1.97	3.14
<i>Artemisia douglasiana</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>] ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Ceanothus leucodermis</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Clarkia</i> sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Clematis lasiantha</i> ^a	0.00	7.00	0.00	0.00	0.00	0.00	1.17	0.011667	0.005011	-0.026538		
<i>Elymus condensatus</i> [<i>Leymus</i> c.]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Eriogonum fasciculatum</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Hesperoyucca whipplei</i> [<i>Yucca</i> w.]	7.00	0.00	0.00	0.00	0.00	0.00	1.17	0.011667	0.005011	-0.026538		
<i>Lepidospartum squamatum</i> ^a	4.00	0.00	0.00	0.00	0.00	0.00	0.67	0.006667	0.002863	-0.016767		
<i>Lonicera subspicata</i> var. <i>denudata</i> ^a	0.00	0.00	0.00	8.00	0.00	0.00	1.33	0.013333	0.005727	-0.029564		
<i>Lupinus</i> sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Malosma laurina</i> ^a	0.00	0.00	0.00	9.00	2.00	0.00	1.83	0.018333	0.007874	-0.038143		
<i>Marah macrocarpus</i>	0.00	12.00	9.00	0.00	3.00	17.00	6.83	0.068333	0.029349	-0.103557		
<i>Melica imperfecta</i>	0.00	0.00	0.00	10.00	0.00	0.00	1.67	0.016667	0.007158	-0.035358		
<i>Opuntia x vaseyi</i>	0.00	11.00	0.00	0.00	0.00	1.00	2.00	0.020000	0.008590	-0.040863		
<i>Phacelia cicutaria</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Platanus racemosa</i>	52.00	81.00	85.00	31.00	6.00	41.00	49.33	0.493333	0.211883	-0.328783		
<i>Polygala cornuta</i> var. <i>fishiae</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Pseudognaphalium californicum</i> [<i>Gnaphalium</i> c.]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Quercus agrifolia</i>	0.00	95.00	71.00	73.00	81.00	76.00	66.00	0.660000	0.283465	-0.357355		
<i>Rhamnus crocea</i> ^a	0.00	14.00	0.00	2.00	0.00	0.00	2.67	0.026667	0.011453	-0.051190		
<i>Rhus aromatica</i> [<i>R. trilobata</i>] ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Rhus ovata</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Ribes aureum</i> ^a	0.00	0.00	2.00	2.00	1.00	5.00	1.67	0.016667	0.007158	-0.035358		
<i>Rubus ursinus</i> ^a	0.00	0.00	12.00	1.00	0.00	0.00	2.17	0.021667	0.009306	-0.043524		
<i>Salix lasiolepis</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Salvia mellifera</i> ^a	0.00	0.00	0.00	4.00	0.00	0.00	0.67	0.006667	0.002863	-0.016767		
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]	0.00	0.00	10.00	11.00	0.00	0.00	3.50	0.035000	0.015032	-0.063099		
<i>Solanum douglasii</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Symphoricarpos mollis</i> ^a	0.00	0.00	0.00	7.00	0.00	0.00	1.17	0.011667	0.005011	-0.026538		
<i>Toxicodendron diversilobum</i> ^a	30.00	23.00	13.00	6.00	11.00	39.00	20.33	0.203333	0.087330	-0.212916		
<i>Umbellularia californica</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
Non-Native												
<i>Araujia sericifera</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Avena barbata</i>	7.00	0.00	0.00	0.00	0.00	0.00	1.17	0.011667	0.005011	-0.026538		
<i>Bromus diandrus</i>	68.00	40.00	10.00	87.00	97.00	57.00	59.83	0.598333	0.256979	-0.349173		
<i>Bromus madritensis</i> ssp. <i>rubens</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	3.00	0.00	0.00	3.00	9.00	5.00	3.33	0.033333	0.014316	-0.060792		
<i>Centaurea melitensis</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		

APPENDIX D-1

TRANSECT DATA AND COMPUTATIONS
CALIFORNIA SYCAMORE/COAST LIVE OAK RIPARIAN FOREST (CS/CLORF)

Plant Species ^a	Transect Number (100-ft Transects; Hits = Percent Coverage)							Sycamore-Coast Live Oak Forest Statistics ^b				
	T-O1	T-O2	T-O3	T-O4	T-O5	T-O6	Mean % Covg	D _i	RD _i	p _i	H'	Potential H' (# sp. = 23)
<i>Ceratonia siliqua</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Conium maculatum</i>	1.00	0.00	0.00	0.00	0.00	0.00	0.17	0.001667	0.000716	-0.005184		
<i>Dysphania pumilio</i> [<i>Chenopodium pumilio</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Erodium cicutarium</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Festuca myuros</i> [<i>Vulpia m. var. myuros</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Hirschfeldia incana</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Nicotiana glauca</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium l.</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Silybum marianum</i>	20.00	0.00	0.00	0.00	0.00	1.00	3.50	0.035000	0.015032	-0.063099		
<i>Sonchus oleraceus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000000	0.000000	0.000000		
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]	0.00	0.00	0.00	4.00	0.00	0.00	0.67	0.006667	0.002863	-0.016767		
Absolute Percent Coverage												
Total Absolute Native Species Coverage	93.00	243.00	202.00	164.00	104.00	179.00	164.17					
Total Absolute Non-Native Species Coverage	99.00	40.00	10.00	94.00	106.00	63.00	68.67					
Total Absolute Coverage (All)	192.00	283.00	212.00	258.00	210.00	242.00	232.83					
Class Percent Coverage												
Native	25.00	47.00	90.00	24.00	5.00	42.00	38.83					
Non-Native	32.00	16.00	0.00	0.00	19.00	20.00	14.50					
Both	42.00	37.00	10.00	76.00	76.00	38.00	46.50					
No Plant	1.00	0.00	0.00	0.00	0.00	0.00	0.17					
Summary												
Total Native Class Coverage	67.00	84.00	100.00	100.00	81.00	80.00	85.33					
Total Non-Native Class Coverage	74.00	53.00	10.00	76.00	95.00	58.00	61.00					
Total Unvegetated	1.00	0.00	0.00	0.00	0.00	0.00	0.17					
Ground Cover												
Bare Soil	2.00	0.00	2.00	0.00	0.00	0.00	0.67					
Rock/Cobble	2.00	0.00	0.00	1.00	1.00	0.00	0.67					
Leaf Litter	67.00	92.00	83.00	82.00	99.00	100.00	87.17					
Fine Woody Debris	24.00		12.00	8.00	0.00	0.00	7.33					
Coarse Woody Debris	5.00	4.00	1.00	5.00	0.00	0.00	2.50					
Living Trunk	0.00	4.00	2.00	4.00	0.00	0.00	1.67					
^a Native shrub species (excluding succulent spp.)												
^b 'Density' computations performed on basis of linear units of transect data												

