

Community Wildfire Protection Plan
Rancho Santa Fe - Southwestern San Dieguito
San Diego County, CA

Cover Page

Document Tracking (for use by CWPP Review Committee):

ORIGINAL CWPP

Date 1st submittal received: _____ CWPP Reviewed: _____

Revisions requested, letter to CWPP originators: _____

Revisions received: _____

Date CWPP approved by Committee: _____

Final signatures obtained: _____

CAL FIRE authorized: _____

Approval letter to CWPP originators: _____

PDF Posted to Website: _____

CWPP AMENDMENT(S)

Date 1st amendment received: _____ Amendment Reviewed: _____

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Revisions received: _____

Date Amendment approved by Committee: _____

Final signatures obtained: _____

CAL FIRE authorized: _____

Approval letter to CWPP originators: _____

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Community Wildfire Protection Plan
Rancho Santa Fe - Southwestern San Dieguito
San Diego County, CA

Introduction

This Community Wildfire Protection Plan (CWPP) was developed by the Rancho Santa Fe Fire Safe Council with guidance and support from the County of San Diego, California Department of Forestry and Fire Protection, and the Rancho Santa Fe Fire Protection District, along with wildfire protection planning consultants from Dudek. This CWPP supplements San Diego County Department of Planning and Land Use documents referenced in *Appendix A*.

The purpose of this collaboratively prepared CWPP is to present the project area's physical characteristics, the fire hazard work that has been completed to date, the rated fire hazard risk areas, and designated fuel reduction projects specified for this area. The ultimate goal of the fuel reduction work outlined in this CWPP is the reduction of fuels in the project area so that structures, primarily residences, are provided additional protection, reducing the potential for wildfire-originated ignitions.

Detailed information regarding the site, its wildfire hazards, and the priority fuel reduction projects are provided in the maps and reports in *Appendix B*.

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Community Wildfire Protection Plan
Rancho Santa Fe - Southwestern San Dieguito
San Diego County, CA

Rancho Santa Fe - Southwestern San Dieguito CWPP 2

Community Wildfire Protection Plan
Rancho Santa Fe - Southwestern San Dieguito
San Diego County, CA

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SECTION I: COLLABORATION ili

A: COMMUNITY / AGENCIES / FIRE SAFE COUNCILS

Representatives or organizations either involved in the development of the Rancho Santa Fe Southwestern San Dieguito CWPP or who provided information for the completion of this CWPP are included in the following table. Their organization, and roles and responsibilities are indicated below:

CWPP Development Team:

Organization	Roles 1 Responsibilities
San Diego County Fire Safe Council - 619.562.0096 Marty Leavitt, District Manager Web site, documents, forms	Provides review and guidance for CWPP preparation, involved with CWPP review team and approval process; Planning information and resources, Web site forms and information
County of San Diego, Land Use and Environment Group - 858.495.5092 Ralph Steinhoff , Fire Services Coordinator Web site, documents, maps	Source for mapping, information, guidance on risk assessment and prioritization and establishment of fuel treatment project areas and methods
Rancho Santa Fe Fire Protection District - 858.756.5971 Nick Pavane, Fire Chief Cliff Hunter, Fire Marshal Michael Scott, Urban Fire Forester	Primary fire suppression for structural fires and fire prevention for project area, strategy development, critical input on hazard assessments, fire behavior modeling efforts, and priority development, information source and project guidance
Rancho Santa Fe Fire Safe Council Pete Smith - 858.756.1174 William Haifley - 858.756.4415	Member input, review, meeting attendance and coordination.
Rancho Santa Fe Association - 858.756.1174 Pete Smith - Association Manager Ivan Holler - Planning Director Board of Directors	Organization responsible for 80-acre Arroyo Property within project area, management of association homeowner's, project funding, and information source.
Fairbanks Ranch Association - 858.756.4415 Board of Directors William Haifley, General Manager	Organization responsible for management of stretch of property's homeowners, project funding, and information source
Cal Fire (California Department of Forestry and Fire Protection) - 619.509.3100 Darryl Pina, Captain	Primary fire suppression for SRA lands within project area, provides input and expertise on minimum standards, SRA lands, and fuel reduction

Website	
Resource Conservation District of Greater San Diego County - 760.745.2061/619.562.0096 Marty Leavitt, District Manager CWPP Review Committee	Reviews CWPP for completeness and approval; Provide assistance with establishing priorities for fuel reduction and grant expenditure
Dudek - 760.942.5147 Michael Huff, Wildfire Protection Planner Scott Eckardt, Forester Andy Thompson, Restoration Biologist	Prepared wildfire hazard reduction plan, recommendations for fuel reduction and structural ignition reduction; Primary development of CWPP, community risk and value assessment, development of community protection priorities, and establishment of fuels treatment project areas and methods.

B. Community Overview

The community of Rancho Santa Fe, a designated community at risk from wildfire, is located in westcentral San Diego County, approximately four miles east of the Pacific Ocean. Within Rancho Santa Fe, the southwestern San Dieguito Area (Project Area) is a vegetated canyon designated a state responsibility area (SRA) within the Rancho Santa Fe Fire Protection District (RSFFPD) (*Figure 1 - Appendix B*).

The project area is within the Rancho Santa Fe Fire Safe Council boundary area (*Figure 2*) and includes 8,500 linear feet (1.6 miles) of 800 to 1,000 feet wide open space canyon (*Figure 3*). There are approximately 80 ridge-top residences directly exposed to the open space and an additional 2,200 homes within Rancho Santa Fe Association and Fairbanks Ranch Association, the two Rancho Santa Fe communities directly adjacent this stretch of the San Dieguito river canyon, many of which are classified as occurring within the Wildland Urban Interface (WUI). The project area includes a mix of privately owned properties including individual lots and a large 80-acre parcel owned by the Rancho Santa Fe Association. There are no commercial businesses in the project area. *Figures 4 and 5* provide site orientation photographs.

The project area's south and north facing slopes are steep (from 30% to 63%) while it flattens out at the bottom near the river channel (*Figure 6*). The project area's slopes historically supported coastal sage scrub with some areas, notably the north-facing slopes, supporting southern mixed chaparral and scrub oak chaparral. The drainage bottom historically includes riparian tree, shrub, and groundcover (*Figures 7 and 8*). The site currently includes an altered vegetation palette due to the October 2007 Witch Fire (*Figure 9*) that temporarily converted the coastal sage scrub and chaparral vegetation to non-native grassland and herbaceous plants and damaged but did not alter the species mix in the riparian areas.

Predominant weather patterns include warm, dry summers and precipitation primarily during the winters, although extended drought and climate change have decreased the annual precipitation. Typical wind is an on-shore pattern with fall Santa Ana winds that can gust to 50 miles per hour or more.

Fire history in the vicinity of the Southwestern San Dieguito area and the greater Rancho Santa Fe community area has included several large fires. Most recently, the 2007 Witch fire burned into the project area with loss of several homes resulting. The Paint fire, the Harmony fire, and two unnamed fires have burned to the north and south of the project area and several more fires to the east have threatened to burn the community but did not due to changing weather conditions (*Figure 10*).

C. Identification of Values at Risk

Using technology and local expertise, the Rancho Santa Fe Fire Safe Council has developed a series of maps and the following narrative depicting the site and situation of the Southwestern San Dieguito and surrounding Community (*Figures 1 through 14*). The maps were used as a planning tool and visual aid from which the CWPP collaborators assessed and made recommendations.

There are approximately 80 residences that are directly exposed to the project area's wildland urban interface (WUI) or to secondary interface drainages which extend into residential areas. However, because wildfires produce embers which may travel for great distances, there are many more properties (1,700 in Rancho Santa Fe Covenant and 660 in Fairbanks Ranch, alone) that may be affected by wildfire in the project area (*Figure 11*). The residences in the direct project area vicinity are primarily large, estate homes located on the ridge tops. The homes range in value from approximately one million to several million dollars or more. Additionally, infrastructure and other improvements occur throughout the area that may be affected by wildfire.

D. Local Preparedness and Firefighting Capability

The project lies within an area considered a Very High Fire Hazard Severity Zone by Cal Fire and RSFFPD. Cal Fire provides response to wildfires in the SRA, including the project area and the RSFFPD provides response to structure fires, wildfire, medical and associated emergencies in the project area.

Cal Fire has a vast arsenal of fire fighting personnel and apparatus throughout San Diego County that can be called upon for responding to the SRA project area, including:

Air tankers	Crew transports
Helicopters	Bulldozers
Airtactical aircraft	Communications centers
Various engine types	

RSFFPD currently employs the following fire fighting apparatus with associated fire fighting personnel: 4 structure protection Type I pumpers

3 Type III brush engines
1 water tender
4 command vehicles

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SECTION II: PRIORITIZED FUEL REDUCTION TREATMENTS

A. Priorities

The following specified fuel reduction work will be accomplished through thinning and removal of vegetation to create horizontal and vertical spacing, removal of dead and dying plants, exotic plants in native areas, and plant parts, removal of ground litter, tree canopy raising, and creation of separation between plants, as described in more detail in following sections. Refer to *Figures 12 and 13* for more detailed information and fire behavior modeling supporting these fuel reduction projects. *Figure 14* provides a prioritized project and WUI location map.

1. Implement establishment *and on-going maintenance of permanent, 100 feet wide fuel modification zones on all exposed sides of WUI adjacent structures - 22 acres total.*

The fuel modification zones will be delineated and treated followed by on-going annual or bi-annual maintenance, as necessary. The fuel modification zones are not limited to the exposed sides of structures, but emphasis will be placed on the interface and the first 30 feet of the non-interface sides.

2. *Implement establishment and on-going maintenance of permanent, fuel modification zones for "secondary drainages" that currently act as pathways for wildfire into communities - 40 acres total.*

Establishment of fuel breaks at "mouths" of and within secondary drainages along with thinning and exotic plant removal. This is essentially an extension of the fuel modification areas for the fire corridors that currently provide continuous fuels from the wildlands into the urbanized areas.

3. *Implement an initial habitat restoration and fuel reduction program within the San Dieguito River riparian vegetation to restore native plants and trees and remove flammable non-natives that have become dominant - 74 acres total.*

This component of the fuel reduction effort provides an important dual purpose of reducing a major crown fire threat extending the length of the project area while enhancing wildlife habitat and restoring the river bottom to its natural condition.

4. *Provide homeowner education on measures to reduce structural ignitability*
 - a. *Fuel modification zone function and importance*
 - b. *Weed abatement inspections conducted and enforced by RSFFPD.*
 - c. *Flammable landscape features in fuel modification zones*
 - d. *Construction enhancements through volunteer retrofits and RSFFPD and County building and fire code requirements.*

Retrofit upgrades such as flame and ember resistant vents, dual pane and tempered windows, Class A roof assemblies, and other products coming into the tested and approved market will be encouraged.

B. Existing Projects

Fuel reduction and weed abatement work within the project area has included Cal Fire lead crews to reduce dead, dying and diseased trees in the river bottom along with ad hoc private property owner vegetation management with no focused, coordinated effort.

The 2007 Witch Fire removed significant fuels in the project area, however, flashy fuels and exotics have quickly recovered and native coastal sage scrub and chaparral communities are beginning to recover. Fuels nearest the residences were not removed by the fires and are the focus of the fuel reduction work outlined in this CWPP.

RSFFPD has initiated fuel reduction projects within the vicinity of the project area including WUI areas of Fairbanks Ranch and throughout other portions of the District. Work included Cal Fire lead inmate crews conducting fuel reduction on high priority slopes and in drainages.

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SECTION III: ■ TREATMENT OF STRUCTURAL IGNITABILITY

In cooperation with the County of San Diego and the Rancho Santa Fe Fire Protection District, the Rancho Santa Fe Fire Safe Council supports and promotes Firewise activities. Rancho Santa Fe Fire Safe Council will support and educate its citizens in ways to reduce structure ignitability through meeting RSFFPD and County of San Diego Building and Fire Code requirements.

The partnership that exists between the collaborating organizations allows the community of Rancho Santa Fe and Fairbanks Ranch Associations to reduce hazardous vegetative fuels that could ignite residences and commercial facilities during Santa Ana wind fire conditions. The Natural Resource Conservation Service has already declared removal of dead, dying, and diseased trees an "exigency" task. Maintaining properties with the appropriate defensible space is a key factor to protecting lives and property in mountain or wildfire-prone communities (*Fire Defensible Space and You...*, 2005).

The projects specified in the fuel reduction treatments section will reduce the ignitability of homes and other structures in this project area. The fuel reduction treatments recommended to occur within 100 feet of residences will reduce the ignitability of homes by reducing the likelihood that radiant or convective heat causes structure ignition. The Witch fire provided a "real-life" fire model for this area with regards to how a fire in this portion of the San Dieguito River canyon will behave given certain conditions. Structures that were lost tended to be of older construction and/or included flammable landscaping within close proximity to the residence.

In addition to managing the vegetation and flammable landscape features within the fuel modification areas, a number of retrofits are available and recommended for residences adjacent the project area and any WUI location in the Rancho Santa Fe area. These retrofits are important for all residences within the WUI, but even more important for homes that are directly exposed to the open space, unmaintained vegetation project area:

1. Maintain all vents by ensuring metal screen is in tact and has no larger than ¼-inch openings. A more ignition resistant retrofit includes replacing old vents with fire and ember resistant vents such as Brandguard Vents. These vents, through a series of baffles, impede the penetration of embers, a major source of home ignitions.
2. Spark arrestors with 0.5-inch mesh should be installed on all chimneys in the communities affected by this fuel reduction project.
3. Wood fences should be replaced by non-combustible material fences, especially the first 5 feet where they attach to a residence.
4. Enclose decks that are built on slopes above wildland areas according to enhanced practices. Paneling products and wire mesh may be used to help inhibit embers or heat from igniting decks.
5. Replace windows on the exposed side(s) of residence with dual pane windows with one tempered pane.
6. Bird-stop all openings on tile roofs to avoid the build up of animal nests which may easily ignite from flying embers that are blown up into the roof opening.
7. Replace non-Class A roofs with Class A roofing covering.
8. Relocate any combustible outbuilding, shed, animal barns, or other structures at least 30 feet from the residence and provide fuel modification and structure retrofitting to reduce the ignition potential.
9. Relocate trellises, umbrellas, flammable patio furniture and/or pillows, children's play equipment, firewood, and other combustible landscape features at least 30 feet from residences and provide fuel modification, as appropriate.

10. Situate a non-combustible (masonry) wall in the landscape at the top of slope to help deflect flames, heat, and embers.
11. Provide rain gutter cleaning on a regular basis and upgrade the gutters with gutter covers which are designed to minimize debris accumulation.

Other products are under development and within the next several years, it can be anticipated that ignition resistance retrofits and products will be available for situations like this to reduce the vulnerability of existing structures to wildfire caused ignition.