APPENDIX D-2

TRANSECT DATA AND COMPUTATIONS
COASTAL SAGE SCRUB (CSS)

Plant Species ^a	Transect Number (50-ft Transects)												Mean % Covg	Coastal Sage Scrub Statistics ^b				
	T-C1		T-C2		T-C3		T-C4		T-C5		T-C6			D _i	Rd _i	p _i	H'	Potential H' (# sp. = 13)
	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg						
Native																		
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]		0.00		0.00		0.00		0.00		0.00	3	6.00	1.00	0.010000	0.006803	-0.033949	1.806	2.565
<i>Artemisia douglasiana</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>] ^a		0.00	17	34.00		0.00	2	4.00		0.00		0.00	6.33	0.063333	0.043084	-0.135482		
<i>Ceanothus leucodermis</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Clarkia</i> sp.		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Clematis lasiantha</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Elymus condensatus</i> [<i>Leymus</i> c.]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Eriogonum fasciculatum</i> ^a	6	12.00		0.00	10	20.00	9	18.00		0.00	39	78.00	21.33	0.213333	0.145125	-0.280114		
<i>Hesperoyucca whipplei</i> [<i>Yucca</i> w.]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Lepidospartum squamatum</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Lonicera subspicata</i> var. <i>denudata</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Lupinus</i> sp.		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Malosma laurina</i> ^a		0.00	20	40.00	12	24.00		0.00	39	78.00		0.00	23.67	0.236667	0.160998	-0.294041		
<i>Marah macrocarpus</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Melica imperfecta</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Opuntia x vaseyi</i>		0.00		0.00	6	12.00		0.00		0.00		0.00	2.00	0.020000	0.013605	-0.058466		
<i>Phacelia cicutaria</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Platanus racemosa</i>		0.00		0.00	1	2.00	36	72.00		0.00		0.00	12.33	0.123333	0.083900	-0.207915		
<i>Polygala comuta</i> var. <i>fishiae</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Pseudognaphalium californicum</i> [<i>Gnaphalium</i> c.]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Quercus agrifolia</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Rhamnus crocea</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Rhus aromatica</i> [<i>R. trilobata</i>] ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Rhus ovata</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Ribes aureum</i> ^a		0.00		0.00	6	12.00		0.00		0.00		0.00	2.00	0.020000	0.013605	-0.058466		
<i>Rubus ursinus</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Salix lasiolepis</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Salvia mellifera</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Solanum douglasii</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Symphoricarpos mollis</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Toxicodendron diversilobum</i> ^a		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Umbellularia californica</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
Non-Native																		
<i>Araujia sericifera</i> *		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Avena barbata</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Bromus diandrus</i>	50	100.00	13	26.00	50	100.00	48	96.00	20	40.00	0	0.00	60.33	0.603333	0.410431	-0.365508		

APPENDIX D-2

TRANSECT DATA AND COMPUTATIONS
COASTAL SAGE SCRUB (CSS)

Plant Species ^a	Transect Number (50-ft Transects)												Mean % Covg	Coastal Sage Scrub Statistics ^b				
	T-C1		T-C2		T-C3		T-C4		T-C5		T-C6			D _i	Rd _i	p _i	H'	Potential H' (# sp. = 13)
	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg	Hits	% Covg						
<i>Bromus madritensis</i> ssp. <i>rubens</i>		0.00	20	40.00		0.00		0.00		0.00	24	48.00	14.67	0.146667	0.099773	-0.229963		
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Centaurea melitensis</i>	2	4.00		0.00		0.00		0.00		0.00		0.00	0.67	0.006667	0.004535	-0.024471		
<i>Ceratonia siliqua</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Conium maculatum</i>		0.00	4	8.00		0.00		0.00		0.00		0.00	1.33	0.013333	0.009070	-0.042655		
<i>Dysphania pumilio</i> [<i>Chenopodium pumilio</i>]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Erodium cicutarium</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Festuca myuros</i> [<i>Vulpia m. var. myuros</i>]		0.00		0.00		0.00		0.00		0.00	2	4.00	0.67	0.006667	0.004535	-0.024471		
<i>Hirschfeldia incana</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Nicotiana glauca</i>		0.00		0.00		0.00		0.00		0.00	5	10.00	1.67	0.016667	0.011338	-0.050789		
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium l.</i>]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Silybum marianum</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Sonchus oleraceus</i>		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.000000	0.000000	0.000000		
Absolute Percent Coverage																		
Total Absolute Native Species Coverage	6	12.00	37	74.00	35	70.00	47	94.00	39	78.00	42	84.00	68.67					
Total Absolute Non-Native Species Coverage	52	104.00	37	74.00	50	100.00	48	96.00	20	40.00	31	62.00	79.33					
Total Absolute Coverage (All)	58	116.00	74	148.00	85	170.00	95	190.00	59	118.00	73	146.00	148.00					
Class Percent Coverage																		
Native	44	88.00	17	34.00		0.00	2	4.00	29	58.00	24	48.00	38.67					
Non-Native	6	12.00	13	26.00	25	50.00	14	28.00	10	20.00	8	16.00	25.33					
Both		0.00	20	40.00	25	50.00	34	68.00	11	22.00	18	36.00	36.00					
No Plant		0.00		0.00		0.00		0.00		0.00		0.00	0.00					
Summary																		
Total Native Class Coverage		88.00		74.00		50.00		72.00		80.00		84.00	74.67					
Total Non-Native Class Coverage		12.00		66.00		100.00		96.00		42.00		52.00	61.33					
Total Unvegetated		0.00		0.00		0.00		0.00		0.00		0.00	0.00					
Ground Cover																		
Bare Soil	4	8.00		0.00	10	20.00		0.00	5	10.00	5	10.00	8.00					
Rock/Cobble		0.00		0.00		0.00		0.00	22	44.00		0.00	7.33					
Leaf Litter	46	92.00	40	80.00	38	76.00	43	86.00	9	18.00	23	46.00	66.33					
Fine Woody Debris		0.00	8	16.00	2	4.00	7	14.00	14	28.00	22	44.00	17.67					
Coarse Woody Debris		0.00	2	4.00		0.00		0.00		0.00		0.00	0.67					
Living Trunk		0.00		0.00		0.00		0.00		0.00		0.00	0.00					
^a Native shrub species (excluding succulent spp.)																		
^b "Density" computations performed on basis of linear units of transect data*																		

APPENDIX E
QUADRAT DATA AND COMPUTATIONS

APPENDIX E-1

QUADRAT DATA AND COMPUTATIONS
CALIFORNIA SYCAMORE/COAST LIVE OAK RIPARIAN FOREST (CS/CLORF)