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SECTION IV: SIGNATORS

The Community Wildfire Protection Plan developed for Rancho Santa Fe:

- Was collaboratively developed. Interested parties and federal land management agencies in the vicinity of **Rancho Santa Fe** have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect **Rancho Santa Fe**.
- This plan recommends measures to reduce ignitability of structures throughout the area addressed by the plan.
- This CWPP document is intended for use as a planning and assessment tool only, utilizing a compilation of community issues/goals and projected fire mitigation strategies. The CWPP is not to be construed as indicative of project "activity" as defined under the "Community Guide to the California Environmental Quality Act, Chapter Three, Projects Subject to CEQA." Per the Community Guide, Section 3.1.1, "CEQA only applies to public agency decisions to approve, or actions to carry out, a discretionary project." Any actual project activities meeting this definition of project activity and undertaken by the CWPP participants or agencies listed shall meet with local, state and federal environmental compliance requirements.
- Was reviewed on the following dates by the San Diego Community Wildfire Protection Plan Review Committee:
 - Date of 1st CWPP Review Committee review & recommendation for changes: 2008
 - Date of 2nd/final CWPP Review Committee review and recommendation for authorization by CAL FIRE: 2008
- Committee members include:

Don Butz, Viejas Fire Department	Daryll Pina, CAL FIRE
Kathleen Edwards, CAL FIRE	Thom Porter, CAL FIRE
Bob Eisele, County of San Diego	Herman Reddick, County of San Diego Office of Emergency Services
Stephen Fillmore, US Forest Service	James Roberts, US Fish & Wildlife Service
Joan Friedlander, US Forest Service	Ralph Steinhoff, San Diego County Fire Authority
Clay Howe, Bureau of Land Management	Eddie Villavicencio, City of San Diego Fire & Rescue
Larry Wade, US Fish & Wildlife Service	John Wiecjorek, County of San Diego Office of Emergency Services
Owen Martin, US Forest Service	Will Metz, US Forest Service
Ken Miller, San Diego County Fire Authority	Howard Windsor, CAL FIRE
Marty Leavitt, Resource Conservation District of Greater San Diego County / Fire Safe Council of San Diego County	

SECTION IV: SIGNATURES

The Community Wildfire Protection Plan developed for Rancho Santa Fe:

- Was collaboratively developed. Interested parties and federal land management agencies in the vicinity of Rancho Santa Fe have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect Rancho Santa Fe.
- This plan recommends measures to reduce ignitability of structures throughout the area addressed by the plan.
- This CWPP document is intended for use as a planning and assessment tool only, utilizing a compilation of community issues/goals and projected fire mitigation strategies. The CWPP is not to be construed as indicative of project "activity" as defined under the "Community Guide to the California Environmental Quality Act, Chapter Three, Projects Subject to CEQA." Per the Community Guide, Section 3.1.1, "CEQA only applies to public agency decisions to approve, or actions to carry out, a discretionary project." Any actual project activities meeting this definition of a project activity and undertaken by the CWPP participants or agencies listed shall meet with local, state and federal environmental compliance requirements.

The following entities attest that the standards listed above are proposed to be met and mutually accept the content of this Community Wildfire Protection Plan:

APPLICABLE GOVERNMENT/MUNICIPALITY

Date

Nicholas A. Pavone

10-25-2010

LOCAL FIRE

Date

Rancho Santa Fe Fire Protection District
Chief Nick Pavone

Howard Windsor

2-24-11

STATE AGENCY (authorizing entity-required for finalization)

Date

California Department of Forestry and Fire Protection (CAL FIRE)
San Diego Unit
Chief Howard Windsor

Appendix A: References

LIST OF REFERENCES:

1. County of San Diego Building Code (current edition).
2. County of San Diego Fire Code (current adopted code: www.sdcountry.ca.gov)
3. County of San Diego Code of Regulatory Ordinances, Title 6 Health and Sanitation, Division 8. Sewage and Refuse Disposal, Chapter 4. Removal of Combustible Vegetation and Other Flammable Materials (current code)
4. County of San Diego, OES *Hazard Mitigation Plan* (2004)
5. County of San Diego, *Fire, Defensible Space and You...* (2005) www.wildfirezone.org
6. Dudek. 2008. *San Dieguito Canyon Wildfire Hazard Reduction Project*. Letter report prepared for the Rancho Santa Fe and Fairbanks Ranch Associations.
7. <http://lfrap.cdf.ca.gov> for additional maps, data, and documents
8. <http://www.cafirealliance.org> California Fire Alliance website for additional documents.
9. <http://wildfire.cr.usgs.gov/fireplanning/> California Fire Alliance mapping tool for additional planning and documents.
10. http://www.iafc.org/grants/wildland_fire.asp#downloads
11. <http://www.livingwithfire.com> Sample of information from Nevada Living with Fire program.
12. www.fast.org
13. www.firesafesdcounty.org

Appendix B: Maps

Figure 1: Rancho Santa Fe Vicinity Map

Figure 2: Rancho Santa Fe Fire Safe Council Boundary Map

Figure 3: Southwestern San Dieguito Area (Project) Focus Map

Figures 4 and 5: Site photograph Maps

Figure 6: Project Topographic Map Figure

7: Project Vegetation Map - 1 of 2 Figure 8:

Project Vegetation Map - 2 of 2 Figure 9:

Witch Fire Progression Map

Figure 10: Fire History 1910 - 1993 (CDF FRAP)

Figure 11: Assets at Risk Map

Figure 12: San Dieguito Fire Hazard Reduction Report

Figure 13: BehavePlus Fire Behavior Output Map

Figure 14: Prioritized Project Location and WUI Map

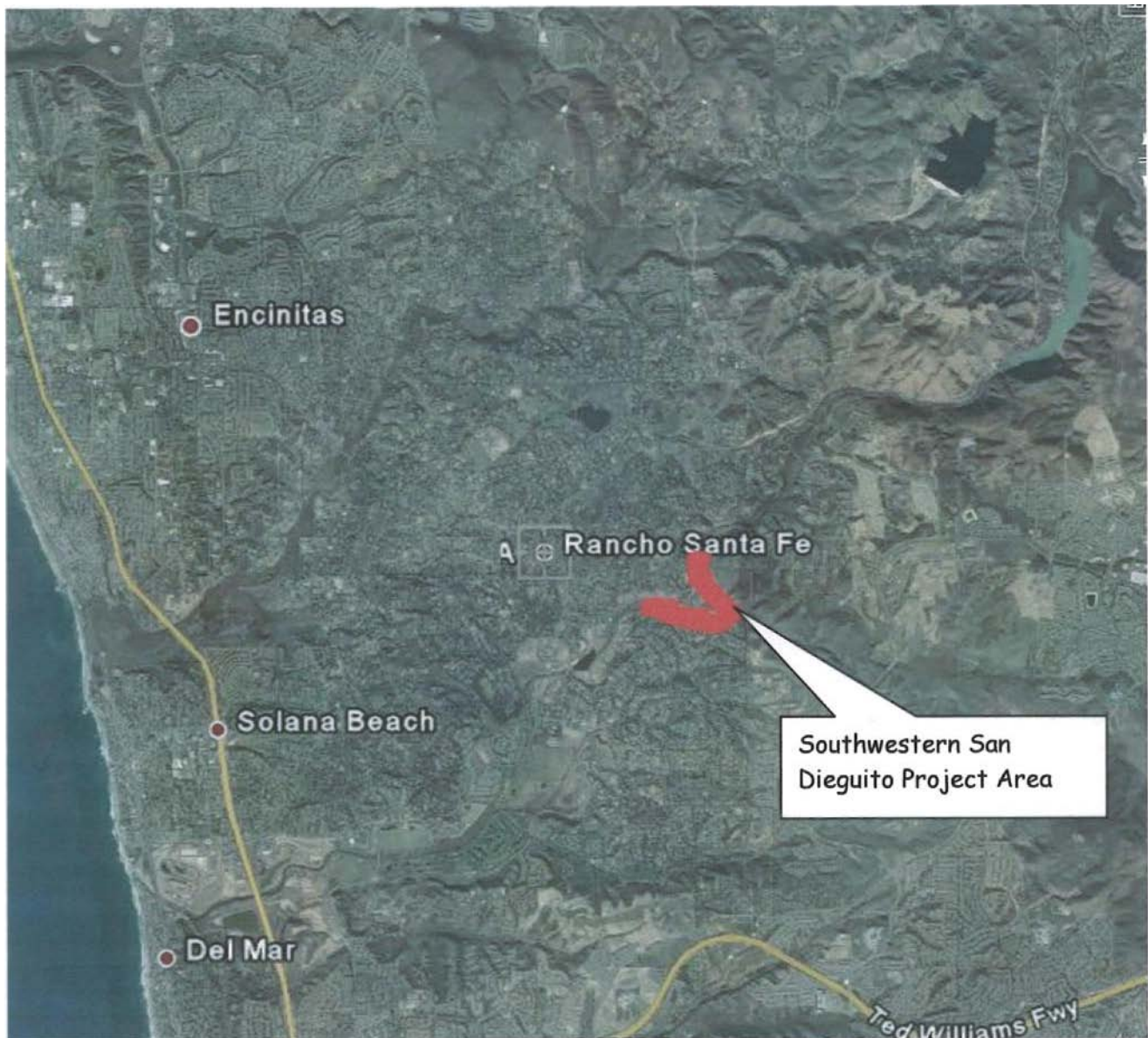
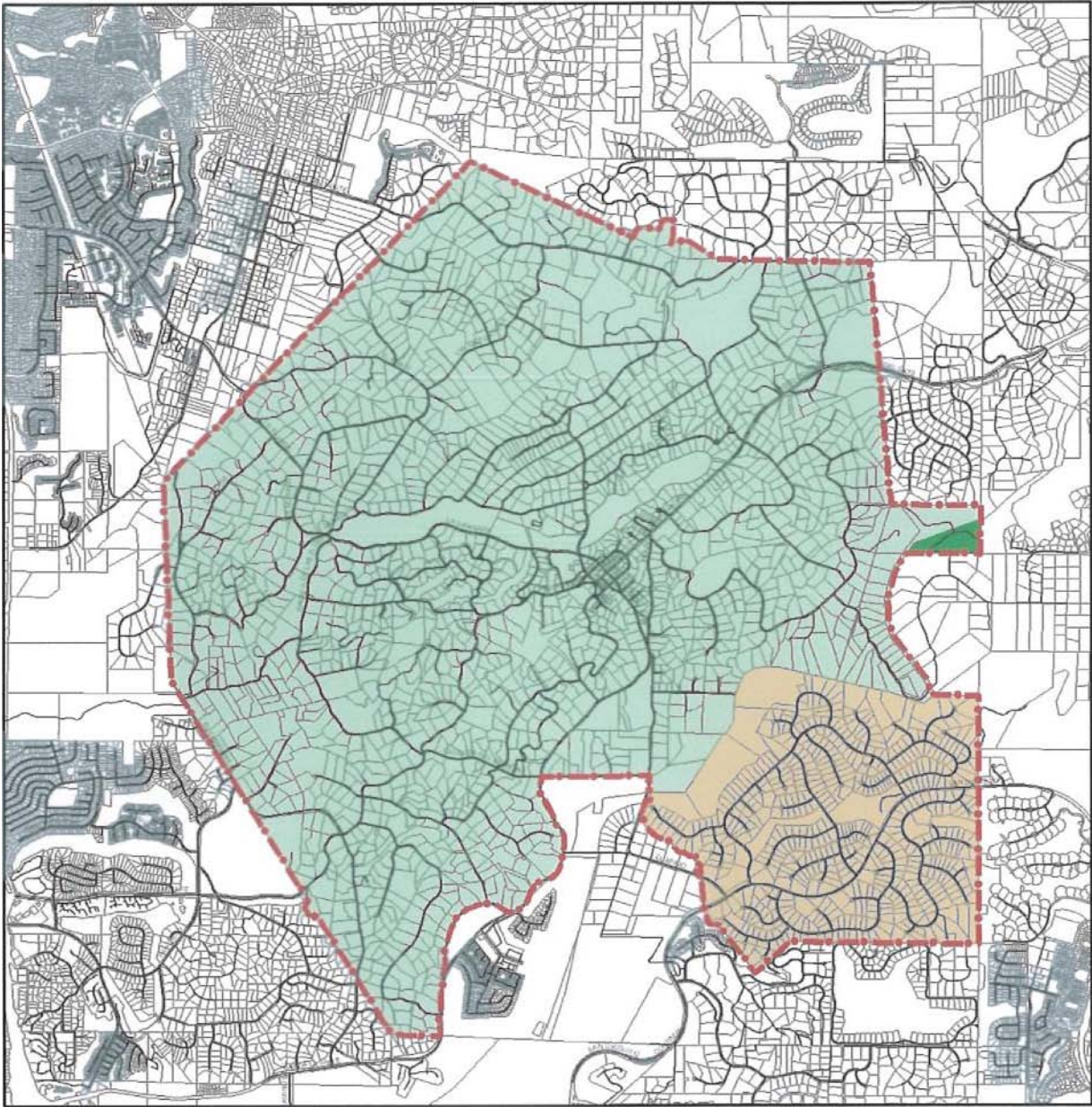


Figure Southwestern San Diego Project Vicinity.