California Sycamore-Coast Live Oak Forest Quadrat Data and Statistics																										
Plant Species ^a	Coverage						Mean	No. of Individual Plants						D _i	RD _i	C _i	RC _i	f _i	Rf _i	p _i	p _i log p _i	H'	Potential H'			
	Q-01	Q-02	Q-03	Q-04	Q-05	Q-06		Q-01	Q-02	Q-03	Q-04	Q-05	Q-06													
Native																										
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.82	3.37
<i>Artemisia douglasiana</i>	0.00	0.00	0.00	0.00	0.00	5.00	0.833					1		0.000208	0.000004	0.008333	0.004519	0.166667	0.020001	0.004519	-0.024400					
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>] ^a	45.00	0.00	0.00	0.00	0.00	0.00	7.500	14						0.002917	0.000052	0.075000	0.040671	0.166667	0.020001	0.040671	-0.130237					
<i>Ceanothus leucodermis</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Clarkia</i> sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Clematis lasiantha</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Elymus condensatus</i> [<i>Leymus</i> c.]	0.00	0.00	0.00	35.00	0.00	0.00	5.833			4				0.000833	0.000015	0.058333	0.031633	0.166667	0.020001	0.031633	-0.109246					
<i>Eriogonum fasciculatum</i> ^a	0.00	3.00	0.00	0.00	0.00	0.00	0.500		3					0.000625	0.000011	0.005000	0.002711	0.166667	0.020001	0.002711	-0.016025					
<i>Hesperoyucca whipplei</i> [<i>Yucca</i> w.]	1.50	0.00	0.00	0.00	0.00	0.00	0.250	2						0.000417	0.000007	0.002500	0.001356	0.166667	0.020001	0.001356	-0.008952					
<i>Lepidospartum squamatum</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Lonicera subspicata</i> var. <i>denudata</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Lupinus</i> sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Malosma laurina</i> ^a	0.00	25.00	0.00	0.00	0.00	0.00	4.167		1					0.000208	0.000004	0.041667	0.022595	0.166667	0.020001	0.022595	-0.085635					
<i>Marah macrocarpus</i>	0.00	0.00	5.00	0.00	0.00	0.00	0.833			1				0.000208	0.000004	0.008333	0.004519	0.166667	0.020001	0.004519	-0.024400					
<i>Melica imperfecta</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Opuntia x vaseyi</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Phacelia cicutaria</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Platanus racemosa</i>	65.00	0.00	60.00	2.00	1.00	0.00	21.333	1		2	1	1		0.001042	0.000019	0.213333	0.115685	0.666667	0.080003	0.115685	-0.249520					
<i>Polygala cornuta</i> ssp. <i>fishiae</i> ^a	0.00	0.00	0.00	4.00	0.00	0.00	0.667				1			0.000208	0.000004	0.006667	0.003615	0.166667	0.020001	0.003615	-0.020327					
<i>Pseudognaphalium californicum</i> [<i>Gnaphalium</i> c.]	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Quercus agrifolia</i>	8.00	65.00	85.00	30.00	85.00	90.00	60.500	1	1	2	3	2	2	0.002292	0.000041	0.605000	0.328076	1.000000	0.120005	0.328076	-0.365644					
<i>Rhamnus crocea</i> ^a	0.00	0.00	0.00	0.00	1.00	0.20	0.200					1	1	0.000417	0.000007	0.002000	0.001085	0.333333	0.040002	0.001085	-0.007404					
<i>Rhus aromatica</i> [<i>R. trilobata</i>] ^a	0.00	0.00	0.00	8.00	0.00	0.00	1.333				3			0.000625	0.000011	0.013333	0.007230	0.166667	0.020001	0.007230	-0.035642					
<i>Rhus ovata</i> ^a	0.00	0.00	0.20	0.00	0.00	0.00	0.033			1				0.000208	0.000004	0.000333	0.000181	0.166667	0.020001	0.000181	-0.001558					
<i>Ribes aureum</i> ^a	0.00	8.00	0.00	0.00	0.00	0.20	1.367		5				1	0.001250	0.000022	0.013667	0.007411	0.333333	0.040002	0.007411	-0.036350					
<i>Rubus ursinus</i> ^a	0.00	0.00	0.00	7.00	0.00	0.00	1.167				1			0.000208	0.000004	0.011667	0.006327	0.166667	0.020001	0.006327	-0.032031					
<i>Salix lasiolepis</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Salvia mellifera</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]	0.00	4.00	12.00	0.00	0.00	0.00	2.667		1	2				0.000625	0.000011	0.026667	0.014461	0.333333	0.040002	0.014461	-0.061260					
<i>Solanum douglasii</i>	0.00	0.01	0.00	0.00	0.00	0.00	0.002		1					0.000208	0.000004	0.000017	0.000009	0.166667	0.020001	0.000009	-0.000105					
<i>Symphoricarpos mollis</i> ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Toxicodendron diversilobum</i> ^a	5.00	0.00	0.00	12.00	3.00	25.00	7.500	1			3	2	4	0.002083	0.000037	0.075000	0.040671	0.666667	0.080003	0.040671	-0.130237					
<i>Umbellularia californica</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
Non-native																										
<i>Araujia sericifera</i>	0.00	0.00	0.00	0.00	0.01	0.00	0.002					1		0.000208	0.000004	0.000017	0.000009	0.166667	0.020001	0.000009	-0.000105					
<i>Avena barbata</i>	0.00	0.10	0.00	0.00	0.00	0.00	0.017		1					0.000208	0.000004	0.000167	0.000090	0.166667	0.020001	0.000090	-0.000842					
<i>Bromus diandrus</i>	60.00	70.00	13.00	45.00	100.00	95.00	63.833	5000	50000	1500	10000	10000	10000	55.52083	0.999145	0.638333	0.346152	1.000000	0.120005	0.346152	-0.367225					

APPENDIX E-1

QUADRAT DATA AND COMPUTATIONS
CALIFORNIA SYCAMORE/COAST LIVE OAK RIPARIAN FOREST (CS/CLORF)

California Sycamore-Coast Live Oak Forest Quadrat Data and Statistics																										
Plant Species ^a	Coverage						Mean	No. of Individual Plants						D _i	RD _i	C _i	RC _i	f _i	Rf _i	p _i	p _i log p _i	H'	Potential H'			
	Q-01	Q-02	Q-03	Q-04	Q-05	Q-06		Q-01	Q-02	Q-03	Q-04	Q-05	Q-06													
<i>Bromus madritensis</i> ssp. <i>rubens</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	2.00	0.00	0.00	0.00	0.50	0.00	0.417	10				2		0.002500	0.000045	0.004167	0.002259	0.333333	0.040002	0.002259	-0.013766					
<i>Centaurea melitensis</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Ceratonia siliqua</i>	0.00	0.00	0.00	0.00	1.00	0.00	0.167					1		0.000208	0.000004	0.001667	0.000904	0.166667	0.020001	0.000904	-0.006335					
<i>Conium maculatum</i>	6.00	0.00	0.00	0.00	0.00	0.20	1.033	20				2		0.004583	0.000082	0.010333	0.005604	0.333333	0.040002	0.005604	-0.029051					
<i>Dysphania pumilio</i> [<i>Chenopodium pumilio</i>]	0.00	0.01	0.00	0.00	0.00	0.00	0.002		2					0.000417	0.000007	0.000017	0.000009	0.000000	0.000000	0.000009	-0.000105					
<i>Erodium cicutarium</i>	0.00	0.01	0.00	0.00	0.00	0.00	0.002		2					0.000417	0.000007	0.000017	0.000009	0.166667	0.020001	0.000009	-0.000105					
<i>Festuca myuros</i> [<i>Vulpia m. var. myuros</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.000		2					0.000417	0.000007	0.000000	0.000000	0.166667	0.020001	0.000000	0.000000					
<i>Hirschfeldia incana</i>	0.00	3.00	0.00	0.00	0.00	0.00	0.500		10					0.002083	0.000037	0.005000	0.002711	0.166667	0.020001	0.002711	-0.016025					
<i>Nicotiana glauca</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium l.</i>]	0.00	0.00	1.00	0.00	0.00	0.00	0.167				50			0.010417	0.000187	0.001667	0.000904	0.000000	0.000000	0.000904	-0.006335					
<i>Silybum marianum</i>	8.00	0.00	0.01	0.00	1.50	0.00	1.585	40				15		0.011458	0.000206	0.015850	0.008595	0.333333	0.040002	0.008595	-0.040883					
<i>Sonchus oleraceus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]	0.00	0.00	0.00	0.00	0.00	0.00	0.000							0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
Absolute Coverage																										
Total Absolute Native Species Coverage	124.50	105.01	162.20	98.00	90.00	120.40	116.685																			
Total Absolute Non-Native Species Coverage	76.00	73.12	14.01	45.00	103.01	95.20	67.723																			
Total Absolute Coverage (All)	200.50	178.13	176.21	143.00	193.01	215.60	184.408																			
Ground Cover																										
Bare Soil	2.00	3.00	10.00				2.500																			
Rock/Cobble/Gravel	2.00	2.00				8.00	2.000																			
Leaf Litter	84.00	87.00	81.80	86.00	96.00	77.00	85.300																			
Fine Woody Debris	10.00	6.00	7.00	7.00	2.00	12.00	7.333																			
Coarse Woody Debris	2.00	2.00	1.00	2.00	2.00	3.00	2.000																			
Living Trunk				5.00			0.833																			
Other (Trash)			0.20				0.033																			

^a Native shrub species (excluding succulent spp.)

APPENDIX E-2

QUADRAT DATA AND COMPUTATIONS
COASTAL SAGE SCRUB (CSS)

Coastal Sage Scrub Quadrat Data and Statistics																				
Plant Species	Q-C1		Q-C2		Q-C3		Mean	No. of Individual Plants			D _i	RD _i	C _i	RC _i	f _i	Rf _i	p _i	p _i log p _i	H'	Potential H'
	Hits	Covg	Hits	Covg	Hits	Covg		Q-C1	Q-C2	Q-C3										
Native																				
<i>Acmispon glaber</i> var. <i>glaber</i> [<i>Lotus scoparius</i> var. <i>scoparius</i>]	1.000	1.00		0.00		0.00	0.333	1			0.000417	0.000006	0.003333	0.003105	0.333333	0.033333	0.003105	-0.017932	2.26	3.22
<i>Artemisia douglasiana</i>		0.00	12.000	12.00		0.00	4.000		1		0.000417	0.000006	0.040000	0.037264	0.333333	0.033333	0.037264	-0.122588		
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i> [<i>B. salicifolia</i>] ^a	5.000	5.00		0.00		0.00	1.667	3			0.001250	0.000019	0.016667	0.015527	0.333333	0.033333	0.015527	-0.064671		
<i>Ceanothus leucodermis</i> ^a	10.000	10.00		0.00		0.00	3.333	1			0.000417	0.000006	0.033333	0.031053	0.333333	0.033333	0.031053	-0.107818		
<i>Clarkia</i> sp.	0.200	0.20		0.00		0.00	0.067	5			0.002083	0.000032	0.000667	0.000621	0.333333	0.033333	0.000621	-0.004586		
<i>Clematis lasiantha</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Elymus condensatus</i> [<i>Leymus</i> c.]		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Eriogonum fasciculatum</i> ^a	15.000	15.00		0.00		0.00	5.000	7			0.002917	0.000045	0.050000	0.046580	0.333333	0.033333	0.046580	-0.142840		
<i>Hesperoyucca whipplei</i> [<i>Yucca</i> w.]		0.00		0.00	3.000	3.00	1.000	2			0.000833	0.000013	0.010000	0.009316	0.333333	0.033333	0.009316	-0.043561		
<i>Lepidospartum squamatum</i> ^a	1.000	1.00		0.00		0.00	0.333	1			0.000417	0.000006	0.003333	0.003105	0.333333	0.033333	0.003105	-0.017932		
<i>Lonicera subspicata</i> var. <i>denudata</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Lupinus</i> sp.		0.00		0.00	0.500	0.50	0.167		2		0.000833	0.000013	0.001667	0.001553	0.333333	0.033333	0.001553	-0.010042		
<i>Malosma laurina</i> ^a	15.000	15.00		0.00	15.000	15.00	10.000	1	3		0.001667	0.000026	0.100000	0.093159	0.666667	0.066667	0.093159	-0.221108		
<i>Marah macrocarpus</i>		0.00		0.00	3.500	3.50	1.167		1		0.000417	0.000006	0.011667	0.010869	0.333333	0.033333	0.010869	-0.049146		
<i>Melica imperfecta</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Opuntia x vaseyi</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Phacelia cicutaria</i>		0.00	3.000	3.00		0.00	1.000		10		0.004167	0.000064	0.010000	0.009316	0.333333	0.033333	0.009316	-0.043561		
<i>Platanus racemosa</i>		0.00		0.00	6.000	6.00	2.000		1		0.000417	0.000006	0.020000	0.018632	0.333333	0.033333	0.018632	-0.074208		
<i>Polygala cornuta</i> ssp. <i>fishiae</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Pseudognaphalium californicum</i> [<i>Gnaphalium</i> c.]		0.00		0.00	0.010	0.01	0.003		2		0.000833	0.000013	0.000033	0.000031	0.333333	0.033333	0.000031	-0.000322		
<i>Quercus agrifolia</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Rhamnus crocea</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Rhus aromatica</i> [<i>R. trilobata</i>] ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Rhus ovata</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Ribes aureum</i> ^a		0.00	50.000	50.00		0.00	16.667		15		0.006250	0.000096	0.166667	0.155265	0.333333	0.033333	0.155265	-0.289200		
<i>Rubus ursinus</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Salix lasiolepis</i>		0.00	2.000	2.00		0.00	0.667		2		0.000833	0.000013	0.006667	0.006211	0.333333	0.033333	0.006211	-0.031559		
<i>Salvia mellifera</i> ^a		0.00		0.00	5.000	5.00	1.667		2		0.000833	0.000013	0.016667	0.015527	0.333333	0.033333	0.015527	-0.064671		
<i>Sambucus nigra</i> ssp. <i>caerulea</i> [<i>S. mexicana</i>]		0.00	5.000	5.00		0.00	1.667		1		0.000417	0.000006	0.016667	0.015527	0.333333	0.033333	0.015527	-0.064671		
<i>Solanum douglasii</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Symphoricarpos mollis</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Toxicodendron diversilobum</i> ^a		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Umbellularia californica</i>	3.000	3.00		0.00		0.00	1.000	1			0.000417	0.000006	0.010000	0.009316	0.333333	0.033333	0.009316	-0.043561		
Non-native																				
<i>Araujia sericifera</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Avena barbata</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Bromus diandrus</i>	75.000	75.00	20.000	20.00	0.800	0.80	31.933	100000	5000	50000	64.58333	0.996234	0.319333	0.297488	1.000000	0.100000	0.297488	-0.360669		
<i>Bromus madritensis</i> ssp. <i>rubens</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000		