Fire Safe Council Boundary



Miles 0
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11

Property Located Within the Fire Safe Council

Fire Safe Council Boundary

Noncovenant Arroyo Property

Fairbanks Ranch Covenant

Boundary



Map By Liz Avalon, Associate Planner, Rancho Santa Fe Association, January 19, 2009

Figure 2



Legend

- Area of Concern
- Roads
- Parcels

0 250 500 1,000 1,500 2,000
Feet

RSFA-Fairbanks Ranch Fire Hazard Area of Concern

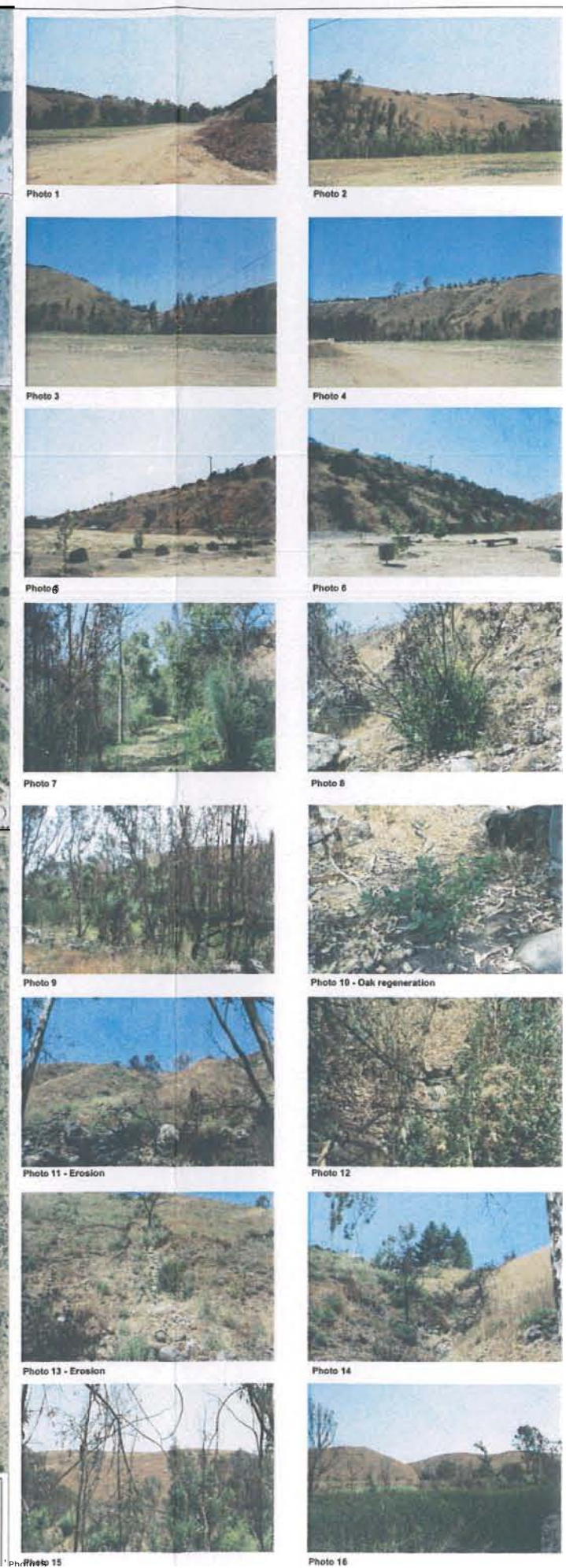


Photo Log North

RSFA-Fairbanks Ranch Fire Hazard Assessment
Photo Log North

Sewage
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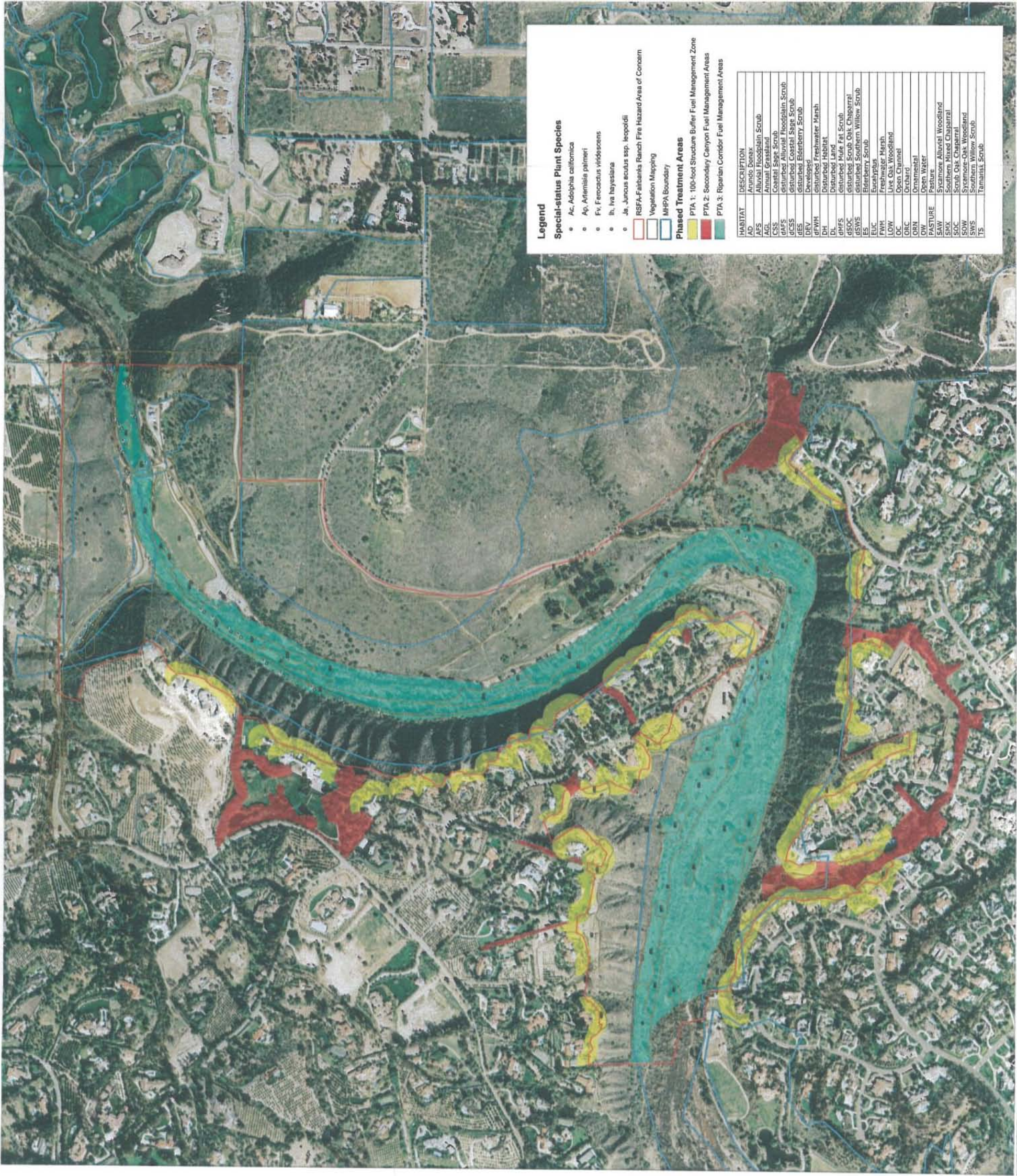
S-SOURCE .USGS Ra nano Santa Fe Quadrangle

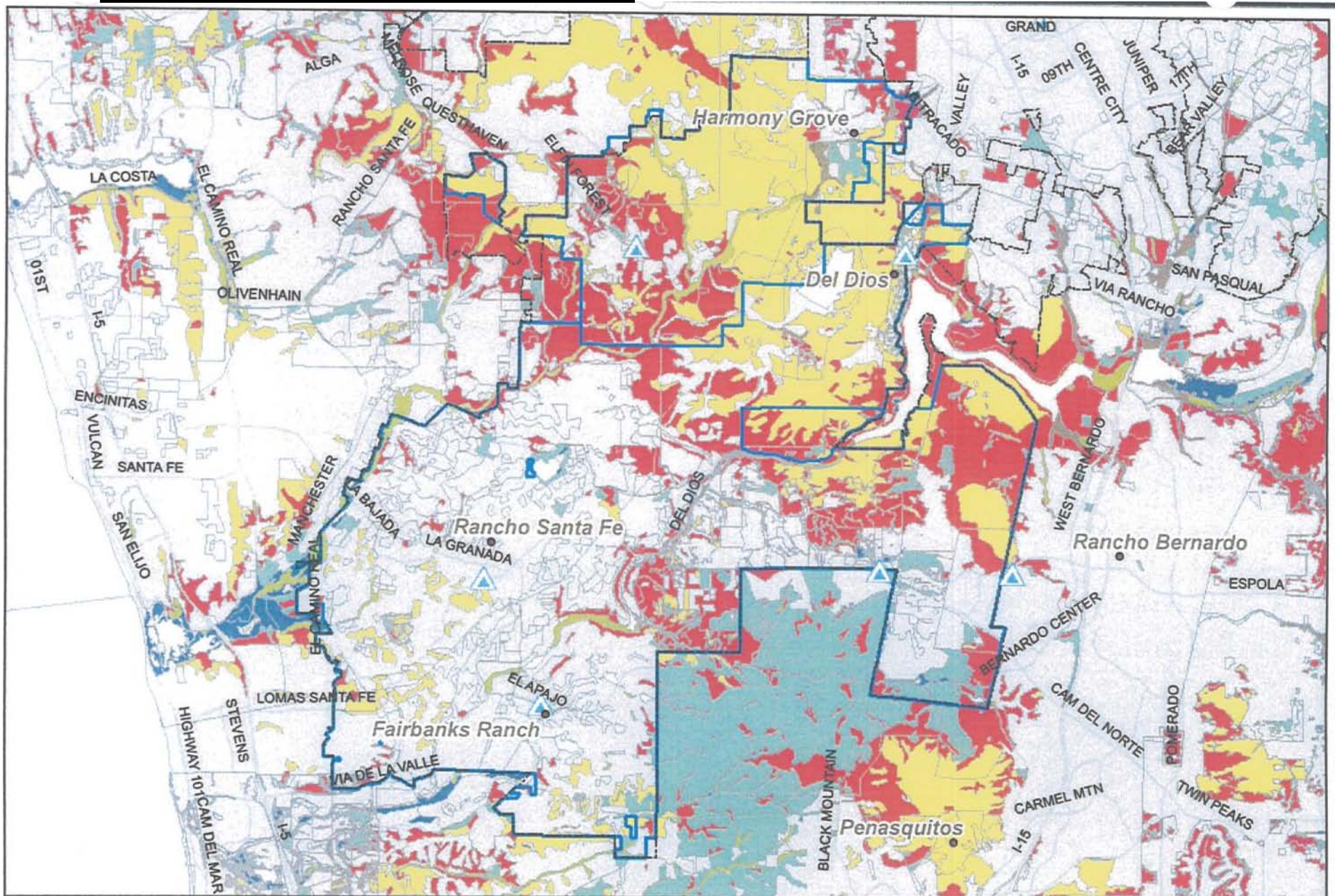
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San Dieguito Canyon Wildfire Hazard Reduction *Project I*
Site Topography

Figure 20





RANCHO SANTA FE & ELFIN FOREST

See attached legend
for vegetation classifications

Figure 8.

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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NORTH

CWPP

Vegetation Classifications

0.5 1 2 3
Miles

Vegetation Communities (Holland 95 Classification)

*Southern Foredunes, Beach,
Saltpan, Mud flats (13300,
13400, 21230)*

Coastal Sage Scrub

E I (31200, 32400, 32500, 32700, 32710, 32720)

Chaparral

(35000, 35200, 35210, 37000, 37120, 37121,
37122, 37130, 37131, 37132, 37200, 37210,
37220, 37300, 37500, 37520, 37530, **37540**,
37830, 37900, 37A00, 37C30, 37K00, 37G00)

Grassland

; (42000, 42100, 42110, **42120**, 42200, **42300**, 42400,
42470)

Riparian Scrub

(60000, 63000, 63300, 63310, 63320, 63410,
63810, 63820)

Riparian Woodland

(62000, 62300, 62400)

Riparian Forest

= (61000, 61300, 61310, 61320, 62330, 61510,
61810, 61820)

Pinyon Juniper Woodlands

(72300, 72310, 72320)

Other Woodlands

= (70000, 71000, 71100, 71160, 71161, 71162, 71180,
71181, 71182, 75100, 77000, 78000, 79000)

Oak Forest

(81300, 81310, 81320, 81340)

Meadow and Seep

M (45000, 45100, 45110, **45120**, 45300, 45320, 45400)

Marsh

(52120, 52300, 52310, 52400, 52410, 52420, 52440)

Coniferous Forest

(81100, 83140, 83230, 84000, 84100, 84140, 84150
84230, 84500, 85100)

Desert Dunes

(22100, 22300, 24000)

Playas/Badlands/Mudhill Forbs

(46000, 46100)

Desert Scrub

(33100, 33200, 33210, 33220, 33500,
33600, 34000, 34300, 36110, 39000)

Desert Chaparral

(37400, 37800)

Dry Wash Woodland

(29000, 33230, 33300, 36120, 62200)

Water

(Including 11200, 13200)

Urban, Disturbed Habitat, Agriculture,

Eucalyptus Woodland

Not Mapped (Data Gaps)

Use with Figure 8.

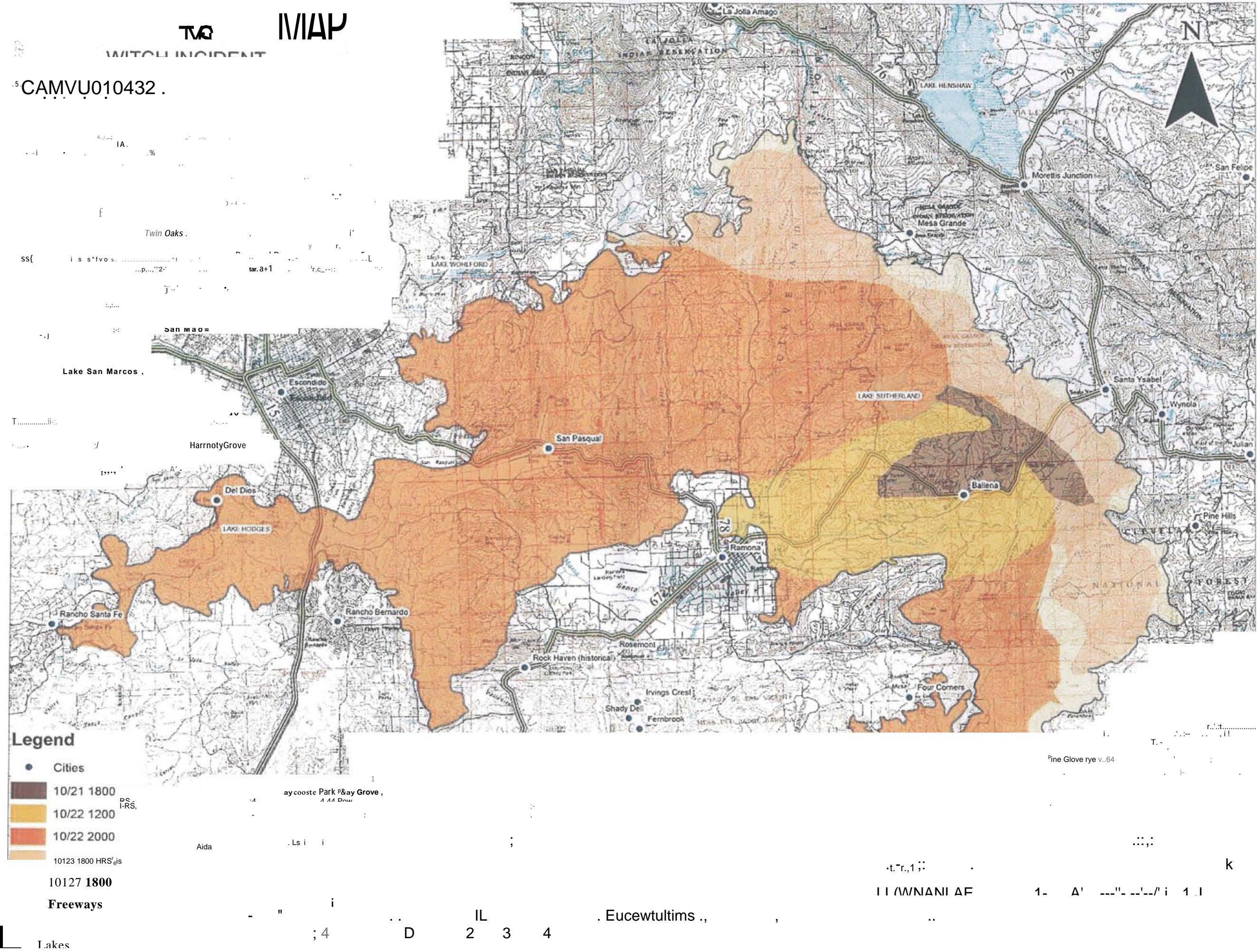
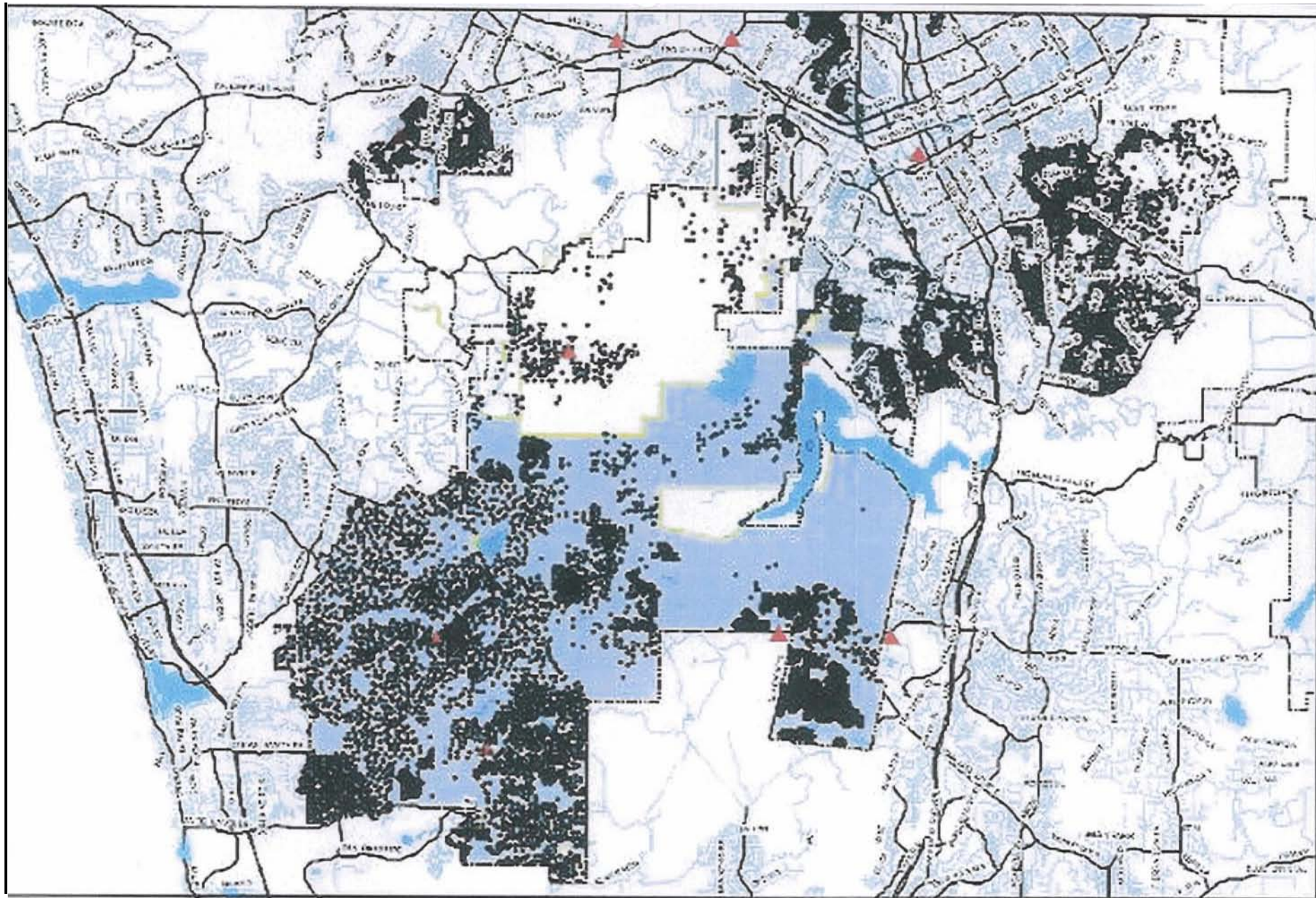


Figure 9



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October 2, 2008

6092

Ivan Holler

David Abrams

Planning Director

General Manager

Rancho Santa Fe Association

Fairbanks Ranch Association

17022 Avenida de Acacias

P.O. Box 8166

Rancho Santa Fe, California 92067

Rancho Santa Fe, California 92067

*Revised • Draft **Report** - San Dieguito **Canyon** Wildfire Hazard Reduction Project*
Dear Mr. Holler and Mr. Abrams:

The following letter report provides details regarding Dudek's wildfire hazard and fuel reduction evaluation for a portion of the San Dieguito River Canyon. The goal of this study and the resulting recommendations is to reduce fuels in the project area so that structures, primarily residences, are provided additional protection, reducing the potential for ignition. Because wildfires produce embers that may travel miles, resulting in "area ignitions" or spot fires, including to vulnerable structures, the principles and recommendations provided in this report are applicable to a much broader region than the focused project area, and should be considered for all properties in the greater Rancho Santa Fe area and beyond.

The project area's approximately 1.6-mile linear Canyon location extends from its northern terminus at an unnamed road intersecting the San Dieguito River drainage, just south of an existing pond (Attachment 1) to its southern terminus approximately 0.8 mile north of an existing pond, just north of Via de Santa Fe Road. This report includes recommendations that are designed to reduce the potential for wildfire damage to existing residences through primarily defined and maintained fuel modification and provides recommendations for structural retrofits and habitat restoration for certain areas where non-native species have established.

PROJECT BACKGROUND

The project area was burned as recently as October 2007 when the Witch fire, driven by Santa Ana winds spread from Ramona westward into Rancho Santa Fe over the course of less than one day (Attachment 2). As the fire approached the project area, it spread into the San Dieguito River drainage west of Lake Hodges, burning westward into the project area fueled by wind and dry coastal sage scrub and chaparral on the slopes and exotic trees in the river bottom. A total of 12 homes were lost, 1 home moderately damaged and 7 homes minimally damaged within the

immediate vicinity of the project area. The slopes in the project area were denuded of vegetation and the drainage bottom vegetation was damaged, especially the eucalyptus woodlands which are prevalent throughout the riparian corridor.

Based on the fire's spread and loss of structures realized during the Witch fire, it is apparent that short- and long- term fuel reduction and, in some areas combined with habitat restoration planning efforts within the project area, will positively impact the potential fire hazard. To that end, this letter report provides recommendations and corresponding substantiation to focus fuel treatments where they will provide the most benefit for structural protection. Secondly, the plan quantifies where habitat restoration efforts will result in reduced wildfire hazard as well as improved wildlife habitat.

As possible, this letter report incorporates fundamental components of the San Diego County FireSafe Council Community Wildfire Protection Plan (CWPP) template. One purpose of CWPPs is to streamline the process of applying for fuel reduction project grant funding. In order to apply for grant funding for the proposed fuel reduction project identified herein, this report will need to be reformatted and augmented to include required CWPP template topics.

COLLABORATION

The organizations listed in Table I have contributed to the completion of this fire hazard and fuel

reduction assessment:

Table 1
Contributing Organizations

Organization	Roles/Responsibilities
Rancho Santa Fe Association	Organization responsible for 80-acre Arroyo Property within project area, management of association homeowner's, project funding, and information source.
Fairbanks Ranch Association	Organization responsible for management of stretch of property's homeowners, project funding, and information source
Rancho Santa Fe Fire Department	Primary fire suppression and prevention for project area, strategy development, information source
San Diego County Department of Planning and Land Use (SANGIS)	Jurisdictional, planning information source, GIS Fire Information Maps

Project Area Overview

Dudek performed wildfire hazard reduction tasks including site assessments, fire behavior modeling, and recommendation formulation for a project area within the community of Rancho Santa Fe, San Diego County. The project area is located along the San Dieguito River within the respective jurisdictions of Rancho Santa Fe Association and Fairbanks Ranch Association, the funding proponents of this project. The project area is a vegetated canyon designated a state responsibility area (SRA) within the Rancho Santa Fe Fire Protection District (RSFFPD). The

project lies within an area considered a Very High Fire Hazard Severity Zone. CalFire provides response to wildfires in the SRA and the RSFFPD provides response to structure fires, wildfire, medical and associated emergencies in the project area.

The project area includes 8,500 linear feet (1.6 miles) of canyon with ridgetop residences directly exposed to the open space. The project area includes a mix of privately owned properties including individual lots and a large 80-acre parcel owned by the Rancho Santa Fe Association.

The canyon's south and north facing slopes are steep (from 30% to 63%) while it flattens out at the bottom near the channel (Attachment 3). The slopes historically supported coastal sage scrub with some areas, notably the north-facing slopes, supporting southern mixed chaparral and scrub oak chaparral. The drainage bottom historically includes riparian tree, shrub, and groundcover (Attachment 4). The site currently includes an altered vegetation palette due to the Witch fire that temporarily converted the coastal sage scrub and chaparral vegetation to non-native grassland and herbaceous plants and damaged but did not alter the species mix in the riparian areas. Predominant weather patterns include warm, dry summers and precipitation primarily during the winters, although extended drought and climate change have decreased the annual precipitation. Typical wind is an on-shore pattern with fall Santa Ana winds that can gust to 50 miles per hour or more.

Identification of Values at Risk

There are approximately 80 residences that are directly exposed to the project area's wildland urban interface (WUI) or to secondary interface drainages which extend into residential areas. However, because wildfires produce embers which may travel for great distances, there are likely thousands of properties (1,700 in Rancho Santa Fe Covenant and 660 in Fairbanks Ranch alone) that may be affected by wildfire in the project area. The residences in the direct project area vicinity are primarily large, estate homes located on the ridge tops. The homes range in value from approximately one million to several million dollars or more. Additionally, infrastructure and other improvements occur throughout the area that may be affected by wildfire.

PRIORITIZED FUEL REDUCTION TREATMENTS

The project area was inspected and evaluated for current and potential wildfire hazard conditions. The intent of these efforts was to evaluate the fire hazard situation in the Canyon and develop fuel hazard reduction recommendations for the area.

Dudek foresters conducted wildfire hazard assessment for the 299-acre project area. The assessments included the entire canyon area so that a variety of potential treatment options could be evaluated. While in the field, detailed notes were collected indicating potentially hazardous situations and actions required to mitigate these conditions. For example, a given location within

the canyon may include continuous vegetation from structure to wildland areas. This condition is addressed and a prescriptive treatment formulated to reduce the potential hazard by vegetation removal, thinning, canopy raising, or other means to introduce horizontal and vertical spacing between plants. In addition, multiple digital photographs were collected from the site to document conditions at the time of inspection. Selected photographs are presented in Attachments 5 and 6 - the Site Photograph Logs.

Initial Conceptual Ideas found to be Infeasible

As mentioned, a number of potential treatments were evaluated for the canyon's fuel reduction goals. The following two conceptualized treatments were preliminarily considered as potentially implementable on this site. After further analysis, they were deemed inappropriately infeasible within the project area. Explanations for why they were considered infeasible or inefficient for implementation within the project area are provided below.

1. Establishment of a Fire Break within the main canyon near the camping area - fire breaks can provide important areas for fire fighter defense, fire/fuel interruption, and segmenting fuel blocks. This concept proved infeasible for a few reasons. First, permanent impacts to coastal sage scrub on the canyon slopes and riparian and stream channel on the canyon bottom would be realized. These impacts would require costly permits and consultation with resource agencies. The RSFFPD also indicated that a fire break in that area would not provide the most benefit for the ridgetop homes, the assets that are the focus of fuel reduction in the project area. RSFFPD also indicated that a Fire Break would not make the residences more defensible, would not have an affect on a wind driven wildfire, and would not be used as a staging area due to the potential danger in the canyon. A good example of why fire breaks are not the best use of available resources includes their ineffectiveness during the San Diego County 2003 and 2007 wildfires. Very wide fire breaks represented by the multi-lane 1-5, 1-8, and 1-15 freeways were easily overcome by wind driven fire. Fire brands and embers too easily are blown across fire breaks to receptive vegetation on the other side. Another good example is the fire break system on Camp Pendleton. These fire breaks were also overwhelmed during the 2007 fires. Fire breaks may help during a non-wind driven fire, but in this project area, the fire of most concern is a Santa Ana driven fire.
2. Goat grazing on canyon slopes - goat grazing can be an effective means to manage vegetation in a fuel modification area. Cities such as Laguna Beach and communities like Scripps Ranch successfully utilize goats to maintain fuel modification areas. Goats have numerous benefits, including lower fuel reduction cost on a long-term basis than manual fuel treatment. However, there are many constraints that must be addressed in order to implement a goat grazing program. Regulatory constraints regarding water quality, invasive species, and habitat protection create difficult issues. Additionally, overgrazing,

erosion, up front environmental costs, herd management costs, food supplements, and indiscrimination between desirable plants and target plants, are among the other constraints. Goats may have merit on portions of this site, especially on the steep canyon slopes. Based on the focus of this plan near structures and in the river bottom, goats are deemed undesirable for this project, but may be useful should large areas within San Dieguito Canyon or other large expanses of fuels require reduction.

Understanding the fire environment of the area is an important component for recommendation development. Fire behavior modeling provides insightful information about the fire environment.

Fire Behavior Modeling

Prioritization of treatment areas was aided by fire behavior modeling. Dudek utilized Geographic Information Systems (GIS) data and technology in combination with BehavePlus software to evaluate flame length and spread rate characteristics. Three separate models were run, representing average and extreme weather patterns and based on current and historic vegetation conditions. Weather inputs include a typical on-shore flow and a Santa Ana wind condition with both sustained and gust wind speeds modeled. Model run locations were conducted at various locations along the canyon sides, including variations in slope, aspect, and fuel type. The model run locations are graphically depicted in Attachment 7.