APPENDIX E-2

QUADRAT DATA AND COMPUTATIONS
COASTAL SAGE SCRUB (CSS)

Coastal Sage Scrub Quadrat Data and Statistics																					
Plant Species	Q-C1		Q-C2		Q-C3		Mean	No. of Individual Plants			D _i	RD _i	C _i	RC _i	f _i	Rf _i	p _i	p _i log p _i	H'	Potential H'	
	Hits	Covg	Hits	Covg	Hits	Covg		Q-C1	Q-C2	Q-C3											
<i>Centaurea melitensis</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Ceratonia siliqua</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Conium maculatum</i>		0.00	3.000	3.00	0.010	0.01	1.003		10	4	0.005833	0.000090	0.010033	0.009347	0.666667	0.066667	0.009347	-0.043676			
<i>Dysphania pumilio</i> [<i>Chenopodium pumilio</i>]		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Erodium cicutarium</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Festuca myuros</i> [<i>Vulpia m. var. myuros</i>]		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Hirschfeldia incana</i>	20.000	20.00	35.000	35.00		0.00	18.333	5	500		0.210417	0.003246	0.183333	0.170792	0.666667	0.066667	0.170792	-0.301842			
<i>Nicotiana glauca</i>		0.00		0.00	12.000	12.00	4.000			3	0.001250	0.000019	0.040000	0.037264	0.333333	0.033333	0.037264	-0.122588			
<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium l.</i>]		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Silybum marianum</i>		0.00		0.00		0.00	0.000				0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
<i>Sonchus oleraceus</i>	0.010	0.01		0.00		0.00	0.003	1			0.000417	0.000006	0.000033	0.000031	0.333333	0.033333	0.000031	-0.000322			
<i>Stipa miliacea</i> [<i>Piptatherum miliacea</i>]	1.000	1.00		0.00		0.00	0.333	1			0.000417	0.000006	0.003333	0.003105	0.333333	0.033333	0.003105	-0.017932			
Absolute Coverage																					
Total Absolute Native Species Coverage	50.200	50.20	72.000	72.00	33.010	33.01	51.737														
Total Absolute Non-Native Species Coverage	96.010	96.01	58.000	58.00	12.810	12.81	55.607														
Total Absolute Coverage (All)	146.210	146.21	130.000	130.00	45.820	45.82	107.343														
Ground Cover																					
Bare Soil	0.000	0.0	7.000	7.00	5.000	5.0	4.000														
Rock/Cobble/Gravel	6.000	6.0	1.000	1.00	10.000	10.0	5.667														
Leaf Litter	81.000	81.0	70.900	70.90	40.000	40.0	63.967														
Fine Woody Debris	10.000	10.0	13.000	13.00	15.000	15.0	12.667														
Coarse Woody Debris	3.000	3.0	8.000	8.00	30.000	30.0	13.667														
Living Trunk	0.000	0.0	0.100	0.100	0.001	0.0	0.033														
^a Native shrub species (excluding succulent spp.)																					

APPENDIX F
OAK TREE ASSESSMENT DATA

APPENDIX F

OAK TREE ASSESSMENT DATA

Tree Tag #	Tree Species		# Main Trunks	dbh (in)			Height ^a (ft)	Canopy Diameter ^a (ft)	Health Rating	Shoot Elongation (in)
	Common Name	Scientific Name		1st Trunk	2nd Trunk	Sum of Two Trunks				
101	coast live oak	<i>Quercus agrifolia</i>	1	13.2	0.0	13.2	30	30	5	4
102	coast live oak	<i>Quercus agrifolia</i>	1	2.0	0.0	2.0	20	12	4	3
103	coast live oak	<i>Quercus agrifolia</i>	1	20.0	0.0	20.0	30	30	4	2
104	coast live oak	<i>Quercus agrifolia</i>	1	8.1	0.0	8.1	20	15	5	2
105	coast live oak	<i>Quercus agrifolia</i>	1	9.6	0.0	9.6	20	20	5	2
106	coast live oak	<i>Quercus agrifolia</i>	2	22.9	24.2	47.1	40	40	2	4
107	coast live oak	<i>Quercus agrifolia</i>	2	22.3	0.0	22.3	45	30	5	–
108	coast live oak	<i>Quercus agrifolia</i>	3	16.2	23.6	39.8	35	30	2	2–3
109	coast live oak	<i>Quercus agrifolia</i>	1	11.5	0.0	11.5	15	20	5	2
110	coast live oak	<i>Quercus agrifolia</i>	3	17.0	18.0	35.0	15	40	5	2
111	coast live oak	<i>Quercus agrifolia</i>	1	16.0	0.0	16.0	25	35	5	5
112	coast live oak	<i>Quercus agrifolia</i>	1	23.9	0.0	23.9	35	40	5	3
113	coast live oak	<i>Quercus agrifolia</i>	1	11.6	0.0	11.6	20	15	5	2
114	coast live oak	<i>Quercus agrifolia</i>	1	29.3	0.0	29.3	40	40	5	2
115	coast live oak	<i>Quercus agrifolia</i>	3	15.0	16.4	31.4	25	25	5	3
116	coast live oak	<i>Quercus agrifolia</i>	5	31.2	8.8	40.0	60	50	5	3
117	coast live oak	<i>Quercus agrifolia</i>	2	30.3	27.1	57.4	60	40	4	2
118	coast live oak	<i>Quercus agrifolia</i>	1	18.0	0.0	18.0	35	20	5	3–4
119	coast live oak	<i>Quercus agrifolia</i>	2	9.7	13.4	23.1	20	20	5	3
120	coast live oak	<i>Quercus agrifolia</i>	1	13.0	0.0	13.0	20	15	5	5
121	coast live oak	<i>Quercus agrifolia</i>	5	13.4	17.4	30.8	30	45	5	3
122	coast live oak	<i>Quercus agrifolia</i>	1	25.0	0.0	25.0	40	20	5	3–4
123	coast live oak	<i>Quercus agrifolia</i>	1	17.2	0.0	17.2	15	20	5	2
124	coast live oak	<i>Quercus agrifolia</i>	1	18.2	0.0	18.2	30	20	5	2–3
125	coast live oak	<i>Quercus agrifolia</i>	1	17.2	0.0	17.2	25	25	3	5
126	coast live oak	<i>Quercus agrifolia</i>	1	5.4	0.0	5.4	15	10	5	4–5
127	coast live oak	<i>Quercus agrifolia</i>	2	9.7	8.0	17.7	25	20	5	2–3
128	coast live oak	<i>Quercus agrifolia</i>	1	5.6	0.0	5.6	15	15	5	5–6