O The models presented in this report attempt to represent conditions that may be experienced during a wildfire in the canyon and serve primarily as a valuable tool in prioritizing fuel treatment activities. It should be noted, however, that model outputs are representations of potential conditions, based on weather, fuel, and topographic inputs, and may or may not represent actual field conditions in the event of a wildfire event in the area. Additionally, BehavePlus software represents conditions at a fixed point in time and does not simulate temporal variations in fire behavior. Ultimately, modeling results should be used as a tool for managing fuel loads and prioritizing fuel treatment activities within the canyon while keeping in mind the limitations and assumptions made in generating the results.

Fire behavior modeling includes a high level of analysis and information detail to arrive at reasonably accurate representations of how wildfire would move through available fuels on a given site. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths and spread rates, the BehavePlus (v. 3.0.2) fire behavior fuel modeling system was applied using expected low fuel moisture values during peak fire season, variable wind speeds, and 3 representative fuel models. Run locations and associated fire behavior outputs are presented in Attachment 7.

Predicting wildland fire behavior is not an exact science. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits

of weather forecasting and the weather that is created by the firestorm. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire prevention planning information.

To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

- First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is the dead fuels less than 0.25 inches in diameter. These are the fine fuels that cant' fire. Fuels greater than 1 inch have little effect while fuels greater than 3 inches have no effect on fire behavior.
- Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within 6 feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
- Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
- Fourth, fire behavior computer modeling systems were not intended for determining sufficient fuel modification zone widths. However, it does provide the average length of the flames, which is a key element for determining "defensible space" distances for minimizing structure ignition.

BehavePlus Fuel Model Inputs

The following provides a description of the input variables used in processing the BehavePlus models. In addition, data sources are cited and any assumptions made during the modeling process are described.

Weather

Historical fuel moisture data for the region was utilized in determining appropriate fire behavior modeling inputs for the site. Specifically, 50th and 97th percentile moisture values derived from the Las Flores Remote Automated Weather Station (RAWS) were determined and utilized in the fire behavior modeling efforts conducted in support of this Fire Protection Plan. RAWS fuel moisture data were processed utilizing the Fire Family Plus software package to determine typical (50th percentile) and atypical (97th percentile) weather conditions. The Las Flores station, while not located near the project site, was used as no stations are situated in similar geographical settings. The Las Flores RAWS is located on Camp Pendleton in San Diego County, approximately 1.5 miles from the Pacific Ocean at an elevation of 100 feet. Data from the Las Flores RAWS was evaluated from May 1 through October 31 for each year between

1992 and 2007 (extent of available data record). Fuel moisture information was analyzed and incorporated into the model runs.

Topography

Site topography information, including elevation, aspect, and slope gradient, was derived from analyzing the U.S. Geological Survey Rancho Santa Fe quadrangle sheet (1:24,000).

Fuels

Vegetation coverage data in the form of a GIS shapefile were used in this analysis to create a fuel model file. Derived from historic (pre-Witch fire) vegetation mapping data for the site (San Diego County Department of Planning and Land Use 2008. Dudek 2007) and field observations of current conditions, vegetation types were classified into fuel models. To evaluate existing conditions, a grass fuel model (Fuel Model 1) was utilized for each of the model runs. To evaluate the wildfire potential based on historic vegetative cover, Dudek classified coastal sage scrub cover as Fuel Model SCAL 18 and chaparral (southern mixed and scrub oak) cover as Fuel Model SI-I7. Table 2 summarizes the input variables used in the BehavePlus modeling efforts.

Table 2
BehavePlus Fire Behavior Inputs

Model Variable	Onshore Value (50th Percentile Wx)	Offshore Value (97th Percentile Wx)
Fuel model	1, SCAL18, SH7	1, SCAL18, SH7
Maximum Temp. (°F)	76°	85°
1 h fuel moisture	6%	3%
10 h fuel moisture	8%	5%
100 h fuel moisture	10%	7%
Live herbaceous moisture	60%	30%
Live woody moisture	80%	60%
20 ft wind speed (mph)	10 mph	20 mph{
Slope steepness	variable by location, range: 0 to 63%	variable by location, range: 0 to 63%

" 97th Percentile weather also modeled with 60mph wind speeds to represent wind gusts

Fuel Model Output Results

Two outputs were generated for each of the three modeling scenarios and include representations of flame length (feet) and rate of spread (mph). Modeling output values are presented in Tables 3 through 5. Fire behavior modeling results vary depending on fuel type, slope, and differing weather conditions.

Table 3
BehavePlus Fire Behavior Outputs - 50th Percentile Weather

Run	Fuel Type	Slope (%)	Aspect	Elevation Range	Flame Length	Rate of Spread (mph)
1	SH7	30	N-NW	80 - 280	19.8	1.2
2	SCAL18	63	SE	80 - 280	23.4	1.1
3	SCAL18	63	E	60 - 300	23.4	1.1
4	SCAL18	59	NE	60 - 180	23.1	1.0
5	SCAL18	48	SW	80 - 260	22.4	1.0
6	SCAL18	38	S	60 - 220	21.9	0.9
7	SH7	50	N	60 - 240	20.7	1.3
8	SCAL18	43	NW	60 - 280	22.1	1.0

Fire behavior using the grass fuel type (Fuel Model 1) resulted in the following values for 50th percentile weather: Flame Length of 7.5 feet, Rate of Spread of 3.4 mph (results were consistent for all runs)

Table 4
BehavePlus Fire Behavior Outputs - 97th Percentile Weather
(20 mph Wind)

Run	Fuel Type	Slope (%)	Aspect	Elevation Range	Flame Length	Rate of Spread (mph)
1	SH7	30	N-NW	80 - 280	35.9	3.7
2	SCAL18	63	SE	80 - 280	39.0	2.7
3	SCAL18	63	E	60 - 300	39.0	2.7
4	SCAL18	59	NE	60 - 180	38.7	2.7
5	SCAL18	48	SW	80 - 260	38.1	2.6
6	SCAL18	38	S	60 - 220	37.6	2.5
7	SH7	50	N	60 - 240	36.6	3.9
8	SCAL18	43	NW	60 - 280	37.8	2.6

Fire behavior using the grass fuel type (Fuel Model 1) resulted in the following values for 97th percentile weather with 20mph winds: Flame Length of 10.0 feet, Rate of Spread of 5.8 mph (results were consistent for all runs)

Table 5
BehavePlus Fire Behavior Outputs - 97th Percentile Weather
(60 mph Wind)

Run	Fuel Type	Slope (%)	Aspect	Elevation Range (ft.)	Flame Length (ft)	Rate of Spread (mph)
1	SH7	30	N-NW	80 - 280	64.4	13.2
2	SCAL18	63	SE	80 - 280	59.7	6.9
3	SCAL18	63	E	60 - 300	59.7	6.9
4	SCAL18	59	NE	60 - 180	59.6	6.9
5	SCAL18	48	SW	80 - 260	59.2	6.8
6	SCAL18	38	S	60 - 220	58.9	6.7
7	SH7	50	N	60 - 240	64.8	13.4
8	SCAL18	43	NW	60 - 280	59.0	6.8

Fire behavior using the grass fuel type (Fuel Model 1) resulted in the following values for 97th percentile weather with 60mph winds: Flame Length of 10.0 feet, Rate of Spread of 5.8 mph (results were consistent for all runs)

As presented, wildfire behavior in chaparral vegetation types represents the most extreme conditions, varying with different wind speeds. In this case, flame lengths can be expected to reach up to approximately 65 feet driven by 60 mph winds. Flame lengths for fires burning in coastal sage scrub, represented as a Fuel Model SCAL18, with wind speeds of 60 mph can be expected to reach approximately 60 feet.

It should be noted that the modeling results presented herein depict values based on inputs to the BehavePlus software and are static outputs dependent on static landscape variables. Changes in wind, weather, or pockets of different fuel types are not accounted for in this analysis. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Modeling for Crown Fire - Riparian Corridor Eucalyptus Stands

While not found adjacent to existing structures on this site, eucalyptus woodland located in the bottom of the canyon presents the potential for crown fire and spotting and increases the likelihood of a canyon fire that transitions into the riparian corridor, into the eucalyptus tree crowns and results in a wildfire that significantly damages the native habitat along the San Dieguito River. As such, Dudek evaluated the likelihood of crown fire.

Understory shrubs can serve as ladder fuels, aiding the transition of surface fires to canopy fires. Fire behavior model outputs conducted by Dudek for a project in San Diego County revealed the

importance of maintaining vertical separation between tree canopies and understory vegetation, usually a 6 to 10 foot separation is sufficient. In this scenario, model outputs for un-treated understory vegetation conditions indicated a high potential for tree torching with no wind, and the transition from surface fire to crown fire with relatively light winds (12 mph). Once an active crown fire (at 12 mph and higher), rate of spread increases with increasing wind speed. An important component to crown fire spread is the effect of canopy bulk density. Increased canopy bulk density requires less severe fire conditions to sustain a canopy fire. This relationship between canopy density and fire intensity is important in considering fuel treatment options that reduce ladder fuels, thus reducing the chance of surface to canopy fire transition.

The same project revealed that treated understory vegetation had a significant effect on fire behavior characteristics. In this model analysis, where it was assumed that the understory had been maintained to create vertical separation (6 to 10 feet) between tree canopy and the shrub layer, surface fire never transitioned to crown fire and flame length values remain below the tree canopies. The vertical separation of tree canopies from ground fuels requires that the critical surface fireline intensity be higher to transition from a surface fire to a crown fire. Therefore, the lack of transition from a surface fire to a crown fire emphasized the importance of vertical canopy separation and understory vegetation treatment.

Fuel Treatment Recommendations

The canyon's steep slopes have, post-fire, been colonized primarily by non-native grasses and herbaceous cover. However, many of the native shrubs are already sprouting from their root crowns and over time, and consistent with plant community succession, it is anticipated that the native coastal sage scrub and chaparral will reoccur on the site. The native vegetation, although representing a higher intensity fuel, provides an important soil stability function on the canyon's steep slopes. As confirmed many times and most recently in the post-Witch fire summary "Mega Fires: The Case for Mitigation" (Institute for Business and Home Safety 2008), the most critical area for structural protection is near the structure. As such, one component of this plan provides for creation of defensible space for the residences where ongoing fuel maintenance can occur vs. on the vast slopes where it may be infeasible to provide ongoing vegetation management due to erosion issues, environmental permitting, cost, and logistics, amongst others. This diligent fuel modification area maintenance must include all sides of WUI homes and will be the responsibility of individual homeowners.

A second component of the fuel reduction project focuses on the "secondary drainages" that provide favorable fuels, topography, and wind alignment for fire spread from the open space (wildland) areas into the urbanized areas. These drainages are nearby residences and include flammable native fuels as well as a large component of escaped and/or planted non-native, ornamental species. Management of these secondary drainages will include exotic and highly flammable plant removal, thinning of retained plants/trees, and fuel modification zone

establishment/maintenance for residences that interface these areas. Fuel reduction and maintenance in these areas may be the responsibility of individual homeowners, groups of homeowner's or a homeowner association, depending on the respective ownership.

The third fuel reduction component of this plan focuses on the fire damaged San Dieguito Riparian corridor as many of the burned eucalyptus and other non-native trees are recovering through sprouting and will continue to dominate. Many of the smaller exotics, such as salt cedar and palms, were only minimally affected by the fire and will continue to out-compete the native plants. In order to reduce the fuel and flammability of the riparian corridor and restore the corridor to a native condition, it is recommended that exotic species removal occur along the San Dieguito River. If exotic species removal in the canyon bottom is pursued, it should be a comprehensive treatment because the exotic species are prone to invasion, especially of disturbed areas. Replanting native species in the place of the removed exotic vegetation is recommended to help minimize the opportunities for re-invasion. Ideally, exotic species removal in the canyon bottom would be coupled with a broader management plan that includes exotic species control upstream of the project area. Adequate time for planning and permitting should be considered early so that once other fuel reduction components are completed, the river bottom work will be ready to commence.

Based on the site assessments, the 3 phases of fuel reduction treatments recommended within the project area are defined below:

1. Fuel modification zone establishment and/or maintenance for residences abutting the interface. The fuel modification zones will be delineated and treated followed by ongoing annual or bi-annual maintenance, as necessary. The fuel modification zones are not limited to the exposed sides of structures, but emphasis will be placed on the interface and the first 30 feet of the non-interface sides.
2. Establishment of fuel breaks at "mouths" of and within secondary drainages along with thinning and exotic plant removal. This is essentially an extension of the fuel modification areas for the fire corridors that currently provide continuous fuels from the wildlands into the urbanized areas.
3. Riparian corridor restoration through removal of exotic trees and shrubs. This component of the fuel reduction effort provides an important dual purpose of reducing a major crown fire threat extending the length of the project area while enhancing wildlife habitat and restoring the river bottom to its natural condition.

The fuel reduction work outlined herein should be accomplished through thinning and removal of vegetation to create horizontal and vertical spacing, removal of dead and dying plants and plant parts, removal of ground litter, tree canopy raising, and creation of separation between plants, as described in more detail in following sections.

A total of approximately 40 acres is recommended for treatment directly adjacent residences, Phased Treatment Area (PTA) I. An additional 22 acres in the secondary canyons or "wildfire corridors", PTA 2, is recommended for treatment. Attachment 8 provides details for recommended fuel reduction efforts. In addition to these 61 acres recommended for treatment, another roughly 74 acres of riparian habitat, PTA 3, is recommended for restoration/treatment.

Dudek has estimated that the prescriptive treatments for PTAs 1 and 2, outlined in this document, would cost roughly \$278,000 to treat initially and then \$130,000 for on-going treatments thereafter if a contractor were to provide the services. The riparian corridor initial treatment is a different type of treatment, mostly tree removal, and is estimated to be roughly \$500,000 to \$750,000, due to the dense eucalyptus woodland. Costs could be minimized if an alternative labor source, such as CalFire supervised prison crews, were utilized. However, contractor selection can significantly affect the effectiveness of the proposed treatments. It is important to hire contractors with experience conducting fuel reduction work in environmentally sensitive habitats and with a solid understanding of regulations and native plant ecology in order to avoid damaging native habitat and violating regulations. Table 6 provides treatment acreages and cost estimates for fuel reduction work.

Table 6
Estimated Fuel Reduction Costs - Project Basis

Area/Canyon Location	Acreage	Estimated Cost/Acre (Initial/Ongoing)	Estimated C Cost Initial Treatment	Estimated Cost Annual Maintenance
Fuel Modification Zone	39.5	\$4,500/\$2,100	\$177,750	\$82,950
Secondary drainages	22.3	\$4,500/\$2,100	\$100,350	\$46,830
Riparian Corridor	74	\$5,000 to \$7,000/Acre	\$370,000 - \$1,302,400	\$155,400

*Assumes approximately 100 trees per acre.

In similar projects including private property in the very high fire hazard severity zone, the initial fuel reduction project has been funded by grant funding obtained by a lead entity. Residents who did not sign up to participate missed out on funding and later were forced to provide the fuel reduction at their own expense. Ongoing fuel reduction work is funded by private property owners and enforced by the local fire authority. Grant funding may be possible for portions of this project's recommendations.

In addition to grant funding for fuel modification, there may be opportunities for grant funding for habitat restoration through organizations such as the National Resource Conservation Service (NRCS). The NRCS Wildlife Habitat Incentive Program has a specific allocation for Emergency Watershed Protection, which funds projects that cover weed removal (e.g., eucalyptus tree

control) in canyons that may act as "wicks" during wildfires. The grant program operates on a cost share basis and will only fund labor and materials (permitting will not be funded). In order to be considered, it would be critical to determine eligibility requirements and to resolve permitting issues in advance.

The fuel treatment areas will require routine inspection and maintenance following this initial hazard reduction planning project. One time vegetation removal and thinning will not mitigate the hazard within the Canyon over the long-term. Annual or biannual inspections should be implemented to determine the status of the WUI fuels. As identified through these inspections, any recurring hazardous fuel situations should be mitigated. Dudek finds that biannual maintenance is effective in most areas, while annual maintenance can occasionally be required.

It is not the goal of this project to completely remove all vegetation, as that would be undesirable for habitat value, soil stability, aesthetics, and resident privacy. Nor is the goal to create a landscape that is fire proof, as that is infeasible given the steep slopes, indigenous (and exotic) plant community, and the seasonal Santa Ana winds that, as illustrated during the October 2007 and 1943 wildfires (Attachment 9), can result in uncontrollable fire spread through this canyon river corridor. Rather, the goal of this project is to reduce wildfire hazard to those living in the area and potentially affected by fire in the area, by strategically creating fuel (vegetation) gaps, removing dead, dying, exotic and highly flammable fuels, and creating defensible space. Defensible space allows fire fighters areas of reduced flame height and spread rates such that they can establish a defensive posture to protect structures and it also reduces the convective and radiant heat intensity directly adjacent homes. The fuel reduction efforts associated with this project will result in reduced wildfire hazard from fire spreading in the canyon to the ridge top and from fire originating in a structure or along a ridge top home or street, and spreading into the canyon.

Regulatory Requirements of Proposed Fuel Reduction Recommendations

Recommendations in this report are segregated into three components (PTAs) each with varying regulatory requirements associated with the proposed actions. The project area occurs in unincorporated lands in the County of San Diego in Rancho Santa Fe, and is covered by the approved Multiple Species Conservation Program (MSCP) County of San Diego Subarea Plan. The proposed actions are subject to various County, State and Federal regulations pertaining biological resources. which are discussed further below.

Reconnaissance plant and wildlife surveys and vegetation mapping of the study area were conducted by Dudek in August 2008. A map showing the vegetation mapping and the three PTAs is included in Attachment 10. The vegetation map also includes incidental observations of special-status plant species listed by the California Native Plant Society (CNPS). Species documented on site included three CNPS List 2 species (rare, threatened, or endangered in

California, but more common elsewhere) including San Diego barrel cactus (*Ferocactus viridescens*), California adolphia (*Adolphia californica*), and San Diego marshelder (*Iva hayesiana*), and two CNPS List 4 species (limited distribution) including Palmer's sagewort (*Artemisia palmeri*) and southwestern spiny rush (*Juncos acutus* ssp. *leopoldii*). Additionally, green-backed heron (*Ibutorides virescens*) and great blue heron (*Ardea Herodias*) were observed in the study area, which are both considered locally sensitive. None of these special-status plant or wildlife species is federally- or state-listed as threatened or endangered. Additional plant and wildlife species observed during reconnaissance surveys conducted by Dudek in August 2008 are included in Attachment 11.

Impacts to vegetation communities that would result from the proposed fuel modification treatments are included in Table 7.

Table 7
Impacted Vegetation Communities by Phased Treatment Areas

Phased Treatment Areas (PTA)	Vegetation Community	Acreage
PTA 1 - 100-foot Structure Buffer	Annual Grassland (AGL)	0.10
	Coastal Sage Scrub (CSS)	4.97
	Disturbed Coastal Sage Scrub (dCSS)	0.02
	Developed (DEV)	0.07
	Disturbed Habitat (OH)	2.42
	Eucalyptus (EUC)	0.92
	Ornamental (ORN)	6.20
	Southern Mixed Chaparral (SMX)	1.53
	Unmapped*	23.27
Total		39.49
PTA 2 Secondary Canyons	Annual Grassland (AGL)	0.45
	Coastal Sage Scrub (CSS)	0.14
	Developed (DEV)	0.00
	Disturbed Habitat (DH)	0.75
	Elderberry Scrub (ES)	0.03
	Ornamental (ORN)	1.44
	Southern Mixed Chaparral (SMX)	2.99
	Unmapped*	16.58
Total		22.37
PTA 3 - Riparian Corridor	Arundo Donax (AD)	1.03
	Annual Grassland (AGL)	5.19
	Coastal Sage Scrub (CSS)	2.03
	Disturbed Alluvial Floodplain Scrub (dAFS)	0.25
	Disturbed Coastal Sage Scrub (dCSS)	0.02
	Disturbed Elderberry Scrub (dES)	0.89
	Developed (DEV)	0.60
	Disturbed Habitat (OH)	0.15
	Disturbed Land (DL)	0.31
	Disturbed Mule Fat Scrub (dMFS)	0.92
	Disturbed Southern Willow Scrub (dSWS)	1.89
	Elderberry Scrub (ES)	3.61
	Eucalyptus (EUC)	14.17

Table 7 (Continued)

	Freshwater Marsh (FWM)	6.20
	Live Oak Woodland (LOW)	0.14
	Open Channel (OC)	0.15
	Ornamental (ORN)	0.00
	Open Water (OW)	1.75
	PASTURE	0.13
	Sycamore Alluvial Woodland (SAW)	0.78
	Southern Mixed Chaparral (SMX)	0.13
	Sycamore/Oak Woodland (SOW)	0.60
	Southern Willow Scrub (SWS)	31.99
	Tamarisk Scrub (TS)	0.58
Total		73.51
and Total		135.37

*Unmapped areas are located outside of the main canyon and typically consist of non-native vegetation (e.g., eucalyptus, palms, etc.) that has been planted.

100-Foot Fuel Modification Zone Surrounding Residences

Clearing vegetation in County lands is governed by the San Diego County Grading, Clearing and Watercourses Ordinance (GCWO). Chapter 5 of the GCWO specifically describes the permit requirements for clearing vegetation. Clearing permits are exempted by Section 87.502 of the GCWO, which states that clearing permits are not needed when "[c]learing for fire protection purposes within 100 feet of a dwelling unit." Further, the RPS states that "[a]ny additional clearing for fire prevention control or suppression is exempt when authorized or required, in writing, by a fire prevention or suppression agency." Under the California Environmental Quality Act (CEQA), clearing associated with fuel modification within 100-feet of structures is categorically exempt.

Additionally, regulatory permitting associated with threatened or endangered species that may potentially be impacted as a result of vegetation thinning and/or removal within portions of the PTAs has been addressed in a Memorandum of Understanding (MOU) between the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Game (CDFG), the California Department of Forestry and Fire Protection, the San Diego County Fire Chiefs Association, and the Fire District's Association of San Diego County signed in February of 1997. Although the recommendations contained in this document attempt to minimize impacts to native vegetation and promote the environmental quality of the surrounding area by focusing on exotics removal and limited trimming of native vegetation, there exists a potential for impacts to listed or other sensitive species. This MOU, however, authorizes the take of species listed as threatened or endangered for the purposes of maintaining fire protection and public safety. Based on the criteria specified in the MOU, it will be necessary for the Fire Chief of the Rancho Santa Fe Fire Protection District to deem this fuel reduction project necessary for protecting improved property or public safety and welfare. According to the MOU, CDFG, and USFWS shall be notified at least 10 days prior to initiating vegetation thinning operations. Should CDFG or

USFWS fail to respond within ten days, vegetation thinning may proceed without violating the agreements set for the in the MOU.

Fuel Modification Treatments in Tributary Canyons Beyond the 100-foot Distance

The GCWO Clearing Exemption and the MOU are applicable in the fuel modification zone areas within 100 feet of residences. Because the 100 feet is measured in horizontal distance, depending on the adjacent slope percent, the actual fuel modification area on the ground will be more than 100 feet. For example, corresponding with each fire behavior model run, the following slope distances will be provided with the 100 feet horizontal distance (Table 8).

Table 8
Fire Slope Distances

Fire Behavior Run (Area)	Slope Angle	Slope Distance (for 100' HD)
1	30%	104.4
2	63%	118.2
3	63%	118.2
4	59%	116.1
5	48%	110.9
6	38%	107.0
7	50%	111.0
8	43%	108.9

As such, areas where the highest flame lengths of up to 65 feet occur, due in large part to the slope, are provided just under 120 feet of actual fuel modification, nearly twice the flame length. If implemented correctly and maintained diligently, this fuel modification width is considered at least adequate and will avoid the need for environmental permitting and potentially costly mitigation.

Proposed vegetation clearing in upland habitats beyond the 100-foot horizontal distance may be allowed by the County under the GCWO clearing exemption if authorized in writing by a fire prevention or suppression agency. However, the MOU with the regulatory agencies would not apply in this instance.

Regulatory requirements for vegetation clearing of upland habitats in the zone beyond 100 feet from occupied structures would depend on the type of resource (i.e., vegetation community and/or species) present in the area proposed for clearing. Biological surveys of the site were conducted as part of this project to determine the vegetation communities that would be impacted, and the species potentially impacted. Dudek has prepared a vegetation map of the study area to quantify the vegetation impacts and it is included in Attachment 10.

Based on reconnaissance surveys by Dudek in 2008, the site supports recovering (from the 2007 wildfire) coastal sage scrub, southern mixed chaparral, scrub oak chaparral, and southern willow scrub, which have the potential to support special-status plant and wildlife species. If implementation of the fuel modification recommendations in these areas is pursued, then focused surveys for special-status plant and wildlife species during the appropriate survey periods may be required.

The project area is within a Take Authorized area of the County of San Diego MSCP Subarea Area Plan, which means that impacts to wildlife habitat are allowable provided that they are conducted consistent with the MSCP. Activities within Take Authorized areas of the MSCP are exempted from the provisions of the Biological Mitigation Ordinance (BMO); therefore, impacts to upland vegetation communities beyond the 100-foot distance that are not designated MSCP habitat preserve would be allowable and would not require mitigation.

O Portions of the project area, particularly along the San Dieguito River corridor, have been designated as Multiple Habitat Planning Area (MI-IPA), which signifies that these areas are MSCP habitat preserves. As described in the County MSCP Subarea Plan, "[M]ore management activities are permitted within the preserve when conducted according to a fire management plan approved by the wildlife agencies, County and appropriate fire district." Therefore, any proposed clearing of upland habitat beyond 100-feet of a structure that would impact the designated MHPA would need approval from the wildlife agencies, the County, and the RSFFPD and can be based on this fire hazard reduction plan. Upon approval by these entities, proposed activities within the preserve would be allowable provided they are implemented consistent with the MSCP. The MI-IPA in this area is designated primarily over the San Dieguito River corridor, which may be considered jurisdictional by state and Federal entities. Fuel modification in jurisdictional habitat is discussed below.

Implementation of the proposed action beyond the 100-foot distance is not specifically exempted from CEQA, unless the proposed action would be considered a small (i.e., less than 5 acres) restoration project and would not result in impacts to special status species. If the proposed actions beyond the 100-foot distance are not exclusively associated with habitat restoration, would result in more than 5 acres of impact, and/or would result in impacts to special-status species or their habitat, then it would not be considered categorically exempt from CEQA. If the project is not determined to be exempt under CEQA, the lead agency would prepare an Initial Study to determine the potential significance of the action and the proper level of CEQA documentation, which in this case would likely be a Negative Declaration or Mitigated Negative Declaration. Numerous procedural and noticing requirements would be associated with the preparation of the CEQA documentation.

Recommended restoration/fuel reduction within the wetlands and riparian area at the bottom of the canyon is not covered under San Diego County's MOU. Compliance with state and federal laws governing impacts to jurisdictional state and federal wetlands and waters would be necessary. If restoration/fuel reduction work could be done without discharge of fill below the ordinary high water line (i.e., no stockpiling of vegetation, no soil ripping, and no vehicles driving below the ordinary high water line) then permitting from the ACOE and Regional Water Quality Control Board (RWQCB) could be avoided. However, a CDFG streambed alteration agreement would still be necessary. CEQA documentation or exemption is necessary to obtain the CDFG streambed alteration agreement.

Due to the scale of the project, and the size of some of the eucalyptus trees that would be removed, operation of heavy equipment below the ordinary high water line would likely be necessary. Operation of equipment in jurisdictional areas would trigger the need for ACOE and RWQCB permitting under Section 401 and 404 of the Clean Water Act. However, ACOE Nationwide Permit (NWP) 27 specifically covers streambed restoration, which would streamline the permitting process with the ACOE and RWQCB. Acquisition of NWP 27 authorization from ACOE coupled with a RWQCB water quality certification and a CDFG streambed alteration agreement would be required for exotics removal in the channel. CEQA documentation or exemption is necessary to obtain the RWQCB water quality certification and CDFG streambed alteration agreement.

Any vegetation removal would need to comply with the Migratory Bird Treaty Act (MBTA), which requires that vegetation removal does not harm nesting birds. Therefore, if vegetation removal is implemented during the nesting bird season (usually February 15 through September 15), then nesting bird surveys conducted by wildlife biologists would be required to determine if there are nesting birds in the vegetation. If nesting birds are discovered, avoidance of the nest and occupants is required. Typically this involves setting aside an adequate buffer area surrounding the nest that is avoided until the nesting cycle is completed. Vegetation removal after the nesting bird season is over and before the next nesting period begins would not require nesting bird surveys.

Fuel reduction within the Phased Treatment Areas

The following descriptions and diagrams of vegetation treatment/hazard reduction tasks are provided as guidelines for fuel reduction efforts within the project's PTAs. The PTAs are defined as the land areas recommended for treatment as illustrated in Attachment S_ the treatment exhibit. The intent of these descriptions is to detail vegetation treatment actions aimed at reducing combustible vegetation adjacent project area residences, breaking up fuels in potential fire spread

corridors, and creating/maintaining defensible space for firefighter safety in the WUI adjacent existing residences.