APPENDIX F

OAK TREE ASSESSMENT DATA

Tree Tag #	Tree Species		# Main Trunks	dbh (in)			Height ^a (ft)	Canopy Diameter ^a (ft)	Health Rating	Shoot Elongation (in)
	Common Name	Scientific Name		1st Trunk	2nd Trunk	Sum of Two Trunks				
129	coast live oak	<i>Quercus agrifolia</i>	1	10.5	0.0	10.5	15	10	5	1–2
130	coast live oak	<i>Quercus agrifolia</i>	2	2.2	4.0	6.2	10	10	5	4–5
131	coast live oak	<i>Quercus agrifolia</i>	1	4.9	0.0	4.9	18	12	5	4–5
132	coast live oak	<i>Quercus agrifolia</i>	1	12.6	0.0	12.6	30	15	5	4–5
133	coast live oak	<i>Quercus agrifolia</i>	1	10.0	0.0	10.0	20	15	5	3–4
134	coast live oak	<i>Quercus agrifolia</i>	1	7.2	0.0	7.2	20	15	5	3–4
135	coast live oak	<i>Quercus agrifolia</i>	1	32.8	0.0	32.8	50	35	5	–
136	coast live oak	<i>Quercus agrifolia</i>	1	3.5	0.0	3.5	12	10	5	3–4
137	coast live oak	<i>Quercus agrifolia</i>	1	3.7	0.0	3.7	10	8	5	1
138	coast live oak	<i>Quercus agrifolia</i>	1	2.4	3.2	5.6	10	8	5	1
139	coast live oak	<i>Quercus agrifolia</i>	1	3.8	0.0	3.8	12	10	5	4
140	coast live oak	<i>Quercus agrifolia</i>	1	3.7	0.0	3.7	12	10	5	2
141	coast live oak	<i>Quercus agrifolia</i>	1	5.3	0.0	5.3	10	10	5	2
142	coast live oak	<i>Quercus agrifolia</i>	7	13.5	12.3	25.8	25	40	5	4–5
143	coast live oak	<i>Quercus agrifolia</i>	1	8.6	0.0	8.6	25	10	5	3
144	coast live oak	<i>Quercus agrifolia</i>	1	5.6	0.0	5.6	15	10	4	1
145	coast live oak	<i>Quercus agrifolia</i>	3	10.8	15.4	26.2	25	35	5	5
146	coast live oak	<i>Quercus agrifolia</i>	2	17.0	18.9	35.9	35	30	5	3
147	coast live oak	<i>Quercus agrifolia</i>	1	15.9	0.0	15.9	30	20	5	4–5
148	coast live oak	<i>Quercus agrifolia</i>	1	7.6	0.0	7.6	20	15	5	5–6
149	coast live oak	<i>Quercus agrifolia</i>	2	11.8	11.0	22.8	25	20	5	2
150	coast live oak	<i>Quercus agrifolia</i>	3	19.7	19.1	38.9	40	40	5	2–4
151	coast live oak	<i>Quercus agrifolia</i>	1	16.6	0.0	16.6	35	25	5	2
152	coast live oak	<i>Quercus agrifolia</i>	2	18.0	10.0	28.0	30	35	5	3–5
153	coast live oak	<i>Quercus agrifolia</i>	1	18.8	0.0	18.8	35	35	5	2–3
154	coast live oak	<i>Quercus agrifolia</i>	1	12.1	0.0	12.1	25	20	5	2–3
155	coast live oak	<i>Quercus agrifolia</i>	1	12.7	0.0	12.7	25	20	5	3–4
156	coast live oak	<i>Quercus agrifolia</i>	2	3.7	3.5	7.2	12	10	5	4–5