The recommendations for individual properties may include some or all of the tasks described below. Contractors performing the fuel reduction work may use these descriptions, along with a site walk through, to determine the most efficient and cost effective method to meet the project's intent. Although these treatment descriptions are aimed at reducing current and long-term fuel volumes and creating both vertical and horizontal separation between vegetation groups, longterm maintenance of the landscape within the PTAs should adhere to the vegetation spacing, fuel volume reduction contained herein. All vegetation treatment operations should be conducted with hand tools. No heavy equipment should be used on non-paved surfaces, except as allowable within the river corridor for tree removal.

SPECIFIC RECOMMENDATION DEFINITIONS

As referred to in Attachment 2, the following fuel treatment categories are defined to provide a more detailed description of the recommended treatments. The following definitions should be provided to the contractor(s)/entities involved in the implementation of this wildfire hazard reduction project.

Exotic/Invasives/Undesirables Removal. Removal of non-native and invasive plants from the defensible space zone will help reduce the presence of undesirable plant species and enhance thinning efforts aimed at reducing overall biomass levels. Exotic species observed throughout project area include flammable landscape plants within fuel modification areas as well as established exotics outside of landscaped areas. Among the exotics noted from the site are: fan palms (*Washingtonia* spp.), eucalyptus (*Eucalyptus* spp.), pepper (*Schinus mole* and *S. terebinthifolius*), castor bean (*Ricinus communis*), myoporum (*Myoporum* spp.), pines (*Pines* spp.) and other conifers, amongst others. All of these plants have been planted by residents along the Canyon top or have opportunistically established within PTAs adjacent structures, in secondary fire spread corridors, or at the canyon bottom along the San Dieguito River. Removal of these plants shall adhere to the following conditions:

- Weed and grass-like species shall be mowed or trimmed to heights no greater than 6 inches.
- Shrub and tree species shall be treated such that all above-ground plant parts are removed. Except for trees removed from the creek area, root systems of removed shrubs and trees shall be left intact. Stump heights shall not exceed 4 inches above natural grade.

Following removal of these species, some may require routine trimming or herbicide application to eliminate sprout growth from remaining stumps. Treatment of debris generated from removal operations shall adhere to the guidelines outlined below (Debris Removal).

Vertical Separation (3Y). Pruning of trees or tree-form shrubs (reaching 4 feet or taller at maturity) off the ground should provide vertical clearance that measures three times the height of the understory vegetation or 10 feet, whichever is greater. In cases where no understory vegetation exists, a minimum vertical clearance of 10 feet shall be provided. This process will remove ladder fuels and reduce the potential for fire spread from lower shrubs to higher trees and structures.

Horizontal Separation. Vegetation pruning shall also result in horizontal clearance that meets the following specifications (Table 9):

Table 9
Distance Between Tree Canopies by Percent Slope¹

Percent of Slope	Recommended Distances Between Edge of Mature Tree Canopies
0 to 20	10 feet
21 to 40	20 feet
41 Plus	30 feet

From Rancho Santa Fe Ordinance 2008-01

¹Adapted from Wildland Home Area Risk Meter, Simmerman and Fischer, 1990.

²Determined from canopy dimensions as described in Sunset Western Garden Book (Current Edition).

Horizontal separation serves to minimize fire spread between plants or plant groups. Horizontal chains of fuel occur in numerous areas throughout the PTAs and effectively link the urban areas with non-maintained wildland areas prone to wildfire. The intent of the horizontal separation criteria contained herein is to break the continuity of vegetation between structures and wildland areas.

Native Shrub Thinning/Trimming. Thinning efforts are aimed at reducing woody biomass to break-up horizontally and vertically continuous fuels and shall reduce overall vegetation by 50%. Native shrubs in the project area include, but are not limited to lemonadeberry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*), laurel sumac (*Il'alosma laurina*), Mexican elderberry (*Sambucus mexicana*), California sage (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), California encelia (*Encelia californica*), and scrub oak (*Quercus* spp.).

Mow/Trim Weeds/Exotic understory. Mowing of native and non-native grasses, weeds, thistle, and fennel in the defensible space zone shall be conducted to maintain heights at 6 inches or less.

Dead/Dying Plant Removal. Removal of dead and dying plant material from the determined PTAs will help reduce low fuel moisture biomass. This practice should also be conducted in concert with vegetation thinning efforts and may help in reaching thinning objectives.

Dead Foliage Removal. All dead twigs, branches, and/or fronds shall be removed from retained trees or shrubs within the PTAs.

Debris Removal. Removal of existing combustible debris shall be conducted within the PTAs. Combustible debris includes branches, landscape trimmings/waste, lumber, or any other combustible material (palapas, umbrellas, trellises, etc.).

Additionally, all debris generated from shrub and tree thinning and/or removal shall be completely removed from the PTAs or chipped and distributed on-site. In no case shall chipped plant material (mulch) depth exceed 5 inches. In no case shall un-chipped debris generated from trimming, thinning, or removal be left on site.

Trim Vegetation within 10 ft. of Structure. All vegetation shall be trimmed such that a clearance of 10 feet exists between structures and landscape vegetation. In cases where vegetation is planted within 10- feet of a structure (vines, shrubs), such vegetation shall be maintained free of dead material and shall be pruned and maintained to reduce overall fuel volume.

In cases where tree canopies extend over roof tops, 10 feet of clearance shall be maintained between the roof and the lowest tree branch extending over the structure.

Remove firewood within 30 ft. of Structure. Firewood shall not be stored within 15 feet of existing structures.

Remove Leaves/Needles from Roof/Rain Gutters. All combustible material, including tree leaves, pine needles, branches, and twigs shall be removed from roofs and rain gutters.

Trim Vegetation within 10 ft. of Chimney. All vegetation shall be trimmed such that a clearance of 10- feet exists in all directions between landscape vegetation and the outlet of a chimney.

Provide 5 ft. Clearance for Firefighter Access. All vegetation shall be trimmed such that a 5-foot-wide clearance exists along both sides of a structure, from the street to the rear of the property. In cases where property setback widths are less than 5 feet, the entire width shall be maintained free of obstructing vegetation.

TREATMENT OF STRUCTURAL IGNITABILITY

The fuel reduction treatments recommended for PTAs 1 and 2 (near the existing residences) will reduce the ignitability of homes by reducing the likelihood that radiant or convective heat causes structure ignition. The Witch fire provided a "real-life" fire model for this area with regards to how a fire in this portion of the San Dieguito River canyon will behave given certain conditions. Structures that were lost tended to be of older construction and/or included flammable landscaping within close proximity to the residence.

A number of retrofits are available and recommended for residences adjacent the project area. These retrofits are important for all residences within the wildland urban interface, but even more important for homes that are directly exposed to the open space, unmaintained vegetation project area:

1. Maintain all vents by ensuring metal screen is in tact and has no larger than ¼ -inch openings. A more ignition resistant retrofit includes replacing old vents with fire and ember resistant vents such as Brandguard Vents. These vents, through a series of baffles, impede the penetration of embers, a major source of home ignitions.
2. Spark arrestors with 0.5-inch mesh should be installed on all chimneys in the communities affected by this fuel reduction project.
3. Wood fences should be replaced by non-combustible material fences, especially the first 5 feet where they attach to a residence.
4. Enclose decks that are built on slopes above wildland areas according to enhanced practices. Paneling products and wire mesh may be used to help inhibit embers or heat from igniting decks.
5. Replace windows on the exposed side(s) of residence with dual pane windows with one tempered pane.
6. Bird-stop all openings on tile roofs to avoid the build up of animal nests which may easily ignite from flying embers that are blown up into the roof opening.
7. Replace non-Class A roofs with Class A roofing covering.
8. Relocate any combustible outbuilding, shed, animal barns, or other structures at least 30 feet from the residence and provide fuel modification and structure retrofitting to reduce the ignition potential.
9. Relocate trellises, umbrellas, flammable patio furniture and/or pillows, children's play equipment, firewood, and other combustible landscape features at least 30 feet from residences and provide fuel modification, as appropriate.
10. Situate a non-combustible (masonry) wall in the landscape at the top of slope to help deflect flames, heat, and embers.
11. Provide rain gutter cleaning on a regular basis and upgrade the gutters with gutter covers which are designed to minimize debris accumulation.

Other products are under development and within the next several years. it can be anticipated that ignition resistance retrofits and products will be available for situations like this to reduce the vulnerability of existing structures to wildfire caused ignition.

CONCLUSION

The combined wildfire hazard reduction efforts involving field inspection of potential wildfire hazards, fire behavior modeling, and analysis for reducing the wildfire hazard provide valuable fire management guidelines based on actual site conditions. It provides a sound method for identifying and implementing hazard reductions activities within the canyon.

The project area assessment identified numerous hazardous fuel occurrences and the fire behavior modeling resulted in definable hazard with both a typical weather pattern and a Santa Ana condition. As such, Dudek's recommendations for the area assessed as part of this project are aimed at reducing hazards and structural ignition in the phased treatment areas and providing a foundation for ongoing WUI inspection and maintenance work. The initial recommendations will mitigate the immediate hazards and will result in a more manageable landscape for future maintenance. Ongoing efforts will be necessary as the area recovers from the October 2007 fires which removed most of the native fuels from the canyon's slopes. Dudek recommends at least biannual inspections and maintenance throughout the project area.

Dudek would be pleased to discuss this report further or answer any questions you may have.

Sincerely,



*Au: Attachment 1 - RSFA - Fairbanks Ranch Fire Hazard Area of Concern
Attachment 2 - Progression Map
Attachment 3 -- Site Topography
Attachment 4 -*

*Vegetation Classifications Attachment 5 -
Photograph Log, North Attachment 6 - Photograph
Log, South Attachment 7 - BehavePlus Fire
Behavior Exhibit
Attachment 8 - Phased Treatment Areas
Attachment 9 - Fire History 1910-2007
Attachment 10 - Vegetation Map with Phased Treatment Areas
Attachment 11 - Plant and Wildlife Species Observed on the Project Site*

Michael Huff
Manager, Wildfire Protection Planning

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VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

CONIFERAE

PINACEAE - PINE FAMILY

- * *Pinus* sp. - ornamental pine

ANGIOSPERMAE (DICOTYLEDONES)

AIZOACEAE - CARPET-WEED FAMILY

- * *Aptenia cordifolia* - baby sun rose
- * *Carpobrotus edalis* - hottentot-fig

ANACARDIACEAE - SUMAC FAMILY

- Malosma laurina* - laurel sumac
- Rhus integrifolia* - lemonadeberry
- * *Schinus molle* - Peruvian pepper tree
- * *Schinus terebinthifolius* - Brazilian pepper tree
- Toxicodendron diversilobum* - poison-oak

APIACEAE - CARROT FAMILY

- * *Apium graveolens* - celery
- * *Conium maculatum* - poison hemlock
- Daucus pusillus* - American wild carrot
- * *Foeniculum vulgare* - sweet fennel

APOCYNACEAE - DOGBANE FAMILY

- * *Nerium oleander* - oleander

ASCLEPIADACEAE - MILKWEED FAMILY

Sarcostemma cynanchoides - climbing milkweed

ASTERACEAE - SUNFLOWER FAMILY *Achillea millefolium* - yarrow
Achillea millefolium - yarrow
Ambrosia psilostachya var. *californica* - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - mugwort
Artemisia dracunculoides - tarragon
Artemisia pauciflora - Palmer sagewort
Aster subulatus var. *ligulatus* - annual water-aster
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Baccharis sarothroides - chaparral broom

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

- Bebbia juncea* - sweetbush
Brickellia californica - California brickelbush
 * *Centaurea melitensis* - tocalote
 * *Cirsium vulgare* - bull thistle
 * *Conyza bonariensis* - asthma weed
Conyza ccmadensis - horseweed
 * *Cotula coronopifolia* - African brass-buttons
 * *Cynara cardunculus* - cardoon, artichoke thistle
Deinandra fasciculata fascicled tarplant *Encelia californica* - California bush sunflower
Eriophyllum confertiflorum - golden yarrow
 * *Gazania linearis* - African daisy
Gnaphalium bicolor - bicolor cudweed
Gnaphalium californicum - California everlasting
Gnaphalium canescens - felt-leaved everlasting
 * *Gnaphalium luteo-album* - white cudweed *Hazardia squarrosa* ssp. *grindelioides* - saw-toothed goldenbush
Helianthus annuus - common sunflower
Heterotheca grandiflora - telegraph weed
Isoetes menziesii ssp. *veneta* - coastal goldenbush
Iva hesperiana - San Diego marsh elder
 * *Lactuca serriola* - prickly lettuce
Lessingia frlaginifolia - virgate cudweed aster
 * *Picris echioides* - bristly ox-tongue
Plichea odorata - marsh-fleabane
Pluchea sericea - arrow-weed
 * *Silybum marianum* - milk thistle
Stephanomeria exigua - small wreathplant
Xanthium strumarium - cocklebur

BORAGINACEAE - BORAGE FAMILY

- Ainsliea menziesii* - rancher's fireweed
 • *Echium candicans* - Pride of Madeira
Heliotropium curassavicum - wild heliotrope

BRASSICACEAE - MUSTARD FAMILY

- * *Brassica nigra* - black mustard
 * *Hirschfeldia incana* short pod mustard
 * *Raphanus raphanistrum* - wild radish
Rorippa nasturtium-aquaticum - water cress

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

CACTACEAE - CACTUS FAMILY

- Ferocactus viridescens* - San Diego barrel cactus
- * *Opuntia flctrs-indica* - Indian-fig
- Optmtia littoralis* - coastal prickly-pear

CAPPARACEAE - CAPER FAMILY

- Isorneris arborea* - bladderpod

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

- Lonicera subspicata* var. *denudata* southern honeysuckle
- Samhucus mexicana* - Mexican elderberry

CHENOPODIACEAE - GOOSEFOOT FAMILY

- * *A triplex sennibaccata* - Australian saltbush
- Atriplex hang-trim-is* spearscale
- * *Chenopodium ambrosiodes* - Mexican tea
- Chenopodium ccrlifornicunr* - California goosefoot
- * *Chenopodium morale* nettle-leaf goosefoot
- *Salsola tragus* - Russian-thistle

CONVOLVULACEAE - MORNING-GLORY FAMILY

- Calystegia macr•ostegin* - morning glory
- * *Convolvulus arvensis* - bindweed

CRASSULACEAE - STONECROP FAMILY

- Crassula conncrta* - dwarf stonecrop
- Dudleya edulis* - ladies-fingers
- Dudleycr pulverulentcr* - chalk dudleya

CUCURBITACEAE - GOURD FAMILY

- Cucurhita foetidissima* - coyote-melon, calabazilla
- Marah macroca pus* - wild cucumber

CUSCUTACEAE - DODDER FAMILY

- Cuscuta californica* -- chaparral dodder

EUPHORBIACEAE - SPURGE FAMILY

- Chaniaesyce albomarginata* - rattlesnake spurge
- * *Chcrrnaesyce maculata* -- spotted spurge