APPENDIX F

OAK TREE ASSESSMENT DATA

Tree Tag #	Tree Species		# Main Trunks	dbh (in)			Height ^a (ft)	Canopy Diameter ^a (ft)	Health Rating	Shoot Elongation (in)
	Common Name	Scientific Name		1st Trunk	2nd Trunk	Sum of Two Trunks				
157	coast live oak	<i>Quercus agrifolia</i>	1	20.7	0.0	20.7	45	30	5	2-3
158	coast live oak	<i>Quercus agrifolia</i>	1	24.2	0.0	24.2	40	40	5	4-5
159	coast live oak	<i>Quercus agrifolia</i>	1	9.7	0.0	9.7	20	20	5	4-6
160	coast live oak	<i>Quercus agrifolia</i>	2	20.7	9.4	30.1	30	30	5	2-3
161	coast live oak	<i>Quercus agrifolia</i>	1	33.4	0.0	33.4	40	40	1	-
162	coast live oak	<i>Quercus agrifolia</i>	4	19.4	18.0	37.4	25	40	2	2-3
163	coast live oak	<i>Quercus agrifolia</i>	1	19.4	0.0	19.4	25	20	4	3-4
164	coast live oak	<i>Quercus agrifolia</i>	1	4.5	0.0	4.5	18	10	5	4-5
165	coast live oak	<i>Quercus agrifolia</i>	1	20.4	0.0	20.4	40	30	5	4
166	coast live oak	<i>Quercus agrifolia</i>	1	16.1	0.0	16.1	25	20	5	-
167	coast live oak	<i>Quercus agrifolia</i>	1	39.8	0.0	39.8	60	40	5	-
168	coast live oak	<i>Quercus agrifolia</i>	1	15.6	0.0	15.6	30	30	5	-
169	coast live oak	<i>Quercus agrifolia</i>	4	20.4	19.4	39.8	25	40	3	-
170	coast live oak	<i>Quercus agrifolia</i>	1	18.2	0.0	18.2	30	20	5	-
171	coast live oak	<i>Quercus agrifolia</i>	2	14.0	22.0	36.0	45	30	3	-
172	coast live oak	<i>Quercus agrifolia</i>	2	6.2	1.9	8.1	15	10	1	-
173	coast live oak	<i>Quercus agrifolia</i>	1	4.3	0.0	4.3	15	8	5	1-3
174	coast live oak	<i>Quercus agrifolia</i>	1	3.5	0.0	3.5	15	10	5	4-5
175	coast live oak	<i>Quercus agrifolia</i>	1	4.1	0.0	4.1	15	8	5	6-7
176	coast live oak	<i>Quercus agrifolia</i>	1	5.1	0.0	5.1	15	10	5	3-4
177	coast live oak	<i>Quercus agrifolia</i>	1	14.0	0.0	14.0	30	20	5	1-3
178	coast live oak	<i>Quercus agrifolia</i>	2	29.9	23.9	53.8	50	40	5	-
179	coast live oak	<i>Quercus agrifolia</i>	1	27.7	0.0	27.7	45	35	5	2
180	coast live oak	<i>Quercus agrifolia</i>	1	25.2	0.0	25.2	40	30	3	-
181	coast live oak	<i>Quercus agrifolia</i>	1	20.7	0.0	20.7	40	30	5	-
182	coast live oak	<i>Quercus agrifolia</i>	1	4.3	0.0	4.3	15	15	5	-
183	coast live oak	<i>Quercus agrifolia</i>	4	21.7	17.2	38.9	50	40	5	-
184	coast live oak	<i>Quercus agrifolia</i>	1	3.5	0.0	3.5	10	8	4	-

APPENDIX F

OAK TREE ASSESSMENT DATA

Tree Tag #	Tree Species		# Main Trunks	dbh (in)			Height ^a (ft)	Canopy Diameter ^a (ft)	Health Rating	Shoot Elongation (in)
	Common Name	Scientific Name		1st Trunk	2nd Trunk	Sum of Two Trunks				
185	coast live oak	<i>Quercus agrifolia</i>	1	24.8	0.0	24.8	40	30	4	–
186	coast live oak	<i>Quercus agrifolia</i>	2	22.0	12.6	34.6	30	30	5	–
187	coast live oak	<i>Quercus agrifolia</i>	2	13.4	10.0	23.4	25	25	5	–
188	coast live oak	<i>Quercus agrifolia</i>	3	11.6	10.5	22.1	25	20	5	–
189	coast live oak	<i>Quercus agrifolia</i>	1	20.7	0.0	20.7	45	35	5	2–3
190	coast live oak	<i>Quercus agrifolia</i>	2	21.2	8.3	29.5	40	20	2	1
191	coast live oak	<i>Quercus agrifolia</i>	1	19.1	0.0	19.1	30	35	5	2–3
192	coast live oak	<i>Quercus agrifolia</i>	1	16.9	0.0	16.9	25	25	5	3–4
193	coast live oak	<i>Quercus agrifolia</i>	1	36.0	0.0	36.0	40	40	5	2
194	coast live oak	<i>Quercus agrifolia</i>	4	31.4	19.4	50.8	45	50	5	–
195	coast live oak	<i>Quercus agrifolia</i>	1	19.3	0.0	19.3	30	30	4	–
196	coast live oak	<i>Quercus agrifolia</i>	1	4.5	0.0	4.5	10	8	5	3
197	coast live oak	<i>Quercus agrifolia</i>	1	21.2	0.0	21.2	30	30	4	–
198	coast live oak	<i>Quercus agrifolia</i>	1	25.8	0.0	25.8	45	25	5	2–3
199	coast live oak	<i>Quercus agrifolia</i>	2	27.4	23.2	50.6	40	35	4	–
200	coast live oak	<i>Quercus agrifolia</i>	1	10.5	0.0	10.5	25	20	2	1
201	coast live oak	<i>Quercus agrifolia</i>	1	8.1	0.0	8.1	20	20	5	–
202	coast live oak	<i>Quercus agrifolia</i>	1	11.0	0.0	11.0	30	15	5	–
203	coast live oak	<i>Quercus agrifolia</i>	1	4.8	0.0	4.8	20	15	5	2
204	coast live oak	<i>Quercus agrifolia</i>	1	11.5	0.0	11.5	25	25	5	–
205	coast live oak	<i>Quercus agrifolia</i>	1	5.7	0.0	5.7	15	15	5	–
206	coast live oak	<i>Quercus agrifolia</i>	1	9.2	0.0	9.2	20	15	5	3
207	coast live oak	<i>Quercus agrifolia</i>	1	7.6	0.0	7.6	20	15	5	–
208	coast live oak	<i>Quercus agrifolia</i>	1	7.0	0.0	7.0	20	15	5	2
209	coast live oak	<i>Quercus agrifolia</i>	1	6.7	0.0	6.7	15	15	5	2–3
210	coast live oak	<i>Quercus agrifolia</i>	2	23.7	11.6	35.3	50	40	5	–
211	coast live oak	<i>Quercus agrifolia</i>	2	16.2	0.0	16.2	40	30	4	–
212	coast live oak	<i>Quercus agrifolia</i>	1	9.9	0.0	9.9	30	20	5	–

APPENDIX F

OAK TREE ASSESSMENT DATA

Tree Tag #	Tree Species		# Main Trunks	dbh (in)			Height ^a (ft)	Canopy Diameter ^a (ft)	Health Rating	Shoot Elongation (in)
	Common Name	Scientific Name		1st Trunk	2nd Trunk	Sum of Two Trunks				
213	coast live oak	<i>Quercus agrifolia</i>	1	11.8	0.0	11.8	20	30	5	–
214	coast live oak	<i>Quercus agrifolia</i>	1	16.6	0.0	16.6	35	35	5	–
215	coast live oak	<i>Quercus agrifolia</i>	3	26.0	7.2	33.2	50	40	5	–
216	coast live oak	<i>Quercus agrifolia</i>	1	8.0	0.0	8.0	20	15	5	4
217	coast live oak	<i>Quercus agrifolia</i>	1	7.3	0.0	7.3	20	10	5	–
218	coast live oak	<i>Quercus agrifolia</i>	1	4.8	0.0	4.8	12	10	5	–
219	coast live oak	<i>Quercus agrifolia</i>	2	20.0	20.0	40.0	25	20	5	4
220	coast live oak	<i>Quercus agrifolia</i>	1	30.0	0.0	30.0	20	30	5	–
221	coast live oak	<i>Quercus agrifolia</i>	1	45.0	0.0	45.0	20	35	2	–
222	coast live oak	<i>Quercus agrifolia</i>	1	3.5	0.0	3.5	10	12	5	2–3
223	coast live oak	<i>Quercus agrifolia</i>	1	13.5	0.0	13.5	25	20	5	2–4
224	coast live oak	<i>Quercus agrifolia</i>	1	19.0	0.0	19.0	40	30	5	4
225	coast live oak	<i>Quercus agrifolia</i>	1	6.1	0.0	6.1	15	15	5	2
226	coast live oak	<i>Quercus agrifolia</i>	1	15.9	0.0	15.9	20	25	5	3
227	coast live oak	<i>Quercus agrifolia</i>	1	15.1	0.0	15.1	40	30	5	–
228	coast live oak	<i>Quercus agrifolia</i>	1	40.0	0.0	40.0	35	40	5	–
229	coast live oak	<i>Quercus agrifolia</i>	2	20.7	22.0	42.7	35	30	2	–

in: inches; dbh: diameter at breast height; ft: feet

^a dbh is calculated at 4.5 feet

^b Height and canopy diameter values are based on visual estimates

APPENDIX G
REFERENCES

REFERENCES

- Beals, M., L. Gross, and S. Harrell. 2000. Diversity Indices: Shannon's H and A. Knoxville: University of Tennessee, Knoxville. <http://www.tiem.utk.edu/~gross/bioed/bealsmodules/shannonD1.html>.
- BonTerra Consulting. 2012. *Amended Final Oak Woodland Habitat Mitigation Program for the Santa Anita Dam Riser Modification and Reservoir Sediment Removal Project*. Pasadena, CA: BonTerra Consulting.
- DeJong, T.M. 1975. A Comparison of Three Diversity Indices Based on their Components of Richness and Evenness. *Oikos* 22:222–227. Copenhagen: Nordic Society Oikos.
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- Rissman, Adena R., Sarah E. Reed, Chuck Hughes, and Richard Reiner. 2006 (October 6). Monitoring Understory Composition of Blue Oak Woodlands on Conservation Easements. Sixth California Oak Symposium: Today's Challenges, Tomorrow's Opportunities, Rohnert Park, California.

APPENDIX F
DATA SHEETS AND DATA CALCULATIONS

APPENDIX F-1

POINT INTERCEPT TRANSECT DATA SHEET

APPENDIX F-2

20x40-FOOT QUADRAT DATA SHEET

20x40-Foot Quadrat Data Sheet

Project Name: _____ Date: _____ Surveyors: _____
 QUADRAT # ____ of ____

Vegetation		Ground Cover	
*Estimate number of native tree individuals (all spp./age classes)		Estimate percent coverage of leaf litter (leaves, ultra-fine twigs, etc.)	%
*Count number of native tree species (all age classes)		Estimate percent coverage of fine woody debris (<1" diameter)	%
*Estimate number of native shrub <u>individuals</u> (all spp./age classes)		Estimate percent coverage of snags and coarse woody debris (≥1" diameter)	%
*Count number of native shrub species (all age classes)		Estimate percent coverage of boulders/rock/cobble/gravel (no litter/debris)	%
*Count number of native herbaceous species		Estimate percent coverage of bare ground	%
*Estimate percent coverage of native tree species (all)	%	Estimate percent coverage: Other (e.g., PVC pipe) _____	%
Estimate percent coverage of native shrub species (all)	%	Estimate percent coverage: Other _____	%
Estimate percent coverage of native herbaceous species (all)	%	Estimate percent coverage: Other _____	%
Estimate percent coverage of non-native species (all)	%	Estimate percent coverage: Other _____	%
* Cross-check with 'List All Species...' information below.		Estimate percent coverage: Other _____	%
		Check total = 100	

List All Species (6-ltr Code, or Genus species), and Estimate Number of Individuals and Percent Coverage of Each Species in Quadrat

Species	#	% cvg	Species	#	% cvg	Species	#	% cvg	Species	#	% cvg
GENSPE; or Genus Species	#	XX %			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%
		%			%			%			%

Directions: All random quadrat locations shall be pre-determined using GIS to eliminate surveyor bias. Locations shall consist of a single Universal Transverse Mercator Grid (UTM) point identified in the field using a Global Positioning System (GPS) unit, from which the quadrat shall be extended from corner to opposite corner at magnetic south using a compass/measuring tape. Quadrats shall be reoriented at successive, 90-degree intervals, as needed to remain within the mitigation sub-area (or if the GIS-defined point location is near a mitigation site boundary). Quadrats may be delineated using flagging tape, wire flags, or other method, as appropriate for field conditions. The 2-person survey team shall perform an initial calibration quadrat and prepare separate data sheets, then compare results and discuss any substantially divergent counts or estimates, prior to performing the formal sampling tasks. Each surveyor shall independently complete a data sheet for each quadrat and the preliminary results shall be compared in preparing one final data sheet. Unknown plant species shall be recorded as 'Unknown #1, #2...', etc., and samples placed in plastic bags labeled with these names ('Unknown #3', etc.) for later identification. Each unknown plant species shall also be photographed with its identity label legible in the photo. 'Unknown' ID# shall be consistent for all quadrats in which the same species is encountered. Each quadrat area shall be photographed northward from its southern vertex. Data sheets shall be digitally scanned, and hard copies archived at the Biological Monitor's office, within 24-hours of the completion of data collection.

APPENDIX F-3

QUADRAT DATA CALCULATIONS

Quadrat Data Calculations

Metric	Equation	Variables
Density of Native Shrubs (all spp.)(D _s)	$D_s = n_s / A$	n _s = total native shrubs; A = total area sampled
Density of Species i (D _i)	$D_i = n_i / A$	n _i = total individuals for species 'i'; A = total area sampled
Relative Density for Species i (RD _i)	$RD_i = N_i / \sum n$	n _i = number of individuals of species 'i'; Σn = total number of individuals of all species in sampled plots
Coverage for Species i (C _i)	$C_i = a_i / A$	a _i = total area covered for species 'i'; A = total area sampled
Relative Coverage of Species i (RC _i)	$RC_i = C_i / \sum C$	C _i = coverage for species 'i'; ΣC = sum of coverage for all species
Frequency of Species i (f _i)	$f_i = j_i / k$	j _i = number of plots containing species 'i'; k = total number of plots
Relative Frequency of Species i (RF _i)	$RF_i = f / \sum f$	f _i = frequency of species i; Σf = sum of frequencies of all species
Shannon Diversity Index (H')	$H = -\sum_{i=1}^R p_i \log p_i$	R = total number of species encountered; p _i = species 'i' as a proportion of R.

APPENDIX G
OAK TREE ASSESSMENT FORM