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

Croton californica - California croton

Eremocalpus setigerus - doveweed

- *Ricinus communis* - castor-bean

FABACEAE - PEA FAMILY

- *Acacia longifolia* - Sydney golden wattle
- *Alnolpha fuiticosa* - desert indigobush
- *Lotus corniculatus* - bird foot trefoil
- *Lotus pllrshianus* - Spanish clover
- *Lotus scoparius* - Deertiveed
- *Lotus strigosus* - bishop lotus
- *Lupinus bicolor* - Lindley's annual lupine
- *Lupinus hirsutissimus* - stingy annual lupine
- *Medicago polymolpha* - California burclover
- * *Medicago sativa* - alfalfa
- *Melilotus alba* - white sweetclover
- *Melilotus indica* - sourclover

FAGACEAE - OAK FAMILY *Quercus*

agrifolia - coast live oak *Quercus*

berberidifolia - scrub oak

GERANIACEAE - GERANIUM FAMILY

- * *Erodium cicutarium* - red-stemmed iilaree

GROSSULARIACEAE - GOOSEBERRY FAMILY

Ribes speciosum - fuschia-flowered gooseberry

HYDROPHYLLACEAE - WATERLEAF FAMILY

Euclypta chlysanthennifolia - eucrypta

Phacelia cicutaria - caterpillar phacelia

Phacelia minor - California bluebell

LAMIACEAE - MINT FAMILY

- * *Marrubium vulgore* - horehound
- *Salvia apiana* - white sage
- *Salvia colulnbariae* - chia

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

Salvia mellifera - black sage

LYTHRACEAE - LOOSESTRIFE FAMILY

- * *Lythrum hyssopifolia* - Hyssop loosestrife

MALVACEAE - MALLOW FAMILY *flfalacothamnus*

- frrsciculatus* - chaparral mallow
- * *Malva parviflora* - cheeseweed

MYOPORACEAE - MYOPORUM FAMILY

- * *J4fyoporuln laetur* - myoporum

NIYRTACEAE - MYRTLE FAMILY

- * *Callistemon viminalis* - weeping bottlebrush
- * *Eucalyptus globulus* - blue gum

NYCTAGINACEAE - FOUR O'CLOCK FAMILY

ivfirabilis californica var. *californica* - California wishbone-hush

OLEACEAE - OLIVE FAMILY

- * *Olea europaea* - olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Carissonia bistorta - California sun cup
Epilobium canur - California fuschia *Epilobium*
ciliatum - California cottonweed *Ludi-t'igia*
peplodes - false loosestrife

PLANTAGINACEAE - PLANTAIN FAMILY

- * *Plantago lanceolata* - English plantain
- * *Plantago major* - common plantain

PLATANACEAE - SYCAMORE FAMILY

Platanus racemosa - western
sycamore

POLYGONACEAE - BUCKWHEAT FAMILY

- Eriogonum fasciculation* - California
buckwheat
- * *Polygonu n arenastrum* - knotweed

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

Rumex crispus - curly dock

PRIMULACEAE - PRIMROSE FAMILY

Anagallis arvensis - scarlet pimpernel

Samolus parviflorus water-pimpernel

RANUNCULACEAE - BUTTERCUP FAMILY

Clematis ligusticifolia - yerba de chiva

RHAMNACEAE - BUCKTHORN FAMILY

Adolphia californica - California adolphia

Rhamnus crocea - spiny redberry

ROSACEAE - ROSE FAMILY

Heteromeles arbutifolia - toyon

Prunus ilicifolia - holly-leaf cherry

RUTACEAE - RUE FAMILY

Cneoridium dumosum -
bushrue

SALICACEAE - WILLOW FAMILY

Populus fremontii - Fremont's cottonwood

Salix exigua sandbar willow

Salix gooddingii var. *gooddingii* - black willow

Salix lasiolepis - arroyo willow

SAURURACEAE - LIZARD'S-TAIL FAMILY *Anemopsis californica* yerba mansa

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum nuttallianum - wild

snapdragon

Keckiella antirrhinoides ssp. *antirrhinoides* - chaparral beard-tongue

Vincetoxicum aurantiacum - bush monkeyflower

Scrophularia californica - California bee plant

SOLANACEAE - NIGHTSHADE FAMILY *Datura wrightii* jimson weed

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

- * *Nicotiana glauca* - tree tobacco
- * *Nicotiana quacrilvalvis* Indian tobacco
- Solanum douglasii* - Douglas' nightshade
- Solanum xanti* - chaparral nightshade

TAMARICACEAE - TAMARISK FAMILY

- * *Tamarix* sp. - tamarisk

URTICACEAE - NETTLE FAMILY

- Urtica dioica* - giant creek nettle

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

- * *Phoenix canariensis* - Canary Island date palm
- * *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY *Cyperus*

- eragrostis* - tall flatsedge *Cyperus*
- escentis* - yellow nutgrass *Eleocharis*
- macrostachya* - spikerush *Scirpus*
- americanus* - winged three-square

IRIDACEAE - IRIS FAMILY *Scilla*

- bellum* - blue-eyed grass

JUNCACEAE - RUSH FAMILY

- Juncus acutus* ssp. *leopoldii* - southwestern spiny rush

LEMNACEAE - DUCKWEED FAMILY

- Lemna minuta* - least duckweed

LILIACEAE - LILY FAMILY

- * *Asparagus asparagoides* - smilax

- * *Asparagus officinalis* garden asparagus
- Calochortus* sp. - Mariposa lily species
- Bloomeria crocea* - goldenstars
- Dichelostemma capitata* - blue dicks

VASCULAR PLANT SPECIES OBSERVED ON THE PROJECT SITE

POACEAE - GRASS FAMILY

- * *Arundo donax* - giant reed
- * *Avena barbata* - slender oat
- * *Brornus diandrus* - ripgut grass
- * *Brornus hordeaceus* - soft chess
- * *Bromus rnadritensis ssp. rubens* - foxtail chess
- * *Carduus pycnocephalus* - Italian thistle
- * *Cortaderia selloana* - pampas grass
- * *Cynodon dactylon* - Bermuda grass
- Distichlis spicata* - salt grass
- Leymus condensatus* - giant wildrye
- Leyrnus triticoides* - creeping wildrye
- * *Lolium multiflorum* - English ryegrass
- Melica in/perfecta* - melic grass
- Muhlenbergia microsperma* - little-seed muhly
- Nassella pulchra* - purple needlegrass
- * *Paspalum dilatatum* - Dallis grass
- * *Pip/a/herum /niliaceum* - smilo grass
- *Polypogon monspeliensis* - rabbit's-foot grass
- * *Iulpia myuros* - foxtail fescue

TYPHACEAE - CATTAIL FAMILY

- Typha angustifolia* - narrow-leaved cattail
- Typha latifolia* - broad-leaved cattail

- * signifies introduced (non-native) species

WILDLIFE SPECIES OBSERVED

ON THE PROJECT SITE

WILDLIFE SPECIES - VERTEBRATES

AMPHIBIANS

HYLIDAE - TREEFROGS

Hyla regilla - Pacific treefrog

RANIDAE - TRUE FROGS *Rana*

catesbeiana - bullfrog

REPTILES

IGUANIDAE - IGUANID LIZARDS

Sceloporus occidentalis - western fence lizard

Uta stansburiana - side-blotched lizard

SCINCIDAE - SKINKS

Eumeces skiltonianus - western skink

ANGUIDAE - ALLIGATOR LIZARDS *Ge-*

rhonotus, uulticarinatus - southern alligator lizard

BIRDS

ARDEIDAE - HERONS

Ardea herodias - great blue heron

Butorides virescens - green heron

CATHARTIDAE - NEW WORLD VULTURES

Cathartes aura - turkey vulture

ACCIPITRIDAE - HAWKS

Buteo j. an, aicensis - red-tailed hawk

COLUMBIDAE - PIGEONS & DOVES

Zenaidura macroura - mourning dove

TROCHILIDAE - HUMMINGBIRDS

Calypte anna - Anna's hummingbird

PICIDAE - WOODPECKERS

Picoides nuttallii - Nuttall's woodpecker

D U D E K

WILDLIFE SPECIES OBSERVED

ON THE PROJECT SITE

TYRANNIDAE - TYRANT FLYCATCHERS

Myiarchus cinerascens - ash-throated flycatcher

Sayornis nigricans - black phoebe

Tyrannus vociferans - Cassia's kingbird

Tyrannus verticalis - western kingbird

CORVIDAE - JAYS AND CROWS

Apheloconra californica - western scrub-jay

Corvus brachyrhynchos - American crow

Corvus corax - common raven

AEGITHALIDAE - BUSHTITS

Psaltiriparus nminirius - bushtit

TROGLODYTIDAE - WRENS *Thryonranes*

belvickii - Bewick's wren *Troglodytes*

aedon - house wren

TIMALIIDAE - LAUGHINGTHRUSH AND WRENTIT

Chamaea fasciata - wrentit

MIMIDAE - THRASHERS

Minus polyglottos - northern mockingbird

EMBERIZIDAE - BUNTINGS AND SPARROWS

Pipilo crissalis - California towhee

FRINGILLIDAE - FINCHES *Carpodacus*

rnexicanus - house finch *Carduelis*

psaltria - lesser goldfinch

MAMMALS

DIDELPHIDAE - NEW WORLD OPOSSUMS *

Didelphis virginiana - Virginia opossum

SORICIDAE - SHREWS

Notiosorex crar+fordi - desert shrew

Sorex ornalus - ornate shrew

WILDLIFE SPECIES OBSERVED

ON THE PROJECT SITE

TALPIDAE - MOLES

Scapanus latimanus - broad-footed mole

LEPORIDAE - HARES AND RABBITS

Sylvilagus bachmani - brush rabbit

SCIURIDAE - SQUIRRELS

Spermophilus beecheyi - California ground squirrel

GEOMYIDAE - POCKET GOPHERS

Thomomys bottae - Botta's pocket gopher

CANIDAE - WOLVES AND FOXES

Canis latrans - coyote

PROCYONIDAE - RACCOONS AND RELATIVES

*Procyon Iota,** - common raccoon

WILDLIFE SPECIES - INVERTEBRATES

BUTTERFLIES AND MOTHS

HESPERIIDAE - SKIPPERS

Erynnis funeralis - funereal duskywing

PAPILIONIDAE - SWALLOWTAILS

Papilio rutzrlus - tiger swallowtail

PIERIDAE - WHITES AND SULFURS

Pieris rapae rapae - cabbage butterfly

Pontia protodice - checkered white

Colias Eu,yclice - California dogface

NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES

Nymphalis antiopa - mourning cloak

* signifies introduced (non-native) species

**WILDLIFE SPECIES OBSERVED
ON THE PROJECT SITE**

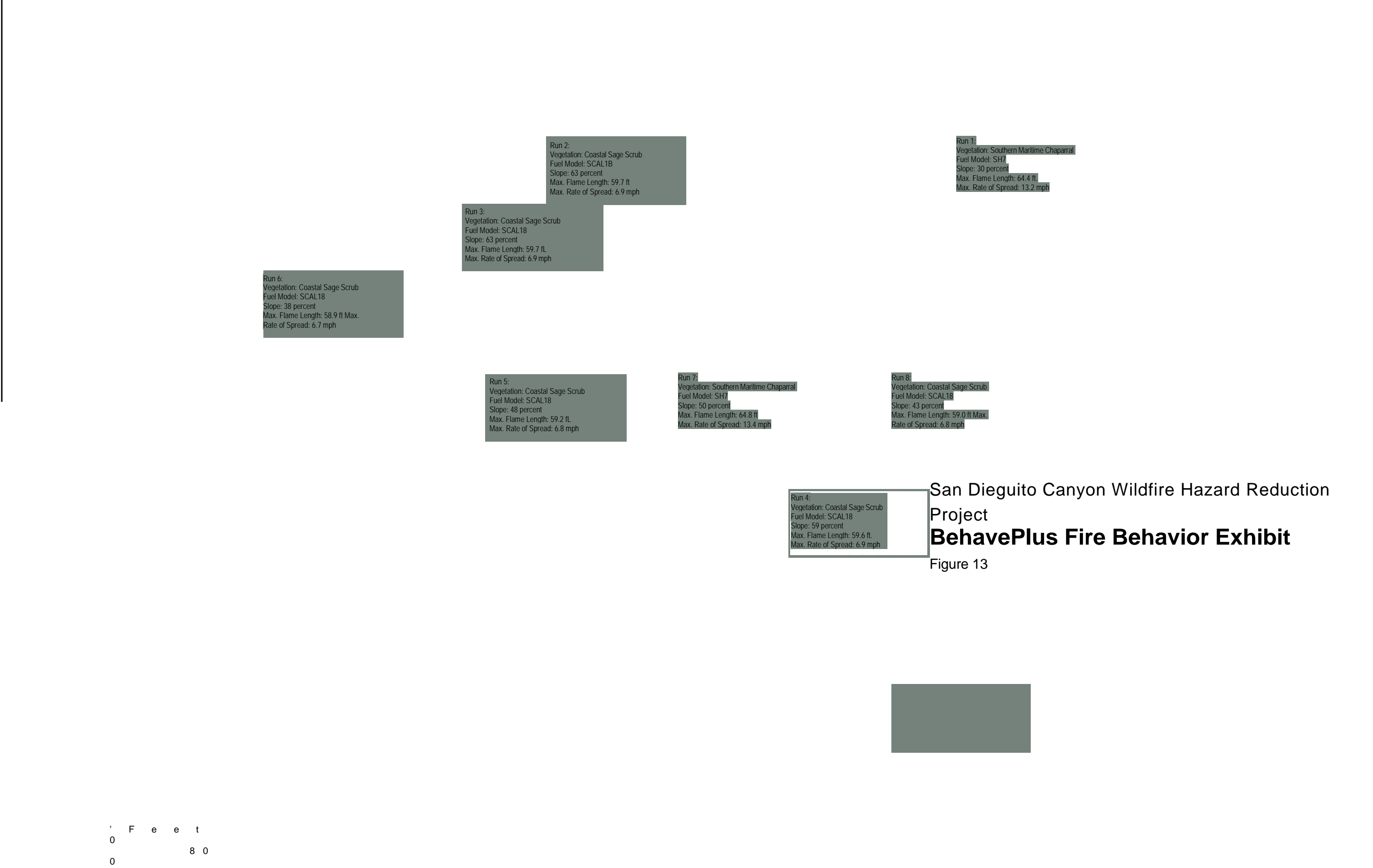
D U D E K

OBSERVED

WILDLIFE SPECIES

ON THE PROJECT SITE

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San Dieguito Canyon Wildfire Hazard Reduction Project
BehavePlus Fire Behavior Exhibit

Figure 13

